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Rapid Fire 1 - Basic Science

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NPM accelerated vascular inflammation and endothelial dysfunction in atherosclerosis progression through NF-kappaB pathway

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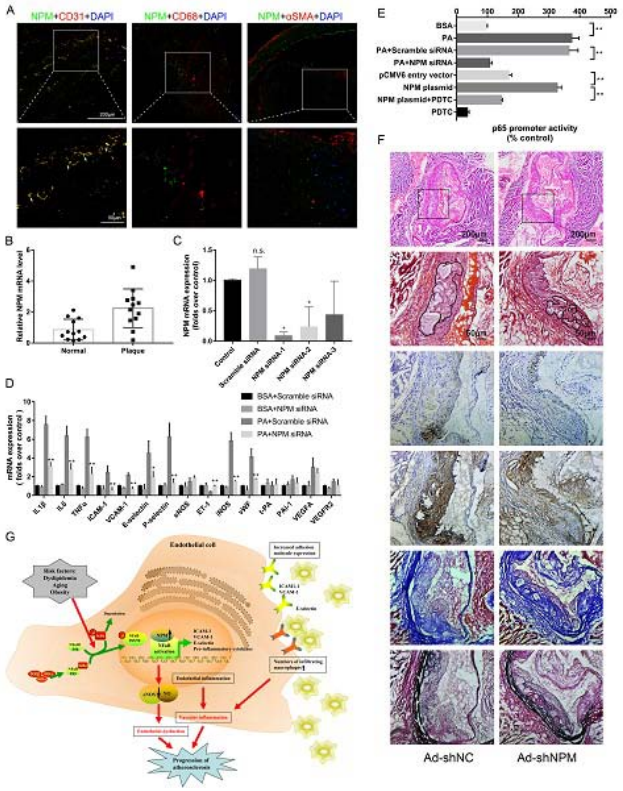
Purpose: It was uncertain whether Nucleophosmin (NPM) participated in cardiovascular disease. The present study aims to investigate the role and underlying mechanisms of NPM in exacerbating vascular inflammation and endothelial dysfunction in atherosclerosis progression.
Methods: Levels and location of NPM in human carotid atherosclerotic plaques and healthy controls were detected by RNA-Seq and immunohistochemistry. Human primary umbilical vein endothelial cells (HUVECs) were used as in vitro model. Atherosclerotic prone ApoE−/− mice was fed with western diet for 24 weeks as in vivo model.



Results: Compared with controls, we found increased levels of NPM inatherosclerotic plaques, which mainly located in endothelial cells. In cultured HUVECs, palmitic acid induced NPM upregulation, the expression of inflammatory cytokines and monocyte adhesion, while NPM knockdown attenuated this effect. In vivo, adenovirus containing shNPM attenuated atherosclerotic leision and promoted plaque stabilization in western diet-fed ApoE-/- mice by reducing vascular inflammation, maintaining endothelial function and decreasing macrophage infiltration in atheromatous plaques. Furthermore, NPM knockdown decreased NF-Kb p65 phosphorylation . In HUVECs, NPM protein physically bind with Nuclear factor-κB (NF-κB) p65 subunits and promotes its nuclear transposition. NPM could also increase the transcriptional activity of NF-κB p65 promoter and enhance its binding to target genes including TNF-α, IL-1β, IL-6, ICAM-1 and E-selectin.
Conclusion: These data provided novel evidence that NPM promoted atherosclerosis by inducing vascular inflammation and endothelial dysfunction through NF-κB pathway, and suggested that NPM may be a novel target for atherosclerosis prevention and treatment.

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Dual Regulation of SUMO2 and STAT1 by HectD3 Protects Heart from Hypertrophy and Inflammation

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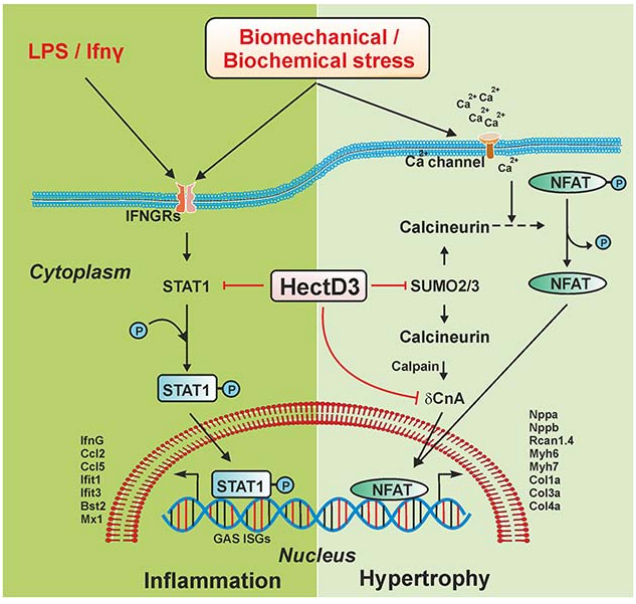
Background: We recently identified SUMO2 as a sumoylation independent inducer of cardiomyocyte hypertrophy through activation of Calcineurin-NFAT signaling via direct interaction and increased nuclear localization of calcineurin.
Purpose: In this study, we aimed at identifying cardiac-specific interactome of SUMO2 to decipher its cardiac function in depth.



Graphical abstract

Methods and results: Using Yeast two-hybrid screen, we identified HECT domain-containing E3 ubiquitin ligase 3 (HectD3) as one of the cardiac SUMO2-interacting protein. Adenovirus-mediated HectD3 overexpression significantly increased polyubiquitination and reduced protein levels of SUMO2 and its sumoylation targets in neonatal rat ventricular cardiomyocytes (NRVCMs). Presence of a proteasome inhibitor MG132, however, prevented this reduction. Moreover, inverse correlation of SUMO2 and HectD3 expression was observed in human hearts with hypertrophic cardiomyopathy. Interestingly, several proteins from interferon signaling, including signal transducer and activator of transcription-1 (Stat1), were found downregulated by HectD3 overexpression in mass-spectrometry based proteomics. Also a known SUMO2/3 target, Stat1 we found as a bona fide cardiac target of HectD3, overexpression of latter strongly attenuated LPS or interferon-mediated activation of Stat1 and downstream inflammatory signaling. Importantly, AAV9-mediated overexpression of HectD3 not only reduced cardiac SUMO2/Stat1 levels, but also significantly dissipated pathological hypertrophy, inflammation, and fibrosis induced by transverse aortic constriction or Angiotensin-II treatment.
Conclusion: In conclusion, we report here a novel mechanism of regulation of cardiac hypertrophy and inflammation by HectD3 via dual regulation of SUMO2 and one of its sumoylation targets, Stat1, establishing an important crosstalk between sumoylation and ubiquitination via a common substrate.

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A translational mouse model of HFpEF

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Background Heart failure with preserved ejection fraction (HFpEF) is a heterogeneous disease with limited therapeutic options. Pathophysiology of HFpEF is complex as a large proportion of HFpEF patients have comorbidities such as obesity, diabetes and hypertension. Importance of heterogeneity and comorbidities is underscored in pre-clinical mouse models, that mostly are models with one (simple) perturbation. This mismatch in underlying pathophysiological mechanisms may contribute to the limited translational value and hinder the development of novel therapeutics. Therefore, in this study we present a heterogeneous HFpEF mouse model that closely mimics the human HFpEF phenotype.
Purpose We aimed to design a HFpEF mouse model integrating four hallmarks of human HFpEF: aging, female sex, obesity and hypertension.
Methods 18-22 months old female C57BL/6J mice (n=10) were fed a control (CTRL) or high fat diet (HFD) for 12 weeks. During the last 4 weeks, hypertension was induced with angiotensin-II (Ang) infusion (1,25mg/kg/day) (CTRL+Ang or HFD+Ang). Prior to sacrifice, echocardiographic measurements were obtained and images were used for strain analysis. Using PCR, mRNA levels of collagen, atrial natriuretic peptide (ANP), and metallopeptidase inhibitor 1 (TIMP-1) and growth and inflammatory plasma markers were determined. Histological analysis of fibrosis was performed.
Results HFD+Ang induced increased lung weights (CTRL 9.9 ± 0.5 vs. HFD+Ang 14.3±1.2 p<0.01) atrial weights(0.5±0.05 vs. 0.9±0.08 p<0.01) and increased body and fat weights. Echocardiography showed preserved ejection fraction with substantial cardiac hypertrophy in HFD and even more pronounced in HFD+Ang. Increased myocardial fibrosis was observed. mRNA levels of collagen, ANP and TIMP-1 were increased in CTRL+Ang and HFD+Ang. Plasma levels of growth factors and TIMP-1 were significantly elevated in HFD+Ang. Global longitudinal strain was impaired in HFD+Ang compared to CTRL (-21.4±1 vs. -14.1±0.6 p<0.01). During left ventricle diastolic early filling the reverse peak longitudinal strain rate is lower in the HFD+Ang compared to CTRL (10,7±0.8 vs. 7.5±0.7 p<0.01).
Conclusion We for the first time showed that by using a multifactorial approach, we were able to closely mimic the human situation. Our mouse HFpEF model uniquely recapitulates the typical human HFpEF signature: impaired movement of the myocardial endocardium, collagen deposition, fibrosis and an increase in cardiac hypertrophy and lung congestion with a preserved ejection fraction. This model is currently available for testing potential novel treatment modalities for patients with HFpEF.

8
Diastolic dysfunction and HFpEF characteristics are exacerbated with ageing in smoothelin-like 1 (SMTNL1)-deficient mice

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On behalf of: Libin Cardiovascular Institute of Alberta, Canada
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Background: Heart failure with preserved ejection fraction (HFpEF) has gained clinical prevalence with ~1% incidence increase per year. Clinical evidence associates HFpEF with endothelial inflammation and microvascular dysfunction, which in turn drive pathologic cardiac remodelling. With a highly comorbid HFpEF patient population and a lack of knowledge about the underlying pathophysiology, no therapeutics are yet available for improving the outcomes of HFpEF patients. Our group revealed a novel impact of the smoothelin-like 1 (SMTNL1) protein which when subjected to genetic deletion drives dramatic alterations in endothelial function and cardiovascular (CV) performance. Of note, previous cardiac hemodynamic profiling show that young male SMTNL1 knockout (KO) mice developed diastolic dysfunction as evident from increased end diastolic pressure (EDP), left ventricular (LV) relaxation time (Tau) and steeper end diastolic pressure-volume relationship (EDPVR).
Purpose: As ageing is associated with slowing of LV relaxation, and HFpEF is predominant in older patients, this study examined the impact of SMTNL1 silencing on cardiac function with increasing age in a murine transgenic model.
Methods: SMTNL1 global KO mice (3- and 12-month old, male and female) were assessed by echocardiography, followed by LV catheterization (PVR 1045, Millar Instruments) and pressure-volume loop measurements to assess the systolic-diastolic and hemodynamic parameters of cardiac function. The background strain 129S6 wildtype (WT) mice served as the control group.
Results: Like young males, aged 12-month old male KO mice developed diastolic dysfunction as evident from increased Tau (12.8±0.6 vs 11.0±0.3 ms, p<0.05), EDP (10.3±1.4 vs 6.7±0.5 mmHg, p=0.05) and EDPVR (0.46±0.03 vs 0.14±0.04, p<0.0001); along with an elevated E/E´ ratio (29.4±1.8 vs 23.2±1.9, p<0.05). However, the female KO group did not develop diastolic dysfunction even at 12-months of age. Although both male and female cohorts showed normal ejection fraction, aged male KO group showed significantly reduced E/A ratio (1.16±0.08 vs 1.56±0.15, p<0.05) in relation to their younger counterparts. Furthermore, with age the total peripheral resistance (25.6±4.5 vs 12.0±0.8 mmHg×min/µl, p<0.05) and the arterial elastance (Ea; 8.7±0.9 vs 4.8±0.9 mmHg/µl, p<0.01) was exacerbated in only male KO animals. Ageing was also associated with increased LV mass and wall thickness along with fibrotic remodelling in the KO group.
Conclusions: We have identified a potentiating effect of age on vascular and cardiac dysfunction in the absence of SMTNL1. The SMTNL1 KO model recapitulates HFpEF clinical phenotypes and represents a novel pre-clinical model to study the aetiology of HFpEF condition, in the absence of any confounding comorbidities. However, the absence of diastolic dysfunction in KO female mice potentially through the protective role of oestrogen requires further study using ovariectomized animals.

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L-2-hydroxyglutarate dehydrogenase (L2HGDH) is a novel metabolic target protecting from cardiac hypertrophy and heart failure

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Background: Heart failure is associated with a metabolic switch to glucose oxidation while usage of long chain fatty acids (LCA) is decreased. Using transcriptional profiling in combination with untargeted metabolic profiling in mice subjected to transverse aortic constriction (TAC), we found a downregulation of L2-hydroxyglutarate dehydrogenase (L2HGDH) which is associated with accumulation of its substrate L-2-hydroxyglutarate (L2-HG). L2HGDH is involved in the energy generation process by catalyzing L-2-hydroxyglutarat (L2-HG) to α-ketoglutarate (α-KG), and therefore plays an important role in the tricarboxylic acid (TCA) cycle. However, the potential connection between L2-HG accumulation, L2HGDH down-regulation and heart failure is unclear.
Aim of our study was to investigate whether adeno-associated virus (AAV) 9-mediated cardiac expression of L2HGDH is able to ameliorate the development of heart failure in a mouse model of heart failure due to TAC.
Methods: C57BL/6N mice were randomly assigned to treatment with AAV9-L2HGDH and vector control (AAV9-luciferase) through tail vein injection. Two weeks later, mice were subjected to TAC surgery. Successful TAC was confirmed by echocardiography 2 days after TAC.
Results: 6 weeks after TAC, AAV9-luciferase control-treated mice showed progressive deterioration of contractile function and left ventricular remodeling. In contrast, over-expression of L2HGDH protein (30%) in AAV9-L2HGDH treated animals was associated with a significantly improved ejection fraction (EF) and fractional shortening (FS) at the end of the study. While AAV9-L2HGDH treated animals revealed an EF of 36.18 ± 6.63 % (n=12, mean± SD) and a FS of 16.72 ± 4.01 % (n=12, mean± SD), AAV9-luciferase treated mice showed a lower EF (20.14 ± 8.24%, n=15, p<0.001) and a reduced FS (12.66 ± 6.66 %, n=15, p<0.05). Furthermore,

AAV9-L2HGDH-treated TAC mice revealed significantly reduced heart weight to tibia length ratios (HW/TL) as indicator of ameliorated cardiac hypertrophy and decreased lung weight to tibia length ratios (LW/TL) as indicator of decreased heart failure when compared to the vector control group (each $p<0.01$). Quantification of myocyte cross section area confirmed reduced hypertrophy in the AAV9-L2HGDH group ($p<0.001$). ANP, BNP, RCAN1.1, and RCAN1.4 as molecular markers of heart failure were also considerably decreased in AAV9-L2HGDH-treated mice ($p<0.05$). In addition, quantification of Masson's trichrom stainings revealed a significant reduction of fibrous tissue in the L2HGDH over-expression group (perivascular fibrosis, $p<0.01$ and interstitial fibrosis, $p<0.001$).
Conclusion: Cardiac over-expression of L2HGDH is able to ameliorate the development of cardiac hypertrophy and fibrosis as well as heart failure in a pressure-overload model. Therefore, upregulation of L2HGDH represents a promising approach for future therapy of heart failure.

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Increased granulocyte neprilysin (CD10) expression is associated with better prognosis in patients with heart failure with reduced ejection fraction

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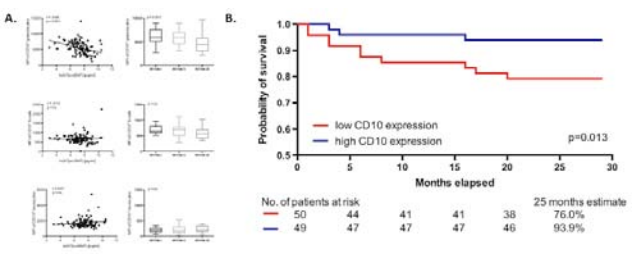
Background. The exact mechanism of action of neprilysin inhibition (NEPi) is still a subject of debate. The soluble form of the enzyme (sNEP), detectable in plasma, is discussed controversially as a potential biomarker in heart failure with reduced ejection fraction (HFrEF). NEP is present on solid tissues but identically to CD10, expressed on the surface of leukocytes under physiological conditions. The possible impact of NEP expression on peripheral leukocytes on prognosis and its association with sNEP levels have not been investigated yet.
Methods. 99 stable HFrEF patients were prospectively enrolled and clinically followed-up. Laboratory markers including NT-proBNP were assessed. NEP(CD10) expression on peripheral blood cells were measured by flow cytometry using a combination of six antibodies with fluorescence minus one samples as control [CD3(#555339),CD19(#555413),CD56(#335826),CD16(#561306),CD14(#562692), +/-CD10(#332777); BD Biosciences,USA]. sNEP levels were determined by a specific ELISA [SEB785Hu, USCN, China].Associations between NEP expression and heart failure severity, sNEP levels and all-cause mortality were determined.
Results. Median age was 65 years (IQR:55-73), 75% were male. Median NT-proBNP level was 1700pg/ml(IQR:794-4009).NEP was expressed on granulocytes with 94.8%(IQR:90.5-97.4) of CD10+cells and measurable on B-cells and monocytes with 8.5%(IQR:5.3-13.5) and 0.8%(IQR:0.4-1.5) of CD10+cells of the respective leukocyte subtype. NEP expression on T-cells was not detectable. The mean fluorescence intensity (MFI) of CD10+cells was 5461(IQR:4028-6904) for granulocytes, 640(IQR:535-740) for B-cells and 1589(IQR:1395-1975) for monocytes. Granulocyte NEP expression, but not NEP expression on B-cells or monocytes, correlated inversely with heart failure severity reflected by NT-proBNP level ($r=-0.46, p<0.001$) and NYHA class ($p=0.013$)(FigureA). sNEP concentrations correlated weakly with NEP expression on granulocytes ($r=0.22$, $p=0.030$) as well as the MFI of CD10+granulocytes ($r=0.31$, $p=0.003$). 15% of the patients died during a median FUP of 24 (IQR:23-28) months. Increased NEP expression on granulocytes was indicative for better overall survival even after adjustment for age and kidney function [adj.HR per 1-IQR increase of MFI 0.41 (95%CI:0.18-0.94),$p=0.035$]. Kaplan-Meier analysis illustrates the impact of granulocyte NEP expression on outcome graphically(FigureB).
Conclusions. Albeit beneficial effects of NEPi by ARNI therapy, NEP expression on granulocytes is inversely correlated with heart failure severity and mortality. The results support the inverse relationship between BNP and plasma NEP activity reported for a mixed population of heart failure patients. The positive correlation of granulocyte NEP expression and sNEP indicates a possible contribution of shed membrane NEP molecules to plasma NEP levels as a surrogate marker. The utility of granulocyte NEP expression or sNEP as biomarkers in HFrEF have to be further evaluated.



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The role and mechanism of Kir6.1 in diabetic cardiomyopathy

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On behalf of: Qinglei Zhu
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Background: Diabetic cardiomyopathy (DCM) seriously plagues the health of diabetic patients. A previous study have showed that the expression and function of mitoKATP was significantly reduced in the mouse model of type 1 diabetes. However, in type 2 DCM, whether its expression and function have changed and what role it plays in DCM has not been reported.
Objective To study the role and mechanism of Kir6.1 in DCM.
Methods We generated transgenic mice including specific cardiac Kir6.1 knockout mice and Kir6.1 overexpressing mice. The cardiac function of mice was analyzed with echocardiography and serum BNP respectively. The cardiomyocyte cell area and apoptosis rate of mice were analyzed with HE staining and TUNEL. The heart mitochondrial structure of the mice was analyzed with transmission electron microscope. The cardiac function and mitochondrial function of cardiomyocyte were analyzed with serum BNP and Seahorse XFe96respectively. The expression of Kir6.1 in mRNA and protein level was analyzed with RT-QPCR and WB, respectively. The expressions of T-AKT, P-AKT, T-FOXO1, and P-FOXO1 in protein level were analyzed with WB respectively.
Results Specific Kir6.1 knockout decreased the cardiac function, mitochondrial function and the phosphorylation of AKT and FOXO1. Moreover, the cardiac function, mitochondrial function and the phosphorylation of AKT and FOXO1 in heart-specific Kir6.1 knockout mice model are decreased more than the group control. Overexpression of Kir6.1 reduces cardiac function and mitochondrial dysfunction and upregulates the phosphorylation of AKT and FOXO1 in mice model of diabetic cardiomyopathy. Furthermore, overexpression of Kir6.1 reduces cardiomyocyte function and mitochondrial dysfunction and upregulates the phosphorylation of AKT and FOXO1 in cardiomyocyte insulin resistance.
CONCLUSIONS: Kir6.1 plays an important role in improving cardiac and mitochondrial function via AKT-FOXO1 signaling pathway in DCM, and may therefore be a new potential therapeutic target for DCM.

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Regulatory effect of enoyl coenzyme a hydratase 1 on left ventricular remodeling and dysfunction after acute myocardial infarction

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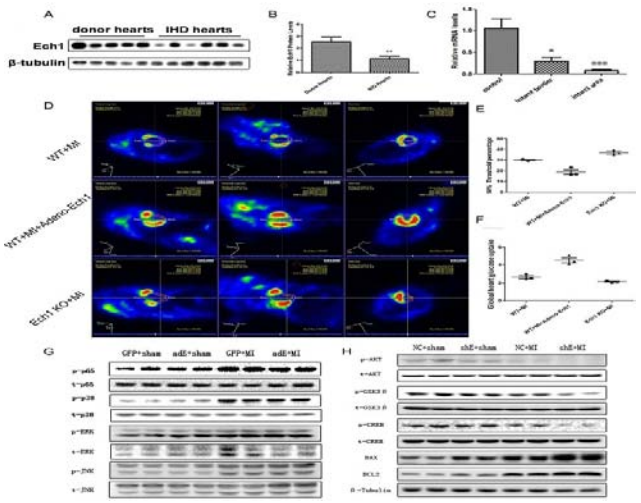
Objective: Acute myocardial infarction (AMI) is one of the major causes of mortality and health care cost in the world. Altered lipid metabolism has been observed in patients with AMI. Enoyl coenzyme A hydratase 1 (Ech1), the second enzyme in the pathway of lipids degradation, has been demonstrated playing a critical role in inflammation, tumor development and metastasis. However, the causal relationship between Ech1 and AMI remains scarcely explored. This study aims to identify the functional significance of Ech1 in cardiac remodeling after AMI and the underlying mechanisms of its effect.
Methods: Ech1 level in human cardiac tissue from ischemic cardiomyopathy patients undergoing heart transplantation was evaluated using immunohistochemical staining and immunoblotting. Age matched male C57BL/6 mice and Ech1-knockout (Ech1-/-) mice were subjected to ligation of LAD coronary artery to simulate human AMI. Adeno-associated virus carrying Ech1 plasmid was injected via tail vein to see the effect of Ech1 overexpression on cardiac remodeling after AMI. Cardiac structure and function were serially assessed by echocardiography at baseline (4d before AMI) and 48h, 7d, 14d as well as 28d after AMI. Mice were sacrificed after 28d for histological and biochemical assessments. Primary cardiomyocyte culture was used as in vitro model.
Results: Ech1 were down-regulated in cardiac tissue from patients with ischemic cardiomyopathy undergoing heart transplantation. In addition, similar results were observed in myocardial infarction area and border zone of mouse post-infarction hearts. At 48h post-AMI, left ventricular ejection fraction (LVEF) was similar and significantly reduced in wild type and Ech1-/- mice compared with baseline, indicating that the ischemic injury was similar in the two groups. However, 28d after AMI, Ech1-/- mice developed larger infarct sizes, reduced survival rates, and more severe LV dysfunction, compared with wild type mice. Furthermore, Ech1-/- mice had more cardiomyocyte apoptosis and inflammatory cell infiltration in the infarct border zone. Conversely, overexpressing Ech1 ameliorated AMI-induced mortality and phenotype change compared with wild type mice. Attenuated LV remodeling was observed in the overexpressing Ech1 hearts after AMI, with reduced cardiac hypertrophy and fibrosis. Similar results were observed in cultured neonatal

mice cardiomyocytes exposed to hypoxia. Moreover, we discovered that the Ech1-mediated cardio-protective effects of AMI were associated with NF-κB and p38 signaling cascades.
Conclusion: These novel findings demonstrate that Ech1 may have a favorable effect on ventricular remodeling after AMI via the regulation of the NF-κB and p38 signaling. Thus, modulation of Ech1 probably has therapeutic potential for patients after AMI at risk for adverse remodeling and development of heart failure.



13
Purified exosome product and extracellular vesicles: treatment for acute myocarditis, dilated cardiomyopathy and heart failure

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Funding Acknowledgements: Mayo Clinic Center for Regenerative Medicine

Background: Myocarditis is an important cause of heart failure and sudden cardiac death in children and young adults with no targeted treatment to reduce/prevent disease.
Purpose: We wanted to determine whether purified exosome product (PEP) or premenopausal PEP (pmPEP) could improve and/or prevent myocarditis and prevent dilated cardiomyopathy (DCM) using a preclinical mouse model of myocarditis/DCM. We looked at pmPEP because estrogen protects women from myocarditis and heart failure. We also investigated if Adipose Derived Extracellular Vesicles (AEV) was a more effective and efficient treatment product.
Methods: We administered PEP, pmPEP or AEV vs. control ip to male BALB/c mice at day -1, 0 and +1 with virus inoculation on day 0 to induce myocarditis, and harvested mice at day 10 post infection (pi) during the peak of acute myocarditis. Next we treated male BALB/c mice with PEP, pmPEP, AEV or control ip on day 7, 8 and 9 pi (a clinically relevant timepoint) and harvested on day 10 pi during acute myocarditis or day 35 pi during DCM.
Results: We found that the dose and exposure route were successful. pmPEP and AEV, but not PEP, significantly decreased acute myocarditis based on histology (ANOVA p=0.0009) and decreased total immune cells (CD45 p=0.008). Importantly, CR1, the central inhibitor of the complement cascade, was significantly increased by pmPEP (p=0.004). Visual qualitative observations in AEV treated mice indicated improved health in mice receiving regenerative treatment. Body weight was also significantly increased in mice treated with AEV indicating improved health. When assessing clinically relevant dosing timepoint we that found that both PEP and pmPEP treatment given during myocarditis significantly reduced inflammation compared to PBS (ANOVA PEP p=0.006, pmPEP p= 0.005) and decreased fibrosis when assessed at day 35pi
Conclusion: These findings suggest that regenerative medicine treatments; PEP, pmPEP and AEV, could be administered to patients who present with acute onset myocarditis to decrease the severity of disease and potentially prevent heart failure and sudden death.

14
Impact of environmental factors on heart failure decompensations

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Introduction: The association of environmental pollution and weather changes in the development and decompensation of heart failure (HF) is not well studied.
Objectives and methods: The objective is to determine the impact of various environmental factors on the decompensation of heart failure. The following data have been collected: 1. Hospital admissions for heart failure in our hospital from January 2012 to August 2017. 2. Weather registry (wind, temperature, humidity, rainfall, atmospheric pressure) in that period (data from Euskalmet, the Basque agency of meteorology). 3. Air quality (% of carbon monoxide, nitric oxide, nitrogen oxide and dioxide, pollution and particulate matter -PM10-, sulphur dioxide, benzenes and toluenes) (data from Open Data Euskadi website).
Results: The database contains 8338 hospitalizations of 5343 different patients (average of 4.02 admissions per day). In the warmer months (June to October) there are significantly fewer hospital admissions due to worsening HF than in the colder months (December to March). The parameter that best predicts HF decompensation is a previous hospital admission due to the same cause (table 1). Within environmental factors, the attribute that best correlates with HF decompensations is temperature, so the lower the temperature, the greater the risk (inverse correlation - Figure 1). The concentrations of sulphur dioxide and nitrogen oxide have a positive correlation with decompensations. Humidity, precipitation and PM10 parameters have not shown significant correlation or relevant p values.
Conclusions: There is a clear relationship between environmental factors and heart failure decompensations. The most relevant being factors are temperature (inverse relationship) and air composition (percentage of sulphur dioxide and nitrogen oxide).

Table 1. Measured parameters and their c

	Correlation	P value
Previous hospital admissions	0.7075	0.002
Temperature	-0.3794	0.014
Humidity	0.0469	0.238
Precipitation	0.0795	0.046
SO2	0.23	0.007
NOX	0.2196	<0.001
NO	0.1733	<0.001
NO2	0.1876	<0.001
PM10	-0.0485	0.324

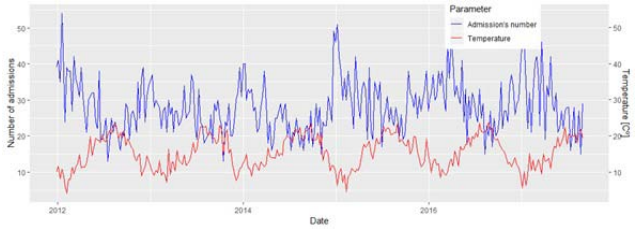

Figure 1: Comparison between the number

15
Acute intravenous infusion of the beta-3 adrenergic receptor antagonist APD418 improves left ventricular function in dogs with advanced heart failure: a dose escalation study

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Background: Unlike β1 and β2-adrenergic receptors (ARs), β3-AR stimulation inhibits cardiac contractility and relaxation through links to inhibitory G proteins. In the failing left ventricular (LV) myocardium, β3-ARs are upregulated, a maladaptation that can contribute to LV dysfunction. This study examined the effects of acute intravenous (i.v.) infusions of the β3-AR antagonist APD418 on LV

systolic and diastolic function by conducting a doseescalation study in dogs with chronic heart failure (HF) (LV ejection fraction, EF˜35%).
Methods: Studies were performed in 7 dogs with coronary microembolizations-induced HF. After baseline measurements, 0.9% NaCl (vehicle) was administered as a continuous i.v. infusion for 30 min. This was followed by infusions of 3 escalating doses of APD418 (0.696, 1.407 and 2.814 mg/kg) with each dose maintained for 30 min. Heart rate (HR), mean aortic pressure (mAoP), LV end-diastolic (EDV) and end-systolic (ESV) volumes, EF, stroke volume (SV) cardiac output (CO), LV end-diastolic pressure (EDP) and systemic vascular resistance (SVR) as well as the diastolic function measures Ei/Ai and mitral inflow velocity deceleration time (DCT) were measured at end of each 30 min period.
Results: Infusion of APD418 had no effects on HR, mAoP, or EDV but significantly decreased ESV, LVEDP and SVR and significantly increased EF, SV, CO Ei/Ai and DCT in a dose-dependent manner (Table).
Conclusions: Acute i.v. infusions of APD418 in HF dogs elicit positive inotropic and lusitropic effects along with modest preload and afterload reductions. The findings support the development of APD418 for the in-hospital treatment of patients with exacerbation of chronic HF.

Table

	Baseline	Vehicle	APD418 (0.696 mg/kg)	APD418 (1.407 mg/kg)	APD418 (2.814 mg/kg)
LV EDV (ml)	62±1	63±1	62±2	62±2	61±2
LV ESV (ml)	41±1	41±1	38±1*	38±1*	36±1*
LV EF (%)	34±1	35±1	38±1*	39±1*	41±1*
SV (ml)	21±1	22±1	23±1*	24±1*	25±1*
CO (L/min)	1.70±0.08	1.81±0.07	1.94±0.11	2.02±0.08*	2.14±0.08*
HR (beats/min)	81±2	83±1	83±1	84±1*	85±1*
mAoP (mmHg)	74±2	79±3	79±4	79±5	77±4
LVEDP (mmHg)	14±0.6	15±0.6	14±0.8	13±0.8	12±1.0*
SVR (dynes-sec-cm^{-5})	3525±257	3537±152	3293±205	3118±183*	2895±153*
Ei/Ai	3.1±0.1	2.9±0.3	3.6±0.3*	3.7±0.3*	4.3±0.4*
DCT (msec)	98±6	99±9	119±14	117±11	133±16*

*=p<0.05 vs. Baseline

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Pharmacological inhibition of non-cardiac ATGL by Atglistatin improves myocardial deformation in a murine model of cardiac fibrosis

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Funding Acknowledgements: DZHK (German Centre for Cardiovascular Research)

Background: Myocardial fibrosis is a hallmark of various heart diseases and is associated with a worse outcome ultimately promoting heart failure (HF) development. Recently, we demonstrated that adipose-tissue-specific deletion of adipose-triglyceride-lipase (ATGL) has complex effects on the cardiac lipidome and prevents pressure-mediated HF in mice. In this study, we investigate the effects of a pharmacological inhibitor of ATGL, Atglistatin (ATGLi), predominantly targeting ATGL in adipose tissue and liver, on the development of cardiac fibrosis.
Methods: Male 129/Sv mice received repetitively high-dose injections of Isoproterenol (ISO, 25 mg/kg BW) to induce myocardial fibrosis, or saline as vehicle (VEH). Five days prior to ISO-application, oral ATGLi (2 mmol kg-1 diet) or control treatment was started. Cardiac function was analyzed by echocardiography twelve and two days after the last ISO-injection. Myocardial deformation was evaluated using speckle-tracking-technique. The results were complemented by histologic/qRT-PCR-based analysis performed on cardiac tissue.
Results: Twelve days after the last ISO-injection, echocardiographic analysis revealed a markedly impaired global longitudinal strain (GLS) due to ISO (VEH vs. ISO, -15.6±1.1% vs. -11.2±0.6%; p≤0.01), which was significantly improved by ATGLi-treatment (ISO vs. ISO/ATGLi, -11.2±0.6% vs. -16.6±0.8%; p≤0.001). ISO had no impact on systolic function. Additionally, ISO-injection led to pronounced fibrotic lesions in the subendocardial layer (VEH vs. ISO, 4.1±1% vs. 21.3±3.8%; p≤0.001). Subendocardial fibrosis was closely associated with GLS and was potently diminished by ATGLi (ISO vs. ISO/ATGLi, 21.3±3.8% vs. 11.2±1.6%; p≤0.05). Accordingly, the ISO-induced increase in mRNA-expression of collagen I and III was significantly reduced by ATGLi.
Mechanistic investigations early (two days) after the final ISO-injection revealed that cardiac pro-apoptotic ISO-induced BAX expression was significantly attenuated upon ATGLi. Moreover, ATGLi ameliorated an increase in mRNA-expression of macrophage marker CD68, indicating a lower migration of macrophages into cardiac tissue.
Conclusion: The present study demonstrates antifibrotic and cardioprotective effects of ATGLi involving anti-apoptotic and/or anti-inflammatory actions. These data suggest a therapeutic potential of ATGLi in the context of myocardial fibrosis. Interestingly, ATGLi´s cardioprotective effects are mediated by non-cardiac actions supporting the concept that pharmacological targeting of remote organs such as adipose tissue may provide an effective way to treat heart diseases.

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Omecamtiv mecarbil: friend and foe - effects beyond positive inotropy

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Omecamtiv mecarbil (OM) is a promising first-in-class direct myosin activator, under clinical development to improve cardiac contractility. Clinical studies with OM confirmed positive inotropy, but also shed light on potential side-effects, such as hypotension and myocardial ischaemia.
We tested OM on rat, dog and human cardiac contractility. OM was administered intravenously to the rat. We confirmed the dose-dependent improvement of systolic cardiac function (building up from 600 μg/kg, reaching maximum at 1,200 μg/kg) by echocardiography and left ventricular (LV) pressure-volume analysis. However, we also observed novel (so far unreported) overlapping side-effects at the same dose. We found (1) a severe drop in blood pressure to 40% of initial value at 1,200 μg/kg (invasive blood pressure measurement); (2) a disturbed diastolic heart function from 600 μg/kg, reaching maximum at 1,200 μg/kg by echocardiography: decreased E/A, increased IVRT and LA diameter; (3) impaired diastolic performance by pressure-volume recordings: decreased dP/dtmin, increased Tau, LVEDP and slope of EDPVR; (4) depressed relaxation: lower maximal force generation, increased pCa50 value, slower kinetics of contraction and relaxation in human cardiomyocytes, in vitro; (5) occasional (n=23 out of the total 30 rats), transient electromechanical alternans: normal systole alternating with diminished contraction without major differences on the ECG; (6) this was associated by disturbances of intracellular Ca2+ handling in canine cardiomyocytes, in vitro.
OM was found to have deleterious effects on cardiac performance, besides improving systolic function. In particular, here we identified OM as a pharmaceutical tool to evoke electromechanical alternans and diastolic dysfunction. These effects may limit its clinical effectiveness.

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Circulating sphingosine-1-phosphate as a non-invasive biomarker of heart transplant rejection

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Background: Nowadays the detection of heart transplant rejection by non-invasive methods represents a challenge. Changes in sarcoplasmic reticulum calcium ATPase 2a (SERCA2a) serum levels occur in cardiac allograft rejection, demonstrating a good potential for detection. Although many SERCA2a-related genes and

proteins involved in the regulation of myocardial Ca2+ fluxes have been explored, its related metabolites remain poorly studied.
Purpose: Our objective was to identify circulating SERCA2a-related metabolites altered in cardiac allograft rejection and to determine whether these could serve as non-invasive biomarkers.
Methods: Sixty plasma samples from adult heart transplant recipients (15 without allograft rejection and 45 with diagnosis of biopsy allograft rejection: 15 Grade 1R, 15 Grade 2R, 15 Grade 3R) were included in a metabolomic analysis.
Results: We identified thirteen differential metabolites and focused on sphingosine-1- phosphate (S1P), metabolite closely related with SERCA. S1P plasma levels were increased in patients with cardiac rejection ($p<0.0001$). A receiver-operating characteristic analysis showed that S1P strongly discriminated between patients with and without rejection: non-rejection grafts vs. all rejecting grafts (AUC=0.911, $p<0.0001$), non-rejection grafts vs. Grade 1R (AUC=0.819, $p<0.01$), non-rejection grafts vs. Grade 2R (AUC=0.911, $p<0.0001$), non-rejection grafts vs. Grade 3R (AUC=0.996, $p<0.0001$).
Conclusions: This metabolomic study reveals that circulating S1P determination could be a novel approach to detect cardiac rejection, even at lower grades, showing a robust capability for detection that improve gradually with the severity of rejection. The alteration of this SERCA-related metabolite demonstrates once again the implication of calcium regulation on the pathophysiology of transplant rejection.

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Genome-wide gene expression analysis reveals pathomechanisms in patients with heart failure and preserved ejection fraction (HFpEF) - Insights from the Leipzig Heart Study

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Background: Heart Failure with preserved Ejection Fraction (HFpEF) is an urgent medical challenge without proven therapy to date. A lack of understanding of the pathophysiology and heterogeneity of the HFpEF syndrome hinders translation into novel therapeutic approaches. Genome-wide gene expression analysis may provide insights into novel mechanisms, associated with disease states and may identify biomarkers for diagnosis, prognosis and therapeutic monitoring of disease activity.
Methods and Results: 719 HFpEF patients and 1106 controls were identified in the Leipzig Heart Study (n=6995). Peripheral mononuclear cell (PBMC) gene-expression was investigated using the HT-12v4 Expression BeadChip (Illumina, USA), quantifying 14,239 unique genes.
We identified 17 differentially expressed genes between HFpEF and controls at a false discovery rate of 5% using fully adjusted linear regression models. Top genes included genes encoding for glutathione peroxidase 3 ($p<0.001$), Ras-related GTP binding protein D ($p<0.001$) and all three subunits of the Fc-γ-receptor ($p<0.001$). Differentially expressed genes were related to several canonical pathways like cellular oxidant detoxification ($p<0.01$), epithelial cell differentiation ($p=0.02$) and interferon-γ signaling ($p<0.01$).
Functional pathway analyses predicated increased downstream activation of mechanisms related to the maintenance of cell viability (z-score 1.3). Enriched upstream factors included the enzyme O-linked N-acetylglucosamine ($p<0.001$) and activated beta-estradiol (z-score 1.9).
Conclusions: In this largest study to date differential gene-expression analysis in PBMCs confirmed several mechanisms known to be involved in the cellular HFpEF pathophysiology, validating our findings. Furthermore, we identified novel potential mechanisms and therapeutic targets that may contribute to the heterogeneity and pathophysiology of the HFpEF syndrome, which require further evaluation to develop novel therapeutic strategies.

Clinical Case Corner 1 - Catheters and devices

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Acute myocardial infarction in cardiogenic shock: beyond coronary anatomy

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We present the case of a 76 year-old male patient with a history of arterial hypertension, dyslipidemia, non-insulin-treated type II diabetes mellitus, non-ST-segment elevation acute myocardial infarction (NSTEMI) in 2001 submitted to percutaneous coronary intervention (PCI) of the right coronary artery, and Parkinson's syndrome.He presented to the Emergency Department due to chest pain with two hours of evolution, associated with elevated blood pressure (BP), vomiting and headache.On admission he was hypertensive with a blood pressure (BP) of 185/89 mmHg and with an heart rate of 93 bpm. The remaining physical exam was unremarkable.
The electrocardiogram documented sinus rhythm, with a frequency of 92 /minute and ST-segment depression in the precordial leads. Laboratory evaluation showed high-sensitivity troponin T of 600 ng/l.
Transthoracic echocardiography (TTE) documented left ventricle with hypokinesia of the infero-lateral wall and of the medium and apical segment of the anterior wall; global systolic function was at the lower limit of normality. He was admitted with a diagnosis of NSTEMI in Killip-Kimball class I. In the following hours he became hypotensive and with signs of systemic hypoperfusion and repeated TTE documented severe biventricular dysfunction.
In this setting the patient was submitted to emergent coronary angiography that revealed a left anterior descending (LAD) artery with a proximal lesion of 90%; first diagonal of small caliber with an ostial lesion of 80%; right coronary artery with anomalous origin in the LAD, with non-significant restenosis of the stent in the proximal segment, diffuse disease of the mid segment with maximum stenosis of 50 to 70% and distal occlusion; there was contralateral filling of the posterior descending artery. PCI was performed in the LAD, with implantation of a drug-eluting stent.After the intervention the patient presented with marked blood pressure variation, alternating periods of shock requiring vasopressor support with noradrenaline, with hypertensive peaks (maximum BP of 270/130 mmHg), accompanied by vomiting and headache, requiring nitrate infusion. For this reason, the diagnosis of pheochromocytoma was considered, and abdominal computed tomography (CT) was performed, which documented a right retroperitoneal hypervascular mass suggestive of paraganglioma, with a dimension of 65 x 35 mm. The remaining study also showed a positive urinary metanephrine assay, and PET demonstrated hypercaptation at the localization previously described, compatible with secretory paraganglioma. Alpha-adrenergic blocking therapy was initiated with tansulosin and amlodipine, with control of the hypertensive spikes and remission of paroxysms.TTE at discharge documented recovery of biventricular function.Four months after hospitalization the patient underwent excision of the paraganglioma, without complications.

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Ischemic cardiomyopathy late complication, an unusual aspect.

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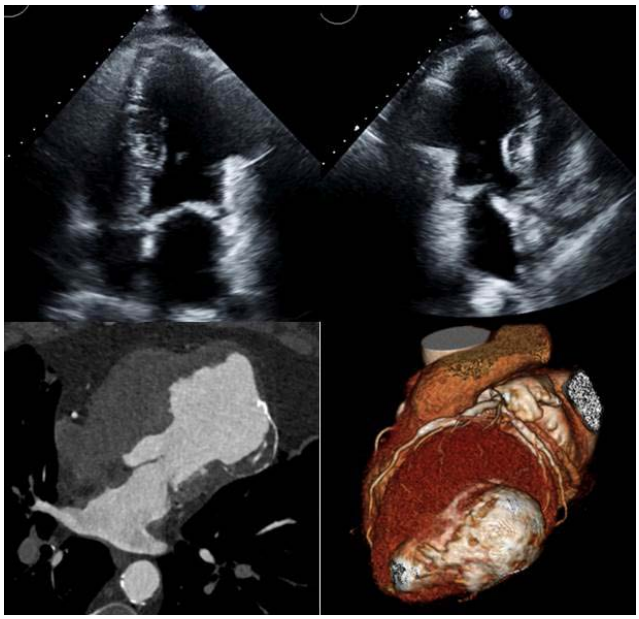
We present the case of a 77-year-old man with hypertension, dyslipidemia, type II diabetes mellitus, smoking history (100 pack-years) and chronic obstructive pulmonary disease. He had history of chest pain and syncope 10 years ago, however he did not go to the emergency department. In the same year he was referred to Cardiology. The echocardiogram had akinesia of the medial and apical segments of the lateral and inferolateral walls; a mildly depressed left ventricular (LV) ejection fraction (EF) and mild aortic stenosis. He underwent percutaneous coronary intervention of the left anterior descending artery and of the proximal circumflex artery. He was then lost to follow-up.
In 2018, he was referred to Cardiology consult after complaints of stable effort dyspnea. He was in NYHA class II/III and had no chest pain or syncope. His physical examination was remarkable for a grade II/VI aortic systolic murmur and bilateral diffuse crackles. The EKG had a left bundle branch block.
The echocardiography showed a probable large aneurysm of the medial and distal segments of the lateral and inferolateral walls with acoustic shadowing artifacts. The LV was non dilated, moderately hypertrophied and had a mild to moderately depressed EF (qualitative evaluation). He also had a probable severe aortic stenosis (aortic valve area 0.9cm2; mean gradient 33mmHg, velocity ratio 0.25, stroke volume 37 mL/m2). For better characterization a cardiac CT was done that showed a LV aneurysm with a wide neck (44mm) with largest dimensions of 44*44mm in the medial and distal segments of the lateral and inferolateral walls. It had calcified walls and an associated organized mural thrombus. The aortic valve Agatston calcium score was 2550 (severe aortic stenosis likely). Given the LV aneurysm he did not underwent dobutamine stress echocardiography. His surgical risk was deemed too high and the patient is currently under evaluation for transcatheter aortic valve implantation.
The development of LV aneurysms is not infrequent after myocardial infarction, however, the development of calcified walls as in this case is rarer and it may difficult echocardiogram evaluation due to acoustic artifacts. It also adds to the complexity of an eventual TAVI procedure.



Echocardiogram and cardiac CT

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The early onset of heart failure caused by myocardial infarcton that is thrombus masquarade ballet

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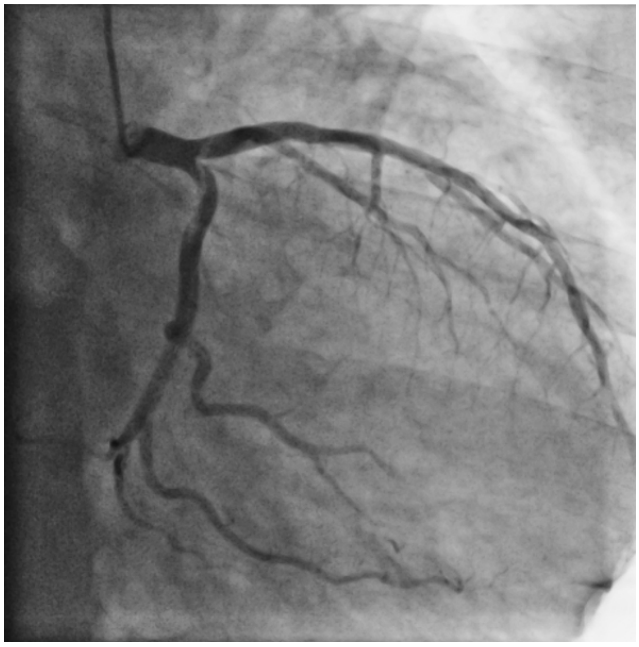
A 75 year old male with a history of diabetes mellitus type 2, hypertension and prostate cancer hospitalized for a few days in Department of internal medicine due

to acute inflammation of pancreas, drug induced acute renal failure requiring temporary hemodialysis,and toxic liver damage. He had also low hemoglobin rate (77g/L) and melaena that temporary occured.Gastroscopy did not reveal any hemorrhage. The patient needed red blood cells transfusion. Due to suspicion of early heart failure onset and significant dynamics of myocardial biomarkers suggesting myocardial infarction, he was referred to our Department for further evaluation including coronarography. On admission to our Department patient suffered from progressive weakness. He denied chest pain, dyspnea or any episode of syncope. On physical examination patient was normotensive. Auscultation of heart valves revealed diastolic murmur at the Erbs point. The liver was not enlarged,jugular veins were normal, there was no oedema of lower extremities.The baseline level of CRP was 80,87mg/l (normal range: <5mg/l), first taken high sensitivity cardiac Troponin I was 8535,41 ng/l and the second one taken 3 hours later was 22815,06 (normal range : less than 46,47 ng/l).The standard 12-lead electrocardiogram demonstrated atrial fibrillation with ventricular rate around 100 beats per minutes ,non specific ST segment and T-wave abnormalities and also low QRS voltage in limb leads. Transthoracic echocardiography revealed local hypokinesis in the areas supplied by circumflex artery , ejection fraction 48%,and pericardial effusion. Due to suspicion of myocardial infarction invasive coronarography was performed. The coronarography revealed thrombus in circumflex artery which moved rapidly “dancing at artery” while contrast was given into the coronary arteries. The cause of myocardial ischemia was proven. Because of high risk of hemorrhage eptifibatyde was not introduced. The pharmacological treatment consisted of a single antiplatelet therapy- acetylsalicylic acid 75mg per day and unfractioned heparin intravenous infusion dosed according to activated partial thromboplastin time. During hospitalization hs Troponin I decreased 177,77ng/l. The patient was discharged on low dose of apixaban 2,5mg twice a day and acetylsalicylic acid 75mg per day. CONCLUSIONS: Early onset of heart failure can be caused by myocardial infarction secondary to thrombus in coronary arteries and it needs different , well balanced treatment, focused on the trigger of early onset heart failure-lets say –personalized treatment.



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Heart failure as an acquired coronary fistula manifestation in the adulthood: a rare case of a coronary arterial fistula

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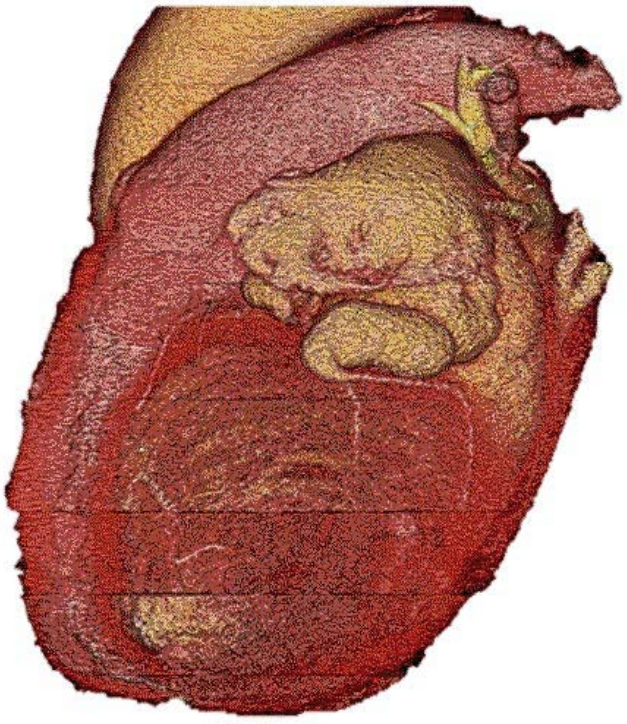
Coronary artery fistula is a direct precapillary connection between a branch of a coronary artery with the lumen of a cardiac chamber or with one of the vessels located around it (1). Coronary fistulas correspond to 0.002% of the general population and 0.4% of all cardiac malformations. (2). The other variant is due to acquired fistulas that occur as a result of coronary angioplasty, coronary revascularization, after a heart transplant, a rare myocardial biopsy, they can be secondary to trauma with the passage of transcutaneous catheters. (1) (3) Located mainly in the right coronary artery (55%), in the left coronary artery (35%) (4) with the most common drainage site, the right ventricle (45%), the right atrium (25%), the pulmonary artery (15%)) and the left atrium or left ventricle in less than 10% of cases (5). The majority of fistulas are isolated, tend to be asymptomatic and incidentally detected, they can be associated to different manifestations depending on the physiopathological mechanism as the short circuit from left to right, which often causes congestive heart failure due to volume overload (6) or in other cases a coronary "steal" syndrome with myocardial ischemia and possible angina or ventricular arrhythmias. (7) (8)68-year-old male patient, first time in our heart failure department, chest pain, arterial hypertension, unidentified heart failure, permanent atrial fibrillation, dextrocardia-levocardia, wound by left thoracoabdominal firearm and a traumatic diaphragmatic hernia, three years ago had been presenting heart failure required hospitalizations, disease modifying therapy, its etiology an incidental finding. Transthoracic echocardiography with presence of coronary fistula with continuous flow at the trunk level, the left coronary to the left atrium was dilated and a dilated left ventricle with moderate eccentric parietal hypertrophy and preserved systolic function with ejection fraction of 55%, arteriography showed the right coronary as a single vessel due to the collaterals to the anterior descending and Circumflex, which are not filled by antegrade circulation and the left coronary artery presents a giant fistula that starts from the trunk of the left coronary artery and it is connected to the left atrium, Angio-Tac was asked for; but not done because of atrial fibrillation, tac with three-dimensional reconstruction was done, left coronary trunk is dilated, as the proximal portion of the first diagonal, the circumflex artery which is connected to the inferior aspect of the left auriculilla, anterior descending artery, first and second diagonal and marginal obtuse artery, are small caliber, with filiform opacification. Based on the findings we conclude that the heart failure episodes are due to coronary steal syndrome in a patient with an acquired fistula after a gun shot, so it was proposed to perform coronary revascularization of the DA and circumflex with ligature of the left main coronary artery.



computed tomography coronary fistula

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ICD and heart transplantation in a child with ARVC

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Introduction Arrhythmogenic right ventricular cardiomyopathy (ARVC) is predominantly a genetically determined cardiac disease that is characterized by fibrofatty replacement of the right ventricular (RV) myocardial tissue and by high incidence of ventricular arrhythmias (VA) that can lead to sudden cardiac death (SCD).

Case report A 12-year-old asymptomatic female patient presented with a pathological ECG at an annual school check-up (repolarization abnormalities, PVCs). Right heart chamber enlargement (RV from parasternal position 47mm, 4-chambers position 50mm, RA 63/64mm), and reduction of both ventricles' ejection fraction (EF) - LVEF 40%, TAPSE 1,0 cm - were observed upon further examination.
Various types of arrhythmia started taking place: atrial flutter, polymorphic PVCs, and VT episodes with syncope and a heart rate of up to 240 beats per minute. At the age of 13, a single-chamber ICD was implanted. Genetic testing marked 859R and 23321 mutations in the PKP-2 gene. Endomyocardial biopsy (EMB) showed fibrofatty replacement of tissue with residual myocytes < 40%.
Further on, the patient has been hospitalized multiple times due to hemodynamic instability caused by various arrhythmias and heart failure (HF) progression. HF medication, antiarrhythmics and anticoagulants were administered. ICD was also helpful – there were 6 effective ATP-therapies.
The patient was put on the heart transplant list at the age of 14 due to the severe deterioration of her HF, further reduction of both ventricles' EF, life-threatening cardiac arrhythmias, and ineffectiveness of drug treatment.
While on the waiting list, her condition deteriorated further.
Echocardiography had been consistently registering gradual enlargement of right heart chambers (RV from parasternal position 58mm, 4-chambers position 67mm, RA 77/89mm), pericardial effusion. The frequency of atrial flutter episodes was increasing. At the age of 15 the patient received mechanical circulatory support system due to the increasing severity of biventricular dysfunction (LVEF up to 20%, TAPSE 0,3 cm).
The patient was hemodynamically stable during the use of EXCOR. After 8 months, an orthotopic heart transplantation was performed using the bicaval technique. The ICD lead was dissected together with vena cava superior; the ICD itself was removed along with the remaining part of the lead.
Conclusion This case shows the efficacy of the complex approach that included various diagnostics and treatment methodologies.
Diagnostic procedures, such as genetic study and EMB allowed us to confirm the diagnosis and determine the further treatment strategy. The implanted ICD prevented SCD from VT. Further systematic follow up and timely optimization of antiarrhythmics and HF drugs helped maintain a stable condition for a certain period. EXCOR served as a bridge to the heart transplantation.
Currently, the patient is being supervised in our center for close follow up and therapy optimization.

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Mechanical circulatory support before and after heart transplantation

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Background: Mechanical circulatory support (MCS) is a surgical method of treatment severe heart failure, in which central hemodynamics supported by the work of implantable or external pump. MCS is used as 'mechanical bridge' to heart transplantation or as a rescue in the development of complications in post-transplant period.
Methods: A 64-year-old man with ischemic cardiomyopathy after coronary artery bypass using internal mammary artery (2007), implantation of cardioverter-defibrillator (2013) was bridged to LVAD (Heart Mate II; 2014) and was listed for heart transplantation. In 2018 LVAD system was stopped due to thrombosis. Term of work was 1249 days. There was a certain remodeling of LV, it´s pumping function was preserved without deterioration. 5 months later he underwent well cross-matched orthotopic heart transplantation. Donor cold ischemia time was 301 min. During 288 min of reperfusion patient developed signs of poor cardiac output and worsening lactic acidosis requiring escalating doses of cardiotonic drugs (dobutamine 6 mcg / kg / min, noradrenaline 0,2 mcg / kg / min). LVEF 25%, RVEF 40%, the inability to disable CPB, AP 69/61 mm Hg, CVP 12 mm Hg, PAP 17/10 mm Hg, SpO2 80-83%. CI 1,0 l / min / m^2, LVSWI 8,2 g * m / m^2, RVSWI 0,29 g * m / m^2. Due to depressed biventricular function patient was subsequently connected to peripheral veno-arterial ECMO with a distal leg perfusion system.
Results: Successful wean off ECMO after 73 hours. Stay in ICU was 22 days, in hospital -31 days. Complications: encephalopathy with coordination disorders, psychoorganic syndrome, pneumothorax, esophageal bleeding, erosive tracheitis, bilateral diffuse-focal bronchitis. The patient was discharged with improvement of condition.
Problems: 1) Irregular evaluation of the effectiveness of anticoagulant and disaggregant therapy during LVAD can be a reason of massive thrombosis or bleeding. 2) Absence of round-the-clock technical and clinical support to patients with MCS can lead to untimely troubleshooting and deterioration of the patient´s condition. 3) Choosing the best option of mechanical support for primary graft dysfunction.
Discussion: 1) It is very important to carefully monitor the patient´s condition and to evaluate the functions of all organs and systems. 2) It is necessary to select the optimal anticoagulant and antiplatelet therapy. 3) High qualified and coordinated work of all specialists (surgeon, perfusiologist, resuscitator, cardiologist and rehabilitologist) significantly increases hospital survival rate.
Conclusions: Mechanical circulatory support is the only effective method of treating patients with end-stage chronic heart failure and contraindications to direct heart transplantation. This is especially significant in conditions of shortage of donors. In case of primary graft failure MCS provides preservation and restoration of function of donor heart. It improves in-hospital survival in perioperative period of heart transplantation.

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Extracorporeal support life support. Insights form ventricular support with ecmo, levitronix and heartmate 3 in a patient with fulminant myocarditis and poor prognostic indicators

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Introduction: Extracorporeal Life Support can provide an opportunity to maintain life in patients who are not candidates for heart transplant. However, circulatory assistance is not available worldwide. A 22-year-old Ukrainian sailor was working on a cargo ship that travelled from Panama in Central America to Santos in Brazil. When the ship was returning to Central America, he developed general malaise and flu-like symptoms, progressive oedema and dyspnea to NYHA 4. The cargo ship stopped in the coast of Colombia (South America) 4 weeks later in a terciary health centre in Barranquilla, Colombia. He had a cardiorespiratory arrest and was resuscitated for 20 minutes, returning to spontaneous circulation. The shock persisted, a diagnosis of fulminant myocarditis was made. The medical team contacted the cardiovascular surgery team in Floridablanca (Colombia). The ECMO team travelled to collect the patient in an air ambulance. Veno-arterial cannulation with ECMO system was performed prior to patient transfer. Problems: Haemodynamic monitoring showed a raised Pulmonary Capillary Wedge Pressure (PCWP), high central venous pressure and a very low cardiac index and output. ECMO support improved cardiac index and lowered the requirement of vasopressors, however, severely raised PCWP was noted with left ventricular end-diastolic pressure of 30 mmHg. A levitronics Centrimag device was implanted, achieving improvement with PCWP and central venous pressure to near normal levels. Additionally, it allowed early endotraqueal extubation, nutritional recovery and physical therapy. Despite the extracorporeal assistance, the level of bilirrubin continued to rise, peaking at 30.9 mg/dl at the seventh day with lactate 4 mmol/L, but returned to normal levels after a week. After 4 weeks, weaning from hemodynamic support was not possible so a heartmate 3 device was implanted, as foreign, he could not be heart transplanted in Colombia. Implications: Myocarditis has different clinical presentations, from mild symptoms, to death, and its prognosis ranges from full clinical recovery to advanced heart failure. A published retrospective analysis of mortality in mechanical supported patients, found that high lactate levels (≥ 2.25 mmol/L), and bilirubin ≥10mg/dl were associated with high mortality and especially higher predictive accuracy, when at least two out of three markers were increased. Bilirubin levels higher than 10 mg/dl were associated with survival probability around 10% to 180 days. Conclusion: a comprehensive reference center for mechanic circulatory support is needed and not yet worldwide available. In Colombia, cardiovascular foundation in Floridablanca Colombia has experience wit short, middle and long term support, greater than other latin american countries.

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Blood-loss minimizing removal technique of extracorporeal membrane oxygenation circuit in a patient unable to receive blood transfusions because of religious belief

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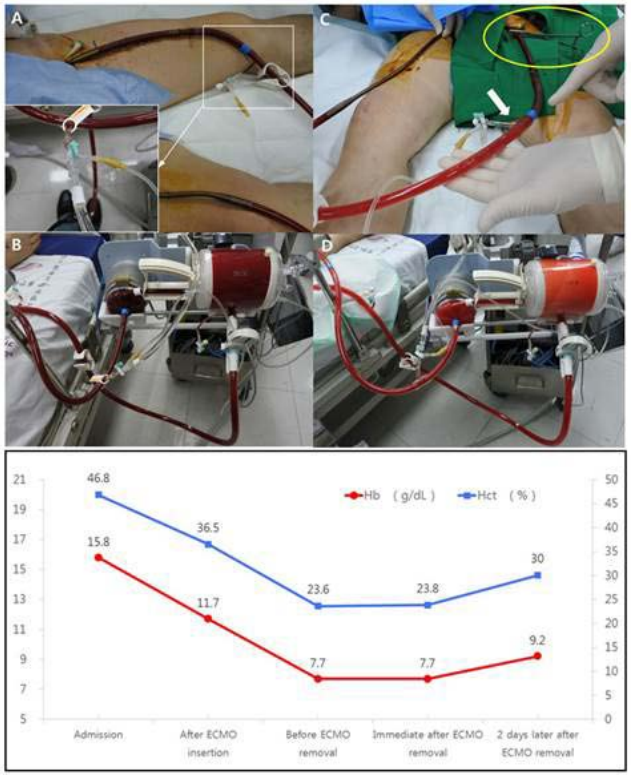
Background: Extracorporeal membrane oxygenation (ECMO) has been widely used to maintain cardiac and/or pulmonary functions in patients with cardiopulmonary collapse. If the patient doesn't accept the blood transfusion even at the risk of death due to any cause, medical team could not help taking up the challenging clinical situation for the patient.
Case: A 61-year-old male came to the emergency room (ER) complaining loss of consciousness and severe dyspnea. In social history, his religion is Jehovah's witness. On arrival at ER, he developed a generalized seizure and cardiac arrest. The cardiac rhythm was recovered 3 minutes after CPR. However, hypoxia was not improved despite mechanical ventilation with high oxygen flow while his vital signs looked stable without any inotropic support. The level of hemoglobin (Hb) and hematocrit (Hct) was 15.8 mg/dL and 46.8% respectively. A chest computed tomography (CT) scan to evaluate the cause of sudden collapse revealed massive

pulmonary thromboembolism. We decided to apply ECMO (Capiox EBS®, Terumo, Tokyo, Japan) for respiratory support. The guardian strongly refused any type of blood transfusion according to his religious belief. Emergency veno-venous (VV) type ECMO was applied. Simultaneously performed coronary angiography showed no significant lesion. At the 3 days of hospitalization, global oxygenation was improved with minimal support by ECMO and the level of Hb and Hct was decreased to 7.7mg/dL and 23.6%. We removed ECMO using blood loss minimizing technique during decannulation as follows; after first venous access cannula was clamped, total 600cc of saline was continuously and slowly infused to EMCO circuit till the whole circuit was fulfilled with saline. Then, return venous cannula was clamped and both cannulae were carefully removed at zero motor speed. The level of Hb and Hct was increased up to 9.2mg/dL and 30.0% respectively 2 days later. There is no significant hemodynamic change after ECMO removal.

Conclusion: Our blood loss minimizing ECMO removal technique with careful and continuous saline infusion into circuit would be greatly helpful in critical patients who cannot accept blood transfusion due to any reason.



Circuit removal and change of hemoglobin

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Clinical case of multiple thrombi in amphetamine-associated cardiomyopathy

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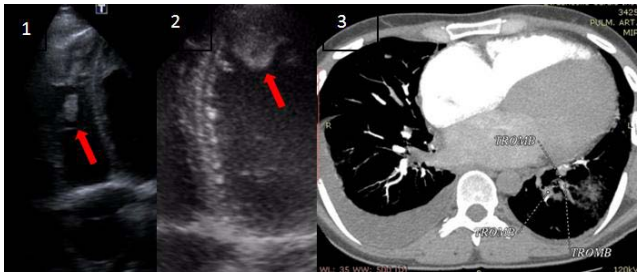
Background. Cardiotoxicity after amphetamines use has been presented mainly by acute coronary syndrome, arrhythmias, hypertension, cardiomyopathy, however its thromboembolic complications are rare. We describe a case of amphetamine cardiomyopathy resulting in heart failure (HF) and complicated by multiple thrombus. Case description. A previously healthy 32-year-old male without cardiac risk factors was admitted with progressive dyspnea on minimal exertion tachycardia, edema and a preliminary diagnosis of dilated cardiomyopathy with HF. There was no evidence of a familial dilated cardiomyopathy. He denied any drug abuse initially, but later confessed oral consumption of amphetamine-type stimulants during the last 3 years in a non-specified quantity. 2-D echocardiography displayed cardiac dilatation, left ventricle (LV) severe systolic dysfunction (ejection fraction (EF) 26%) with total hypokinesis, apical LV thrombus (2.4×1.7 cm), multiple thrombi in right ventricle and atrium, pulmonary hypertension. Chest X-ray revealed cardiomegaly with right-sided pleural effusion. Anticoagulants (low-molecular-weight heparin and warfarin) and heart failure treatment (diuretics, angiotensin receptor II blocker and b-blockers) were started. On day 2 of in-hospital stay - progressive worsening with chest pain, tachycardia and polypnea. A thorax contrast T scan showed signs of pulmonary embolism and confirmed thrombi in right and left heart chambers. During in-hospital stay patient demonstrated liver insufficiency (10-fold increase of transaminases) and coagulopathy with anticoagulant's dose correction. On the 10th day patient was discharged home in stable condition. At 2 month follow-up patient presented asymptomatic, with HR 75 bpm; 2D-echocardiography showed partial LV thrombus resolution and no RV thrombus, though LV function was not recovered (EF 29%).
Conclusion. Amphetamine toxicity on myocardium should be taken into account as a possible risk of cardiomyopathy with LV dysfunction and thromboembolism in young patients with symptoms of acute dyspnea, tachycardia and thoracic pain. In this case early and optimal anticoagulation therapy decreased risk of thrombosis progression. Prolonged HF treatment and long-term monitoring are required to achieve LV function recovery and coagulation control.

Discussion: - Could right-heart thrombi be equal to diagnosis of pulmonary embolism?
- Should early anticoagulation therapy be started even in asymptomatic patients?



Picture1

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Intravascular Ultrasound As An Effective Tool Of The Left Main Critical Lesion Detection In A LVEF-preserved Allograft Within Cardiac Allograft Vasculopathy Surveillance. PCI Management Of The Case.

A Aliaksei Barysevich[1]; O Polonetsky[1]; V Stelmashok[1]; A Zakharevich[1]; A Zatsepin[1]; N Strygo[1]; E Kurlianskaya[1]; L Rachok[1]
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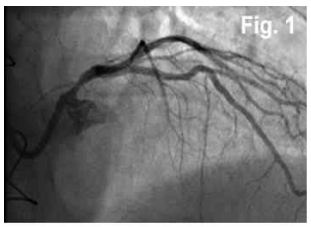
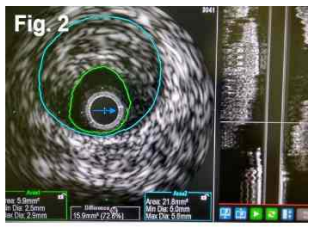
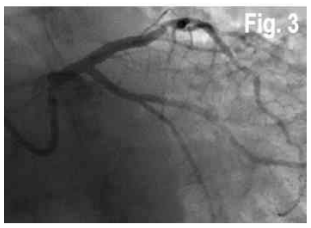
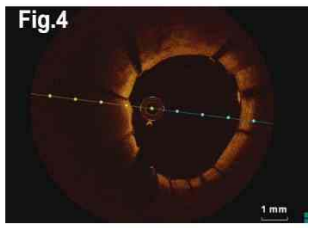
Introduction And Background: early detection and treatment of transplant coronary arterial vasculopathy is of vital significance as it is a major cause of death among long-term outcomes after heart transplantation. Classic symptoms of myocardial ischemia are usually absent due to allograft denervation. As many noninvasive modalities and invasive coronary angiography are proven to be relatively insensitive the role of intravascular imaging is hard to overestimate.









A 57 years old patient was admitted to the hospital because of progressing dyspnea and weakness on minimal physical exertion. According to anamnesis he had orthotopic heart transplantation due to dilated cardiomyopathy (08.2010), diabetes mellitus 2 type, gouty arthritis, mild arterial hypertension, latent chronic renal failure. Initial assessment included ECHO which showed preserved LVEF (69%) with normokinesis of the LV wall. Coronary angiography via transradial access (fig.1) showed intermediate stenosis of the distal part of LM. Then the patient proceeded

to intravascular ultrasound (IVUS) of the LM which showed minimum lumen area of 5.9 mm2 (73% stenosis) (fig.2). After a Heart team presentation between the options of CABG, PCI and retransplantation we decided to switch to PCI of the Left Main coronary artery. We used single stent technique. Optimal drug eluting stent apposition to the vessel wall was achieved with balloon postdilatation within proximal optimization technique under optical coherence tomography (OCT) control with final minimum lumen area of 15 mm2. (fig.3)
The patient was discharged on the day 2 without any complications. The telephone follow-up 4 months after the procedure showed significant clinical improvement.

Conclusion: - patients with previous heart transplantation need regular routine surveillance in order for early cardiac allograft vasculopathy detection because of frequent atypical clinical manifestation
- in medium to long-term follow-up invasive intravascular assessments contribute much to evaluation of "intermediate" angiographic lesions
- PCI is the adequate and effective mode for revascularization in case of local critical lesion of the main coronary vessels including LM due to CAV
- final high pressure in-stent postdilatation with non-compliant balloon leads to optimal stent expansion especially followed by OCT-control (fig.4)

Moderated Poster Session - Acute heart failure

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External validation and comparison of the CardShock and IABPII shock risk scores in real-life cardiogenic shock patients

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Funding Acknowledgements: Instituto de Salud Carlos III, CIBERCV

Background: The recently published CardShock and the IABPII-Shock scores have shown a good performance in predicting short-term mortality. To date, they have not been compared in a large cohort of real-life patients.
Methods: This is a multicenter retrospective cohort study of CS patients.
Results: The 696 patients with complete data were analyzed. Acute Coronary Syndrome (ACS) was the main cause of shock in 62% of patients. The main characteristics of patients are summarized in the table. The Cardshock risk score and the IABPII risk score were good in-hospital mortality predictors with similar Areas Under the ROC Curve in ACS patients (AUC: 0.742 vs 0.752, p=0.551). The discrimination performance dropped when the scores were applied to non-ACS patients (0.648 vs 0.619, respectively p=0.310). Calibration was acceptable for both scores (non-significant Hosmer-Lemeshow test).

Characteristics of the study population

	ACS434 patients62%	Non-ACS262 patients38%	p-value
Age (years), mean (SD)	68 (13)	61 (16)	<0.0001
Hypertension	281 (65%)	133 (51%)	<0.001
Diabetes	183 (42%)	100 (38%)	0.298
Smokers	159 (37%)	71 (27%)	0.028
Renal insufficiency	61 (14%)	61 (23%)	0.002
Previous myocardial infarction	77 (18%)	63 (24%)	0.044
Previous heart failure	46 (10%)	151 (58%)	<0.001
Cardiac arrest	119 (27%)	25 (13%)	<0.001
CardShock risk score, mean (SD)	5 (2)	4 (2)	<0.0001
IABPIIshock risk score, mean (SD)	2.8(1.8)	2.0 (1.6)	<0.0001
Dobutamine	392 (90%)	237 (90%)	0.953
Invasive mechanical ventilation	275 (63%)	156 (60%)	0.314
Renal replacement therapy	80 (18%)	53 (20%)	0.543
IABP	245 (56%)	82 (31%)	<0.001
LVAD or BiVAD (Levitronix)	14 (3%)	28 (11%)	<0.001
In-hospital mortality	198 (45%)	112 (43%)	0.460

Conclusions: The Cardshock and the IABPII shock risk scores were good predictors of in-hospital mortality. The lower ability of both scores to predict the short-term prognosis in non-ACS patients may be related to their marked heterogeneity.

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Adverse Dose Dependent Effects of Morphine Therapy in Acute Heart Failure

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[1]Rambam Health Care Campus, Cardiology, Haifa, Israel; *[2]Technion - Israel Institute of Technology, Haifa, Israel*

Aims: Morphine has been a pivotal therapy in acute heart failure (AHF) for more than a century. The evidence for morphine therapy in AHF remains controversial. This study sought to assess the therapeutic effect of morphine on patients with AHF.
Methods and Results: The study used a cohort of 13,788 patients admitted with a primary diagnosis of AHF. Propensity-score-matching was generated using 26 clinical variables. Primary endpoints included in-hospital mortality and invasive mechanical ventilation. Secondary endpoints included non-invasive ventilation, need for inotropes and acute kidney injury (AKI). 761 (5.5%) patients were treated with morphine in the first day following hospital admission. Propensity score matching yielded 672 patient pairs. The incidence of invasive ventilation was higher in the morphine-treated patients (7.4%) than in matched patients in the no-morphine cohort (3.6%), OR 2.13 (95% CI 1.32-3.57, P=0.007). In-hospital mortality was also higher in the morphine group (17.4%) than in the matched no-morphine group (13.4%), OR 1.43 (95% CI 1.05 to 1.98, P=0.024). For both the endpoint of invasive ventilation (Ptrend=0.005) and mortality (Ptrend=0.004), there was a significant linear dose-response relationship for the adverse effect of morphine. Morphine was associated with a significant increase in all secondary outcomes: Non-invasive ventilation (OR 2.78, 95% CI 1.95–3.96); Inotrope use (OR 3.50, 95% CI 2.10–5.82) and AKI (OR 1.81, 95% CI 1.39–2.36). A landmark analysis demonstrated no difference in post-discharge survival between cohorts.
Conclusions: Morphine administration in is associated with significant dose-dependent risk for in-hospital mortality and need for mechanical ventilation.

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Prevalence and prognostic impact of anaemia, renal insufficiency, and iron deficiency in patients discharged from hospital after decompensation for systolic heart failure

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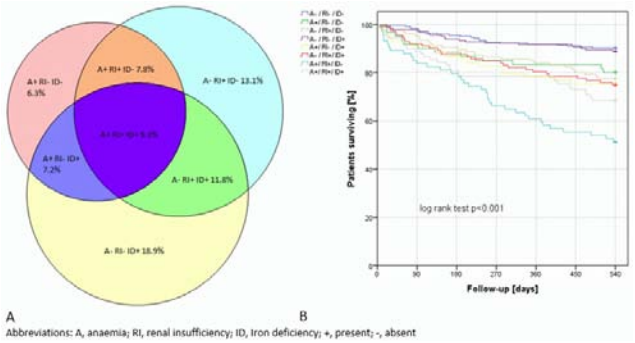
On behalf of: INH Study Group

Background: Anaemia (A), renal insufficiency (RI), and iron deficiency (ID) are common in heart failure (HF) and associated with adverse outcomes.
Purpose: This study investigated the prevalence of A, RI, and ID and their individual and cumulative impact on 18-month all-cause mortality (ACM) in patients discharged from hospital after admission for decompensated HF with reduced ejection fraction (HFrEF).
Methods: This post-hoc analysis was performed with participants of the Interdisciplinary Network for HF (INH) program. Out of 1022 consecutive patients, 953 patients (68.0±12.3 years, 28.3% female) had laboratory values to define A, RI, and ID available at baseline and were thus included into the current analysis. Follow-up was 18 months (100% complete). Participants were divided into eight groups according to the presence/absence of A (defined as haemoglobin <13/12g/dL in men/women), RI (estimated glomerular filtration rate <60mL/min/1.73m^2), and ID (ferritin <100μg/L or ferritin 100-299 μg/L plus transferrin saturation <20%). For survival analyses log rank tests and multivariable Cox regression models (not shown) were used.

Results: Overall, the baseline prevalence of A was 30.6%, of RI 42.0%, and of ID 47.2%. 74.4% of patients had at least one comorbidity and 9.3% showed all three comorbidities. The figure shows the prevalence of the three comorbidities alone and combined (A) and the individual and cumulative impact on ACM (B). Hazard Ratios indicated that isolated ID had no significant impact on ACM. The risk for ACM was highest in patients with A and RI with or without ID. When only the latter two groups were compared, patients with A and RI without ID appeared to be at higher risk for ACM.
Conclusions: Our findings in this large cohort of survivors of the in-hospital phase demonstrate, that A, RI, and ID are common and often coincide in patients after acutely decompensated HFrEF. Patients with A and RI with or without ID had the highest risk of ACM. The prognostic role of ID after acute cardiac decompensation requires further evaluation.



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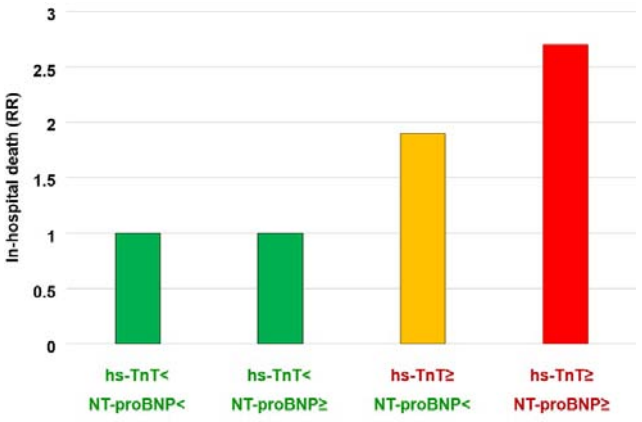
Admission high-sensitivity troponin T and NT-proBNP for outcome prediction in acute heart failure

A Aimo[1]; JL Januzzi[2]; C Mueller[3]; O Miro[4]; D Pascual Figal[5]; J Jacob[4]; P Herrero-Puente[4]; P Llorens[6]; D Wussler[3]; N Kozhuharov[3]; Z Sabti[3]; T Breidthardt[3]; G Vergaro[7]; C Prontera[7]; M Emdin[8]
[1]Azienda Ospedaliero-Universitaria Pisana, Scuola di Specializzazione Malattie dell'Apparato Cardiovascolare, Pisa, Italy; *[2]Massachusetts General Hospital, Boston, United States of America*; *[3]University Hospital Basel, Basel, Switzerland*; *[4]University Hospital of Bellvitge, Barcelona, Spain*; *[5]University of Murcia, Murcia, Spain*; *[6]General University Hospital of Alicante, Alicante, Spain*; *[7]Gabriele Monasterio Foundation, Pisa, Italy*; *[8]Sant'Anna School of Advanced Studies, Pisa, Italy*

Background: High-sensitivity troponin T (hs-TnT) reflects the severity of ongoing myocardial damage and is a predictor of outcome in chronic heart failure (HF), while its prognostic value in the acute setting is unclear.
Purpose: To assess hs-TnT as predictor of prognosis in acute HF (AHF).
Methods: The study was a retrospective analysis of individual data of 1449 patients with AHF with hs-TnT measured on admission, deriving from 3 cohorts (2 Spanish, 1 Swiss). Patients received Guideline-recommended treatment for HF. In-hospital death and post-discharge outcome (all-cause and cardiovascular mortality, HF hospitalization, composite of cardiovascular mortality and HF hospitalization at 6, 12 and 24 months) were evaluated.
Results: Patients were aged 78±10 years, 51% were men, and 45% had an history of coronary artery disease. Median left ventricular ejection fraction was 50% (interquartile interval 33-60). The index hospitalization was the first manifestation of HF in 31% of patients. Median hs-TnT and NT-proBNP concentrations were 43 ng/L (26-69) and 5660 (2693-12466), respectively. Patients experiencing in-hospital death (n=187, 13%) had significantly higher hs-TnT and NT-proBNP on admission (both p<0.001). The risk of in-hospital death increased by 45% per each doubling of hs-TnT (HR 1.45, 95% confidence interval - CI 1.31-1.59, p<0.001), and by 32% per each doubling of NT-proBNP (HR 1.32, 95% CI 1.17-1.50, p<0.001). Patients with hs-TnT ≥43 ng/L and NT-proBNP ≥5660 ng/L had a 2.7-fold higher risk of in-hospital death (relative risk - RR 2.7, 95% CI 1.7-4.5). Among the 1262 patients discharged, 1024 deaths occurred over a median 11-month follow-up (4-22). hs-TnT ≥43 ng/L was a strong, independent predictor of all-cause death at 6, 12 and 24 months, and the composite of cardiovascular death or HF hospitalization at 6 and 24 months. hs-TnT ≥43 ng/L also improved risk reclassification.
Conclusions: The risk of in-hospital death is almost 3 folds higher with admission hs-TnT ≥43 ng/L and NT-proBNP ≥5660 ng/L, and hs-TnT ≥43 ng/L holds strong independent prognostic significance for post-discharge outcome. Admission hs-TnT may help identify patients at higher risk needing an enhanced, individualized therapeutic effort during hospital admission and after discharge.



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Increased NT-proBNP levels most significantly predict 30-day mortality in admitted out-of hospital-cardiac-arrest (OHCA) patients

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Background. After cardiac arrest (CA) complex post-resuscitation syndromes develope such as brain injury, global cardiac dysfunction, systemic ischemia/reperfusion injury, etc. Brain injury accounts for the majority of deaths, but severe acute post-CA heart failure – in particularly shock - affects more than two-thirds of OHCA patients. Mortality from post-CA shock and brain injury share similar risk factors, which are related to the quality of the rescue process. Shock after CA, requiring vasopressor support is consistently associated with an adverse outcome after CA and is the result of pre-existing cardiac pathology, ischemia/reperfusion injury with activated inflammatory cytokine and catecholamines, etc. Hemodynamic stabilization after CA aims to reverse the effects of myocardial dysfunction and to improve systemic perfusion. Purpose. To evaluate the less clear association between acute heart failure and 30-day mortality of admitted OHCA patients.
Methods. We retrospectively included 110 OHCA patients, admitted in 2013 to 2016 (72.7% men, mean age 65.6±13,8 years, age ≥ 65 years 72.7%) to the medical ICU. We registered their clinical and laboratory data, treatments, 30-day mortality and predictors of 30-day mortality.
Results. In admitted OHCA patients witnessed CA was observed in 71.8%, ventricular fibrillation or pulseless ventricular tachycardia (VF/VT) as the cause of OHCA in 63.6%, asystole in 35.5%, resuscitation ≥20 minutes in 21.8%, admission lactate ≥ 6 mmol/L in 30%, acute coronary syndromes (ACS) in 55.5%, PCI in 40%, admission mechanical ventilation (MV) in 87.3%, in-hospital peak NT-proBNP ≥ 400pmol/l in 23.6%, in-hospital acute heart failure 82.7% and shock in 75.5%, ischemic brain injury in 62.7% and acute kidney injury (AKI) in 32.7%. 30-day mortality of admitted OHCA patients was 48.2%. 30-day mortality in comparison to survival was associated significantly with age ≥ 65 years (54.6% vs 29.8%, p=0.02), with asystole as the cause of CA (56.6% vs 15.8%, p<0.001), resuscitation ≥ 20 minutes (32.1% vs 12.3%, p=0.017), admission MV (98.1% vs 77.1%, p=0.001) and lactate ≥ 6 mmol/l (45.3% vs 15.8%, p=0.005), in-hospital acute heart failure (98.1% vs 68.4%, p<0.001), shock (84.9% vs 66.7%, p=0.029), AKI (47.2% vs 19.3%, p=0.002), brain injury (96.2% vs 31.6%, p<0.001), peak NT-proBNP ≥ 400pmol/L (30.2% vs 17.5%, p=0.003), but significantly less likely with ACS (43.4% vs 66.7%, p=0.042), VF/VT as the cause of CA (43.4% vs 82.5%, p<0.001) and admission EF ≥ 35% (24.5% vs 43.9%, p=0.031). Logistic regression (forward Wald) demonstrated that peak hospital NT-proBNP ≥ 400pmol/l was most significant independent predictor of 30-day mortality (OR 29.8, 95% CI 2.377-372.762, p=0.009).
Conclusions. Acute heart failure was present in more than 80% of admitted OHCA patients – in particular in early non-survivors. Increased levels of NT-proBNP, reflecting acute heart failure, most significantly predicted 30-day mortality in admitted OHCA patients.

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The clinical use of bioactive adrenomedullin and proenkephalin A in detecting congestion, renal dysfunction and clinical outcomes in two independent acute heart failure cohorts

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[1]Skane University Hospital, Dept of Cardiology, Malmo, Sweden; [2]Lund University, Dept of Clinical Sciences, Malmo, Sweden; [3]Sapienza University of Rome, Rome, Italy; [4]Sphingotec GmbH, Hennigsdorf, Germany; [5]GREAT Network, Rome, Italy

Background: In an acute heart failure (AHF) setting, proenkephalin A 119-159 (PENK) has emerged as a promising prognostic marker for predicting worsening renal function (WRF), while biologically active adrenomedullin (bio-ADM) has been proposed as a potential marker for congestion.
Aims: We examined the diagnostic value of bio-ADM in congestion and PENK in WRF, and investigated the prognostic value of bio-ADM and PENK regarding mortality, rehospitalisation, and length of hospital stay in two separate European AHF cohorts.
Methods: Bio-ADM and PENK were measured in 530 subjects hospitalized for AHF in two cohorts: the Swedish Heart and Brain Failure Investigation study - Malmö (HARVEST- Malmö) (n=322, 30.1% female; mean age 75.1 years; 12-months follow-up) and the GREAT Network Rome study (n=208, 54.8% female; mean age 78.5 years; no follow-up).
Results: PENK was associated with WRF (AUC 0.65, p<0.001). In multi-variable logistic regression analysis of the pooled cohort, PENK showed an independent association with WRF (adjusted odds ratio [aOR] 1.74, p=0.004).
Bio-ADM was associated with peripheral oedema (AUC 0.71, p<0.001) which proved to be independent after adjustment (aOR 2.30, p<0.001).
PENK was predictive of in-hospital mortality (OR 2.24, p<0.001).
In the HARVEST-Malmö cohort, both PENK and bio-ADM were predictive of one-year mortality (aOR 1.34, p=0.038 and aOR 1.39, p=0.030). Furthermore, bio-ADM was associated with rehospitalization (aOR 1.25, p=0.007) and length of hospital stay (β 0.702, p=0.005).
Conclusion: In two European AHF cohorts, bio-ADM and PENK perform as suitable biomarkers for early detection of congestion severity and WRF occurrence, respectively, and are associated with pertinent clinical outcomes.

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Heart failure day treatment centre (HFDTC), a novel service design

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BACKGROUND: Heart Failure (HF) is one of the most common causes of acute hospital admissions and bed occupancies. A local Audit was carried out to analyse the HF population in a London borough and to investigate the causes of non-elective HF admission, in order to prevent them and to promote a more effective management. The Audit identified a fragile population, insufficiently referred to HF specialists (51%), with poor compliance (21%) and in sub-optimal therapy (27%) suggesting a large number of preventable admissions. The majority of non-elective admission had sub-acute presentation with relatively mild symptoms or signs of failure. The key objective of the Audit was to guide a novel service design. The Heart Failure Day Treatment Centre (HFDTC) was suggested.
AIM AND HYPOTHESIS: The aim was to design a service to improve quality and reduce admission rate and costs. We hypothesised that the HFDTC would reduce non-elective admission by 10% and readmission rate within 30 days by 30%, increasing patients access to specialised care, with significant reduction of in-patient bed demand.
SERVICE DESIGN: The HFDTC has been established by the multi-disciplinary HF team to operate as a HF specialist nurse (HFSN) run and HF-consultant led facility. The HFDTC aims to provide timely access to specialist care and better patient experience, in line with national and international benchmark.
Inclusion and exclusion criteria identify a sub-acute group of HF population (main inclusion: patients in threatening admission mode, already under HF Team). Patients who meet criteria receive a 'business card' with contact details and opening times; patients are enabled to self-refer to the service or be referred by general practitioner or hospital clinician. The first point of contact with the patient is the HFSN, who can escalate to the HF physician. The HFDTC offers a full range of hospital treatment, such as imaging, bloods and medical therapy. Patients can have single or multiple accesses to the HFDTC until they are ready to be discharged back to community.CHALLENGE: Service design implies a delicate balance between quality and cost-effectiveness. Funding limitation, agreement among 'Providers' and 'Commissioners', estimation of demand and capacity and coordination with the co-existing teams are the most relevant challenges.
SERVICE EVALUATION: Economic evaluation, key performance indicators, data monitoring and quality data will be collected and analysed with a specifically designed Audit Tool and through patient questionnaires.
CONCLUSION: The HFDTC is the first of its kind in the UK and acts effectively as day hospital for patients with established diagnosis of HF. It guarantees prompt assessment and treatment by the HF Team with the aim to reduce acute HF admissions which will result in a decrease in costs and improvement in patients quality of life. The cost-effectiveness of this model will be analysed with the support of a designed Audit Tool.

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5-year outcome of acute heart failure in korea: results from the korean acute heart failure registry (KorAHF)

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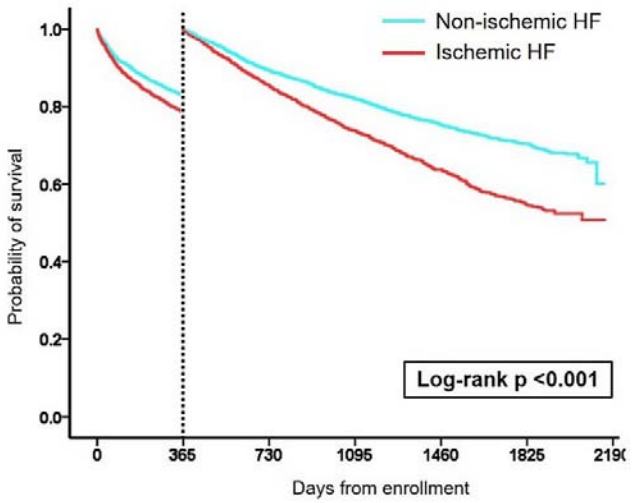
On behalf of: KorAHF
Funding Acknowledgements: This research was supported by the Korea Centers for Disease Control and Prevention

Background: Heart failure (HF) is associated with high mortality and cost, and even with current advances in medicine, the prevalence of HF is on a steady increase.Purpose: The Korean Acute Heart Failure registry (KorAHF) evaluated the clinical characteristics, treatment, and long-term outcome of patients hospitalized for acute HF.

Baseline characteristics	Ischemic (n=2113)	Non-ischemic (n=3512)	p
Age (years)	71.9 ± 10.9	66.5 ± 15.9	<0.001
Male (%)	61.5	48.2	<0.001
Diabetes	56.2	30.2	<0.001
LVEF≤40%	68.7	55.9	<0.001
ACEI/ARBs at discharge	67.1	65.2	0.147
Beta-blockers at discharge	54.7	47.0	<0.001
MRAs at discharge	39.6	48.1	<0.001
In-hospital mortality (%)	6.5	4.1	<0.001

LVEF, left ventricular ejection fraction; ACEI, angiotensin converting enzyme inhibitor; ARB, angiotensin receptor blocker; MRA, mineralocorticoid receptor blocker.



Survival according to etiology

Methods: Patients were prospectively enrolled in 10 university hospitals nationwide from March 2011 to February 2014. A total of 5 625 patients were followed up for up to 5.9 years. Primary outcome was death and readmission due to HF. Total

outcome of hospitalized HF patients, along with outcomes in relation to etiology and left ventricular ejection fraction (LVEF) were analyzed. The proportion of patients adhering to guideline-recommended therapies were additionally assessed.
Results: The mean age of patients was 68.5 (14.5) years, and 53.2% were male. De novo HF compromised 52.2% of the patients, and 37.6% of total enrolled patients had ischemic etiologies. Acute HF due to ischemic etiologies showed poorer in-hospital, 1-year, and long-term outcomes compared with non-ischemic HF. In relation to LV systolic function, 57.4% of the patients were classified as heart failure with reduced ejection fraction (HFrEF). For these group of patients, there were no differences in survival compared to either heart failure with mid-range or preserved ejection fraction. Regarding oral treatment, guideline-based therapies such as renin-angiotensin system blockers, beta-blockers, and mineralocorticoid receptor blockers were used in 73, 55, and 51% of patients with HFrEF.
Conclusion: This registry provides information on the current status and prognosis of acute HF in Korea. Although the proportion of ischemic HF is lower than previous global registries, these patients have worse outcome, suggesting that closer monitoring and treatment is needed.

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Surface respiratory electromyography and dyspnea in acute heart failure patients

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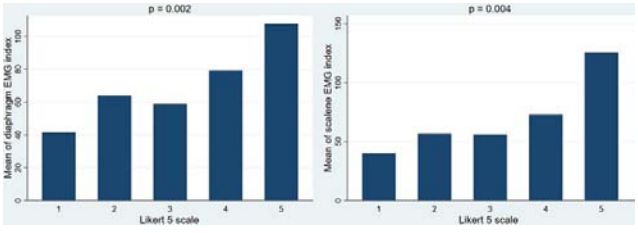
Background/Introduction Dyspnea is the most common symptom among hospitalized patients with heart failure (HF) and represents a therapeutic target. Despite this, there is no instrument that allows an objective evaluation of dyspnea. Studies performed in respiratory patients and mechanically ventilated patients suggest that the measurement of electromyographic (EMG) activity of the accessory muscles with surface electrodes correlates well with dyspnea and offers prognostic information. However, no data is available about the usefulness of this technique in HF.
Purpose Our aim was to demonstrate a relationship between respiratory muscles EMG activity and dyspnea severity in acute HF patients.
Methods Prospective and descriptive pilot study carried out in adult patients admitted for acute HF at the Emergency department. Measurements were carried out with a cardio-respiratory portable polygraph including nasal prongs to assess ventilation, pulse oximetry and EMG surface electrodes for measuring the activity of accessory (scalene and pectoralis minor) and main (diaphragm) respiratory muscles. After the sensors were in place, the patient was asked about his/her dyspnea sensation by means of the Likert 5 questionnaire. Then, data were recorded during 3 min of spontaneous breathing and after immediately asking the patient to breathe at maximum effort for several cycles. This assessment was carried out within the first 24 hours of admission, at 24 hours and at day 5. Clinicians were blinded to the EMG measurement, which was analyzed offline following patient discharge. An index to quantify the activity of each respiratory muscle was computed. A higher EMG index was expected as dyspnea intensity increased.
Results The study was carried out in 28 patients. Dyspnea score with Likert 5 scale decreased along the three measured days: from a median 2 (1.5-3) in day 1 to a median 1 (1-2) in day 5 (p=0.011). Out of the total 84 possible measurements per muscle (28 patients x 3 days/patient), reliable EMG results were obtained in 74 cases (88%) for pectoralis minor and diaphragm and in 63 cases (75%) in scalene. Diaphragm and scalene EMG index showed a significant direct relationship with dyspnea score: the higher the Likert 5, the higher EMG index (p=0.002 and p=0.004 respectively). The pectoralis minor muscle did not show a significant linear relationship with Likert 5 scale (p=0.075).
Conclusion(s) In our pilot study, diaphragm and scalene EMG activity was linearly associated with increasing severity of dyspnea. Surface respiratory EMG could be a useful tool to objectively quantify dyspnea in acute HF patients.



EMG index along Likert 5 scale

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Residual congestion on discharge for Heart Failure assessed by impedance technique predicts 30-day and one-year Heart Failure death. Results of IMPEDANCE-HF extended trial

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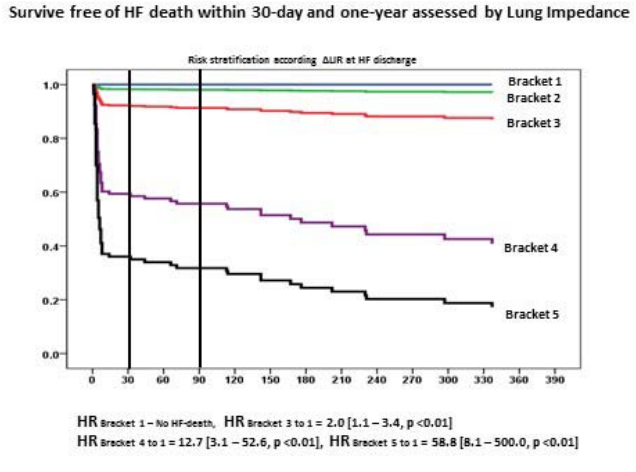
The aim of secondary analyses of the IMPEDANCE-HF extended trial was to find out if residual congestion on discharge for HF could predict 30-day and one-year Heart Failure death.
The analysis of IMPEDANCE-HF extended trial was based on the data collected during the index hospitalization for HF. The IMPEDANCE-HF extended trial was a randomized controlled single-blinded trial of HF with reduced LVEF patients. Inclusion criteria were LVEF $\leq$ 45%, NYHA class II-IV and patients were hospitalized for HF within 12 months (ClinicalTrials.gov NCT01315223). Half of the patients (N=145) were assigned to the active Lung Impedance (LI)-guided treatment arm where clinicians were based therapy on LI level. The other half was assigned to the control arm where LI values were recorded but not conveyed to the clinical treatment team. In the case of hospitalization, LI was recorded in all patients at discharge. The decisions regarding discharge and choice of treatment were at the discretion of the hospital staff.
A non-invasive impedance device was used in this study to assess the lung fluid content. Unlike the existing impedance devices, the present device has the ability to differentiate a true signal from the lungs from the noise signal of surrounding chest wall. Such approach enables to measure a small change in lung fluid content. A method to determine individual "dry" baseline LI (BLI) for each HF patient has been reported. BLI for each patient was used to calculate a new parameter, the LIR= [(current LI/BLI)-1] $\times$100%, which determinate the degree of pulmonary congestion in time of measurement.
Method. Degree of pulmonary congestion at discharge for HF hospitalization was divided into 5 brackets. (1) LIR= 0 to – 18% - minimal interstitial edema (IE), (2) LIR= - 18.1 to -28% - mild IE, (3) LIR= -28.1 to – 38 – moderate IE, (4) LIR= -38.1 to -48% - severe IE to mild alveolar edema (AE) and (5) LIR < -48.1% - moderate AE.
Results: LI-guided patients were followed for 61.9.4$\pm$39.6 months and control patients for 46.7$\pm$33.3 months (p<0.01) accounting for 269 and 470 HF hospitalizations, respectively (p<0.01). Twenty-five (38%) and 57 (66%) HF-associated deaths were recorded during follow-up (p<0.01) representing a mortality rate of 0.03 and 0.1 per patient×year follow up in the LI-guided and control group, respectively (p<0.01). Probability of HF death within 30-day and one year is presented on figure. Conclusion The degree of pre-discharge pulmonary congestion as assessed by LI is a very robust and reliable predictor for 30-day and one-year HF death.



Heart Failure associated death

Rapid Fire 2 - Biomarker: present and future

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Role of neprilysin in myocardial tissue Renin-Angiotensin-System (RAS) of the failing heart

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Background. Prognosis of patients with HFrEF remains poor despite recent advances in pharmacologic therapy as the introduction of angiotensin-receptor neprilysin-inhibitor (ARNI). The Renin-Angiotensin-System (RAS) is dysregulated in HF with elevated AngII levels as a central driver of disease progression. The myocardium is capable of synthesizing all RAS components resulting in tissue specific angiotensin levels. Neprilysin (NEP), among other tissue enzymes, is implicated in the RAS peptide cascade, catalyzing the generation of Ang1-7 which counteracts the deleterious effects of AngII. The specific role of neprilysin in myocardial tissue RAS of the failing heart and has not been investigated yet.
Methods. Angiotensin metabolite levels (RAS-fingerprints), enzyme regulation and metabolic activities were investigated in myocardial samples of end-stage HFrEF patients undergoing heart transplantation with a mass-spectrometry based method.
Results. Eighteen patients were included (n=10 with ACE-I and n=8 without RAS-blockade). Median age was 54(IQR:45-61) years and 83% of patients were male. Median NT-proBNP levels were 4572(IQR:1559-10684) pg/ml. Myocardial AngI, Ang1-7, Ang1-5 and AngIV levels were below the detection limit for all samples. AngII and AngIII levels were comparable between the ACE-I and no-RAS-blocker group [AngII: 72.4(IQR:54.6-139.1) vs 45.7(IQR:22.5-123.8),p=ns and AngIII 19.0(IQR:5.0-46.5) vs 23.4(IQR:5.0-64.5),p=ns]. Moreover, there were no significant differences in angiotensin metabolization patterns between patients receiving ACE-I compared to no RAS-blocker therapy, indicating similar regulation of tissue RAS enzymes between the groups (Figure1A). The formation of AngII from AngI was mainly chymase dependent with conversion rates of 99.4(IQR:77.0-254.1) (pg/µg protein)/h for the ACE-I and 141.8(IQR:67.9-369.2) (pg/µg protein)/h for the no RAS-blockade group, whereas ACE-related generation of AngII was under the detection limit. The formation of Ang1-7 from AngI was mediated by both NEP and propel-endopeptidase (PEP), however the contribution of NEP was significantly higher [5022(IQR:5002-5286) (pg/µg protein)/h vs 3555(IQR:3351-3849) (pg/µg protein)/h,p=0.005 for the ACE-I group and 4729(IQR:4438-6135) (pg/µg protein)/h vs 3601(IQR:3052-4182) (pg/µg protein)/h,p=0.012 for the no RAS-blockade group]. Interestingly, there were no differences in tissue enzymatic activities between the different therapy groups, as already indicated by the metabolization patterns.

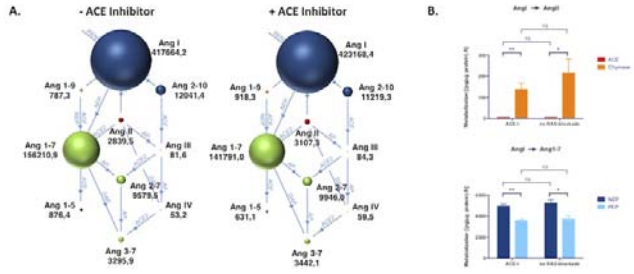

Figure 1

Conclusions. AngII levels are high in the failing heart and levels are independent of an established RAS-blocker therapy with ACE-I. In contrast to plasma, AngII formation of the tissue is mainly chymase dependent, whereas ACE seems to play an unsignificant role. Neprilysin has a substantial role in the generation of beneficial Ang1-7 from AngI. The impact of NEP inhibition by ARNI on tissue RAS and mechanism of action have to be further investigated.

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The value of tubular maximum phosphate reabsorption capacity, a functional proximal tubular parameter in heart failure

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Introduction Renal proximal tubule cells are early and essential sensors of kidney injury. We aimed to study the clinical determinants of tubular maximum phosphate reabsorption capacity (TmP/GFR), a functional proximal tubular parameter, as well as its association with renal and cardiovascular outcome in patients with heart failure (HF).
Methods In 2,085 HF patients (BIOSTAT-CHF), we established determinants of TmP/GFR (calculated using the formula originally devised by Bijvoet), and its association with worsening renal function (WRF; defined as >25% eGFR decrease), tubular damage (defined as plasma Neutrophil Gelatinase-Associated Lipocalin [NGAL] doubling between baseline and 9 months), and outcome independent of confounders.

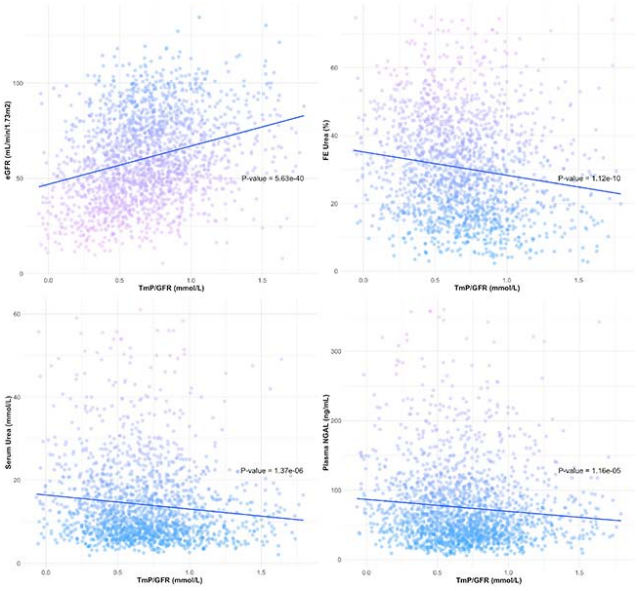

Figure 1. Correlation plots of TmP/GFR

Results Low TmP/GFR (<0.80 mmol/L) was observed in 1,392 (67%) patients. Patients with lower TmP/GFR had more advanced HF, lower eGFR, and signs of increased tubular damage. Lower TmP/GFR was strongly associated with lower serum phosphate, and to a lesser extent with higher fractional urea excretion, higher serum urea, lower haemoglobin, higher urinary creatinine, and lower plasma NGAL (all P<0.001). TmP/GFR was independently associated with tubular damage (OR 2.36 [1.20–4.67], P=0.014 per log TmP/GFR decrease), but not with WRF. Decreased TmP/GFR was independently associated with increased mortality (HR per log

decrease 3.05[1.52–6.13], P=0.002), HF hospitalisation (HR per log decrease 2.17 [1.05–4.50], P=0.036), and the combined endpoint (HR per log decrease 1.83 [1.04–3.22], P=0.035) after adjustment for the BIOSTAT risk model, serum phosphate, and eGFR.
Discussion TmP/GFR is a novel marker for proximal tubular function that is associated with severity of HF, and with glomerular and tubular function. TmP/GFR predicts tubular damage, as well as poor outcome, suggesting that TmP/GFR might be a suitable, novel parameter to monitor proximal tubular function in HF.

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The risk of bias of current novel circulating biomarker studies for the detection of HFpEF and left ventricular diastolic dysfunction

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Background: Diagnosing Heart Failure with preserved Ejection Fraction (HFpEF) remains a major challenge. Natriuretic peptides lack positive predictive value for diagnosing this heterogenous syndrome, giving rise to a multitude of research investigating novel circulating biomarkers within this field. However, large variation in methodological quality possibly introduced bias, hindering the potential implementation of novel biomarkers into the clinics.
Purpose: To determine the risk of bias of papers evaluating novel circulating biomarkers for the diagnosis of HFpEF or left ventricular diastolic dysfunction (LVDD).
Methods: Extensive literature searches using the PubMed and Embase databases until February 2018 were performed for this systematic review. Inclusion criteria were: (i) use of novel blood/urine biomarker for the detection of HFpEF or LVDD in humans (ii) use of a control population (e.g. healthy controls or heart failure with reduced ejection fraction) (iii) use of Dutch or English language. Studies were excluded if they: (i) did not state a diagnostic performance measure (ii) studied an acute HF population (iii) were a (systematic) review, meta-analysis, editorial or conference abstract. Two reviewers independently screened titles, abstracts and full-text and evaluated the methodological quality using the QUADAS-2 checklist. This checklist determines the risk of bias within four domains: patient selection, index test, reference standard, and patient flow & timing. The risk of bias was rated low, intermediate or high individually for the four domains. Inconsistencies in the quality assessment between the reviewers were resolved by discussion and consensus between all authors.
Results: A total of 1978 articles derived from the search, 260 papers were analyzed as full text. Finally, 18 papers were eligible. These included a wide range of HFpEF-related biomarkers (Figure 1a). The risk of bias within the different domains is presented in Figure 1b. A total of 6 papers showed high risk of bias within all four domains and all papers had at least one domain with high risk of bias. Main determinants of bias included the wide use of case-control designs, excluding difficult to diagnose patients, not making use of a pre-specified cut-off value for the index test without performing external validation, and the use of an inappropriate reference standard.
Conclusions: The majority of current diagnostic HFpEF and LVDD papers have a high risk of bias. This indicates that standardized research methodologies (e.g. avoidance of case control designs, performance of external validation and making use of the same reference standards) are urgently needed to determine the incremental value of novel biomarkers within this field.

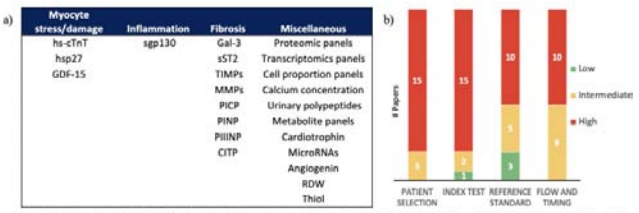

Figure 1 a) Biomarkers included within this study: High-sensitive cardiac troponin T(hs-cTnT), Heat shock protein 27 (hsp27), Growth differentiation factor 15 (GDF-15), Soluble glycoprotein 130 (sgp130), Galactin-3 (Gal-3), Soluble ST2 (sST2), Tissue inhibitors of MMP levels (TIMPs), Matrix metalloproteinases (MMPs), Serum carboxy (PICP) amino (PINP) and carboxytelo (CITP) peptides of procollagen type I, Amino peptide of procollagen type III (PIIINP), red cell distribution width (RDW). b) Overview of risk of bias of current studies that focus on the diagnostic value of novel blood/urine biomarkers for the detection HFpEF or LVDD subdived in the domains: Patient Selection, Index test, Reference standard and Flow and timing.

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The effect of liraglutide on natriuretic peptides and copeptin in heart failure patients

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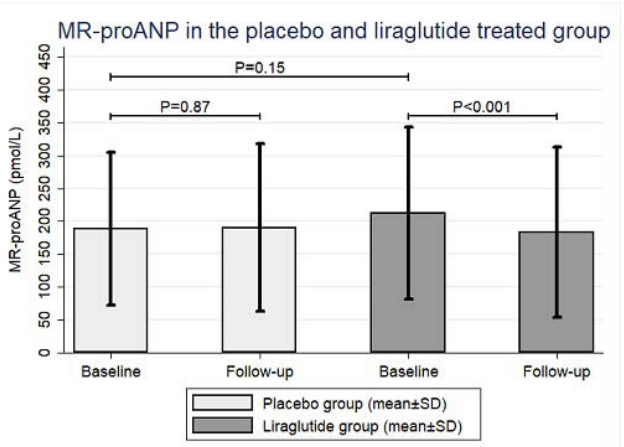
Background: Treatment with the anti-diabetic therapy GLP-1 analogue liraglutide improves the prognosis in patients with type 2-diabetes (T2D). Despite this, two randomized trials enrolling more than 500 heart failure patients with reduced ejection fraction (HFrEF) did not demonstrate any effect of liraglutide on left ventricular ejection fraction (LVEF) or B-type natriuretic peptide. However, liraglutide treatment may be associated with changes in other parameters of neurohormonal activation as midregional-pro-atrial natriuretic peptide (MR-proANP), midregional-pro-adrenomedullin (MR-proADM) and copeptin, being part of a system controlling fluid and hemodynamic homeostasis.

Table 1

	Liraglutide (n=104)	Placebo (n=104)	Delta	P-value
MR-proANP (pmol/L)	-22.6±5.9	0.7±4.7	-23.4 (-38.2, -8.5)	0.002
MR-proADM (nmol/L)	0.00±0.01	0.03±0.01	-0.03 (-0.07, 0.01)	0.10
Copeptin (pmol/L)	0.30±0.83	0.91±0.42	-0.61 (-2.45, 1.24)	0.52
E/e'	-0.72±0.48	0.68±0.44	-1.39 (-2.68, -0.11)	0.03
LAVI (ml/m2)	-2.5±0.9	1.8±1.0	-4.2 (-6.9, -1.5)	0.002

Changes from baseline to follow-up in each study group



MR-proANP levels

Purpose: To investigate the effect of liraglutide treatment on MR-proANP, MR-proADM and copeptin in HFrE patients, and to evaluate the possible association with changes in diastolic function.
Methods: The LIVE-study investigated the effects of liraglutide in HFrEF patients. In a double blinded clinical trial, 241 patients with LVEF ≤ 45 % were randomized to receive liraglutide (1.8 mg. daily) or placebo for 24 weeks. For this substudy, MR-proANP, MR-proADM and copeptin were analysed at baseline and after 24 weeks.
Results: LVEF was 34±9% and 31 % had T2D with no difference between study groups (P=0.13, P=0.67 respectively). At baseline, MR-proANP was 201±124 pmol/L, MR-proADM 0.90±0.29 nmol/L and copeptin 9.8 [5.6, 16.4] pmol/L with no difference between study groups (P>0.05 for all). At follow-up,

MR-proANP decreased by approximately 10% (P<0.001) in the liraglutide treated group as compared to no change in the placebo group (P=0.87) with a significant difference in changes between groups (P=0.002, Table 1, Figure 1). Changes in MR-proADM (P=0.10) and copeptin (P=0.52) did not differ between groups. A decrease in E/e' (P=0.03) and left atrial volume index (LAVI) (P=0.002) was observed in the liraglutide treated group as compared to the placebo group. The observed effect on MR-proANP was confined to HF patients with T2D (P=0.003).
Conclusion: Treatment with liraglutide decreased the levels of MRproANP and improved parameters of diastolic function in patients with T2D and heart failure with reduced ejection fraction.

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Improvement of existing strategies to prevent heart failure after myocardial infarction: a potential role for thrombopoietin

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Patients who survived myocardial infarction represent an extremely high-risk group for heart failure development. Currently existing strategies to prevent heart failure (HF) after myocardial infarction include early completed revascularization, optimal medication to prevent rethrombosis, atherosclerosis progression, fibrosis and myocardial remodeling, and biomarker approach to identify patients with increased risk of HF development. Thrombopoietin (TPO) is primarily known as the principle regulator of thrombopoiesis. However, recent studies suggest that TPO possesses pleotropic effects. For instance, several animal model studies provided evidence that TPO reduced cardiac damage caused by doxorubicin.
The purpose of the study was to investigate possible cardioprotective effects of thrombopoietin (TPO) in patients with ST-segment elevation myocardial infarction (STEMI) undergoing percutaneous coronary intervention (PCI), as to improve existing strategies to prevent HF after myocardial infarction.
Methods. 118 male patients with STEMI undergoing PCI were involved in the study. TPO and TPO receptor (MPL) levels were measured serially at admission, after PCI and on the 7th day. At these points, we also measured myoglobin (MYO), troponin I (TNI), creatine kinase MB (CKMB) and brain natriuretic peptide (BNP). Platelet function was assessed by impedance and luminescence aggregometry. Follow-up period was 18 months.
Results. In 57.5 % of patients TPO level at admission exceeded 250 pg/mL (TPO high). Low and high TPO subgroups were comparable by age 59 (46; 68) vs 58 (48; 65) y.o., p = 0.613, frequency of antiplatelet pretreatment (p = 0.694), total ischemic time (p = 0.089) and incidence of comorbidities. Collagen-induced aggregation was weaker in high TPO patients: 2 (1; 5) vs 5(3; 9) ohms, p = 0.049. CKMB, TNI and BNP were significantly lower in high TPO subgroup with p levels = 0.023; 0.050; and 0.032 respectively. This distinction maintained through all period of observation. At baseline patients with high TPO seemed to present more severe course of STEMI: incidence of cardiogenic shock, pulmonary edema, malignant arrhythmias was 28% vs 9%, but at discharge frequency of mid-range and reduced ejection fraction in combination with elevated BNP level was significantly higher in low TPO subgroup (p = 0.014). TPO at admission revealed positive correlation with BNP level at discharge (p = 0.047). There was weak but significant correlation between TPO and time before end-point (HF manifestation, rethrombotic event; R = 0.3, p=0.023). Low TPO indicated higher risk of HF manifestation within follow-up period (OR 1.8 CI 1.1 to 2.3). Conclusion. Received data support hypothesis that TPO possesses cardioprotective effects, and could improve heart failure risk stratification in STEMI patients. Our results encourage further investigation of TPO role in postinfarction heart failure, and the development of TPO and related compounds as cardiac protective agents.

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Plasma Tenascin-C: a novel prognostic biomarker in heart failure with preserved ejection fraction

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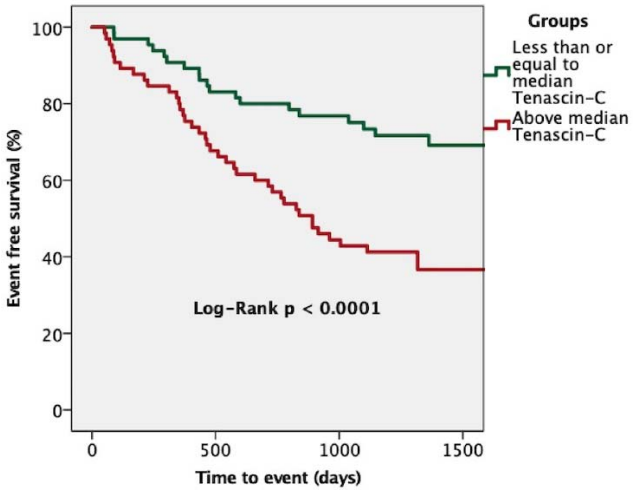
Funding Acknowledgements: National Institute for Health Research Leicester Cardiovascular Biomedical Research Centre overall project Grant (IRS_BRU_0211_20033)

Background: Tenascin-C is reportedly associated with adverse outcomes in heart failure with reduced ejection fraction but its role in heart failure with preserved ejection fraction (HFpEF) is unknown.
Purpose To assess whether plasma Tenascin-C is related to prognosis in HFpEF.
Methods Prospective, observational study of age and sex-matched HFpEF n=130 and controls n=42 (age 73±9, males 50%) who underwent comprehensive phenotyping with plasma biomarkers, cardiovascular magnetic resonance imaging, echocardiography and 6-minute-walk-testing (6MWT).
Results Tenascin-C was higher in HFpEF (13.7 vs 11.1 ng/ml [controls], p<0.0001). During follow-up (median 1428 days), there were 61 composite end-points (21 deaths, 40 HF hospitalizations). 28 univariable predictors were noted (p<0.1). In multivariable Cox regression, Tenascin-C (adjusted hazard ratio [HR] 1.755, 95% confidence interval [CI] 1.305–2.360; p<0.0001) and indexed extracellular volume (HR 1.465, CI 1.019-2.106; p=0.039) were the only parameters that remained significant when added to a base prognostic model comprising age, prior HF hospitalization, diastolic blood pressure, lung disease, NYHA, 6MWT distance, haemoglobin, creatinine, BNP and E/E'.
Conclusions Tenascin-C is a strong prognostic marker in HFpEF

Univariable predictors of outcome

Clinical/imaging parameters	Hazard Ratio (p value)	Plasma biomarkers	Hazard Ratio (p value)
*Age (years)	1.386 (0.009)	Tenascin-C	1.668 (<0.0001)
*Prior HF hospitalization	2.902 (0.001)	Suppression of tumorigencity-2 (ST-2)	1.275 (0.060)
*Diastolic Blood pressure	0.650 (0.002)	Galectin-3	1.263 (0.075)
*Lung disease	1.891 (0.027)	Growth differentiation factor-15 (GDF-15)	1.495 (<0.0001)
*NYHA class III/IV	1.703 (0.033)	Tissue inhibitor of metalloproteinase-1 (TIMP-1)	1.610 (0.002)
*6 minute walk distance	0.659 (0.019)	Matrix metalloproteinase-2 (MMP-2)	1.527 (0.002)
*Haemoglobin	0.727 (0.010)	Matrix metalloproteinase-3 (MMP-3)	1.279 (0.059)
*Creatinine	1.312 (0.018)	matrix metalloproteinase-8 (MMP-8)	1.300 (0.061)
*B-type natriuretic peptide (BNP)	1.471 (0.014)	N-terminal pro-atrial natriuretic peptide (NTpro-ANP)	1.378 (0.025)
*E/E'	1.459 (0.002)	Highly-sensitive C-reactive protein (hs-CRP)	1.358 (0.033)
Left ventricular mass indexed to body surface area (LVMI)	1.296 (0.046)	Tumour necrosis factor receptor-1 (TNFR-1)	1.330 (0.028)
Maximal left atrial volume indexed to body surface area(LAVImax)	1.237 (0.059)	Cystatin-C	1.778 (0.002)
Extracellular volume (ECV)	1.519 (0.018)	Neutrophil gelatinase-associated lipocalin (NGAL)	1.573 (0.001)
Extracellular volume indexed to body surface area (iECV)	1.516 (0.010)		
Presence of myocardial infarction on late gadolinium enhancement imaging	1.670 (0.088)		
*Parameters comprising the base prognostic multivariable model			



Kaplan-Meier survival analysis

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Phosphodiesterase 9A - novel biomarker or potential therapeutic target in patients with heart failure and preserved ejection fraction?

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Rationale:
Increasing cyclic guanosine monophosphate (cGMP) levels in cardiomyocytes has been suggested as a potential therapeutic approach in patients with heart failure (HF) with preserved ejection fraction (HFpEF). Phosphodiesterase 9A (PDE9A) was recently identified as a novel nitric oxide-independent regulator of cGMP in murine models of hypertrophic heart disease.
Objective: We aimed to characterize PDE9A expression in endomyocardial biopsies (EMB) and peripheral blood mononuclear cells (PBMNC) from patients with different HF phenotypes.
Methods and Results: EMB and PBMNC were obtained from a derivation cohort of patients with HFpEF (n=24), HF with reduced ejection fraction (HFrEF, n=22), inflammatory cardiomyopathy (iCMP, n=24) and patients without HF (n=5). PDE9A expression was increased in EMB and PBMNC from patients with HFpEF as compared to other HF phenotypes or subjects without HF. Endomyocardial PDE9A expression correlated with the inflammatory cell count on EMB, but not with cardiac fibrosis or left ventricular diastolic wall stress. PDE9A expression in PBMNC was increased in patients with higher hsCRP levels and in response to pro-inflammatory stimulation. As a validation cohort, 719 patients with HFpEF and 1,106 subjects without HF were identified from the LIFE-Heart study. PDE9A expression data in PBMNC from this cohort were obtained from a gene expression array and displayed an age-dependent distribution. Following age adjustment, PDE9A expression in PBMNC conferred increased risk for HFpEF with a lower confidence interval for the main effect of 5.9. Notably, lower PDE9A expression in PBMNC was associated with worse survival in patients with HFpEF.
Conclusion: The present findings suggest an inflammation-associated increase in PDE9A expression in EMB and PBMNC from HFpEF patients, with higher PDE9A expression in PBMNC being associated with disease risk after age adjustment, but lower mortality. Whereas PDE9A appears as a marker of prognostic and potential pathophysiological relevance in HFpEF, its role as a treatment target requires further investigations.

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Evolution of low risk natriuretic peptide to higher risk - Do we have a phenotype?

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On behalf of: STOP HF
Funding Acknowledgements: Heartbeat Trust, Ireland

INTRO Natriuretic Peptide (NP) is a strong independent risk factor and predictor of cardiovascular (CV) events. Being a surrogate marker of risk and inherently one of ventricular stretch it also provides assurances related to lower risk once values remain low. The natural history of NP in low NP patients has yet to be defined. Establishing when to retest NP may be a useful way of mapping risk in a sub-population with CV risk factors. PURPOSE Using the STOP-HF cohort we examined the natural history of patients with initially low values of NP to determine the transition frequency to higher risk status and thereby determine retest intervals. METHODS In our retrospective study we utilised the STOP-HF population. Low risk patients (LPs) were defined as those with an initial NP<40 pg/ml, a choice reflecting a value significantly below the cut-off used for intervention in high risk patients in STOP-HF. Transitioners (Ts) were defined by a NP of <40 with a NP >50pg/ml upon repeat annual reassessment. We compare Ts to LPs with a focus on retest intervals and a comparison of hospitalisations for CV and nonCV events. RESULTS Population total of 661 LPs and 171 Ts. Ts were older (54 vs 65, p<0.001), 43% were male (p=0.521). Comorbidity was similar between the groups; DM 22%, HTN 62%, stroke/TIA 4%, atrial fibrillation 1%. NP levels were higher in Ts (11 vs 23 p<0.001). Ts had lower mean heart rate (73 vs 69, p<0.001), but were more likely to be on a beta blocker (15 vs 26%, p<0.001). Ts were prescribed more non-RAAS BP lowering medications (39 vs 49%, p<0.019) with no difference in RAAS medications (ACE/ARB, p=0.768). LAVI was higher in Ts (23 vs 26, p<0.001). Otherwise there were similar ECHO parameters (LVEF>55%). Approximately 4% of patients with an initial BNP<40 transitioned (any BNP>50) each year. From our cox-proportional hazards model, transition potential was dependent on baseline BNP. Those in 10-20 group were 2.5 times more likely versus <10 group. Those in 20-40 group were 7.5 times more likely versus <10 group. To keep the percentage of Ts under 5% at follow-up, recheck BNP should occur at 4 years for those with BNP <10, at 2 years for those with BNP 10-20 and at 1 year for those with BNP 20-40. Event rates were measured from the time of initial NP measurement. Via basic non parametric testing CV (p<0.036) and nonCV admissions (p<0.048) were more frequent in Ts. Events become less significant when correcting per 1000 patient-years and controlling for covariates of age, sex and BNP at baseline. CONCLUSIONS Transition to higher NP occurs in 4% of the population annually. Ts had higher baseline NP, were older, were more frequently on non-RAAS BP medication or beta blockers and had higher LAVI on ECHO. Retest frequency should be pursued at 1, 2, or 4 years respective of baseline BNP to keep the percentage of Ts under 5% at follow up. Retest intervals have been defined to allow for effective re-screening of this changing risk status population.

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Biomarker correlates of coronary microvascular dysfunction and diastolic dysfunction in heart failure with preserved ejection fraction

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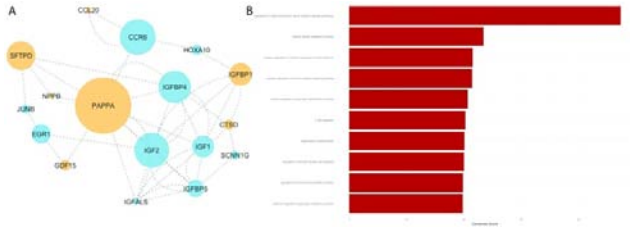
Background. Limited data is available on the pathophysiological mechanisms and the role of underlying coronary microvascular (CMD) in heart failure with preserved ejection fraction (HFpEF). Therefore, we studied biomarker profiles associated with CMD and associations between left ventricular systolic and diastolic dysfunction and structural derangements in HFpEF.
Methods. We measured 268 biomarkers from different pathophysiological domains (e.g. inflammation, oxidative stress) in 192 patients with stable HFpEF from the prospective PROMIS-HFpEF study. Coronary flow reserve (CFR) was measured with adenosine stress transthoracic Doppler echocardiography. Elastic net regression analyses combined with network and pathway overrepresentation analyses were used to identify key pathophysiological biomarkers and mechanisms associated with CFR as well as global longitudinal strain (GLS), lateral E' and left atrial volume indexed to body surface area (LAVi).
Results. In total, 11 biomarkers were significantly associated with CFR with the strongest predictors being N-terminal pro B-type natriuretic peptide (NT-proBNP),

growth differentiation factor 15 (GDF15), insulin-like growth factor binding protein 1 (IGFBP1) and surfactant protein D (PSPD). Only NT-proBNP was significantly associated with both CFR, LAVi, lateral E' and GLS (P <0.001 for all). Network analyses showed that Pappalysin-1 (PAPPA) was an important hub (Figure A). Insulin-like growth factor receptor pathways and T-cell migration were most strongly associated with CFR (Figure B) in pathway overrepresentation analyses.
Conclusions. In HFpEF, CMD is associated with a unique biomarker profile, related to T-cell migration and insulin-like growth factor receptor signaling. These data highlight IGF signaling and immune cell trafficking as distinct pathophysiological correlates of CMD in HFpEF



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Serum endotrophin levels in heart failure patients with reduced ejection fraction; a preliminary study

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Introduction: Endotrophin, a type VI collagen cleavage product, induces fibrosis, insulin resistance and has tumour-promoting effect. Collagen VI plays a role in cardiac fibrosis. In this study, we aimed to investigate the role of endotrophin in the pathogenesis of cardiac fibrosis by determining its levels in heart failure patients with reduced ejection fraction. We also aimed to determine the possible association between endotrophin and treatment that prevent ventricular fibrosis.
Materials and Methods: Sixty heart failure patients with reduced ejection fraction and twenty-seven volunteers with no cardiac failure were included in this study. In both groups, complete blood count, creatinine, triglyceride, total cholesterol, low density lipoproteins cholesterol, high density lipoproteins cholesterol, glucose, ejection fraction and endotrophin levels were measured. Body mass indexes were calculated. In the determination of Endotrophin levels Enzyme-Linked Immuno Sorbent Assay (ELISA) was performed.
Results: There was no significant difference between the patient and the control groups in endotrophin levels (p:0.35). Participants in the study were divided into three groups according to their ejection fractions: 30% and less, 30-50% and >50% (the control group). These three groups were again divided into two groups, seperately according to usage of renin-angiotensin-aldosterone system blocking drugs. In %30-50 EF Group (p:0,04) and >50% EF Group (p: 0.03), endotrophin levels were significantly statistically lower in patients using renin angiotensin aldosterone system blockers than the patients not using renin angiotensin aldosterone system blockers.
Conclusion: This study is the first study evaluating the relationship between endotrophin and heart failure in the literature. Endotrophin levels were found to be low in the patients using the renin-angiotensin-aldosterone system blockers with heart failure. This may suggest that renin-angiotensin-aldosterone system blockers may affect endotrophin levels and it could have a role of remodelling prevention.

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Global longitudinal strain predicts future cardiovascular hospitalizations and death in patients with non-ischemic cardiomyopathy and recovered left ventricular ejection fraction: a multicenter study

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Background: Patients with recovered left ventricular ejection fraction (LVEF) remain at increased risk for adverse outcomes but we currently have very limited tools to risk stratify them. A prior single center analysis showed that in this patient population an absolute Global Longitudinal Strain (aGLS) ≥ 16 correlates with a decreased risk of redeveloping a depressed LVEF (<50%). However, it is unknown whether this translates into a reduced risk of adverse outcomes.
Purpose: To test the hypothesis that in patients with non-ischemic cardiomyopathy (NICM) and recovered LVEF, aGLS ≥ 16 is predictive of future cardiovascular hospitalizations and all-cause mortality.
Methods: We combined databases from 3 tertiary centers in 2 different countries and identified patients with NICM who initially had a reduced LVEF (<50%), but whose LVEF had increased by at least 10% and normalized (LVEF >50%). Speckle tracking GLS was quantified at the time of LVEF recovery and studied in relation to cardiovascular hospitalizations and death during follow-up.
Results: We identified 222 patients meeting inclusion criteria. Mean reduced LVEF was 31 ± 9%, mean LVEF at the time of EF recovery was 55% (Range 50 to 72), mean aGLS at the time of EF recovery was 13.6 (range 4.1 to 22.7). During a mean follow up of 5.5± 2.74 years, 80 patients had at least one hospitalization for cardiac causes and 39 patients died. During follow up, patients with aGLS ≥ 16 at the time of LVEF recovery had a lower probability of experiencing cardiovascular hospitalizations or death (Odds Ratio 0.50, 95% CI 0.28-0.90, p=0.02). In a time to event analysis, patients with aGLS ≥ 16 had also a lower risk of death for any cause in the first 5.5 years since normalization of LVEF (Log-Rank p<0.01, Fig 1). The reduction in mortality risk persisted with longer follow up but lost statistical significance (p=0.22).
Conclusions: GLS has important prognostic significance in HF patients with non-ischemic cardiomyopathy and recovered LVEF. An abnormal GLS in the setting of recovered LVEF portends an increased risk of cardiovascular hospitalizations and death.

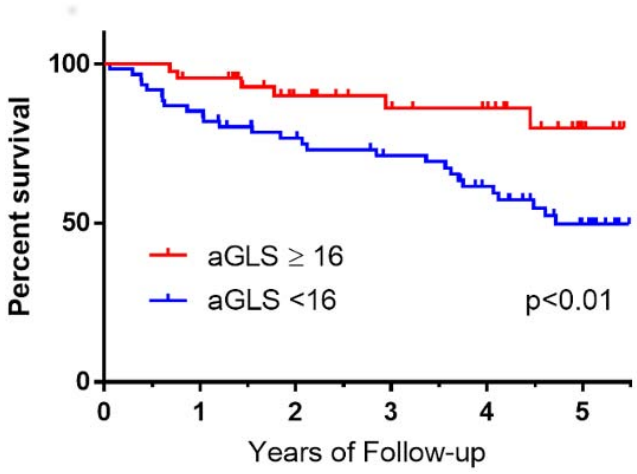

Figure 1

Clinical Case Award - Unusual heart failure presentations: teach the teachers

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An unusual case of giant cell myocarditis managed with immunosuppression and left ventricular assist device

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We describe the case of a 55-year-old female presenting with symptoms of chest tightness and palpitations. Evaluation revealed low-level troponin elevation, non-sustained ventricular tachycardia, and reduced left ventricular ejection fraction. Cardiac catheterization performed during her initial evaluation ruled out coronary artery disease. During a subsequent admission for ventricular tachycardia, she underwent cardiac magnetic resonance imaging, which showed diffuse patchy transmural delayed hyperenhancement compatible with infiltrative cardiomyopathy with a left ventricular ejection fraction of 32.8%, and received a dual chamber implantable cardioverter-defibrillator. Due to concern for myocarditis she underwent endomyocardial biopsy, which revealed a predominantly lymphocytic infiltrate in the cardiac interstitium with no eosinophils or granulomas and multiple areas of myocyte damage suggestive of Lyme carditis, though serologies were negative. She progressively declined over the following year and underwent implantation of a left ventricular assist device (LVAD) as a bridge to transplant. During surgery, a left ventricular apex core biopsy was performed with findings consistent with giant cell myocarditis (GCM) as shown in Figure 1. Unfortunately, she developed high levels of preformed antibodies as a result of surgery, which limited donor availability. She was initially treated with mycophenolate to reduce the antibody burden, it was not effective and she developed leukopenia so was discontinued after a year. She was then treated with rituximab, intravenous immunoglobulin, and plasma exchange for the 4-year interval until transplant. During this time, she experienced a reduction and then stabilization of symptoms and an increase in systolic function, however she was unable to tolerate wean of LVAD support. She was ultimately transplanted at age 60, she is now four years post transplant without evidence of recurrent GCM.

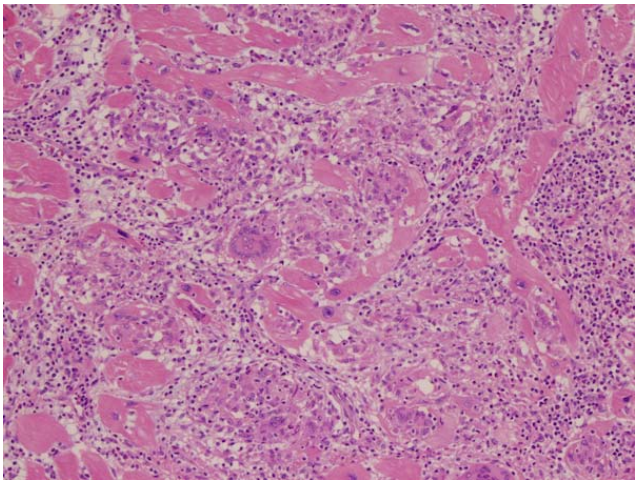

Figure 1

The search is ongoing for accurate and timely ways to diagnose and effectively treat GCM. Randomized clinical trials evaluating immunosuppression regimens to manage GCM face challenges in enrollment due to the rare nature of the disease. This case describes an atypical presentation of giant cell myocarditis, where cardiac function deteriorated over more than a year. Management with LVAD and immunosuppression resulted in significant improvement in cardiac function, though insufficient to allow device explant. This benefit was observed in the setting of using an alternative immunosuppression regimen to what has often been reported for GCM. This case adds to the evidence of alternative treatment modalities outside of immunosuppression that may support functional and symptomatic recovery as well as prolonging time to transplant.

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Sudden cardiac death: a case of fulminant myocarditis

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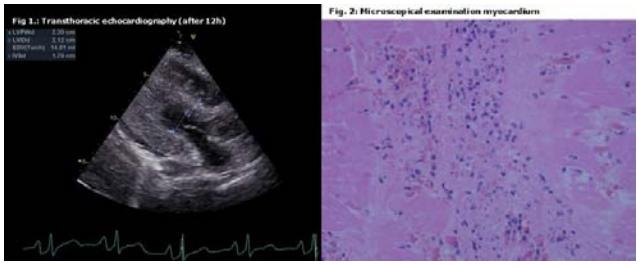
Introduction: A 31-year-old man collapsed while driving his car, without any warning signs. His co-driver immediately started basic life support. The first documented rhythm was ventricular fibrillation (VF). Repeated external defibrillation was unsuccessful and resuscitation was continued while patient was transported to the hospital.
Management: Veno-arterial extracorporeal life support was initiated after a resuscitation time of 90 minutes. Quick-look transthoracic echocardiography (TTE) displayed an akinetic heart without major signs of hypertrophy. Coronary angiography demonstrated normal coronary arteries. TTE 12 hours later showed extensive wall thickening and a depressed systolic function (EF<10%, fig. 1). Despite optimal medical treatment and circulatory support, brain death was diagnosed 48 hours after admission and the patient died after withdrawal of life support.
There was no relevant medical or family history. Autoimmune and toxicological screening came back negative. At necropsy, the heart weighed 520 grams. The left ventricular wall was thickened. The myocardium had grey-yellow streaks due to hemorrhagic and necrotic tissue. Microscopical examination revealed fulminant lymphocytic infiltration and myocytolysis (fig. 2). Postmortem viral PCR on the myocardial tissue was negative.
Differential diagnosis: Sudden cardiac death (SCD) is usually caused by an acute coronary syndrome (ACS). However, the patient had no risk factors and coronary angiogram ruled out ACS. Structural heart disease can also cause SCD, but TTE on admission showed normal ventricular dimensions. Nevertheless, pronounced myocardial hypertrophy was documented on TTE 12 hours after admission. Given the autopsy results, this is likely due to severe myocardial edema caused by fulminant myocarditis, which likely caused the VF. Underlying genetic cardiac conditions are possible, but genetic examination is still ongoing.



Conclusion: Myocarditis is a not uncommon cause of SCD. Patients mostly have symptoms such as chest pain or heart failure. Rarely, SCD may be the first presenting symptom. Echocardiographic signs suggestive of myocarditis can be absent on admission, but can evolve quickly. TTE is necessary in the workup for myocarditis and should be repeated if there is a high index of suspicion. Current guidelines advocate endomyocardial biopsy when myocarditis is complicated by life-threatening arrhythmias. In this case, the lack of structural myocardial abnormalities on

admission was deemed sufficient to withhold myocarditis as a possible cause of SCD. PCRs for cardiotropic viruses were negative, but tissue was obtained after patient passed away.
This case should alert clinicians to the possibility of myocarditis as cause of SCD and repeat TTE if no definite diagnosis has been made. There should be a low threshold to perform an endomyocardial biopsy and start cardiogenetic work-up in the acute setting if coronary atherosclerosis is ruled out in patients with VF.

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Constrictive pericarditis secondary to prior Mycobacterium tuberculosis infection: the use of multimodality imaging to guide pericardectomy

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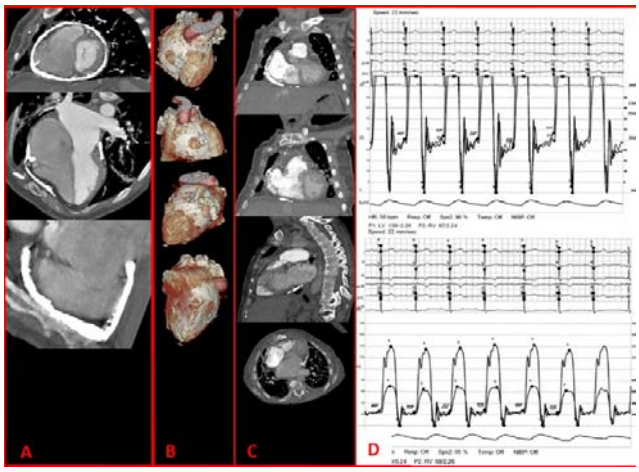
A 66-year-old Somalian lady, with regular non-attendances to cardiology follow up, presented to the Emergency Department with decompensated right heart failure symptoms. Her past medical history was significant for congestive cardiac failure (diagnosed in 2001), previous pulmonary Mycobacterium tuberculosis infection, fully treated in 1990. On examination, she had significant bilateral pitting peripheral oedema up to the sacrum area, as well as evidence of moderate ascites. Her JVP was elevated at 10cm, and a third heart sound as well as a pericardial knock was present with positive Kussmaul sign. Initial bloods demonstrated a Brain Natriuretic Peptide (BNP) of 437pg/ml, the admission chest x-ray showed cardiomegaly and pericardial calcification. Transthoracic echocardiography demonstrated a constrictive physiology with a good systolic left ventricular function. The RV longitudinal function was reduced with moderate tricuspid, and elevated pulmonary artery pressure estimated at 50-55 mmHg.
She was established on a high dose of diuretics, and her heart failure medications were optimised as her fluid balance normalised over the course of a few weeks.
As her symptom burden had decreased, further investigations were undertaken to confirm the aetiology of the heart failure and to discuss her further management.
Coronary angiogram with right and left cardiac catheterisation was undertaken. The right heart catheterisation showed equalization of the diastolic pressure in both left and right ventricles with square root sign and interventricular dependence on deep inspiration (Fig 1. D) . The left ventricular rapid filling wave was noticed to be very deep. The right atrium showed M shape morphology with prominent X and Y descent. and the left heart catheter showed non-obstructive coronary arteries.
Following this, she underwent a functional ECG gated cardiac CT angiography to identify the relationship of the pericardial calcification with the myocardium. The scan demonstrated extensive pericardial calcification surrounding predominantly the right ventricle with some calcified protrusion into the right ventricle free wall (Fig 1. A pre-operative CCTA).
As a result, pericardiectomy was offered with an accepted mortality of 8-12% and an acknowledgement of the potential difficulty in resecting the entire pericardium due to local calcific infiltration of the myocardium into the right ventricle. The patient made an informed decision to proceed and had an uncomplicated partial pericardiectomy and a subsequent marked reduction in symptom burden (Fig 1. C post-operative CCTA).
In conclusion, multimodality imaging techniques not only have an important role to play in the diagnosis of constrictive pericarditis and planning of pericardiectomy, but also in helping clinicians to better determine the peri- and intra-operative risks to allow the patient to make a better informed decision.



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Double trouble: when a thrombus save your life

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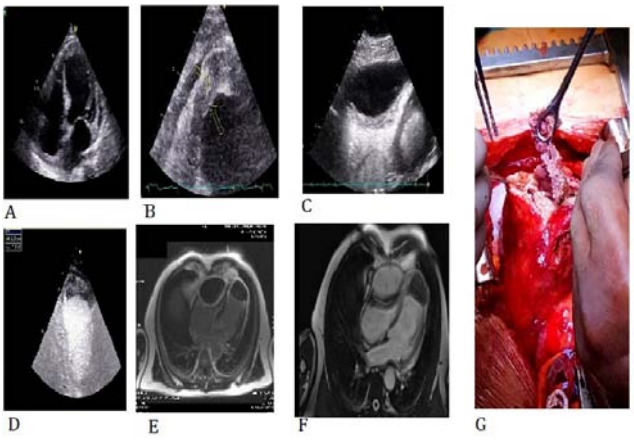
Funding Acknowledgements: No financial support.

We report a case of a 72-year-old man, who was admitted to intensive care unit from cardiac rehabilitation institute for dizziness and acute onset of pericardial effusion. He had suffered from subacute anterior wall myocardial infarction one month earlier, underwenting unsuccesful revascularization of left anterior descending coronary artery (and succesful PTCA on RCA). The patient was discharged on DAPT and oral anticoagulant for apical thrombosis (figure A-B), with moderate systolic dysfunction and no pericardial effusion.
The patient was asymptomatic at rest, hemodinamically stable; no heart murmurs were audible and no paradoxical pulse was found.Echocardiography showed severe pericardial effusion causing compression of right ventricle free wall (maximal diameter 5.2cm) associated with persistence of left ventricle apical thrombosis; contrast administration showed no pericardial blush excluding a communication with ventricular cavity (Figure C-D).
We performed cardiac magnetic resonance that showed a "double trouble" (Figure E – F): Cine images confirmed the presence of severe hematic pericardial effusion with compression of mid and basal right ventricle free wall and massive left ventricle apical thrombosis (5.09x3,27cm).
The patient was referred to heart surgeon; during surgery a communication between left ventricle apical wall and pericardium was found, closed by a large apical thrombus. The surgeon succesfully performed left ventriculoplasty and pericardial drainage (Figure G).
Surgery confirmed our pathophysiological hypotesis of a sudden left ventricle rupture with pericardial hemorrage, which was immediately closed by apical thrombosis.



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The price of emulating Hercules: mephentermine associated cardiomyopathy (MAC)

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PRESENTATION: A 32-year-old professional bodybuilder presented with acute decompensated heart failure preceded by progressively worsening exertional dyspnea for 3 months. He gave history of anabolic androgenic steroids (AAS) use for more than 2 years and mephentermine use for the past 3 months (coinciding with the symptom onset). Examination revealed features of decompensated heart failure - tachycardia (HR 116/min), tachypnea (RR 26/min), hepatomegaly, pedal edema and elevated jugular venous pressure. Auscultation revealed left ventricular (LV) third heart sound and bilateral crepitations.
INVESTIGATIONS: He had polycythemia (Hb 18.2 gm/dL), neutrophilic leukocytosis (TLC 13400) and raised SGOT/SGPT levels. NT-proBNP level was increased (3280 pg/mL). Troponin-I and CPK-MB levels were within normal limits. Chest radiograph showed cardiomegaly with pulmonary venous hypertension (Figure 1A). Electrocardiogram showed sinus tachycardia and LV enlargement, with no evidence

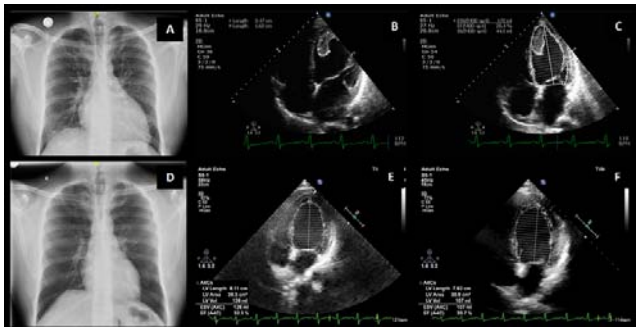
of ischemia/infarction. Transthoracic echocardiograph showed a large pedunculated, mobile thrombus (3.47x1.62 cm) attached to the ventricular apex with severe biventricular dysfunction (LVEF 20.4%) (Figure 1B-1C).

CLINICAL COURSE: He had an embolic stroke during hospital stay, with complete neurological recovery within 6 hours. MRI brain done later showed infarcts in left parietal lobe and right cerebellum. Over the next 2 weeks of hospital stay, his functional status improved to NYHA class II. At discharge, his LVEF was 25%, with significant reduction in the clot size. He was discharged on torsemide, eplerenone, ramipril, carvedilol and warfarin.

Following cessation of mephentermine use, there was steady improvement in his functional status along with resolution of chest radiograph changes (Figure 1D) and LV function improvement over a follow-up of 2 months (LVEF 32.3%) (Figure 1E). At the next follow-up (3 months), his ventricular function showed deterioration (EF 20.7%) (Figure 1F). On repeated questioning, he confessed to have started mephentermine reuse for 2 weeks. He was referred to Psychiatry department for mephentermine deaddiction.

MAC HYPOTHESIS: Though AAS abuse by athletes leading to such a presentation has been documented, similar role of mephentermine has not been reported. Deterioration of cardiac function in rat model with nor-epinephrine infusion, in humans by methamphetamine (which bears structural and physiological resemblance to mephentermine) use and in pheochromocytoma (a hyperadrenergic state similar to that created by mephentermine use) provide proof of concept for Mephentermine Associated Cardiomyopathy (MAC). Because of strong biological plausibility and temporal correlation, we conclude that in our patient, mephentermine caused the reversible cardiomyopathy.

CONCLUSION: Mephentermine addiction potential is being increasingly recognised, and increased awareness regarding the entity of Mephentermine Associated Cardiomyopathy (MAC) is warranted.



Chest radiograph and 2D Echocardiograph

Rapid Fire 3 - Acute heart failure

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The discriminative power and optimal diagnostic thresholds of NT-proBNP in patients admitted with acute heart failure-related signs and symptoms: a prospective observational study

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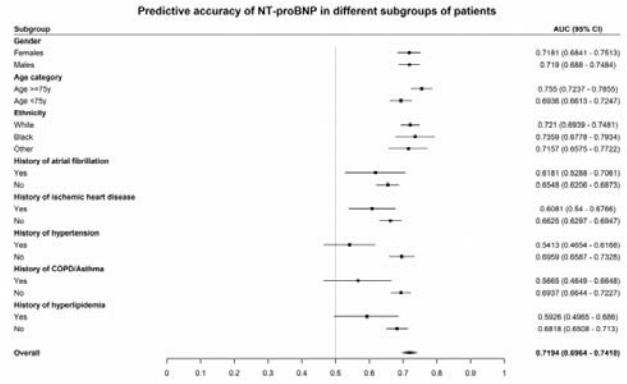
Background: A prompt diagnosis of acute heart failure (AHF) is challenging in patients presenting to Emergency Department (ED) with AHF-related signs and symptoms and plasma NT-proBNP has been shown to be effective as a rule-out test. However, few non-UK studies have explored the discriminative power of this test.
Purpose: We sought to determine the diagnostic power of NT-proBNP in patients presenting acutely with HF-related symptoms in a UK hospital setting.
Methods: This is a prospective single-center observational study of 1995 consecutive patients who attended the ED with AHF-related symptoms during 12 months. They all had NT-proBNP measured and the diagnosis of AHF versus other conditions was adjudicated by the multidisciplinary Heart Failure Team. Receiver operating characteristic (ROC) curves analysis was used. The area under the curve (AUC) and its respective 95% confidence intervals (CI) was used to assess the discriminative power of NT-proBNP. Optimal NT-proBNP thresholds for each ROC curve were estimated based on the F1 score.



Predictive accuracy of NT-proBNP

Results: Among 1995 patients presenting with AHF-related symptoms 730 had a final diagnosis of AHF and a median NT-proBNP 4223pg/ml (IQR: 8670pg/ml) while 1265 were diagnosed with other conditions and had a median NT-proBNP 1257pg/ml (IQR: 3056pg/ml). The test had a fair discriminative power for AHF [AUC: 0.7194 (95%CI: 0.6964 - 0.7418)] acute decompensation of chronic HF (CHF) [AUC: 0.7135 (95%CI: 0.6837 - 0.7437)] and denovo AHF [AUC: 0.7238 (95%CI: 0.6976 - 0.7494)] versus other conditions. The same was true for HF with reduced ejection fraction (HFrEF) and HF with mid-range ejection fraction (HFmrEF) versus other conditions [AUC: 0.7738 (95%CI: 0.7473 - 0.7997) and 0.7302 (95%CI: 0.691 - 0.7669) respectively]. However, for patients with HF with preserved ejection fraction (HFpEF) the test did not perform well [AUC: 0.6341 (95%CI: 0.5993 - 0.6669)]. The optimal NT-proBNP threshold for AHF was 955pg/ml (specificity: 43.87%, sensitivity: 85.62%, accuracy: 59.15%, negative prognostic value: 84.09%, F1 score: 0.605). The test had significantly higher predictive power for patients over 75 years vs younger (AUC: 0.755 vs 0.6936, p= 0.0064) but there was no difference in gender, ethnicity, history of atrial fibrillation (AF) or ischemic heart disease (IHD). It had no discriminatory capacity for patients with hypertension or COPD/asthma. Males had higher optimal threshold than females (1258 vs 874pg/ml) and black patients lower than white (508 vs 955pg/ml).
Conclusions: In a large sample of UK patients who attended the ED with AHF-related symptoms, NT-proBNP was helpful in discriminating between AHF and other conditions, but its predictive power was not satisfactory (AUC<0.80). Its power was significantly higher in older patients but did not differ by gender or ethnicity. Finally, the optimal NT-proBNP threshold was significantly higher than the proposed 300pg/ml in the entire cohort and across all subgroups.

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Compeering of predictive accuracy for 30, 90 and 365-day Heart Failure readmission assessed by impedance technique and NT-proBNP. Results of IMPEDANCE-HF extended trial

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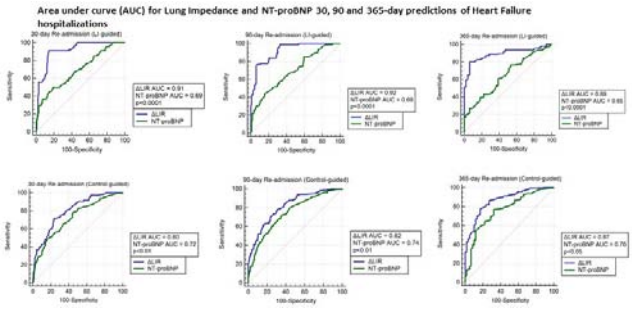
The aim of secondary analyses of the IMPEDANCE-HF extended trial was to find out if residual congestion on discharge for HF could predict 30-day and one-year Heart Failure death.
The analysis of IMPEDANCE-HF extended trial was based on the data collected during the index hospitalization for HF. The IMPEDANCE-HF extended trial was a randomized controlled single-blinded trial of HF with reduced LVEF patients. Inclusion criteria were LVEF ≤ 45%, NYHA class II-IV and patients were hospitalized for HF within 12 months (ClinicalTrials.gov NCT01315223). Half of the patients (N=145) were assigned to the active Lung Impedance (LI)-guided treatment arm where clinicians were based therapy on LI level. The other half was assigned to the control arm where LI values were recorded but not conveyed to the clinical treatment team. In the case of hospitalization, LI was recorded in all patients at discharge. The decisions regarding discharge and choice of treatment were at the discretion of the hospital staff.
A non-invasive impedance device was used in this study to assess the lung fluid content. Unlike the existing impedance devices, the present device has the ability to differentiate a true signal from the lungs from the noise signal of surrounding chest wall. Such approach enables to measure a small change in lung fluid content. A method to determine individual "dry" baseline LI (BLI) for each HF patient has been reported. BLI for each patient was used to calculate a new parameter, the LIR= [(current LI/BLI)-1] ×100%, which determinate the degree of pulmonary congestion in time of measurement.



Area under curve

Method. Degree of pulmonary congestion at discharge for HF hospitalization was divided into 5 brackets. (1) LIR= 0 to – 18% - minimal interstitial edema (IE), (2) LIR= - 18.1 to -28% - mild IE, (3) LIR= -28.1 to – 38 – moderate IE, (4) LIR= -38.1 to -48% - severe IE to mild alveolar edema (AE) and (5) LIR < -48.1% - moderate AE.
Results: LI-guided patients were followed for 61.9.4±39.6 months and control patients for 46.7±33.3 months (p<0.01) accounting for 269 and 470 HF hospitalizations, respectively (p<0.01). Predictive accuracy of 30, 90 and 365-day readmission was assessed by calculating area under curve for Lung Impedance method and for NT-proBNP for both groups separately. Results are presented on figure.
Conclusion The degree of pre-discharge pulmonary congestion as assessed by LI is a better predictor than pre-discharge values of NT-proBNP for 30, 90 and 365-day HF readmission.

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Improving diuresis and dropsy with elamipretide in advanced heart failure (IDDEA-HF); a multi-centre, double-blind, placebo-controlled trial

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Background: Most trials of 'acute' heart failure have focussed on dyspnoea as the primary symptom but many patients are admitted to hospital for increasing peripheral oedema reflecting both deteriorating cardiac function and renal water and salt retention. The myocardium and kidney are metabolically active and produce a substantial amount of ATP. However, defective mitochondrial electron-transport chain (ETC) function impairs ATP production and increases oxygen free-radical production. Elamipretide is designed to repair the cardiolipin scaffold on which the ETC sits, which might improve function and ATP production and thereby therapeutic response to conventional therapy for heart failure.
Purpose: to discover whether administration of Elamipretide enhances the resolution of congestion in patients with worsening heart failure.
Methods: a randomised, double-blind, placebo-controlled trial of Elamipretide 20mg given as a one hour infusion repeated daily for up to seven days to patients with heart failure and an LVEF ≤40% within 48 hours of an admission for worsening peripheral oedema. The primary endpoint was the slope of the decline in logNT-proBNP from baseline to Day 8.
Results: of 306 randomised patients, 22% were women, median (IQR) age was 70(63-78) years and LVEF was 30(24-35)%. The primary aetiology of ventricular dysfunction was ischaemic heart disease in 45%, dilated cardiomyopathy in 27%, hypertension in 14% and other in 13%; 52% were in a rhythm other than sinus. Treatment at baseline included loop diuretics (100% - median dose in 24 hours before randomisation in furosemide equivalents - 480mg/day), MRA (78%), ACEi (73%), ARB 14%, beta-blockers (89%), digoxin (22%) and hypoglycaemic therapy (37%). At randomisation, respiratory rate 20(18-23)bpm, heart rate 76(68-86)bpm, systolic blood pressure 120(108-130)mmHg, haemoglobin 13.2(11.6-14.6)g/dL and eGFR 51(40-66)ml/min/1.73m2 were similar for each group. NT-proBNP [5,333(2,855-11,337)ng/L] and CA125 [92(31-224)U/mL] were grossly elevated.
Over eight days, the decline in NT-proBNP was similar (p = 0.414) in patients assigned to placebo [from 6,653(3,085-10,586) to 3,639(1,990-7,922)ng/L] and Elamipretide [from 5,236(2,562-10,210) to 3,486(1,771-6,402)ng/L]. Weight declined by 4.7(6.7-2.5)Kg, median eGFR did not change [+1(-5-7) ml/min/1.73m2] and congestion score improved markedly but changes were similar for placebo and Elamipretide. Doses of diuretic during the study were also similar for each group.
Median length of admission was similar [9 (8-10) versus 10 (8-12)days]. Within 40 days of randomisation, 16 patients assigned to placebo and 10 assigned to Elamipretide were re-hospitalised for heart failure or had a cardiovascular death [HR 0.66(0.29-1.5); p=0.317].
Conclusions: This trial suggests that short-term administration of Elamipretide does not substantially enhance the effects of conventional treatment for congestive heart failure.

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BIS equation of glomerular filtration rate in the prediction of hospitalization and mortality in older patients with heart failure

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Introduction: Renal dysfunction (RD) is a predictor of adverse outcomes in heart failure (HF). There are several equations to estimate glomerular filtration rate (eGFR), namely the recent Berlin Initiative Study creatinine-based (BIS) formula, developed in ≥70 years old patients; the chronic kidney disease epidemiology collaboration creatinine-based (CKD-EPI) formula; and the Modification of Diet in Renal Disease (MDRD) formula. This study compares different eGFR equations in the prediction of adverse outcomes in older patients with HF.
Methods: All patients with ≥70 years admitted for acute HF in a Cardiology Department during 7 years were included. Admission creatinine levels were used to calculate eGFR, using BIS, CKD-EPI and MDRD formulas. Patients were classified into normal renal function/mild RD if eGFR≥60mL/min/1.73m2 or moderate/severe RD if eGFR<60mL/min/1.73m2. The follow-up (FU) was of 24 months. The primary endpoint (EP) was a composite of all-cause mortality or hospitalization for HF. Statistical analysis used chi-square, Mc Nemar and Mann-Whitney U tests; Kaplan-Meier curves and log-rank tests; Cox proportional hazards regression; and ROC curves to estimate the area under the curve (AUC) for the 3 eGFR formulas.
Results: 815 patients were studied (54.2% female, mean age 81.1±6.2 years). eGFR mean values as measured by the BIS, CKD-EPI and MDRD formulas were 45.95±16.59, 50.85±21.37 and 56.57±25.73 mL/min/1.73m2, respectively. The prevalence of eGFR<60mL/min/1.73m2 was different with the 3 formulas: 80.6% with BIS, 66.7% with CKD-EPI and 60% with MDRD (p<0.001).
Mortality during FU was 9.6%, and was associated with older age (p<0.001); chronic obstructive pulmonary disease (p<0.001); lower systolic blood pressure (p=0.005); lower hemoglobin (p=0.027) and albumin (p=0.021) levels; higher urea (p=0.049), potassium (p=0.012) and blood natriuretic peptide (p<0.001) levels. Mortality was associated with lower eGFR calculated with BIS (p=0.035), but not with CKD-EPI (p=0.096) or MDRD (p=0.152) equations. In survival analysis, there was a significant decrease in primary EP in patients with eGFR≥60 mL/min/1.73m2 using BIS (p=0.002), CKD-EPI (p<0.001) and MDRD (p=0.001) formulas. The unadjusted hazard ratio for reduction in primary EP was 0.984 (p<0.001) for BIS, 0.988 (p<0.001) for CKD-EPI and 0.991 (p=0.001) for MDRD. The BIS equation showed the best discriminatory power of the 3 formulas for prediction of both primary EP (AUC 0.609, 95% CI 0.566-0.650) and mortality during FU (AUC 0.574, 95% CI 0.531-0.616), and outperformed all other equations (p<0.001 in all comparisons).
Conclusion: In this study, BIS eGFR equation was a predictor of primary EP and mortality during FU in older patients with acute HF, and had the best predictive power, when compared to other commonly used formulas. Therefore, BIS should be considered to estimate renal function in these patients, as its use could translate into better risk prediction.

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Incident hyperkalemia and RAAS-inhibition during an acute heart failure hospitalization

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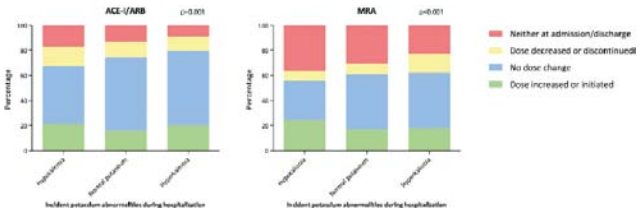
Background: Hyperkalemia is common in patients with heart failure but data on the association between incident hyperkalemia during AHF hospitalizations and up- or down-titration of renin–angiotensin–aldosterone-system (RAAS) inhibitors are scant.
Methods: Serum potassium levels were measured daily from admission until discharge or day 7 in 1589 patients from the PROTECT trial. Incident hypokalemia was defined as at least one episode of potassium <3.5 mEq/L and incident hyperkalemia >5.0 mEq/L. Primary outcome was all-cause mortality at 180 days.
Results: Mean serum potassium levels increased from 4.3±0.6 mEq/L at admission to 4.5±0.6 mEq/L at discharge or day 7 (p<0.001). Patients developing incident hyperkalemia (564 patients (35%)) were more often on mineralocorticoid antagonists (MRAs) prior to hospitalization and MRAs were more often down-titrated during hospitalization, independent of confounders. Down-titration of MRAs during hospitalization was independently associated with increased risk of 180-day mortality (HR 1.70; 95%CI 1.15-2.53). Incident hyperkalemia was not associated with increased risk of 180-day mortality. There was no interaction (Pinteraction>0.1) between incident hyperkalemia and up-titration of MRA during hospitalization for the primary outcome. Compared to normokalemia, patients with incident hyperkalemia and constant MRA doses or up-titration throughout hospitalization showed a better survival (HR 0.67; 95%CI 0.46-0.99). This was similar for ACE-I/ARB therapy (HR 0.70; 95%CI 0.50-0.99).

Conclusion: Incident hyperkalemia occurs in a third of patients hospitalized for AHF and is independently associated with down-titration of MRAs. Patients who maintained or increased their dose of MRA and/or ACE-I/ARB during hospital admission had a better 180-day survival.

hyperkalemia and up-titration

Incident hyperkalaemia +change in therapy(n of patients)	Univariable	PROTECT Risk Engine*
Reference group (n=760):Normal potassium levels (3.5-5.0 mEq/L)throughout hospitalization	HR (CI), p	HR (CI), p
ACE-I/ARB		
Hyperkalaemia + down-titration (n=63)	1.69 (1.00 - 2.85), 0.048	1.46 (0.86 - 2.50), 0.164
Hyperkalaemia + up-titration or constant doses (n=428)	0.69 (0.49 - 0.96), 0.028	0.70 (0.50 - 0.99), 0.043
MRA:		
Hyperkalaemia + down-titration (n=82)	1.08 (0.62 - 1.87), 0.789	N.S.
Hyperkalaemia + up-titration or constant doses (n=334)	0.67 (0.46 - 0.97), 0.032	0.67 (0.46 - 0.99), 0.042

HR, Hazard Ratio; CI, Confidence Interval* Corrected for the PROTECT Risk Engine: age, previous HF hospitalizations, peripheral edema, systolic blood pressure, serum urea, creatinine, sodium, and albumin levels



RAAS change by potassium abnormalities

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Concurrent Initiation of Intra-aortic Balloon Pumping with Extracorporeal Membrane Oxygenation Reduced In-hospital Mortality in Postcardiotomy Cardiogenic Shock

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Purpose: We analyzed the outcomes, predictive factors and complications of veno-arterial extracorporeal membrane oxygenation (VA-ECMO) use for postcardiotomy cardiac shock (PCS).
Methods: A total of 152 adult subjects who received VA-ECMO (24 hours) for PCS in our hospital were consecutively included. Baseline characteristics were compared between survivors with non-survivors, and logistic regression was performed to identify predictive factors for in-hospital mortality.
Results: The mean age of the subjects was 49.5±14.1 years. The main surgical procedures were heart transplantation (32.2%), coronary artery bypass graft (17%) and valvular surgery (11.8%). Intra-aortic balloon pumping(IABP) was initiated concurrently with ECMO in 32.2% subjects and sequentially in 18.4% subjects. The ECMO weaning rate was 56.6%, and the in-hospital mortality was 52.0%. When compared with non-survivors, survivors had less hypertension (15.1% vs. 35.4%, p=0.004), pre-ECMO secondary thoracotomy (19.2% vs. 39.2%, p=0.007), pre-ECMO cardiac arrest/ventricular fibrillation (11.0% vs. 34.2%, p=0.001), bedside implantation of ECMO (11.0% vs. 41.8%, p0.001), and more transplant procedure (45.2% vs. 20.3%, p=0.001), concurrent IAPB initiation with ECMO (41.1% vs. 24.1%, p=0.025). Multivariate logistic regression indicated concurrent IABP initiation with ECMO was the only independent protective factor for in-hospital mortality (OR=0.375, p=0.041, 95% CI: 0.146-0.963). Concurrent IABP initiation with ECMO had less need for continuous renal replacement therapy (30.6% vs. 49.3%, p=0.039) and less neurological complications (8.2% vs. 22.7%, p=0.035), but more thrombosis complications (18.4% vs. 2.7%, p=0.007).
Conclusion: Concurrent initiation of IABP with ECMO provides better short-term survival for PCS, with reduced peripheral perfusion complications.

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Cardiac autonomic nerves stimulation improves hemodynamics and clinical status in advanced heart failure patients

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Despite therapy advances in the management of HF, symptomatic congestion and low cardiac output in acute heart failure is a leading cause of mortality and morbidity. The purpose of this study was to investigate transvenous cardiac autonomic nerve stimulation (CANS) effects on in-hospital hemodynamics and signs and symptoms of congestion.
The study was a single-center, observational, clinical investigation of CANS. Twelve subjects with left ventricular ejection fraction (LVEF) < 40% and at least two signs and symptoms of congestion were consented and enrolled. A purpose-built electrical stimulation catheter was placed in the left brachiocephalic vein via left subclavian vein access. A purpose-built neurostimulator was then connected to the catheter and used to deliver CANS therapy in-hospital for up to 96 hrs.The subjects presented symptomatic, had a mean baseline NT-proBNP of 10,915 pg/mL, a LVEF of 24%, and a pulmonary capillary wedge pressure (PCWP) of 19 mmHg. CANS therapy was provided for a mean duration of 59 hrs. and was well tolerated. There were no device or study related adverse events reported.
During CANS therapy average cardiac index increased (1.7 to 2.1 L/min./m2), systemic vascular resistance decreased (25 to 20 WU), and PCWP decreased (19 to 14 mmHg) with little change in MAP or HR. Clinical status improved during CANS therapy and at 30 day follow-up. On average, patients were fluid net negative 1.3 L, edema pitting score improved 2 points, and 6 minute hall walk distance (6MHW) increased 54 m. At 30 day follow-up, edema pitting score improved 3 points, 6MHW increased 106 m and the KCCQ-12 summary score improved 37 points from baseline.
Hemodynamic and clinical improvements occurred in the presence of stable medical management. Patients received at least 80 mg/day of furosemide, had minimal change to existing HF medical management, received no new vasoactive therapies, and a majority of the patients (9/12) received no furosemide dose uptitration during CANS therapy.
Alongside concomitant medical therapy, CANS holds promise as a tool to improve in-hospital hemodynamics and relieve congestion.

CANS Therapy Hemodynamic Profile	
CardiacIndex	+22%(p=0.03)
Rightventricular stroke work index	+29%(p=0.06)
PulmonaryCapillary Wedge Pressure	-28%(p<0.01)
SystemicVascular Resistance	-22%(p=0.04)
MAP	-3%(NS)
HR	+1%(NS)

Paired, single tail t-test of the mean, n=12, NS= not significant.

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Lung ultrasound in acute heart failure: prevalence of pulmonary congestion and associated short- and long-term outcomes

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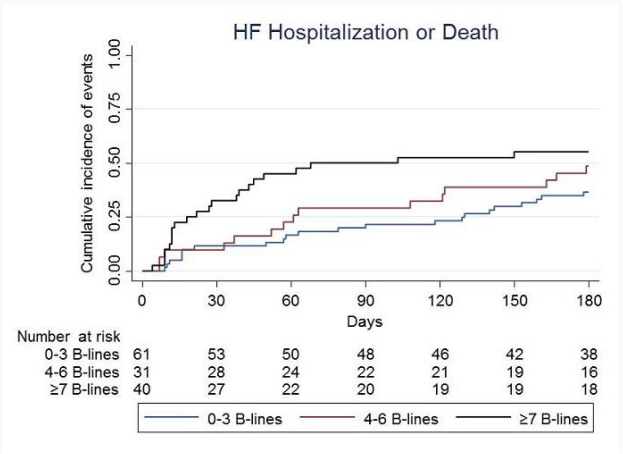
Background: Pulmonary congestion in acute heart failure (AHF) is both a common and important finding. However, current methods for its detection, such as auscultation and chest x-ray, are insensitive.
Purpose: To assess the prevalence and prognostic importance of pulmonary congestion, with a simplified lung ultrasound (LUS) method, and examine changes of LUS findings ('B-lines') with treatment for AHF.
Methods: In a two-site, prospective, observational study 4-zone LUS was performed early during hospitalization for AHF (LUS1) and at discharge (LUS2). B-lines were quantified offline, blinded to clinical findings and outcomes by a core laboratory.
Results: Among 349 AHF patients (median age 75, 59% men, mean EF 39%) the sum of B-lines in 4 zones ranged from 0 to 18 (median 6) (LUS1). The risk of an adverse in-hospital event increased with rising B-line number on LUS1: odds ratio for each B-line tertile 1.82 (95% CI 1.14-2.88, P=0.011). B-line count decreased from a median of 6 on LUS1 to 4 on LUS2; P<0.001) over a median of 6 days. In 132 patients with LUS2 images, the risk of HF hospitalization or all-cause death increased with increasing B-line number at discharge (LUS2). This relationship was stronger closer to hospital discharge: unadjusted HR comparing the first to the third B-line tertile for the first 90 days: 2.94, 1.46-5.93, P=0.003; for 180 days: 2.01, 1.11-3.64, P=0.021 (Figure). The association between B-line number and short and long-term outcomes persisted after adjusting for other important clinical variables, including NT-proBNP.
Conclusion: Pulmonary congestion using a simplified 4-zone lung ultrasound method was found to be common in AHF and improved with therapy. A higher number of B-lines at baseline and discharge identified patients at increased risk for adverse in-hospital and longer-term events.



Figure

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The value of discharge bio-ADM as a marker of residual congestion, discharge loop diuretic doses and clinical outcomes in patients with acute heart failure

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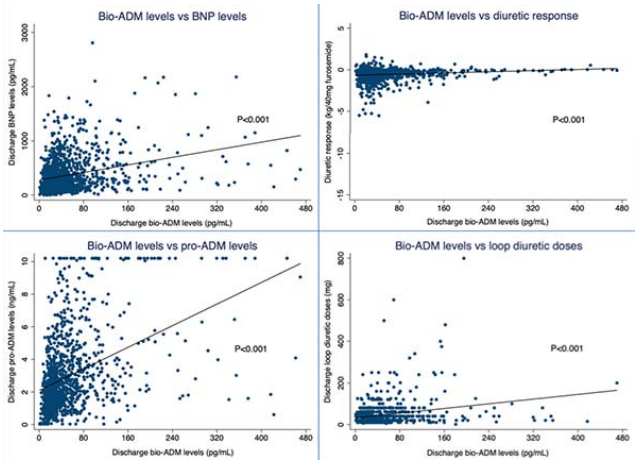
On behalf of: PROTECT

Background: Recently, bio-adrenomedullin (bio-ADM) was implicated to be a congestion marker in acute heart failure (AHF) patients. As a result, there is potential interest in the use of this biomarker in patients with AHF before discharge to provide additional information on (residual) congestion status, titration of diuretic doses and to predict the risk of death and hospital re-admission.
Objectives: We evaluated the association between discharge bio-ADM levels and clinical variables, congestion status and discharge loop diuretic doses. Furthermore, we investigated the combined value of bio-ADM and loop diuretic doses to predict the risk of 60-day HF rehospitalization and 180-day mortality.
Methods: Plasma bio-ADM levels were measured in 1,236 acute HF patients at day 7 or discharge in the randomized controlled PROTECT trial. Clinical congestion score (CCS) was defined as a composite score (range 0 to 8) comprising of jugular venous pressure, orthopnoea and peripheral oedema.
Results: Median plasma bio-ADM concentration was 33.7 pg/mL [IQR 21.5-61.5] at day 7 or discharge. Patients with higher discharge levels of bio-ADM had a longer length of hospitalization, more residual congestion at discharge, higher BNP levels, and a poorer diuretic response (all P<0.001). Bio-ADM was the strongest predictor of residual congestion at discharge (defined as CCS>3) (OR=4.35, 95%CI: 3.37-5.62, P<0.001). In a multivariable regression model, oedema at the time of discharge was one of the strongest predictors of bio-ADM levels (b=0.240, P<0.001). Higher discharge loop diuretic doses were independently associated with a poorer diuretic response during hospitalization (b=0.187; P<0.001) and higher discharge bio-ADM levels (b=0.084; P=0.020). High bio-ADM levels combined with higher use of loop diuretics at discharge were independently associated with greater risk of 60-day HF rehospitalization (HR=4.02, 95%CI: 2.23–7.26; P<0.001), but not 180-day mortality (P=0.247).
Conclusions: Elevated discharge bio-ADM levels reflected residual congestion and were associated with higher loop diuretic doses at discharge. Patients with higher bio-ADM levels and higher loop diuretic doses at discharge had an increased risk of HF rehospitalization. Assessment of bio-ADM at discharge could therefore be a readily applicable marker to identify patients with residual congestion who are at higher risk of early hospital re-admission after discharge.



Bio-ADM and clinical variables

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Trends in outcomes in patients with acute ischemic heart failure: a report from Swedish Angiography and Angioplasty Registry

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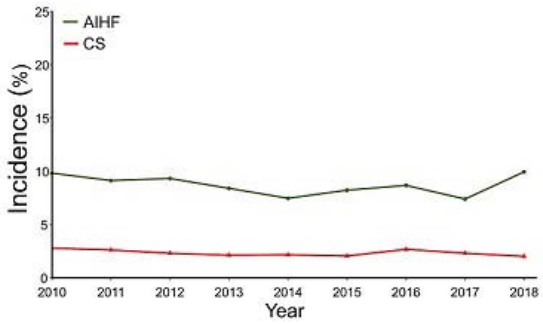
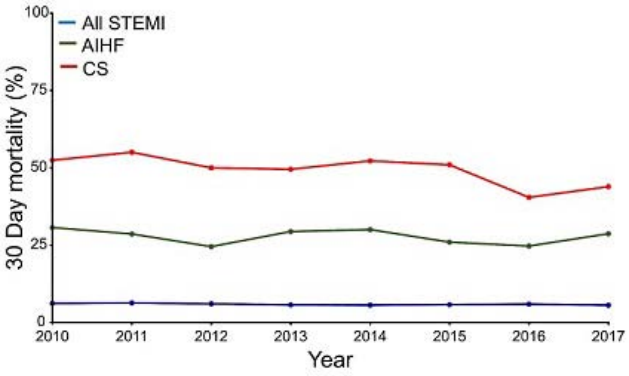
Background: Acute ischemic heart failure (AIHF) is the most common cause of death for patients with ST-elevation myocardial infarction (STEMI). The most severe form of AIHF, cardiogenic shock, carries a particularly poor prognosis.
Purpose: We sought to determine whether the incidence and prognostic impact of AIHF and CS in STEMI have been reduced over the last eight years.
Methods: Using the nationwide Swedish Angiography and Angioplasty Registry (SCAAR) we identified patients who underwent primary PCI due to STEMI in Sweden between January 2010 and April 2018. We defined IAHF as Killip class ≥2 and cardiogenic shock as Killip class 4. The primary endpoint was mortality at 30 days.
Results: We identified 40,701 patients who underwent primary PCI during the study period with known vital status at 30 days, for whom Killip class was reported for 40,365 (99.2%). AIHF occurred in 3,456 (8.6%) of these patients, and 955 (2.4%) developed cardiogenic shock. Thirty-day mortality for the overall STEMI cohort was 5.9%, whereas 30-day mortality for patients with AIHF and CS were 27.7% and

48.8%. respectively. The incidence of AIHF decreased somewhat (ptrend=0.006), whereas the incidence of CS did not (ptrend=0.77)(Figure). In contrast, we observed an improvement over the study period in the prognosis of CS (ptrend=0.004) but not AIHF (ptrend=0.065) (Figure).

Conclusions: The incidence and prognostic implications of AIHF among patients with STEMI have improved slightly over the eight years. However, AIHF, and particularly CS, is still associated with a very high risk of dying.





Poster Session 1

Atrial Fibrillation

P232

The relationship between epicardial adipose tissue and atrial fibrillation

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Introduction: Atrial fibrillation (AF) is the most common arrhythmia affecting approximately 2% of the general population and 25% of those over the age of 75. Recently, epicardial adipose tissue (EAT) has been associated with AF prevalence. Our study sought to understand the relationship between EAT and AF by comparing EAT volumes in matched patients with and without AF.
Methods: A total of 781 AF patients undergoing cardiac computed tomography angiography (CCTA) between January 2006 and June 2016 were included and matched to propensity score-matched controls without AF. The entire study comprised 1,562 CCTA patients. Non-contrast enhanced images were analyzed using QFAT. Epicardial fat borders were traced for each axial image starting at the level of the bifurcation of the pulmonary arteries and ending at the level of the diaphragm. Total EAT volume was measured and differences between AF and non-AF patients were compared.
Results: 1,562 were analyzed (mean age 59.0±11.3 years, 996 (63.76%) men, mean BMI 29.14±5.42 kg/m2) (Table 1). Patients with AF had higher overall EAT volumes than those without (125.75±57.5 cm3 and 118.3±55.7cm3 respectively, p=0.016).
Conclusion: Our study confirms, in a large cohort, that EAT is associated with AF.

Table 1: Patient Demographics

		AF	Non-AF		
	n	%	SD	n	%	SD
Gender (male)	498	63.76		498	63.76	
Age (mean)	58.96		11.29	58.96		11.29
BMI	29.14		5.42	29.13		5.33
CAD	43.00			22.00		
Risk factors						
	Family Hx CAD	307	39.31		358	45.84
	Hypertension	353	45.20		398	50.96
	Hyperlipidemia	340	43.53		451	57.75
	Diabetes	65	8.32		105	13.44
	Smoking	397	50.83		402	51.47
Symptoms						
	Chest pain	292	37.39		435	55.70
	Dyspnea	481	61.59		474	60.69
	Palpitations	609	77.98		369	47.25
	Syncope	336	43.02		253	32.39

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Decreased left atrial reservoir function can predict new onset atrial fibrillation in patients with acute heart failure

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Background: Atrial fibrillation (AFib) is one of major cardiovascular disease associated with worsening heart failure (HF) and embolic events. Early detection of AFib can prevent future cardiovascular events. We studied that decreased left atrial (LA) strain can predict new-onset AFib (NOAF) in patients with acute heart failure (AHF).
Materials and Methods: In our STRATS-AHF (STrain for Risk Assessment and Therapeutic Strategies in patients with AHF) registry, we included all consecutive patients with AHF admitted to 3 tertiary hospitals in Korea from January 2009 to December 2016. Of them, we measured LA global longitudinal strain (LAGLS) in 4010 patients with suitable echocardiographic images.
Results: In a total of 4312 patients in STRATS-AHF registry, we excluded 1338 patients with AFib, 209 patients without LA strain and 65 patients with AFib during the index hospitalization. Thus, we included total 2700 patients (1439 males, mean age: 70±14 years old) with LAGLS and sinus rhythm. The mean LVEF was 39.2±15.5%, LA diameter was 42.7±8.2mm, LA volume index was 42.5±23.1ml/m2 and LAGLS was 16.1±10.0%.
During follow-up, 250 patients (9.3%) had NOAF. Age (HR=1.029, P<0.001), hypertension (HR=1.555, P=0.001), diabetes (HR=0.720, P=0.018), total cholesterol (HR=0.995, P<0.001), LV end-diastolic dimension (HR=0.985, P=0.033), LV end-systolic dimension (HR=0.975, P<0.001), LV end-diastolic volume (HR=0.997, P=0.019), LV end-systolic volume (HR=0.996, P=0.007), LVEF (HR=1.015, P<0.001), LA diameter (HR=1.046, P<0.001), LA volume index (HR=1.010, P<0.001), LAGLS (HR=0.966, P<0.001), HFpEF (HR=1.691, P<0.001) and use of RAS-inhibitor at discharge (HR=0.708, P=0.011). The best cut-off value of LAGLS in the detection of NOAF was 18.0%. Patients with LAGLS<18.0% had significantly higher incidence of NOAF (HR=1.931, P<0.001). In the multivariate analysis, hypertension (HR=2.423, P=0.004), diabetes (HR=0.616, P=0.036), mitral E-velocity (HR=1.009, P=0.009), LA diameter (HR=1.043, P=0.010), RV systolic pressure (HR=0.967, P<0.001) and LAGLS<18.0% (HR=2.498, P=0.001). Conclusion: LAGLS<18.0% was a powerful predictor of future NOAF in AHF patients.

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Impact of obesity and age on left atrial function in patients with paroxysmal atrial fibrillation undergoing catheter ablation

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Background: Obesity and older age are associated with increased risk of atrial fibrillation (AF) and heart failure. Previous studies assessing the efficacy of catheter ablation in obese and elderly patients have shown conflicting data.
Purpose: We thought to assess the impact of obesity and age on left atrial (LA) phasic function in patients with paroxysmal AF undergoing the first catheter ablation.
Methods: We prospectively enrolled 112 consecutive patients (age:63±21 years; 32% female) with symptomatic paroxysmal AF and preserved left ventricular ejection fraction (≥50%) undergoing the first catheter ablation during sinus rhythm, and 23 healthy controls. Patients with valvular AF or in AF at the time of ablation were excluded. All patients underwent comprehensive echocardiography at one day pre and at one day post ablation, and after three months. The LA reservoir, conduit and contractile strain and strain rate (SR) were assessed using the two-dimensional speckle tracking echocardiography as average of segmental values in apical views.
Results: A total of 36 (32%) patients had normal weight (BMI <25 kg/m^2), while 50 (45%) overweight (25≤BMI<30kg/m^2), and 26 (23%) obesity (BMI≥30kg/m^2). A total of 42 (38%) individuals were elderly (≥ 65 years old). Pre-ablation, all groups of patients with paroxysmal AF had significantly lower magnitude of all three components of LA strain and SR compared with controls (all p<0.01). Obese patients showed significantly lower magnitude of reservoir strain, contractile strain and SR compared with normal-weight patients (all p<0.05). Reservoir but not contractile strain was also significantly lower in over-weight versus normal-weight individuals . Middle-age compared with elderly patients had significantly higher magnitude of reservoir strain, reservoir and contractile SR (all p < 0.05). Post ablation, LA strain and SR significantly decreased in all groups of patients regardless of BMI or age (all p<0.05) (Figure 1AB,2AB). At three-month follow-up, LA strain

and SR showed almost complete recovery to pre-ablation values in all groups of patients. Yet, LA function remained significantly lower compared with controls (all p<0.01). Moreover, individuals with obesity remained to have significantly lower LA function than patients with normal weight. Elderly patients with overweight tended to have lower follow-up LA function compared with middle-age patients with normal weight (p 0.06). Out of the all indices of phasic LA function, reservoir strain showed to be the most clinically useful to monitor LA function throughout the study.

Conclusion: Obese patients with paroxysmal AF had significantly lower LA function both pre and post catheter ablation. This may imply a higher AF recurrent rate and risk for development of heart failure. Reservoir LA strain appears to be the most useful parameter to monitor LA function.

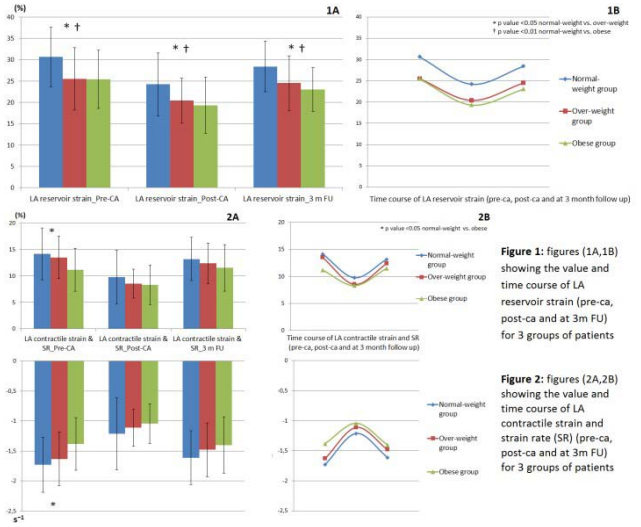

Figure 1: figures (1A,1B) showing the value and time course of LA reservoir strain (pre-ca, post-ca and at 3m FU) for 3 groups of patients

Figure 2: figures (2A,2B) showing the value and time course of LA contractile strain and strain rate (SR) (pre-ca, post-ca and at 3m FU) for 3 groups of patients

P236

Sex differences in the effects of class III antiarrhythmic drugs on left ventriculoatrial remodeling in atrial fibrillation patients with diastolic dysfunction

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Background: The association between gender and atrial fibrillation (AF) is poorly understood. Some studies have revealed that women with AF seem to have a higher risk of stroke, death and poorer results of rhythm control strategy compared to men. The origin of these differences may lie in a sex-specific variability of the left atrial (LA) and ventricle (LV) remodeling.

Purpose: This study sought to evaluate the impact of sex on the effects of class III antiarrhythmic drugs on left ventriculoatrial remodeling in AF patients with diastolic dysfunction (DD).

Methods: The study included 27 men and 28 women (median age of 65 [60;72]) with recurrent non-valvular AF, hypertension, coronary artery disease, mild to moderate LV DD and preserved ejection fraction (>50%) treated with amiodarone or sotalol. All patients underwent conventional and speckle tracking echocardiography at baseline and after 3 months. Global peak LA longitudinal strain (PALS, %) in the reservoir (r) and contractile (c) phases was assessed using 6 segments in the 4-chamber and 2-chamber views.

Results: No difference was observed between LA structural and functional parameters in men and women at baseline. However, in women LV diastolic function was worse [E/E' (13 vs 11.2; p=0.03) and E/E'/LV-end diastolic volume (LVEDV) (0.13 vs 0.09 ml-1; p=0.001)]. Despite comparable changes () in heart rate and blood pressure, LA volume index (: -4 vs -1 ml/m2; p=0.03) as well as PALSr (: 2 vs 0.7; p=0.001) and PALSc (: -1.8 vs -1.6; p=0.02) improved more significantly in men. Significant improvements of diastolic function were observed in male patients only. However, only women had intergroup differences in E', E/E', E/E'/LVEDV, LV global longitudinal strain with complete and partial antiarrhythmic response.

Conclusion: During the treatment, structural and functional LA and LV parameters of male patients improved more significantly. However, the association between antiarrhythmic efficacy and diastolic function at the end of treatment was observed only in women.

P237

Impact of gender on the relation between heart rate and left atrial remodeling in patients with recurrent atrial fibrillation and preserved ejection fraction

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Background: In contrast with patients with reduced ejection fraction, the benefit of heart rate (HR) reduction in patients with preserved ejection fraction has not yet be proven. Lower HR is associated with higher augmentation index and late systolic load on the left ventricle (LV) which could lead to deterioration of diastolic function and, therefore, left atrial (LA) remodeling. Some studies have also found that diastolic dysfunction (DD) is more frequent in women than in men. But the data concerning the relationship between HR and LA remodeling depending on gender is scarce.

Purpose: To evaluate the impact of gender on the association between HR and LA remodeling in patients with recurrent AF, hypertension and preserved ejection fraction

Methods: Twenty seven men and 28 women (median age of 65 [60;72]) with paroxysmal or persistent AF, hypertension and preserved ejection fraction (>50%) were enrolled in this study. Beyond conventional echocardiographic protocol, global peak LA longitudinal strain (PALS, %) in the reservoir (r) and contractile (c) phases was measured using two-dimensional speckle tracking echocardiography. We used the diastolic index [(E/E')/LV-end diastolic volume] as a measure for LV stiffness.

Results: There were no significant differences between women and men in most clinical and demographic parameters including mean HR (63 vs 63; p=0.21), duration of hypertension (65 vs 67 moths, respectively; p=0.88) and AF (37 vs 42 moths, respectively; p=0.83). Despite the fact that DD was significantly more pronounced in women than in men [E/E' (13 vs 11.2; p=0.03); diastolic index (0.13 vs 0.09 ml-1; p=0.001)], both groups had similar LA volume index (41 vs 41 ml/m2; p=0.97). Compared to men, women also had higher median of LV relative wall thickness (0.53 vs 0.4; p=0.03). Diastolic index was not significantly related to mean HR both in women (r=-0.27; p=0.08) and men (r=-0.11; p=0.61). However, in women as distinct from men, we observed significant association between LA volume index and mean HR (r=-0.49; p=0.01 vs r=0.06; p=0.74; z=-1.67, p=0.048).

Conclusion: Only in women was lower mean HR significantly related to increased LA volume index. Accordingly, HR lowering strategy might not be beneficial or could even be harmful for women with preserved ejection fraction. However, this fact needs to be proved in prospective studies.

P238

Immediate recovery of atrial mechanical function after electrical cardioversion in patients with persistent atrial fibrillation is predictive of maintenance of sinus rhythm

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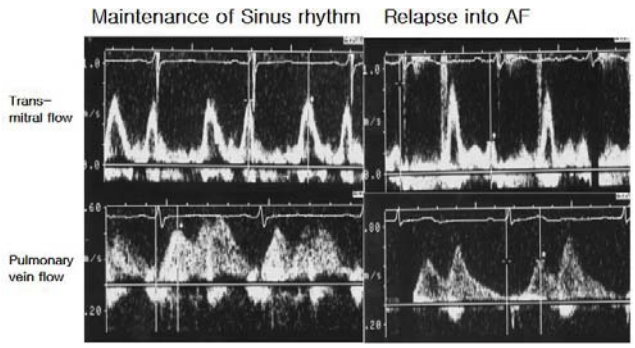
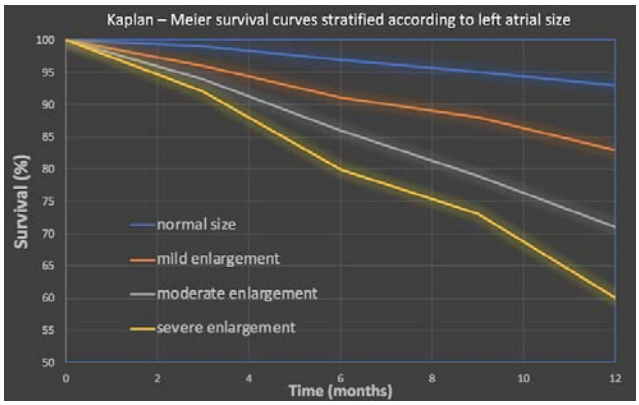
Background: Electrical or structural degeneration in left atrium (LA) occur after long period of atrial fibrillation (AF). This change of left atrium lead to increase of LA size and might be related to success rate of sinus conversion and relapse of AF after cardioversion. Purpose: We investigated whether recovery of left atrial mechanical function over time after electrical cardioversion in patients with persistent AF is related to relapse of AF, using serially measured echocardiographic parameters. Methods: We included 20 patients with persistent AF who have no valvular or structural heart disease and unsuccessful in pharmacological cardioversion. After electrical cardioversion, we recorded tans-mitral and pulmonary vein flow to evaluate mechanical function of LA at 30 min, 1 day, 7 days, and 30 days in each patient. We evaluated clinical parameters such as age, sex, duration of AF, presence of heart failure, risk factors, and antiarrhythmic agents; and echocardiographic parameters such as chamber size, left ventricular ejection fraction, and Doppler measurements, including estimated right ventricular pressure. Results: Mean age is 59 ± 12 years old (male, n=12, 60%). Duration of AF is 47 month (median: 22 month). Hypertension was most prevalent risk factor (55%). Electrical cardioversions were successful in 16 patients (80%). In cardioverted patients, AF recurred in 8 patients (50%) and AF relapse occurred within 15 days in 6 patients among them. Left ventricular ejection fraction decreased transiently after electrical cardioversion and left atrial size decreased over time. In all converted patients, A wave of trans-mitral flow was more than 0.35 m/sec at 7 days during follow-up. Early S wave and reverse a wave of pulmonary vein flow appeared during follow-up in most patients. Trans-mitral flow and pulmonary vein flow were normalized at 30 days after electrical cardioversion. AF relapse was not related to age and duration of atrial fibrillation. Maintenance of sinus conversion is associated with earlier elevation of mitral A wave and earlier detection of early S wave and revere a wave of pulmonary vein flow. Muscle enzymes such as isoenzyme of creatine kinase and lactate dehydrogenase were elevated in 7 patients.

Conclusions: Systolic and diastolic function of left atrium were much improved at 7 days after electrical cardioversion for patients with persistent atrial fibrillation and were normalized at 30 days. Immediate recovery of atrial mechanical function using

trans-mitral flow and pulmonary flow might be useful predictor for maintenance of sinus rhythm after cardioversion of atrial fibrillation.



comparison of mitral and PV flow



Picture 1

P239

Left atrial enlargement predicts 1-year mortality in patients with atrial fibrillation and heart failure

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On behalf of: MISOAC-AF investigators

Background Enlargement of the left atrium (LA) appears to portend poor outcomes in the general population. Atrial fibrillation (AF) and heart failure (HF) have been known to be separately associated with increased LA dimensions; yet the association between the LA size and the risk of death among patients with both AF and HF remains still largely unexplored.
Purpose This study sought to evaluate the prognostic value of the left atrial size as a predictive tool for death among hospitalized patients with AF and HF.
Methods Transthoracic or transesophageal echocardiogram was used for the measurement of the LA area in consecutive patients who were hospitalized at our cardiology department with any diagnosis and coexisting AF and HF. LA area was defined as normal (≤20 cm^2), mildly enlarged (21-30 cm^2), moderately enlarged (31-40 cm^2) and severely enlarged (>40 cm^2) as measured in the 4-chamber view. The outcome measure was all-cause mortality after 1 year of follow-up.Results We reviewed 441 patients with AF and HF aged 18 years or older (mean age 75.5 ± 9.0 years, 57% men). In total, 101 (23%) patients died. The crude cumulative 1-year survival among patients with normal left atrial size, mild enlargement, moderate enlargement and severe enlargement was 93.4%, 82.9%, 71.2% and 60.2%, respectively (p=0.001) [Picture 1]. After adjustment in multivariable Cox proportional hazard analysis, LA area remained a predictor of all-cause mortality in both sexes (HR 1.03 per 1 cm^2 increase, 95% CI 1.01–1.05, p = 0.001 in men, and HR 1.06 per 1 cm^2 increase, 95% CI 1.02–1.11, p >0.001 in women) [Table 1].

Table 1

Risk factors for men	p value	HR (min-max)
RBBB (on the ECG)	0.002	3.04 (1.35-6.83)
Dyspnea (as the main symptom on admission)	0.009	2.75 (1.31-5.77)
LA area (per 1cm^2increase)	0.001	1.03 (1.01-1.05)
Risk factors for women	p value	HR (min-max)
History of Cardiac arrest	0.019	4.71 (1.29-8.12)
LA area (per 1cm^2increase)	<0.001	1.06 (1.02-1.11)
GFR at discharge (per 1 mL/min/1.73 m^2 decrease)	0.004	1.03 (1.02-1.04)

Independent predictors of all-cause mortality in both sexes among hospitalized patients with AF and HF

Conclusions Nearly 1 out of 4 patients with AF and HF will die during 1 year of follow-up after a hospitalization for cardiac reasons. LA area has a graded and independent association with all-cause mortality in both sexes among hospitalized patients with AF and HF. Further research is suggested to refine the prognostic value of this echocardiographic parameter.

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Sinus rhytm restore in patients with atrial fibrillation and heart failure

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Atrial fibrillation (AF) and heart failure (HF) the two major syndromes in cardiology and they frequently coexist. HF increases mean right and left atria (LA) pressures, contributing their progressive dilatation. Such remodeling promotes atrial fibrosis and electrical heterogeneity and eventually induces AF. Otherwise, AF episode immediately induces loss of atrial contraction, increases mean heart rate and pdecrease the heart's pump function. Mortality and morbidity are higher among patients with AF and HF than among those with HF or AF alone. Restoration of sinus rhythm (RSR) using catheter ablation (CA) may be useful treatment tool in this group. But not all patients with HF will RSR, because most of them with longstanding AF and markedly dilated LA.CA for atrial fibrillation can improve outcomes among this group of patients, if it made to correctly selected patients.
Objective: Estimate the efficacy of CA for RSR in patients with HF and AF.
Methods: We identified 350 patients with AF and divided them either with HF and preserved ejection fraction (EF)- AF-HFpEF (n = 130, 37%), HF and reduced EF-AF-HFrEF (n = 150, 43%) and HF and moderately reduced EF–AF-HFmrEF (n = 70, 20%).Compared to the patients with AF-HFrEF, those with AF-HFpEF were older. For RSR 35% underwent radiofrequency ablation and 65% cryobaloon ablation. The levels of NT-proBNP and LA and left ventricular (LV) function echocardiographic parameters were estimated. LA volume measurements were done at the time of mitral valve opening, at the onset of atrial systole (p wave at the electrocardiogram=Vp) and at mitral valveclosure. All volumes were indexed for body surface area, and the following left atrial emptying functions were calculated. Follow-up was made after 3,6,9,12 months after CA.
Results: In all cases restoring of RSR was achieved using electrical cardioversion after ablation. After 12±3 months, 49% of the patients with HF remained in sinus rhythm and had significant improvement in left ventricular function (increases in the ejection fraction and fractional shortening of 19±12 percent and 9±5 percent, respectively; P<0.001 for both comparisons), LV dimensions (decreases in the diastolic and systolic diameters of 3.5±2 mm and 2.7±3 mm, respectively; P=0.03 and P<0.001, respectively). Also, there was significant reduction of mitral regurgitation level in 25% from 3 to 2 degree, 37% from 2 to 1 degree. Those patients who recurred AF after ablation had higher levels of NT-proBNP than in group with RSR (470.2 ± 180.7 and 230.7 ± 175.8 retrospectively, P<0.001). Among the patients with RSR 38% was patients with AF-HFmrEF, among patients who recurred AF was the prevalence of AF-HFrEF. It is important to notice,that patients who recurred AF initially had lower LA EF.
Conclusion: Catheter ablation for AF is useful treatment tool in HF patients. It needs further research to develop correct selection criteria of patients with AF and HF undergoing catheter ablation.

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Low albumin level is one of the strongest predictors for cardiovascular mortality in reduced ejection fraction heart failure patients with atrial fibrillation in both genders

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BACKGROUND: Even though atrial fibrillation (AF) is common in reduced ejection fraction heart failure (HFrEF), the predictors for cardiovascular mortality according to gender are not clear. The aim of this study was to evaluate the predictors for cardiovascular mortality in the male and the female patients with AF in HFrEF who were discharged on optimal medical therapy.

METHODS AND RESULTS: 172 patients (mean age 67± 11 years, 106 male, 66 female, and mean ejection fraction (EF) 27 ± 9%) with atrial fibrillation in HFrEF who were hospitalized due to worsening heart failure were included to the study. 34 male patients (32%) and 26 female patients (39%) of the cohort died during a median follow-up (FU) duration of 76 months. Patients who died during FU were older and hospitalized more than the patients who survived during FU. Hepatic functions in both genders who met the study endpoint were worse than the patients who survived during FU (Table). Both genders had the same predictors for CVS mortality in multivariate analysis (In the male patients: Albumin [HR, 0.561 (95% CI 0.449-0.701), P < 0.001] and age [HR, 1.058 (95% CI 1.044-1.073), P < 0.001] and in the female patients: Albumin [HR, 0.524 (95% CI 0.424-0.648), P < 0.001] and age [HR, 1.059 (95% CI 1.045-1.073), P < 0.001]) .

CONCLUSION: Although there were some differences for predictors of CVS mortality in the males and the females with AF in HFrEF in univariate analysis both genders had the same predictors in multivariate analysis. Older age and decreased albumin were the most powerful predictors for CVS mortality for both genders in this study.

Important parameters for mortality

	Maleswith CVSmortality(n=34)	Males without CVSmortality(n=72)	p	Females with CVSmortality(n=26)	Females without CVSmortality(n=40)	p
Age (years)	71±11	64±11	0.002	71±12	65±10	0.055
NYHA	3.1±0.3	3.0±0.2	NS	3.1±0.3	3.0±0.0	NS
Hospitalization	3.2±1.3	2.4±1.1	0.001	3.0±1.5	2.1±1.1	0.006
Diastolic Blood Pressure (mmHg)	80±11	75±11	0.032	76±11	75±13	NS
Respiratory rate (per minute)	27±4	25±4	0.002	27±5	26±4	NS
Urea (mg/dL)	83±47	63±31	0.009	66±38	64±33	NS
AST (U/L)	118±225	30±23	0.031	66±76	29±21	0.020
ALT (U/L)	137±279	30±31	0.033	58±66	25±19	0.019
Total protein (g/dL)	6.4±0.9	6.9±0.6	0.002	6.6±0.8	6.8±0.5	0.19
Albumin (g/dL)	3.2±0.7	3.7±3.2	<0.001	3.2±0.5	3.6±0.4	0.004
Homosistein (μmol/L)	18.5±7.5	14.5±7.0	0.015	14.4±3.8	12.7±9.9	NS
Free-T_3(pg/mL)	2.4±0.7	2.5±0.6	NS	2.0±0.8	2.6±0.8	0.004

CVS: Cardiovascular, NYHA: New York Heart Association, NS: Not significant

Device Therapy

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Low heart rate at follow up predicts improvement of ejection fraction in a large-volume cohort of women with wearable cardioverter defibrillator

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Background. Wearable cardioverter defibrillators (WCD) are effective in short-term therapy of ventricular arrhythmias and serve as diagnostic tools with continuous heart rate (HR) monitoring. Previous studies highlighted the importance of HR control in heart failure. Women at risk for sudden cardiac death are not well studied. The objective was to evaluate the impact of HR on improvement of ejection fraction (EF) in women provided with WCDs.

Methods. Data from women fitted with WCD from 2015 to 2018 were obtained from the manufacturer's database. Quartiles of HR were compared between patients showing improvement of EF and patients who either had indication for implantable cardioverter defibrillators (ICD) or died.

Results. A total of 15 321 women with mean age of 66 ± 13 years were included. Mean time of WCD use was 96 ± 50 days. Patients with improvement of EF had significantly lower HR compared to patients who died or received an ICD. Univariable logistic regression showed that lower HR was predictive for improvement, with nighttime HR at follow up showing strongest predictive power with OR of 2.06 (95%CI 1.90-2.23, p<0.001). Multivariable adjustment revealed that daytime, nighttime and delta nighttime HR at the end of WCD use was predictive for improvement.

Conclusion. HR was significantly lower in patients showing improvement of EF. Absolute daytime, nighttime and delta nighttime HR at follow up showed predictive ability for recovery.

Logistic regression model

Variable	Quartile 1	Odds ratio	95% Confidence interval	Pvalue	Adjusted Oddsratio	95% Confidence interval	Pvalue
Daytime HR at baseline, bpm							
Ref Quartile 4: HR>87	≤70	1.53	(1.41-1.65)	<0.001	1.11	(0.93-1.33)	0.263
Daytime HR at follow up, bpm							
Ref Quartile 4: HR>84	≤67	1.99	(1.84-2.15)	<0.001	1.32	(1.11-1.56)	0.001
Daytime delta HR, bpm							
Ref Quartile 4:delta HR >8.72	≤2.29	0.77	(0.71-0.83)	<0.001	1.02	(0.87-1.18)	0.846
Nighttime HR at baseline, bpm							
Ref Quartile 4: HR>84	≤67	1.53	(1.42-1.65)	<0.001	1.12	(0.93-1.34)	0.227
Nighttime HR at follow up, bpm							
Ref Quartile 4: HR>82	≤ 65	2.06	(1.90-2.23)	<0.001	1.36	(1.15-1.61)	<0.001
Nighttime delta HR, bpm							
Ref Quartile 4: HR>9.51	≤-1.36	0.72	(0.67-0.78)	<0.001	0.78	(0.67-0.91)	0.001

EF, ejection fraction; ICD, implantable cardioverter defibrillator; bpm, beats per minute; WCD, wearable cardioverter defibrillatorDelta indicates the difference between HR at baseline and follow up.

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Epicardial adipose tissue echocardiographic thickness predicts arrhythmic outcome in heart failure patients.

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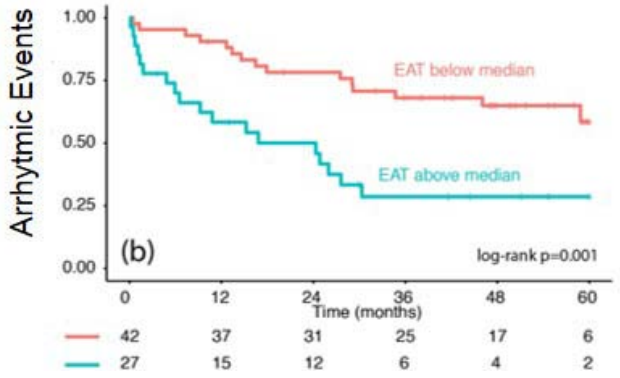
Background: We previously demonstrated that epicardial adipose tissue (EAT) thickness is increased in patients with heart failure with reduced ejection fraction (HFrEF). In HFrEF EAT is a marker of cardiac denervation and is a local source of catecholamines, both predictors of arrhythmic events and sudden death. EAT is also strongly associated with atrial fibrillation.

Purpose: in this study we investigated the predictive value of EAT thickness on arrhythmic events in a HFrEF population undergoing implantable cardioverter defibrillator implantation (ICD) for primary and secondary prevention.
Methods: We prospectively enrolled 104 patients (mean age 68.7 ± 6.5 years) with HFrEF, undergoing ICD implantation and followed up (FU) them for a maximum of 5 years (median FU of 17.2 months). At baseline, demographic, clinical and laboratory data were collected. At the time of enrollment, all patients underwent complete echocardiography with the measurement of the maximal EAT thickness. Sustained atrial and ventricular tachyarrhythmic events were recorded at the time of each ICD check, including appropriate DC-shocks.
Results: Median EAT thickness was 9.3±3.3 mm. At FU, 36 atrial events and 29 ventricular events, were recorded. Of interest, EAT did not correlate with left ventricular ejection fraction (LVEF) (p =0.3), which drives ICD implantation. EAT predicted arrhythmic events at univariate analysis (p<0.001). At multivariate analysis, including LVEF and betablockers therapy, EAT was an independent predictor of arrhythmias (p <0.001). The figure shows Kaplan Meier curves dividing patients for EAT median value.
Conclusions: EAT thickness significantly predicts the arrhythmia occurrence in patients with HFrEF, becoming a new prognostic marker. The correlation of this parameter with cardiac denervation in patients with heart failure, previously demonstrated by our group, suggests that EAT contributes to the pathogenesis and progression of heart disease. It is therefore desirable to include the EAT measurement in the standard echocardiographic examination.



P244
The prevalence of anxiety among patients with implantable cardioverter-defibrillator, does it change with decades of implementations?

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INTRODUCTION: Currently, it is believed that implantable cardioverter-defibrillator (ICD) is the most effective method of primary and secondary prevention of sudden cardiac death due to ventricular arrhythmias. Although ICD saves lives, it can lead to psychological disturbance in many patients including anxiety and other forms of psychological distress.
AIM: The aim of this meta-analysis was to assess the prevalence of anxiety among adults with an implantable cardioverter-defibrillator. A more accurate estimate of anxiety prevalence than what is currently available is needed to gauge the potential impact of anxiety management among patients with implantable cardioverter-defibrillator.
METHODS: A comprehensive search of articles that were published between 1999 and October 2018 was conducted using MEDLINE, PubMed, Web of Science, Scopus and Google Scholar. Data extraction was carried out by two independent researchers. The severity of anxiety symptoms in the included studies was measured by self-report questionnaires; Hospital Anxiety and Depression Scale (HADS). The quality of the included studies was assessed using the Newcastle-Ottawa Scale. A random-effects model was used to estimate the pooled mean difference of these values between patients with ICD and the controls. The eligible publications were divided into two parts depending on the decade in which they were carried out; the first decade 1999-2008 and the second decade 2009-2018.
RESULTS: 20 studies of the 591 search results met the inclusion criteria with data from 7352 patients (77 % male, mean age 59 years) with implantable cardioverter -defibrillator. Patients with ICD implanted in the first decade have reported a higher prevalence of anxiety symptoms (HADS index ≥ 8) compared to the patients with ICD implanted in the second decade, respectively (25.5% vs 19.6 %, p < 0.001). Fig. 1.

CONCLUSION: Based on existing data, the prevalence of contemporary anxiety in patients with ICD is high as 19.6% but significantly lower than in the previous decade. This requires further research on the cause and the possibility of treatment. This may be related to the dissemination of information about this modern method of treatment in society.

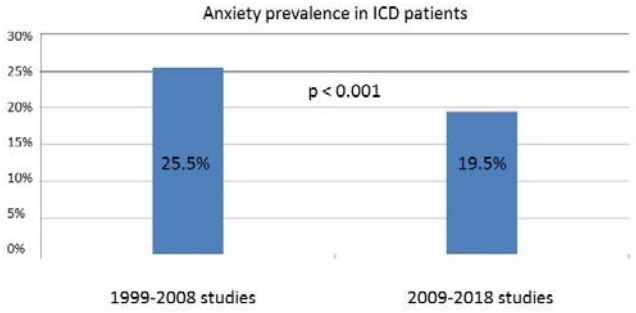

Fig. 1.

P245
Single lead implantable cardioverter-defibrillator lead system with a atrial sensing dipole (Dx-AICD technology): 1-year follow-up

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Background: Atrial sensing ability is supposedly useful for discrimination of arrhythmias. A lead incorporating an atrial electrode, theoretically, can discriminate tachy-arrhythmias better. Atrial oversensing can also at times miss ventricular tachycardia (VT). Atrial sensing (VDD mode) is also useful in patients with AV block, where sinus node function is preserved. However data regarding atrial electrograms, battery longevity and lead performance of the Dx-ICD system is lacking.
Methods: We retrospectively analysed the data of 34 patients who had undergone ICD implantation at our center in the period from April 2017 to April 2018. Of these patients, 22 (64%) were implanted with Itrevia 5 VR-T Dx AICD with either Protego Dx or Linox Smart Dx MRI compatible leads using the SMART algorithm (BIOTRONIK). The baseline characteristics, implant characteristics and follow-up pacemaker records of the patients including the remote transmissions were analysed.
Results: Among the 22 patients, mean age was 61.5 ± 16 years, males were 92%, diabetics and hypertensives were 43% and 64% respectively. The etiology of underlying cardiomyopathy was ischemic, idiopathic dilated, hypertrophic, valvular cardiomyopathy in 43%, 36%, 14% and 7% respectively. The mean LVEF was 35± 16%. ICD was implanted for secondary and primary prevention in 72% and 28% patients respectively. 14.3% patients had underlying AV block. Radiofrequency ablation for documented VT was performed before the implant in 64% patients. Remote monitoring was installed in 79% patients.
Extrathoracic left subclavian vein was used for lead implant at the RV apex in all the patients. The mean fluoroscopic time was 67 ±12 minutes. There were no procedural complications. The mean follow-up was 14 ± 8 months. The mean P wave amplitude, sensed R wave, pacing threshold, pace/sense lead impedance and mean defibrillation lead impedance at follow-up were 6.3±5.2 mv (2.1 to 13 mv), 15.1± 4.2 mv, 0.9± 0.3 Volts, 748± 136 Ohms and 69 ± 4.1 Ohms. The mean ventricular pacing rate was 2%. The battery life expectancy was satisfactory. Lead failure as defined by atrial undersensing or oversensing events or inappropriate therapies or failed detection of ventricular tachyarrhythmias, was not detected in any patient. Appropriate therapies were recorded in 15% patients, atrial AT/AF episodes were detected appropriately in 22% patients. ATP and DC shock reverted the underlying VT successfully in 14 and 7% patients respectively.
Conclusions: Dx-ICD systems provide reliable atrial and ventricular signals and superior arrhythmia discrimination, in the follow-up recordings as well as transmitted remote data. They bear significant advantages over dual chamber ICD systems by avoiding lead and procedural complications due to dual leads. Atrial dipole sensing did not encroach upon the battery life.

P246
Appropriate and inappropriate ICD therapy in patients with ischemic and non-ischemic cardiomyopathies according remote monitoring data.

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Background: Implantable cardioverter–defibrillator (ICD) in patients with symptomatic systolic heart failure is indicated for prevention of the sudden cardiac death. The Danish study demonstrated no benefits from ICD in patients with non-ischemic cardiomyopathy in all cause death, but many patients died suddenly without ICD therapy. Also, the problem of inappropriate ICD therapy is still remained.
Purpose: To test the frequency and reasons of anti-tachy pacing (ATP) and ICD shocks between patients with ischemic and non-ischemic cardiomyopathies using remote monitoring data.
Methods: The retrospective analysis included data of 198 patients with an ICD. Remote monitoring data with Discovery Link system were analyzed. All patients were included in CareLink system (Medtronic, LTD) after ICD implantation. Active transmissions for assessing arrhythmic events were recommended every 3 months after implantation.
Results: The mean period of follow up was 36±5 months. Data were analyzed from 42 (21%) single chamber ICD, 30 (15%) dual chamber ICD and 126 (64%) CRTD. The 1860 (mean 73±35 per month) active transmissions were performed at the end of follow up with and without events. The number of patients with treated events was 34(17.1%). In 16 (45%) cases ICD therapy was inappropriate and appropriate therapy was occurred in 18 (55%) patients. In cases with inappropriate therapy, most of the patients had non-ischemic cardiomyopathy: 12(80%) vs 3(20%) ischemic cardiomyopathy ($p<0.001$). In cases with appropriate therapy, most of the patients had ischemic cardiomyopathy: 12(66.7%) vs 6(29%) non-ischemic cardiomyopathy ($p<0.001$).
Conclusion: Patients with non-ischemic cardiomyopathy had significantly more inappropriate ICD therapies as compared with ischemic cardiomyopathy based on remote monitoring. More data needs to assessed necessity of the ICD implantation for patients with non- ischemic cardiomyopathy.

P247

Frequency and patterns of implantable cardiac defibrillator therapies in patients with left ventricular assist devices

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Purpose: Durable ventricular assist devices (VADs) use is a life-saving therapy in patients with end-stage heart failure. These patients are at high risk for ventricular arrhythmias. The pattern of ICD therapies in these patients is not well characterized.
Methods: Our Hospital, in Athens is the only centre in Greece for VAD and Heart Transplantation. We have implanted more than 160 VADs since 2003. BiVADs being the majority of the VADs implanted due to advanced biventricular failure of the patients and the late referral for advanced heart failure treatment. Our single-center retrospective cohort included 90 patients with ICDs and VADs followed at our centre. Not all the patients treated with VADs had previously ICD. According to our Hospital Guidelines patients planned to receive BIVAD were not supposed to have an ICD. On the other hand, for all the patients treated with LVAD ICD implantation was mandatory. Data collected included frequency of ICD therapies, type of therapy (appropriate vs. inappropriate; shocks vs. anti-tachycardia pacing (ATP)), and time-course of therapies.
Results: There were 105 episodes (2,9 episodes/patient) and 379 arrhythmias were treated, 61,4% of which were appropriate. 36 episodes (46%) required ICD shocks with the remaining requiring ATP. LVAD pts who received ICD therapy were all hospitalized due to our Hospital Guidelines in order to protect the RV function. Only one patient had sustained VT and needed temporary RV support with ECLS. VF when detected in BiVAD patients was treated only once and when recurrent episodes were occurred were left untreated if no hemodynamic compromise was occurred. ICD therapies were all switched off in BiVAD pts after the first treatment and no battery change was performed in the BiVAD cohort. All VAD pts were treated with heart failure treatment and some LVAD pts received antiarrhythmic therapy with amiodarone and mexiletine. Ablation of ventricular tachycardia was proposed by EP physicians in 2 LVAD patients with recurrent episodes of ventricular tachycardia.
Conclusions: Analysis of our VAD cohort revealed three important findings: a) ICD therapy is very common (42%) in the first year especially after LVAD implantation; b) Ventricular arrhythmias are highly clustered in this cohort, especially VF in the very sick BiVAD patients; c)ATP is frequently effective. These findings have important implications on device follow-up and programming for this expanding patient population. New data from our hospital are available including follow up of 5 years support for LVAD and BiVAD patients in a low organ donation environment.

P248

Low guideline adherence of physicians for primary prevention of sudden cardiac death with implantable cardioverter defibrillator implantation despite prenotification system

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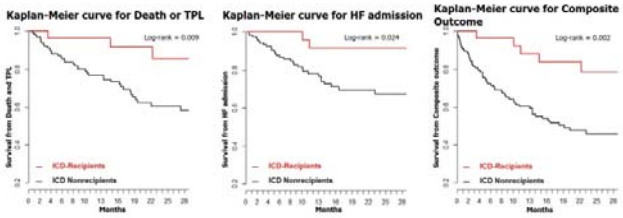
Background: Implantable cardioverter defibrillators (ICD) is known to improve survival of patients with heart failure by preventing sudden cardiac death. Although the guideline and reimbursement system have been expanded, there is a gap between the guideline recommendation and real-world practice.
Purpose: We sought to find the impact of prenotification system of candidate for ICD implantation and the adherence to guideline in tertiary hospital.
Methods: Patients were screened based on echocardiography (less than 35% of left ventricular ejection fraction, LVEF) and medical records from 2015 January to 2018 April. If the patients were or could be met to the guideline and reimbursement criteria, prenotification with e-mail was sent to physicians to recommend ICD implantation. We evaluated the implantation rates, the cause of non-implantation, and outcomes after prenotification.
Results: Total 156 of patients (mean age 67.4 years, male 68.6%) were screened, and 26 (16.7%) of patients were referred to electrophysiologists and performed device implantation (15 of ICD and 11 of cardiac resynchronization therapy defibrillator [CRT-D]). Among those without ICD implantation (n=130), 61 (46.9%) of patients did not receive optimal medical therapy, 21 (16.2%) of patients refused procedures, and other following reasons; candidate for cardiac transplantation (TPL, n=13), prescribed new drugs and observed (n=21), and other reasons (n=14). Among those with ICD implantation (n=26), one patient received TPL because of heart failure aggravation and two were expired. During a mean follow-up of 1.8 years, 3 (11.5%) of ICD implanted patients occurred sustained ventricular tachycardia (n=2) and fibrillation (n=1) and treated by anti-tachycardia pacing therapy and shock. In the non-implantation group, 42 (32.3%) patients were deceased and seven received TPL. Patients with ICD implantation showed better survival compared to those without ICD implantation in all-cause death and TPL (adjusted hazard ratios [HR] 0.3, 95% confidence interval [CI] 0.13-0.65).
Conclusions: Substantial number of patients didn't receive guideline recommended therapy and effect of e-mail letter for activating referral system was unfavorable. New methods for appropriate treatment should be sought.



P249

The follow-up of patients with chronic heart failure and implantable cardioverter defibrillator in primary prevention

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Background: The aim of the study was to examine the occurrence and predictors of appropriate and inappropriate shocks and all cause mortality in patients with chronic heart failure who had received an implantable cardioverter defibrillator (ICD) in primary prevention of sudden cardiac death.
Methods: We have retrospectively included 454 consecutive ICD patients (mean age 61 ± 10 years, 388 men) received single- or dual-chamber ICD. Two hundred forty-five patients (54 %) were in NYHA class III and the mean left ventricular ejection fraction (LVEF) was 27 ± 5 %. ICD shock was defined as an appropriate when delivered for ventricular tachycardia or ventricular fibrillation and as an inappropriate when delivered for other arrhythmias or for an abnormal sensing.
Results: During a mean follow-up of 1578 ± 876 days, 87 patients (20 %) had ≥ 1appropriate ICD shock and 55 patients (12 %) had ≥ 1 inappropriate ICD shock. Causes of an inappropriate ICD shock were atrial fibrillation or atrial flutter (65 %), an abnormal sensing (24 %) and sinus tachycardia (11 %). The mean time from the ICD implantation was 790 ± 643 days to the first appropriate ICD shock and 873 ± 794 days to the first inappropriate ICD shock. Logistic regression analysis showed that digoxin therapy (OR 1,72, 95 % CI 1.03 - 2.87, p = 0.037) was significantly associated with an appropriate ICD shock and NYHA class III (OR 1.97, 95 % CI 1.06 - 3.66, p = 0.032), history of atrial fibrillation (OR 2.34, 95 % CI 1.31 - 4.19, p = 0.004) and mineralocorticoid receptor antagonist (MRA) therapy (OR 0.47, 95 % CI 0.25 - 0.86, p = 0.016) were significantly associated with an inappropriate ICD shock.

The death from any cause occurred in 193 patients (43 %). The mean time from the ICD implantation to death from any cause was 1010 ± 687 days. Cox regression analysis showed that diabetes mellitus (HR 1.58, 95 % CI 1.13 - 2.20, p = 0.006), LVEF ≤ 27 % (HR 1.64, 95 % CI 1.19 - 2.25, p = 0.002) and creatinine level ≥ 1.2 mg/dl (HR 1.48, 95 % CI 1,08 - 2.03, p = 0.013) increased and statin therapy (HR 0,71, 95 % CI 0.51 - 0.98, p = 0.041) decreased the occurrence rate of all cause mortality.
Conclusion: In the present study, 20 % of patients received appropriate ICD shock and 12 % of patients received inappropriate ICD shock during 4 years after implantation ICD. The digoxin therapy was independent predictor of appropriate ICD shock and NYHA class III, history of atrial fibrillation and MRA therapy were independent predictors of inappropriate ICD shock. Four-year all cause mortality was 43 %. Independent predictors of all cause mortality were diabetes mellitus, LVEF, creatinine level and statin therapy.

P250

Late gadolinium enhancement mass to predict shocks of defibrillators implanted for primary prevention in patients with non-ischaemic heart failure

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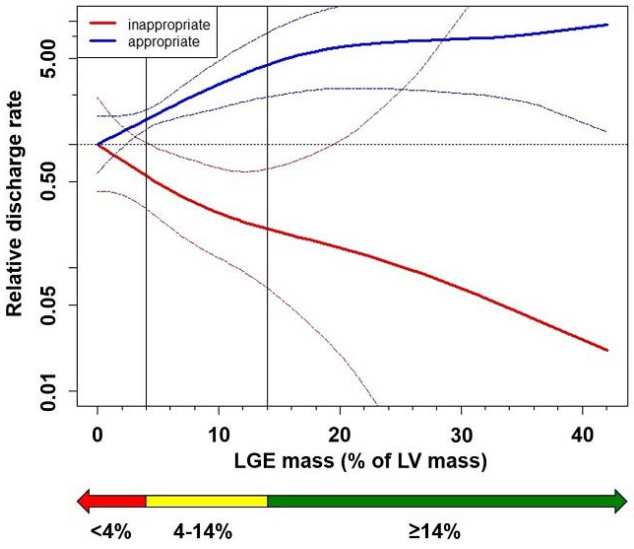
Background: Implantable cardioverter defibrillator (ICD) is recommended for patients with non-ischaemic heart failure (HF) and left ventricular ejection fraction (LVEF) ≤35% despite optimal medical therapy. No solid evidence exists to support this recommendation, and most patients will not experience any appropriate ICD intervention. Cardiovascular magnetic resonance (CMR) may allow a tailoired and more effective strategy of ICD implantation.
Methods: From our institutional dataset we retrieved the data of all patients with non-ischaemic HF receiving an ICD for primary prevention, and undergoing CMR within 1 month before implantation.



Results: 183 patients were evaluated (men 73%, median age 66 years, LVEF 24%, N-terminal fraction of pro-B-type natriuretic peptide 1217 ng/L, atrial fibrillation, flutter or atrial ectopic rhythm 21%). They received single-chamber (n=21, 12%), dual-chamber (n=34, 19%), or cardiac resynchronization therapy devices (n=127, 69%); 1 patient (1%) received a subcutaneous defibrillator. Twenty patients (11%) experienced a shock for ventricular tachycardia or fibrillation (VT/VF) over 2.5 years (0.8-5.4), and 13 (7%) had an inappropriate shock over 2.7 years (0.9-5.4). At CMR examination, late gadolinium enhancement (LGE) accounted for a very limited percentage of the LV mass (4% [2-11%]). LGE mass and posterior wall LGE emerged as univariate predictors of shocks for VT/VF, LGE mass being also an independent predictor (hazard ratio - HR 1.90, 95% confidence interval - CI 1.19-3.03; p=0.007). LGE mass ≥14% (the best cut-off at receiver operating characteristics analysis) independently predicted shocks for VT/VF (HR 3.82, 95% CI 1.51-9.68; p=0.005). LGE mass <4% was the only univariate predictor of inappropriate shocks (HR 4.82, 95% CI 1.07-21.76; p=0.041). As visually represented by spline curves, patients with LGE mass ≥14% (n=27, 15%) had a high likelihood of shocks for VT/VF and a low likelihood of inappropriate shocks, while the opposite was true for patients with LGE mass <4% (n=88, 48%).
Conclusions: Among patients with non-ischaemic HF receiving an ICD for primary prevention, those with LGE mass ≥14% benefit most from ICD in terms of prevention of SCD, while those with LGE mass ≤4% display mainly inappropriate shocks. A therapeutic strategy informed by LGE quantification is then worth considering.

P251

Etiology of dilated cardiomyopathy as the leading predictor of efficiency of implantable cardioverter-defibrillators in prevention of sudden cardiac death

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Purpose: to study the predictors of efficiency of ICD/CRTD in prevention of sudden cardiac death (SCD) in patients with dilated cardiomyopathy (DCM).
Methods: 275 patients with DCM syndrome were included (185 males; 46.8±12.5 years). Inclusion criteria were left ventricular end-diastolic diameter (LV EDD) more than 5.5 cm and LV ejection fraction (EF) less than 50%.The average EF 37.8±11.6% and EDD 6.5±0.8 cm. Patients with coronary artery stenoses more than 50% were excluded. Cardioverter-defibrillators were implanted in 78 (28. 4%) of patients (54 males, 48.8±12.8 years): 43 ICD, 35 CRTD. The follow-up was 14 [6; 120] months.
Results: defibrillators were implanted in patients with more severe dysfunction: EDD (6.7±0.8 vs 6.4±0.8 cm in patients without devices, <0.005), EF (32.5±9.5 vs 40.1±11.8%, <0.001), RV (3.4±0.8 cm vs 3.1±0.8 cm, <0.05), pulmonary artery systolic pressure (45.4±16.6 vs 49.6±15.0 mmHg, =0.02), mitral regurgitation (2.0 vs 1.5, <0.005). The following causes of DCM syndrome have been identified: the isolated myocarditis (n=137, 49.8%), the primary (genetic) DCM (n=54, 19.6%), the genetic basis with myocarditis (n=68, 24.7%) and anthracycline-induced cardiomyopathy (n=4, 1.5%). Genetic forms of DCM were represented by non-compact myocardium (n=64), ARVC (n=12), TTR-amyloidosis (n=1), myopathy (n=6). The pathogenic mutations in the genes LMNA (n=1), DES (n=2), DSP (n=2), EMD (n=2), PKP2 (n=1), MUH7+MyBPC3 (n=2), MyBPC3 (n=4) were detected. The appropriate shocks rate (ASR) was 21. 8%. The only reliable predictor of ASR was identified the genetic nature of DCM syndrome (in combination with myocarditis in 67% or isolated in 30% in comparison with 35/20% in patients without ASR, p<0.005, AUC 0.733, RR 1.66, 95% CI 0.711-3.885). In patients with shocks were detected the higher frequencies of stable/unstable VT (22 / 67%) in comparison with patients without shocks (1.7 / 73%, =0.06), a low QRS voltage (39 vs 13%, <0.05), absence of LV hypertrophy signs on the ECG (83% vs 53%, =0.07). The average LVEF was higher in patients with ASR (34.4±9.4%) in comparison with patients without ASR (25.9±9.0%), <0.003. There were no differences of NYHA class, the sizes of cardiac chambers. The mortality in patients with DCM was 18.9% (n=52), death + transplantation 22.5% (n=62), SCD 2.9% (n=8); in patients with defibrillators – 23.0%, 31.0%, 2.6%; in patients without devices – 17.3%, 19.3%, SCD 3.1%. There were no differences between the groups.
onclusion. Due to effective ICD therapy, death rate did not exceed those of less severe patients without devices. As criteria for ICD implantation, it is necessary to use the genetic nature of DCM, sustained / unsustained VT, the low QRS voltage, and the absence of LV hypertrophy (ECG). The genetic nature of DCM syndrome (alone or in association with myocarditis) is the more important predictor of appropriate shocks than EF.

P252

Are women being offered an ICD compare to men ?

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BACKGROUND: Guidelines supporting the use of implantable cardioverter-defibrillator (ICD) for primary prevention of sudden cardiac death (SCD) in patients diagnosed with heart failure have been established for many years. We suspected discordance between Canadian Cardiovascular Society's recommendations and current clinical practice. Our goal was to establish the difference between current guidelines and clinical practice as well as the factors, such as sex, that significantly influence prescription of an ICD.
METHODS: This retrospective study included 903 consecutive patients that were followed by cardiologists in a specialized heart function clinic. Our electronic medical

record (Vision C+) collected data from patients seen between May 2005 and February 2017. Patients had to have a documented left ventricular ejection fraction of 35% or less and be followed for at least one visit over a period of at least 90 days. All patients fulfilling these criteria were included except patients with a latest documented New York Heart Association functional class of 4. We described the use of ICD within our group of patients, considering the selected patients were potentially eligible for ICD in primary prevention of SCD. All variables available such as age, sex, medication and comorbidities were analyzed.
RESULTS: Of our 903 patients group, 195 (21,6%) were women. Mean age on was 72 years. The use of ICD was reported for 367 (40,6%) patients. CAD was labeled has the cause of HF in 607 (67,2%) of patients. In a logistic regression, factors such as age (OR=1,03, p<0,001), female sex (OR=1,6, p=0,011) and diagnostic of cognitive impairment (OR=3,45, p=0,004) were showed to negatively influence the prescription of an ICD.
CONCLUSIONS: As expected, clinical practice differs to national recommendations. We agree that the prescription of an ICD should be approached individually according to the age, comorbidities and wishes of each patient. The present study indicated that women, independently of age and comorbidities, were to receive significantly less ICD then men. Our group included only 21,6% of women which can possibly be a source a bias. We cannot know for sure if the difference noted is related to wishes and beliefs in our group or if there really is a sex bias within clinical practice. This concern would benefit further evaluation in future studies.

Chronic Heart Failure - Pathophysiology and Mechanisms

P253
Relationship between functional capacity, haemodynamic response to exercise and quality of life in chronic heart failure

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Funding Acknowledgements: National Institute for Health Research Newcastle Biomedical Research Centre

Background/Aim: Heart failure is associated with high mortality rate. Diminished functional capacity, haemodynamic response to exercise and quality of life are strong independent determinants of prognosis and mortality in chronic heart failure. The aim of the present study was to assess the relationship between functional capacity, haemodynamic response to exercise and quality of life in patients with chronic heart failure.
Methods: A single-centre, prospective, cross-sectional study recruited 42 patients (31 males, 11 females, age 60±10 years, body mass index 29±4 kg/m2) with stable chronic heart failure due to left ventricular systolic dysfunction (LVEF=25±7%) and the New York Heart Association Functional Class II (45%) and III (55% of patients). All patients completed a maximal graded cardiopulmonary exercise stress testing using cycle ergometer with non-invasive gas exchange and haemodynamic measurements to assess peak oxygen consumption and cardiac response to exercise. Cardiac power output, expressed in watts, was calculated as the product of mean arterial blood pressure and cardiac output. Quality of life was assessed using Minnesota Living with Heart Failure Questionnaire (MLHF).
Results: The average value (±SD) for functional capacity i.e. peak O2 consumption was 14.3±4.3 ml/kg/min, peak exercise haemodynamics i.e. heart rate 105±21 beats/min, mean arterial blood pressure 95±18 mmHg, cardiac output 13.9±3.6 L/min, cardiac power output 2.87±0.83 watts, and MLHF quality of life score 27±18. There was a significant negative relationship between the MLHF quality of life score and peak O2 consumption (r= -0.50, p=0.01) and heart rate (r= -0.30, p=0.05). There was however no significant relationship between the MLHF quality of life score and other exercise haemodynamic measures including peak cardiac power output (r= 0.15, p=0.38), cardiac output (r= 0.22, p=0.15), and mean arterial blood pressure (r= -0.09, p=0.57).
Conclusion: The major finding from the present study suggests that functional capacity, represented by peak exercise oxygen consumption, is a strong determinant of quality of life in patients with chronic heart failure. Results further reveal that the MLHF quality of life score may not be influenced by overall function and pumping capability of the heart.

P254
Rationale and design of RHYTHM-HF: a novel observational study to investigate the role of arrhythmias and cause of death in heart failure utilising injectable cardiac monitors and autopsy examinations

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Funding Acknowledgements: British Heart Foundation, British Society for Heart Failure, Abbott and Roche Diagnostics

Background Cardiac rhythm disturbances are common in heart failure, and likely to play a significant role in adverse clinical outcomes. Despite this, they have not been systematically studied, because until recently it has not been possible to undertake prolonged, continuous cardiac monitoring.
Purpose To investigate the role of arrhythmias and conduction disturbances in adverse clinical outcomes in patients with heart failure and to determine the cause and mode of death.
Methods Patients are recruited during an index admission for decompensated heart failure and receive an injectable cardiac monitor (ICM) prior to hospital discharge. Patients are then followed-up remotely for between two and four years, or until death. Cardiac rhythm data are collected via home transmission and are analysed for their temporal association with subsequent clinical events, including readmission for heart failure and stroke, and all-cause mortality. In an optional sub-study, patients are prospectively consented to an autopsy examination in the event of their death before the end of the study. Amongst these patients, the mode and cause of death will be characterised utilising both autopsy data and the terminal electrocardiographic rhythm captured via interrogation of their implanted ICM. In a further optional sub-study, patients undergo cardiac magnetic resonance (CMR) imaging during their index hospitalisation, to inform correlation of CMR data at baseline with subsequent novel ICM-defined arrhythmic outcomes (eg. new-onset, subclinical, ICM-detected atrial fibrillation; or ICM-documented arrhythmic sudden death). Study recruitment commenced in August 2017 and follow-up will end on 31/07/2021. We will enrol up to 500 patients.
Results/Conclusion RHYTHM-HF is a novel, contemporary, natural history study which aims to investigate the association of arrhythmias and conduction disturbances to adverse clinical events in patients with heart failure, and to characterise the cause and mode of death in heart failure. It is anticipated that the results of this study will inform the design of several new randomised, interventional trials directed at preventing these adverse events.

P255
Heterogeneity of cardiac macrophages in patients with of ischemic ADHF

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The role of the inflammatory reaction in the pathogenesis of HF is a well-known fact. However, there are no methods that affect myocardial inflammation. This is due to the lack of laboratory and clinical criteria for the phenotyping of HF. Macrophages play an important role in the inflammation. Identification of macrophage subpopulations in different types of inflammation in patients with HF will allow filling the lack of knowledge.
Aim: To study the heterogeneity of cardiac macrophages in patients with cute decompensation of ischemic chronic heart failure (ADHF).
Methods: This open-label, nonrandomized, single-center, prospective trial was registered at clinicaltrials.gov (#NCT02649517). This trial included 25 patients (84% men, left ventricular ejection fraction 29.17±9.4%) with ADHF and ischemic systolic dysfunction. Inclusion criteria were ADHF not earlier than six months after optimal surgery (percutaneous coronary intervention or/and coronary artery bypass graft) and optimal drug treatment for ADHF according to ESC guidelines. All patients underwent invasive angiography and endomyocardial biopsy with immunohistochemistry (n=25) and immunofluorescent analysis (n=21). Immunohistochemical criteria of myocarditis were at least 14 leukocytes per sq. mm in the myocardium including up to 4 monocytes and 7 or more CD3+ T lymphocytes per sq. mm. After that they were divided into four groups: group 1 (viral and autoimmune inflammation), group 2 (viral inflammation), group 3 (cardiotropic virus without inflammation), group 4 (cardiotropic virus with antibodies to cardiomyocytes without inflammation). We used CD68 as a marker for the cells of the macrophage lineage, while CD80 was considered as M1-like macrophage and CD163, CD206, stabilin-1 were considered as M2-like macrophage biomarkers. We used CD19, Cq1, MHL II as a marker for autoimmune process.

Results: The most common phenotype of inflammation according to the results of immunohistochemical analysis is viral inflammation (40%). Cardiotropic virus without signs of inflammation in the myocardium was revealed in 16% of patients. Viral and autoimmune inflammation and a cardiotropic virus with antibodies to cardiomyocytes were found in 12% and 8% of cases, respectively. The number of CD68+CD80+ cells in group 1 was significantly higher than in group 2 (p=0.0429). In addition, we observed an increased number of macrophages CD68+CD206+ in group 2 compared with group 3 (p=0.0085). We noted a slight increase stabilin-1 in group 4.
Conclusions: We found the heterogeneity of cardiac macrophages in patients with ADHF. It was revealed the predominance of CD68+CD80+ cells in patients with viral and autoimmune inflammation and CD163-CD206+ cells predominate in patients with viral inflammation.

P257

Sex-specific biomarker profiles underlying Heart Failure development: a sub-study of the HOMAGE (Heart OMics in AGEing) consortium

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On behalf of: Heart "OMics" in AGEing (HOMAGE) investigators
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Background: Heart failure (HF) is common in both men and women, however disease pathophysiology, presentation and progression differ between sexes. These sex differences may cause differences in circulating biomarkers, but studies investigating sex-specific biomarker profiles in prediction of new onset HF are scarce.
Purpose: To identify and validate sex-specific proteomic biomarkers and the underlying mechanistic pathways associated with development of new onset HF.

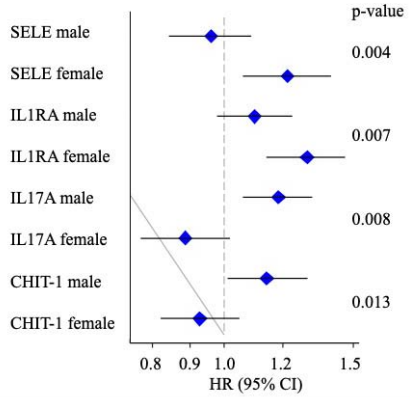

Figure 1: Forest plot showing hazard ratio's with 95% confidence intervals and p-values of the sex-interaction of 4 sex-specific protein biomarkers in relation to new onset HF

Figure 1

Methods and results: A matched case control design was used with cases (new-onset HF) and controls selected out of different international cohorts within the HOMAGE consortium (>20,000 individuals). Incident HF was defined as first hospitalization for HF. Controls were matched on cohort, follow-up time and age. Two independent sample sets were used to discover and replicate the findings: a 'discovery' set with 300 cases and 600 controls (phase 1a) and a replication set with 315 cases and 315 controls (phase 1b). Circulating proteins in the plasma were studied (n= 252) using O-link technology, and were manually clustered into 9 functional clusters based on the ConsensusPath database. Cox regression analysis was performed to look for sex-specific biomarkers related to HF development in the different sample phases as well as the pooled phases, correcting for matched factors and clinical factors (heart rate, systolic and diastolic blood pressure, BMI, HDL, LDL, history of coronary artery disease, diabetes mellitus, creatinin and smoking status). Four protein biomarkers consistently revealed (a trend to) significant sex differences in the prediction of new onset HF (figure 1) in the pooled data: E-selectin (SELE) and interleukin-1 receptor antagonist (IL1RA) being more predictive for females; and interleukin-17A (IL17A) and Chitotriosidase-1 (CHIT1) being more predictive for males. All 4 proteins are involved in the immunological response. Moreover, both female biomarkers (SELE and IL1RA) also play a role in energy metabolism or fibrosis (SELE).
Conclusions: IL17A and CHIT1 in male and SELE and IL1RA in female are sex-specific protein biomarkers for the prediction of new onset HF in the HOMAGE study. Further studies are required for validation in other independent cohorts and to investigate the clinical value of these proteins.

P258

Functional mitral regurgitation in pts with HFrEF, HFmrEF and HFpEF: the good, the bad and the ugly ?

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Background: The 2016 heart failure(HF) guidelines introduced a new classification of heart failure based on ejection fraction – HFrEF, HFmrEF and HFpEF. The aim of this study was to evaluate and compare the prevalence and evolution of functional(F) mitral(M) regurgitation(R) in HFrEF, HFmrEF and HFpEF pts admitted with an episode of acute decompensated heart failure .
Methods:We retrospectively analyzed data of 1453 de novo heart failure(HF) patients consecutively admitted with an acute episode of heart failure in a tertiary HF center (mean length of stay: 18 ± 16 days) . Ejection fraction was measured during index hospitalization and functional mitral regurgitation(FMR) was assessed at time of discharge. Severe FMR ≥ 2 was present in 40 % of pts. Mean age of the patients was 74 ± 12 years, 52% of them were men. After a mean FU of 1045 ± 702 day, 63 % of pts were still alive. According to ESC criteria we identified 45.3 % patients with HFrEF, 18.8 % patients with HFmrEF and 35.9 % patients with HFpEF.
Results: Pts with HFpEF were younger (p<0.001), had lower NTproBNP (p<0.001), less cardiac readmissions (p<0.001) and better RV function as evidenced by TAPSE(p=0.003). HFrEF pts had significantly higher incidence of severe FMR ≥ 2 at time of discharge (50.8 % vs 33.1% vs 38.8%; p > 0.001) and had higher LVEDD (60 ± 9 mm vs 54 ± 8 mm vs 48 ± 7mm; p < 0.05) compared to HFpEF, HFmrEF pts. Interestingly in HFrEF as well as in HFpEF pts optimisation of the HF therapy resulted in a significant improvement in FMR. Although no difference in early survival was noted between HFpEF, HFmrEF and HFrEF pts, HFpEF patients had worse long term survival compared to HFmrEF and HFrEF
However, only in the HFrEF group a significant difference in survival was noted beween those pts with and without severe FMR (p < 0.001).
Conclusion: Interestingly in HFrEF and HFmrEF but not in HFpEF pts optimisation of HF therapy resulted in a significant improvement in MR. Although FMR is prevalent in pts with HFpEF and HFmrEF it only bears prognostic information in HFrEF pts. Therefore we speculate that HFrEF pts with persistent severe FMR after recompensation should be followed intensively in a dedicated heart failure clinic.

P259

Characterizing heart failure with preserved and reduced ejection fraction: an integrated clinical, imaging and plasma biomarker approach

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Background The pathophysiology of heart failure with preserved ejection fraction (HFpEF) remains incompletely defined.
Purpose To characterize HFpEF compared to heart failure with reduced ejection fraction (HFrEF) and controls and gain pathophysiological insights.
Methods Prospective, observational study of HFpEF n=140, HFrEF n=46 and controls n=48; age (73±8) and sex-matched (males 49%). Subjects underwent intense phenotyping with cardiovascular magnetic resonance imaging, echocardiography, 6-minute-walk-testing (6MWT) and plasma biomarkers of myocardial fibrosis (ST2, galectin-3, GDF-15, pentraxin-C, TIMP-1, TIMP-4, MMP-2, MMP-3, MMP-7, MMP-8, MMP-9), cardiomyocyte stress/damage (Troponin-I, BNP, pro-BNP, NTpro-ANP), myocardial hypertrophy (Renin), inflammation/oxidative stress (MPO, hs-CRP, TNFR-1, IL-6) and renal dysfunction (cystatin-C and NGAL).

Results The HFpEF group was characterized by a high burden of co-morbidity: obesity (body mass index 34±7), hypertension (91%), diabetes (54%) and atrial fibrillation (31%). Both HFrEF and HFpEF groups when compared to controls had worse exercise capacity (6MWT distance: 210 vs 180 vs 380m), lower left ventricular (LV) EF (28 vs 56 vs 58%), higher LV filling pressures (E/E': 15 vs 13 vs 9, BNP: 387 vs 135 vs 33 ng/L), greater proportion of right ventricular (RV) systolic dysfunction (defined as RVEF <45%): 46 vs 19 vs 0%, more left atrial (LA) remodeling/dysfunction i.e. higher LA volumes: 59 vs 53 vs 35 ml/m2 and lower LA ejection fraction (LAEF): 29 vs 32 vs 51%, greater proportion of focal fibrosis i.e. myocardial infarction: 57 vs 23 vs 0% and non-ischaemic: 41 vs 35 vs 10%, greater burden of diffuse fibrosis i.e. extracellular volume fraction: 31 vs 28 vs 25% and higher levels of all plasma markers tested; p<0.0001 for all above.
LV remodeling i.e. mass/volume ratio was different between HFpEF (0.68 - concentric) and HFrEF (0.47 - eccentric); p<0.0001. Compared to HFpEF, HFrEF patients had lower LVEF, increased LV volumes, greater burden of focal and diffuse fibrosis, more RV remodeling, lower LAEF and higher LA volumes; p<0.05 for all. Plasma markers of LV cardiomyocyte stretch: BNP (387 vs 136 ng/L), pro-BNP (2.3 vs 1.6 pg/ml) and NTpro-ANP (7814 vs 6443 pg/ml) were also higher in HFrEF; p<0.05. In contrast, highly sensitive-C reactive protein was highest in HFpEF (43 vs 25 mg/L); p=0.06.
Conclusions HFpEF exists as a distinct pathophysiological entity compared to age- and sex-matched HFrEF and controls, providing differing targets for treatments. Inflammation (hs-CRP) is possibly more prominent in HFpEF compared to HFrEF in which cardiomyocyte stretch/stress is greater.

	HFrEF	HFpEF	Reference controls
		ECHO	
Filling pressures / diastolic dysfunction	↑↑	↑	-
		CMR	
LV			
LVEF	↓↓	↓	-
LV volumes	↑	normal	-
LV mass	↑↑	↑	-
LV mass/volume ratio	↓	↑	-
LV Remodeling pattern	eccentric	concentric	-
Focal fibrosis (overall)	↑↑	↑	-
Focal ischaemic fibrosis	↑↑	↑	-
Focal non-ischaemic fibrosis	↑	↑	-
Diffuse fibrosis	↑↑	↑	-
RV			
RV dysfunction	↑↑	↑	-
RV Remodeling	↑	normal	-
LA			
LAEF	↓↓	↓	-
LA volumes	↑↑	↑	-
		PLASMA BIOMARKERS	
Inflammation/oxidative stress	↑	↑↑	-
LV			
Interstitial fibrosis	↑	↑	-
Myocardial Hypertrophy	↑	↑	-
Cardiomyocyte stress/damage	↑↑	↑	-
Renal			
Renal dysfunction	↑	↑	-

Summary of imaging and plasma profiles

P260

Effects of sympathetic modulation by renal denervation in patients with heart failure and preserved ejection fraction

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Background: Heart failure with preserved ejection fraction (HFpEF) is associated with significant morbidity and mortality and up to now no treatment has proven effective. Amongst many pathophysiological derangements studies have indicated that HFpEF might be linked to increased sympathetic activity. Modification of the sympathetic nervous system through renal sympathetic denervation (RDN) is associated with reduction of blood pressure variability, which is an indicator of sympathetic nervous activity and effective circulating volumes. We therefore hypothesised that RDN might pose a possible treatment option in HFpEF through modifying sympathetic activity.
Purpose: The aim of the present analysis was to investigate the effects of RDN on patients with HFpEF.
Methods: Patients ≥18 years who underwent RDN, either in a prospective randomized clinical trial or in clinical routine in a single high-volume centre, were retrospectively included in the current analysis. Patients with a LVEF < 50% (n=9) were excluded. Patients were stratified into a "HFpEF" or no heart failure "non-HF" group according to ESC recommendations from 2016.
Results: Between November 2011 and September 2018, 76 HFpEF (median age, 66 [IQR 61-74] years, 39.5% ♀) and 48 non-HF patients (age 60 [54-66] years, 18.8% ♀) were included in the current analysis. RDN reduced systolic ambulatory blood pressure (BP) in both HFpEF (Fig. 1a) and non-HF patients at three-months (-8.5 ± 11.7 and -7.4 ± 10.4, both p<0.001; respectively) and six months (-8.1 ± 11.8 and -8.2 ± 8.4, both p<0.001; respectively). Frequencies of BP response ≥5 mmHg were not different between HFpEF and non-HF patients (p=0.663).
BP variability (BPV) as indicated by day- or night-time 24-h ambulatory BP standard deviation (SD) tended to be higher in HFpEF as compared to non-HF patients at baseline (SDday 17.0 [13.6-20.2] vs. 14.7 [12.4-17.3], p=0.055 and SDnight 15.5 [12.4-20.4] vs. 12.6 [11.3-15.0], p=0.003). RDN reduced BPV at three and six months in HFpEF patients (Fig. 1b) to equivalent levels of non-HF patients.
Compared to baseline values, NT-proBNP levels at the three months follow-up were decreased in HFpEF (348 [216-679] vs. 326 [164-689] pg/mL, p=0.010) (Fig. 1c) but not in non-HF patients (54 [34-90] vs. 67 [41-114] pg/mL, p=0.006), while renal function as assessed by estimated glomerular filtration rate did not improve in either group.
Conclusion: Sympathetic activity and stressed volume might be increased in HFpEF patients as indicated by higher BPV when compared to non-HF patients undergoing RDN. RDN in HFpEF patients reduced ambulatory BP. Additionally BPV was reduced to values of non-HF patients, which was accompanied by a decrease in NT-proBNP levels. Modification of sympathetic activity through RDN might be a promising therapeutic approach in HFpEF, which merits further investigations.

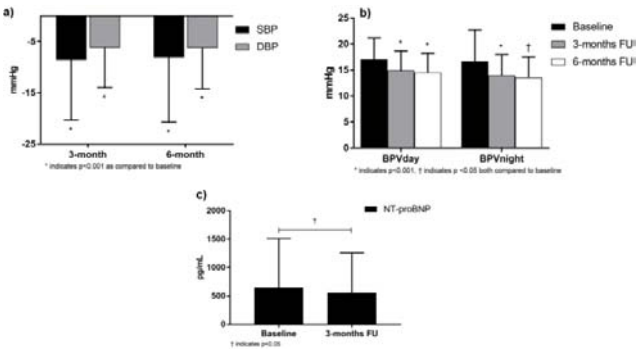

Figure 1a-c: RDN effects in HFpEF

P261

Evaluation of left intraventricular synchrony in asymptomatic left bundle branch block patients by non-invasive parameters obtained from radionuclide ventriculography

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Background: Radionuclide ventriculography (RNV) has been used to assess left ventricular ejection fraction (LVEF) and ventricular synchrony by means of phase and amplitude parametric images and their quantitative-derived parameters, where mean phase angle (PA) represents mean time of ventricular contraction onset and the standard deviation (SD) of the PA relates to synchrony of ventricular contraction. Objective: To study global and regional LVEF data as well as LV synchrony parameters obtained by RNV in patients (P) with asymptomatic left bundle branch block (LBBB)
Methods: Global and regional LVEF and LV synchrony data obtained from a RNV in 18 normal ECG P, were compared with the same parameters in 46 asymptomatic LBBB P with no previous cardiac history, who were referred for evaluation because of the abnormal ECG finding. SD of PA was derived from the phase histogram obtained

in the best left anterior oblique view, and expressed both in grades (°) or milliseconds (ms). Regional LVEF was derived from each of the four segments that ventricular blood pool was divided (Septal, Apex, Inferior-Lat, Post-Lat) in the same left anterior oblique view.

Results: In 19 LBBB P, mean LVEF was < 50% and > 50% in the remaining 27 P (40±7% vs 60±5%p < .001). Other results are expressed in the table below. In the whole LBBB group, a weak but good and inverse correlation between SD of PA and LVEF was found (r=-0.53, p<0.001), so the greater SD of PA, the less LVEF.

Conclusions: 1. Abnormal LV systolic function is encountered in 41% of asymptomatic ambulatory P with LBBB. 2. All LBBB P, showed left intraventricular mechanical asynchrony data estimated by RNV parameters when compared to controls, although higher in those P with depressed LVEF.

3. We may speculate that this abnormal LVEF in 41% of LBBB group is due to an undiagnosed primary cardiomyopathy since regional wall motion is globally affected in this group compared with control P and those LBBB P with preserved EF or due to a LV remodeling because of LBBB-dependent electrical asynchrony itself

RESULTS

	CONTROL	LBBB/EF >50%	LBBB/EF <50%
SD(°)	20 ± 12	39 ± 21 **	56 ± 17 ***
SD (ms)	45 ± 25	92 ± 49 **	129 ± 40 ***
Septal (%)	39 ± 10	31 ± 13 *	18 ± 10 ***
Apex (%)	60 ± 8	62 ± 7	44 ± 10 ***
Inferior-Lat (%)	61 ± 11	67 ± 11	51 ± 14 ***
Posterior-Lat (%)	69 ± 12	75 ± 12	56 ± 15 ***

*: p<.05 vs control;**:p<.01 vs control;***:p<.001 vs control and LVEF>50%

P262

The impact of regulatory T lymphocytes on long-term survival in patients with ischemic heart failure with reduced ejection fraction

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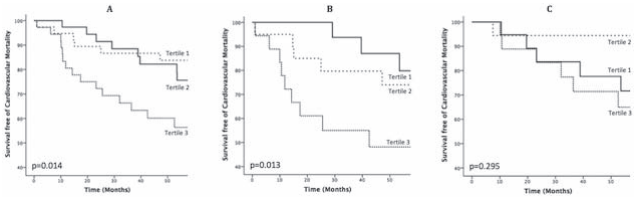
Background: Heart failure with reduce ejection fraction (HFrEF) constitutes a global health issue representing a prevalent clinical syndrome. While pro-inflammatory cytokines proved to have a pivotal role in the development and progression of HFrEF, less attention has been paid to the cellular immunity. Regulatory T lymphocytes (Tregs) seem to have an important role in the induction and maintenance of immune homeostasis especially in patients after acute coronary syndrome and coronary vessel disease. Therefore we aimed to investigate the impact of Tregs on the outcome of patients presenting with ischemic HFrEF.

Methods: We prospectively enrolled 112 patients with HFrEF defined by New York Heart Association (NYHA) functional class >II and left ventricular ejection fraction (LVEF) <40%. Patients were stratified in ischemic (iHFrEF, n=57) and dilated etiology (dHFrEF, n=55). Cells from fresh heparinized blood were stained and analyzed using BD FACS Canto II flow cytometry. Cox regression hazard analysis was used to assess the influence of Tregs on survival. The multivariate model was adjusted forage and gender.

Results: Comparing patients with iHFrEF to dHFrEF we found a significantly lower fraction of Tregs within lymphocytes in the ischemic subgroup (0.42% vs. 0.56%; p=0.009). After a mean follow-up time of 4.5 years 32 (28.6%) patients died due to cardiovascular causes. We found that Tregs were significantly associated with cardiovascular survival in the entire study cohort with an adjusted HR per one standard deviation (1-SD) of 0.60 (95% CI 0.39-0.92; p=0.017). Interestingly while there was no association with cardiovascular survival independently in the dHFrEFsubgroup (adj. HR per 1-SD of 0.62 (95% CI 0.17-2.31); p=0.486), we found a significant inverse association of Tregs and cardiovascular survival in patients with iHFrEFwith an adj. HR per 1-SD of 0.59 (95% CI 0.36-0.96; p=0.034).

Conclusion: Our results indicate a potential influence of Tregs in the pathogenesis and progression of iHFrEF, fostering the implication of cellular immunity in iHFrEF pathophysiology and proving Tregs as a predictor for long-term survival among iHFrEF -patients.

Figure 1: Survival Curves of Cardiovascular Mortality.Kaplan-Meier plots showing survival free of cardiovascular mortality in the total study collective (A) and patients stratified in ischemic CMP (B) as well dilative CMP (C) according to tertiles of frequencies of regulatory T cells. Tertile 1 = high; Tertile 2 = mid; Tertile 3 = low



P263

Prognostic role of ST2 in heart failure patients with carbohydrate metabolism disorders

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Objective. The objective of this study was to evaluate prognostic value of sST2 biomarker in the development of adverse cardiac events during the 12-month follow-up period in heart failure patients with carbohydrate metabolism disorders (impaired glucose tolerance (IGT) and type 2 diabetes mellitus (DM)). Methods. A total of 118 patients (83.9% men, median age of 62.5 [57; 68] years) with stable coronary artery disease and baseline LVEF of 60% [46; 64]% were enrolled in the study. At baseline evaluation, heart failure patients were of New York Heart Association (NYHA) class I (7.7%), class II (61.0%), and class III (31.3%). Serum levels of sST2 and NT-proBNP were measured using an enzyme immunoassay. Results. Depending on the presence of carbohydrate metabolism disorders (CMD), the patients were divided into 3 groups: group 1 (n = 65) comprised patients without CDM, group 2 (n = 30) comprised patients with IGT, and group 3 (n = 23) comprised patients with type 2 DM. Serum levels of sST2 in patients with CMD were (p = 0.011) higher than in patients without CMD, but in subgroups of patients with IGT and type 2 DM the concentrations of sST2 did not differ. The median values of baseline sST2 were 30.51 [26.38; 37.06] ng/mL in group 1, and 37.97 [33.18; 47.48] and 41.45 [35.27; 50.37] ng/ml in group 2 and 3, respectively. During the 12-month follow-up period in group 1 the rate of adverse cardiac events was 29.7% cases, and 55.2% and 52.2% in group 2 and 3, respectively. Odds ratio for ST2 were 3.06 (95% CI 2.89–3.17; p <0.0001) in patients with CMD and 2.11 (95% CI 1.93–2.15; p <0.001) in patients without it for adverse cardiac events. CMD did not impact the predictive value of sST2 biomarker, but in patients with CDM, sST2 levels were significantly higher than in those without CDM that was associated with a higher rate of adverse cardiac events during the 12-month follow-up period (p<0,001). The cut-off values predicting adverse cardiac events in ischemic heart failure patients with CDM were determined based on receiver operating characteristic curve analysis. Baseline sST2 concentration of 34.14 ng/mL was identified as a cut-off value with the sensitivity of 73.3%, specificity of 75.0%, and AUC of 0.77 (95% CI 0.59-0.89, p=0.002). Conclusion. Our data suggest that ST2 may be considered a non-invasive biomarker for prediction of adverse cardiac outcomes during the 12-month follow-up period in heart failure patients with CMD.

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Body composition is associated with constructive but not wasted myocardial work in subjects free of heart failure Results from the STAAB cohort study

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INTRODUCTION: Obesity is a major risk factor for the development of heart failure (HF). In patients with overt HF, the amount of fluid retention contributing to the apparently higher body weight may be difficult to assess. In order to understand the pathophysiologic mechanisms and trigger factors of a failing heart, profound knowledge on normal physiology is key. A novel echocardiographic method to non-invasively determine myocardial work based on speckle-tracking derived longitudinal strain and blood pressure has recently been validated. We assessed the association of body mass index (BMI), total body water (TBW), and extracellular water (ECW) with myocardial work.

METHODS: The Characteristics and Course of Heart Failure STAges A/B and Determinants of Progression (STAAB) cohort study carefully characterized a representative sample of the population of a medium-sized town in Germany, aged 30-79 years and free from HF. Weight, TBW, and ECW were assessed using a

bioimpedance scale, respectively. Off-line analysis (EchoPAC®, Version 202, GE) of the standardized, quality-controlled transthoracic echocardiograms regarding myocardial work yields i.e. the following parameters: global constructive work (GCW): work performed during shortening in systole and adding negative work during lengthening in isovolumic relaxation; global wasted work (GWW): negative work performed during lengthening in systole adding work performed during shortening in isovolumic relaxation; and global work efficiency (GWE): constructive work / (constructive work+ wasted work).
RESULTS: From the sample of the first planned STAAB interim analysis, myocardial work analysis could be performed in 1838 (74%) individuals (49.5% female; 54±12 years). In simple linear regression, GCW was significantly associated with BMI (B=−10.76 [−15.5; −6], p<0.001), TBW (B=−9.3 [−12; −6.61], p<0.001) and ECW (B=-19.2 [−26.42; −12], p<0.001). No significant association was found with GWW and GWE.
CONCLUSION: In subjects free of HF sampled from the general population, we observed that higher BMI, TBW and ECW were associated with lower GCW. This implies a negative impact of subclinical fluid retention on constructive myocardial work, while wasted work and work efficiency seemed unaffected by these variables. The individual contribution of these factors to reduced cardiac performance deserves further validation in patients with HF.

P265

Impact of renal function and serum electrolytes on myocardial work - Results from the STAAB cohort study

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Funding Acknowledgements: German Ministry of Research and Education BMBF 01EO1004 and 01EO1504

INTRODUCTION: In order to understand the mechanisms and trigger factors of a failing heart, profound knowledge on normal physiology is key. A novel and invasively validated echocardiographic method allows to non-invasively quantify constructive and wasted myocardial work based on speckle-tracking derived longitudinal strain and blood pressure. Here we assessed the association of serum electrolytes and renal function with myocardial work.
METHODS: The Characteristics and Course of Heart Failure STAges A/B and Determinants of Progression (STAAB) cohort study phenotyped a representative sample of the population of a medium-sized town in Germany, aged 30-79 years. Off-line analysis of standardized, quality-controlled transthoracic echocardiograms yields the following aspects describing myocardial work: global constructive work (GCW): work performed during shortening in systole and adding negative work during lengthening in isovolumic relaxation; global wasted work (GWW): negative work performed during lengthening in systole adding work performed during shortening in isovolumic relaxation; global work efficiency (GWE): constructive work / (constructive work+ wasted work). Glomerular filtration rate (GFR) and serum electrolytes were assessed at the same study visit.
RESULTS: Myocardial work analysis was performed in 1838 (74%) individuals (49.5% female; 54±12 years). In simple linear regression, GCW was significantly associated with sodium (B= +18.0 [8.4; 27.6], p <0.001), potassium (B=−79.7 [−132.7; −24.6], p=0.004), and GFR (B=−3.2 [−4.6; −1.9], p<0.001). GWW was significantly associated with GFR (B=−0.365 [−0.516; −0.215], p<0.001). Regarding GWE, we found a significant association with potassium (B=−0.362 [−0.603; −0.120], p=0.003) and GFR (B=+0.013 [+0.007; +0.019], p<0.001).
CONCLUSION: In individuals free from heart failure, increasing GFR was associated with both, a decrease in constructive but also in wasted work which resulted in a significant increase of net myocardial work efficiency. Further, increasing serum sodium was associated with a slight increase in constructive work but no significant change in work efficiency. In contrast, increasing serum potassium was associated with a significant decrease in constructive work which resulted in a significant decrease of work efficiency. These findings are worth further evaluation in patients with heart failure to investigate whether this pattern can be reproduced in patients with heart failure, and, importantly, whether these novel echo-measures may be used to determine individual target ranges for electrolytes to improve myocardial function in patients with heart failure.

P266

Urinary sodium profiling in chronic heart failure to detect the development of acute decompensated heart failure.

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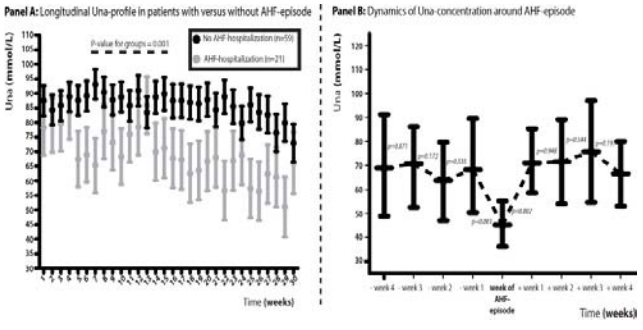
BACKGROUND
No data is available about the dynamics of urinary sodium (Una)-concentration in patients with chronic heart failure (CHF), including its temporal relationship with acute heart failure hospitalization (AHF).
OBJECTIVE To determine the relationship between Una-concentration and the pathophysiologic interaction with the development of AHF.
METHODS We prospectively included stable CHF-patients with either reduced or preserved ejection fraction to undergo prospective collection of morning spot Una-samples for 30 consecutive weeks. Linear mixed modeling was used to assess the longitudinal changes in Una-concentration. Patients were followed for the development of the clinical endpoint of AHF.
RESULTS A total of 80 CHF-patients (age=71±11years, NT-proBNP=771[221-1906], LVEF 33±7%) prospectively collected weekly pre-diuretic first void morning Una-samples for 30 weeks. A total of 1970 Una-samples were collected, with mean Una=81.6±41mmol/l. Sodium excretion remained stable over time on a population level (time-effect p=0.663). However, inter-individual differences revealed the presence of high (n=39, Una=88mmol/l) and low (n=41, Una=73mmol/l) sodium-excreters. Only a younger age was an independent predictor of high sodium excretion (OR=0.91; CI=0.83-1.00; p=0.045 per year). During 587±54 days of follow-up, 21 patients were admitted for AHF. Patients who developed AHF had significantly lower Una-concentrations (F[1.80]=24.063;p<0.001; figure panel A). The discriminating capacity of Una-concentration to detect AHF, persisted after inclusion of NT-proBNP and eGFR as random-effects (p=0.041). Additionally, Una-concentration further dropped (Una=46±16mmol/l vs. Una=70±32mmol/l; p=0.003) in the week preceding the hospitalization, and returned to the individual baseline (Una=71±22mmol/l; p=0.002) following recompensation (figure panel B). While such early longitudinal changes in weight and dyspnea scores were not apparent in the week preceding decompensation.
CONCLUSION Overall Una-concentration remains relatively stable over time, but large inter-individual differences exist in stable CHF-patients. Patients who develop an AHF-admission exhibit a chronically lower Una-concentration and exhibit a further drop in Una-concentration the week preceding hospitalization. Ambulatory Una-sample collection is feasible and might offer additional prognostic and therapeutic information.



P267

Arterial stiffness in heart failure patients after an acute episode of acute decompensation : preliminary results

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Background: The role of arterial stiffness in the pathogenesis and clinical outcome in heart failure (HF) patients should be elucidated yet. Preliminary data demonstrated an increased pulse wave velocity (PWV) in HF patients in comparison with healthy subjects and patients with cardiovascular risk factors. Moreover, growth differentiation factor-15 and soluble ST2 (sST2), biomarkers of cardiac stress and validate prognostic tools of HF , seemed to be strictly related to PWV.

Purpose: The aim of this observational experience was to analyze the arterial stiffness in HF patients in comparison with a healthy control population trying to correlate it with functional parameters.
Methods: consecutive patients admitted for acute decompensation underwent clinical examination, echocardiogram, biomarkers dosage and evaluation of arterial stiffness by measuring the PWV (expressed in meter/second from the pressure wave transit and the distance between carotid and femoral artery) and the augmentation index (AIX75) (using the manufacturer's proprietary software) with a Sphygmocor applanation tonometer system according to the established protocol. The arterial stiffness was also calculated in a control group formed by healthy volunteers.
Results: 59 hospitalized HF patients (40 males; age 73.3±11.5 years) with mean LVEF 38.5±12.2% and NT-proBNP (10765.7± 10096.4 pg/ml) entered the study. Twenty-seven (47.5%) had a coronary artery disease (CAD), in 27 (45.7%) the aetiology was dependent from a valvular disease and the others are hypertensive of idiopathic. The HF population were compared with 42 subjects [25 healthy controls (11 males, age 54.8±13.6 ys) and 17 patients (11 males, age 71.9±8 ys) with cardiovascular risk factors (CVRF) but in absence of heart failure]. The control group was formed by younger subject in comparison to CVRF group and HF patients ($p<0.001$ for both groups). The analysis of PWV demonstrated a velocity of 10±1.68 m/sec , 12.41±2.18 m/sec and 10.94±2.19 m/sec in controls, CVRF and HF patients, respectively (HF vs CVRF p=0.03; HF vs controls p=0.14; CVRF vs controls p=0.001). Aix75 (corrected for heart frequency) demonstrated to be higher in CVRF group vs HF patients (35.12±9.21 vs 23.28±13.22, p=0.004) so as central systolic pressure resulted higher in CVRF than in others (CVRF 63.23±14.50 mmHg, HF 54.16±14.09 mmHg, controls 50.08±8.94 mmHg: CVRF vs HF p=0.03; HF vs controls p=0.40; CVRF vs controls p=0.005).
Conclusion: CVRF patients seemed to present a worst arterial stiffness in comparison to healthy subjects and HF patients hospitalized. These preliminary results deserve future investigation on a larger population.

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Left ventricular geometry impact on myocardial work, Results from the STAAB cohort study

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On behalf of: STAAB Consortium
Funding Acknowledgements: Funding of the STAAB cohort study in the frame of the Comprehensive Heart Failure Center, BMBF 01EO1004 and 01EO1504

INTRODUCTION: Patients with heart failure (HF) often exhibit left ventricular (LV) hypertrophy or dilation. Nevertheless, the individual effect of LV dimensions on LV function is not well understood. A novel echocardiographic method to non-invasively determine myocardial work based on speckle-tracking derived longitudinal strain and blood pressure has recently been invasively validated.
We aimed to assess the relationship of LV dimensions on myocardial work.
METHODS: The Characteristics and Course of Heart Failure STAges A/B and Determinants of Progression (STAAB) cohort study carefully characterized a representative sample of the population of a medium-sized town in Germany, aged 30-79 years. We defined a subsample of "healthy" individuals in sinus rhythm and free from cardiovascular disease and risk factors, and designated the remaining subjects "at risk". Off-line analysis (EchoPAC®, Version 202, GE) of the standardized, quality-controlled transthoracic echocardiograms regarding myocardial work yields; global constructive work (GCW): work performed during shortening in systole and adding negative work during lengthening in isovolumic relaxation; global wasted work (GWW): negative work performed during lengthening in systole adding work performed during shortening in isovolumic relaxation; global work efficiency (GWE): GCW / (GCW + GWW). Further, LV volume and mass were measured and indexed to body surface area.
RESULTS: We analysed 1838 individuals (49.5 % female; 54±12 years, n=432 healthy). Mean values of GWE, GCW, and GWW are given in the table. In linear regression, GCW was associated with LVEDVi (B=−2.07 [−3.95; −0.195], p= 0.031) and LVMi (B=+1.51 [0.349; 2.67], p= 0.011); GWW with LVMi (B=+0.457 [0.328; 0.585], p <0.001); and GWE with LVEDVi (B=−0.011 [−0.019; −0.003], p=0.01). An association of GWE with LVMi (B=−0.023 [−0.029; −0.017], p <0.001) was only observed in the at risk group.
CONCLUSION: Although both an increase in LV volume and in LV mass were associated with lower myocardial work efficiency, only LV volume was associated with reduced constructive work (but not wasted work). Particularly in subjects at risk, higher LV mass was associated not only with higher constructive but also wasted work, and thus with a decrease in net efficiency. The clinical utility of this concept deserves further investigation in heart failure patients.

	Healthy (n=432)	At risk (n=1404)	p
GWE %mean (SD)	96.05 (1.5)	95.4 (±2)	<0.001
GCW mmHg%mean (SD)	2443 (343)	2529 (455)	<0.001
GWW mmHg%mean (SD)	82 (39)	96 (51)	<0.001

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Cardiovascular risk factors are associated with constructive but not with wasted myocardial work, Insights from the STAAB cohort study

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On behalf of: STAAB Consortium
Funding Acknowledgements: Funding of the STAAB cohort study in the frame of the Comprehensive Heart Failure Center, BMBF 01EO1004 and 01EO1504

INTRODUCTION: A novel echocardiographic method to non-invasively determine myocardial work based on speckle-tracking derived longitudinal strain and blood pressure has recently been validated against invasive reference measurements and is considered a less load-depend parameter than LVEF and strain. We aimed to assess the relationship of cardiovascular risk factors (CVFR) on the individual indices of non-invasively measured myocardial work.
METHODS: The Characteristics and Course of Heart Failure STAges A/B and Determinants of Progression (STAAB) cohort study comprehensively characterized a representative sample of the population of a medium-sized town in Germany, aged 30-79 years. Using off-line analysis of the standardized, quality-controlled transthoracic echocardiograms, several indices describing myocardial work could be derived. Global constructive work (GCW): sum of positive work performed during systolic shortening plus negative work during lengthening in isovolumic relaxation; global wasted work (GWW): sum of negative work performed during systolic lengthening plus work performed during shortening in isovolumic relaxation; global work efficiency (GWE): GCW / (GCW+GWW).
RESULTS: From the sample of the first planned STAAB interim analysis (n=2473; 51% female; 54±12 years), myocardial work analysis could be retrieved in 1838 (74%) individuals. Mean values and results of the multiple regression including CVRF and age are given in the table. Hypertension was significantly associated with higher levels of GCW and GWW but lower GWE. We found an adverse association of smoking and dyslipidemia with GCW, but not with GWW. Obesity was associated with lower GCW, but not with GWE. Diabetes mellitus had no significant relationship on myocardial work.
CONCLUSION: Our results from a representative sample of the general population suggest an adverse effect of smoking, dyslipidemia and obesity on constructive, but no effect on wasted myocardial work. Only the effect of hypertension and dyslipidemia might be dominant enough to significantly reduce global work efficiency as parameter integrating constructive and wasted myocardial work.

	Mean (SD)	Hypertension	Smoking	Diabetes	Dyslipidemia	Obesity
		B	B	B	B	B
GWE [%]	96 (2)	-0.66***	ns	ns	-0.34**	ns
GCW [mmHg%]	2509 (433)	+352.9***	-88.6***	ns	-124.7***	-195.2***
GWW [mmHg%]	323 (93)	+25.4***	ns	ns	ns	ns

Table: CVRF association with myocardial work (n=1838); B =regression coefficient * p<0.05; ** p<0.01; *** p<0.001

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Sleep disordered breathing, neurocognitive impairment and diastolic function in acute heart failure patients with preserved ejection fraction

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Background: Sleep disordered breathing (SDB) and neurocognitive impairment (NI) are typical features of heart failure (HF), especially HF with preserved ejection fraction (HFpEF).
Purpose: To investigate changes in the severity of SDB, the degree of NI, and the diastolic function in an acute phase of hospitalization and in a stable period at home after discharge.
Methods: We enrolled 24 AHF patients (12 HFrEF and 12 HFpEF) with SDB and compared them to a matched population of 12 non-HF patients hospitalized for other cardiovascular causes. A complete echocardiogram, a set of NI tests, and a polysomnography were performed in the acute phase and after 3 months follow-up.
Results: Improvements in diastolic and right ventricular function were observed at 3 months compared to baseline, with a greater extent in HFpEF vs HFrEF, probably due to the higher volume load dependence of these echocardiographic indexes in HFpEF than HFrEF: respectively E/E' from 15.52 ± 6.90 to 13.28 ± 5.67 in HFpEF ($p < 0.05$) and 12.57 ± 4.49 to vs 13.56 ± 5.57 in HFrEF (p= 0.2); LAVI- left atrial volume index- from 63.49 ± 41.94 ml/m2 to 54.08 ± 34.20 ml/m2 (p = 0.04) vs 55.59 ± 17.01 ml/m2 to 54.60 ± 24.55 ml/m2 (p 0.2); PAPs -pulmonary artery pressures- from 34.57 ± 7.73 mmHg to 25.02 ± 14.94 mmHg (p = 0.04) vs 31.65 ± 10.99 mmHg to 25.36 ± 10.25 mmHg (p 0.02); TAPSE – tricuspid annular plane systolic excursion- from 20.57 ± 4.40 mm to 25.14 ± 10.14 mm (p = 0.03) vs 16.90 ± 3.21 mm to 21.70 ± 6.15 mm (p 0.03). At baseline SDB were present in both HFpEF and HFrEF, and a significant reduction of apneic events was observed at follow up (AHI-apnea hypopnea index-: 25.0 ± 16.9/h to 16.6 ± 10.7/ h and 33.7 ± 21.6/ h to 19.2 ± 14.1/h, $p < 0.05$; mean SaO2 –oxygen saturation-: 91.7 ± 4.4 % to 92.8 ± 2.1% vs 91.6 ± 2.4% vs 92.8 ± 2.3%, p = NS). Moreover, compared to non HF and HFrEF patients, lower baseline scores at NI tests were observed in HFpEF, but a more significant improvement was assessed at 3 months in this group.
Conclusion: Our study seems to suggest that in AHF patients with SDB the achievement of a better compensation could lead to important beneficial effects not only on echocardiographic parameters and nocturnal respiratory profile, but also on NI, especially in HFpEF.

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Atrial fibrillation and heart failure with non reduced ejection fraction: can biomarkers make the difference?

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BACKGROUND: Atrial fibrillation (AF) and Heart Failure (HF) share similar symptoms and echo findings. The overlap of AF and HF with preserved (HFpEF) or mid-range ejection fraction (HFmrEF) usually delays the use of the appropriate therapies in each case. Biomarkers (BM) are commonly determined in these patients and could be used to differentiate both diseases.
PURPOSE: We design a study to assess the differences in BM between both diseases.
METHODS: We designed a cross sectional study in a population of 101 patients with symptomatic persistent non-valvular AF. We excluded patients with clinical instability or ejection fraction < 40%. We defined HF as the presence of diastolic dysfunction in echo (left atrium indexed volume >34 ml/m2 or e/é>8) or ejection fraction between 40 and 50%. According to this definition, we detected 72 patients with HF (14 with HFmrEF and 58 with HFpEF) and 29 without HF. We compared the plasmatic levels of 7 BMs between the 2 groups. The BMs studied were proBNP, C reactive protein (CRP), galectin 3, ST2, fibrinogen, urate, and ultrasensible troponin T (trop). We used t-student for normal variables or U Man Whithney for non normal quantitative variables and Chi square for qualitative ones to compare the values between the 2 groups. We performed a ROC curve to detect the best cut off point in the variables that presented statistical differences.
RESULTS: In table 1 we summarized the baseline characteristics of both groups. The only BM that showed statistical difference was proBNP that was higher in patients with HF (118.93 ± 876.46 vs. 847.45 ± 837.74 pg/ml; $p<0.05$). The area under the curve was 0.67 and the best cut off point was 524.5 pg/ml (sensitivity 84% and specificity 52%).
CONCLUSIONS: The levels of BMs in patients with AF with or without HF are similar. Only proBNP was significantly higher in patients with HF, so its measurement could be useful to suspect HF in symptomatic patients with AF in order to modify their clinical management. We suggest higher cut off points than usually recommended in this clinical scenario.

Table 1

Variable	With HF (n=72)	Without HF (n=29)	P
Age (years)	65 ± 8	60 ± 11	0.01
Male	49 (68.6 %)	24 (82.7 %)	NS
Hypertension	43 (59.7%)	14 (48.3 %)	NS
Diabetes	10 (13.8 %)	3 (10.3 %)	NS
Smoking	13 (18 %)	4 (13.8 %)	NS

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Matrix metalloproteinase-2,9 activity, galectin-3 and systemic inflammation in patients with postinfarction heart failure with preserved ejection fraction

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Objective: study was designed to evaluate the serum level of MMP 2,9, galactin-3 and C- reactive protein (CRP) in postinfarction heart failure with preserved ejection fraction (HFpEF) patients. Methods: We divided all included patients into two main groups: 1st group- 40 patients with HFpEF and history of myocardial infarction. 2nd group- 38 patients with HFpEF and stable angina. Standard laboratory blood tests, CRP, haematological parameters, lipid profile, glucose, renal and liver function tests were performed for all patients. MMP activity assay and galectin- 3 serum level was detected for all patients.
Results: It was established significant differences between study groups in MMP-2, MMP-9 levels. Particularly, patients with HFpEF with MI in anamnesis had significantly higher MMP-2, MMP-9 levels on 21.8 % and 20.7 % respectively. The C-RP and leucocytes levels were significantly higher in 1st group pts. Significant differences in MMP-2, MMP-9 were established in 1st group patients in different age groups ($p < 0.05$). The MMP 2 level was positively correlated with MMP 9 level ($R=0.73$, $p < 0.05$), the MMP 9 level – with age ($R=0.68$, $p < 0.05$). There were no significant differences between galectin-3 level in study group. But we estimated significant differences in galectin-3 level between 1st and 2nd subgroups ($p < 0.05$). Conclusion: Serum MMP-2, MMP-9, CRP and galectin-3 were significantly increased in pts with postinfarction heart failure with preserved ejection fraction compare to pts without myocardial infarction in anamnesis.

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Increased inflammatory state can be a predictive marker for acute kidney injury in acute decompansated heart failure patients with preserved ejection fraction

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Background: Acute kidney injury (AKI) is an independent risk factor for mortality in acute decompansated heart failure (ADHF). The purpose of this study is to determine the predictors and prognostic impact of AKI in ADHF patients with preserved ejection fraction.
Methods: Fifty-three patients with ADHF with preserved ejection fraction (29 male; mean age 79 ± 10 years) who were hospitalized at our intensive cardiac care unit (ICCU) during January 2016 – April 2018 were retrospectively investigated. All patients received prespecified standardized decongestive heart failure therapy as a part of "ICCU - Acute Heart Failure Treatment Protocol". AKI is defined as an increase in serum creatinine ≥0.3 mg/mL during the hospitalization.
Results: AKI developed in 37.7% of patients with ADHF with preserved ejection fraction. The baseline demographic characteristics, co-morbidities, medical therapies and laboratory analyses were similar between patients with and without AKI, except for higher N-terminal pro-brain natriuretic peptide (NT-proBNP) levels in the AKI group (13879 ± 12534 vs 7422 ± 8924; p = 0.03) (Table 1-2). Baseline C-reactive protein (CRP) levels were increased in both groups on admission. CRP increase during hospitalization period (CRPΔ: maximal CRP baseline CRP), but not CRP value on admission, was found to be an independent risk factor for AKI [odds ratio (OR): 1.07, 95% confidence interval (CI): 1.01–1.14, P = 0.01] despite clinically diagnosed infection was not different between the groups. AKI was associated with increased

lenght of hospital stay (9.9 ± 10.2 vs 5.4 ± 2.8; p = 0.02) and also increased risk of in-hospital mortality (Table 2). Conclusion: Increased inflammatory state (i.e. CRP levels) may be a marker of uncontrolled incidious infection which is associated with AKI leading to longer hospital stay and higher in-hospital mortality in ADHF patients with preserved ejection fraction.

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Therapeutic approaches via blood transfusion in anemic patients with diastolic heart failure.Role of bone morphogenetic protein 11 from young (<30age) blood donors in diastolic dysfunction reverse.

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Background/Introduction Heart failure (HF) represents a clinical syndrome of symptoms and sings, with structural or functional alterations of myocardial systolic or diastolic properties or mixed. HF is correlated with anemia (AN), since 30% of HF patients (HFP) will develop AN and vice versa AN is a risk factor for HF. Annual risk of death is higher in anemic than in normoanemic HFP and reduction of 1% in hematocrite (Ht) increases 10% the death risk in HFP. Since normal levels of Ht are correlated with lower HFP death risk, in our study we examine if blood transfusion (BT) is a possible optimum treatment in diastolic HFP (DHFP). Also we examine the hypothesis from evidence in animal models that BT from young blood donors (YBD) reverses HF, due to high levels of plasma bone morphogenetic protein 11 (BMP-11) (BPM-11 levels are high only in plasma of young subjects and decreases with age).
Purpose Investigate whether; the BT could improve HF outcomes in anemic DHFP and also the existence of possible existence correlation between BT from YBD and HF reversing.
Methods 2 groups of 30 DHFP with anemia (due to chronic disease), (15 males, 15 females, average age 80 years old, without chronic kidney disease and with eligibility criteria for BT [hemoglobin (Hb) <7g/dl]. The first group (15 subjects) where treated for AN receiving BT from YBD (<30years old) and the second from donors >30 years old. The mean transfusion frequency was 1 BT/ 4 months and the total study period was 4 years. At the start and at the end of the study diastolic echo parameters [maximal velocity (Vmax) of both early and late diastolic left ventricular filling, deceleration time (DT) of early diastolic filling, left atrial diameter (LAD)] were measured and compared statistically.
Results In both groups we found a statistically significant negative and mild correlation between Hb and Vmax (r=0.61, p<0.05), DT (r=0.54, p<0.05) and LAD (r=0.64, p<0.05) indicating evidence that AN correction with BT is possible related with diastolic dysfunction improvement. However the echo findings regarding diastolic dysfunction were optimum in the first group compared with the second group [statistically significantly (p<0.05) lower values in Vmax, DT and LAD in the first group (BT from YBD)], suggesting indirect evidence of possible correlation between high plasma levels of BMP-11 and diastolic HF reverse.
Conclusion(s) a)There is evidence that treatment of AN in DHFP with BT, improves diastolic dysfunction lowering intracardiac pressures.b)Also emerging indirect evidence that circulated blood-borne signals (BMP-11) from a YBD, during anemic DHFP treatment via BT, maybe reverses heart diastolic dysfunction.Our study has serious limitations, sample is small and more specific studies (with direct measurements of BPM-11) must be conducted, in order to clarify if the diastolic HF reverse observed in anemic DHFP treated via BT, is a result of Hb normanization and/or BPM-11 effect.

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Effect of long-term remote ischemic conditioning on inflammatory and cardiac remodeling parameters in patients with chronic ischemic heart failure

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Background: Remote ischemic conditioning (RIC) protects against acute ischemia-reperfusion injury and may also have beneficial effects in patients with stable cardiovascular disease. We investigated the effect of long-term RIC treatment in patients with chronic ischemic heart failure (CIHF).
Methods: In a prospective, exploratory and outcome-assessor blinded study, 21 patients with compensated CIHF and 21 matched controls without heart failure or ischemic heart disease were treated with RIC once daily for 28±4 days. RIC was conducted as 4 cycles of 5 minutes upper arm ischemia followed by 5 minutes of reperfusion. We evaluated circulating markers of inflammation and cardiac remodeling at baseline and following long-term RIC.
Results: RIC reduced C-reactive protein from 1.5 (0.6-2.5) to 1.3 (0.6-2.1) mg/l following long-term RIC treatment (p=0.02) and calprotectin from 477 (95% CI 380 to 600) to 434 (95% CI 354 to 533) ng/ml (p=0.03) in patients with CIHF, but not in matched controls. Overall, RIC did not affect circulating markers related to adaptive or innate immunology or cardiac remodeling in patients with CIHF.Among patients with CIHF and N-terminal pro-brain natriuretic peptide (NT-proBNP) plasma levels above the geometric mean of 372 ng/l, long-term RIC treatment reduced soluble ST2 (n=9) from 22.0 ± 3.7 to 20.3 ± 3.9 ng/ml following long-term RIC treatment (p=0.01).
Conclusion: Our findings suggest that long-term RIC treatment have mild anti-inflammatory effects in patients with compensated CIHF and anti-remodeling effects in those with increased NT-proBNP levels. This should be further investigated in a randomized sham-controlled trial.

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Usefulness of comprehensive cardiac assessments for early detection of subclinical chemotherapy-related cardiac dysfunction in breast cancer patients -A prospective pilot study-

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Background: Long-term prognosis of cancer patients has been dramatically improved along with the progress in cancer chemotherapies with anti-cancer agents. However, chemotherapy-related cardiac dysfunction (CTRCD) is an emerging serious adverse effect because it deteriorates long-term prognosis of those patients and severely limits their quality of life. Thus, early detection of subclinical CTRCD is one of the important emerging issues in the management of cancer patients.
Purpose: In this pilot study, we examined whether the comprehensive cardiac assessments, including cardiac magnetic resonance (CMR), echocardiography, and biomarkers, are useful for early detection of CTRCD. We performed a prospective pilot study to evaluate the usefulness of comprehensive cardiac assessments, including novel imaging modality and biomarkers, in breast cancer patients treated with chemotherapies.
Methods: A total of 94 consecutive patients with breast cancer (all female) were registered in this study from August 2017 to December 2018. To evaluate CTRCD in those patients treated with chemotherapies, we performed CMR (at baseline and/or 6 months), and 12-lead electrocardiogram (ECG), echocardiography, biomarkers analysis including cardiac troponin T (cTnT) and BNP (at baseline and every 3 months during chemotherapies.). CTRCD was defined as a reduction in left ventricular ejection fraction (LVEF) >10% from baseline and below 53% without symptoms
Results: In the 94 patients, 52(mean age, 53.0±12.7 yrs.)completed cardiac assessment at 6 months. Among them, 40 (77%) were treated with anthracycline and 6 (12%) developed CTRCD. In patients with CTRCD (CTRCD group), as compared with those without it (non-CTRCD group), both native T1 value on CMR and QTc interval on ECG were significantly prolonged after chemotherapy (1,322±22 vs. 1,303±32 msec at 6 months, P=0.03; 461±22 vs. 441±18 msec at 6 months, P<0.0001, respectively). Plasma levels of cTnT at 3 months were also higher in the CTRCD group compared with the non-CTRCD group [0.022 (IQR 0.015-0.026) vs. 0.01 (0.006-0.014) ng/mL, P=0.024], whereas there was no difference in BNP values. In patients whose plasma levels of cTnT at 3 months were higher than 0.014, LVEF at 6 months was significantly decreased at 6 months from the baseline (62.7±2.6% at baseline to 59.0±6.0% at 3 months, P=0.042).
Conclusions: These results indicate that early detections of the changes in native T1 value, QTc interval, and cTnT are useful to identify CTRCD among breast cancer patients treated with chemotherapies. Based on these preliminary findings of the presentpilot study, we have started multicenter prospective study with 25 participating institutions.

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Differences in patients with early and late toxic cardiomyopathy post-chemotherapy: characteristics and prognosis

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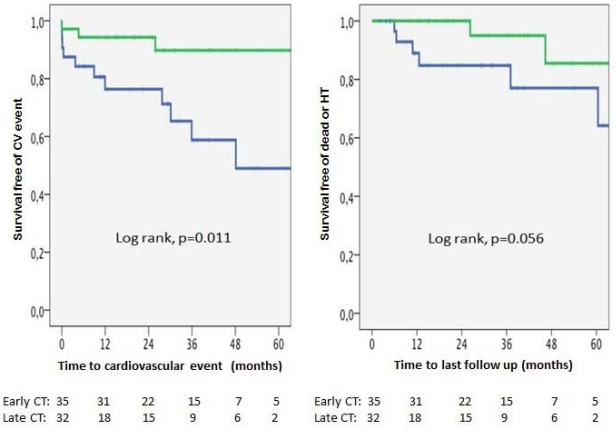
Background Toxic cardiomyopathy (TC) post-chemotherapy is well described. It can be classified as early or late depending on the time of presentation relative to the administration of chemotherapy but there are few studies that have evaluated outcomes according to this classification.
Purpose We aimed to evaluate differences in the characteristics and prognosis of patients according to the timing of appearance of TC.
Methods In this unicentric, observational, retrospective study we evaluated all patients with the diagnosis of TC followed in one heart failure unit since 2004 until 2017. TC was defined as a drop in left ventricle ejection fraction (LVEF) ≥10% with a final LVEF inferior to 50% or as a reduction in LVEF ≥15% with a final LVEF ≥50% after chemotherapy and no other known cause. Early and late TC were defined depending on whether toxicity appeared before or after two years since the beginning of chemotherapy. Improvement in LVEF was analyzed by the Wilcoxon signed Rank test for related samples, and survival free of heart transplant(HT)/death or cardiovascular events (acute myocardial infarction, stroke, hospitalization for heart failure, cardiovascular dead/heart transplant) by Kaplan-Meier curves and multivariate Cox regression analysis .
Results Of 67 patients with TC included, the etiology of cancer was: 46 breast , 17 hematologic and 4 other. Anthracyclines were given in 84% and trastuzumab in 45%. Mean age was 55 years , 25% were in NYHA class III-IV. We found 35 patients with early TC and 32 with late TC. Statistically significant differences between the two groups were: higher LVEF, higher number of patients with trastuzumab, lower values of NT-proBNP and less deegre of mitral and tricuspid regurgitation in patients with early CT compared to late CT. After starting neurohormonal treatment (92% beta blockers, 93% ACEI/ARB, 41% MRA) there was an improvement in the ejection fraction in both groups from a median LVEF of 45% to 58% (p<0.001) in early TC and 40% to 50% (p<0.001) in late TC. After a median of 29 months of follow-up, the group with early TC had better prognosis. In the multivariate analysis, early TC was associated with a better survival free of heart transplant or death: Hazard Ratio: 0.11 (CI 95%:0.02- 0.62), p=0.012.
Conclusions The majority of patients with TC have a significant improvement in LVEF after the beginning of neurohormonal treatment. Prognosis in patients with early TC is better than in patients with late TC.



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Left ventricle alterations in anthracycline cardiotoxicity in patients with lymphomas.

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Background: the development of severe chronic heart failure (CHF) is a serious complication of anthracyclines chemotherapy.
Purpose: to identify the specific issues associated with left ventricle remodeling in patients with CHF developed due to anthracycline treatment taken as part of antitumor therapy of lymphoproliferative diseases
Methods: we examined 112 patients with Hodgkin's lymphomas and stages I-IV non-Hodgkin's lymphomas during the anthracyclines treatment and for 6 months thereafter. The total dose of anthracycline (doxorubicin) under the ABVD regimen was 300 mg / m2, BEACOPP regimen 200 mg / m2 and CHOP regimen 300 mg /m2. All patients underwent a standard echocardiographic examination. We used nonparametric statistical methods, and the results are presented as median and interquartile range. Additionally, 92 patients, who have been in remission from 1 to 30 years, were examined.
Results: 13 patients (11.6%), who were examined after a long time following their treatment, had NYHA Functional Class (FC) II and III heart failure symptoms and ejection fraction (EF) from 40% to 55%. Two patients examined 10 and 30 years after chemotherapy had less than 30% EF, and IV FC CHF. In patients, who developed CHF during chemotherapy, the indexed end diastolic volume (iEDV) decreased from 55.8 (42.4 - 72.4) ml / m2 to 51.8 (40.5 - 71.4) ml / m2; the dynamics persisted for the next 6 months – iEDV decreased to 48.2 (38.9 - 61.3) ml / m2 (p = 0.029). In patients who did not have CHF during chemotherapy, iEDV also decreased from 55.6 (37.4 - 79.4) to 47.8 (40.3 - 68.5) ml / m2, but went up to 50.1 (35.8-62.9) ml / m2 during the later period. We also investigated the dynamics of the left ventricle (LV) relaxation fraction of the first third of diastole in the aforesaid patient groups. The patients who developed CHF during our observation period, had a regular decrease of relaxation fraction from 35.5 (25.7 - 54.8)% to 21.2 (19.1 - 53.7)% (p = 0.028), while no such diastolic pattern was revealed in patients with no CHF. We observed 3 types of cardiac remodeling induced by anthracyclines: 1. Cardiomyopathy with a small LV chamber, reduced LV relaxation rate, normal EF and II FC CHF. 2. Patients with a large LV chamber and low EF, and typical course of II-IV FC CHF. 3. The severest cases are patients with a small LV chamber and low EF (<35%), who suffer from the most severe course of CHF often leading to death or cardiac transplantation.
Conclusion: The patients who developed CHF during chemotherapy had a decrease in LV compliance manifesting itself as a decreased relaxation fraction during the first third of the diastole and a decrease in the iEDV. There were 3 types of cardiac remodeling induced by anthracyclines.

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Assessing a various biomarker panel for early detection of cardiotoxicity after treatment with anthracyclines

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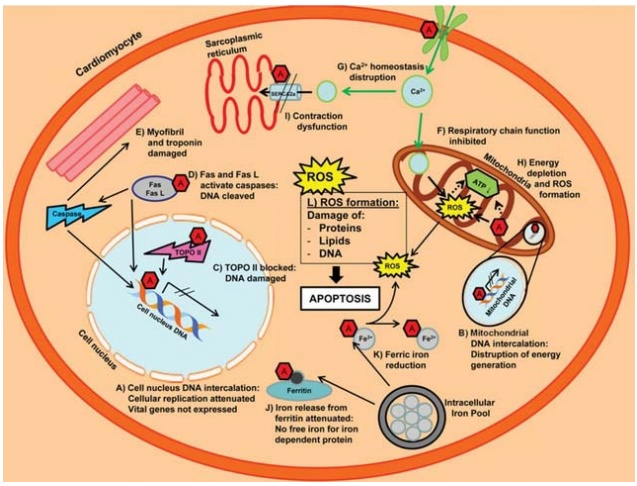
ntroduction: Breast cancer represents the most frequent form of cancer in women worldwide, comprising 16% off all cancers. A report of the World Health Organization showed that 1 from 6 cancers is determined by breast cancer and this form of neoplasm causes 1.6% of all annual deaths in the world.
Objective: A novel approach, based on the use of biomarkers has recently emerged, resulting in a very effective tool for early, real-time identification, and monitoring of cardiotoxicity. Assessing a diverse biomarker panel (NT-proBNP, TNF-a, galectin-3, IL-6, Troponin I, ST2 and sFlt-1) to detect subclinical cardiotoxicity after treatment with anthracyclines.
Methods: An observational single centre cohort study between 2016-2017. For 35 breast cancer patients, which received treatment with docetaxel, doxorubicin or cyclophosphamide, biomarkers were assessed and one year follow-up echocardiography was performed after treatment with anthracyclines. All female patients with breast cancer, >18 years of age at the time of breast cancer diagnosis who completed (neo) adjuvant treatment were asked to participate in the study. Exclusion criteria were: evidence of breast cancer recurrence or metastatic disease, current heart disease, renal failure at the time of cardiac evaluation, diabetes mellitus, pregnancy or lactation, ionizing radiation within 1 year prior to inclusion, Parkinson's disease. Abnormal levels of biomarkers according to preset standards were used as a measure for subclinical cardiotoxicity. Primary analysis consisted of determination of the prevalence of abnormal biomarkers.Thirty-six millilitres of blood was drawn from every patient for determination of blood and serum markers. Echocardiographic parameters were obtained from all patients (IVSd: interventricular septal thickness in diastole; BSA: body surface area; LVPWd: left ventricular posterior wall dimension in diastole; LVIDd: left ventricular internal dimension in diastole; LVIDs: left ventricular internal dimension In systole; E/A ratio: early to late atrial mitral Doppler peak flow velocity ratio; LV: left ventricle).
Results: Mean age at the time of enrollment was 54,6 ± 2,3 years. 27,9% of patients showed abnormal biomarker levels: NT-proBNP in 16,6%, TNF-a and Galectin-3 in 7,2%. IL-6, troponin I, ST2 and sFlt-1 were normal in all patients. A correlation between left ventricular ejection fraction (LVEF) and NT-proBNP was observed (r=-0,514, p<0.01) and the mean LVEF of the study population was 58,3% (SD 7.6%). Docetaxel was given 75mg/m2, doxorubicin 50mg/m2 and cyclophosphamide 500mg/m2 in each cycle.
Conclusion: The evaluated biomarkers panel do not contribute to early detection or early risk factor assesment. Future research should focus on NT-proBNP and genetic testing and screening. Detection of subclinical cardiotoxicity would be a more desirable approach, since early detection could have clinical implications for individual patients.



Anthracycline mechanism in cardiomyocyte

P280

Activity and outcomes of a cardio-oncology service in a public hospital of Greece; a two-year experience

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Background: Cardio-oncology focuses on identifying cancer therapy-related cardiovascular side effects and providing optimum multidisciplinary care for cancer patients. However, there are limited descriptive information about case characteristics, activity and outcomes of cardio-oncology departments.
Purpose: The aim of this study is to present the activity and results of a cardio-oncology service focusing on the holistic approach of cancer patient in a public-health hospital without Oncology wards but with outpatient clinic.
Methods: We prospectively followed up 39 patients with cancer referred to our Cardio-oncology service from January 2017 to January 2019. All patients underwent physical and biochemical examination, electrocardiography, two-dimensional (2D), 3D and 2D speckle tracking echocardiography at baseline, during and at the end of cancer therapy. Up-titration of cardiac treatment, continuation of cancer therapy and mortality were used as outcome measures.
Results: Of the 39 patients (77% females) with mean age of 54.3 years old, 74.4% presented with breast cancer, 10% with hematological disease, 5% with lung cancer and 5% with cancer of digestive system. Most of our patients (92.3%) underwent chemotherapy and half of them (56.4%) additionally radiotherapy. Patients with left ventricular systolic dysfunction (LVSD) (n =18) were younger and most of them (n=14) without the usual cardiovascular risk factors (smoking, dyslipidemia, diabetes mellitus, previous exposure to chemotherapy/radiotherapy or history of cardiovascular disease). At a median follow-up of one year, 89% of the patients with LVSD showed improvement in LV ejection fraction (50% pre vs 58% post; p<0.001). One patient (66 years old) presented with complete atrioventricular block during chemotherapy agent infusion and a pacemaker was implanted. All patients with LVSD were able to continue cancer therapy after optimisation of cardiovascular therapy except for one. All patients are alive.
Conclusion: The establishment of a cardio-oncology department in a hospital, especially in the context of preventive cardiology care with full cardiovascular monitoring and therapy, can lead to cancer treatment continuation and better quality of life.

P281

Chemotherapy induced cardiotoxicity. The role of right ventricle.

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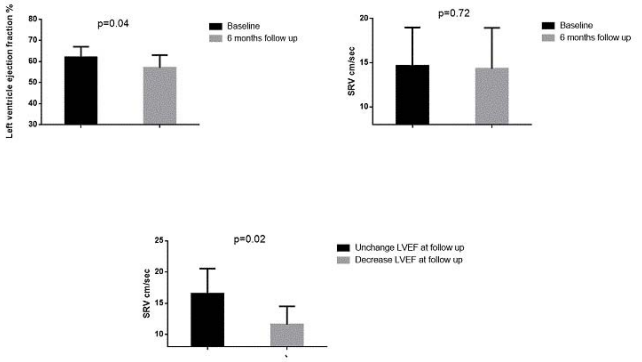
Background: Cardiac dysfunction, impairment of left ventricle ejection fraction (LVEF) and heart failure symptoms may developed in patients following antineoplastic treatment for breast cancer. Several risk factors have been associated with increased risk of cardio-toxicity. The prognostic role of right ventricle performance has not been tested.
Purpose: To examine the prognostic role of right ventricle performance in the development of left ventricle dysfunction and cardiotoxicity.
Methods: We enrolled 25 female patients (58±12 y) diagnosed with breast cancer and scheduled for anthracycline-based chemotherapy. Patients were treated with epirubicin(75mg/m2) and cyclophosphamide followed by docetaxel and trastuzumab. A transthoracic echocardiogram was performed at baseline, 3 and 6 months after chemotherapy initiation to evaluate LVEF with Simpson's rule and right ventricle systolic performance by measurement of the tissue systolic velocity of the right ventricle free wall (SRV).
Results: At baseline the mean LVEF was (62±5%) and the SRV 14.66±4.33cm/sec. Compared to baseline at the 6 months follow up study there was a significant reduction in LVEF (57±6%, p=0.04) while SRV has not change (14.33±4.61cm/sec, p=0.72). In 7 out of 25 patients there was a clinically significant decrease in LVEF at the 6 months follow up study of more than 5% compared to baseline study. Interestingly, compared to subjects with no change in LVEF, subjects with a decrease in LVEF at the 6 months follow up study had significant lower values of SRV at baseline evaluation (16.5±4.03cm/sec vs. 11.6±2.88cm/sec, p=0.02).
Conclusions: In the present study we found an association between baseline right ventricle systolic performance as it is expressed by SRV and development of chemotherapy induced cardiotoxicity with reduction in left ventricle ejection fraction.



P282

Prevention of heart failure with cardioprotective therapy after early detection of cardiotoxicity during chemotherapy in cancer patients using CMR Fast-SENC intramyocardial LV & RV strain

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Background: Heart failure is a growing problem for cancer survivors. Current biomarkers and imaging modalities such as left ventricular ejection fraction (LVEF) are used to detect cardiotoxicity during cancer therapy. Unfortunately, these diagnostics only identify systemic damage in symptomatic patients after the heart is unable to compensate regional dysfunction. Fast-SENC segmental intramyocardial strain (fSENC) is a unique cardiac magnetic resonance imaging (CMR) modality that detects subclinical intramyocardial dysfunction in 1 heartbeat per image plane. This prospective study compares fSENC and conventional biomarkers in patients undergoing cancer therapy.
Methods: This single center, prospective Prefect Study was used to evaluate the cardiotoxicity and the impact of cardioprotective therapy in Breast Cancer and Lymphoma patients (NCT03543228). fSENC was acquired with a 1.5T MRI and processed with the MyoStrain software to quantify intramyocardial strain. Segmental strain was measured in three short axis scans (basal, midventricular, & apical) with 16 longitudinal segments & three long axis scans (2-, 3-, & 4-chamber) with 21 circumferential segments. fSENC CMR was performed before chemotherapy, during and after anthracycline therapy, after taxane therapy, at 1 year follow-up, and as needed. Cardioprotective therapy was offered to patients meeting the definition of cardiotoxicity by EACVI Position paper or those observing a substantial decline in cardiac function.
Results: One hundred eighty seven (187) CMRs were performed in fifty (50) patients (43 female). Patients had an average (± stdev) age of 52 (15) yrs, BMI of 26 (6) kg/m2; 76% had breast cancer, 24% had Lymphoma. fSENC CMRs required 11.6 (2.2) min total exam time. fSENC detected cardiotoxicity in 47% of patients with 27.4% worsening of regional strain (% of normal myocardium), at an average of 79 days of chemotherapy. Upon administrating cardioprotective therapy as well as ensuring compliance based on fSENC testing, regional strain improved to 7.4% reduced function from pre-chemotherapy at 191 days and 3.9% at 368 days. Figure 1 shows

the normalized change in CMR LVEF, the % of normal myocardium (% fSENC < -17%), fSENC GLS, fSENC GCS, echo LVEF, and echo GLS for patients recieving cardioprotective therapy. Patients who did not require cardioprotective therapy only observed 8.0% worsening of regional strain at an average of 78 days and 10.2% at 391 days.

Conclusion: fSENC detects subclinical dysfunction due to cardiotoxic response of chemotherapy and the impact of cardioprotective therapy before other biomarkers and imaging modalities. The ability to detect subclinical effects of diseases and pharmacological cardiotoxicity enables proactive prescription of cardioprotective agents to avoid tissue remodeling that is associated with systemic cardiac dysfunction culminating in damage to myocardial tissue that precedes worsening of global measures such as LVEF.

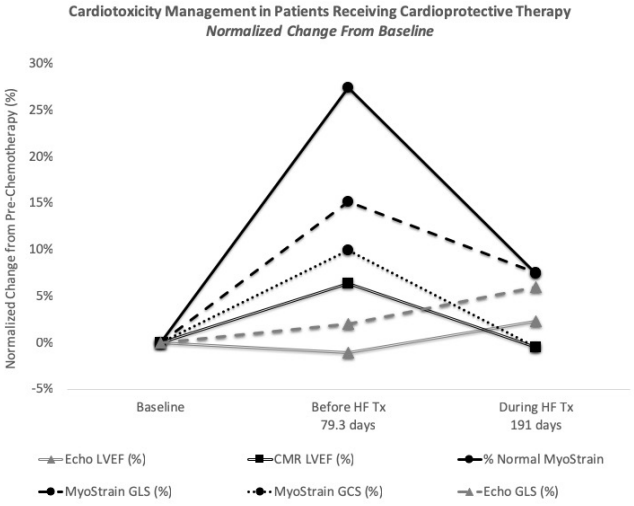

Figure 1

P283

Three-dimensional ECHO in serial monitoring of patients undergoing Trastuzumab therapy

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Purpose: There is increasing awareness of the effects of chemotherapy on the heart and in particular myocardial function and the need for optimal surveillance and treatment by a specialised cardio-oncology service. Advanced cardiac imaging is key to detecting cardiotoxicity, but there is a large variation in recommended techniques. We examined accuracy of all echocardiographic methods used at our institution.

Methods and results: 116 consecutive patients treated with Trastuzumab were serially evaluated with transthoracic echocardiography according to cardio-oncology protocols. Tissue Doppler, M-Mode, B-mode and 3D ECHO were used to evaluate cardiac function by assessing longitudinal function, volumetric changes and myocardial deformation.

20 patients developed cardiotoxicity requiring heart failure therapy and/or alteration of their chemotherapy regime. The most accurate parameters for diagnosing cardiotoxicity were 3D LVEF (ROC AUC 0.95) and GLS (ROC AUC 0.92). Diagnostic accuracy was not increased by compounding ECHO parameters.

Conclusions: Three-dimensional volumetric analysis is a highly accurate method for detecting chemotherapy-induced cardiac dysfunction, while a full echocardiographic assessment did not confer increased accuracy during serial monitoring. A simplified echo protocol based on 3D ECHO alone for serial monitoring of Trastuzumab cardiotoxicity is feasible and could greatly increase capacity for cardio-oncology units.

P284

Assessment of three-dimensional echocardiography as a diagnostic tool for detecting chemotherapy-induced cardiotoxicity

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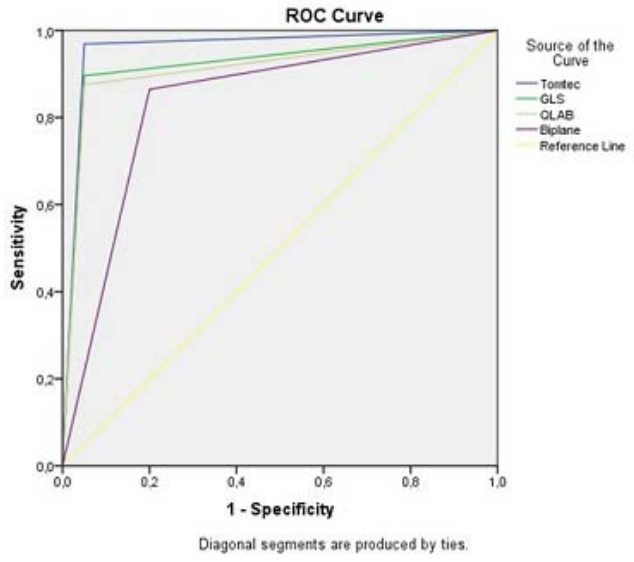
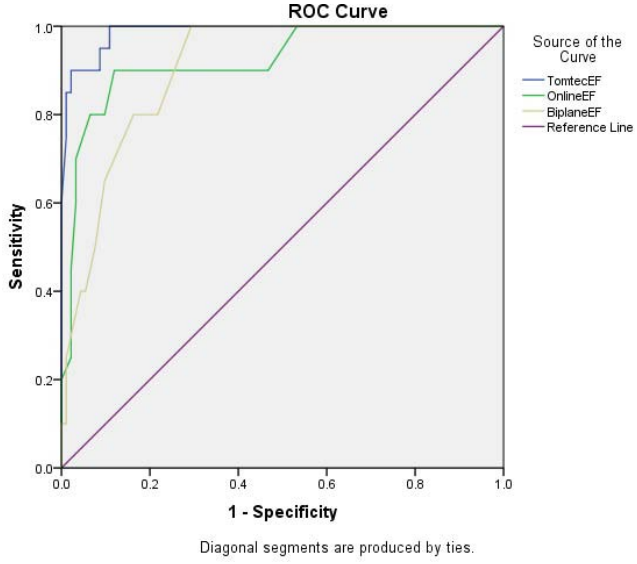
Purpose: Cardiotoxicity has become an emerging concern as a side-effect of chemotherapy. We investigated the echocardiographic techniques used for detecting cardiotoxicity, and we evaluated their effectiveness.

Methods and Results: 280 patients treated with chemotherapy, either Anthracyclines or Trastuzumab or combination of the two, were repeatedly evaluated for cardiotoxicity using two- and three-dimensional echocardiography according to our institution's protocols. We constructed Bland – Altman plots, to compare the various echocardiographic techniques with each other. Furthermore, we created ROC curves, so that we could evaluate which method had the highest accuracy in detecting cardiotoxicity. Lastly, we tried to determine the inter- and intraobserver variability of the most successful technique according to our evaluation. The Bland – Altman plots did not show significant differences in the evaluation of Left Ventricular Ejection Fraction (LVEF) among the various techniques. All methods were in good agreement, especially two commercial packages for three- dimensional analyses. Receiver Operating Characteristic (ROC) curves were computed for all methods. Three-dimensional ejection fraction analyzed by a particular commercial program was the most accurate method of all (0.978, 95% confidence interval). The inter- and intra-observer variability of this method was very low. Between the two investigators, the results were in good agreement (0.90, 95% confidence interval), whilst



ROC curve



ROC curve

the intra-observer variability was even lower, with an interclass correlation coefficient of 0.98 (95%, confidence interval) between results.
Conclusion: Three- Dimensional echocardiography was the best method for detecting cardiotoxicity especially the commercial package used in our institution.

P285
Clinical outcomes and predictors of cancer therapy related cardiac dysfunction (CTRCD) in breast cancer patients on Trastuzumab: Real world data from an integrated cardio-oncology service

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Background: Despite the lack of a standardized approach there is consensus that an integrated cardio-oncology service is vital in early detection and management of cancer treatment related cardiac dysfunction (CTRCD).
Purpose: We reviewed clinical outcomes of women treated with trastuzumab in a newly developed integrated cardio-oncology service at Sandwell and West Birmingham Hospitals (SWBH) NHS Trust. We also assessed the performance of baseline demographic, clinical and echocardiographic parameters in predicting CTRCD.
Methods: This is a retrospective review of 60 women on trastuzumab therapy for breast cancer followed-up between October 2016 and December 2018. CTRCD was defined as more than 10% absolute reduction of LV ejection function (LVEF) to below 55%. Global longitudinal strain (GLS) was utilised as a predictor of CTRCD. Patients with more than 15% relative increase of GLS were considered high risk of developing CTRCD and were managed either by increasing the frequency of echocardiographic surveillance (every 6 weeks) and/or initiation of heart failure treatment. All measurements were performed by dedicated operators using the same equipment. For patients with confirmed CRTCD treatment with an ACE inhibitor or an ARB and a beta-blocker was initiated and increased to the highest tolerated dose unless there was a contraindication. Follow-up was organised in our cardio-oncology clinic service with support by our nurse-led heart failure community service. Interruption or re-initiation of trastuzumab was a joint decision of the oncologists and cardiologists.
Results: Of the 60 patients (mean age 58; range 36-78 years) on trastuzumab followed-up for a median of 346 days (interquartile range 258-629 days), 6 patients (10%) developed CTRCD resulting in temporary (5 patients; 8.3%) or permanent (1 patient; 1.7%) discontinuation of trastuzumab. There was no cardiovascular mortality in our cohort or hospitalization for heart failure. In a binary logistic regression analysis, age (p=0.80), previous treatment with anthracyclines (p=0.27), presence of hypertension (p=1), diabetes (p=1), atrial fibrillation (p=1), coronary artery disease (p=1) or renal failure (p=1) did not correlate with CTRCD. A previously proposed clinical risk score (CRS)1 similarly performed poorly in predicting CTRCD in our cohort (AUC 0.563; 95%CI 0.31-0.82; p=0.61). GLS strongly correlated with CTRCD in our cohort with a value above -17.35 showing 83% sensitivity and 77% specificity for CTRCD. Despite a trend towards lower baseline LVEF in the CTRCD group (64.6 SD 4.7 vs 61.5 SD 2.4) the predictive value of baseline LVEF did not reach statistical significance (AUC 0.70; 95%CI 0.55-0.85; p=0.12).
Conclusions: Monitoring and management of CTRCD in an integrated multidisciplinary cardio-oncology service resulted in low rate of permanent discontinuation of trastuzumab and no adverse cardiovascular outcomes. Baseline clinical characteristics were not predictive of CTRCD.

P286
Low pulmonary artery pulsatility index is associated with adverse outcomes in patients with advanced heart failure

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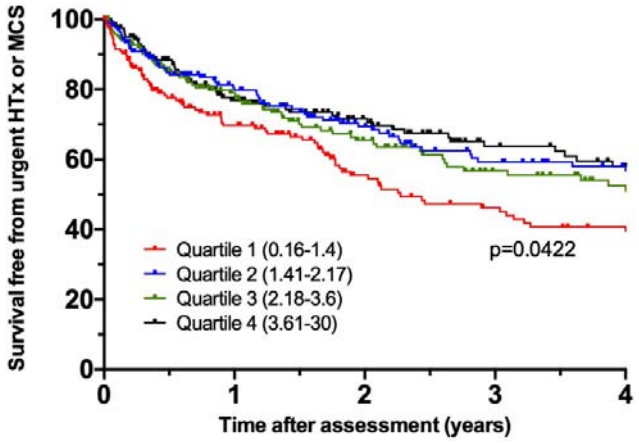
Background. Pulmonary artery pulsatility index (PAPi) is a novel haemodynamic measure of right ventricular function. PAPi is defined as systolic pulmonary artery (PA) pressure minus diastolic PA pressure, divided by right atrial pressure. Low PAPi has been shown to be associated with an increased risk of right ventricular failure after left ventricular assist device (LVAD) implantation and was also associated with an increased risk of mortality in the ESCAPE trial.
Purpose. To determine whether PAPi is associated with adverse outcomes in ambulatory outpatients with advanced heart failure.
Methods. All outpatients who were assessed for heart transplantation at a single centre between January 2010 and January 2019 were included. Each patient underwent right heart catheterisation and PAPi was calculated. Death, urgent heart transplantation and requirement for mechanical circulatory support (MCS) were the co-primary endpoints. Patients were followed up until the first primary endpoint or 1st January 2019. Kaplan-Meier analyses were performed on patients grouped into PAPi quartiles.
Results. A total of 668 patients were included. The median PAPi for the entire study population was 2.18 (interquartile range 1.41-3.60). In total, 272 (41%) patients reached a primary endpoint after a median of 1.49 years follow-up. PAPi was significantly lower in patients who reached a primary endpoint, compared with patients who did not reach a primary endpoint (2.06 vs 2.25, p=0.01552). There was a significant difference in survival free from urgent heart transplantation or mechanical circulatory support when patients were grouped in quartiles (Figure, p=0.0422). Patients with a PAPi of less than 1.4 had the greatest likelihood of death or the need for urgent heart transplantation or mechanical circulatory support.
Conclusions. Low pulmonary artery pulsatility index (PAPi) is associated with adverse outcomes in ambulatory outpatients with advanced heart failure. Clinicians who are undertaking right heart catheterisation for assessment of advanced heart failure should consider calculation of this haemodynamic measure.



P287
Do NT-proBNP levels depend on the diameter of abdominal aorta in patients with chronic HFpEF and AAA?

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Background/Introduction Abdominal Aortic Aneurysm is a vascular disorder that necessitates regular diagnostic assessment and close evaluation if present among other comorbidities. Endovascular or open surgical repair is the ultimate treatment if patient criteria are fulfilled. HFpEF when associated with AAA might have deteriorating hemodynamic effects that may lead to negative outcomes.
Purpose The purpose of this study was to investigate if a Chronic Heart Failure biomarker as NT-proBNP is related to any changes in diameter of AAA in patients with abdominal aorta aneurysmatic disease and Chronic HFpEF.
Material/Methods 412 (284male,118 female) patients between 58-75 years of age with chronic HFpEF and AAA were recruited on this study. Criteria for diagnosis and evaluation of HFpEF and AAA were according to ESC and ESVS clinical practice guidelines, respectively. All patients underwent U/S Echo assessment and their EF was ≥50 %. Values for HFpEF and AAA were obtained based on a 6-month follow-up period and measurements for this study were considered to be significant for NT-proBNP levels when ≥400pg/ml and for abdominal aortic diameter when ≥4.7cm. Data were analyzed using ANOVA and logistic regression analysis and NT-proBNP levels were analysed as an independent variant. Data are presented as mean ± standard deviation and level of significance was accepted when p<0. 05.
Results Data were analyzed from 412 patients (284 male,118 female) and showed in 106 (25,7%) patients NT-proBNP levels 587± 98 pg/ml and an abdominal aortic diameter of 4.77 ± 0.21 cm. In 96 (23.3%) patients NT-proBNP was 892 ± 96 pg/ml and abdominal aortic diameter of 4.94 ± 0.19 cm. 113 (27.4%) patients with NT-proBNP levels of 1063 ± 103 pg/ml and an abdominal aortic diameter of 5.19 ± 0.23 cm. And 97 (23.6%) had NT-proBNP levels of 1294 ± 99 pg/ml. Increased levels of NT-proBNP p<0.0001 were independently associated with increased abdominal aorta diameter p<0.0001 in patients with AAA.

P288: Table 1

Variable	All patientsN=238	Group 1N=64	Group 2N=174	P	No congestion†N=150	≥1 marker of congestion†N=64	P
NTproBNP - ng/L	176 (106-277)	81 (56-98)	81 (56-98)	NA	169 (103-254)	182 (112-336)	0.32
BNP - ng/L	70 (41-126)	23 (16-29)	74 (50-136)	NA	50 (37-87)	91 (63-140)	0.04
LAESV - ml	49 ±18	41 ±15	52 ±18	<0.001	48 ±17	55 ±20	0.007
IVCD - cm	1.5 ±0.4	1.4 ±0.4	1.5 ±0.4	0.07	1.4 ±0.3	1.7 ±0.4	NA
JVD ratio	7.9 ±3.8	8.8 ±4.7	7.7 ±3.3	0.05	8.5 ±3.6	6.9 ±3.8	NA
Lung comets present - %	72	63	74	0.05	65	89	NA
>1 Marker of congestion - % †	30	28	31	0.74			

Group 1: NTproBNP <125 ng/L or BNP <35 ng/L; Group 2: NTproBNP 125-1000 ng/L or BNP 35-280 ng/L. † - out of 214 patients with complete congestion data. Abbreviations used: N- number; : NTproBNP – N-terminal pro-B-type natriuretic peptide; BNP – B-type natriuretic peptide; LAESV - left atrial end systolic volume; IVCD - inferior vena cava diameter; JVD - jugular vein distensibility.

Conclusion Increased circulating levels of NT-proBNP are independently associated with increased Abdominal Aorta Diameter in patients with chronic HFpEF and abdominal aneurysmal disease.

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The prevalence and clinical associations of ultrasound measures of congestion in patients at risk of developing heart failure: insights from the HOMAGE trial.

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Background: Venous congestion is the hallmark of untreated heart failure (HF), and might be detected by ultrasound before overt clinical signs appear. The prevalence of subclinical congestion by ultrasound in patients at risk of HF is unknown.
Purpose: We investigated the prevalence and clinical associations of congestion by ultrasound in patients with at least one risk factor for HF (diabetes, ischaemic heart disease or hypertension).
Methods: We assessed 238 patients who attended screening for the HOMAGE clinical trial (Heart OMics in AGEing) at 2 centres (Hull and Glasgow) using three ultrasound techniques: 1) inferior vena cava (IVC) diameter; 2) jugular vein distensibility (JVD) ratio (the ratio of the jugular vein diameter during Valsalva to that at rest); 3) the number of lung "comets". Congestion was defined as IVC diameter >2.0 cm, JVD ratio <4.0 and total lung comet count >14.
Results: The prevalence of subclinical congestion was 13% by IVC diameter, 9% by JVD ratio and 13% by lung comets; 30% of patients had at least one marker of congestion but none had all three. Those with congestion had larger left atria than those without. JVD ratio was lower (7.69 vs. 8.80; P=0.05), and the proportion of patients with any lung comets higher (74% vs. 63%; P=0.05) amongst patients with raised natriuretic peptide levels (NTproBNP >125 ng/L or BNP >35 ng/L) but there was no difference in IVC diameter (1.4cm vs. 1.5cm; P=0.07) (table 1).
Conclusions: Approximately 1 in 3 patients at risk of heart failure have at least one marker of congestion by ultrasound. Whether this indicates greater risk of subsequently developing heart failure is unknown.

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Pulmonary wedge measurements at the trough of Y-descent provide more reliable and predictive diastolic pressure gradient estimation.

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Funding Acknowledgements: János Bolyai Scholarship of the Hungarian Academy of Sciences. Swedish Research Council

Background. The diastolic pulmonary gradient (DPG) has become a cornerstone in the diagnostics of combined pre-capillary (Cpc) pulmonary hypertension (PH)., compared to the traditionally applied pulmonary vascular resistance. However, its diagnostic utility is affected by the high prevalence of physiologically incompatible negative values (DPGNEG). We have shown previously that the presence of large V-waves significantly impacts on DPGNEG occurrence.
Purpose. We hypothesized that left atrial pressure assessment circumventing the oscillatory effect of the V-wave might yield less frequent DPGNEG values. Thus we set out to investigate how PAWP measurement at the trough of Y-descent of the waveform influences DPG calculations, particularly the prevalence of DPGNEG and the prognostic value of resultant index.
Methods. 153 consecutive heart failure patients referred for right heart catheterisation were analysed. Measurements of PVR and DPG, as recommended, were performed.. Additionally, PAWP was also measured at the trough of Y-descent; subsequently, based on this measurement, DPGy was calculated.
Results. DPGy yielded higher values (median 3.7 [1.5 - 5.7]) as compared to DPG (median 0.9 [-1.7 - 3.8] mmHg); p<0.001. Conventional DPG was negative in 45% of the patients whereas DPGy in only15%. During a mean follow-up period of 22 ± 14 months, 58 patients have undergone heart-transplantation or died. The predictive ability of DPGy ≥ 6 for the above defined end-point events was significant [HR 2.1; CI 1.2-3.6, p=0.008] and similar to that of DPG ≥6 mmHg [HR 2.2; CI 1.0-4.6, p=0.043].
Concussion. Measurement of PAWP at the through of Y-descent yields significantly fewer DPGNEG values as compared to conventionally calculated DPG. At the same time, the prognostic value of DPGy is similar to that of conventional DPG.

P290

Right ventricular function using real-time three-dimensional echocardiography according to the acute volume reduction

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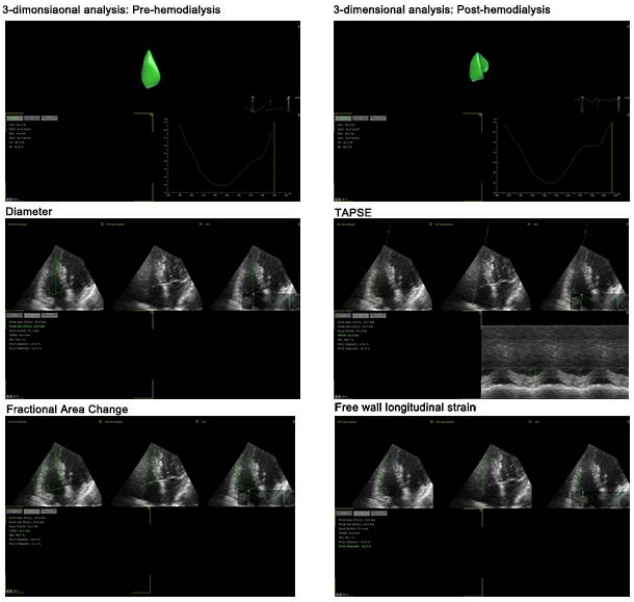
Background: The evaluation of right ventricular function using 2-dimensional echocardiography is limited due to its complexity in the geometry. In this study, we investigated right ventricular function analysis using 3-dimensional echocardiography is affected by acute changes of preload or not.
Methods: 57 subjects who underwent transthoracic echocardiography including real time 3-dimensional image acquisition of right ventricle before and after hemodialysis were enrolled. End-diastolic and end-systolic volumes were obtained from right ventricular real time 3-dimensional image. Right ventricular stroke volume and ejection fraction were also calculated. Parameters representing right ventricular size and function based on 2-dimensional echocardiography were obtained from real time 3-dimensional image.
Results: The right ventricular functional parameters from real time 3-dimensional echocardiography could be easily obtained from commercially available software with other 2-dimensional functional parameters. And right ventricular ejection fraction obtained from real time 3-dimensional echocardiography was less dependent on acute preload changes.
Conclusion: Conventional structural and functional parameters and strain of right ventricle derived from three-dimensional echocardiographic images are also affected by acute volume reduction. These parameters also should be interpreted with caution considering the body volume status.

Right ventricular function: 3-D Echo			
	Pre-hemodialysis	Post-hemodialysis	P values
End diastolic volume index (mL/m^2)	59.0±14.3	51.8±12.9	<0.001
End systolic volume index (mL/m^2)	25.8±6.3	23.8±5.4	0.011
Stroke volume index (mL/m^2)	33.3±9.9	28.1±8.0	<0.001
Ejection fraction (%)	56.1±4.6	53.7±4.4	<0.001
RVD1 (mm)	29.4±5.1	27.3±5.4	0.001
RVD2 (mm)	34.0±6.3	31.1±6.7	0.006
RVD3 (mm)	78.1±7.1	74.9±7.5	<0.001
TAPSE (mm)	22.4±4.0	19.0±4.2	<0.001
FAC (%)	49.6±5.9	46.4±5.5	<0.001
Free wall longitudinal strain (%)	-29.8±4.6	-27.5±4.4	0.002

3-D: three-dimensionalEcho: echocardiography



3D RV Measurement

P291

Best wedge as a predictor of right ventricle

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Background: Right ventricular failure is an important mortality predictor in heart failure patients especially in continuous flow left ventricular assist devices (LVAD) era. Different indices and risk scores defined as predictors of RVF in these patients. Pulmonary capillary wedge pressure (PCWP) is a crucial parameter in HF. The ratio of PCWP to cardiac index (CI) in shock patients to determine best cardiac filling pressure for given hypertonic solutions. This ratio also could be helpful for HF patients to foresee right ventricular condition.
Purpose: Our aim was to evaluate PCWP/CI ratio in heart failure patients and compare with echocardiographically and invasively calculated parameters.
Methods: One hundred and eighteen patients with a mean age of 48±12 years (85.6% male) included in the study. Right heart catheterization and transthoracic echocardiography performed in the same day. All invasive calculations made using Fick method.
Results: Mean left ventricular ejection fraction was 22±7% and mean cardiac index was 1.9 L/min/m2. Mean PCWP/CI ratio was 13±7. PCWP/CI ratio was positively correlated with systolic, diastolic and mean pulmonary artery pressure (PAP) and negatively correlated with pulmonary artery pressure index (PAPI), tricuspid annular plane systolic excursion (TAPSE) and right ventricular S velocity (Table-1). No correlation has been found between pulmonary vascular resistance and right ventricular stroke work index.
Conclusion: PCWP/CI is well correlated with echocardiographic RV function parameters and PAP and PAPI. This parameter should be evaluated in larger patient series and LVAD patients.

Table-1 Bivariate correlation for PCWP/CI		
Parameters	r	p value
Systolic pulmonary artery pressure	0.545	<0.001
Diastolic pulmonary artery pressure	0.661	<0.001
Mean pulmonary artery pressure	0.641	<0.001
Pulmonary artery pressure index	-0.322	<0.01
TAPSE	-0.302	0.001
Right ventricle S velocity	-0.202	0.041

Correlations between PCWP/CI and echocardiographic and invasive parameters

P292

Changes in the ratio of discocytes and pathological forms of erythrocytes and microcirculation in chronic heart failure

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Background. Normally, discocytes are the dominant form and make up about - 90% of all red blood cells in the peripheral blood of humans and mammals. There are also so-called pathological forms of red blood cells - stomatocytes, red blood cells with a crest, echinocytes, as well as irreversible forms of red blood cells in the human blood.
It is shown that the ratio of normal erythrocytes - discocytes and their pathological forms, affects the state of microcirculation. The state of microcirculation and the ratio of discocytes and pathological forms of erythrocytes in chronic heart failure has not been studied.
Aim: To study the ratio of discocytes and pathological forms of erythrocytes in peripheral blood and the state of microcirculation in patients with chronic heart failure.
Material and methods. The calculation of normal erythrocytes - discocytes and their pathological forms in the blood obtained from a finger was carried out using the express - methods of "thick drop" in patients with chronic heart failure. Microcirculation of the earlobe skin was evaluated using laser Doppler flowmetry.
Results. In patients with chronic heart failure, shifts in the ratio of discocytes / pathological forms of erythrocytes were revealed. Echinocytes becomes 1.8 times more, stomatocytes 2.5 times, erythrocytes with a comb 3.8 times, and irreversible forms 3 times. The share of discocytes decreases by almost 22%.
Chronic heart failure causes violations of the main indicators reflecting the state of microcirculation. The relative indicator of the arterial component of the microcirculation, the total value of the average velocity of the erythrocytes and the number of functioning capillaries are significantly reduced. The vasomotor activity of microvessels decreases by one third and the speed of erythrocytes almost halves.
Conclusions: In chronic heart failure, changes in the D / PFE ratio determine microcirculation disorders.

P293

Can invasive hemodynamics reflect a poor renal perfusion pressure in end stage heart failure?

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Background: One of the most important comorbidities in heart failure (HF) is renal dysfunction. The so-called cardiorenal syndrome reflects the close interaction between heart performance and kidney function. Several evidences suggest that deteriorating central hemodynamics may contribute to impaired renal function but this relationship is not well defined.
Purpose: To investigate the association between glomerular filtration rate (GFR) and invasive hemodynamic measurements in patients with advanced HF.
Methods: A total of 220 consecutive patients undergoing evaluation for heart transplantation (mean age 48,6 years ± SD 12,9; 73,6 % male) during 1988 and 2018 were included in this study. Patients underwent right sided cardiac catheterization with measurements of central hemodynamics and GFR was measured with chrome-EDTA clearance.
Results: We observed a significant positive correlation between GFR and heart rate (HR), mean arterial pressure (MAP), and mixed venous oxygen saturation (SvO2) but a significant negative correlation was recorded with right atrial pressure (RAP). No correlation was reported with pulmonary artery wedge pressure (PCWP) or cardiac output (CO). In a stepwise multivariate regression analysis adjusted for sex and age, GFR was independently associated with MAP (b-estimate 0.27; p= 0.017), RAP (b-estimate -0.55; p= 0.018), and tended to be related to HR (b-estimate 0.13; p= 0.061).
Conclusion: In patients with end stage HF, impaired GFR is independently related to decreasing MAP and increasing RAP, probably reflecting a poor renal perfusion pressure.

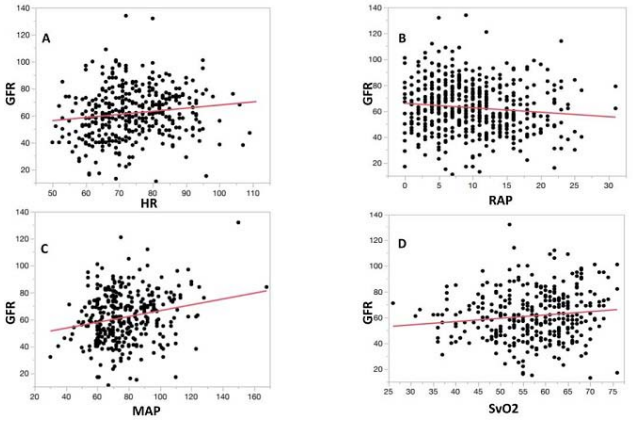

Figure 1

P294
Ventricular function recovery in chronic heart failure patients

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BACKGROUND: Recently, interest in patients with ventricular function recovery has emerged. Data on these patients is scarce, namely concerning the understanding of the phenomenon, its frequency and its natural history. We aimed to characterize the prevalence and characteristics of patients with ejection fraction recovery followed in a Heart Failure (HF) clinic.
METHODS: We analysed patients included and followed in our HF clinic from 2002 to 2015 who had 2 echocardiograms performed during the follow-up period. A total of 334 patients had at least mild left ventricular dysfunction and an echocardiographic re-evaluation. From these, 30 patients were excluded because an intervention (revascularization or surgical valve correction) was performed between image evaluations. Partial recovery was considered when patients presented ejection fraction recovery without attaining ejection fraction of at least 50% and total recovery was considered when patients reached a normal ejection fraction (left ventricle ejection fraction ≥ 50%).
RESULTS: In our population we observe that 150 (49.3%) of the patients showed no ejection fraction recovery or even worsening; 55 (18.1%) had a partial recovery and 99 (32.6%) showed total recovery of left ventricular function. A median time of 34 months was observed between echocardiogram evaluations. Mean patients' age was 66 years and 71.1% were men. Patients had a high comorbidity burden (35.9% were diabetic, 55.9% hypertensive, 55.9% had dyslipidemia and 36.2% were in atrial fibrillation); the aetiology was ischaemic in 35.5%. Patients were on optimally medical therapy: 95.1% were on Angiotensin Converting Enzyme inhibitor or Angiotensin Receptor Blocker, 98% on beta blocker, 53.9% on mineralocorticoid receptor antagonist. Non-recovered patients were mostly men (80.7% against 61.8 in partially and 61.6% in fully recovered patients, p=0.001) with ischemic HF (46.0% against 32.5% in partially and 21.2% in fully recovered patients, p<0.001). Comorbidity burden, New York Heart Association class upon admission and evidence-based therapy were not different between the groups of patients.
CONCLUSIONS: In this chronic HF cohort, half of the patients with HF and reduced ejection fraction showed no systolic function recovery despite optimal medical treatment; one third of the patients presented ejection fraction recovery and around 20% presented partial recovery. Male with ischemic HF is the prototype of the non-recovered patient.

Chronic Heart Failure - Epidemiology, Prognosis, Outcome

P295
Changes in the causes of death in a heart failure unit in Spain along 17 years

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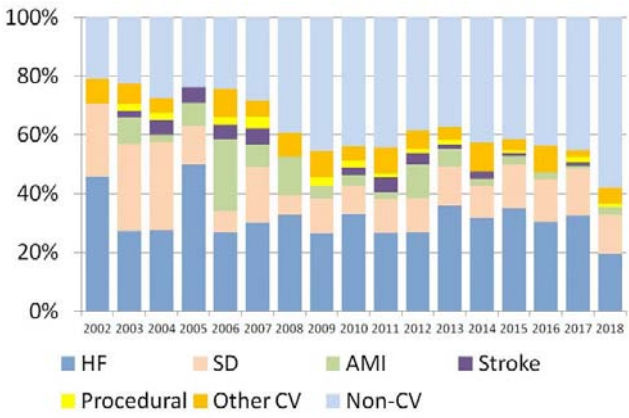
Background: Advances in heart failure (HF) treatment have achieved a reduction of death in HF patients in the last two decades. Indeed, not only mortality has been reduced but also the mode of death might have been modified through these years.
Purpose: To assess the causes of death in outpatients attended in a HF Unit since the year 2002 up to the year 2018.
Methods: Causes of death were classified as follows: progression of HF (worsening HF or treatment-resistant HF, in the absence of another cause); sudden death (any unexpected death, witnessed or not, of a previously stable patient with no evidence of worsening HF or any other known cause of death); acute myocardial infarction; stroke; procedural (post-diagnostic or post-therapeutic); other cardiovascular causes (e.g., rupture of an aneurysm, peripheral ischemia, or aortic dissection), and non-cardiovascular. Patients who died of unknown cause were excluded from the analysis. Fatal events were identified from the clinical records of patients with HF, hospital wards, the emergency room, general practitioners, or by contacting the patient's relatives. Furthermore, data were verified from the databases of the Catalan and Spanish Health Systems. Trends on every cause of death were assessed by linear regression.
Results: Since August 2001 to May 2018, 2295 HF patients were admitted to the HF clinic (age 66.4 ± 12.8 years, 71% men, 49% from ischemic aetiology, mean LVEF 35.2% ± 14). During the 17 years of the study, 1201 deaths were recorded. Seventy-eight patients (6.5% of deaths) were excluded due to unknown cause of death. The evolution in the mode of death by years is shown in the figure. Two trends were observed: a decrease in sudden death (p=0.05) and a very significant linear increase in non-cardiovascular causes of death (p<0.001). The decrease of sudden death was mainly driven from changes observed in the first 10 years (p=0.014); thereafter the incidence of sudden death remained stable (p=0.18). Remarkably we did not observe significant changes in HF progression as mode of death (p=0.17).
Conclusions: During the 17 years of the study, a very significant trend towards higher percentage of non-cardiovascular deaths was progressively observed. On the other hand, percentage of sudden death showed a gradual decrease, mainly driven from the changes observed in the first 10 years.



P296

Epidemiology and long-term outcome in outpatients with chronic heart failure in north-western europe

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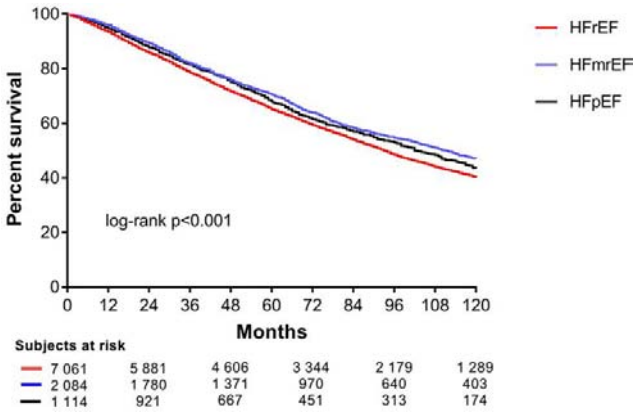
Objective: To describe the epidemiology, long-term outcomes and temporal trends in mortality in ambulatory patients with chronic heart failure (HF) with reduced (HFrEF), mid-range (HFmrEF) or preserved ejection fraction (HFpEF) from three European countries.
Methods: We identified 10,312 patients from three European HF registries. Patients were classified according to baseline left ventricular ejection fraction (LVEF) and time of enrolment (period 1: 1995-2005 vs. period 2: 2006-2015). Predictors of mortality were analysed by use of univariable and multivariable Cox regression analyses.
Results: Among 10,312 patients with stable HF, 7,080 (68.7%), 2,086 (20.2%), and 1,146 (11.1%) were classified as having HFrEF, HFmrEF, or HFpEF, respectively. A total of 4,617 (44.8%) patients was included in period 1, and 5,695 (55.2%) patients were included in period 2. Baseline characteristics significantly differed with respect to type of HF and time of enrolment. During a median follow-up of 66 (33-105) months, 5,297 patients (51.4%) died. In multivariable analyses, survival was independent of LVEF category (p>0.05), while mortality was lower in period 2 as compared to period 1 (HR 0.81, 95% CI 0.72-0.91, p<0.001). Significant predictors of all-cause mortality regardless of HF category were increasing age, NYHA functional class, NT-proBNP, and use of loop diuretics.
Conclusion: Ambulatory HF patients stratified by LVEF represent different phenotypes. However, after adjusting for a wide range of covariates, long-term survival is independent of LVEF category. Outcome significantly improved during the last two decades irrespective from type of HF.



Survival stratified by HF category

P297

Identification of founder MYBPC3 gene mutations in hungarian patients with hypertrophic cardiomyopathy

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Background: Hypertrophic cardiomyopathy (HCM) is a primary disease of the myocardium most commonly caused by the mutations in sarcomeric genes. Mutations underlying HCM are mostly unique, "private" mutations. However, the presence of so-called "founder" mutations is also known, where a mutation, occurring in a common ancestor earlier, is present in high frequency in a population, seemingly in non-related patients.
Purpose: We were searching for founder mutations in Hungarian patients with HCM genotyped by next-generation sequencing.
Patient and methods: We examined 133 patients with HCM (81 men, 52 women, average age: 45±15 years). Familial disease was present in 26% of the cases. Maximal left ventricular (LV) wall thickness was 22±6 mm and significant LV outflow tract gradient was observed in 28 patients. Using next-generation sequencing we screened 103 known causative cardiomyopathy genes, the target region consisted of 500.000 base pairs.
Results: Pathogenic or likely pathogenic variants were identified in 66% of the patients. Pathogenic variants most commonly affected the MYBPC3 (35%) and the MYH7 genes (16%). Multiple occurrence of mutations were observed in case of 6 gene mutations among the 133 patients [MYBPC3 p.Ala1056fs: 2 patients (1.5%), p.Arg495Gln: 3 patients (2.3%), p.Gln1233Stop: 9 patients (6.8%), p.Pro955fs: 6 patients (4.5%), p.Ser593fs: 7 patients (5.3%) and MYH7 p.Arg663Cys: 3 patients (2.3%)]. Haplotype analysis of the mutations suggested a founder effect in case of MYBPC3 p.Gln1233Stop, p.Pro955fs and p.Ser593fs mutations.
Conclusion: According to our results founder mutations are present in the Hungarian HCM population. The MYBPC3 gene p.Gln1233Stop, p.Pro955fs and p.Ser593fs founder mutations affect approximately 17% of the Hungarian HCM patients.

P298

Trends in heart failure epidemiology between 2007 and 2016 in Piedmont, Italy: findings from the Epi-HF study

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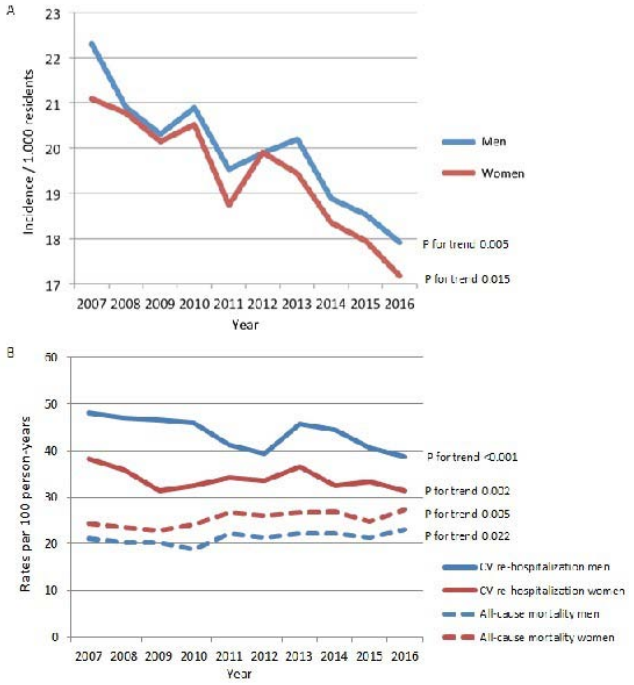
BackgroundDifferences exist in epidemiology of heart failure (HF) between countries worldwide but recent data on HF temporal trends in Italy are lacking.PurposeTo describe HF epidemiology in Piedmont (about 4.5 million people in Northwest Italy) by analysing trends of first hospitalisation, readmission, survival and variables associated with outcome.
Methods This retrospective cohort study was based on hospital discharge records, tracking all hospitalisations occurred in Piedmont. The study population included residents first discharged between 2007 and 2016 with a principal diagnosis of HF. Endpoints were all-cause mortality and cardiovascular (CV) hospitalisation. Hospitalisation rates were age-standardised by direct standardisation. Crude case-fatality rates were calculated at 30 days, 1 and 3 years from discharge. Kaplan-Meier analyses were used to determine survival. Cox models were used to investigate factors associated with outcome.
Results74292 patients were admitted for the first time with HF (female 48.6%, mean age 77.5 years). The average length of in-hospital stay was 13 days. Since 2007, rates of first HF hospitalisation decreased significantly from 22.3 to 17.9 cases/1000 inhabitants and from 21.1 to 17.2 cases/1000 inhabitants in men and women respectively (Fig.A). In-hospital mortality was 10.7% overall. Mortality was 4.2%, 20.3% and 39% at 30 days, 1 and 3 years respectively. Readmission rates were 13.1%, 48.6%, and 68.9% after 30 days, 1 and 3 years, respectively. Post-discharge one-year mortality increased significantly from 2007 to 2016 in both sexes whereas CV-hospitalisations decreased (Fig.B). At multivariable analysis several factors were associated with outcome (Tab).

Table 1

	1 year all-cause mortality	1 year CV-rehospitalisation		
HR	95%CI	HR	95%CI	
Female (vs. Male)	1.07	1.03-1.12	1.17	1.12-1.21
Age (years) < 6565-74 75-84 >84	1.001.963.52 7.41	-1.74-2.21 3.16-3.93 6.63-8.29	-1.04 0.910.84	-0.99-1.10 0.86-0.96 0.78-0.89
Chronic renal failure	1.43	1.36-1.49	1.21	1.15-1.27
Chronic Obstructive Pulmonary Disease	1.17	1.11-1.23	0.95	0.90-0.99
Cancer	1.70	1.62-1.79	0.96	0.91-1.02
Myocardial infarction	0.98	0.93-1.02	1.26	1.21-1.32
Diabetes	1.02	0.97-1.06	1.11	1.06-1.15
Atrial fibrillation	0.99	0.95-1.03	1.31	1.26-1.35

Conclusions During the last decade, in Piedmont, rates of first HF hospitalisation decreased progressively. However, post-discharge mortality remained high.



P299

Prognostic value of handgrip strength in patients with heart failure

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Background. Handgrip strength is used to estimate overall muscle strength. The impact of handgrip strength on prognosis of heart failure is unclear.
Purpose. We evaluated the impact of handgrip strength on hospitalisation rate and survival of patients with heart failure.
Methods. We retrospectively collected data of consequent patients with heart failure from outpatient heart failure clinic. We measured handgrip strength at every visit at the clinic. Study endpoints were all-cause hospitalisation or death and hospitalisation or death because of heart failure. We recorded the first and the last handgrip before endpoint event. We evaluated the impact of handgrip strength on hospitalisation rate and survival wit Cox proportional hazards analysis.
We used the last measured handgrip to define frailty (standardised tables which consider age and body mass index). We divided patients into frail and non-frail groups and compared survival of these groups with Kaplan-Meier analysis.
Results. Out of 215 patients, 73 (34%) were hospitalised or died from any cause and 35 (16%) were hospitalised or died due to heart failure. Patients who reached the endpoint were older, had a higher level of troponin T, a higher percentage of them had arterial hypertension, patients who were hospitalised or died from any cause had higher level of NT-proBNP than non-hospitalised patients. No other significant differences were found between groups in clinical characteristics, comorbidities and laboratory parameters.
Handgrip strength was a statistically important negative prognostic factor of hospitalisation rate and survival in all-cause and heart failure group (Exp(B)=0.958, 95%CI 0.932-0.986, p=0.003 and Exp(B)=0.929, 95%CI 0.889-0.973, p=0.002, respectively). When adding age, type of heart failure and stage of chronic kidney disease as prognostic co-factors, stage of chronic kidney disease showed to be a significant prognostic co-factor besides handgrip in all-cause hospitalisation rate and survival. Patients in the frail group (N=176) had a significantly lower all-cause heart failure survival than the non-frail (N=39) group (14.5±0.8 vs. 18.3±1.3 months, p=0.018 and 17.6±0.9 vs. 20.6±1.0 months, p=0.031, respectively).
Conclusions. Handgrip strength can be used as a prognostic factor in heart failure patients - lower handgrip correlates with more hospitalisation and higher mortality (all-cause and heart failure related).

P300

Trends in incidence and survival in patients with heart failure in sweden: insights from swedish coronary angiography and angioplasty registry

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Background: Aging of the population and prolongation of the lives of cardiac patients by modern therapeutic innovations has led to an increasing prevalence of heart failure (HF). Despite improvements in therapy, the mortality rate in patients with HF has remained high. We aimed to evaluate the incidence and survival in patients who underwent coronary angiography with HF diagnosis in Sweden during the last two decades.
Methods: We used data from the Swedish Coronary Angiography and Angioplasty Registry (SCAAR), which contains information about all coronary angiographies and PCI (percutaneous coronary interventions) performed in Sweden (31 hospitals). We included all coronary angiographies performed in patients with HF diagnosis from 2000 to 2018 in Sweden. We used multivariate Cox proportional-hazards regression to adjust for differences in patient characteristics. Multilevel modeling was used to adjust for clustering of observations in a hierarchical database.
Results: In total, 24,171 patients were included in the study. Of these, 17,677 (73.2%) were men and 6,484 (26.8%) were women. Median follow-up time was 4,510 days (range 0-6648). Mean age was 63.7±11.3, and 32.7% were <60 years old. The number of diagnostic angiographies for HF indication increased by 5.5% per year. Normal coronary angiogram was reported in 63.2% while 36.8% had >50% diameter stenosis in one or more coronary arteries. In patients with significant coronary artery disease (CAD), 37.3% had single vessel disease (SVD), 23.8% had a multivessel disease without the involvement of left main (MVD), and 38.5% had a multivessel disease with involvement of left main (MVD-LM). The majority (53.4%) of HF patients with CAD were treated conservatively while (46.6%) were referred for revascularization with PCI or CABG. In revascularized patients (n=4,589), PCI was performed in 71.1% and 28.9% were referred for CABG. Between 2000 to 2018, age and gender adjusted survival in HF improved by 1.3% per the calendar year both in patients with and without CAD. The number of revascularized patients increased by 7.5% per the calendar year. Compared to HF patients without CAD, adjusted long-term mortality was higher in HF patients with SVD (HR 1.3; 95% CI 1.20-1.41; P<0.001), MVD (HR 1.72; 95% CI 1.58-1.88; P<0.001) and MVD-LM (HR 2.02; 95% CI 1.88-2.18; P<0.001).
Conclusions: The number of patients with HF undergoing coronary angiography and revascularization in Sweden has increased considerably over the last two decades. Long-term survival was substantially improved in HF patients with and without CAD. However, survival is better in HF patients without CAD.

P301

Previous cardiomyopathy in cardiogenic shock

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Background: Cardiogenic shock (CS) remains the major cause of death in acute coronary syndrome, and the presence of a previous cardiac dysfunction can influence the outcome.
Purpose: Evaluate the impact of previous cardiomyopathy in CS and the predictors of mortality in CS patients.
Methods: Single-centre retrospective study, engaging patients hospitalized for CS between 1/04/2016-31/10/2018. Multiple linear regression was performed to assess predictors of mortality at admission in CS patients. Then, patients were divided in two groups: A - previous cardiomyopathy in CS, and B - CS without a history of cardiomyopathy. Chi-square, Fisher and T-student tests were used to compare categorical and continuous variables.
Results: 214 patients were included, mean age 62.36±13.92 years, with 78.5% males. Arterial hypertension (AH) (53.3%), dyslipidaemia (DL) (46.7%) and smokers (31.6%) are the most frequent comorbidities. Beta blockers (BB) (31.6%), Angiotensin-Converting-Enzyme inhibitor (ACEI) (40.9%) and platelet antiaggregant (PA) (30.8%) are frequent medications before the CS occurrence. Multiple linear regression revealed age, AH, and ACEI as predictors of CS mortality with an R2a of 0.096 – Table 1. In the group A (50 patients) the most prevalent aetiologies were ischemic (50%), valvular (24%) and alcoholic (12%). The groups were similar regarding gender, AH, DL, diabetes, obesity, values of cardiac troponins, creatinine and platelet count, arterial pressure and arrhythmias at admission and mortality rates. Group A were older (66.34±15.49 vs 61.15±13.22 years, p=0.021), use more cardiovascular medication, BB (81 vs 15.7%, p0.001), ACEI (60 vs 34.8%, p=0.002), spironolactone (24 vs 4.4%, p0.001), furosemide (40 vs 11.9%, p0.001) and PA (53.1 vs 23.9%, p0.001); at admission presented lower values of

haemoglobin (12.39±2.44 vs 13.46±2.24, p=0.008) and leukocytes (13.02±10.27 vs 15.4±7.7, p=0.043). Group B had more angiography performed (84.8 vs 64%, p=0.001), and less time until the angiography (3±3 vs 3.5±2.88 hours, p=0.001) and higher left ventricular ejection fraction (35.64±13.59 vs 28.22±14.07, p=0.02). Linear regression confirmed that previous cardiomyopathy did not influence the mortality rates in CS patients, p=0.612.

Conclusions: Age and AH are the major predictors of mortality in CS and the use of ACEI seems have a protective effect.

Table 1

Independent Variables	β (95% CI)	P value
Age	0.205 (0.002 - 0.013)	0.006
Arterial Hypertension	0.230 (0.067 - 0.390)	0.006
ACEI	-0.252 (-0.409 - -0.100)	0.001

Multiple linear regression models for prediction of mortality in cardiogenic shock.

P302

Revisiting the obesity paradox in heart failure: percent body fat as predictor of biomarkers and outcome

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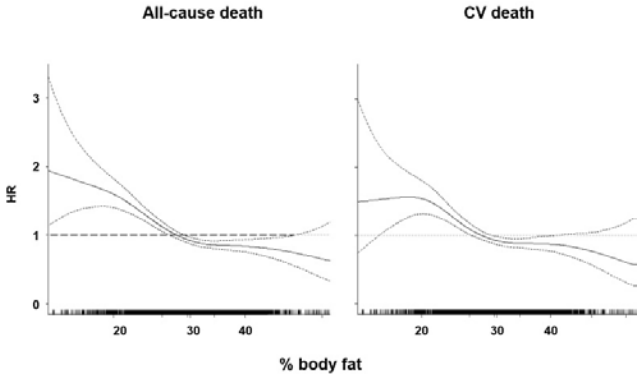
Background: Obesity defined by body mass index (BMI) is characterized by better prognosis and lower plasma N-terminal pro-B-type natriuretic peptide (NT-proBNP) in heart failure (HF). It is unknown whether another anthropometric measure, percent body fat (PBF), reveals different associations with outcome and HF biomarkers (NT-proBNP, high-sensitivity troponin T [hs-TnT], soluble suppression of tumorigenesis-2 [sST2]).

Methods: In an individual patient dataset, BMI was calculated as weight(kg)/height(m)2, and PBF through the Jackson-Pollock and Gallagher equations.

Results: Out of 6468 patients (median 68 years, 78% men, 76% ischemic HF, 90% reduced EF), 24% died over 2.2 years (1.5-2.9), 17% from cardiovascular death. Underweight patients (BMI <18.5 kg/m2) had the shortest survival; prognosis improved from underweight to normal and overweight, being similar from overweight to grade III obesity. Median PBF was 26.9% (22.4-33.0%) with the Jackson-Pollock equation, and 28.0% (23.8-33.5%) with the Gallagher equation, with an extremely strong correlation (r=0.996, p<0.001). Patients in the first PBF tertile had the worst prognosis, while patients in the second and third tertile had similar survival. The risks of all-cause and cardiovascular death decreased by up to 36% and 27%, respectively, per each doubling of PBF (all-cause death: hazard ratio - HR 0.68, 95% confidence interval - CI 0.58-0.80, p<0.001, and HR 0.64, 95% CI 0.53-0.77, p<0.001, with the Jackson-Pollock and Gallagher equations, respectively; cardiovascular death: HR 0.76, 95% CI 0.64-0.91, p=0.003, and HR 0.73, 95% CI 0.60-0.90, p=0.003, respectively). Furthermore, prognosis was better in the second or third PBF tertiles than in the first tertile regardless of model variables. Both BMI and PBF were inverse predictors of NT-proBNP (beta coefficients: BMI -0.206, PBFJackson-Pollock -0.234, PBFGallagher -0.244; all p<0.001) and sST2 (beta coefficients: BMI -0.063, p=0.004; PBFJackson-Pollock -0.083, p=0.001; PBFGallagher -0.084, p=0.001), but not hs-TnT. In obese patients (BMI ≥30 kg/m2, third PBF tertile), hs-TnT and sST2, but not NT-proBNP, independently predicted outcome.

Conclusions: Patient prognosis improves with either BMI or PBF. Obesity, assessed with BMI or PBF, is associated with lower NT-proBNP but not hs-TnT or sST2. hs-TnT or sST2 are stronger prognostic predictors than NT-proBNP among obese patients.



P303

Prognostic significance of obesity after ST-elevation myocardial infarction: the impact on heart failure

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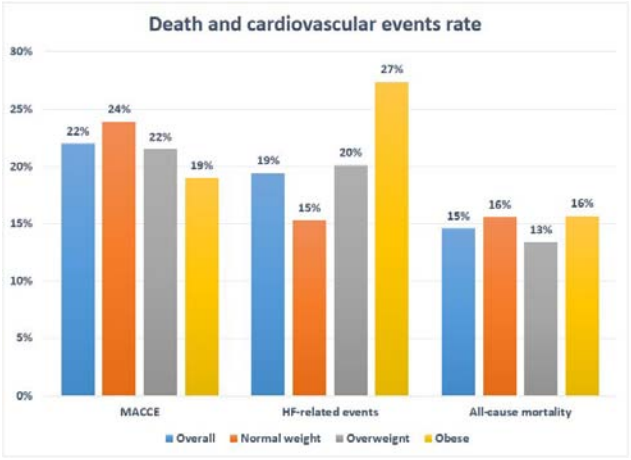
Introduction: In general population, a normal range body mass index (BMI) is associated with lower mortality. Paradoxically, in several chronic diseases an increased BMI is related to better prognosis, including in post-acute coronary syndrome patients.

Purpose: We aimed to evaluate the relation between BMI and cardiovascular outcomes in a cohort of ST-elevation myocardial infarction (STEMI) patients.

Methods: We retrospectively studied consecutive STEMI patients treated with primary percutaneous coronary intervention at a tertiary hospital between 1st January 2010 and 31st December 2016. Clinical and outcome data were retrieved by chart review. BMI was categorized as low weight (<18.5 kg/m2), normal (18.5-24.9 kg/m2), overweight (25- 29.9 kg/m2) and obese (≥30 kg/m2). Major adverse cardiovascular and cerebrovascular events (MACCE) were defined as occurrence of cardiovascular death, myocardial infarction, stroke or target lesion revascularization. Heart failure (HF)-related events were defined as de novo HF diagnosis, clinical worsening HF (increased dose of diuretics at outpatient clinic) or HF hospitalization.

Results: We included 864 patients (63±13 years, 75% male), 0.6% with low weight, 33.3% with normal weight, 45.1% overweight and 16.1% obese. Obese were younger and exhibited higher prevalence of previous hypertension, diabetes and dyslipidemia. Incidence of MACCE was 20.1%, with a median time to event of 10.1 [1.3-255.1] days and no significant differences between BMI groups. In multivariate analysis, only left ventricular ejection fraction (LVEF; if preserved, HR 0.45, 95 CI 0.23-086) and previous history of hypertension (HR 2.77, 95 CI 1.43-5.39) were independent predictors of MACCE. The overall post-STEMI HF-related events was 18.2% (6.2% de novo HF, 2.7% HF worsening and 9.3% HF hospitalization) with a median time to event of 10.8 [2.4-32.4] months. Independent predictors of



Death and cardiovascular events rate

HF-related events were age (HR 1.05, 95 CI 1.03-1.08), diabetes (HR 1.94, 95 CI 1.17-3.20), Killip-Kimball class (HR 3.02, 95 CI 1.96-5.25), LVEF (if preserved, HR 0.46, 95 CI 0.27-0.79) and obesity (HR 2.43, 95 CI 1.19-4.96).
Conclusion: In a cohort of all-comers STEMI patients, BMI was not associated with MACCE. In contrast, obese patients had an increased risk of developing de novo HF or worsening of preexistent HF. Our data suggests that obesity has a divergent prognostic significance regarding cardiovascular outcomes.

P304

Comparative analysis of multiparametric scores in heart failure: does the type of follow-up matter?

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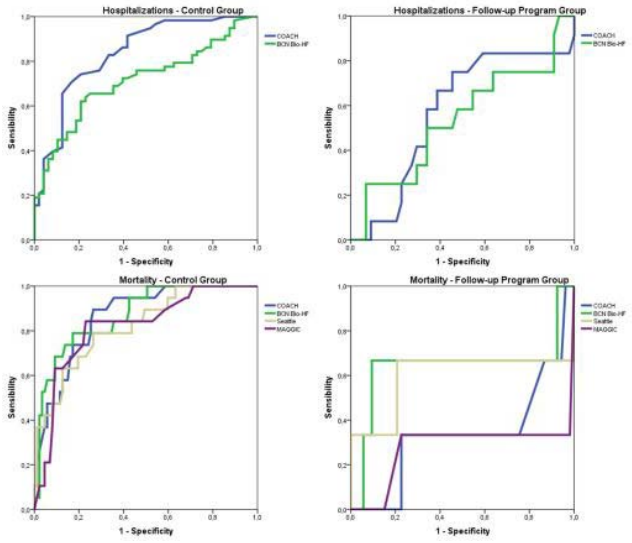
On behalf of: RICA-HFTeam

Introduction : Multiple prediction score models have been validated to predict major adverse events in patients with heart failure (HF); however, these scores do not include variables related to the type of follow-up.
Objective : To evaluate the impact of a protocol-based follow-up program (PFP) of pts with chronic HF regarding scores accuracy for predicting 1-year hospitalizations and mortality.
Methods : Data from 2 HF populations were collected: one composed of pts included in a PFP after the index-hospitalization for HF; and a second one – the control population - composed of pts hospitalized prior to the beginning of the PFP. For each pt, the risk of hospitalization and mortality at 1-year was calculated using the COACH Risk Engine, BCN Bio-HF Calculator, MAGGIC Risk Calculator and Seattle Heart Failure Model. The accuracy of each score was established using the area below the ROC curve (AUC), calibration graphs and discordance (disc) calculation. AUC comparison was established by DeLong method.
Results : The PFP group included 56 pts, and the control group, 106 pts, with no significant differences between groups [median age: 67 vs 68.4 years; male sex: 58 vs 55%; median ejection fraction 28.2 vs 30.5%; functional class II: 60.7 vs 56.2%, I: 30.4 vs 31.9; p =NS). Hospitalization and mortality rates were significantly lower in the PFP group (21.4 vs 54.7, P <0.001, 5.4 vs 17.9, p <0.001, respectively).
Hospitalization risk calculated by COACH and BCN Bio-HF was 25.5 and 7.45% (disc: -55 and -79%, respectively) in the PFP group, and 24.5 and 11.5% (disc: 19 and -65%) in the control group. Mortality risk calculated by COACH, Bio-HF BCN, MAGGIC and Seattle was 21.5, 8.35, 11.1 and 13.7% (disc: 298, 55, 106 and 153%) in the PSP group and 20, 13.1, 11.65 and 14.5% (disc: 12, -26, -35 and -19%) in the control group.
When applied to the control group, COACH and BCN Bio-HF had, respectively, good (AUC 0.835) and reasonable (AUC: 0.712) accuracy to predict hospitalization. There was a significant reduction of COACH accuracy (AUC: 0.572; P =0.011) and a non-significant accuracy reduction of BCN Bio-HF (AUC: 0.536; P =0.1) when applied to the PFP group. All scores showed good accuracy to predict 1-year mortality (AUC: 0.863, 0.87, 0.818, 0.82, respectively) when applied to the control group.
However, when applied to the PFP group, a significant predictive accuracy reduction of COACH, BCN Bio-HF and MAGGIC (AUC: 0.366, 0.642 and 0.277, P: <0.001, 0.002 and <0.001, respectively) was observed. Seattle had no significant reduction in its acuity (AUC: 0.597; P: 0.24).
Conclusions : The accuracy of scores to predict major events in pts with HF is, globally, significantly reduced when they are applied to pts under follow-up in PFP. This may be related to the magnitude of reduction in major events rate that these programs entail. In these pts, BCN Bio-HF Calculator maintained reasonable accuracy and should be regarded as the score of choice.



P305

Heart failure in healthy young people with left bundle branch block: long-term follow-u

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Left bundle branch block (LBBB) is generally associated with a poor prognosis if with known ischemic heart disease and / or left ventricular dysfunction. However, the clinical and prognostic significance of the LBBB in young people (age <50 years old) totally asymptomatic and without any comorbidities is not well recognized.
The aim of our study is to evaluate this condition in a long term follow-up.
From 1996 to 2016, a total of 55 (0.27%) have been enrolled from 20,123 patients. Exclusion criteria were: previous history of cardiac arrest, syncope, any known cardiomyopathies, history of angina or dyspnea, known arterial hypertension. All patients underwent annual clinical cardiac evaluation, ECG recording and complete echocardiogram. Whether clinical appropriate, angiographic evaluation, cardiac magnetic resonance (CMR), and electrophysiological study have been performed. The mean age was 36 ± 11.7 years old and 40 (72 %) were male. More than half practiced any sportive activities and 13 (23%) had positive familial history for cardiac sudden death (SD). Considering the coronary clues, an abnormal origin of circumflex artery had been detected in 3 cases; an intramyocardial bridge of the left main coronary artery in 4 cases; and hypoplasia of right coronary artery in 1 case. About the CMR findings, 10 (18%) showed an area of late gadolinium enhancement (LGE), of whom, 9 in the interventricular septum, and 1 in the apical lateral wall. During a mean follow up of 10 ± 16 years, all patients are still alive, except 1 that died for non-cardiovascular causes. Conversely, 3 (5%) had syncope needing of cardiac pacemaker; 1 (2%) developed heart failure with severe left ventricular heart dysfunction needing of cardiac resynchronization therapy; 1 (2%) had ventricular tachycardia needing of implanted cardiac device.
The LBBB in <50 years old without any overt cardiac disease is a very rare condition, predominantly in males, and could be associated to coronary congenital abnormalities or evidence of fibrosis at the CMR. In a long-term follow-up, LBBB seems not to be associated to mortality neither to development of heart failure; conversely, it could be associated to other advanced atrioventricular block.

Clinical variables	
Number	55
Male sex, n (%)	40 (72)
Sport activities, n (%)	37 (67)
Familial history of juvenile cardiac sudden death, n (%)	13 (23)
Age, years	36± 11.7
QRS width, mmsec	132± 20

P306

Impact of recurrent heart failure hospitalizations on cardiovascular mortality in patients with heart failure in CPRD, a UK database

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P306: Table 1.All-cause and CV mortality rates

	0 recurrent HF hospn=6205 (72.1%)	1 recurrent HF hospn=1568 (18.2%)	2 recurrent HF hospn=496 (5.8%)	3 recurrent HF hospn=190 (2.2%)	4+ recurrent HF hosp n=144 (1.7%)	All patients n=8603 (100.0%)
Follow-up time (days) from respective recurrent HF hospitaliza-tion(median [IQR])	402 [71-1009]	176 [33-622]	87 [21-383]	67 [20-272]	157 [50-403]	305 [50-879]
All-cause death (n (%))	3050 (49.1%)	841 (53.6%)	273 (55.0%)	121 (63.7%)	87 (60.4%)	4372 (50.8%)
CV death- any cause (n (%))	2642 (42.6%)	773 (49.3%)	260 (52.4%)	115 (60.5%)	82 (56.9%)	3872 (45.0%)
CV death- primary cause(n(%))	1804 (29.1%)	557 (35.5%)	185 (37.3%)	88 (46.3%)	63 (43.7%)	2697 (31.3%)

Background. Heart failure (HF) is a leading cause of hospitalization among older adults. Previous studies have suggested that recurrent heart failure hospitalizations are a predictor of cardiovascular (CV) and all-cause mortality. Purpose. This study examined the impact of recurrent HF hospitalizations on CV mortality in real-world UK HF patients. Methods. Adult HF patients identified in the CPRD database with a first (index) hospitalization due to HF recorded in the HES dataset from 01/01/2010 to 31/12/2014 were included. Patients were followed until death or end of study period (31/12/2017). CV death as primary and as any reported cause and all cause death were evaluated. An extended Cox regression model was used for reporting adjusted relative CV mortality rates for time dependent recurrent HF hospitalizations. Adjusted variables were included based on clinical importance or statistical significance at baseline and if missing values were below 30%.
Results. 8603 HF patients with an index hospitalization were included, providing 15975 patient-years follow-up. Patients were relatively old (median [IQR] age of 80 [71-86]); majority were male (54.6%), with main comorbidities being hypertension (65.0%), atrial fibrillation (53.3%) and ischemic heart diseases (48.0%). LVEF values were only available for 1.9% of the sample so were not used in the analysis. Recurrent HF hospitalizations occurred 1, 2, 3 and ≥4 times in 1568 (18.2%), 496 (5.8%), 190 (2.2%) and 144(1.7%) patients, respectively. The median (IQR) time to all cause death was 215 (38-664) for the 50.8% of patients that died during the study period, and 139 (27-531) days for the 31.3% who died due to CV death recorded as primary cause. Compared with those without recurrent HF hospitalizations, the adjusted hazard ratios for CV death were 2.8 (95%CI 2.5-3.1), 3.5 (95% CI 2.9-4.2), 6.2 (95% CI 4.9-7.9) and 6.3 (95% CI 4.7-8.4) for 1, 2, 3 and ≥4 recurrent HF hospitalizations. Conclusion. Recurrent HF hospitalizations are a strong predictor of CV death in the HF population. The risk of CV death and all-cause death increases progressively with each recurrent HF hospitalization. These data highlight the relevance of reducing hospitalizations in the management of HF.

P307

Direct costs of heart failure in a portuguese population.

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Funding Acknowledgements: Financial support for data retrieval from Servier.

Introduction: Heart failure (HF) is a global public health issue. Its economic impact in the Autonomous Region of Madeira (ARM) is unknown. Due to the condition's high prevalence and healthcare utilization, profiling its costs is fundamental for improved disease management.
Purpose: To estimate the direct costs related to HF in the ARM. Methods: A prevalence-based cost-of-illness approach was adopted to estimate direct costs of heart failure over a 12 month period from the healthcare system perspective. Prevalence estimates were derived from previous published study. Hospitalization and emergency department (ED) episodes were identified by the International Classification of Diseases 9th edition. Patterns of ambulatory visits and diagnostic tests in the hospital and primary care setting were derived from previous reported research and regional health system data. Medication use was also derived from this study. Costs were based on Diagnosis Related Groups and from the Portuguese official national health system tariffs.

Results: There was a 4.93% prevalence of HF in 2014 in individuals aged above 25 years, equivalent to an estimated 9201 patients. Of these, 4140 were symptomatic (NYHA≥II) and hence considered healthcare consumers. We identified 426 admissions with primary diagnosis of HF, 5.5% of total cardiovascular admissions. There were 16850 primary care ambulatory visits, 857 ED visits and 13414 internal medicine and cardiology ambulatory visits. Total direct costs were €4,089,540. Hospital-related care summed 56% of total costs, of which 49% related to hospitalization. Primary care costs accounted for 22%, medication (20%) and long term care (2%). Average annual cost per patient was €987.81.Conclusion: Total costs amounted to 0.1% of gross domestic product and 1.2% of the healthcare budget of the ARM. This finding is in line with other reports from developed countries. HF is a costly syndrome for ARM, and this research adds information about the disease that was until now unknown. Population ageing is likely to continue to drive increasing costs. These results can help policy making by identifying the financial burden of HF for the healthcare public provider in the ARM. Since it defined several cost components, this study can aid in the implementation of measures to improve disease management in the regional setting and reduce the major driver of costs which is hospitalization.

P308

European Heart Failure Aeareness day: evaluation of self-reported and control of cardiovascular risk factors

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Introduction In the last decade the Heart Failure Association (HFA) of the European Society of Cardiology promoted the "European Heart Failure Awareness days" initiative, aiming to increase the knowledge and prevention of heart failure (HF). It is known that the knowledge of HF, its causes and risk factors in critically low in general population, despite the high and increasing prevalence of pathology.
Aim During the 2017 initiative, we investigated subjective, and subsequent objective, awareness related to self-control of cardiovascular risk factors as physical inactivity, obesity and healthy diet, hypertension, diabetes mellitus, smoking habits.
Methods A 60-item multiple choice questionnaire has been developed to collect demographic data, presence of overt cardiac disease, adherence to pharmacological treatment, presence and level of physical activity, psychological well-being, diet and smoking habits. The questionnaires were administered to 709 people in 8 different cities.
Results The age of our population was 14-40 years old (yo) in 10%, 51-50 yo in 15%, 51-50 yo in 18%, 61-70 yo in 20%, 71-80 yo in 20% and over 80 yo in 13%. 55% were female and >50% declared high scholarity level. 91 out 709 were active smokers, and 167 out 709 former smoker. In 46% of cases the amount of cigarettes smoked was <10 per day, in 39% between 10 -20 and in 10% >21 cigarettes daily. In the 30% of cases the presence of a known cardiovascular disease was reported. The 68% of people was on pharmacological treatment (40% for hypertension, 11% for diabetes mellitus, 26% for hypercholesterolemia and 32% for cardiac ischemic disease or heart failure). Of these, 81% affirmed to be adherent to a prescribed

treatment but in the subsequent items, we found that 27% often forgot to assume the prescribed drugs. In 21% of cases, deteriorating of clinical status was the cause of voluntary interruption while in 16% due to improvement in symptoms. The self-reported status of physical activity was: satisfactory in 50% of cases (very good only in 5,4%), poor in 25,5%, very poor or absent in 21%. Investigating the amount of time and the intensity of the physical activity, 41% of the population was completely sedentary. Dietary habits were consistent with Mediterranean diet, with a correct assumption of vegetables and fruit in respectively 80% and 71% and a lower amount of fish and legumes (65% and 64%).
Discussion Our study revealed a discrepancy in self-assessed and measured adherence to a prescribed treatment. A better adherence level is pivotal component to maintain a good clinical status in patients with a diagnosis of HF, especially to keep an euvolemic status. Dietary habits were satisfactory while the amount of physical activity was not achieved in half of the cases. These data highlights the importance of increase awareness and to investigate real population adherence to risk factor's management, to obtain a better success in early diagnosis and treatment of HF.

P309

Differences between diabetics and non-diabetics with chronic heart failure and its impact on prognosis

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The FAR NHL (FARmacology and NeuroHumoraL activation) registry is a database of patients treated in 3 departments with specialized heart failure care in one country. The patients should be treated for systolic heart failure (EF < 50%) and stable for at least one month. It analyses physical status, laboratory tests :blood count, biochemistry, including NT-proBNP, echocardiography and concomitant medication. Continuous variables are described by median, categorical variables are described by absolute and relative frequencies.P-value of Mann-Whitney U test for continuous variables and P-value of the Fisher's exact test for categorical variables are reported for comparison of patients' characteristics according to presence diabetes mellitus. Survival was evaluated after 2 years of follow-up and defined as freedom of death or left ventricle assist device implantation or heart transplantation.
1052 patients were included, and divided to diabetics 409 and non-diabetics 643. Patients with diabetes were older: 67 (60; 73) vs 64 years (54; 72) (p<0.001), had higher BMI 30 (27; 34) vs 28 (25; 31) (p<0.001), higher heart rate 74 (65; 81) vs 71 (64; 80) (p<0.01), higher uric acid 412 (351; 477) vs 388 μmol/l (330; 463) (p<0.003), lower hemoglobin 141 (130; 151) vs 145 (133; 154) g/l (<0.001) and lower glomerular filtration 63 (47; 82) vs 73 (57; 89) (ml/min/1.73 m^2) (<0.001). Diabetics had more often ischemic heart disease 70.9 vs 47.3 % (p<0.001), hypertension 79.7 vs 55.8% (p<0.001), dyslipidemia 89.0 vs 69.2% (p<0.001). The NT-proBNP levels were signifficantly higher in diabetics 681 (225; 1 708) vs 463 (138; 1 462) ng/l in non-diabetics (p<0.003). There were no differences in blood pressure, ejection fraction or presence of atrial fibrillation. Medication for heart failure did not differ in usage of ACEI/ARB, beta blockers and verospiron. Diabetics had more often furosemide 85.8 vs 77.3% (<0.001). Two year survival was 81.2% in diabetics (77.2; 85.3) vs 86.1% in non- diabetics (83.3; 88.9) p<0.057.
Conclusion: Diabetics have more often comorbidities: ischemic heart disease, hypertension, dyslipidemia, decreased renal functions and anemia, which contributes to more severe heart failure evaluated by NT-proBNP and worse prognosis than in non- diabetics with chronic heart failure.

P310

Prognostic nutrition index predicts prognosis in ultra-elderly patients with heart failure

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Background: The prognostic nutritional index (PNI), calculated from the serum albumin concentration and total lymphocyte count, is a simple and objective indicator of postoperative outcomes in patients undergoing cancer surgery. Recent studies have shown that PNI is associated with long-term survival in patients hospitalized for acute heart failure. However, the clinical significance of nutritional risk assessment in ultra-elderly patients with heart failure has not been well established.

Purpose: To test the hypothesis that PNI predicts prognosis in ultra-elderly patients with hospitalized heart failure.
Methods: We enrolled consecutive 48 octogenarian or nonagenarian patients (mean age 86 ± 4 years, 23 male) who were admitted to our hospital for treatment of heart failure. The diagnosis of heart failure was based on the Framingham criteria. Patients with significant (moderate or severe) primary valve disease were not included in this study. Vital status, information about medical treatment, laboratory data and echocardiographic data before discharge were collected from medical records. According to previous reports, PNI > 40 was considered normal value. The date of discharge was considered the entry time-point of observation. Primary outcomes were defined as cardiac death and unplanned hospitalization due to congestive heart failure.
Results: During a median follow-up of 291 days (range, 5 to 1331 days), 23 events (5 deaths, 18 heart failures) occurred. Compared with event free patients, plasma log BNP was significantly higher (2.58 ± 0.36 vs 2.26 ± 0.32, p < 0.01), PNI was significantly lower (35.8 ± 4.9 vs 41.6 ± 4.7, p < 0.01), and hemoglobin was significantly lower (10.5 ± 1.8 g/dl vs 11.8 ± 1.8 g/dl, p < 0.05) in patients with events. Univariate analysis showed that plasma log BNP (hazard ratio [HR] 6.1, 95% confidence interval [CI] 1.7 - 23.4, p < 0.01) and PNI (HR 0.89, 95% CI 0.82 - 0.96, p < 0.01) were predictors of outcome. Although lower hemoglobin level tended to associated with outcome (p = 0.066), none of the echocardiographic parameters were associated with outcome. Multivariate analysis revealed that both plasma log BNP (HR 4.2, 95% CI 1.2 – 16.0, p < 0.05) and PNI (HR 0.91, 95% CI 0.83 - 0.98, p < 0.01) were independent outcome predictors. Kaplan-Meier analysis showed that event rate was markedly higher (log rank, p < 0.01) in patients with PNI ≤ 40 than in those with PNI > 40.
Conclusion: Malnutrition, as evaluated using PNI, was associated with unfavorable outcomes even in ultra-elderly patients with heart failure.

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Co-morbid conditions and their relationship with mortality in elderly heart failure patients

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In recent years, there has been growing evidence that multimorbidity is associated with the poor prognosis of chronic heart failure (CHF), but less is known about how these conditions impact outcomes in elderly patients.
Aim. To assess the o-morbid conditions and their relationship with mortality in elderly CHF outpatients. Methods. Eighty outpatients suffering from CHF (44% F/56% M, age 60-89 years) due to coronary heart disease (CHD) or arterial hypertension entered the study. Forty subjects with cardiovascular diseases but without CHF (45% F/55% M, age 60-88 years) were selected as sex- and age-matched controls. All patients provided written informed consent and had clinical, laboratorial evaluation, Echo CG measurements. Frailty was identified according to the score 3 or greater due to questionnaire FRAIL. Validated Charlson comorbidity index (CCI) was calculated. Bone mineral density (BMD) in the femoral neck (FN) were examined using dual-energy X-ray absorptiometry. Statistical analysis was made using software packages SPSS 21.0, Stata 15. Results. Co-morbidity (2 or more chronic conditions) was present in all patients with CHF and in 92,5% of control group. The most common comorbid conditions in CHF were chronic kidney disease (CKD, 66%), osteoporosis (58,6%), falls (48,5%), frailty (42,5%), obesity (35%); in control group - obesity (42%) or CKD (40%). The prevelance of osteoporosis (26,1%, p=0,005), falls (25%, p=0,039), frailty (5%, p<0,001) was less in control group compared to patients with CHF. The most common comorbid conditions ombinations in CHF were osteoporosis and CKD (28%), obesity and CKD (23%), in control group – obesity and CKD (28%), obesity and diabetes (18%). Frailty associated with age of 75 years or higher (p=0,001, OR 6,0, 95% CI 2,1-17,5), CKD (p<0,001, OR 18,9, 95% CI 5,2-20,2), osteoporosis (p=0,019, OR 4,5, 95% CI 1,3-15,8) and past myocardial infarction (p=0,001, OR 6,8, 95% CI 2,2-20,8). During the mediana of follow-up 24,1±13,0 months the mortality rate was the same in the CHF patients with ≥3 diseases or <3 diseases (=0,164). Patients with CHD (p=0,016), history of myocardial infarction (MI, p=0,016), osteoporosis (p=0,018) appear to have aggravated mortality. The relationship of mortality with male gender (=0,001, R 7,9, 95% CI 2,3 - 27,2), CHD (=0,039, R 8,3, 95% CI 1,1-62,4), history of MI (=0,027, OR 3,5, 95% CI 1,2-10,5), low BMD in FN region (=0,016, R 4,3, 95% CI 1,3-17,2), CCI (=0,012, R 1,2, 95% CI 1,04-1,4) was confirmed. Conclusion. Co-morbidities are prevalent in elderly patients with CHF. The presence of CHD, osteoporosis and complex of co-morbidities defined by CCI was indepedently related to increased mortality.

P312

Heart failure whit preserved ejection fraction (HFpEF); a mexican cohort

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Background Several epidemiologic studies indicate that up to 50% of patients with heart failure have a preserved ejection fraction, and this proportion has increased over time. The knowledge of its severity and associated comorbidity is determinant to develop adequate strategies for its treatment and prevention. This study was focus on the creation of a cohort and follow-up of Mexican population and to analyze its severity as well as its interaction with the comorbidity of other cardiovascular risk factors.
Methods We included patients from different sites of Mexico City than were sent to the Cardiology hospital of the National Medical Center in Mexico City for the realization of an Echocardiogram as part of their assessment by the presence of dyspnea, edema, or suspicion of hypertensive heart disease. Complete medical history, physical examination and laboratory studies including Brain Natriuretic Peptide (BNP) serum levels were performed. Diagnosis of diastolic dysfunction was based on symptoms and echocardiographic data including time of deceleration, size of left atrium, e´ septal and e´ lateral, as well as E wave, A wave and its ratio E/A. All patients had left ventricle ejection fraction > 45%.
Results We included 168 patients with HFpEF. The most common risk factor was hypertension (89.2%), followed by overweight and obesity (> 78.5%), dyslipidemia (82.1%) and diabetes (42.8%). Women were dominant, 108 (64.3%); the mean age was 63 years old. When we classify by severity of diastolic dysfunction, we found that 41.1% were grade I, 57.1% were grade II and only 1.8% were grade III. The risk factors most strongly associated with the severity of diastolic dysfunction were hypertension, obesity and dyslipidemia. We found BNP levels highly variables, but the levels were higher detected as the ejection fraction was approaching to 45%. At one year of follow up mortality was not reported.
Conclusion HFpEF is a frequent entity in patients with cardiovascular risk factors in Mexico. The most common risk factor was hypertension. The combination of hypertension, overweight and dyslipidemia predicted the severity of diastolic dysfunction. We recommend that all Mexican patient with hypertension and overweight or obesity should be submitted as a part of its medical evaluation to an echocardiogram study in order to detect diastolic dysfunction even though the signs or symptoms are or not evident.

P313

Structural determinants of therapeutic compliance in chilean heart failure patients

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Most observational studies have identified a lack of therapeutic adherence as a major cause of heart failure (HF) decompensation. However, the determinants of poor therapeutic adherence behaviors in Chilean population are scarcely known
Aim: To assess determinants of poor therapeutic adherence in subjects admitted to a university hospital due to acute decompensated HF.
Methods: Cross-sectional study. We included patients admitted due to ADHF in a University Hospital between 2015-2017. Therapeutic adherence was assessed using the Morisky-Green Questionnaire; a score of 1 or less was considered as adequate adherence. As determinants of therapeutic adherence, we evaluated sociodemographic characteristics, disease knowledge using a Spanish version of the 15 items Knowledge of CHF Questionnaire. Multidimensional poverty data was assessed from the National Socioeconomic Characterization Questionnaire (CASEN). All analysis was performed on R v. 3.5. Georeferentiation was performed using QGIS.
Results: Ninety-two patients were included, 48.4% female, age 71,2±14,6. Optimal therapeutic adherence (MGQ score 0) was very low (6.5%). Patients with adequate or poor therapeutic adherence did not differ in age (69.4 vs 74.8, p= 0.09), gender (70.4% female vs. 65.9% men with adequate compliance, p= 0,81), employment (66.6% vs. 64.5% economically inactive, p= 0.73), educational level (30.6% vs. 43.3% with only elementary school, p=0.32), or disease knowledge (score 9.35 vs. 8.77, p=0,27). Insurance was a strong predictor of poor adherence (41.8% public insurance vs. 16.2% private insurance in the adequate compliance group, p = 0.027). Since health insurance is a surrogate marker of socioeconomic status, data were georeferenced considering the county where patients live, and data were adjusted using the multidimensional poverty index, which includes wealth, health access and quality of life components. Patients from counties with a higher multidimensional poverty index exhibited lower therapeutic adherence behaviors than those from richer counties (p=0.0023 for trend) (Fig. 1)
Conclusions: Poor therapeutic adherence behaviors in Chilean HF patients are more strongly associated with structural health determinants than with individual socioeconomic variables. Efforts to increase therapeutic adherence should take into consideration the impact of wealth, health access and quality of life in the development of self-care behaviors.

P314

Association between Phase angle and hypoxia in heart failure and chronic obstructive pulmonary disease

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Background: Heart Failure (HF) and Chronic Obstructive Pulmonary Disease (COPD) are an important cause of morbidity and mortality around the world.
The decrease of oxygen tissue increases the oxidative distress, peroxides, and free radicals inducing body composition alterations, specifically phase angle (PA) which is an integrity indicator of membrane cellular and a prognosis factor. However, no studies evaluating the relation between hypoxia and PA in HF and COPD patients has been reported.
Objective: To determinate association between hypoxia and PA in HF and COPD patients.
Methods: In a Cross sectional study, 159 subjects older than 40 years with diagnosis of HF and COPD were included. Asthma and cancer subjects were excluded. Body composition and PA were assessed by bioelectrical impedance vectorial analysis (RJL Systems. Quantum IV). Hypoxia was defined by oxygen saturation < 80%
Results: The 58.1 % were woman (mean age was 67.4 ± 12), and 61.83 % had cachexia. Hypoxia subjects had less PA (4.3 ± 0.84 vs 4.94 ± 0.93, p = 0.046), as well higher edema (89.89 % vs 58.8 %, p =0.203) than without hypoxia subjects. No showed statistical significance between the groups in grip strength, impedance index, and skeletal muscle mass.
Conclusion: In HF and COPD subjects, the hypoxia represents an important negative impact in body composition, especially on membrane cellular integrity

P315

Frailty and prognosis in heart failure. A prospective study with a quick and self-administered scale.

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Background Heart failure and its associated comorbidities are a delicate health condition that affects both life expectancy and the quality of life of patients. It is necessary to provide questionnaires or scales to stratify the short-term prognosis to address the need of medical attention or to know the death risks. Nowadays, we have scales like the Barcelona Bio-Heart Failure Risk Calculator (BioHF) or the Heart Failure Risk Calculator from MAGGIC investigation group, but its practical utility can be doubtful, due to the difficulties in completing these scales quickly in a consult setting. FRAIL scale has demonstrated a useful tool to detect frail patients at risk of suffering functional impairment, disability or death.
Material and methods
We proceeded to recruit a consecutive sample from the Advanced Heart Failure consults. After all participants signed the informed consent, patients completed FRAIL scale a few minutes before their medical consult. A total of 42 patients were recruited. Following, we analyzed the number of hospital re-entry in relation to acute hearth failure and death, in a period of six months from the first contact, dividing the patients in two groups: frail patients (3 or more points in FRAIL scale) and non frail patients. There were no significant diferences in sex, age and comorbidities between both groups. We compared the results in these groups with the score of the BioHF scale without biomarkers.
Results Compared with non frail patients, the patients with 3 or more points in the scale presented higher rates of hospital ingress due to acute heart failure (33,3% vs 6,9%, p=0,003) and decease (16,7% vs 0%, p=0,024). The prognosis value of FRAIL scale was correlated with the score of the BioHF scale: in the one-year ingress, frail

patients presented a bioHF score of 0,93% (vs 0,69 in non frail patients, p=0,044) and in death a BioHF of 32,5% (vs 17,1%, p=0,019).

Conclusions FRAIL scale has demonstrated in our study to be a useful, simple and fast acquiring tool to assess the risk of hospital re-entry and short-term mortality in patients with heart failure.

Results from study

Results FollowingRisk Stratification After 6 Months

VARIABLES	NON FRAIL(N=29)	FRAIL(N=12)	p
Acute heart failure hospital re-entry	2 (6,9%)	4(33,3%)	0,003
Death	0(0%)	2(16,7%)	0,024
BioHF one year hospital re-entry(%)	0,69; 0,1	0,93; 0,2	0,044
BioHF one year death(%)	17,1;2,9	32,5; 7,1	0,019

The number of hospital re-entry and deaths are presented as absolute values and percentages.Values of BioHF scale are presented as mean and standard deviation.

P316

Snapshot evaluation of heart failure in Turkey: baseline characteristics of SELFIE-TR

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On behalf of: SELFIE-TR Investigators

Objective: The prevalence of heart failure (HF) in our country was found to be 2.9%. However, country-wise profile, frequency and characteristics of different phenotypes,risk factors are not well established. Hence, it is important to identify phenotypes, risk factors and prescription patterns in a sample representative of Turkey.

Method: Twenty threee centers having at least two cardiologists in charge of patients, out of 12 NUTS-1 regions of Turkey were allowed to make consecutive enrolment for heart failure patients, confirmed by principal investigator according to the guidelines and in pre-selected one-day of each week of October or November (2015).

Results: Whole cohort has mean age of 63.3±13.3 years (M/F ratio: 751/353, % 71.3 / %28.7). In the whole cohort, number of acute and chronic HF patients were 712 and 342. Figure 1 shows the ratio of patients with different HF types. Baseline characteristics of patients with HF were summarized in Table 1. In the whole cohort, hypertension was observed in 46%, diabetes mellitus was present in 27.5%, chronic obstructive pulmonary disease was present in 12.8% and previous myocardial infarction was noted in 45.2%. In patients with HFrEF, ACEI/ARB, beta blocker and MRA use was noted in 74.7%, 89.7% and 60.9% respectively.

Conclusion: SELFIE-TR provides important insight since it is the first study to show snapshot of heart failure patients in our country. These information might be beneficial to develop guideline-concordant prevention and treatment strategies.

Table 1

	HFrEF (n=801)	HFmrEF(n=176)	HFpEF (n= 77)	P
Age	62,1± 13,2	65,9± 12,3	69,2±14,0	<0,001
Female (%)	26,1	32,4	48,1	<0,001
Acute HF (%)	20,3	20,5	37,7	0,005
Ischemic etiology (%)	52,8	58,5	40,3	0,632
LBBB (%)	31,5	14,9	9,3	<0,001
Hemoglobin (g/dL)	13,0±1,96	12,7±2,0	12,3±2,4	0,013
Creatinin (mg/dL)	1,22±0,59	1,21±0,75	1,15±0,54	0,677
SBP(mmHg)	119±19	121±16	127±17	0,003
HR	80±16	77±16	87±20	0,001
LVEF %	27,4±6,5	42,8±2,8	56,1±5,3	<0,001
LA(mm)	46,1±7,5	42,7±7,5	44,3±8,1	<0,001
TAPSE (mm)	17,8±4,3	20,2±6,5	22,1±5,6	<0,001
esPAB(mmHg)	42,7±14,2	39,5±14,2	42,4±14,3	0,010

Baseline characteristics of patients

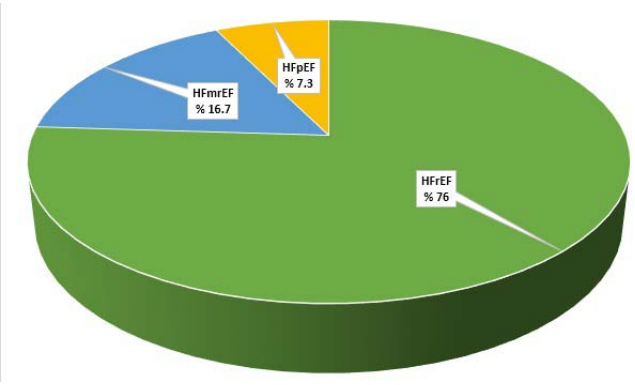

Figure 1

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Epidemiology of heart failure: incidence, prevalence, and risk factors from a systematic review

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INTRODUCTION: Heart failure (HF) is a global public health problem. Recent data on the epidemiology of HF from population-based sources that identify cases using echocardiographic assessments are limited.

PURPOSE: To examine the contemporary worldwide incidence, prevalence, and clinical correlates of HF with reduced (HFrEF) and preserved ejection fraction (HFpEF).

METHODS: Systematic review of peer-reviewed original papers, published in English between January 2013–August 2018, focused on HF prevalence and incidence, and including echocardiographic data.RESULTS: From 11 identified studies (TABLE), prevalence of HFrEF and HFpEF ranged from 3.8¬–4.2% and 3.5–5.5%, respectively (from 3 community-based studies in Germany, China, Brazil); whereas incidence of HFrEF and HFpEF ranged from 0.5–9.3 and 0.6–15.1 per 1,000 person-years respectively (from 8 studies in US, EU, Japan, Australia). Prevalence and incidence of HFpEF was similar to or higher than that of HFrEF in all studies except Brouwers, 2013. Higher HF incidence regardless of EF was reported with older age, physical inactivity, hypertension, myocardial infarction, left ventricular hypertrophy, and increased natriuretic peptides. Female and renal disease were associated with higher HFpEF incidence. One study examining trends in the US between 2000-2010 showed overall decline in HF incidence (more in HFrEF than HFpEF), with increasing proportion of incident HFpEF (vs. HFrEF).CONCLUSIONS: The worldwide prevalence and incidence of HF remain high. Despite advances in identifying individuals at risk, HF, especially HFpEF, remains a global public health problem.

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A multicenter brazilian cohort to optimize heart failure treatment using an organized multidisciplinary approach - Optimize Brazil

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Introduction: Heart Failure (HF) is a major health problem worldwide, with elevated proportion of deaths and hospitalizations. In Brazil, a national prospective registry

P317: HF prevalence and incidence studies

Study (Country)	Study Type	Study Years	Population	Diagnostic Criteria	Prevalence/ Incidence	Factors Associated with Higher Prevalence/Incidence		
HFrEF	HFpEF	HFrEF	HFpEF					
Tiller, 2013 (Germany)	Prevalence	2002-2006	Community-based (45-83 years old)	>50% (HFrEF) ≤50% (HFpEF)	4.2%	4.1%	Hypertension, MI	Hypertension
Guo, 2016 (China)	Prevalence	2012-2013	Community-based (≥35 years old)	>50% (HFrEF) ≤50% (HFpEF)	NR	3.5%	NR	M: NRF: Hypertension, heart disease
Jorge, 2016 (Brazil)	Prevalence	2011-2012	Community residents registered in primary medical care (45-99 years old)	>50% (HFrEF) ≤50% (HFpEF)	3.8%	5.5%	NR	NR
Kraigher-Krainer, 2013 (US)	Incidence	1986-1990	Community-based, elderly (67-97 years old)	EF≤45% (HFrEF) EF>45% (HFpEF)	9.3% (over mean 10 yrs.)9.3 per 1,000 PY	9.5% (over mean 10 yrs.)9.5 per 1,000 PY	Lowest activity level	
Seliger, 2015 (US)	Incidence	1989-1993	Community based, ≥65 years old	EF<45% (HFrEF) EF≥45% (HFpEF)	No LVH: 4-6 per 1,000 PYLVH: 4-20 per 1,000 PY (NT-proBNP tertiles 1-3)	No LVH: 6-10 per 1,000 PYLVH: 7.5-16 per 1,000 PY (NT-proBNP tertiles 1-3)	LVH, hs-cTnT or NT-proBNP	
Gerber, 2015 (US)	Incidence	2000-2010	Olmstead County, MN	EF<50% (HFrEF) EF≥50% (HFpEF)	2002: 1.5 (F)1.9 (M) per 1,000 PY2010: 0.80 (F)1.4 (M) per 1,000 PY	2002: 1.7 (F)1.4 (M) per 1,000 PY2010: 1.4 (F)1.0 (M) per 1,000 PY	NR	NR
Zhang, 2017 (US)	Incidence	2003-2013	Pts with pre-clinical diastolic dysfunction	EF≤40% (HFrEF) EF≥50% (HFpEF)	3.5 per 1,000 PY	15.1 per 1,000 PY	Non-Hispanic black vs. white, higher age, diabetes, MI, renal disease	Higher age, diabetes, MI, renal disease
Brouwers, 2013(The Netherlands)	Incidence	1997-1998	General population (28-75 years old)	EF≤40% (HFrEF) EF≥50% (HFpEF)	2.8%(over median 11.5 yrs)2.5 per 1,000 PY	1.5%(over median 11.5 yrs)1.3 per 1,000 PY	Male, higher age NT-proBNP	Female, higher age NT-proBNP, AF, increased UAE excretion and cystatin C
Ho, 2016 (US and EU multi-region)	Incidence	1979-1993	Community-based (45-75 years)	EF≤45% (HFrEF) EF>45% (HFpEF)	871 over mean 13.2 years2.9 per 1,000 PY	795 over mean 13.2 years2.7 per 1,000 PY	Higher age, male sex, systolic BP, BMI, hypertension, diabetes, current smoker, MI, LVH, left bundle branch block	Higher age, systolic BP, BMI, hypertension, MI
Komi, 2017 (Japan)	Incidence	NR	General population mean age: 63 years	NR	68 cases over mean 9 yrs.0.5 per 1,000 PY	74 cases over mean 9 yrs.0.6 per 1,000 PY	Higher plasma BNP levels	
Gong, 2018 (Australia)	Incidence	2007-2015	Community residents age ≥60 with >1 HF risk factor	EF<50% (HFrEF) EF≥50% (HFpEF)	53 cases during median 4.8 years3.0 per 1,000 PY	73 cases during median 4.5 years4.2 per 1,000 PY	Age, male, MI, NT-proBNP	Age, BMI, diabetes, MI, AF, NT-proBNP

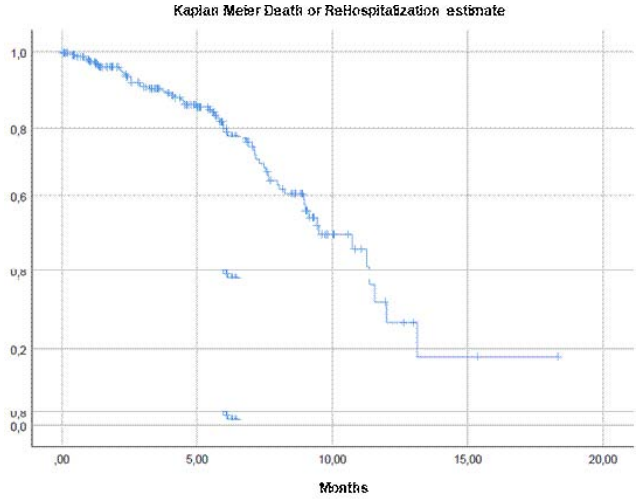
demonstrated an even higher rate of death and re-hospitalizations. The treatment is challenging and requires a multidisciplinary initiative to improve pharmacological and non-pharmacological treatment in this population. This comprehensive multidisciplinary approach is the main goal of the Optimize Program and is focused beyond the pharmacological treatment in educating patients and their families about the disease and providing information for self-monitoring.

Purpose: We aimed at assessing the clinical effect of Optimize-HF Program in a prospective multicenter Brazilian cohort of heart failure patients.

Methods: We prospectively included a total of 288 patients (pts) (180 males, 61.07±12.5 y.o.) with heart failure and reduced left ventricular ejection fraction (LVEF) mainly with non-ischemic etiology (178 pts – 61.8%). Pts were followed in HF clinics of six Brazilian centers and received the orientations of the Optimize program.

Results: The baseline characteristics were: LVEF = 33.7±12.2%, EDLV = 65.7±10.5mm, ESLV = 55.2±10.6mm, systolic arterial pressure = 114.9±22 mmHg, heart rate = 77.9±20.4 bpm, 37.8% of the patients were in NYHA functional class II and 58.7% of the patients were in NYHA functional class III and IV, 31.8% had atrial fibrillation/flutter, 54.9% had hypertension, 31.9% diabetes mellitus, 35.4% smoking, 18.4% obesity, 7.98% had implantable cardioverter defibrillator or cardiac resynchronization therapy. Patients were treated following the recommendations of the guidelines: 93.4% were using betablockers, 78.1% ACE inhibitors or ARBs, 70.8% ARMs, 2.1% ARNI, 18.4% digoxin, 91.7% diuretics, 28.5% warfarin, 23.6% amiodarone, 11.1% nitrate/hydralazine, and 12.9% ivabradine. The follow-up time was 158,7±131,2 days, with 9.7% of mortality and 20.5% of rehospitalization. The low mean LVEF and the worse functional class (NYHA III-IV) suggest that this is a high risk HF population. The outcome rate of death and a combined

outcome of death or rehospitalization were markedly lower in comparison to the Brazilian National Registry of HF, which showed more than 42% of mortality and rehospitalization over 6 months.
Conclusion: The optimization of HF treatment using a multidisciplinary program showed a lower rate of death and death or rehospitalization. These results suggest the potential benefit of this strategy to improve prognosis of patients with heart failure and reduced LVEF.



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Prevalence and prognostic association of hyperuricemia in heart failure patients with reduced ejection fraction

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Introduction: Substantial evidence advocates that uric acid (UA) is an independent marker for adverse prognosis in chronic HF of varying severity. Serum UA, produced in the terminal step of purine nucleotide metabolism by xanthine oxidase (XO), seems to be a predictor of mortality in HFrEF, independent of chronic kidney disease (CKD). Whether UA is simply a marker of dismal prognosis or an active contributor in disease pathogenesis is currently unknown.
Purpose: To appraise the association of UA levels with clinical features and prognosis in pts with HF and reduced ejection fraction (HFrEF) in a Heart Failure Clinic (HFC).
Methods: Unicentric, retrospective analysis of pts followed in a HFC since 3/2011. Included pts with reduced ejection fraction (EF) (<50%) and previous diagnosis for at least 6 months. The pts were divided into 2 groups: hyperuricemic (G1) and with normal UA levels (G2). Hyperuricemia was defined has serum UA ≥7.0mg/dL. Clinical, demographic, analytical, electrical, echocardiographic characteristics and major cardiac events – HF hospitalization (HFhosp) and mortality (from cardiovascular cause (CVm) and non-cardiovascular cause (nCVm)) were analysed.
Results: Included 318 pts, mean age 60.4 ± 13.3 years and a mean body mass index (mBMI) of 27.9kg/m2. 74% were male. 41.5% had ischemic etiology. G1 consisting of 153 pts (48%) with mean age of 61.3±13.3 years. There were no differences in age, mBMI and cardiopathy etiology between groups.There were no significant differences in cardiovascular risk factors prevalence, except for smoking (43 vs 32%, p=0.032). The hyperuricemic group correlated positively with the presence of atrial fibrillation (AF) (42 vs 28%, p=0.009) and CKD (41 vs 22%, p<0.001). G1 had more right ventricular dysfunction and lower left ventricular EF (LVEF) at admission (p<0.001). LVEF remained significantly lower in G1 during follow-up (FU) (p=0.045). Although there were no significant differences regarding mortality, G1 pts had more HFhosp (20 vs 12%, p=0.046).
Conclusion: Hyperuricemia was particularly prevalent in this cohort. There were no associations with standard cardiovascular risk factors although hyperuricemic pts had more AF and CKD. Furthermore, higher levels of ventricular dysfunction were observed in this subgroup, with greater presence of biventricular dysfunction and HFhosp.

P320

Echocardiographic features of ultra-elderly heart failure patients in Japan: secondary tricuspid regurgitation due to atrial fibrillation

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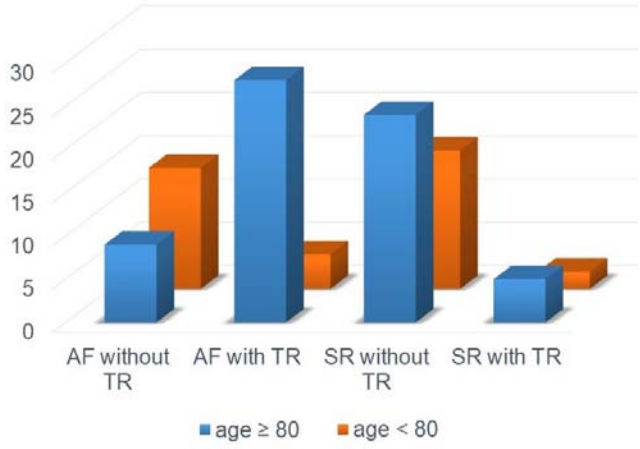
Background: Japan has the oldest population, with 27.7% of its citizens aged over 65 years in 2017. Moreover, there are over 10 million people over 80 years old in Japan. With the rapidly aging population in Japan and European countries, the prevalence of heart failure (HF) is expected to rise continuously, because the incidence of HF increases with age. Therefore, it seems important to evaluate clinical characteristics of current ultra-elderly HF patients for prevention of future HF.
Purpose: To explore echocardiographic features of ultra-elderly patients with HF.
Methods: We enrolled 102 patients (mean age 78 ± 13 years, 40 male) who were admitted to our hospital for treatment of HF. The diagnosis of HF was based on the Framingham criteria. Patients who have received cardiac surgery or with primary valve disease were not enrolled in this study. We divided our patients into two groups stratified according to age (≥ 80 and < 80 years old). Then, we compared echocardiographic parameters of the patients between both groups.
Results: Most common comorbid disease were atrial fibrillation (n = 55 [54%]), followed by hypertension (n = 50 [49%]), diabetes (n = 20 [20%]). Compared with patients with age < 80 years (n = 36, mean age, 66 ± 11 years), left ventricular ejection fraction was significantly higher (51 ± 14% vs 42 ± 14%, p < 0.01), tricuspid regurgitation (TR) velocity was significantly greater (2.9 ± 0.6m/sec vs 2.4 ± 0.6m/sec, p <0.01) in patients with age ≥ 80 years (n = 66, mean age, 87 ± 4 years). Left ventricular mass index and E/e' were similar in both groups. Although the prevalence of atrial fibrillation and significant (moderate or severe) mitral regurgitation were similar, the prevalence of significant TR was significantly higher in patients with age ≥ 80 years (n = 33 [50%] vs n = 6 [17%], p < 0.01). Interestingly, in patients with atrial fibrillation, the prevalence of significant TR was significantly higher in patients with age ≥ 80 years compared to patients with age < 80 years; in contrast, in patients with sinus rhythm, the prevalence of significant TR was similar and low in both age groups (Figure).
Conclusion: Current ultra-elderly patients with HF had preserved ejection fraction, greater TR velocity. Moreover, the prevalence of significant TR due to atrial fibrillation was very common. Therefore, early aggressive rhythm control strategy may become one of therapeutic option to prevent TR and future HF.



P321

Epidemiology of atrial fibrillation among heart failure patients according to ejection fraction.

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Background: Heart failure is a common syndrome in patients with atrial fibrillation (AF), that particular due to similar risk factors and pathogenesis.
Aim of the study:to evaluate the occurrence of the risk factors depending on left ventricular ejection fraction (LVEF) in patients with AF.Material and methods:in

population-based survey 1544 people with cardiovascular diseases were selected; of them 667 were with AF (56,84%). The association of AF and 3 EF groups was assessed. Patients with thyroid disorders and valvular heart diseases were excluded.
Results: When comparing the 3 EF groups, detection of HFrEF was low and amounted to 16,3%, HFmrEF in 21,5% and the highest number of patients were detected in group with preserved EF, in 62,2%. Despite such distribution, the prevalence of cardiovascular risk factors more often detected in group of patients with reduced EF. Thus, 78,9% of men were with HFrEF versus 57,3% with HFpEF (OR: 2,8; CI 1,7-4,6; p < 0.001), twice as often smoking occurred, 26,6% versus 13,98%, respectively, (OR: 2,23; CI: 1.3-3.7; p < 0.001), 41,3% patients with reduced LVEF suffered a myocardial infarction while in group with preserved LVEF only in 17,6% cases (OR: 0,3;CI: 0,19-0,47; p < 0.001). The frequency of diabetes mellitus (DM) in patients with HFrEF was 27,5%, that exceeded in two times the number of patients (16,1%) in HFpEF group (OR: 1,97; CI: 1,2-3,23; p = 0,011). The incidence of hypertension and prior stroke was similar in both group (p = 0,15 and p = 0,13, respectively).
Conclusion: atrial fibrillation was more common in HFpEF versus in HFmrEF versus in HFrEF. Contrariwise, the significant association of cardiovascular risk factors such as gender, prior myocardial infarction, smoking, diabetes mellitus and atrial fibrillation was detected in group of HFrEF. Importantly, hypertension and prior stroke similarly occurred in patients of all 3 EF groups.

P322
Gender differences in heart failure with mid-range ejection fraction patients

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Background: Little is known on the gender differences in patients with heart failure (HF) with mid-range ejection fraction (EF) (HFmrEF).
Objectives: We aimed to investigate the gender differences in patients with HFmrEF.
Methods: Among 252 consecutive patients with primary diagnosis of HFmrEF (EF 40-49%) and baseline and follow-up echocardiogram in an urban tertiary referral center from October 2013 to March 2017, 131 (52.0%) were in men and 121 (48.0%) were in women. We compared the characteristics and composite event (cardiovascular death and HF readmission).
Results: Compared to women, men had significantly higher rates of prior ischemic heart disease, chronic kidney disease (CKD), and peripheral arterial disease. At baseline, LVEF was not significantly different between men and women. At follow-up, LVEF in women significantly improved from the baseline levels (48.9% vs. 45.3%, p<0.001), whereas no significant changes in LVEF were observed in men. In women, the use of inhibitor of the renin angiotensin system (odds ratio 0.39, 95% confidence interval [CI] 0.18-0.82, p=0.014) was contributed to the improvement of LVEF. Composite event occurred in 80 patients (31.7%). There were no significant differences in the composite event between men and women (32.1% vs. 31.4%, hazard ratio [HR] 1.16, 95% CI 0.74-1.81, p=0.529). Significant contributors for composite event were age (HR 1.04, 95% CI 1.01-1.06, p=0.002), the presence of atrial fibrillation (HR 1.78, 95% CI 1.15-2.76, p=0.010), spironolactone use (HR 0.56, 95% CI 0.36-0.87, p=0.009). Cardiac death occurred in 9 patients (3.6%). Men had a significantly higher rate of cardiac death than women (6.1% vs. 0.8%, HR 1.26, 95% CI 1.01-6.69, p=0.027). In men, age (HR 1.12, 95% CI 1.02-1.22, p=0.015) and CKD (HR 3.14, 95% CI 1.03-6.58, p=0.042) were independently predictive for increased risk of cardiac death.
Conclusions: This study showed that in patients with HFmrEF, women might be associated with improved LVEF and lower risk of cardiac death compared to men.

P323
Capability for self-care of patients with heart failure

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The lack of compliance with medical and other lifestyle recommendations is a serious problem in elderly patients who suffer from heart failure (HF) and have serious consequences for individual patients and their families as well as for the health care system. The aim of the study was to evaluate the influence of the level of the capability for self-care on the number of rehospitalizations in patients with HF.
METHODS: 180 pts. (aged 72.8±8.0 years; 29.4% W) diagnosed with HF were included in the study. The following inclusion criteria were used: the diagnosed with HF at least 6 months earlier and being more than 60 years of age. The mean follow-up time was 454.6±262.1 days. The treatment for HF was verified and the optimal therapy (pharmacological and/or device-based) was confirmed in all of the participants. Depending on the treatment that was being used, the patients were divided into three groups: Group I: HF being treated conservatively by pharmacological treatment and lifestyle changes (treated conservatively), 51 patients (28.3%); Group II: HF being treated with the implantation of a cardioverter-defibrillator (ICD), 47 patients (26.1%); Group III: HF being treated with the implantation of a cardiac resynchronization system (CRT), 82 patients (45.6%). In all of the patients the Polish version of the nine-item European Heart Failure Self-care Behavior Scale (EHFScBS-9) was used – the more the points one gets, the worse the capability for self-care is. The data were analyzed statistically, and the values were treated as significant when p<0.05. RESULTS: The ROC curves for all groups are presented in the figure below. The EHFScBS-9, which has a cutoff value of >28 points, identified patients that had a significantly higher risk of rehospitalization for HF. The analysis of the impact of the capability for self-care on rehospitalization revealed that in the group of patients that were treated conservatively, the cutoff point was ≤30 points (P=0.1738), in the group of patients that were treated with ICD it was >32 points (P=0.0001) and in the group of patients that were treated with CRT it was >28 points (P=0.0394).
CONCLUSIONS: The level of the capability for self-care in patients with HF has been described as an additional risk factor for rehospitalization. The lower cutoff level for patients with implanted CRT seems to be clinically significant. It concerns the group of the most burdened patients, and despite the fact that it was the group that showed the best capability for self-care, it was the one that was most frequently rehospitalized.

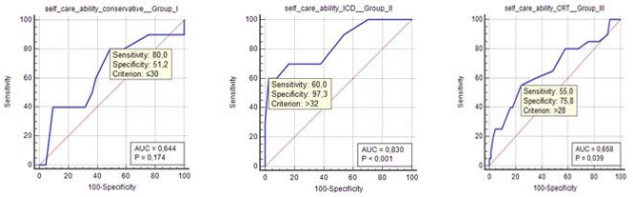

Figure - ROC curves

P324
Heart failure in women: insights from de RECOLFACA registry

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On behalf of: RECOLFACA registry
Funding Acknowledgements: This registry received financial support from NOVARTIS and the Colombian society of cardiology

Background: There is a lack of information about heart failure in Latino America, the main objective of this registry was to characterize the population of outpatients with heart failure that were followed in 60 Colombian hospitals in order to establish the differences between women and man in clinical presentation, comorbidities, treatment and quality of life.
Methods: This a cross-sectional analysis of HF in the Colombian Registry (RECOLFACA) Continuous variables are expressed as mean (standard deviation) and categorical variables such as absolute values and proportions. T-student

Women vs men: clincal characteristics

Variable	Women	Men	P value
HFrEF	63.6%	70.1%	0.001
HFpEF	19.7%	11.9%	0,001
HFmEF	16.6%	18%	0.001
NYHA I	10.5%	11.5%	0.472
NYHA II	56.4%	55.2%	0.472
NYHA III	26.2%	27.8%	0.472
NYHA IV	5.7%	3.9%	0.472
Anemia	38.9%	23.0%	0.000
CKD GFR< 60 ml/min	26.9%	73.4%	0.000
Quality of lifeSPF 36 score	78.4	80.4	0.098
Ace inhibitors	28.8%	37.6%	0.001
ARB blockers	45%	36.5%	0.003
ARNI	10.3%	11.7%	0.49
Betablockers	84.3%	87.4%	0.124
MRA	49.6%	55.5%	0.003

and Chi-square or Fisher test were used to identify differences between groups (Women vs men).
Results: 2099 patients were included from 2016 to 2018,mean age was 67.59 +/- 13.54 years, 43.46% were women. The main differences between men and women are presented in table 1.
CONCLUSIONS: The data from RECOLFACA registry found significant differences according to sex, , women have more HFpEF, more anaemia and less chronic kidney disease. ACE inhibitors, ARB and MRA were used less often in women despite a similar use of beta-blockers and ARNI. There were no differences in the quality of life and NYHA functional class.

P325

Profile comparison of an elderly cohort with HFpEF and HFrEF: a multivariate analysis of mortality risk factors and death causes attested by CID10

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BACKGROUND: The elderly population with Heart Failure with preserved Ejection Fraction (HFpEF) and Heart Failure with reduced Ejection Fraction (HFrEF) display different etiologies, profiles and comorbidity rates, with a consequent variable impact in prognosis.
PURPOSE: To evaluate and to compare an elderly cohort with the gold standard for HFpEF and HFeEF, and the Hazard Ratio (HR) of the risk mortality factors and the cause of mortality registered in death certificates (CID10).
METHODS: We enrolled patients with dyspnea and suspicion of HF in the emergency of a tertiary hospital in our city, in the South of Brazil. The patients were included between March 2006 and September 2012. They were assessed for HF through the Framingham and Boston Score gold standard, Uni + Bidimensional Echocardiogram with Doppler Color and BNP (Biosite, San Diego - CA). The Hazard Ratio (HR) of mortality risk factors in bivariate and multivariate analysis was measured.
There was monitoring for 78 months, average time of 49 months. The primary cause of death and other data were obtained through death certificates (CID10) collected at MIS
RESULTS: A sample with 634 patients included, the majority of patients were white (93%) and women (63%), average age 77,3 sd +- 8,6 years and 40,5% > 80 years. In HFpEF 79,6 sd +- 6,8 years and HFrEF 72 sd +-9,7 years. BMI > 30kg/m2 present in 16% HFrEF and 26% HFpEF, cardiomegaly 72,7%, congestion 70,7%, pleural effusion 52,5% and 18% has showed DCE <30ml/h. Gold standard for HF in 340 patients (53,3%). A total of 216 (63,5%) has showed HFpEF with a median BNP of 380 pg/ml. HFrEF with a median BNP of 800pg/ml. In the multivariate analysis for mortality, BNP > 180pg/ml with HR of 3,4 (CI 95%: 1,2 to 9,6). Age > 80 years, HR: 1.54; [CI: 0.9-2.5]. Cardiomegaly HR: 1.71 [CI: 0.9-3.9], pneumonia HR: 1.63 [CI: 0.0-2.7], DCE < 30ml/h, HR: 2,14 [CI: 1.05-4.4], BMI < 22 in 13%, HR: 1. 821 [CI: 95%; 1. 053-3. 149] p 0.18. Survival analysis throughout the 78 months of the study was carried out by the Kaplan-Meier curve (Fig 1). The HFrEF has displayed a survival average time of 27 months, HFpEF of 52 months and No Heart Failure (NHF) > 50% at the end of the study. The death certificates analysis, total deaths and Hazard ratios follow in Table 1.
CONCLUSIONS Comparing elderly groups with HFrEF, a higher rate of cardiovascular mortality by HF progression, sudden death and IAM, a higher BNP median, and a lower survival average time have been presented. The group with HFpEF has displayed the highest average age, female and BMI. A higher rate of thromboembolic events (stroke and AMI), digestive bleeding and higher rates of comorbidities as well. BNP was the most powerful mortality predictor when adjusted to the other factors in both HFrEF and HFpEF.

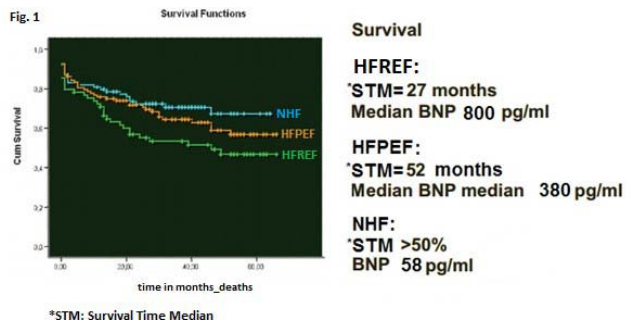

Figure 1

P326

Predictors of combined critical endpoint (all-cause death/heart failure hospitalization) in patients with chronic heart failure and reduced left ventricular ejection fraction.

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Background. It is known that patients with heart failure (HF) demonstrate high mortality/hospitalization rate. So, the search of clinical and laboratory predictors of combined endpoint (death or HF hospitalization) potentially may improve the estimation of their individual prognosis.
Objective. To establish the predictors of all-cause death/HF hospitalization during 2 – year follow-up in patients with chronic heart failure (CHF) and redused (red) left ventricular ejection fraction (LVEF).
Methods. 134 stable CHF pts (NYHA II-IV, LVEF < 40%) under optimized standard treatment were examined. Statistics programs package SPSS 13,0 was used; cluster analysis and logistic regression were used to calculate the predictors.
Conclusion. Plasma levels of bilirubin, ALT, BUN, NTproBNP, and citrullin as well as LVEF, SBP, BMI, GFR, FMVR and MHFLQ score are the strong predictors of critical event (death or HF hospitalization) in CHF with redLVEF.
Results.

Predictors of mortality/HF hospitalizati

Variable	Cut off level	OR	CI	p
Bilirubin, mkmol/l	> 42,5	5,20	1,94- 13,9	0,001
MHFLQ score	> 40,5	3,91	1,73- 8,82	0,001
BMI,kg/m2	< 28,73	3,53	1,69-7,36	0,001
Citrulline, mmol/l	> 111,5	3,39	1,56-7,33	0,003
NTproBNP, pg/dl	> 818,51	3,26	1,33-8,00	0,014
FMVR, %	< 8,77	3,21	1,41-7,29	0,18
GFR, ml/min/1,73 m2	< 57,5	3,00	1,43-6,25	0,005
SBP, mm Hg	< 130	2,91	1,35-6,28	0,009
BUN, mmol/l	> 2,3	2,62	1,30-5,30	0,011
LVEF, %	< 30	2,50	1,22-5,10	0,018
ALT, mmol/l	> 21	2,46	1,19-5,09	0,023

SBP – systolic blood pressure; MHFLQ – Minnesota HF life questionnaire, BUN – blood urea nitrogen, ALT - alaninaminotransferase, BMI - body mass index, GFR – glomerular filtration rate, FMVR – flow-mediated vasodilatory response.

P327

Prognostic value of depression, anxiety disorders and inflammatory markers in patients with heart failure

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Background: Heart failure (HF) is a public health problem. Depression and anxiety are more common in HF patients than normal population.
Purpose: We aimed in this study to investigate the relation between depression and inflammatory parameters on survival and hospitalization in HF patients.
Methods: A total of 122 consecutive patients with ejection fraction (EF) ≤45% were included in this prospective study. N-terminal brain natriuretic peptide (NT-proBP), high sensitive C-reactive protein (hs-CRP), tumor necrosis factor alfa (TNF-α), interleukin 6 (IL-6) and neutrophile to lymphocyte ratio (NLR) were evaluated for inflammatory system.
Results: Mean follow-up was 36,4 months. Non-survivors are older (68,6±9,7 vs. 61 ± 8,8 years, p<0,001), have lower EF (32,5 ±6,4% vs. 35,1±6,5%, p=0,037), decreased GFR (51,3 ±19,5 vs. 65,6 ±19,3 ml/min, p<0,001) and serum sodium level (135 ±19 vs. 139 ± 2, p=0,04) (Table 1). Kaplan–Meier survival curves are shown Figure 1.
Conclusions: Depression, anxiety and inflammatory markers were not related to mortality in heart failure patients. Age, EF and GFR was found as independent predictors of mortality.

Table 1

	Univariate	Multivariate				
Variable	HR	CI 95%	p	HR	CI 95%	p
Age (years)	1.08	1,04-1,12	<0,001	1,08	1,04-1,14	<0,001
EF	0,94	0,9- 0,98	0,015	0,93	0,89-0,98	0,014
GFR	0,96	0,95-0,98	<0,001	0,97	0,95-0,99	0,028
Sodium	0,98	0,96-0,99	0,036			
NLR	1,31	1,12-1,52	<0,001			
hsCRP	1,01	0,99-1,04	0,216			
TNFα	1,00	0,99-1,01	0,789			
IL-6	1,00	0,99-1,00	0,870			
NT-proBNP	1,00	1,00-1.00	0,970			
SF pain	0,95	0,92-0,98	0,006			
SF general health	0,96	0,93-0,99	0,037			
MCS	1,01	0,981,05	0,322			
PCS	0,98	0,96-1,01	0,240			
NYHA class	2,77	1,63-4,7	<0,001			
HAM-A	1,0	0,97-1,03	0,622			
HAM-D	1,00	0,97-1,03	0,819			

Cox regression analysis for cardiovascular mortality

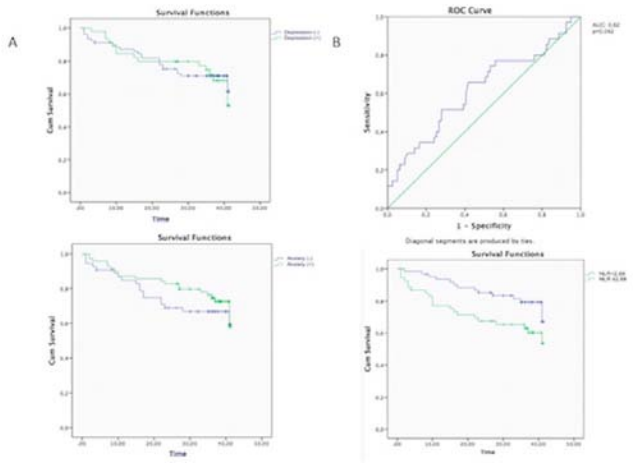

Figure 1

P328

The difference in association of atrial fibrillation and sinus rhythm with heart failure with reduced, mid-range and preserved ejection fraction.

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Background: Atrial fibrillation (AF) is a common disorder in patients with heart failure, mostly with reduced left ventricular ejection fraction (LVEF). The prevalence of AF in HF with preserved EF and HF midrange EF is less well known.

Aim of the study:to evaluate the association of AF with HF with preserved, midrange and reduced EF.

Material and methods:in population-based survey 1544 people with cardiovascular diseases were selected. Authors assessed prevalence of and association of AF and HFrEF versus HFmrEF versus HFpEF.

Results: of 1544 patients with cardiovascular disorders 56,84% with non-valvular AF (1 group) and 43,16% without AF (2 group). The number of men was higher in AF group (63,7%) versus non-AF group (46,4%). The number of patients in both groups decreased with decreasing LVEF, HFrEF 16,3% in 1 group and 6,8% in the 2 group, HFmrEF 21,5% and 7,4% and HFpEF 62,5% and 85,7%, respectively.When compared two groups in association with HFrEF some characteristics had significant relationships with AF. Thus, 78,9% men in AF group versus 33% in sinys rhythm group (OR:7,5; CI:3,68-15,8), more often prior stroke 22% versus 8% (OR:3,1; CI: 1,1-8,6). The association of rest risk factors in patients with HFrEF in both groups was non-significant.The same tendency was in the group with HFpEF. Statistically, the percentage of men with HFpEF was higher in AF group versus sinus rhythm 57,3% and 42,4% (OR:1,8; CI:1,4-2,3), prior stroke- 15% and 8,9 % (OR:1,86; CI:1,29-2,68) respectively. The group with HFpEF different from HFrEF in correlation with hypertension 84% in patients with versus 93% without AF (OR:0,35; CI:0,24-0,53), with age ≥65 years 53,7% in the 1 group and 31% in the 2 group (OR:0,38; CI:0,3-0,4).In both EF group, no association with previous myocardial infarction and AF was observed.

In HFmrEF, beside different in aged patients older than 65 years in AF group 58% versus sinus rhythm 41,5% (OR:0,5; CI:0,28-0,9), the correlation between previous myocardial infarction and AF was observed, 28,7% patients with AF and 60% with sinus rhythm (OR:0,26; CI:0,14-0,49).

Conclusion: AF was associated with clinical characteristics such as male gender and prior stroke in HFrEF and HFpEF, with aged population in HFpEF and HFmrEF. There wasn't association with previous myocardial infarction and HFpEF and HFrEF. In contrast, there was an association with previous myocardial infarction and HFmrEF. The difference in patient characteristics and outcomes in both group depending on LVEF should be explored further.

P329

Correlation of endorgan function and bioimpedance measurement in patients with advanced heart failure

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Introduction: Bio impedance analysis (BIA) is a non-invasive, low-cost tool to assess frailty. The impact of end-organ dysfunction on the results of BIA is unknown. Impaired renal and cardiac function can cause a fluid shift from the intravascular to the extravascular space and have an impact on the nutritional status of the patient and may cause changes in the phase angle (PA). The PA represents the relationship between resistance and reactance of tissue in the BIA and is mostly influenced by cell mass and water. Laboratory parameters indicative of heart failure, renal and liver function were collected and correlated with the PA.

Methods: In 50 patients (45 female, 5 male) with end-stage heart failure, a BIA measurement was performed prior to LVAD implantation and correlated to NT-proBNP, creatinine, eGFR, albumin, total bilirubin and MELD-XI-Score. Additionally, the correlation between phase angle hemoglobin and hematocrit as a representative of the intravascular fluid status of the patient was assessed. The trial protocol was approved by the local ethics committee (ES2/236/17).

Results: Mean age was 59.9 years (+/-10.4), mean NT-proBNP was 12169pg/ml (+/-11737). 25 (50%) patients were in INTERMACS level I or II, 12 (24%) were stable on inotropic support (IM III) and 13 (26%) patients were in IM level IV. 16 (32%) patients suffered from dilated cardiomyopathy, 31 (62%) patients had ischemic heart disease and 3 (6%) had other reasons for heart failure. 28 (56%) patients had an eGFR under 50 ml/min/1.73 m2. The mean phase angle was 4.0 (+/-1.32). The correlation with laboratory parameters was tested for with the Gaussian distribution ,Kolmogorov-Smirnov-Test and spearman correlation test. The PA correlated strongly with hemoglobin ($rs = .46$, $p < 0.01$), hematocrit ($rs=.42$, $p < 0.01$) and as expected albumin ($rs=0.48$, $p < 0.01$). A weak correlation was found between MELD-XI-Score and PA ($rs=-.28$, $p < 0.05$). There was no correlation between PA and creatinine, eGFR, total bilirubin and NT-proBNP.

Conclusion: The PA had no correlation with routinely used parameters to assess outcome in heart failure patients (NT-proBNP, eGFR, bilirubine). Therefore this parameter might be used to add independent information about frailty in this patient cohort but further investigation and outcome correlation for BIA measurement in heart failure patients is strongly needed.

Chronic Heart Failure - Diagnostic Methods

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Functional capacity and body composition in subjects with heart failure and COPD

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Background: Heart Failure (HF) and Chronic obstructive pulmonary disease (COPD) are characterized by body composition alterations and low functional

capacity, however is not enough evidence about the body composition alterations and functional capacity in subjects with HF and COPD concomitant.
Objetive: To evaluate the functional capacity and body composition in HF and COPD subjects.
Methods: In a cross sectional study, patients with HF and COPD diagnosis older than 40 years were included, subjects with asthma were excluded. Body composition was determinate by bioelectrical impedance vectorial analysis, functional capacity was performance by 6-minute walk test and muscle strength assess by dynamometer.
Results: 962 subjects were evaluated, subjects were divided into three groups, HF (n = 769),COPD (n = 71), and HF + COPD (n =122). HF + COPD subjects had less skeletal muscle mass index (8.8 ± 1.7 vs 9.0 ± 2.0 vs8.5 ± 1.8, p=0.022), muscle strength (20. 3 ± 8.8 vs22.6 ± 10.3 and25.6 ± 9.5, p =0.007), phase angle (4.6 ± 1.2 vs 4.9 ± 1.6 and 5.2 ± 1.3, p = 0.05) and functional capacity (260.32 ± 146.7 m vs306.2 ± 145.2 m and334.0 ± 123.7 m, p =0.06) than HF or COPD subjects, respectively.
Conclusion: HF and COPD concomitant have less functional capacity and body composition alterations, this induce worse clinical status and quality of life.

Type	COPD	CI	COPD + CI	P	TOTAL
WOMEN	26 (36,6%)	346 (44,9%)	67 (54.9%)	0.035	439 (45.6%)
SISTOLIC Heart Failure	0 (0%)	325 (42.3%)	16 (13.0%)	0.001	341 (35.4%)
DISTOLIC Heart Failure	0 (0%)	236 (30.7%)	60 (48.7%)	296 (30.8%)	
MIXED Heart Failure	0 (0%)	125 (16.3%)	10 (8.1%)	135 (14.0%)	
SMOKING COPD	15 (22.7%)	0 (0%)	32(41.5%)	0.001	47 (32.6%)
MIXED COPD	15 (22.7%)	0 (0%)	9(11.6%)	24 (16.67)	
Heart Failure	0 (0%)	770 (100%)	123 (100%)	0.001	893 (92%)
STRENGHT, KG	25.6 ± 9.5	22.6 ± 10.3	20. 3 ± 8.8	0.007	22.6
DISTANCE	334.0 ± 123.7	306.2 ± 145.2	260.32 ± 146.7	0.06	291.2
FEV1 PREBRON-CODILATADOR	55.0 ± 21.7	75.2 ± 25.4	56.9 ± 28.3	0.009	60.3
FEV1 POSTBRON-CODILATADOR	58.4 ± 21.9	82.1 ± 14.3	62.1 ± 29.9	0.03	63.2
DLCO	44.1 ± 38.2	61.2 ± 29.5	75.6 ± 36.2	0.08	65.8
MUSCULOS-KELETAL MASS INDEX	8.8 ± 1.7	9.0 ± 2.0	8.5 ± 1.8	0.022	9.0
PHASE ANGLE	5.2 ± 1.3	4.9 ± 1.6	4.6 ± 1.2	0.05	4.9

P331

Evaluation of body composition and endothelial dysfunction in heart failure and chronic obstructive pulmonary disease subjects

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Introduction: Endothelial dysfunction (ED) represents a pathophysiological link between heart failure (HF) and Chronic Obstructive Pulmonary Disease (COPD). In both, there is a high levels of systemic inflammation, body composition alterations, as loss of lean mass, which is associated with a worse prognostic. Nonetheless, there is few evidence on the relationship between ED and body composition alterations.
Objetive: to evaluate the body composition in subjects with ED and HF and COPD
Methods: A cross-sectional study. 233 subjects older than 40 years old with diagnosis of HF and COPD. The subjects with asthma diagnosis were excluded. Body composition was assessment by bioelectrical impedance vectorial analysis (BIVA), ED was assessment by
photoplethysmography.
Results: Mean age was 68.59 ± 12.78 years old, 64.80 % had ED. ED patients were older (70.83 ± 10.57 vs 64.23 ± 15.38, p<0.001) and had resistance/height (356.604 ± 82.27 vs 336.089 ± 70.30, p=0.013), lower prevalence of men (42.6 % vs 54.2 %, p= 0.032), muscular strength (21.79 ± 8.7 vs 24.94 ± 9.1, p <0.001), phase angle (4.95 ± 1.03 vs 5.54 ± 1.06, p<0.001) and skeletal muscle mass index (8.19 ± 1.79 vs 8.84 ± 1.74, p=0.001) compared with subjects without ED. No statically significant differences were observed on ECW, ICW and, arterial hypertension and diabetes.
Conclusion: The subjects with ED present greater alterations in body composition, which gives a poor prognostic.

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Performance of an implanted cardiac device heart failure risk predictor, in a real-world tertiary heart failure clinic

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Background: The Heart failure risk status (HFRS) is a validated dynamic Heart Failure (HF) risk prediction tool available on Medtronic Cardiac Resynchronization Therapy Device with defibrillation capability (CRT-D) and Implantable Cardioverter Defibrillator (ICD) devices, which integrates diagnostic data to generate a patient-specific assessment of low, medium, or high risk for HF Hospitalization (HFH) in the next 30 days. In this study we aim to determine the accuracy of the HFRS in predicting 30-day heart failure related admissions in patients attending a real-world tertiary heart failure clinic.
Methods: We performed a retrospective analysis of consecutive HFRS transmissions over a 12-month follow up period in patients with a Medtronic ICD/CRT-D implanted. We then correlated this with HFH in the 30 days post transmission. Any relevant admissions up to 1 year after the transmissions were also recorded. We tested two thresholds in our analysis for diagnostic accuracy. Threshold 1 - A positive alert was considered for a Medium or High HFRS and negative alert for a Low HFRS. Threshold 2 - A positive alert was considered for only High HFRS and negative alert for a Low or Medium HFRS. We also obtained drug therapy at the time of these alerts and calculated their adherence score.
Results: Over the 12-month period of analysis, 78 patients sent single HFRS alerts. 95% had a CRT-D implanted, 86% had a primary prevention indication, 58% had an ischaemic substrate for heart failure and 79% were male. The mean age and ejection fraction of all patients was 69±13 years and 27%±10.5 respectively. 36 patients had a low HFRS and 42 had medium/high HRFS. None of the low HFRS resulted in HFH within 30 days of transmission. Of the 42 patients who had medium/high HFRS, 3 were admitted within 30 days for management of heart failure with a mean time to admission from alert, of 15 days. 1 of these patients had a moderate HF adherence score while 2 of them had good scores. Using Threshold 1, sensitivity and specificity of the HFRS was 100% and 48% respectively with a negative predictive value and false positive rate of 100% and 52% respectively. Threshold 2 had a sensitivity of 33% and a specificity of 94.6% with a false positive rate of 5.3%.
Conclusion: This analysis has demonstrated that the HFRS with selected Threshold 1, is reasonably accurate as a point estimator of risk, correctly identifying all HF patients with a risk of decompensation of heart failure in the following 30-day period of the alert, at the expense of a high false positive rate. Improving morbidity and mortality in HF patients involves using tools that identifies at-risk patients in a timely fashion to receive interventions. The drive to develop systems in local health economies to respond to these available device alerts, would likely involve additional clinical information to mitigate false positive signals and improve healthcare resource utilization.

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Rate pressure product and severely impaired systolic function in heart failure patients

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Background: rate pressure product (RPP) is an independent index of cardiac work. We aimed to assess the significance of the RPP in patients with chronic heart failure (HF)and its relation to their echocardiographic findings.
Methods: thisprospective study included 358 patients with chronic HF[201 (56.1%) HF preserved ejection fraction (HFpEF) & 157 (43.9%)HF reduced EF (HFrEF)],as

3 groups; average resting RPP 7- 10 (n= 229), high resting RPP> 10 (n= 88) and low resting RPP <7 (n= 41). NYHA class, heart rate (HR), blood pressure,RPP were estimated, S3 and rales were evaluated. Echocardiographic parameters; left ventricular end diastolic (LVEDd), LV end systolic dimensions (LVESd),LV-EF and LV- stroke volume index (SVI) were obtained.

Results: Patients with low RRP had significantly higher prevalence of S3, rales, limiting dyspnea and lower EF. Patients with high RPP had significantly higher incidence of left ventricular hypertrophy, the best EF and the lowest SVI. RPP had significant positive correlations with NYHA class, S3, EF, and EPSS. RPP ≤ 7.75 had 79.2% sensitivity and 70% specificity to predictseverely impaired systolic function (EF<30%), (AUC=0.80, P<0.001).

Conclusion: RPP could be a readily available easily measured clinical predictor of low EF, RPP at a cutoff value ≤ 7.75 could be useful to predict severely impaired LV systolic function. With a new emphasis on incorporation of SVI into diagnostic and follow up approach, hand in hand with the EF specifically in those with LVH.

table 1

Variables	Average RPP (n=229)	HighRPP (n=88)	LowRPP (n=41)	P
S3(%)	(84%)	(70%)	(93%)	L#H <0.05
Rales(%)	(6%)	(1%)	(26%)	L#H,L#A<0.05
NYHA class: I(%)II& III(%)	(56.4%) (43.6%)	(98.7%) 1.3%	(7.5%) (72.5%)	<0.001<0.001
RPP(mean±SD)	8.3±0.9	12±2.1	5.9±0.5	<0.001
EF%(mean±SD)	52.2±13.3	51.4±10.6	37±8.8	L#A &L#H<0.001
SVI(HFrEF) mL/m^2/beat (mean±SD)	42.9±18.5	37.8±8.7	40.2±18.3	H#L& H#N<0.05
HFrEF<30% HFrEF>30% HFpEF	4.7%48.1% 47.2%	0%55.7% 44.3%	24.4% 73.2%2.4%	L#H,L#A <0.05L#H,L#A <0.05
LVH(n%)Conc. (n%)Eccent. (n%)	(11%)(10 %)(1%)	(51.5%) (42.4%) (9.1%)	(10%) (10%)0	<0.001 <0.001 <0.001

RPP; rate pressure product, SD; standard deviation M;, S3; 3rd heart sound, NYHA;New York Heart Association (NYHA) Functional Classification,EF; ejection fraction, SVI; stroke volume index, HFrEF ; heart failure with reduced EF,HFpEF; heart failure with preserved EF, LVH ; left ventricular hypertrophy, Conc; concentric hypertrophy, Eccent; eccentric hypertrophy, L#H; low RPP versus high RPP groups, A; group of average RPP.

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Improving diagnostic awareness of amyloidosis among cardiologists: effectiveness of online education

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Background: Despite significant advances in treatment of cardiac amyloidosis, many patients remain undiagnosed worldwide, leading to increased mortality and poor outcomes.

Purpose: To determine if an online continuing medical education (CME) intervention could improve knowledge and competence of cardiologists related to assessment and diagnosis of cardiac amyloidosis.

Methods: Cardiologists electively participated in a text-based, CME activity on diagnosing cardiac amyloidosis. The effects of education were assessed using a repeated pairs, pre-assessment/post-assessment study design. For all questions combined, a chi-square test assessed differences from pre- to post-assessment. P values <.05 are statistically significant. Cramer's V was used to assess educational effect. The activity launched on July 25, 2017, and data were collected through October 4, 2017.

Results: Overall significant improvements were seen after education for cardiologists (N=220; P < .001; noticeable educational effect, V=.107), with average correct response rate of 32% pre-assessment, which increased to 51% post-assessment. Improvements were observed in cardiologists' knowledge and competence (Table). Following exposure to education, 36% of cardiologists reported higher confidence related to making a diagnosis of cardiac amyloidosis, compared to pre-education.

Conclusion: The statistically significant improvements observed in this CME intervention demonstrate the benefits of using education to increase knowledge, competence and confidence of cardiologists involved in the diagnosis of patients with amyloidosis, and suggest that this type of intervention has the potential to positively impact patient outcomes.

Improvements in knowledge/competence

Topic	Cardiologists (N=220)Relative % improvement (post-assessment vs pre-assessment; P value)
Knowledge of appropriate tests to confirm diagnosis of hereditary amyloidosis	29% (65% vs 84%; P<.001)
Appropriate referral to cardiology specialist in hereditary amyloidosis	33% (60% vs 80%; P<.001)

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Identification of preclinical predictors of systolic dysfunction in the elderly population without a diagnosis of heart failure: Results from the PULSE-HF study

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On behalf of: PULSE-HF study group
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Introduction: Diagnosis of heart failure (HF) in the elderly is challenging due to age-related comorbidities. Development of a simple prediction model for diagnosis of systolic dysfunction may thus help in early diagnosis and effective management of HF.

Purpose: The primary objective of PULSE-HF is to develop a simple predictive score for screening of systolic dysfunction (left ventricular ejection fraction [LVEF] <50%) in elderly population at risk of HF, and evaluate its diagnostic precision against echocardiogram.

Methods: PULSE-HF is a Phase IV cross-sectional study that enrolled 800 elderly (aged ≥70 years) at-risk outpatients without a diagnosis of HF, from 15 centres in Argentina. At Visit 1, patients underwent a physical examination and cognitive (Mini-Cog test), functional (VIDA questionnaire and Edmonton scale), and mood (geriatric depression scale [GDS]) assessments. Patients received prescriptions for any outstanding assessments and the reports were collected at Visit 2 (within 3 months of Visit 1). There were no further assessments at Visit 2. No study drug was administered during the study.

Results: Of the 800 enrolled patients, 762 (95.3%) completed the study. Key demographic data (mean) were: age 76.6 years, body mass index 29.1 kg/m2, male 37.9%, systolic blood pressure 135 mmHg, Charlson Comorbidity Index (CCI) (mild 374 [46.8%], moderate 54 [6.8%], severe 8 [1.0%] and none 361 [45.1%]), hypertension 779 (97.4%), type 2 diabetes mellitus 186 (23.3%), obesity 235 (29.4%), coronary artery disease (CAD) 82 (10.3%), and atrial fibrillation 74 (9.3%). Data from the full analysis set (722 [90.3%]) were used for the development of the predictive model. Univariate linear regression analysis identified the factors significantly associated with LVEF <50% and were subsequently used in multivariate regression analysis. Regression analysis with forward selection method identified the most predictive variables of systolic dysfunction. Independent variables associated with systolic ventricular dysfunction were: N-terminal pro b-type natriuretic peptide (NT-proBNP) (log transformed) (odds ratio [OR] 2.29 [95% confidence interval 1.68–3.12]), gender (0.23 [0.11–0.49]), CAD (2.71 [1.16–6.31]), and cardiomegaly (2.37 [1.16–4.82]) (P<0.05 for all). Adverse events were observed in 147 (18.4%) patients, including cardiac failure in 23 (2.9%) patients.

Conclusions: NT-proBNP, gender, CAD, and cardiomegaly were most predictive of impaired systolic function.

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The role of galectin-3 in obese patients with heart failure

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Background. It is well known that obese patients with heart failure have a more favorable prognosis than normal weight or cachectic patients. In this context, the values of NT-proBNP, an important biomarker of heart failure, are lower, while the clinical diagnosis of heart failure is difficult, and the majority of obese patients have preserved ejection fraction. However, there are data showing the implication of another heart failure-specific biomarker in the development of obesity, galectin-3 (Gal-3), which is a modulator of adipogenesis. The link between galectin-3, obesity and heart failure is still incompletely understood.
Aim. To determine the role that galectin-3 may have in a more accurate diagnosis of heart failure in obese patients.
Material and method. The study included 88 obese patients with a mean age of 69±9 years, 51.13% women, admitted to the Clinical Rehabilitation Hospital, for cardiac decompensation events, NYHA functional class II-IV. All patients were evaluated clinically and echocardiographically. In all patients, NT-proBNP and Gal-3 values were determined. Heart failure was defined according to ESC 2016 criteria.
Results. 73% of the patients were hypertensive, 38% had type 2 diabetes mellitus, 34% were smokers, and 18% had a history of myocardial infarction. The mean ejection fraction value was 45%, 33.7% of the patients having values higher than 50%. The Charlson comorbidity score was 4.65±1.59. The mean NT-proBNP value was 2410±2676 pg/mL, and the mean galectin-3 value was 41±31 ng/mL. Of the patients included in the study, 66 (75%) had increased Gal-3 values (>17.8 ng/mL). There was a significant indirect correlation of NT-proBNP with BMI (r=-0.3, p=0.04) and ejection fraction values (r=-0.37, p=0.001). Regarding Gal-3, these correlations were indirect, but without statistical significance (p=0.5 and 0.6, respectively). Echocardiographically, pseudonormal or restrictive diastolic dysfunction was much more frequently found in patients with increased Gal-3 values compared to those with Gal-3 values <17.8 ng/mL (p=0.05). Patients with Gal-3 concentrations >17.8 ng/mL did not have a significantly larger left atrial area (p=0.8). Of heart failure patients with preserved ejection fraction, 20 (64%) were assigned to a high risk class (Gal-3 values >25.9 ng/mL), 8 (25%) were classified as low risk patients (Gal-3 <17.8 ng/mL) and moderate risk patients, respectively.
In conclusion, in the current study, Gal-3 can be considered a useful biomarker, which can contribute, only in conjunction with NT-proBNP, to the diagnosis of heart failure in obese patients.

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Comparative evaluation of the functional state of the lungs in various types of dilated cardiomyopathy

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The aim: assessment of the functional state of the respiratory system in patients with dilated cardiomyopathy of the right ventricle (DCMPr) and idiopathic DCMP with biventricular heart failure (DCM-biHF).
Material and methods: The study included 78 patients with various forms of DCM. For a comparative analysis, two groups were formed: 1g. included 21 patients with DCMPr; 2g. - 57 patients with DCMP-biHF. All patients were examined by standard clinical, laboratory and functional examinations. To assess the functional state of the respiratory system, all patients underwent spirometry with the calculation of the Tiffno index.
Results: According to spirometry, it was found that such indicators as respiratory volume of the lungs (RV), reserve volume of exhalation (RVE) and vital capacity of the lungs (VC), when compared with standard values, were reduced in both patients with DCMPr and patients with DCMP-biHF. Namely, RV in 1gr. = 487,14 ± 105,98ml and 2gr. = 450,00 ± 86,77ml; RVE in 1 g. = 878.09 ± 270.36 ml and in 2 g. = 845.43 ± 190.19 ml; VC in 1g. = 2.12 ± 0.56l and in 2g. = 2.02 ± 0.37l (all p> 0.05). All-group reduction of these indicators was regarded by us as a sign of impaired respiratory function. When conducting a comparative intergroup analysis, it was found that all spirometry indicators were lower in patients of group 2, but the difference did not reach the level of confidence, except for the Tiffno index, which in 1g. = 69.14 ± 2.83 e. and in 2g. = 64.11 ± 4.07 u. (p <0.05). The maximum volumetric air velocity (MOAV) at the expiratory level from 25% to 75% of FVC in the compared groups was somewhat controversial (all p> 0.05). There was an inverse correlation between the values of the Tiffno index and the MPAP level (p = 0.000, t = -3.845, r = -0.451), i.e. the normal values of the Tiffno index corresponded to the normal level of MPAP, and the decrease in the indexes of Tiffno index was accompanied by an increase in the level of MPAP and, accordingly, a deterioration in the functions of external respiration.
Conclusion: Pulmonary ventilation rates were equally reduced both in DCMr and in DCM-biHF, but in the latter case the Tiffno index was lower than the standard values, which indicated the prevalence of obstructive respiratory failure, while in DCMPr, the Tiffno index was characterized by inverse correlation with the level of average pressure in the pulmonary artery.

P338
HFA-PEFF versus H2FPEF score for diagnosing heart failure with preserved ejection fraction

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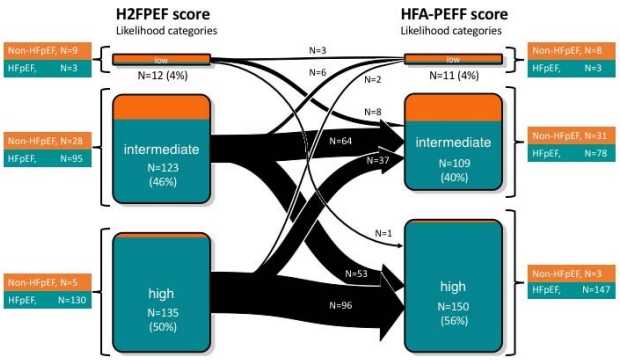
Background: The diagnosis of heart failure with preserved ejection fraction (HFpEF) remains a great challenge, reflected by the recent proposal of 2 diagnostic scores: the H2FPEF-score and the HFA-PEFF-score. Their diagnostic performance has not yet been compared.
Purpose: Investigate the diagnostic performance and reclassification accuracy of 2 new HFpEF-scores.
Methods: Between January 2015 and April 2018, the prospective Maastricht HFpEF cohort included 270 consecutive patients referred to our outpatient clinic with suspected HFpEF. Undergoing a thorough diagnostic work-up, the final diagnosis HFpEF was made in 228 and was rejected in 42 patients. The H2FPEF- and HFA-PEFF-score and their likelihood categories (low, intermediate, high) were calculated as suggested. The diagnostic and discriminative value of the HFA-PEFF-score was compared to the H2FPEF-score, including area under the ROC-curve (AUC), absolute reclassifications, net reclassification index (NRI) and integrated discrimination index (IDI), using the final clinical diagnosis as the gold standard.
Results: Both scores categorized a dominant proportion (i.e. >=50%) of the entire cohort of suspected HFpEF into the high-likelihood category. However, the high-likelihood category was more prevalent using the HFA-PEFF score, leaving a smaller intermediate category (Figure 1, P<0.001). The distribution of the HFA-PEFF score was significantly different between patients with a final HFpEF diagnosis versus non-HFpEF patients (Figure 1, P<0.001), i.e. HFpEF patients scored higher than non-HFpEF patients. This was also true for the H2FPEF-score (Figure 1, P<0.001). The AUC was not significantly higher for the HFA-PEFF-score (0.89, 95% CI 0.82-0.95) versus the H2FPEF-score (0.80, 95% CI 0.72-0.87, P=0.06), although a trend was observed. Reclassification of patients based on the 2 scores is shown in Figure 1. Using the predefined categories, 107/270 (40%) patients were reclassified into a different category (P<0.001). The HFA-PEFF-score reclassified 53 HFpEF patients upward and 36 patients downward, relative to the H2FPEF-score. In non-HFpEF patients, the net reclassification was 0. Together, the net reclassification index of the HFA-PEFF-score was 7.5% (P=0.49). When using likelihood cut-offs (rule-out: 15%, rule-in: 85%), the NRI was 37% (P=0.001). The continuous NRI was 78% (P<0.001) and the IDI was 20% (P<0.001).
Conclusions: The diagnostic accuracy (AUC) of both the HFA-PEFF and the H2FPEF score for diagnosing HFpEF was high. However, the HFA-PEFF and the H2FPEF-score classified patients into likelihood-categories very differently; i.e. 40% of patients were reclassified. Using several measures of discrimination, the HFA-PEFF-score performed at least similar or may be better in classifying patients compared to the H2FPEF-score. This finding needs confirmation in additional, preferably less-selected cohorts.



Reclassification HFA-PEFF vs H2FPEF

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Features heart rate variability at patients with ischemic heart disease, arterial hypertension and left ventricle hypertrophy

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Purpose: to study heart rate variability (HRV) at patients with ischemic heart disease (IHD) and arterial hypertension (AH) and left ventricle hypertrophy (LVH).
Materials and methods: 34 men with IHD and AH and LVH (average age 56.5±9.9 years) were examined and were included in first grope. Left ventricle hypertrophy was estimated if the left ventricle myocardium mass index was above 134 g/2 for the men. The second group was 37 men with IHD and AH without LVH (average age 58.6±7.7 years; p>0.05). Heart rate variability was examined on 5-min recordings of electrocardiogram at rest, then during the orthostatic test and at rest after orthostatic test.
Results: The groups did not differ on age, duration IHD, AH and therapy. At rest the patients with LVH and the patients without LVH had such parameters of HRV accordingly: heart rate (HR) – 60.3±1.5 and 60.8±1.6 min-1 ($p > 0.05$), SDNN – 38.8±3.5 and 29.7±2.4 msec ($p < 0.05$); rMSSD – 35.4±5.1 and 20.1±2.0 msec ($p < 0.01$); pNN50% - 14.3±3.8 and 4.07±1.6 ($p < 0.05$); TP – 1486.2±266.9 and 859.7±136.3 msec2 ($p < 0.05$); HF – 678.0±187.7 and 176.1±44.6 msec2 ($p < 0.05$); LF – 376.3±55.7 and 270.5±55.9 msec2 ($p > 0.05$); VLF – 431.8±56.1 and 413.1±60.1 msec2 (p> 0.05). At rest the patients with LVH had such parameters of power waves HRV accordingly in percentage: HF% - 45.6%; LF% - 25.3% and VLF% - 29.1% and the patients without LVH: HF% - 20.5% ($p < 0.05$); LF% - 31.5% ($p > 0.05$) and VLF% - 48.0% ($p > 0.05$). Further, the patients with LVH had vegetative balance at rest: 59.4 % predominance of parasympathetic nervous system, 12.5 % balance between parasympathetic and sympathetic nervous system and 28.1 % prevalence sympathetic nervous system. The patients without LVH had vegetative balance at rest accordingly: 43.8 % predominance of parasympathetic nervous system ($p > 0.05$), 12.5 % balance between parasympathetic and sympathetic nervous system ($p > 0.05$) and 43.7 % prevalence sympathetic nervous system ($p > 0.05$). Conclusion: The patients with IHD and AH and LVH, in comparison with the patients without LVH, had higher heart rate variability, especially in high-frequency power waves of spectrum and predominance parasympathetic nervous system in vegetative balance at rest, these data must be considered when prescribing treatment.

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Body composition and oxygen saturation recovery after six-minute walk test in heart failure and chronic obstructive pulmonary subjects

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Background :Heart Failure (HF) and Chronic Pulmonary Obstructive Disease (COPD) has body composition alterations and decreased infunctional capacity, with important repercussions on clinical status and prognosis. However, there is not enough evidence about the relation between the oxygen saturation (SPo2) recovery and body composition HF and COPD subjects.

	Increase > 0 in Sar n= 34	Change of negative SpO2 n=85	All n=120	p
Weight	81.8±22.3	73.9±20.9	76.1±21.5	0.07
TBW	46.3±8.2	50±8.8	48.8±8.8	0.07
ECW	21.2±2.7	23.3±5.6	22.7±5.0	0.07
3er. Space	.83±.04	.84±.03	.84±.03	0.22
XC_ RJL	30.7±9.8	28.1±8.1	28.8±8.1	0.18
SpO2 rest	91.37±4.5	86.4±6.8	87.7±6.6	0.0005
BPS	125.7±25.81	118.6±18.2	120.5±20.6	0.10
BPD	74.1±12.5	71.6±11.7	72.3±12.0	0.31
IND_ IMP	.83±.04	.84±.03	.84±.03	0.22
DISTANCE	269.2±162	261.5±137.8	263±144.4	0.79
ANGLE	5.2±1.1	4.7±.87	4.8±.98	0.02
AGE	68.5±12.2	67.7±12.5	67.7±12.4	0.65

TBW.- total body water, ECW.- extracellular water, XC_RJL .- reactance, SpO2 rest .- Saturation rest, SBP .- systolic blood pressure, DBP .- diastolic blood pressure, IND_IMP .- Index impedance,

Objectives: To evaluate the relation between SPo2 recovery after six-minute walk and body composition in HF and COPD subjects.
Materials and Methods: In a cross sectional study, HF and COPD diagnosis, older than 40 years were included, those with asthma diagnosis were excluded. Oxygen saturation recovery capacity was determinate value > 80 of SPo2 difference between recovery period and end of the 6-minute walk test, grip strength was determined by dynamometer, body composition by Bioelectric impedance vectorial analysis.
Results: 120 COPD and HF subjects were included, mean age was 68.5±12.2. Patients with low SPo2 recovery capacity had more total body water (50±8.8 vs 46.3±8.2, p=0.07), extracellular water (23.3±5.6 vs 21.2±2.7, p= 0.07), as well less phase angle (4.7 ± 0.8 vs 5.2 ± 1.1, p=0.02), basal SPo2 (86.4 ± 6.8 vs 91.37 ± 4.5, p= 0.0005) and body weight (73.9 ± 20.9 vs 81.8 ± 22.3, p=0.07) than SPo2 recovery capacity subjects.
Conclusions: Low oxygen saturation recovery capacity had greater body composition alterations, this had an important impact on prognosis in HF and COPD subjects

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The relationship of sympathetic regulation with immune inflammation, fibrosis, neurohumoral activation in patients with devices for cardioversion-defibrillation and cardiac resynchronisation therapy

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Introduction: Increased sympathetic activity is known in congestive heart failure (CHF). The role of adrenaline (Adr) and noradrenaline (Nadr) is often identified and not fully studied.
Purpose: To assess the relationship of sympathetic activity with immune inflammation, fibrosis, neurohumoral activation in patients with CHF before implantation of devices for cardioversion-defibrillation (ICD) and cardiac resynchronisation therapy (CRT).
Methods: 209 patients with CHF (79.9% men, mean age 60.6±9.6 years, 74.6% ischemic etiology) were divided into 2 groups before devices implantation: 1gr. (n=125) – ICD; 2 gr. (n=84) – CRT. Electrocardiogram, echocardiographic parameters, plasma levels of Adr, Nadr, interleukins (IL) 1β, 6, 10, tumor necrosis factor alpha (TNF-α), NT-proBNP, matrix metalloproteinase () 9, tissue inhibitors of (TIMP) 1 and 4, ratio Adr/Nadr, MMP-9/TIMP-1, MMP-9/TIMP-4 were evaluated.
Results: Patients of gr.1 were older (61.6±9.4 vs 59.0±9.7 years; =0.049), more often had coronary artery disease (80 vs 66.7%; =0.030), myocardial infarction (60 vs 34.5%; =0.002), percutaneous coronary intervention (42.4 vs 22.6%; =0.003), coronary artery bypass graft (15.2 vs 3.6%; =0.007), lower frequency of the RF-ablation of the AV connection (4.8 vs 23.8%; <0.001), shorter duration of QRS (122.3±26.5 vs 155.8±35.1 msec; <0.001), lower incidence of complete left bundle brunch block (LBBB) (10.4 vs 59.5%; p<0.001). Gr.1 showed the tendency to smaller dimensions of right ventricle (=0.062), significantly smaller left ventricular (LV) end-diastolic and end-systolic dimension (<0.001), LV end-systolic and end-diastolic volume (<0.001), higher LV ejection fraction (p<0.001), lower pulmonary artery systolic pressure (p=0.002); higher plasma levels of Adr (2.0[1.0;3.1] vs 0.8[0.1;2.1] pg/ml; <0.001), Nadr (12.9[7.2;15.6] vs 3.0[0.3;11.5] pg/ml; <0.001), lower ratio Adr/Nadr (0.188[0.120;0.273] vs 0.257[0.128;0.702] units; =0.042); lower levels of IL-1β (2.7[2.3;4.2] vs 3.7[2.8;4.3] pg/ml‘; =0.007), IL-6 (2.4[2.2;3.9] vs 3.1[2.4;4.5] pg/ml; =0.026), NT-proBNP (1050.0[397.8;2925.8] vs 1840.0[1020.5;398.0] pg/ml; =0.001), TIMP-1 (204.8[165.5;300.7] vs 261.0[165.0;421.5] ng/ml; =0.027), higher level of -9 (242.2[177.7;286.2] vs 156.2[126.1;210.6] ng/ml; <0.001), higher ratio MMP-9/TIMP-4 (0.109[0.081;0.140] vs 0.066[0.046;0.099] units; =0.001).
Conclusion: The different plasma Adr and Nadr levels were revealed in patients with ICD and CRT. The lower level of catecholamines in CRT patients associated with a longer QRS duration, higher frequency of LBBB, worse echocardiographic parameters, greater activity of immune inflammation, neurohumoral activation, fibrosis. This may be due to cytokine modulation of the sympathetic function and its depletion. A higher value of ratio Adr/Nadr indicates an increase role of Adr in severity of CHF and can be used to assess the progression of CHF during prospecting observation.

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Dynamics of laboratory parameters and left ventricular remodeling in patients with acute myocardial infarction during atorvastatin therapy

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Purpose: to study the dynamics of several laboratory parameters and the risk of the rapidly progressive left ventricular remodeling in patients with acute myocardial infarction with ST-segment elevation (STEMI) in 24-week atorvastatin therapy different doses.

Methods: 117 STEMI patients were included in the study. The patients were divided into two groups: the main group included 71 patients who took atorvastatin 40-80 mg / day (group 1), the average age was 52 (45; 58) years. The second group (control) consisted of 46 patients who received atorvastatin in low doses, the average age was 52 (43; 58) years. The compared subjects were matched by age, sex, BMI, and office blood pressure. All patients have been receiving treatment for STEMI before study treatment. At baseline and after 24 weeks of follow-up we analyzed lipid profile (TC, LDL-C), brain natriuretic peptide (BNP), C-reactive protein (CRP); an echocardiography was performed using the MyLab apparatus (Esaote, Italy) with determination of the end-diastolic volume index (EDVi) of the left ventricle. The relative risk (RR) of the rapidly progressive remodeling was determined by the dynamics of increased EDVi exceeding> 20% after 24 weeks of follow-up.
Results. In group 1, a more pronounced dynamics of lipid profile was revealed: TC decreased by 43% (from 6.1 ± 1.2 to 3.5 (3.1; 4.0) mmol / l; p <0.001), LDL-C - by 51% (from 4.1 ± 1.1 to 2.0 (1.7; 2.4) mmol / l; p <0.001). In the 2nd group, TC decreased by 25% (from 5.6 (5.1; 6.4) to 4.2 ± 1.0 mmol / l; p <0.001), LDL-C - by 33% (with 3.9 (3.2; 4.5) to 2.6 ± 0.7 mmol / l; p <0.001). In the main group, BNP initially amounted to 71.8 (22.9; 137.5), follow-up - 32.7 (19.2; 69.5) pg / ml (-54.5%, p<0.001); in the control group - 79.7 (45.6; 163.2) and 52.8 (16; 80.1) pg / ml (-33.8%, p <0.001), respectively. Comparative dynamics of CRP in the comparison groups was revealed: in group 1 - from 8.6 (4.5; 18.7) to 1.5 (0.8; 2.4) mg / l (-82.6%, p < 0.001); in group 2 - from 9.4 (4.6; 14.1) to 1.2 (0.7; 3) mg / l (-87%, p <0.001). The EDVi level did not change in group 1: baseline - 60.3 (48.3; 67.7), follow-up - 58.8 (45.9; 74.2) (p = 0.7); in group 2 the EDVi increased from 53.4 ± 17.1 to 64.2 ± 22 (p = 0.001). At the same time, the OR of the rapidly progressive remodeling in the low-dose atorvastatin therapy group was 1.9 [95% CI 1.1; 3.3] (p = 0.02).
Conclusion: In patients with STEMI, in 24-week treatment with high doses atorvastatin, a pronounced favorable dynamics of lipid profile, BNP and a lower risk of rapidly progressive remodeling were diagnosed.

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Predictive value of growth differentiation factor-15 levels in chronic heart failure with reduced and mid-range ejection fraction with known diabetes mellitus

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Background: Diabetes mellitus (DM) in patients with established heart failure (HF) influences negatively of clinical state and outcomes. Although there is strong recommendation regarding treatment of HF individuals with DM, biomarker-based risk stratification for diabetics with HF is not completely developed. Growth differentiation factor-15 (GDF-15) belongs to the transforming growth factor-beta/bone morphogenetic protein super family that involves in the pathogenesis of HF and DM.
The objective: to investigate the levels of growth differentiation factor-15 (GDF-15) levels in HF patients with reduced and mid-range ejection fraction with known type 2 DM (T2DM).
Methods: A total of 376 HF patients (left ventricular ejection fraction < 50%) aged 39 to 68 years were prospectively involved in the study. Among all HF patients with reduced ejection fraction (HFrEF; n=125) and mid-range ejection fraction (HFmrEF; n=151) T2DM was diagnosed in 56 (44.8%) individuals and 62 patients (41.1%) respectively. Data collection included demographic and anthropometric information, and hemodynamic performances. The levels of NT- pro brain natriuretic peptide (NT-proBNP) and GDF-15 were determined by ELISA at baseline.
Results: The levels of GDF-15 for HFrEF and HFmrEF patients were 2120 pg/L (confidence interval [CI] 1570 to 3866 pg/L) and 2075 pg/L (CI 1610 to 3796 pg/L) respectively (P=0.22). In HFrEF cohort levels of GDF-15 for both diabetic (2215 pg/mL, CI 1632 to 4012 pg/mL) and non-T2DM patients (2088 pg/mL, CI 1542 to 3878 pg/mL) were similar (P=0.14). In contrast, in HFmrEF cohort levels of GDF-15 in diabetics was significantly (P=0.001) higher (2203 pg/mL, CI 1624 to 3915 pg/mL) to non-T2DM individuals (1998 pg/mL; CI 1366 to 2790 pg/mL). Additionally, the levels of GDF-15 in HFmrEF cohort did not correlate with clinical signs and symptoms of HF including NYHA class, oedema of legs and jugular venous distention, whereas in HFrEF cohort it did. In entire HF cohorts plasma GDF-15 level was positively correlated with plasma NT-proBNP concentration (r=0.810; P=0.012), and negatively correlated with LVEF (r=-0.38, P=0.018). There were not significand changes in plasma NT-proBNP levels for diabetics and non-diabetics in HFrEF and HFmrEF. In multiple variates logistic regression analysis we found that level of GDF-15 ≥ 2215 pg/mL was the best predictor of HFrEF in both non-T2DM and known T2DM HF individuals respectively.
In conclusion, in HFmrEF cohort the levels of GDF-15 were extremely evaluated in T2DM patients to non-T2DM patients, whereas there was not significant difference between levels of GDF-15 in diabetics and non-diabetics with HFrEF. Cut-off point 2215 pg/mL predicted HFrEF for all patients with HF regardless of T2DM presentation.

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Markers of heart failure and lipid-lowering effect of atorvastatin in patients with myocardial infarction with ST segment elevation

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Purpose: To study the dynamics of the brain natriuretic peptide (BNP) level, highly sensitive C-reactive protein (hSBR), ejection fraction (EF) in patients who have had a myocardial infarction with ST segment elevation (STEMI), depending on the lipid-lowering effect of atorvastatin.
Methods: 116 patients aged 52 (45.5; 58) years were examined, predominantly men (88%). During the 48 weeks after STEMI, patients have been taking atorvastatin in different doses regularly. At the 7th day, 24th and 48th week after STEMI, serum BNP and hrsRBR were determined using an Olympus AU400 analyzer. EF was determined by the Simpson method on an ultrasound device at the 7th day, and then every 12 weeks thereafter. Depending on the achievement of the target low-density lipoprotein cholesterol (LDL-C) level less than 1.8 mmol / l and / or reduction by 50% from baseline values, two groups of patients were distinguished: effective therapy "E" - 61 people (52.6%)), those who have reached the recommended level of atherogenic lipids; 55 patients (47.4%) who did not reach the target LDL-C level made up the group of low-effective therapy "L". The compared groups were matched by sex, age and anthropometric data.
Results: In the "E" group, by the 48th week, the BNP level decreased by 50% (p = 0.02), in the "L" group this indicator decreased by 41% (p = 0.04) in comparison with the baseline values. By the end of treatment, the level of hsCRP in the effective therapy group decreased by 83% (p = 0.0001), in patients who did not reach the target values of LDL-C, by 73% (p = 0.0001) from baseline values. In the group "E", at the 7th day the EF was 52 (95% CI 49; 55)%, and further increase was observed: by week 12, the EF increased to 55 (95% CI 52; 58)% (p = 0.04), by week 24 - up to 56 (95% CI 53; 59)%, by week 36 - up to 58 (95% CI 54; 61)% (p = 0.004), by week 48 - up to 56 (95% CI 53; 60)% (p = 0.04). In the "L" group, the initial EF was 58 (95% CI 54; 61)%, but by the 48th week of treatment, a negative change was obtained - a decrease to 53 (95% CI 49; 57)% (p = 0, 02).
Conclusion: effective lipid-lowering therapy with atorvastatin contributes to a more pronounced decrease in the progression of heart failure, and is also associated with an increase in myocardial contractility in the post-infarction period.

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Serum Levels of sST2, proBNP and cTnI for early risk stratification of acute myocardial infarction after percutaneous coronary intervention

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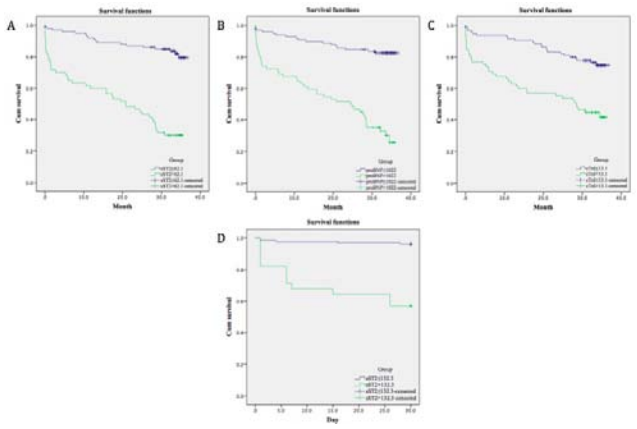
Background: Survivors of acute myocardial infarction (AMI) are at high risk for major adverse cardiovascular events (MACEs). The objective of the study was to investigate the prognostic impact of soluble ST2 (sST2), proBNP, cTnI in AMI patients undergoing percutaneous coronary intervention (PCI).
Materials and Methods: A total of 161 AMI patients were enrolled in the study. The serum levels of sST2, proBNP and cTnI were measured using enzyme-linked immunosorbent assay (ELISA). The prognostic values of sST2, proBNP and cTnI for predicting 3-year and 30-day MACEs, defined as a composite of all-cause death, heart failure (HF), non-fatal MI and ischemia-driven revascularization were evaluated.
Results: All the patients were followed for a median period of 3 years. Compared with the MACEs-free group, the serum levels of sST2, proBNP and cTnI were significantly higher in the 3-year and 30-day MACEs groups. The area under curves (AUC) for 3-year and 30-day MACEs of sST2, proBNP and cTnI at admission were 0.813, 0.808, 0.659 and 0.832, 0.699, 0.673. Cox multiple regression analysis revealed that high serum levels of sST2, proBNP and cTnI at admission were independently associated with 3-year MACEs. Kaplan-Meier curves showed a significant increase in the occurrence of MACEs in high sST2, proBNP and cTnI groups (P<0.001). High serum level of sST2 (>132.2ng/ml) at admission independently predicted 30-day MACEs after adjusting for other risk factors (HR 7.671, 95%CI 1.939-30.347, P=0.004).
Conclusion: The present study demonstrates that sST2 might be a promising biomarker to improve the prediction in AMI patients undergoing PCI.

Cut-off values of sST2, proBNP and cTnI

3-year MACEs	AUC	95%CI	Cut-off values	Sensitivity (%)	Specificity (%)
sST2	0.813	0.743-0.883	62.1	70.0	82.2
proBNP	0.808	0.733-0.883	1022.0	71.7	81.2
cTnI	0.659	0.571-0.746	13.1	61.7	72.3
30-day MACEs	AUC	95%CI	Cut-off values	Sensitivity (%)	Specificity (%)
sST2	0.832	0.733-0.930	132.3	70.6	88.9
proBNP	0.699	0.564-0.834	777.2	76.5	62.5
cTnI	0.673	0.518-0.827	16.1	70.6	67.4

none



(A-C) Kaplan-Meier curve analysis on the

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Use of composite laboratory measurements to assess frailty in stable elderly patients with heart failure

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Background: Frailty associated with aging produces subclinical dysfunction across multiple organs and increases the risk of death. There is little information about the relationship between frailty status and laboratory measurements in patients with heart failure (HF). Purpose: To investigate which laboratory measurements indicate frailty in stable elderly patients with HF.
Methods: Ninety-two stable elderly patients with HF were evaluated by laboratory measurements and on the Kihon Checklist (KCL), on which a score of ≥8 indicates frailty. We compared laboratory measurements between the frail (KCL ≥8) and non-frail (KCL <8) groups.
Results: Mean age was 81.6 years, mean left ventricular ejection fraction was 57.9%, mean plasma brain natriuretic peptide content was 184 pg/mL, and mean t-KCL score was 13.1. Patients were allocated to non-frail (n = 29) and frail (n = 63) groups on the basis of their KCL scores. Serum iron concentration was significantly lower in the frail group (frail, 61.2 30.3 μg/dL; non-frail, 89.5 26.1 μg/dL; P 0.001). Blood urea nitrogen (BUN) and C-reactive protein (CRP) levels were significantly higher in the frail group (BUN: frail, 27.3 16.5 mg/dL; non-frail, 19.7 8.2 mg/dL; P = 0.013. CRP: frail, 1.05 1.99 mg/dL; non-frail, 0.15 0.2L mg/dl; P = 0.004). KCL score was significantly correlated with serum hemoglobin, albumin, and iron concentrations, BUN, estimated glomerular filtration rate, CRP, and plasma brain natriuretic peptide level. Multivariate analysis revealed that serum iron concentration, CRP, and BUN were significant independent predictors of frailty (β = −0.069, 0.917, and 0.086, respectively).
Conclusions: Frailty status was significantly associated with serum iron concentration, CRP, and BUN in stable elderly patients with HF. Composite biomarkers (of iron deficiency, inflammation, and renal perfusion) may be useful for assessing the frailty of stable elderly patients with HF.

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Predictors of anaemia and iron deficiency in patients with chronic heart failure.

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Background: Anaemia and iron deficiency (ID) are important factors for muscle function and exercise capacity in patients with chronic heart failure (HF). Their interaction in HF remains to be defined.
Methods: A total of 280 out-patients with stable chronic HF were enrolled with mean age of 67.0±10.7 years, 21%female, mean left ventricular ejection fraction (LVEF) was 38.9±13.4%, mean Body Mass Index (BMI) 29.3±5.5 kg/m^2]. Anaemia was defined according to World Health Organization criteria [Haemoglobin (Hb) <13 g/dL in men and <12 g/dL in women]. ID was defined as ferritin <100 µg/L or ferritin <100 <300 µg/L together with transferrin saturation (TSAT) <20%. Exercise capacity was assessed by spiroergometry (peakVO2), 6 minute walk test (6MWT), short physical performance battery test (SPPB), hang grip strength (HGS) and leg force (LF). All patients were followed up for a mean of 8 month.
Results A total of 89 (32%) chronic HF patients had anaemia and 142 (51%) had iron deficiency at baseline. Patients with anaemia showed significant lower exercise capacity compared to patients without anaemia (peak VO2: 15.3±4.6 vs.18.5±4.8 kg/min p<0.0001, 6MWT: 365.2±135.5 vs. 461.6±127.4 m p<0.0001, SPPB: 9.4±2.3 vs. 11.0±1.6 total points p<0.0001, HGS: 32.5±10.0 vs. 38.8±12.4 kg p<0.0001, LF: 31.4±11.0 vs. 41.3±21.6 kg p<0.0001). The same we found in patients with ID compared to patients without ID (peak VO2: 16.3±5.1vs. 18.6±4.5 kg/min p= 0.001, 6MWT: 400.0±140.8 vs. 458.8±128.4 m p=0.0008, SPPB: 10.0±2.1vs. 10.9±1.7 total points p= 0.0003, HGS: 34.5±11.9 vs. 39.3±11.7 kg p=0.001, LF: 35.7±23.4 vs. 40.5±13.6 kg p=0.04). After a Follow up of mean 8 month 53 patients develop a new onset of either anaemia (n=24) or ID (n=29). Logistic regression analysis showed that gender, 6 minute walk distance, SPPB, HGS and presence of diabetes mellitus at baseline are significantly associated with the development of anaemia or ID (all p<0.05). The strongest predictor was lower SPPB (p= 0.0008). Interestingly known determinates lower peak VO2, higher age, higher NYHA class, Creatinine, and hsCRP were not predictive in our cohort to develop anaemia or ID after 8 month (all p>0.05).
Conclusion: Both anaemia and ID are strongly associated with reduced exercise capacity in patients with HF. The effect of anaemia and iron deficiency together is stronger than that of anemia and ID alone. Reduced SPPB, 6MWT, and HGS are important risk factors for the development of anaemia or ID.

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Decrease in Fibrosis-4 index is associated with decrease in NT-proBNP in patients with acute heart failure

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Objective: In patients with heart failure (HF), liver congestion results in liver stiffness and fibrosis, which might be associated with poor prognosis. Fibrosis-4(FIB4) index, which is calculated with age, aspartate aminotransferase, platelet count, and alanine aminotransferase, emerged as a marker of liver stiffness. In this study, we examined the time course change in FIB4 during hospitalization for acute HF (AHF), and evaluated the factors associated with the change in FIB4.
Method: From January 2015 to October 2017, 183 patients with AHF who had high FIB4 index of 3.01 were enrolled (84 years, 106 male). All subjects were calculated FIB4 index on admission and two weeks later. Blood test including NT-proBNP was also performed at two time points.
Results: During the course, 131 patients had decline in FIB4 (FIB4 decline group), whereas 52 patients did not (FIB4 non-decline group). Baseline characteristics, such as age, gender, coronary risk factors, left ventricular function and ln NT pro-BNP were comparable between the two groups. During the course, total protein and albumin increased in the FIB4 decline group, whereas it remained unchanged in the FIB4 non-decline group. Ln NT-pro BNP decreased in both groups, but delta change in ln NT-proBNP was higher in FIB4 decline group compared with FIB4 non-decline group (-0.53±0.69 vs -0.31±0.45pg/ml, p=0.043). Delta change in ln NT-pro BNP was associated with delta change in FIB4 index in univariate analysis (r=0.224, p=0.0025). This association was still significant after adjustment for confounding factors (beta=1.039, 95%CI 0.460 to 1.619, p=0.0005).
Conclusion: Change in NT-proBNP was associated with change in FIB4 in patients with AHF.

P349

Phoenixin concentration in plasma of heart failure with reduced ejection fraction patients.

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Introduction: Cardiovascular disease is the leading cause of death among all noncommunicable disease worldwide. Among those, heart failure is of the outmost importance given its prevalence and overall poor outcome. Heart failure detection and treatment optimization might be improved by biologically active peptides, extensively studied in recent years. Lately, new neuropeptide – phoenixin, produced locally in heart, was found to have cardioprotective features.
Purpose: The aim of this pilot study was to investigate phoenixin presence in plasma of heart failure patients' and its potential usefulness as a biomarker of the disease.
Methods: Study group consisting of 34 patients with heart failure with reduced ejection fraction (HFrEF) and control group of 18 patients without clinical and echocardiographic indications of heart failure were recruited. Study protocol was approved and all patients signed informed consent form. Patients underwent basic laboratory testing, comprehensive physical and echocardiographic examination. Phoenixin plasma concentration was measured. All values were expressed as the mean ± SEM. For comparison of two groups Student's t-test or Mann-Whitney test and for correlation analysis Pearson and Spearman coefficients were used in respect of variables distribution. P value <0,05 was considered statistically significant.
Results: Mean left ventricule ejection fraction in HFrEF group was 30.3±1.3% and in control group 62.6±1.8%, p<0.0001. Heart failure patients had significantly higher LVM index (156.2±5.8 vs 88.6±3.7 g/m2, p<0.0001), left atrium area (LAA) (31.4±1.2 vs 18.7±0.6 cm2, p<0.0001), creatinine, CRP and uric acid concentration. Control patients had markedly higher total, LDL and HDL cholesterol levels. Phoenixin concentration was found to be lower in HFrEF group, however the difference was not statistically significant (0.0934±0.0039 vs 0.1017±0.0044ng/ml, p=0.1914). Phoenixin concentration in control group was found to positively correlate with HDL (r= 0.590, p=0.01) and systolic blood pressure (r=0.467, p=0.05). Importantly, in HFrEF group phoenixin concentration was negatively correlated with LAA (r=-0.488, p=0.0034). Among HFrEF patients atrial fibrillation was associated with markedly lower phoenixin concentration than sinus rhythm (0.0803±0.0057 vs 0.0996±0,0046ng/ml, p=0.0182).
Conclusion: In this pilot study phoenixin plasma concentration did not differ between heart failure patients and controls. Interestingly, its level was found to negatively correlated with left atrium area in HFrEF subjects and was significantly lower in patients with persistent atrial fibrillation compared to patients with sinus rhythm. Further studies are needed to fully elucidate phoenixin involvement in cardiovascular disease, and particularly heart failure, pathophysiology.

P350

Determinant factors of plasma fibroblast growth factor 23 levels in patients with heart failure patients with reduced ejection fraction

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Background: Fibroblast growth factor 23 (FGF-23) is an important regulator of the phosphorus homeostasis as well as the bone and mineral metabolism. FGF-23 displays also multiple direct effects on cardiac function and seems to participate to adverse cardiac remodeling. Several recent studies demonstrated that FGF-23 is a strong and independent predictor of adverse events in patients with heart failure (HF). Two types of assays are available to assess FGF-23 levels, those measuring the intact hormone (iFGF-23) and those targeting the C-terminal parts (C-term FGF-23).
Purpose: To examine which factors determine plasma C-term FGF-23 and iFGF-23 in HF patients with reduced ejection fraction (HFrEF).
Methods: Our evaluation included one hundred and seven chronic HF patients (women n=24; men n=83; NYHA II-IV; mean age: 66 years; mean EF: 23 %). A two-site enzyme immunoassay and an automated chemiluminescent immunoassay were used to measure levels of C-term FGF-23 and iFGF-23, respectively. We statistically analyzed the correlation between plasma C-term FGF-23 and iFGF23 levels and several variables including age, EF, estimated glomerular filtration rate (eGFR) and several biomarkers.
Results: Median levels of C-term FGF-23 and iFGF-23 were 169.1 RU/mL and 128.2 pg/mL, respectively. On univariate analysis, plasma C-term FGF-23 levels were significantly correlated with EF, eGFR, calcium, PTH 1-84, 1,25(OH)2 vitamin D, BNP, NT-proBNP, Galectin-3 and sST2. Plasma iFGF-23 levels were significantly correlated with age, EF, eGFR, PTH 1-84, 1,25(OH)2 vitamin D, BNP and Galectin-3. No significant difference was observed between women and men, either of C-term FGF-23 or I FGF-23. On multiple linear regression analysis, sST2 was the strongest independent determinant factor of plasma C-term FGF-23 levels and PTH 1-84 was the strongest independent determinant factor of plasma iFGF-23.
Conclusion: In patients with HFrEF, the strongest determinant factors of plasma C-terminal FGF-23 and intact FGF23 levels are respectively sST2 and PTH 1-84.

P351

Role of exhaled metabolites of biogenic amines in diagnostics of heart failure

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Background. Currently, cardiovascular diseases (CVD) occupy the first place in the structure of morbidity and mortality of the population. As is well known, in the pathogenesis of CVD, metabolic biogenic amines are of particular importance. According to the literature, ischemic heart disease (IHD), complicated by heart failure (HF), a high content of catecholamines in blood plasma and their increased excretion with urine is noted. Cathecholamines standing out in excess, as biochemically active substances, can have a significant impact on the development of the disease, and its outcome. To date, it has been shown to increase the intensity of lipid peroxidation (LPO) in CVD in both acute and chronic forms.
Aim. Purpose of our study was to determine volatile metabolites of biogenic amines - secondary alkylamines (diethylamine) in exhaled air (EA), formed as a result of deamination of catecholamines . To determine diethylamine in explosives, colorimetric and gas analytical methods were used.
Materials and methods: The studied patients (40 people) in the hospital were randomly assigned to 2 groups: the first group (control) consisted of 20 clinically healthy men aged from 30 to 44 years; the second group – 20 men aged (32-50 years) with HF.
The obtained samples of explosives by thermal degassing were evaluated using an amine gas analyzer. Examination of patients with HF was carried out at admission, then at discharge for 10-12 days after treatment.
Results: In the group of clinically healthy men, the indicator of volatile amines in EA was 74 ± 2 10^9 g/l. The maximum level of volatile metabolites of biogenic amines in explosives in the second group was recorded on the first day and amounted to 207 ± 42 10-9 g / l, which is 179.7% higher than the control level. And on the 10-12th day the level of diethylamine dropped to 160 ± 37 10-9 g / l.
Conclusion: The increased content of diethylamine in explosives is apparently due to the impaired function of the sympathetic-adrenal system (SAS) in IHD. Nowadays, it is considered that as a result of deamination of catecholamines , secondary alkylamines are formed, in particular, diethylamine. In the process of lipid peroxidation, Schiff bases are formed. Under cellular hypoxia, under the conditions of the shift of SAS and an increase in the concentration of adrenaline (A), Schiff bases are transformed into secondary alkylamines. As is well known, a stressful situation aggravates hypoxia, which contributes to increasing adrenaline concentration and at the same time stimulates LPO. Therefore, increasing the concentration of Schiff bases and adrenaline leads to the formation of secondary amines. This effect significantly increases the concentration of alkylamines, in particular diethylamine.
The results we obtained, taking into account the literature data, indicate the need to monitor the state of SAS in patients with HF.

P352

Differences in the expression of the novel cardiac biomarkers sST2, GDF-15, suPAR and H-FABP in HFpEF, ICM and DCM patients

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Background: Heart failure represents an ongoing therapeutic and diagnostic challenge to date with a considerable impact on morbidity, hospitalisation rates and health-care costs. Cardiac biomarkers have shown impressive results in risk

stratification and monitoring over the last years and provide great potential as a possible discriminator between different heart failure entities.
Purpose: The aim of this analysis was to analyse four novel cardiovascular biomarkers, namely sST2, GDF15, suPAR, and H-FABP in different heart failure entities (ischaemic cardiomyopathy, ICM; dilated cardiomyopathy, DCM; and heart failure with preserved ejection fraction, HFpEF).
Methods: In total, 252 patients have been included in this study. 77 patients diagnosed with DCM, 62 patients with ICM, and 18 patients diagnosed with HFpEF were enrolled. Additionally, 95 patients without coronary artery disease (excluded by coronary angiography) or signs of acute or chronic heart failure were included as control group. During outpatient visits, serum samples of all patients were obtained and analyzed for sST2, GDF-15 (inflammation, remodelling), suPAR (inflammation, remodelling) and H-FABP (ischemia) by means of ELISA.
Results: Levels of sST2 were significantly elevated in ICM and DCM patients compared to the control group ($p<0.0001$). No significant differences between HFpEF patients and the control group were observed for sST2. Regarding GDF-15, a significant elevation was evident for all heart failure entities compared to controls ($p<0.005$) with no significant differences between the respective groups. For H-FABP, a significant elevation of all heart failure entities was observed compared to the control group ($p<0.0001$). However, H-FABP levels in HFpEF were significantly lower compared to ICM and DCM patients ($p<0.0001$). Similar to sST2, levels of suPAR were significantly elevated in ICM and DCM patients compared to the control group ($p<0.0001$) and HFpEF patients ($p<0.01$) with no significant differences between HFpEF patients and controls.
Conclusion: By means of different expression patterns, novel cardiovascular biomarkers represent a promising tool to further distinguish between different heart failure entities. Multimarker measuring could thereby facilitate diagnosis, risk stratification and therapy monitoring in heart failure patients.

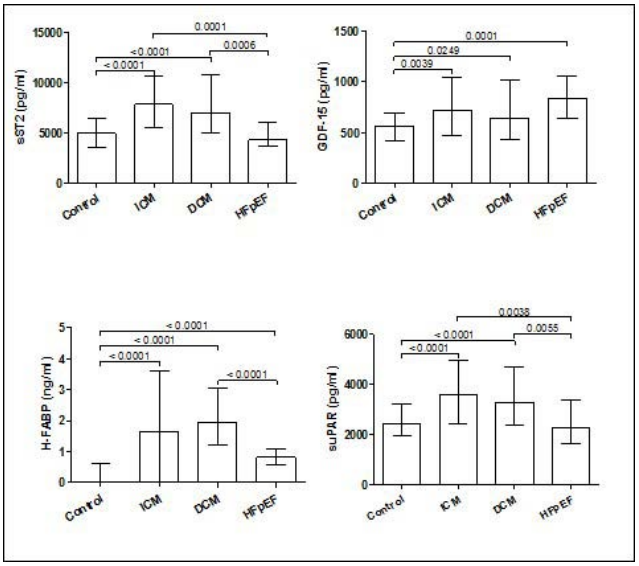

Figure I: Comparison of biomarker levels

Chronic Heart Failure - Treatment

P353
Ventricular arrhythmias in patients with continuous-flow left ventricular assist devices

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Introduction: Ventricular arrhythmias (VAs) pose a significant burden in patients with continuous flow left ventricular assist devices (cfLVADs). However, the incidence, risk factors, and impact on survival are not yet well-described.
Hypothesis: We hypothesized that there were demographic, hemodynamic, and comorbid condition parameters that would predict post-VAD arrhythmias and mortality.
Methods: We performed a retrospective analysis of 37 consecutive patients undergoing placement of cfLVADs between February 2008 and December 2018. Exploring the outcomes of early VA (occurring during the index hospitalization), late VA (occurring after discharge) and death, we compared demographic, comorbid, pharmacologic, and clinical data. Time to event analyses were undertaken to identify predictors of the outcomes.
Results: Most subjects were men (83%) with non-ischemic heart failure (70%) and an ICD (92%) in place.No deaths were obswerved. Pre-LVAD VA , chronic kidney disease and diabetes independently correlated with the incidence of arrhythmias in the time to event analysis. Pre-LVAD VAs occurred in 30 (29%) patients whereas post-LVAD VAs occurred in 33 (31%). The median time to an early VA was 6 days in the 19 patients with an event during the index hospitalization. Patients with an early VA were older
and had a lower pre-operative RVSP (23 vs. 29, p=0.03). Late VAs occurred in 19 (23%) of the 82 patients surviving the index hospitalization. The median time to event was 219 days. Predictors of time to late VA included pre-LVAD appropriate ICD therapy and baseline antiarrhythmic use .
Conclusions: Ventricular arrhythmias following LVAD placement are common and predicted by pre-LVAD arrhythmia and ICD therapy, comorbid conditions and medication use. For the rare patient without an ICD placed pre-LVAD, post-operative implantation should be considered.

P354
Treating advanced heart failure patients with biventricular assist devices in a low organ donation environment

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BACKGROUND: Heart transplantation remains the gold standard treatment for patients with end stage heart failure. Low organ donation combined with delayed referral of advanced-stage cardiomyopathy patients necessitates biventricular assist device (BiVAD) support for extended period of time.
METHODS: We retrospectively reviewed the records of the patients treated with this paracorporeal device between June 2004 and December 2018 at our institution. patients (mean age 41.9+-13.3 years, range 11 to 59 years) were supported as a bridge to transplantation. Eighty out of 90 patients were in INTERMACS 1 Level while 15 of them had survived after a successful resusctation (intravenous inotropes, 60; ventilated, 10; mean: CI 1.9 L/min/m2; CVP 19 mmHg; total bilirubin 3.75 mg/dl; NT-proBNP, 35,500 pg/ml). Various short-term devices were used as a bridge to bridge (IABP: 62, Impella:2, Levitronix:2 and ECMO:6). Two patients needed a BiVAD after left ventricular assist device support of 439 and 295 days, respectively.
RESULTS: Thirty day, 180 day, and 1 year survival after implantation (excluding transplanted patients) was 78%, 87% and 80% respectively. Forty nine of them were transplanted and seven are ongoing. Mean time on support was 781 days and 1 out of 90 patients with adult-sized pumps were discharged home with a mobile driver. Thirty patients exceeded 2 years of uncomplicated support before they were transplanted. One of our patients was successfully transplanted after 1460 days of support. One patient with renal failure and dialysis dependence lived at home 3.5 years after implantation. Complications included infection (n=15), bleeding requiring reexploration (n=12), and thromboembolic events (n=20). Thirty four patients died during support due to different reasons. Early mortality was due to multiorgan failure while late mortality regarded mostly cerebrovascular complications.
CONCLUSIONS: Support with BiVAD offers an acceptable rate of survival to heart transplantation. Furthermore, the use of a BiVAD itself does not confer an increased morbidity or mortality, and overall outcomes with this device are comparable to that of implantable LVADs if used strategically in severe congestive heart failure. With the institution of meticulous wound care, morbidity has been significantly reduced, and management as an outpatient is achievable, however readmissions are still frequent.

P355
Coronary flow reserve estimated by 82-rubidium positron emission tomography predicts survival in long-term heart transplant recipients

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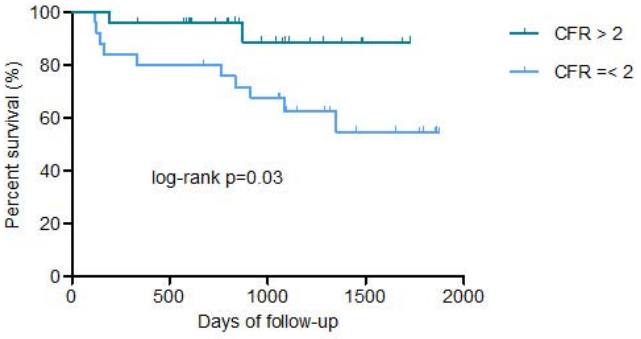
Funding Acknowledgements: The Danish Heart Foundation, The Research Fund of Rigshospitalet

Background: Cardiac allograft vasculopathy (CAV) is a leading cause of mortality in heart transplant (HTx) recipients and non-invasive methods to assess and risk stratify patients are highly desirable. Coronary flow reserve (CFR) estimated by 82-rubidium positron emission tomography (82-Rb PET) is affected by both epicardial and microvascular disease and might thus be a reliable tool. This study aimed to investigate the predictive value of CFR after HTx.
Patients and methods: This is a single-centre retrospective study of consecutive HTx recipients receiving 82-Rb PET at our hospital, Denmark, between April 2013 and July 2017. In total 50 patients were eligible for inclusion based on available CFR measurement. 82-Rb PET was performed as part of annual CAV surveillance post HTx in patients not suitable for invasive evaluation. As a CFR value of 2.0 or greater

is widely accepted as normal in clinical practice patients were grouped according to CFR: (i) high-CFR group: CFR > 2 (n=25 (50%)) versus (ii) low-CFR group: CFR ≤ 2 (n=25 (50%)). Presence of CAV at the time of 82-Rb PET was determined by coronary angiography or intravascular ultrasound (IVUS).
Results: Median (IQR) age at time of 82-Rb PET was 57 years (43-68) and 68% were male. There was no significant difference among groups (p=0.31 and p=0.23, respectively). Median time from HTx to 82-Rb PET was 121 months (81-194) with no difference between groups (p=0.15). Median follow-up time from 82-Rb PET was 29 months (20-40) in the high-CFR group and 36 months (25-48) in the low-CFR group (p= 0.26). 12 (24 %) patients died of all-cause mortality during follow-up. In the high-CFR group median CFR was 2.43 (2.26-2.81) and in the low-CFR group median CFR was 1.64 (1.36-1.88). In 28 patients (58%) CAV was present at time of 82-Rb PET with no significant difference among groups (p=0.13). Presence of CAV was determined by IVUS (maximal intimal thickness (MIT) ≥ 0.5 mm) in 11 (39%) patients and by coronary angiography in 17 (61%) patients. In 1 (2%) patient CAV was diagnosed during follow-up and in 1 (2%) patient a percutaneous coronary intervention (PCI) was performed during follow-up. Survival function stratified by CFR group was estimated by Kaplan Meier (figure 1) and there was significant difference between the high-CFR group and the low-CFR group (log-rank test p=0.03).
Conclusion: CFR obtained by 82-Rb PET predicts survival in selected long-term HTx patients and holds promise as a non-invasive method for CAV surveillance and risk-stratification after HTx.

Figure 1. Kaplan meier



P357
Is there a mortality weekend effect in cardiac transplantation?
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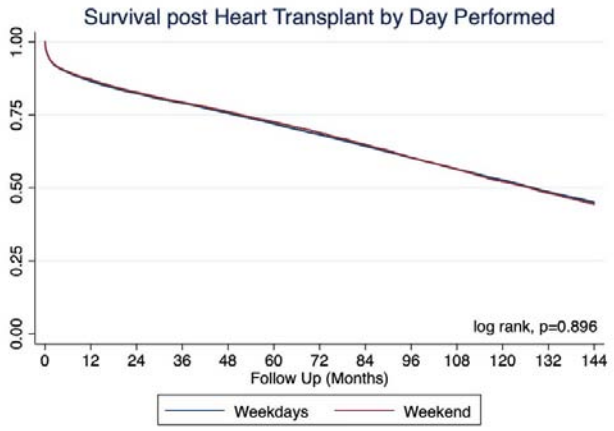
BACKGROUND: Cardiac transplant surgeries can be complicated, prolonged, resource-heavy procedures that may be affected by the timing of the surgery.
PURPOSE: We analyzed the UNOS database to evaluate for a "weekend effect" on mortality comparing transplant surgeries that occurred on a weekday versus during the weekend.
METHODS: We conducted a retrospective, cohort analysis of the UNOS Organ Registry of all heart-only transplant patients from 1987 to 2018 comparing mortality rates between weekday transplants (WDT) versus weekend transplants (WET). The exclusion criteria included age <10, patients lost to follow-up, multi-organ transplants, and re-do heart transplants. A multivariate Cox proportional hazard regression analysis (adjusted for age, sex, diabetes, race, ischemic time, need for dialysis, on life support, wait time, and HLA mismatch) was performed. Survival was censored at 12 years.
RESULTS: 55,670 patients received heart transplants between 1987-2018 per the UNOS Organ Registry, of which 40,504 patients received a transplant on a weekday and 15,166 patients received a transplant during the weekend. Overall, the mortality for WDT versus WET were 52% and 52% (p=0.98), respectively. The breakdown of cardiovascular and non-cardiovascular mortality were similar for both WDT (15.8%, 36.2%, respectively) and WET (15.8%, 36.2%). Furthermore, there was no significant difference in cause of death between WDT vs WET, looking specifically at graft failure, rejection, infection, cardiovascular, malignancy, multi-organ failure, and other.
CONCLUSIONS: Based on this retrospective, cohort analysis of the UNOS Organ Registry there was no mortality "weekend effect" observed for cardiac transplantation surgeries.



Mortality Post-Transplant

P358
Pregnancy in patients with pre-existing cardiomyopathy and in cardiac transplant patients
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Introduction: Pregnancy in patients with pre-existing cardiomyopathy or after orthotopic heart transplantation (OHT) represents a high risk both for mother and her child. Therefore, pregnancy is not generally recommended. This case series describes successful outcome of pregnancies in such a cohort of patients.
Methods: We reviewed retrospectively the clinical data of mothers and their children, the course of delivery and complications in the early postpartum period in a high volume transplant center.
Results: In 5 mothers with pre-existing cardiomyopathy, we documented a total of 7 births of 8 healthy children (maternal age 32 ± 7 years, week of delivery 34 ± 4, child birth weight 2220 ± 454 grams). Three patients had dilated cardiomyopathy (DCM) with borderline left ventricular function and 4 pregnancies were carried without any complications. One additional patient with DCM with severe left ventricular dysfunction accomplished two pregnancies despite negative recommendation, the first one complicated with bilateral heart failure and mild pulmonary embolism. Last patient presented clinically with hypertrophic cardiomyopathy, later diagnosed as Danon disease. She became pregnant, developed severe heart failure and required OHT after delivery.
In 4 mothers after OHT (3 patients had DCM as primary disease and 1 left ventricular noncompaction) we recorded 4 deliveries (maternal age 31 ± 3 years, months after the transplantation 67 ± 38, week of delivery 31 ± 4, birth weight 1882 ± 571 grams). During the pregnancy, drug therapy was minimized and immunosuppressives reduced to a combination of tacrolimus and corticoids. One gravidity was complicated with preeclampsia. All the delivered children were hypotrophic, but otherwise in a good health condition. One child developed later incipient cardiomyopathy.
Conclusions: Pregnancy is not recommended in patients with advanced forms of cardiomyopathy and/or after OHT. However, if the future mother accepts the risks, the pregnancy could be carried out relatively safely, employing specific management and close follow up.

P359
Use of idarucizumab to reverse the anticoagulant effect of dabigatran in cardiac transplant surgery. a multicentric experience in spain
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INTRODUCTION AND OBJECTIVES: Anticoagulation in heart transplant (HT) recipients increases the risk of serious hemorrhagic complications during the perioperative period, so the urgent and correct reversal of anticoagulation is of great importance. Dabigatran, a direct thrombin inhibitor, is increasingly being used for anticoagulation in patients with non-valvular atrial fibrillation (NVAF) whose effect can be reversed by idarucizumab in situations where urgent surgery such as a HT may be needed. Aim: To present the preliminary experience of the use of idarucizumab for the urgent reversal of dabigatran in patients receiving a HT in Spain.
METHODS: Observational study, carried out in 12 adult HT Spanish centers to analyze the clinical outcomes of the use of Idarucizumab (5 mg) for urgent reversal of dabigatran effects at the HT surgery.
RESULTS: 53 patients were included, 81.1% male. One patient required a rescue dose. 7.5% required redo surgery in the immediate postoperative period to control bleeding and 66% needed transfusion of blood products. The average length of stay in the intensive care unit was 5 days and the total hospital stay was 23 days. The 30-day survival was 92.4% . There were 4 deaths during hospitalization, three of them in the first five days after HT. In 3 cases, death was not related to bleeding. In one case, a patient transplanted because a congenital heart disease with previous sternotomy, death occurred at 2 days post-HT associated to surgical problems, right ventricular failure, cardiac arrest and bleeding (bleeding ocurred 12 hours after HT surgery)
CONCLUSION: These results may support the use of dabigatran as an alternative to vitamin K antagonists in patients with HT who require anticoagulation for NVAF. More studies are needed to corroborate these observations.

P360

Regenerative therapy in patients with ischemic cardiomyopathy from cardiac transplant waiting list

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Introduction . The possibility of use of mononuclear cord blood stem cells may have a good perspective from the point of view of better safety and efficiency in the restoration of myocardial contractility. However, until now we have very poor clinical data about the delivering of this kind of stem cells in patients with ischemic cardiomyopathy with resistant heart failure.
Materials and methods. We have studied 190 patients with ischemic cardiomyopathy, which are set in a waiting list on the heart transplantation. Instrumental investigation included ECG, cardiac ultrasound techniques, ventriculography. The patients were divided into three groups due to the treatment: coronary artery bypass (66 patients), coronary artery bypass and intravenous transplantation of stem cells (86 patients), conservative therapy (38 patients).
Results. Comparing the efficiency of therapy with umbilical cord blood stem cells in ischemic cardiomyopathy, a reduction in cardiovascular and total mortality was demonstrated by 24,4%, with reliable relative risk 2,61 [1,38 – 4,94] and a odds ratio 1,61 [1,52 – 8,83]. Comparing the efficiency of surgical treatment without cell transplantation and coronary artery bypass with cell transplantation in ischemic cardiomyopathy patients has been shown decrease of cardiovascular and total mortality by 14,0%, RR of 1,90 [1,02-3,57] and OR of 2,27 [1,03 - 5,03]
According to the changes of the data of Strain Rate Imaging after the administration of cord blood stem cells, all patients were divided into groups of "good" and "poor" responders. It has been established that in the cluster of "good responders", after 12 months of stem cells transplantation, certain parameters that characterize the systolic (S, *v*) and diastolic (e, a) functions of the left ventricle improved significally, while in the cluster of "poor responders" the changes were unreliable or even the worsening of the indexes of diastolic blood flow were set ($p<0.05$).
Conclusion: the delivering of umbilical cord blood stem cells can be used as an additional useful procedure for patients with ischemic cardiomyopathy, which are set in the waiting list for heart transplantation.

P361

The impact of extracorporeal photopheresis on peripheral blood leukocyte subclasses in heart transplant recipients

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Background: The efficacy of extracorporeal photopheresis (ECP) beside standard immunosuppressive therapy in the management of cardiac allograft rejection is proven. However, data regarding its effect on the individual leukocytes still remain elusive. The CD3 cell surface marker is expressed by each mature T cell, CD4 by helper T cells (Th), CD8 by cytotoxic T cells (Tc), while CD19 by B cells. Th and Tc cells can differentiate into either effector cells participating in the maintenance of transplant rejection or into regulatory cells playing a role in the suppression of rejection. Both B cells and natural killer cells (NK) contribute to allograft rejection, while regulatory T cells (Treg) play an important role in its termination.
Purpose: We aimed to evaluate the effect of ECP on peripheral blood leukocyte subclasses in adult Hungarian heart transplant recipients.
Methods: The retrospective study analysed the outcomes of 9 patients between September 2013 and December 2018 who underwent heart transplant for end-stage heart failure. We studied the absolute value and proportion of CD3+, CD4+, CD8+, CD19+ cells, NK cells and Treg cells measured by fluorescence activated cell sorting both before and after the ECP treatment period. The grade of rejection was analysed in transvenous endomyocardial biopsies. Data values were characterized by either mean±standard deviation or median(min-max).
Results: The patients underwent 30(12-39) ECP treatments beside standard immunosuppressive therapy. The absolute value and the proportion of CD3+ and CD4+ T cells increased significantly at completion of the ECP therapy (CD3+ T cells: 0.56 G/l±0.35 G/l vs. 0.81 G/l±0.46 G/l; p=0.027 and 6.04%±3.37% vs. 10.72%±6.17%; p=0.025; CD4+ T cells: 0.33 G/l±0.28 G/l vs. 0.49 G/l±0.41 G/l; p=0.038 and 3.34%±2.37% vs. 6.20%±3.78%; p=0.017, respectively). There was also a significant increase in the proportion of CD8+ T cells (2.45%±1.50% vs. 4.37±3.08%; p=0.036). We observed a fairly significant twofold increase in the proportion of Treg cells after the ECP treatment period (0.19%±0.23% vs. 0.38%±0.21%; p=0.057). The absolute value of B cells and NK cells did not reveal any significant rise. The average grade of cellular rejection improved significantly with approximately one class (gr. 1,22±0,44 vs. gr. 0,50±0,53; p=0,048) and also the humoral rejection moderated after the ECP treatment period.
Conclusion: The ECP therapy may support the predominance of Th and Tc cell subpopulations with anti-inflammatory properties which is confirmed by the improvement of the average grade of both cellular and humoral rejection. Furthermore, the increase of Treg cell count is assumable. Although, the small sample size and the effect of the medical therapy on the leukocytes may present some limitations. Subsequently, for improved understanding of the immunomodulatory effect of ECP, further studies are required focusing both on additional CD cell surface markers and on cytokines.

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Is there a mortality weekend effect in cardiac transplantation for patients with Adult Congenital Heart Disease?

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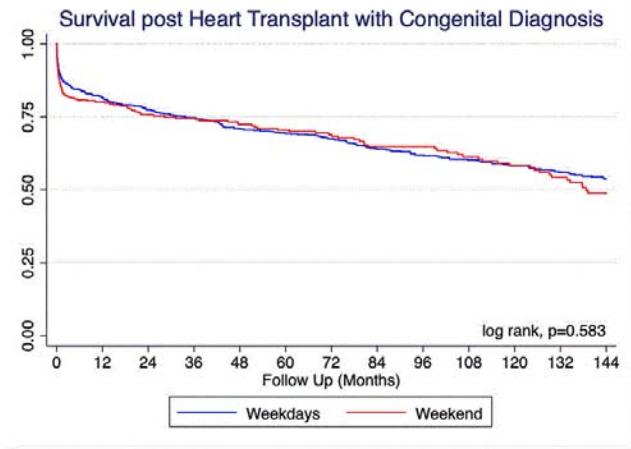
BACKGROUND: Cardiac transplant surgeries can be complicated, prolonged, resource-heavy procedures that may be affected by the timing of the surgery, especially in adult patients with a history of congenital heart disease (ACHD).
PURPOSE: We analyzed the UNOS Organ Registry to evaluate for a "weekend effect" on mortality for transplant surgeries that occurred on a weekday versus the weekend in ACHD patients.
METHODS: We conducted a retrospective, cohort analysis of the UNOS Organ Registry of all heart-only ACHD
transplant patients from 1987 to 2018 comparing mortality rates between weekday transplants (WDT)
versus weekend transplants (WET). The exclusion criteria included age <18, patients lost to follow-up,
multi-organ transplants, and re-do heart transplants. A multivariate Cox proportional hazard regression
analysis (adjusted for age, sex, diabetes, race, ischemic time, need for dialysis, on life support, wait time, and HLA mismatch) was performed. Survival was censored at 12 years.
RESULTS: 1,244 ACHD patients received heart transplants between 1987-2018, of which 923 patients received a transplant on a weekday and 321 patients received a transplant during the weekend. Overall, the mortality for WDT and WET were 41.2% and 41.4% (p=0.63), respectively. The unadjusted and adjusted hazard ratios for WET are 1.00 (p=0.90; 95% CI 0.97-1.03) and 1.00 (p=0.93; 95% CI 0.97-1.03), respectively. The breakdown of cardiovascular and non-cardiovascular mortality were similar between both groups: WDT (16.0%, 25.1%, respectively) and

WET (17.1%, 24.3%, respectively). There was no significant difference in cause of death between WDT vs WET (e.g. graft failure, rejection, infection, cardiovascular, malignancy, multi-organ failure, and other causes).
CONCLUSIONS: Based on this analysis of the UNOS Organ Registry, there was no mortality "weekend effect" observed for ACHD patients undergoing cardiac transplantation surgery, even though ACHD patients can potentially be a more complicated subset of surgical patients.



ACHD Transplant Survival

renal replacement therapy compared to 65% of patients in the nonTT group (p<0.001). Furthermore, the rate of primary graft failure requiring MCS was 53%, nearly 4 times higher in the TT group (14% vs 53%; p<0.001). As expected TT patients experienced longer mechanical ventilation (3.7±4.2 vs 33.2±31.5 days in the TT group; p<0.001) and longer ITU stay (7.1±4.9 vs 34.6±23.3; p<0.001). Despite comparable 30-day mortality between the groups, 90-day mortality was significantly higher in the TT group (29% vs 12%; p=0.009).
Conclusions: In our cohort, one-third of OHT patients required TT. The procedure was safe. Risk factors for TT included previous stroke/TIA, pre-transplant MCS, longer CPB time and higher maximum SOFA score in the first 24 hours post OHT. TT was performed in patients requiring multiple-organ support in addition to prolonged mechanical ventilation.

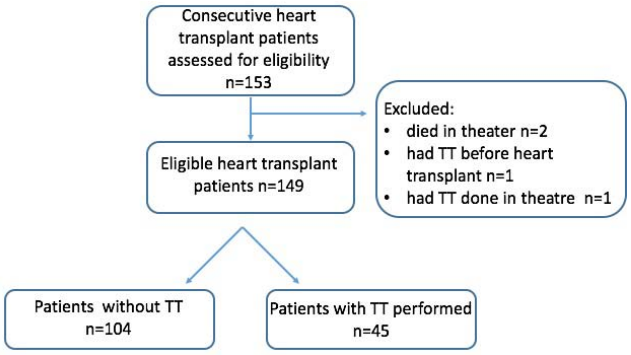


Fig 1. Study flow chart

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Tracheostomy after orthotopic heart transplantation

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Background: Tracheostomy (TT) is commonly performed after cardiac-surgery when prolonged mechanical ventilation is required. The main benefits of TT include a reduction in sedation requirement, avoidance of laryngeal injury, airway protection, improvement in patient comfort and allowance of gradual ventilatory weaning. Data regarding TT after orthotopic heart transplantation (OHT) is limited.
Purpose: To describe prevalence, timing and safety of TT in patients after OHT and identify subgroups of patients at highest risk of TT.
Methods: We retrospectively reviewed 153 consecutive OHT patients in our centre between 2013 and 2018.
Results: In total 149 OHT patients were analysed as shown in the flow chart (Fig 1). One-third of them required TT (n=47; 30.2%) during ITU stay. The majority of TT was performed percutaneously (91.1%). Mean time from ITU arrival to TT was 12.3±6.8 days. There were no life-threatening complications related to the procedure (major bleeding, pneumothorax, pneumomediastinum, tube misplacement or cardiac arrest). However, over half of the patients (53.3%) received red blood cell transfusion (on average 313 ml) during the first 24 hours post TT.
Comparison of baseline characteristics showed that patients were of similar age in both groups (44±14 vs 46±16 years in the TT group; p=0.546), however the rate of both previous stroke/TIA (11% vs 27% in the TT group, p=0.013) and pre-transplant mechanical circulatory support (MCS) (35% vs 53% in the TT group; p=0.036) were significantly higher in the TT group. In univariate logistic regression analysis both previous stroke/TIA (OR 3.1; 95% 1.2-7.6; p=0.016) and MCS prior to OHT (OR 2.1; 95% 1.1-4.3; p=0.038) were significantly associated with the risk of TT. Moreover, longer cardiopulmonary bypass (CBP) time was related to the risk of TT (OR 1.1; 95%; 1-1.01; p=0.014) as well as higher maximum SOFA score in the first 24 hours after OHT (OR 1.2; 95% 1.1-1.4; p=0.08).
Postoperative characteristics revealed that the majority of TT patients required additional organ support. Nearly all patients (98%) who received TT experienced

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Bicaval vs biatrial anastomosis techniques in orthotopic heart transplantation: an updated analysis of the UNOS database

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Background: Despite the significant increase in the number of orthotopic heart transplants (OHT) performed annually using the bicaval anastomosis technique, the impact on long-term outcomes remains a topic of debate. We analyzed the United Network for Organ Sharing (UNOS) database in search of the latest insight.
Methods: We performed an updated analysis using the UNOS database from 2006 to 2016 to identify first-time OHT recipients. Patients were primarily stratified according to anastomosis technique: bicaval vs biatrial. Baseline characteristics and clinical status were recorded. The primary end-point was all-cause mortality. Secondary outcomes included need for postoperative permanent pacemaker (PP), and length of hospital stay (LOS). Kaplan-Meier was used to compare survival between the two groups. Cox proportional hazards regression model was used to conduct multivariable analysis and to obtain adjusted hazard ratio (HR). Statistical significance was established at p <0.01.
Results: A total of 21,597 patients were identified. Of those who met inclusion criteria, 16,573 (77%) underwent bicaval anastomosis. Both groups had similar baseline characteristics. The bicaval anastomosis technique was not associated with increased survival during the study period (HR 0.97, p = 0.3557). The bicaval group required less post-operative PP placement (2.51% vs. 5.79%, p <0.001) and was associated with shorter LOS on multivariable analysis (t associated with the anastomosis technique was -3.45 (p = 0.006), and 95% confidence interval for the unstandardized regression coefficient (b) was 0.94 – 0.98). The adjusted mean LOS for the bicaval group was 16.7 days versus 17.3 days for the biatrial group.
Conclusions: The use of either bicaval or biatrial anastomosis during orthotopic heart transplant offers comparable survival advantage. Nonetheless, bicaval anastomosis is associated with less need for postoperative PP and slightly shorter LOS.

Table 1. Baseline characteristics

		Bicaval (*N* = 16,573)	Biatrial (*N* = 5,024)	*p*-value
Demographics	Recipient age	53 (12.6)	53 (12.4)	0.0103
	Female	4202 (25.35)	1201 (23.91)	0.0377
	Ethnicity			0.0071
	White	11036 (66.59)	3459 (68.85)	
	Black	3482 (21.01)	961 (19.13)	
	Hispanic	1312 (7.92)	405 (8.06)	
	Others	743 (4.48)	119 (3.95)	
Acuity	Recipient BMI	27 (4.89)	27 (4.96)	0.5253
	Creatinine	1.35 (0.97)	1.32 (0.77)	0.0186
	Diabetes*	4592 (27.76)	1410 (28.17)	0.5756
	Inotropes	6752 (40.74)	1701 (33.86)	<.0001
	Mechanical ventilation	259 (1.56)	78 (1.55)	0.9591
	Ischemic time	3 (1.03)	3 (1.10)	0.4060
	Donor mean age	32 (11.65)	31 (11.47)	<.0001

Table 2. Multivariable Cox Proportional Hazards Regression Model

Risk Factor	HR (95% CI)	*p*-value
Bicaval vs. Biatrial	0.97 (0.91-1.04)	0.3557
Age	1.00 (1.00-1.01)	0.1825
Gender	1.00 (0.94-1.08)	0.8481
Ethnicity		
Blacks	1.25 (1.16-1.34)	<.0001
Hispanics	1.01 (0.90-1.12)	0.9304
Others	0.96 (0.82-1.11)	0.5581
BMI	1.01 (1.01-1.02)	<.0001
Creatinine	1.06 (1.05-1.10)	<.0001
DM	1.23 (1.56-1.31)	<.0001
Inotropes	0.96 (0.91-1.02)	0.1927
Mechanical ventilation	1.59 (1.32-1.92)	<.0001
Ischemic time	1.10 (1.07-1.13)	<.0001
Donor age	1.01 (1.00-1.00)	<.0001
Transplant year	0.98 (0.97-0.99)	0.0022

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Diastolic function evaluation in heart transplantation

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Background. Diastolic dysfunction is an early marker of acute rejection and a severity-defining hallmark of cardiac allograft vasculopathy in transplanted hearts. Its non-invasive definition and classification suffer long-standing conflictual evidence. This may be due to morphological and functional specificities of transplanted hearts, such as the post-surgical biatrial enlargement that may reduce left atrial (LA) compensation to progressive end-diastolic left ventricular pressure (EDP) increase, but also denervation, ischemia-reperfusion injury and acute and chronic rejection.
Purpose. To evaluate how current echo guidelines and usual measures stratify heart transplanted (HTx) patients according to their diastolic function; to seek for more reliable non-invasive parameters for diastole evaluation in HTx subjects.
Methods. We conducted a two-phase study. In the first one, we retrospectively enrolled 122 asymptomatic rejection-free HTx and controls subjects in 1:1 ratio. In the second one, we prospectively enrolled 20 asymptomatic HTx patients (mean HTx age 8.7 ± 5.3 years) who were hospitalized for routine follow-up coronary angiography, without systolic dysfunction and irrespectively of rejection history. Invasive EDP measurement during left heart catheterization and transthoracic echocardiogram were performed within one hour.
Results. In the preliminary study, controls and HTx subjects did differ (p<0.005) in A velocity (respectively, 0.8 ± 0.1 vs 0.43 ± 0.12 m/s) and Global peak atrial longitudinal strain (PALS) (31 ± 9.2 % vs 12.2 ± 5.7 %), thus showing LA dysfunction in HTx. According to echo guidelines, there was a proportionate distribution among the four grades of diastolic dysfunction in controls (normal: 51.6%; grade 1: 38.7%; grade 2: 9.7%; grade 3: 0%), whereas a U distribution was observed in HTx group with virtual disappearance of intermediate grades (normal: 51.7%; grade 1: 1.7%; grade 2: 1.7%; grade 3: 45%). In the prospective study, besides finding a similar distribution, no echo parameter did show a significant correlation in univariate and multivariate regression analysis with EDP but two, that were E DecT (R -0.53, p =0.03) and isovolumic relaxation time (IVRT) (R -0.55, p =0.02). We then divided the population according to a strict cutoff of increased EDP, i.e. 13 mmHg. In HTx patients with normal-high EDP (>13 mmHg) compared to those with normal-low EDP (≤13 mmHg), IVRT and E DecT were significantly reduced (respectively, 80.2 vs 95.7 ms, p =0.04; 152.1 vs 178.5 ms, p =0.03). Finally, when ROC curves were calculated, among IVRT, E DecT, E/A, E/e', Global PALS and Global longitudinal strain, IVRT and E DecT were the best predictors of increased EDP (respective AUC 0.82 and 0.77).
Conclusions. Usual non-invasive parameters of diastolic function alone imprecisely stratify HTx patients. Other echo measures, such as E DecT and IVRT, might be more reliable and considered for routine use in these patients.

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Mortality risk factors in patients from a heart transplantation waiting list

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Purpose. To study clinical differences of chronic heart failure (CHF) patients who were included in a heart transplantation waiting list (HTx WL) and to estimate their survival.
Methods. We retrospectively analyzed HTx WL data that was collected from 2010 to 2017 and included 151 patients: mean age 47.4±12.8 yrs, male – 113 (75%), BMI – 24.5±4.5 kg/m^2, LVEF (Simpson) 20.8±7.9%, LVEDV - 266±110 ml, TAPSE – 1.3±0.5 cm, pulmonary vascular resistance (PVR) – 3.5±1.5 W.U., mean pulmonary artery pressure (PAP) - 32±13 mm Hg. Causes of CHF were: IHD – 61 (40%), DCM – 66 (44%), non-compacted myocardium – 9 (6%), transferred myocarditis – 4 (3%), RHD – 3 (2%) and others – 8 (5%). Patients were divided into 2 groups: 1st group – survivors in a HTx WL (n=110), 96 of patients underwent heart transplantation (HTx) and 14 of them improved (n=14); 2nd group – patients who died in a HTx WL (n=41). Data were analyzed by using the Statistical Package 'STATISTICA 10.0' (StatSoft Inc., USA).
Results. The duration of stay in a HTx WL was 96 (range 31-192) days and deceased patients spent less time in a HTx WL than survivors (37.0 vs. 115.5 days, =0.004). In 17 (41%) patients death from the moment of inclusion in a HTx WL occurred within 1 month. We found the following differences in deceased patients: lower incidence of IHD (=0.03) and more frequent occurrence of pulmonary embolism (PE), CHF class IV (<0.001) and inotrope-dependent patients (<0.001). In patients who died during their 1st month in a HTx WL a greater degree of mitral regurgitation (MR) was found than in those who died in long-term follow-up (=0.036). In a severe CHF decompensation, survival depended on the urgent implantation of mechanical circulatory support (MCS) or HTx. From 2010 to 2011 the frequency of CHF surgical treatment increased from 20% to 55% and was on the same level from 2012 to 2014 (=0.001) and during the following years. Moreover, in 2015-2017, compared with 2010-2011, patients' mortality significantly decreased (Cox'sF-Test: =0.04). An active optimization of drug therapy made it possible to achieve a significant increase in the survival of patients with status 1B of UNOS compared with patients who did not receive ACE inhibitors / ARA or beta-blockers (p=0.0007 and p=0.009, respectively).
Conclusion. In our Centre HTx WL mortality for the period of 2010-2017 decreased what can be associated with an active use of CHF surgical treatment as a bridge-to-transplantation and optimal drug therapy. HTx WL mortality was significantly higher in patients with CHF class IV, status 1 UNOS and the development of acute decompensation of advanced CHF. The highest mortality is due the first month after inclusion in HTx WL. It is associated with the severity of MR and no opportunity for urgent HTx and MCS implantation.

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Incidence of vasoplegic syndrome after cardiac transplant in patients treated with Sacubitril/Valsartan

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Introduction: Vasoplegic syndrome (VS) is associated with high morbidity and mortality after heart transplant (HT). ACE-inhibitors have shown to increase the risk of VS after heart surgery, but little is known about the effect of Sacubitril/Valsartan (SAC/ VALS), a more potent vasodilator used in heart failure.
Objective: To assess whether SAC/VALS is associated with a higher incidence of VS in patients undergoing a HT.
Patients and Methods: We retrospectively analyzed all consecutive HT performed in 3 in the same city, between January 2017 and August 2018. VS was defined as the need of vasopressors for more than 24 hours to maintain a mean arterial pressure >

70 mm Hg, which included vasopressin or high-dose norepinephrine or epinephrine (> 0,5 mcg/kg/min). Emergent HT and recipients with primary graft failure in the first 48h post HT, defined as ejection fraction <50% or cardiac index <2l/min/m2, were excluded from further analyses.
Results: Among a cohort of 96 HT recipients, 4 were excluded for having previously implanted a IVAD, 16 for primary graft dysfunction and 26 for emergent HT. Our final cohort was 50 HT recipients (66% male, mean age 51±12). 11 patients were on SAC / VALS treatment at the time of HT and were compared to 39 recipients who were not receiving SAC/VALS.
The global incidence of VS was 8%, with no significant differences between the groups: 9.09% in the SAC/VALS group vs 7.69% in the no-SAC/VALS group, p = NS. No significant differences were found either in vasopressor doses 4 h post HT, 24 h post HT and maximal dose, or in post-operative laboratory parameters.
Conclusion: In our study, SAC / VALS was not associated with a higher incidence of VS.

Between-group differences in outcomes.

	Whit SAC/VALS	Whitout SAC/VALS	p
Total - n (%)	11 (22)	39 (78)	
Vasopressor/Inotrope (mcg/kg/min) - median (IQR)			
Norepinephrine at 4 hs	0 (0-0,09)	0,12 (0-0,35)	NS
Norepinephrine at 24 hs	0,13 (0-0,26)	0 (0-0,19)	NS
Highest Dose of Norepinephrine	0,16 (0-0,26)	0,23 (0-0,46)	NS
Highest Dose of Dobutamine	10 (7-10)	10 (7-11)	NS
Adverse Events - n (%)			
Vasoplegic Syndrome	1 (9,09)	3 (7,69)	NS
In-hospital Death	1 (9,09)	0	NS
Circulatory support	1 (9,09)	0	NS
Urgent Restransplant	0	0	NS

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Feasibility of heart transplant in a distant insular population: accessibility and outcomes in patients from the Canary Islands

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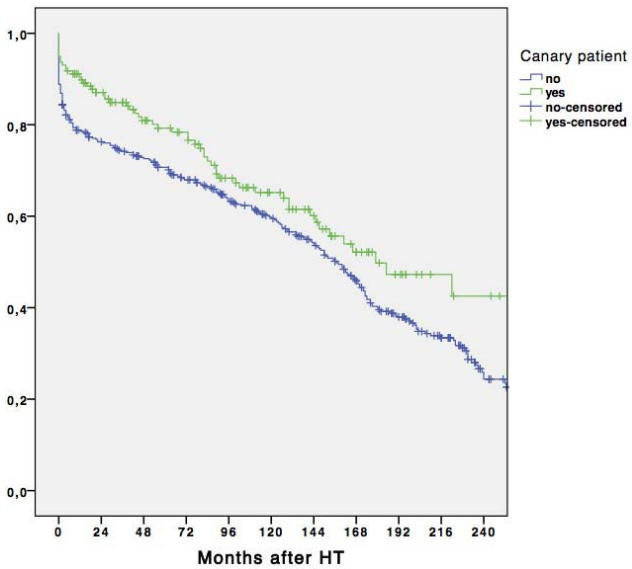
On behalf of: CIBER de Enfermedades Cardiovasculares

Background: The Canary Islands are located at a distance of more than 1700 km from Madrid. Although the distance between patient and transplant center does not seem to have an effect in the results, whether the inherent difficulty of the insularity has an impact in the heart transplant (HT) accessibility and outcomes is unknown.
Purpose: The aim of the present study was to analyse HT accessibility and outcomes in the population of the Canary Islands.
Methods: All HT performed in our center from 15 January 1991 to 31 December 2017 were analysed. We compared baseline characteristics and follow-up after HT between patients from the Canary Islands and from the Peninsular Spain. In addition, time evolution of the HT rate per million population from 1994 in the Canary Islands and the Community of Madrid were reviewed.
Results: 75.2% of HT in patients from the Canary Islands has been performed in our hospital. Among 562 HT performed in our center, 28.1% were from the Canary Islands. These patients showed better survival compared with the others (log-rank = 0.020) (figure), due presumably to a lower mean age and proportion of ischemic heart disease (table). HT rate per million population in the Canary Islands has been equated to the Community of Madrid rate in the last four years.
Conclusions: Despite distance from the Canary Islands to Peninsular Spain, HT is accessible for its population and with at least comparable results to the rest of the autonomous communities.

Baseline characteristics

	Canarian patients (n=158)	Others (n=404)	
Receptor age (years)	47.7±12.6	51.1±11.9	p=0.003
Male	83.5%	80.9%	p=0.473
Diabetes mellitus	16.6%	12.4%	p=0.194
Creatinine (mg/dL)	1.16±0.38	1.24±0.59	p=0.147
Bilirrubin	1.66±1.5	1.32±0.9	p=0.017
Ischemic heart disease	24.7%	49.3%	p<0.001
Previous heart surgery	17.9%	25.3%	p=0.066
Mean pulmonary artery pressure (mmHg)	30.5±9.3	28.8±9.6	p=0.061
Transpulmonary pressure gradient (mmHg)	8.0±3.9	8.6±4.1	p=0.102
Inotropic support pre-HT	46.5%	36.4%	p=0.028
MCSD pre-HT	29.3%	26.0%	p=0.428
Donor age (years)	33.0±12.2	30.9±11.4	p=0.054
Ischemic time (minutes)	206±76.3	196±62.2	p=0.136

HT: Heart transplantMCSD: Mechanical circulatory support device



Survival after heart transplant

P370

Tacrolimus and neoplasia. Do level really be important?

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Introduction . Immunosuppressive therapy as Tacrolimus is related with higher incidence of neoplasia in heart transplant (HT) recipients. So, we could hypothesized that a high exposition with higher levels of tacrolimus would increase neoplasia incidence. There are only few studies in other organ solid transplant recipients that assessed it with conflicting results.
Purpose. Our aim is evaluate the relationship between high tacrolimus level and neoplasia in HT recipients.

Methods. We analyzed retrospectively HT recipients treated with tacrolimus in our center from 2005. We evaluate general characteristics, neoplasia history and all measurements of tacrolimus levels. We compare groups with and without neoplasia.
Results. 115 HT recipients (median age 52 years; Q3-Q 42-57 years; 76% male) were analyzed. There were 14 patients with neoplasia (12.2%): 4 cutaneous and 10 solid organ. Mean follow-up was 6 ± 3 years. Univariate and multivariate analysis are in the table 1. Kaplan-Meier analysis in relation with tacrolimus mean level is shown in the figure 1.
Conclusions. In our series higher levels of tacrolimus do not seem to be related with a higher incidence of neoplasia. Age and smoking before transplant are risk factors as other studies. However there are only a few patients with neoplasia and so multicenter studies will be necessary to evaluate this aim.

Table 1. Univariate and Multivariate Analysis

Univariate Analysis			
	Free of neoplasia	Neoplasia	p
Age (years)	47,9± 1,2	56,5± 6,6	0,011
Sex	73%	93%	0,09
Smoking	No: 49%Ex: 23%Yes: 28%	No: 14%Ex: 36%Yes: 50%	0,049
Tacrolimus mean level (ng/ml)	10,11	9,45	0,5
Tacrolimus15 ng/ml - first year[1]	13,9%	13,2%	0,8
Tacrolimus15 ng/ml - all follow-up[1]	10,4%	8,9%	0,5
Multivariate analysis			
	Odds Ratio	CI 95%	p
Age	1,2	1,02 - 1,23	0,014
Male sex	1,8	,19 - 16,6	0,6
No smoking	0,135	0,022 - 0,812	0,029
Tacrolimus mean level (ng/ml)	2,68	0,8 - 8,9	0,1

1. Percentage of tacrolimus measurements upper to 15ng/ml in relation to all tacrolimus measurements of this patient in the first year or entire follow-up.

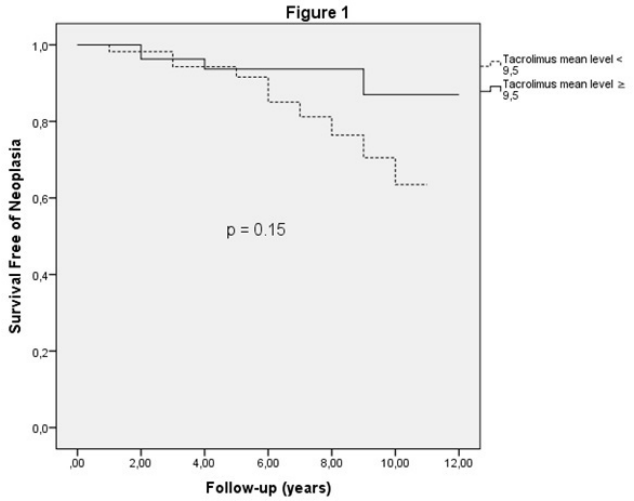

Figure 1. Kaplan-Meier Analysis

P371
Donor age in heart transplantation: results and controversies

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Heart transplantation (HTx) is the best therapeutic option for patients suffering from end-stage heart failure, but the shortage of donor hearts still represents a crucial problem, leading to an extension of donor criteria. Since 1985 to December 2017, a total of 611 HTx in 600 patients have been transplanted at our Centre. The aim of the present study is to analyze the short- and long-term results of HTx in patients with older donor age, comparing the < 60 years old (Group A) vs ≥60 – 64 years old (Group B) vs ≥ 65 – 69 years old (Group C). The mean age at HTx was 55±11.1 years. Of these, 561 (91%) received a donor heart <60 years old, while 40 (7%) patients received a donor heart ≥60 – 64 years old (mean donor age 62.7±2.4 years), and 10 patients (2%) received a donor heart ≥ 65 – 69 years old (mean donor age 66.7±2.4 years). Furthermore, recipients from donors of Group A had more previous cardiac surgery (52% vs 31% vs 29%, p < 0.001); but no difference has been reported comparing the Group B vs the Group C (p=0.49). No differences have been reported in the aetiology of the cardiomyopathy or total ischemia time (194.5±58.8 min vs 187.1 ±62.5 min, p=0.4) between the three groups. Considering the donor < 60 years group, 22 HTx patients (4%) died in the first month after HTx; conversely 7 patients (13%) died early from the Group B and 2 HTx patients (20%) from the Group C. In a mean follow up of 216 ± 48 months, a total of 503 patients (81%) was alive after the first year from HTx from the Group A, compared to 38 (76%) from the Group B and 8 (80%) from the Group C. In the older donor groups, the incidence mortality is highest in the first month from HTx; conversely, it appears similar between donor < 60 years old and ≥60 years old, even if when ≥65 years old patients have been considered. It could be reliable to expand the cardiac donor pool by accepting allografts from donors ≥ 60 years of age in selected cases.

Clinical variables among the 3 groups

	Group A<60 years old	Group B≥60 - 64 years old	Group C≥ 65 - 69 years old
N (%)	561 (91)	40 (7)	10 (2)
Age	55 ± 11.1	59 ± 11.1	61.1 ± 12.8
Male sex, n (%)	387 (69)	28 (70)	7 (72)
Previous cardiac surgery, n (%)	291 (52)	12 (31)	3 (29)
Idiopathic aetiology, n (%)	360 (65)	25 (63)	6 (64)
Ischemic aetiology, n (%)	168 (30)	11 (27)	3 (30)
Myocarditis, n (%)	33 (6)	4 (10)	1 (10)
Mean ischemic time, min	194.5±58.8	187.1±62.5	177.1 ±82.5

P372
Is cardiac contractility modulation a new step in heart failure treatment?

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Background: Heart failure (HF) is one of the most significant cardiac diseases due to its prevalence and frequency of hospitalizations. In many cases treatment with prescribed medications does not improve symptoms enough to significantly reduce risk of cardiac death. Cardiac Contractility Modulation (CCM) is an effective treatment tactics in patients with narrow QRS complexes who are refractory to medical therapy.
Purpose: Current study demonstrates whether CCM leads to symptomatic and functional improvement in patients with heart failure.
Methods: Twenty-seven patients with symptomatic heart failure (II-III NYHA class), persistent/paroxysmal AF and reduced left ventricular ejection fraction (LVEF 30±9%) were included in study. The average age was 50 ±11 years. Mean LA-volume was 117,6±47 ml and average NT-pro-BNP level was 1505 pg/ml.A 6-minute walk distance (6-MWD) was 328 ±48,04 m. Patients were treated with medications optimized for their conditions. All patients were implanted with CCM Optimizer Smart according to the standard implantation protocol.
Results: In two months follow-up CCM stimulation rate 89±7% was observed. A significant improvement in functional and symptomatic parameters was achieved. LVEF increased by 3-10% and reached 36±6% (p-0,141). Mean 6 MWD values were 353± 62 m (p-0,283). NYHA improved by at least one functional class. We observed two deaths: in one case the patient died because of myocardial infarction and in another case the patient died because of thoracic aortic rupture.

Conclusions: CCM is a safe technology for patients with HF and reduced LVEF. It improves functional parameters, including a 6-minute walk distance and NYHA functional class. Apparently CCM prevents HF progression and may influence the outcome, however longer follow-up period would be beneficial to determine the extended prognosis.

P373

Preserved contractile function of the myocardium of the right ventricle as a predictor of the effectiveness of cardiac resynchronization therapy.

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Objective: to identify the effect of the preserved contractile function of the right ventricle (RV) in patients with implanted devices on cardiac resynchronization therapy (CRT). Materials and methods. The study included 110 patients (79 men) with a diagnosis of non-ischemic cardiomyopathy, mean age 54 ± 10.5 years, functional class III heart failure according to NYHA, left ventricular ejection fraction (LV) (EF) 30 ,1 ± 3.8%, six-minute walk (6MWD) 290.5 ± 64.3 m and the final LV diastolic volume (EDV) 220.7 ± 50.9 ml. All patients had a steady sinus rhythm, complete blockade of the left bundle of the His; QRS duration ranged from 146 to 240 ms (183 ± 32 ms). CRT devices were implanted in all patients. All patients, prior to implantation of devices and after 24 months, the contractile functions of the LV and RV myocardium were assessed using equilibrium radionuclide tomoventriculography. Results: follow-up examination was performed after 24 months of CRT, showing favorable clinical changes: HF NYHA decreased in all patients from III to II. 99 patients responded to CRT (86.25%); 11 patients (13.75%) did not respond to CRT. The criterion of the patient's response to CRT was an increase in LV by 15% or more over 24 months. Respondents on CRT showed favorable clinical changes: LV EF increased from 30.1 ± 3.8% to 42.8 ± 4.8% ($p \leq 0.001$); LV EDV decreased from 220.7 ± 50.9 ml to 197.9 ± 47.8 ml ($p \leq 0.005$). In patients who did not respond to treatment, LV EF did not change significantly (30.1 ± 3.8% vs. 33.8 ± 3.8%, $p \leq 0.001$); EAD of LV increased from 220.7 ± 50.9 to 227.8 ± 27.8 ml ($p \leq 0.001$). All patients were retrospectively divided into two groups: group 1 consisted of patients who responded to CRT; group 2 included non-responders. In patients of the 1st group, radionuclide tomoventriculography showed that the frequency of filling of the RV peak (PFR) decreased from 1.8 ± 0.36 to 0.56 ± 0.16 ($p \leq 0.001$); The average rate of diastolic filling (1 / 3FR-m) decreased from 0.6 ± 0.2 to 0.36 ± 0.15 ($p \leq 0.001$). In patients of the 2nd group, these indicators were significantly worse (by 30% and 60%, respectively). It is important to note the fact that the responders prior to the implantation of the devices on all indicators showed a preserved function of the right ventricle, whereas in the patient who did not respond to therapy, it was initially reduced. Conclusion: CRT in patients with severe heart failure was significantly more effective in those individuals who had contractility of the right heart chambers, which was detected before the start of therapy. RV PFR and RV 1 / 3FR-m values can serve as prognostic criteria for a favorable response of patients to CRT.

P374

Predictors of response after cardiac resynchronization therapy implantation in heart failure patients

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On behalf of: Ain Shams University

BackgroundCurrent inclusion criteria may not be accurate enough to differentiate patients who will or will not respond to CRT. Other pathophysiologic factors such as HF etiology, LV dimensions and function, mitral regurgitation, LV dyssynchrony, position of LV pacing lead, and extent/location of myocardial scar have also shown to influence CRT response.PurposeThis was a retrospective study that aimed at characterization of responders after CRT implantation , determining predictors of good or bad response to CRT.
Methods This study included 50 patients with congestive heart failure refractory to optimum medical treatment who received CRT according to guidelines. All patients were subjected to thorough history taking, physical examination, ECG and echocardiographic study before and after the procedure and a fluoroscopic study to assess LV lead position.
Results Responders to CRT were determined either clinically or according to echocardiographic study, clinical responders were 62% of the patients vs 60% echocardiographic responders. Predictors of good response to CRT were female gender (P=0.009), non-diabetics (P=0.006), non-dyslipidemics (P <0.001), higher NYHA class of the patient (P <0.001), non-ischemic cardiomyopathy (P=0.013), absence of paracardiac conditions (P=0.028), faster heart rate (P=0.017), wider QRS complex (P=0.007), lateral position of LV lead (P <0.001) and larger distance between RV and LV leads (P <0.001)
Conclusion Ten predictors of response to CRT could be identified from this study apart from the current guidelines for CRT insertion.

P375

Dynamics of mechanical dyssynchrony in patients with superresponse to cardiac resynchronisation therapy at a long-term follow-up

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Background: Mechanical dyssynchrony (MD) and superresponse (SR) to cardiac resynchronisation therapy (CRT) relationship is still debated.
Purpose: To study the dynamics of mechanical dyssynchrony in patients with congestive heart failure and SR to CRT as well as to assess clinical features and morpho-functional properties of heart.
Materials and methods: 72 patients were examined (mean age 54.3±8.9 years) at baseline and during follow-up visits: 10.5±3.7 months, 52.0±21.4 months. Patients were divided into 2 groups: I group (n=31) with decrease of left ventricular (LV) end-systolic volume (ESV) ≥30% (superresponders) and II group (n=41) - decrease of LV ESV <30% (nonsuperresponders).
Results: At baseline there was difference in the presence of myocardial infarction (22.5% in the I group vs 46.3% in the II group; p = 0.038), the groups were comparable in severity of electrical and MD. LV pre-ejection period in group I was statistically significantly decreased at both control visits, in group II there was no significant dynamics. Right ventricular pre-ejection period significantly increased only in group I at the second control visit compared to baseline values. The mechanical interventricular delay significantly decreased in group I at both control visits compared to baseline values, in group II only at first control visit. The intraventricular dyssynchrony assessed by tissue Doppler imaging (TDI) significantly decreased in both groups compared to baseline values. The survival rate in group I was 87.1%, in group II was 65.9% (Log-Rank test p=0.038).
Conclusion: SR is associated with decrease of MD and higher survival rate at a long-term follow-up.

P376

Gender differences of patients randomized in the AdaptResponse trial

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BackgroundCRT response rates vary significantly with limited clinical improvement in at least 20-30% of device recipients. Women historically do better with CRT but have been under represented in most trials. The AdaptivCRT algorithm provides ambulatory CRT optimization with LV fusion pacing in patients with LBBB and a normal PR interval. The AdaptResponse trial tests the hypothesis that AdaptivCRT is superior to conventional CRT.
PurposeTo describe the baseline characteristics of female versus male patients randomized in the AdaptResponse trial.
Methods AdaptResponse is a global randomized trial, completing enrollments in February 2019. Eligible patients are CRT indicated with NYHA Class II-IV heart failure, LBBB by Strauss criteria (QRS ≥140 ms in men, ≥130 ms in women), and baseline PR interval ≤200ms. The preliminary baseline data are presented here.
ResultsAdaptResponse enrolled 3,540 subjects as of October 26, 2018, of which 3,372 were randomized in 218 centers worldwide, including 43.3% females. Women were older, shorter, had shorter QRS duration, worse baseline CHF, and fewer had ischemic cardiomyopathy. Medication includes more loop diuretics and angiotensin receptor blocker (ARB) and less angiotensin converting enzyme inhibitors (ACEi). Comorbidities such as AF, diabetes and renal dysfunction were less frequent in female patients, whereas more often depression was reported. Final baseline data will be available in 2019.
ConclusionAdaptResponse is the largest randomized CRT trial to date, with a proportion of female patients approaching the actual prevalence of the heart failure population. Importantly, the data from AdaptResponse will provide long term outcome data from the AdaptivCRT algorithm and lead to better understanding of responses to CRT among women.

Percentage or mean ± s.d.	Male (N=1912)	Females (N=1460)	Males (N=1912)	Females (N = 1460)	
Age (years) *	64.5 ± 11.0	65.4 ±11.0	Atrial Fibrillation **	14.5%	10.1%
Height (cm) **	175.2 ±8.1	161.0 ±7.4	Renal Dysfunction	17.9%	15.3%
NYHA Class III/IV **	48.7%	55.7%	Diabetes *	36.0%	32.5%
LVEF (%) *	25.2 ±6.4	25.6 ±6.2	Anemia **	5.1%	8.6%
QRS interval (ms) **	166 ±16	158 ±17	Depression **	9.6%	18.5%
KCCQ Overall Summary Score **	65.9 ±23.2	57.8 ±23.7	β-Blocker	87.9%	89.7%
Previous HF hospitalization	47.8%	48.9%	ACE inhibitor **	54.7%	48.3%
Ischemic Cardiomyopathy **	39.4%	21.9%	ARB **	30.0%	36.4%
Mitral Valve Dysfunction **	13.3%	17.7%	Loop Diuretic **	56.1%	62.9%

* p<0.05, ** p<0.001

P377

The efficiency of cardiac resynchronization therapy with atrioventricular correction in patients with chronic heart failure with moderate clinical manifestations

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Objective: to assess the efficiency of CRT (cardiac resynchronization therapy) implantation with atrioventricular correction in patients with chronic heart failure NYHA functional lass II at 12 months after surgery

Methods: 30 patients (pts) with ischemic or dilated cardiomyopathy, complicated by CHF NYHA functional lass (FC) II, LV EF below 35%, QRS duration 150 msec nd more and with ECHO confirmed mechanic myocardial dyssynchrony were examined. All patients underwent the LV end-diastolic volume (LVEDV), LV end-systolic volume (LVESV), interventricular delay, dyssynchrony index (TS-DS), all segments max delay were estimated by ECHO. The levels of BNP, the six-minute walk test (6MWT) and life quality (LQ) were measured initially and at 12 months after surgery

Results: At 12 months LVEDV decreased from 343,8±25,3 ml to 213,8±66,6ml (<0,05), LVESV significantly decreased from 270,8±22,47 to 160,8±68,8 (<0,05), LVEF increased evidently from 21,5±1,35% to 38,80±7,4% (<0,05). Intracardiac haemodynamic changes were accompanied by decreased mechanic dyssynchrony event rate - there was trend to the evident decrease of interventricular delay from 71,1±3,97 to 35,2±15,5 msec. (<0,05),improved LQ of patients: LQ evidently decreased from 61,3±2,8 scores to 41,1±4,2 scores (<0,05); distance of 6 MWT increased from 379,6±25,8 m to 428,4±22,3 m; NT-proBNP level decreased from 1476,0±254,54 to 270,2±43,2(<0,05).

Conclusions: At 12 months biventricular heart stimulation with atrioventricular correction evidently enhances heart haemodynamic and the clinical conditions of pts, improving exercise tolerance in pts. with chronic heart failure NYHA functional lass II.

P378

Differences between ischemic and non-ischemic cardiomyopathy and its relationship with long-term outcomes following ventricular assist device placement

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Background: Ventricular assist devices (VAD) are rapidly becoming an option for many end-stage heart failure patients with ischemic (ICM) or non-ischemic cardiomyopathy (NICM). There is limited data regarding disparities in VAD outcomes in patients with these different cardiovascular substrates.

Methods: Retrospective review was performed for all patients who received a VAD between 2010-2016 with 2 years of follow-up and further stratified by ICM or NICM. Endpoints include all-cause mortality, post-VAD stroke, myocardial infarction (MI), infection, and VAD thrombosis. Cumulative mortality was studied with Cox-proportional hazard model. Multivariate logistic regression was performed for endpoints at 2 years. Covariates include age, sex, smoking, hypertension, hyperlipidemia, diabetes, chronic obstructive lung disease, chronic kidney disease, and peripheral artery disease.

Results: Of the 289 patients who received a VAD between 2010-2016, 116 (40.1%) had ICM, and 159 (55.0%) received an orthotopic heart transplant. On average, ICM patients were older, have a higher ejection fraction, and had a prior MI with revascularization. All-cause mortality was higher for patients with ICM over 2 years (p=0.049) (Figure 1). At 2 years, there were no differences in the incidence of post-VAD stroke, MI, major bleeding, infection, or VAD thrombosis.

Conclusion: Survival is worse for patients with ischemic cardiomyopathy compared to those with non-ischemic cardiomyopathy undergoing VAD implantation.

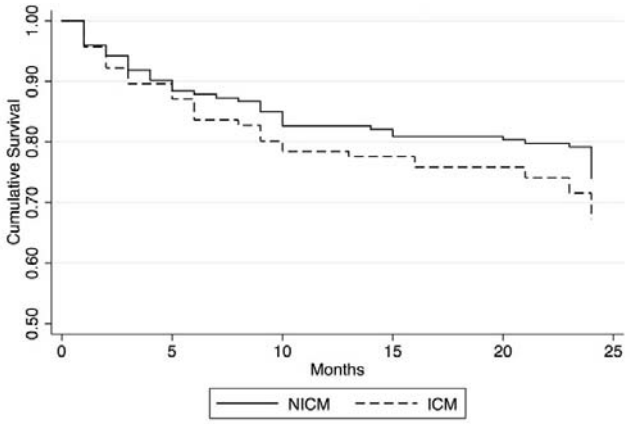

Figure 1: All-cause mortality

P379

Preoperative geriatric nutrition risk index scoring is predictive of survival in LVAD recipients

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Background: Poor nutritional status is associated with poor long term outcomes in patients with chronic heart failure and in those undergoing surgeries, however there is little data in patients on circulatory assist. The Geriatric Nutritional Risk Index (GNRI) is commonly adopted scoring system that evaluates patients' nutritional status and has been reported to have significant prognostic value for adverse events in patients with heart failure as well as those undergoing various surgeries. There is a paucity of GNRI data in left ventricular assisted device (LVAD) recipients and GNRI cut-off value at which patients have significantly worse outcomes has yet to be reported.

Purpose: Our aim of study is to analyze patient outcomes related to preoperative GNRI and develop a GNRI cutoff value for worse overall survival as a prognostic tool to enable better candidate selection for LVAD placement.

Methods: We included 298 end stage heart failure patients who underwent primary LVAD implantation from January 2015 to February 2018 in our single institution retrospective study. GNRI was determined using the formula (14.89 × albumin in g/l) + (41.7 × present/ideal body weight). Receiver operation characteristic (ROC) curve was used to determine a cut off GNRI value for worse overall mortality on LVAD support. This cutoff was used to define two groups as either high or low GNRI. Univariate analysis was used to evaluate GNRI as an independent risk factor for mortality.

Results: ROC curve demonstrated a cut off GNRI value for overall survival as 92.68. High GNRI group (n=178) and low GNRI group (n=120) were defined from this cut off value. Kaplan Meier curve showed significant overall mortality between 2 groups (p=0.04). Univariate analysis showed GNRI p-value of 0.051.

Conclusion: GNRI below a cutoff value of 92.68 is associated with worse outcomes in LVAD recipients including worse overall mortality. For these patients, it is important to consider the surgical indication, timing and nutrition optimization prior to LVAD implantation.

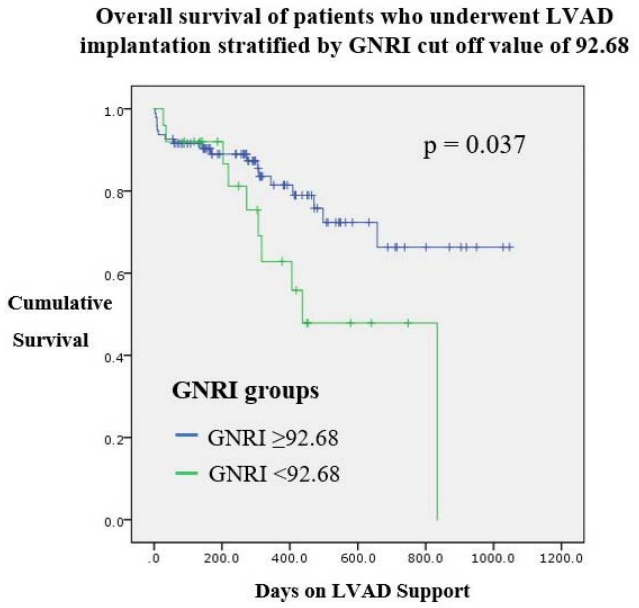

Figure 1.

P380

Monitoring Heart rythm across borders

A Amit Hooda[1]; A Sharma[2]; P Datta[3]; S Attawar[3]
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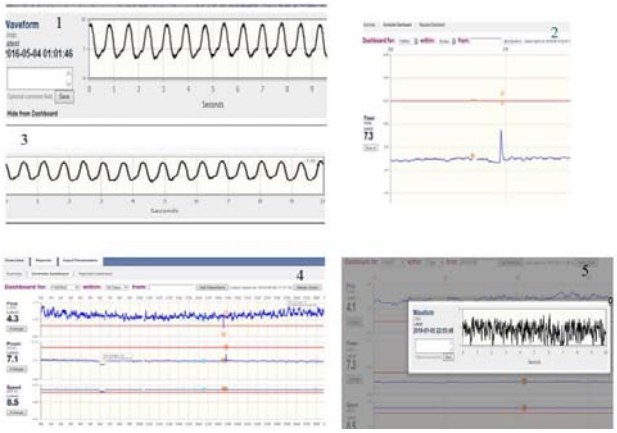
Background: Patients living in remote areas especially the war-torn countries like Iraq may not have access to experienced, high level mechanically circulatory support care. To decrease the incidence of frequent hospitalizations and to prevent complications which may occur as a result of lack of communication between patient and care givers, a remote monitoring system connecting a web based application allows review of LVAD system performance.
Purpose: To assess the feasibility of remote monitoring in patients with advanced heart failure undergoing LVAD implantation
Methods: Four patients with advanced heart failure from warn torn countries(Iraq) which did not have access to advanced mechanical circulatory support care underwent LVAD implantation with scope of remote monitoring. The VADLink Network is a remote monitoring service which connects clinicians to the patients supported by the HA5 LVAD via a secure Internet website to monitor trending. Diagnostic reports can be exported to a hospital network and to a patient file. Alerts regarding the changes in LVAD flow, power or speed can be received by physicians or VAD coordinators in the form of an email or text. Trended data can be displayed from 1 hour to 30 days. A 10 second display of a real time wave form can be requested to add clarity to the trend data.
Results: Normal 10 second waveform showing heart rate of 75 bpm and aortic valve opening (Fig 1)
Through remote monitoring of the LVAD true flow waveform, it was feasible to we have been able to evaluate LVAD function (flow, power and speed) and patient physiologic function such as arrhythmias, trends in cardiac contractility, aortic valve opening and left heart volume status. No pump malfunctions have occurred during the monitoring time. Periodic issues with device communication have been encountered due to the issues with cell tower service.
Sudden change in power trend in a patient indicated probably a thrombus wash through. Patient was immediately contacted and found to have a sub therapeutic PT-INR. Anticoagulant therapy was optimised and further catastrophe was prevented. (Fig 2). Changes in heart rate and waveforms helped in assessing the fluid status of the heart failure patients and their hydration status was immediately optimized.(Fig 3). A low flow with high power alarm showed gradual decrease in LVAD flow from 5 L/min to 3 L/min and further investigation revealed that the patient's systemic blood pressure was>90 mmHg. Antihypertensive dosages were increased and the pump flow returned back to 5 L/min. (Fig 4).Change of normal waveform to erratic one without any change in pump function on further investigation revealed water egression into a connector after the patient has showered (Fig 5)
Conclusion: Remote monitoring has enabled patients living in remote places to receive high level monitoring of their LVAD systems and efficient home care. It helped in preventing complications which could have led to grave consequences.



Figure

P381

The use of ARNI in the prevention of ventricular assist device implantation among patients with advanced heart failure: a single center experience

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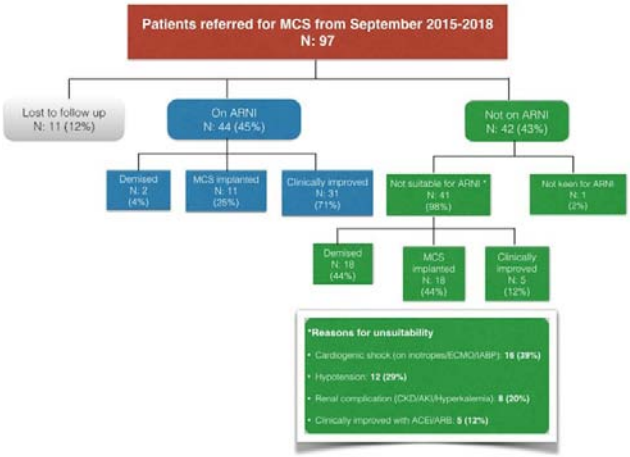
Background/Introduction: Ventricular assist devices (VADs) are proven therapy in advanced heart failure for bridge to transplant and destination therapy. The role of Sacubitril/Valsartan (ARNI) is established in guideline directed medical therapy for chronic heart failure, however its role in advanced heart failure is not well defined.
Purpose: To determine the effect of ARNI on patients referred to the National Heart Centre Singapore (NHCS) for mechanical circulatory support (MCS)
Methods: All patients referred to NHCS for MCS from September 2015 to September 2018 were retrospectively reviewed via electronic health records.
Patients were divided into two groups: those who were treated with ARNI and those who were not. Clinical course and outcomes were reviewed.
Results: Among ninety seven patients referred to NHCS for possible MCS implantation, 82% were males and the mean age was 53+/-9 years old. Eleven (12%) were lost to follow up, 44 (45%) were treated with ARNI and 42 (43%) were not. The non ARNI group had a worse hemodynamic profile with Interagency Registry for Mechanically Assisted Circulatory Support (INTERMACS) scale of 1 to 2 in 56% of patients compared to the ARNI group of 11%.
Thirty one patients out of the 44 (71%) treated with ARNI clinically improved leading to deferral of the need for MCS while 11 patients (25%) eventually had MCS implanted. Only two patients (4%) on the ARNI group died.
For non-ARNI group, one patient was not keen on ARNI due to financial constraint. Forty one patients were not suitable due to cardiogenic shock (39%), development of hypotension (29%) or renal side effects (20%) when ARNI was started. Five patients (12%) were able to have significant improvement with Angiotensin Converting Enzyme inhibitors or Angiotensin Receptor Blockers. Majority of the non ARNI patients either died (44%) or had AMCS implanted (44%).



Conclusion(s): Inability to tolerate ARNI portends poor prognosis in patients with advanced heart failure.
Majority of patients who could tolerate initiation of ARNI in advanced heart failure were able to avoid MCS.
Optimisation of guideline directed medical therapy is imperative prior to consideration of mechanical support device therapy in heart failure

P382
Inotropic score on postoperative day 0 and 1 is associated with LVAD patients survival

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Background: Immediate postoperative management of left ventricular assist device (LVAD) recipients usually requires support of multiple inotropes and pressors. Poor right ventricular function or vasoplegia may require higher dose support; however, this may complicate the course by causing severe vasoconstriction or lactic acidosis. Currently, there is a paucity of reports regarding postoperative inotrope/pressor use and survival on LVAD support.
Purpose: The aim of this study is to analyze the negative effect of inotrope and pressors for survival on LVAD in our cohort by using Inotropic Score (IS). IS is a previously reported scoring system used to unite the effect of multiple medications in one scale.
Methods: From January 2015 through February 2018, 134 patients with chronic end-stage heart failure underwent primary CF-LVAD implantation in our single center. Pre and intra-operative variables, postoperative IS, and survival of LVAD days were analyzed. IS was defined using the following formula reported in ISHLT consensus 2014. IS = dopamine(x1) + amirinone (x1) + milrinone (x15) + epinephrine (x100) + norepinephrine (x100) with each drug dosed in microgram/kilogram/minutes.
Results: Chi-squared test revealed mortality on LVAD support to be significantly related to the sum of postoperative day 0 to 1 IS (POD 0-1 IS)(p=0.02). Receiver operating characteristic analysis showed an IS of 508.8 as the optimal cutoff value for POD 0-1 IS, with higher IS associated with worse survival. Cox multivariate analysis showed POD 0-1 IS as an independent risk factor for survival (HR 1.00, p=0.05, 95% Confidence Interval 1.00-1.01). Kaplan Meier curve showed a statistically significant survival difference between groups above and below the cut off value (p=0.012)
Conclusion: Our research highlighted that the IS sum from postoperative day 0 to 1 was an independent predictor for mortality with a cutoff value of 508.8. Further research may elucidate the negative effect of high-dose inotropes/pressors for LVAD recipient outcomes.

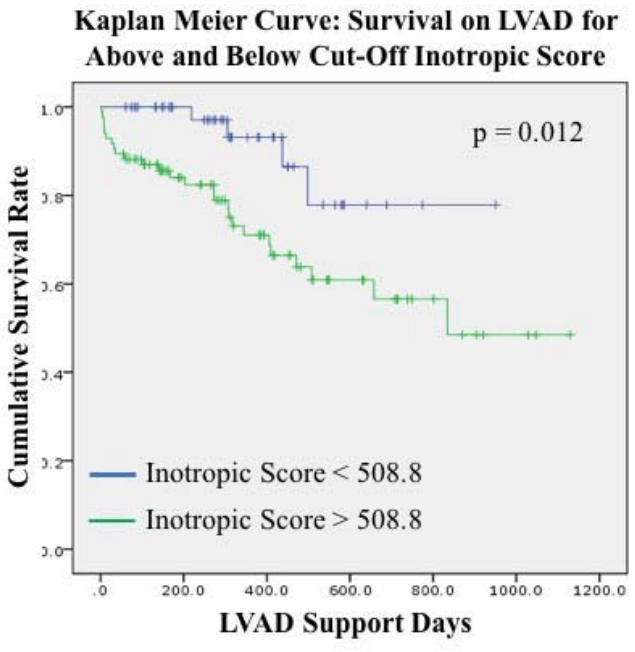

Figure 1

P383
The significance of right ventricular stroke work index for optimizing the selection of suitable candidates for implantation of left heart support

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Background: Orthotopic heart transplantation is a treatment for selected patients with end stage heart failure. Implantation of left ventricular assist devices (LVAD) can be used to bridge to heart transplant.
Aim of study: To evaluate some hemodynamic parameters obtained by right heart catheterization and echocardiographic parameters in patients before LVAD implantation or HTx. Assess the possible impact of these parameters on the failure of the right ventricle and the further course after the HTx or LVAD implantation.
Methods: Between 1/2016 -12/2017 was performed 59 HTx in Brno transplant center. For 47 of them (40 men and 7 women), average age 56.3 ± 7.6 years, LVEF 18.6 ± 9.9% were available the required parameters. The most common diagnosis leading to the HTx was dilated cardiomyopathy (27 patients), 16 patients underwent HTx for ischemic heart disease, in 2 cases the HTx was performed for restrictive cardiomyopathy, one for valvular defects and next one for cardiac amyloidosis. We evaluated cardiac output and cardiac index (CO, respectively. CI), mean pulmonary artery pressure (MPA), the mean pulmonary capillary wedge pressure (PCWP), the right ventricle stroke work index (RVSWI) obtained by right heart catheterization. Parameters to describe the function of the right ventricle (RV) - the size of RV, tricuspid annular systolic excursion (TAPSE), peak systolic velocity of the tricuspid annulus (s'tri) were mesaured by the echocardiography.
Results: Implantation LVAD underwent 12 patients with prosperous course of 7 patients (58%). In 5 patients (42%) occurred after the implantation RV failure and progression of tricuspid regurgitation witch required tricuspid annulus plastic in 3 patients. Patients with complicated course had significantly lower RVSWI (6.1 ± 1.3 g / m vs 8.5 ± 2.7 g / m) and s'tri (9.0 ± 1.2 cm / s vs. 11.9 ± 3.3 cm / s, both p 0.05). For the other 35 patients after HTx were no previous LVAD implantation. Right heart failure appeared in 17 of them (48%) after the transplant, three of them underwent plastic of tricuspid valve for significant tricuspid regurgitation. The remaining 18 patients (52%) had a favorable early post-transplant course. None of monitored parameters in these groups did not differ significantly.
Patients undergoing LVAD implantation had statistically higher TAPSE (17.3 ± 3.3 mm vs 14.1 ± 3.1 mm s'tri (10.6 ± 3.0 cm/s vs 8.3 ± 2.5 cm/s; all p <0.05) and diastolic dimension of left ventricle (77 ± 9 mm vs 68 ± 10 mm), opposite they have lower LVEF (15.0 ± 3.0% vs 20.0 ± 11.0%; p <0.05) .
Conclusions: Implantation of LVAD has become a part of the transplant program and proper patient selection is crucial to the success of this treatment. Besides the commonly used echocardiographic parameters, the evaluation function of right ventricle using a right ventricle stroke work index might be another parameter of risk prediction RV failure in the postoperative period.

P384
Prolonged mechanical ventilation after left ventricular assist-device implantation: risk factors and clinical implications

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Background: Unsuccessful weaning from ventilator after major cardiovascular procedures has been shown to be associated with increased postoperative morbidity and mortality. Purpose: Our study aimed to identify predictors and clinical implications of prolonged mechanical ventilation (PMV) after left ventricular assist device (LVAD) implantation. Methods: We analyzed the data of patients receiving a continuous-flow LVAD in our center from 12/2010 to 09/2017. PMV was defined by a duration of invasive ventilation of > 7 days after LVAD implantation. Multivariable logistic regression analysis was performed for predictors of PMV. Survival was estimated by the Kaplan-Meier method. Results: During the study period 156 patients received a continuous-flow LVAD in our center. Seventeen patients were excluded due to early death (<7 days) and 139 patients were enrolled in the study. PMV was observed in 43% of patients. Overall, patients on PMV were characterized by a more severe disease state at baseline, compared to the group of early extubation, as reflected by their INTERMACS level (level 1-3: 72 vs. 49%, p =0.008). Patients with PMV exhibited higher pulmonary wedge pressures (25 vs. 21 mmHg, p=0.04), lower estimated glomerular filtration rate (eGFR) (53 vs. 60 ml/min/1.73m2, p=0.02), lower hemoglobin (10.6 vs. 11.6 g/dl, p= 0.02) and lower platelet counts

(189 vs. 240/nl, p=0.02). The percentage of patients with a history of previous sternotomy was increased (32 vs. 13 %, p=0.006) and at least three-fold higher rates of preoperative circulatory support (p=0.006), invasive ventilation (p<0.001) and dialysis (p=0.001) were reported for the group of patients with PMV. Logistic regression analysis revealed that eGFR, platelet count and previous sternotomy were independent predictors of PMV in this patient cohort. PMV was accompanied by significantly longer ICU- and hospital stay (p<0.001 and p= 0.003, respectively). Survival analysis revealed a profound increase in the reported mortality rates at 180 days post-implantation in the PMV group (62 vs 10%, Log-rank test: p < 0.001). Conclusions: PMV is common after LVAD implantation. Certain biomarkers and previous sternotomy are associated with increased risk for PMV postoperatively, which is accompanied by decreased survival at 180-days post-implantation and longer hospitalizations.

P385

Clinical profiles, outcome and prognostic factors of patients treated with percutaneous left ventricular assist devices for protected PCI and cardiogenic shock

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Introduction: Percutaneous left ventricular assist devices (Impella) are used both for protected PCI (pPCI) and for patients with cardiogenic shock (CS).
Aims: We investigated the clinical profiles, outcome and prognostic factors of patients under Impella support for pPCI and CS in our monocentric registry.
Results: We evaluated n=25 consecutive patients (males: 72%; age: 67.4+11.2 years; range: 43-86 years), treated with Impella devices from 11/2016 to 01/2018 at our tertiary center. Impella 3.5 / CP was used in 48%, and Impella 2.5 in 52% of the patients. 88% of the patients had ischemic heart disease, and additional 3 cases had CS due to non-ischemic cardiomyopathy (dilated cardiomyopathy: n=2; non-compaction cardiomyopathy: n=1). The indications for the implantation of Impella were pPCI in 48%, and CS in 52% of the patients, respectively. All cases with pPCI were treated with an Impella 2.5, while all but one CS cases were treated with an Impella 3.5 / CP (p<0.0001). The mean duration on Impella-support was 53.8+157 hours. The rate of non-fatal complications was 9.8% (i.e. bleeding, hematoma), however, no fatal complications due to the use of the Impella occurred. Intra-hospital mortality occurred in 52% of the total patients, and was significantly higher in CS patients (84.6%) as compared with patients with pPCI (16.7%; p=0.0007). Furthermore, intra-hospital mortality was significantly associated with CPR (p=0.0017), with peak creatine kinase (CK; p=0.0020), with peak high-sensitive Troponin T (hsTnT; p=0.0011), and with peak lactate (p=0.0002).
Conclusions: Our data confirm the safety of Impella for pPCI and CS. Intra-hospital mortality in severe CS patients is still high despite Impella support. In contrast, mortality in patients with severe coronary artery disease subjected to pPCI is low. In addition to myocardial ischemia markers (CK, hsTnT), peak lactate might prove a relevant prognostic marker for adverse outcome in this setting.

P386

Organisation programme for left ventricular assist device in end stage heart failure patients - Single centre experience

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Background: End stage heart failure patients are challenging for treatment and burden to the society, especially in the developing countries. In our coutry of 8 million residents, 5 cardiac surgery centers, we still do not have data of number of end stage heart failure patients. .In lack of donors and incrising numbers of heart failure patients, we started LVAD programe.Our primary goal was to organize our outpatient clinic in terms to register and evaluate all patients with end stage heart failure, to decide who is candidate for HT and/or LVAD. Secundary goal was to determine risk factors that may influence survival in patients on medical therapy and in LVAD patients.
Methods: We established patient selection programe with essencial support of Advanced heart failure department from an hospital in Houston, Texas. We analyzed data of prospectively admitted 65 patients with end stage heart failure , from June 2017 . Nine patients undervent LVAD implantation from December 2017 until December 2018. We evaluated and compared one year survival, functional capacity, right ventricle function, liver and renal function in patient on medical therapy alone, waiting for HT, compared with 9 LVAD patients.
Results: One year survival rate for patients with end stage heart failure that are indicated for medical therapy and heart transplant programe was 83 % and in group that undervent LVAD implantation, survival is 100%. Significant improvement in survival, functional capacity in LVAD patients , MVO2, renal function (P<0.05 for all) were detected after 3, 6 and 12 months. In multivariate Cox regression analysis renal failure and right ventricle function was found to be independent risk factor for the overall survival (P<0.001).
Conclusion: In our data, LVAD is successful treatment option for patients with end stage heart failure and significantly improves survival, functional capacity and renal function. Our goal, supported by Hermmann Hospital from Houston, is to provide safety and quality to all patients with end stage heart failure by establishing HT/LVAD programme.

P387

Safety of sacubitril-valsartan vs. ramipril in left ventricular assist device carriers and comparison of NTproBNP levels - a pilot study

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Background: Currently, there is no consensus on the optimal medical therapy for patients after left ventricular assist device (LVAD) implantation, but usually the HFrEF therapy is continued beyond implant. We compared NT-proBNP values in LVAD patients treated with ramipril or sacubitril/valsartan (sac/val).Patients and Methods: A single centre, retrospective study included data from 26 patients (88% male, mean age 59±11 years). 54% were continuously treated with ramipril, and 46% were switched to sac/val. The median follow-up was 13.3 months (IQR 8.5-15.4).
Results: Baseline patient data are presented in Table 1. Throughout the follow up, the mean arterial blood pressure, creatinine and glomerular filtration rate (GFR) values did not change significantly (Figure 1a). A decrease in NT-proBNP values was noted in both groups, although without significant difference between them. However, a difference in trends expressed as negative logarithms of ratios of NT-proBNP at 3 months follow up and at baseline is seen in the sac/val group compared to those on ramipril, achieving significance (p=0.009) for the low medication doses (Figure 1b). During follow-up, 3 patients died in the ramipril subgroup and none in the sac/val group, but the sample size precluded survival analyses.Conclusion: Our data suggest a good safety profile of sac/val in LVAD recipients. A decrease in NT-proBNP values is seen in patients in both treatment groups, with results suggestive of a decrease in the biomarker with sac/val. However, a larger prospective randomized study is required to to establish the consistency of this finding and its translation to treatment benefit.

Baseline data of the patient population

	Sac/Val (n=12)	Ramipril (n=14)	p-value
Age at implant	53±13	63±5	0.016
LVAD type - HM2, n (%)	1 (8.3%)	7 (50%)	0.07
LVAD type - HW, n (%)	3 (25%)	2 (14.3%)	
LVAD type - HM3, n (%)	8 (66.7%)	5 (35.7%)	
Female gender, n (%)	1 (8.3%)	2 (14.3%)	0.64
Etiology of HF - Ischaemic, n (%)	5 (41.7%)	10 (71.4%)	0.13
- Dilated, n (%)	7 (58.3%)	3 (21.4%)	
- Other, n (%)	0 (0.0.%)	1 (7.1%)	
NT-proBNP at baseline, [ng/L]	1863 [1381, 2129]	1774 [983, 3631]	0.96
GFR at baseline, [mL/min/1.73m^2]	68.3±24.0	77.7±24.5	0.33
MAP at baseline, [mmHg]	86.2±11.3	85.6±12.6	0.91

HM2-Heart Mate II, HM3-Heart Mate 3, HW-HeartWare, MAP-mean arterial pressure.

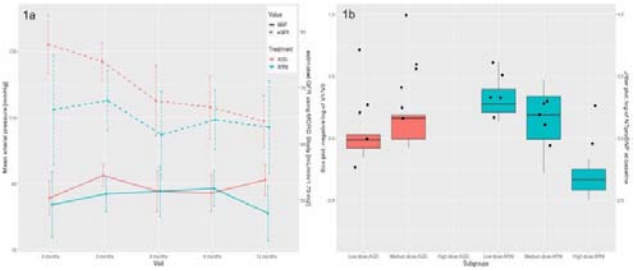

Figure 1

P388

Implementation of the 2016 ESC guidelines for treatment of heart failure in patients after continuous flow LVAD implantation

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Introduction /Background2016 European heart failure guidelines recommend the neprilysin inhibitor Sacubitril, for the treatment of heart failure. When medical therapy and device therapy fail, patients with HFrEF might be candidates for LVAD therapy.
Purpose Despite studies showing reverse remodeling under aggressive heart failure medication, data about the efficacy and the safety of guideline directed medical treatment in patients with LVAD therapy is lacking.
Methods From October 2017 onwards the pharmacological management of heart failure in patients with continuous flow LVAD therapy was updated in accordance with the ESC Guidelines of heart failure management, including the application of Sacubitril/ Valsartan. The trial protocol was approved by the local ethics committee (ES2/236/17).
Results Since October 2017, 54 newly implanted continuous flow LVAD (HeartWare and HM III) patients were treated according to the current guidelines. The mean duration of postoperative hospital stay was 33 days (+/- 36.64). Mean follow-up after hospital discharge is currently 117 days (+/- 105.87), medication is displayed in table 1.
Conclusion Adherence to guideline recommended therapy at hospital discharge and at first follow-up visit was excellent. 72% of patients received beta-blockers at discharge; approx. 85% were under dual RAAS blockade (including 61% combined therapy with Sacubitril/Valsartan) at discharge and nearly 92% had a beta-blocker at follow-up. No patient under treatment with Sartan plus neprilysin inhibition died during follow-up or was rehospitalized for worsening of renal failure or hyperkalemia. The current heart failure therapy algorithm appears to be safe in patients under continuous flow LVAD therapy after a short term follow up.

Medication at discharge and at follow up	
Medication at discharge	Number of patients (n=54)
AT I blocker and Nep inhib.None	33 (61.1%)21 (38.9%)
AT I blocker or ACE-inhibitorsNone	13 (24.1%)41 (75.9%)
Beta-blockersNone	37 (72.2%)17 (27.8%)
Aldosterone inhibitorsNone	46 (85.2%)8 (14.8%)
Medication at follow up	Number of patients (n=48)
AT I blocker and Nep inhib.None	23 (47.9 %)25 (52.1%)
AT I blocker or ACE-inhibitors ACE-inhibitorsNone	18 (37.5%)30 (62.5%)
Beta-blockersNone	44 (91.7)4 (8.3%)
Aldosterone inhibitorsNone	42 (87.5)6 (12.5 %)

P389

Temporal changes in N-Terminal prohormone brain natriuretic peptide do not predict pump thrombosis and cardiovascular death in patients with a continuous flow left ventricular assist device

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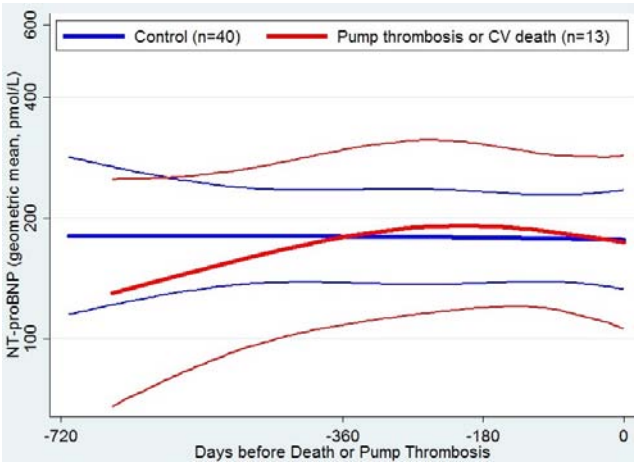
Background: Natriuretic peptide concentrations reflect intracardiac pressure in patients with heart failure. Continuous flow left ventricular assist device (cfLVAD) recipients are at risk of pump thrombosis and cardiovascular (CV) death, which could be preceded by changes in natriuretic peptide levels.
Purpose: This study aimed to evaluate whether serial changes in the N-terminal prohormone of brain natriuretic peptide (NT-proBNP) precede pump thrombosis or CV death in patients with cfLVAD, making this a candidate biomarker for outpatient monitoring.
Methods: This was a single center observational study. Pre-scheduled sampling of NT-proBNP was measured pre-implant, at discharge, every 3 months within the first year, and annually afterwards in patients implanted with a cfLVAD. Pump thrombosis or CV death was used as a combined endpoint. Time-to-event analyses, using both time-updated cox modeling and restricted cubic splines, were used to identify any differences in the temporal changes of NT-proBNP concentrations in patients with and without an event.
Results: In our cohort of 53 patients, a total of 176 NT-proBNP samples were analyzed. Patients has a mean±SD age of 56±13 years, eGFR of 57±25 ml/min/1.73m2, and BMI of 27±3 kg/m2. Thirty-one (58%) patients were implanted with the HeartMate 2, and 22(42%) with the HeartMate 3. Median NT-proBNP (post-implant) was 175 [IQR 107-358] pmol/l (equal to 1488 [IQR 910-3043] pg/ml). During a median follow-up time of 447 days [IQR 229-739], 10 patients experienced a pump thrombosis and 3 patients died of CV causes. Temporal changes in NT-proBNP were not associated with subsequent events, neither for the composite endpoint (HR: 1.0 [0.49-2.0], p=0.99), nor for each component; pump thrombosis (HR: 0.85 [0.37-1.9], p=0.69), CV death (HR: 1.6 [0.42-6.0], p=0.50).
Conclusion: Our analysis did not show that changes over time in NT-proBNP concentrations were associated with the outcome of pump thrombosis or CV death.



Cubic spline

P390

Gastrointestinal bleeding after left ventricular assist device implantation: serious problem, multi factorial cause, no proved treatment?

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Introduction: Gastrointestinal bleeding (GIB) is a serious problem after left ventricular assist device (LVAD) implantation. Its incidence has been estimated between 15% and 61%. LVAD associated gastrointestinal bleeding is associated with significant morbidity, hospital readmission and cost.
Case presentation: A male, 63 years old, with ischaemic cardiomyopathy, low systolic function of left ventricle, recurrent hospital treatment because of heart failure, underwent LVAD implantation. Patient was under treatment for sideropenic anemia, has diabetes mellitus non insulin dependent and no other significant co-morbidity. In postoperative period there was persistent anemia with repeated blood transfusion. High inflammatory markers were registered and no causative agent isolated. There was postoperative pericardial and pleural effusion, regularly checked by echo and RTG. Drainage of pericardial effusion, which was hemorrhagic, was on 5th postoperative day done, and left pleural, which was serohemorrhagic, on 9th and 22nd day. The drop in hemoglobin value was further present with repeated blood transfusion, and no clear signs of blood loss or hemolysis. On 24th postoperative day melena was registered. Patient underwent gastroduodenoscopy, erosive gastritis was found, but there was no active bleeding lesions. As melena persisted, colonoscopy was performed and small intestine scintigraphy, with no bleeding lesions detected. Colon was filled with hematized content. As there was further significant drop in red

blood count exploratory laparotomy with colonoscopy, ileoscopy and gastroduodenoscopy was performed, no bleeding lesion was detected, but intestinal walls were coated by parietal coagulums. Somatostatin 0,1 mg s.c. TID was introduced. GIB was most likely multifactorial, caused by anticoagulation, acquired Von Willebrand syndrome, platelet dysfunction and increased incidence of arteriovenous malformations due to chronic low pulse pressure. Treatment with somatostatin lasted twenty days and then mesalazin 2 gr in one dose for 2 weeks was continued. Anticoagulant therapy included acenocumarol with strict control of prothrombic time. No further drop in red blood count and GIB were registered.
Conclusion: Gastrointestinal bleeding is multifactorial and related to lowered pulse pressure with relative hypoperfusion of the gut, a systemic decrease in high molecular weight Von Willebrand factor multimers, and impaired platelet aggregation, with angiodysplasia and gastro-duodenal erosive disease as predominant etiologies. Somatostatin is an option for advanced medical management but has not yet been proven in a large cohort of patients.

P391
Clinical outcome and issues of implantable left ventricular assist device (LVAD) treatment at a non-transplant institution located in central Tokyo

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Background: Organ donation is quite limited due to the traditional value of life, death and religious outlook in Japan; however, the numbers of patients who benefit from LVAD therapy is increasing after approval of implantable LVAD in 2011. Even though the majority of patients with advanced heart failure were treated in heart transplant institutions in central Tokyo, but some patients were forced to be treated in non-transplant LVAD institutions for some reasons, i.e. borderline heart transplant candidacy.
Purpose: We sought to analyze the clinical outcome and issues of LVAD therapy in a non-transplant institution.Method and Results: We retrospectively reviewed 18 consecutive patients who were treated with implantable LVAD between 2011 and 2018. Underlying disease of the patients were dilated cardiomyopathy (n=9, 50%), ischemic cardiomyopathy (n=3, 17%), myocarditis (n=2, 11%), and the others. Overall survival rate is satisfactory good; 94% (17/18 patients) with average support duration of 1023±310 days. Among them, 10 patients (56%) were cardiogenic shock at the time of admission, and all of them but one were supported by temporary circulatory assist devices (IABP only n=1, IABP+V-A ECMO n=8). All those patients underwent paracorporeal LVAD as a bridge to candidacy before converted to implantable device. Median duration between admission and registration of heart transplant list was 64 days in bridge to candidacy patients, which leads to significantly longer hospital stay in those than de-novo implantable LVAD patients (median 222 vs 157 days, $p<0.05$). 9 patients (50%) experienced at least one event of re-admission, mostly for the treatment of driveline infection.
Conclusion: In the locational and institutional circumstances, majority of the patients treated in our institution were bridge to candidacy patients; however, our data showed LVAD therapy provides considerable survival benefits even for those patients. High prevalence of re-admission and long hospital stay are the common issues to be addressed.

P392
The role of LVAD coordinator in programe for mechanical circulatory support. One year single centre experience.

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Background: Heart failure is a life-threatening condition in which the heart is not strong enough to pump enough blood to meet the body's needs. The new artificial heart technology - left ventricular assist device (LVAD) has in recent years provided new life and hope for patients.To establish successful VAD programe for mechanical circulatory support (MCS) , a serious planning and organization of educated personnel is required. The VAD coordinator is an important part of the VAD team and involves serious inpatient and especially, outpatient care and helps to bridge the technical and medical aspects of the field.
Methods: Our LVAD core team has cardiologists, cardiac surgeons, intensive care spacialists, anestesiologists,perfusionists, physical therapists, LVAD coordinator/nurse and a team of educated nurses from intensive care unit and cardiac surgery department. The role of LVAD coordinator is to integrate all team, starting from patient selection.
Results: Our LVAD team has one year experience in selecting patients for LVAD implantation, starting from the initial evaluation and following the continuum of care including pre procedure, post procedure, and continued follow-up post VAD implantation. We have 8 implanted CF-LVAD (6 bridge to transplantation and 2 patients for destination therapy). Caring for the hospitalized patient with an LVAD begins with a thorough assessment of both the patient and LVAD. Monitor blood pressure and mean arterial pressure (MAP); the goal is 60 mm Hg to 80 mm Hg. Elevated MAP decreases flow and perfusion. The LVAD requires regular care and system checks, including power-source changes, daily self-tests, and driveline dressing changes. Performing these tasks by LVAD coordinator team in the hospital provides teaching opportunities for patients and caregivers. LVAD coordinator is available for counceling 24/7. Most frequent questions are regarding INR level, blood pressure measurment and drive line dressing. Every follow up visit is scheduled and assisted by LVAD coordinator.
Conclusion: The kee role of LVAD coordinator is very clear, since he /she is liaison among physicians, staff, patients, families, and payers to ensure effective utilization of resources, education and coordination of care. LVAD coordinator ensures maintenance of electronic database, and submits patient demographic, medical and progress report information. LVAD coordinator participates in the department quality improvement program and strives to optimize patient outcomes through patient education and clinical expertise.

P393
Prevalence, predictors & outcomes of vitamin D deficiency in heart failure patients in an ambulatory care setting in Ireland.

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Background: The TILDA study determined 1 in 8 older Irish adults are deficient in vitamin D, however limited data exists on vitamin D levels in the heart failure population in Ireland. Various studies have investigated the role of Vitamin D in improving outcomes in heart failure. Vitamin D deficiency was reported as an independent predictor of mortality in patients with heart failure. Supplementation of patients with HFrEF in the Vindicate study showed a modest improvement in left ventricular function. Purpose: To examine the prevalence, predictors and outcomes of low 25-hydroxyvitamin D (25(OH)D) levels in heart failure patients attending an ambulatory setting.
Methods: Retrospectively 85 (53 males: 31 females) patients in the period February to December 2018 were included. Serum vitamin D levels were obtained, with patients categorized to Vitamin D deficient or non-deficient. Demographic descriptors including; age, gender, heart failure type, etiology, NYHA classification, biochemical measures including NTproBNP, CRP, GFR, creatinine, phosphate, calcium, magnesium & albumin were extracted. Number of admissions (all cause & cardiovascular) & mortality data was also collected over the intervening months. Chi Square analysis was completed to assess for associations. A subgroup analyses was conducted to assess response to vitamin D supplementation in patients with vitamin D deficiency (20 treated/17 non treated) in the above outcomes.
Results: 44% of patients had clinically significant Vitamin D deficiency (vitamin D level <50) with mean vitamin D levels 29.2±10.4. A statistically significant relationship was found between gender & vitamin D levels with males having a greater levels of deficiency compared to females (33.3% vs 10.7% p0.04). No other statistically significant relationships were revealed between demographic variables, biochemcial measures & vitamin D levels ; however there was a trend towards vitamin D deficiency in patients with ischemic etiology (p0.08). There was no significant relationship with vitamin D level on admissions & mortality; however there was a trend toward increased admissions for cardiovascular causes in patients who were vitamin D deficient (25% vs 13.1%, p0.07).
Vitamin D supplementation was initiated in 20 patients. Interestingly, pre post test analysis revealed vitamin D levels improved in both treated & non treated vitamin deficient patients (p value0.02 versus p0.05). Moreover, there was no association between vitamin D supplementation & outcome measures; GFR, NYHA class, admissions & mortality.
Conclusions: 44% of our sample had vitamin D deficiency with males more likely to be deficient. Vitamin D deficiency did not significantly affect patient's outcomes in this small study with relative shorter term follow up. The study showed an improvement in vitamin D levels whether patients were taking vitamin D which may have confounded an ability to see any impact on outcomes with active supplementation.

P394
Effect of therapy with ARNI on cardiac remodelling, functional and biomarker responses in selected cohort of patients with HFrEF and influence of aetiology, gender and medication dose.

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Background: The PARADIGM HF trial demonstrated the therapeutic effect of ARNI in reducing morbidity and mortality in HFrEF. However, studies demonstrating ARNI's effect in modifying the remodelling process are scant. Additionally, the influence of HF aetiology on the degree of reverse remodelling following treatment with

ARNI is lacking. Purpose: To explore the therapeutic effect of ARNI in reverse remodelling of HF patients and determine the role of underlying HF aetiology, gender & medication dose on these outcomes. Method: Data from 90 HFrEF patients were collected (74 male: 16 female) with patients categorised based on HF aetiology (55 ischemic: 35 non-ischemic), prior to initiating ARNI & 12 months post achieving maximum tolerated dose. Indices of cardiac function were recorded including LVEF & LVIDd with neurohormonal cardiac biomarkers (NTproBNP). Functional capacity was determined based on NYHA Class. Paired sample t-test was completed to assess for statistically significant changes. Results: Median maximal tolerated dose for all patients was 49/51mg BD, 97/103mg BD for non ischemic patients and 49/51mg BD for ischemic patients. A statistically significant mean increase of 7.9% in LVEF was revealed among all patients (p0.00). This remained significant among groups categorised based on HF etiology however there was a greater increase in LVEF in non-ischemic as compared to ischemic (10.2% vs 5.4%, p0.01). Chi Square analysis revealed no statistically significant dose dependent relationship with LVEF (p0.29). LVIDd also reduced by mean of 0.4 cm (p0.04) which remained significant for non-ischemic patients (p0.02) but not for ischemic patients (p0.47). NTproBNP levels reduced from 2252 pg/mL to 1560 pg/mL (0.01) which remained clinically significant for ischemic (p0.02) and non-ischemic patients (p 0.02), though a greater reduction was found in ischemic patients (-916 pg/mL vs -338 pg/mL). A statistically significant reduction in NYHA Class (p0.00) was revealed among all patients which remained significant ischemic and non-ischemic patients (p0.001 vs 0.000). Gender did not influence degree of cardiac remodelling based on LVEF (0.55), LVIDd (0.27) or NTproBNP (0.87), however males appeared to have greater functional improvement following treatment than females (p0.00 vs p0.68). Conclusion: This small study assessed the effect of ARNI therapy on cardiac structure & function in HFrEF patients. These findings indicate that treatment with ARNI results in favourable effects on reverse remodelling, neurohormonal indices and functional improvement. The response was similar in ischemic and non-ischemic patients, but increases in LVEF and LVIDd were significantly greater in non-ischemic patients. Functional improvement was greater in males than females although this did not correlate with clinically significant improvements in other measures of cardiac remodelling based on gender. No dose dependent relationship was revealed in this small-scale study.

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Aerobic exercise, designed with individualized method based on lactate threshold definition, initiate reverse myocardial remodeling in heart failure patients

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Background. Finding ways to non-pharmacological effects on myocardium is very relevant. Objective. To evaluate the effects of long-term aerobic training, designed with individualized method based on lactate threshold definition, on myocardial remodeling inversion in heart failure patients and to find its predictors. Methods. We evaluated 143 HF patients, mean age 51±3.8, 98 men, with NYHA class III, LVEF 31,6±2,1%. CPET performed on a treadmill ("Oxycon Pro") at baseline, in every 8 weeks and after 9 months. All patients were randomized into following groups: 83 patients of study group (SG) mean age 53±4.3, 61 men, BMI 23±3,6 kg/m2, with NYHA class III, LVEF 29,3±4,0%, atrial fibrillation 13%, anemia 5%, chronic obstructive pulmonary disease 35%, CRT 23%, who underwent physical rehabilitation program (PRP), calculated due to lactate threshold; and 60 HF patients control group (CG) mean age 52±5.1, 45 men, BMI 25±4,1 kg/m2, with NYHA class III, LVEF 31,5±5,8%, atrial fibrillation 10%, anemia 8%, chronic obstructive pulmonary disease 41%, CRT 15%, who underwent physical training, calculated based on VO2 percentage. Results. At baseline CPET results in both groups did not significantly differ. V2 at lactate threshold and V2peak were 8.8±0,5; 13,5±0,9 ml/min/kg and 9.0±0.9; 13,6±1,2 ml/min/kg in study group and control group, respectively (p1=0,08, p2=0,07, respectively). After 9 months of training V2LT and V2peak were better in the study group than in control group: the increase of V2LT and V2peak was 15% and 20% in the main group, and 4% and 7% in the control group, respectively (p1<0,01, p2<0,01). After 9 months of aerobic training it was significant improvement of myocardial contractile function in SG patients: LA, at baseline and after training were 5,52±0,09 and 5,35±0,05sm; LVEDD 6,37±0,08 and 6,10±0,09sm; LVESD 5,91±0,12 and 5,68±0,08sm, LVEF 30±1,31 and 39,29±2,07%, p<0,05. In CG patients the improvement of myocardial contractile function was not observed: LA, at baseline and after training were 5,46±0,38 and 5,41±0,35sm; LVEDD 6,32±0,57 and 6,27±0,45sm; LVESD 5,91±0,50 and 5,87±0,29sm, LVEF 36±5,3 and 39,2±4,7%, p>0,05. We found correlation between LVEDD changes and duration of training (r=0,9, p<0,05), LVEDD changes and BMI (r= 0,7, p<0,05), LVEDD changes and b-blockers dose (r=0,4, p,0,05), LVSED changes and blood creatinine (r=-0,4, p<0,05). Conclusions. Aerobic exercise, designed with individualized method based on lactate threshold definition, increase exercise tolerance, improves myocardial contractile function more than aerobic training, calculated based on VO2peak percentage. Predictors of myocardial remodeling inversion in heart failure patients were: aerobic training duration (r=0,9, p<0,05), BMI (r= 7, p<0,05), b-blockers dose (r=4, p,0,05), blood creatinine (r=-4, p<0,05).

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High-intensity interval training alleviates consumptive coagulopathy in patients with heart failure

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Background: Consumptive coagulopathy is associated with increased mortality in patients with heart failure (HF). Exercise may impact the risk of major vascular thrombotic events.
Purpose: This study investigates how high-intensity interval training (HIIT) influences the capacity of endogenous thrombin generation (TG) by modulating circulatory procoagulant microparticles (MPs) in HF patients.
Methods: Thirty-eight HF patients and 38 normal counterparts (N-C) were recruited into this study. The HF patients performed HIIT (3-min intervals at 40% and 80%VO2peak) on a bicycle ergometer for 30 min/day, 3 days/week for 12 weeks. Plasma TG kinetics, procoagulant MPs, coagulation-related factors, and oxidative stress/proinflammatory status were analyzed.
Results: Compared to N-C, HF patients exhibited (i) less endogenous thrombin potential (ETP) and TG rate, (ii) fewer levels of total and tissue factor (TF)-rich MPs derived from erythrocytes/leukocytes/platelets, (iii) lower TF and tissue factor pathway inhibitor (TFPI) concentrations and TF activity, and (iv) higher vascular endothelial shedding, myeloperoxidase, and interleukin-6 levels. After adding TF to plasma, HF patients revealed higher changes of ETP and TG rate than N-C did. However, HIIT diminished the extents of HF-declined ETP and TG rate and procoagulant MPs, which were associated with increased TF/TFPI concentrations and TF activity. Moreover, HIIT decreased vascular endothelial shedding and plasma myeloperoxidase/interleukin-6 levels in HF patients.
Conclusions: The HF progression reduces the capacity of endogenous TG, which is associated with decreased (or consumed) circulatory procoagulant MP levels. However, HIIT alleviates HF-induced endogenous TG reduction and vascular endothelial damage through recuperating TF-related coagulation activity and suppressing oxidative stress/proinflammatory status.

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Contributing factors to exercise induced desaturation during a six-minute walk test in pulmonary arterial hypertension

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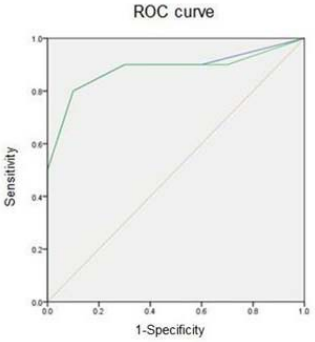
Objective: To evaluate the prevalence of exercise induced desaturation (EID) and elucidating the contributing factors in pulmonary arterial hypertension (PAH) patients.
Methods Analyze 20 pulmonary arterial hypertension patients' data (EID group = 10) from April 2016 to May 2018. Comparisons of background characteristics, comorbidity, trans-thoracic echocardiography (TTE), cardiac catheterization, pulmonary function test (PFT), 6MWT with gas analysis, body composition test and muscle power test between EID and non-EID patients were conducted.



Score	Sensitivity	1-Specificity
0	1.000	1.000
1.5	.900	.600
2.5	.900	.300
3.5	.800	.100
4.5	.500	.000
5.5	.400	.000
6.5	.200	.000
8	.000	.000

Results Epidemiological characteristics, TTE data and cardiac catheterization data did not differ between 2 groups. Forced expiratory volume in the first second (FEV1), 6MWD and peak oxygen consumption (VO2peak) were significantly low in EID group. We suggest a "predictive scale for exercise induced desaturation in pulmonary arterial hypertension (PSEID)". EID might be considered as PSEID is 4 and more, by 80% of sensitivity and 90% of specificity (figure 1).
Conclusion The EID was found in the half of PAH patients and FEV1, 6MWD and VO2peak were most relevant factors. Result of TTE and cardiac catheterization was not correlated with EID

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Effects of cardiovascular rehabilitation in heart failure patients with mid-range ejection fraction: is there age difference?

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Background: The positive effects of exercise training in patients with chronic heart failure (CHF) are reflected in improving exercise tolerance, reduce symptoms and less hospitalization, increasing survival and improving quality of life (QOL). Elderly patients have more advanced CHF than younger because they tend to be more sedentary and thus do not note symptoms or do not receive a diagnosis of CHF until their cardiac limitation is advanced. Heart failure with mid-range ejection fraction (HFmrEF), the "middle child", as a new entity, in heart failure family, has limited data regarding exercise tolerance and training, functional capacity and QOL.
Objective: To evaluate the effects of short-term exercise training on physical exercise, tolerance and level of markers of inflammation, neuro-humoral activation, endothelial function and QOL in patients with HFmrEF, in relation to age.

Patients and Methods: The study involved 36 HF patients (21 male; mean age 60.5 ± 4.7 years, with established ischemic heart disease, which fulfill criteria for HFmrEF. All patients were included in three-week rehabilitation program in the residential center, based on strictly controlled and individually prescribed exercise training. Before and after rehabilitation, all patients were underwent exercise stress test, and from the veins blood samples, biochemical markers of inflammation, atrial natriuretic peptide (ANP), brain natriuretic peptide (BNP) an endothelin (ET) were determined. In relation to age, patients were divided into three groups: A (n=14, <60 yrs), B (n=10, 60-69 yrs) and C (n=8, ≥70 yrs).
Results: After rehabilitation, in group C, significantly lower serum ANP (p = 0.048), BNP (p=0,034) and ET (p=0,047) were registered, compared to the values before rehabilitation. In groups A and B, there was decreasing trend of these neurohormons after rehabilitation but without significance. After rehabilitation, value of BNP was lower in group C than in group B (p=0,067), and significantly lower than in group A (p=0,04), while ANP and ET did not show significant changes in all three groups. Inflammatory markers: erythrocyte sedimentation rate (ESR), hs-CRP, fibrinogen, and white blood cell count (WBC) after cardiovascular rehabilitation showed a decreasing trend but not significant, in all groups. Exercise tolerance improved in all groups (p <0.001 for all). After the rehabilitation in group C, heart rate at rest, was substantially lower than in the group A (p = 0.03) and B (p=0,038). The quality of life assessed by Minnesota Living With Heart Failure Questionnaire was improved in all groups (p=0,001).
Conclusion: Residential short-term rehabilitation decreased the level of neurohormons (ANP,BNP,ET) in patients with mid-range CHF, especially in patients older than 70 year. Those positive effects on neurohumoral status were associated with significant increase of exercise tolerance, improvement of QOL and decreasing trend of inflammatory markers.

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Does religious denomination influence coping in chronic heart failure?

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Purpose. Chronic heart failure (HF) causes a marked physical and psychological discomfort, thus requiring an significant coping effort from patients. Achieving problem-centered or emotion-centered coping is influenced by a number of factors. Some studies support the adaptive - even active - character of religion as a coping mechanism in chronic HF, therefore, the aim of our study was to investigate how the denomination influences coping in chronic HF patients.
Methods. 96 patients with chronic HF (34.4% males and 65.6% females, mean age 68.4 ± 12.6) were included in the study after having signed informed consent, divided into two groups according to their denomination: Orthodox (55) and Reformed (44). The patients completed the MHLF (quality of life) and Brief-COPE (mechanisms of coping) questionnaires and undergone a semi-structured interview. The study methodology was approved by the Ethics Committee of the University of Medicine and Pharmacy "Iuliu Hatieganu" Cluj-Napoca; statistical analysis was done using SPSS 20.
Results. All patients reported a reduction in the quality of life with an important impact on all its three aspects: physical, emotional and social. In order to cope with it, Orthodox patients have turned to religion more than Reformed patients (69.1% vs 65.9%, p <0.05). The term "religion" was defined by 44.8% of patients as attending religious service at least once weekly, by 74% as reading or saying of daily prayer and by over 85.4% as having intrinsic religious beliefs and attitudes. Using this coping mechanism was more frequent in patients with more severe impairment of emotional and social aspects of quality of life and was associated with the use of emotional support (p <0.05). Reformed patients used more frequently "active coping" (84.09% vs 80%, p <0.05), "use of instrumental support" (79.5% vs. 76.4%, p <0.05) and "planning" (75% vs 72.7%, p <0.05) than Orthodox patients. Orthodox patients used more frequently "use of emotional support" (87.3 % vs. 81.8%, p <0.05), "positive reframing" (81.8% vs. 77.3%, p <0.05) and "self-blame" (78.2% vs 72.7%, p <0.05). The most common mechanisms (used in relatively equal proportions by both patient groups) (Fisher test, p > 0.05) were: "accepting", "venting", "denial", and "self-distraction". "Substance use" and "humor" were the least used coping mechanisms in both Orthodox and Reformed patients. Conclusion. Recourse to religion is an important and often used coping mechanism for patients with chronic HF, regardless of their denomination. However, denomination seems to influence the type of coping, in our study the Reformed patients using "problem-centered coping" more frequently, while Orthodox patients used "emotion-centered coping".

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Exercise training in heart failure patients: involvement level, motivation, barriers, and beliefs.

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Funding Acknowledgements: Russian Heart Failure Society

Background Exercise training (ET) is highly recommended by ESC and Russian heart failure society guidelines, but it is still severely underutilized in heart failure (HF) patients all over the Russia.
Purpose
To explore current level of HF patients involvement in ET and describe potential barriers and motivations to ET as well as patients' personal characteristics which leading to positive attitudes to ET.
Methods
The study had a cross-sectional survey design. HF patients visiting Open clinics in 7 cities during 2018 Heart Failure Awareness Days were given the self-administered questionnaire containing questions about social and educational status, attitudes and believes about ET and motivation and barriers for ET performance. Questions describing HF features were filled out by medical practitioners. Code number were used to further de-identify the participants and ensure their confidentiality. Exact confidence limits (CLs) for proportions (as the parameters of multi-nominal distribution) were calculated using StatXcat-8 software (Cytel Inc., USA). CLs for the proportion difference and/or proportion ration were estimated applying the MOVER method.ResultsA total of 560 HF patients (52% women) of mean age (95% CI: 63 to 65 yr) were included. In average women were 3 years older than man (95% CI; for the age difference 1,3 to 4,9 yr). II-III NYHA FC- 90%. HFrEF- 49% (n=265). 62% (n=350) had non-cv comorbidities; 41% Diabetes; 25% - arthritis. In total 17% of patients (N=91) reported involvement in ET. Patients younger than their median age (62 yr for males and 65 yr for females) reported involvement in ET and desire to start exercise significantly more often than older patients. OR =2.3 (95% CI: 1,6 to 3,3, mid-p=0,00002). Patients with higher level of education were more likely to take part in ET or to express a desire to start OR = 2.7 (95% CI from 1.6 to 4.7, midp= 0,00015). Ability to influence the course of the disease was most important motivator for ET for the both genders. Proportion of this answer was 65% (95% CI; 26 to 81%) in males and 54% (95% CI: 36 to 72%) in women. Poor health condition was noted by 62% of patients as a main barrier for participation in ET. Only 55% of patients were aware that ET could be a treatment method for the HF, and only 50% of those patients got this information from the medical practitioner.

Discussion
Currently the level of HF patient's participation in ET is extremely low. Younger patients and patients with higher levels of education are more likely to participate in ET. Our study demonstrates that medical practitioners very unlikely prescribe ET as a treatment for HF.

P401
Comparison of characteristics and benefits in patients with heart failure with reduced ejection fraction referred to a cardiac rehabilitation unit

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INTRODUCTION: Cardiac rehabilitation (Rc) in patients with heart failure with reduce eyection fraction (HF-EFr) is still underused. Objective: to compare the characteristics and benefits of Rc in this patients.
METHOD: Prospective cohort study of patients referred to Rc in our center during 2016. Group 1 included patients with EF <40% and group 2 patients with EF≥ 50%. We analyzed clinical differences between groups, and then results in effort capacity and risk factors control.
RESULTS: Of 334 patients referred to Rc, 44 were group 1 (13.2% of all Rc patients) and 253 were group 2. 37 patients with intermediate EF were excluded. The baseline clinical characteristics of both groups were very similar (view table), except for a lower origin after an ACS and a tendency to higher baseline blood glucose in group 1. Only one third of the patients had a functional grade ≥ II
219 patients completed the Rc program with a dropout rate of 26%. 87.4% of group 2 performed only 12 to 16 sessions, compared to 63.9% of group 1 which required 24 sessions. In both groups, the exercise capacity improved before and after the Rc, measured by ergometry in METs (8.1 + -2.3 vs 9.7 + -1.9, increase of 1.58 METS, 95% CI 1.35 -1,80, p 0,0001), percentage of maximum heart rate reached (72 + -21 vs 58 + -33, decrease 14%, IC95% 10.7-17.7, p 0.0001) and final heart rate training (100.7 + -15 vs114.5 + -17, increase 13.7 bpm, 95% CI 12.6-14.8, p 0.0019), although there wasn´t difference in these benefits between the two groups at the end of the program (figure). Significant benefits were obtained in weight control, abdominal perimeter, LDL cholesterol and basal glycemia, but without differences between the two groups after the program.
CONCLUSIONS: Patients with HF-FEr that are referred to Rc represent a minority, have clinical characteristics and obtained benefits similar to the rest.

Baseline clinical characteristics

	Group1(n=44)	Group2(n=253)	P
Age	57,1±9,6	57,8±9,5	0,64
Sex:man	38 (86,4%)	206 (81,4%)	0,43
DM	11 (25%)	59 (23,3%)	0,7
ACS	34 (77,3%)	241 (95,3%)	0,001
AtrialFibrillation	3 (6,8%)	8 (3,2%)	0,23
NYHA I	27(67,5%)	146(63,2%)	0,5
BMI	25,9±9	24,3±12	0,35
Basalglucose	127,5±65	105,5±37	0,075
LDL Cholesterol	113±37	115±37	0,8

P402
Wearable defibrillator for the prevention of sudden cardiac death: our preliminary experience.

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Introduction. The implantation of an ICD for primary prevention of sudden cardiac death (SD) is indicated in patients at high risk according to current European Society of Cardiology (ESC) Guidelines. However, in some patients it is not possible to quantify immediately the arrhythmic risk and the indication to an ICD should be re-evaluated after a period of observation and pharmacological therapy optimization. Wearable defibrillators (WD) can protect against fatal arrhythmic events during this period. Purpose. We report our preliminary experience with the use of WD as a bridge to decision. Methods. Forty-seven patients (40 M; mean age 51,9 years; range 11-76) underwent WD placement between Aug. 2016 and Aug. 2018. Indication for WD was ischemic LV dysfunction in 18 patients (recent myocardial infarction and/or left ventricular dysfunction treated with revascularization), dilated cardiomyopathy in 12, ICD explant in 2, other causes in 15 patients (tachycardiomiopathy, myocarditis, congenital diseases, etc.). All patients wearing WD have been followed by remote monitoring (LV Network, Zoll). Until the final decision, pharmacological therapy the diagnostic process was completed and pharmacological therapy was individually optimized. Results. Patients wore WD for an average of 71.6 days (range 3-27). The average daily use was high (22.4 hours). An effective electrical therapy was delivered in only one patient for a ventricular fibrillation and normal heart rhythm was restored after 4 shocks. In one case, the device recorded a sustained, self-terminating ventricular tachycardia. An inappropriate shock on supraventricular tachycardia was delivered in one patient. After the observation period, 26 patients (55.3%) underwent ICD implantation. For 16 patients (34%) the ICD implantation was not longer indicated. Among them, 15 showed a recovery of the systolic function and 1 underwent cardiac transplantation. Of the remaining 5 patients, 2 still have active WD, 2 refused the ICD implantation, and 1 died from non-cardiac causes. A patient presented a transient allergy, which did not excluded the use of WD. Conclusions. In our experience WD allowed to critically re-evaluate the ICD indication in over 1/3 of the potential candidates. The device adequately protected 1 patient against a potentially lethal arrhythmia. The device was well tolerated, with a satisfactory wearing time.

P403
Subacute ICD-lead perforation in patients with noncompaction cardiomyopathy

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Introduction: Noncompaction cardiomyopathy (NCCM) is a rare abnormality characterized by a hypertrabeculated left ventricular wall with a sponge-like appearance and a two-layered structure with a subepicardially located compacted zone and a subendocardially located noncompacted zone. The right ventricle may also be affected. Cardiac manifestations comprise heart failure, thromboembolism and malignant arrhythmias. There is evidence that guidelines for primary prevention of sudden cardiac death (SCD), developed for dilative or ischemic cardiomyopathy, may also apply to patients with NCCM.
Subacute perforation of the right ventricular (RV) free wall by an ICD lead is a rare complication and with use of newer devices has been reported in less than 1%. However, little is known about this complication in patients with NCCM.
Methods: Over a 5-year period (2009-2013), ICD leads had been implanted in 248 patients by 2 experienced physicians. In all cases active fixation leads (Medtronic Inc.) were used. The rate of subacute RV wall perforation was compared in patients with NCCM (diagnosed by echocardiography and/ or cardiac magnetic resonance imaging) and those with other cardiac abnormalities.
Results: ICD leads were implanted for primary prevention of SCD in 121 patients (49%) and for secondary prevention in 127 patients (51%). Overall, 55/248 patients (22%) with left bundle branch block and heart failure received a CRT-D system.
Implantation of an ICD lead was performed in 8 patients with NCCM (2 female, 6 male, mean age 59±12 years). The indication was primary prevention of SCD in all patients. A CRT-D was implanted in 5 of the 8 NCCM patients (62%). Complications occurred in 2/8 patients: 1 pocket infection and 1 subacute lead perforation of the RV free wall 10 days after implantation requiring emergency cardiac surgery. During a follow-up period of 1.5 to 5 years no additional lead perforation was observed.
Subacute RV perforation of an ICD lead occurred in 1/8 patients with NCCM (12.5%) versus 0/240 patients with various other cardiac abnormalities (p=0.03). No patient with NCCM had obvious RV involvement by cardiac MRI and/ or echocardiography. This observation raises the question that despite its normal appearance there may be subtle structural RV abnormalities in NCCM favouring ICD lead perforation.
Conclusion: Subacute RV perforation after ICD implantation is more frequent in patients with NCCM. A septal insertion site of the lead tip may be preferable since the interventricular septum is rarely involved in the noncompaction process.

P404
Impact of sacubitril-valsartan compared to angiotensin inhibition on ventricular tachycardia burden in heart failure patients with reduced ejection fraction and implantable defibrillator

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Purpose: To determine the effect of Angiotensin receptor - neprilysin inhibition (ARNI; sacubitril-valsartan) compared to angiotensin receptor inhibition on ventricular tachycardia burden in recipients of Implantable Cardioverter Defibrillator (ICD) and Heart Failure with reduced ejection fraction (HFrEF).

Methods: We included 42 patients (31 men), mean age 67±9 years with HFrEF, left ventricular ejection fraction ≤35% and New York Heart Association class ≥II. Most of the patients (68%) had ischemic cardiomyopathy and secondary prevention of Sudden Cardiac Death (SCD) was the main indication (57%) for ICD implantation. All patients were treated with Angiotensin Converting Enzyme Inhibitors (ACE-I) or Angiotensin Receptor Blockers (ARB) plus beta-blockers and Mineralocorticoid Receptor Antagonist (MRA) for 12 months (group A) and subsequently they switched to ARNI for the next 12 months (group B). All detected sustained ventricular tachycardia (VT) episodes and appropriate interventions (antitachycardia pacing-ATP and shocks) were thoroughly reviewed and analyzed.
Results: All patients received the highest tolerated doses of their medications for HFrEF. There was no difference between groups concerning the dose of b-blocker or MRA. No statistically significant difference was observed on recorded VT episodes (9 VT episodes in 8 patients in group A versus 7 VT episodes in 7 patients in group B, p=0.776); delivered shocks (5 shocks in 4 patients and 3 shocks in 3 patients respectively, p=0.693), and ATP interventions (14 ATP in 8 patients and 9 ATP in 6 patients respectively, p=0.558).
Conclusions: Angiotensin receptor - neprilysin inhibition compared to angiotensin receptor inhibition did not reduce VT burden and appropriate ICD interventions (shocks or ATP) in our cohort of HFrEF patients with an ICD.

P405

Effect of loading dose of sacubitril-valsartan on the incidence of ventricular tachycardia as assessed by ICD interrogation -single center experience

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Background: Sacubitril-valsartan (SV) has been shown to reduce risk of sudden cardiac death compared to enalapril in patients with HFrEF in the PARADIGM-HF trial. In one recent study, SV reduced significantly episodes of non-sustained-VT, sustained VT and need for ICD shocks after 9 months follow-up. In another observational single center study, starting with SV was associated in 6 of 108 patients with arrhythmogenic storm.
Study objective: to evaluate the effect of SV treatment on incidence of VT as assessed by ICD in our center.
Patients and methods: we analyzed data from 52 patients with HFrEF frome a tertiary HF clinic, and who started treatment with SV from October 2017. Total number of 46 patients had ICD implanted in our centre, one patient stopped SV for intolerance, one patient died and one patient received LVAD during follow-up. Complete data from ICD interrogation before and after SV were finaly available in 24 patients. We analyzed any NSVT, VT or ICD therapy before and after SV therapy at the last and follow-up ICD interrogation at pacemaker clinic. All patients were on optimal therapy including maximal tolerated doses of BBs, MRAs (and diuretics) and therapy did not change during follow-up of a mean 12 months.
Results: Mean age of the patients cohort (22 men and 2 women) was 64 years, 11 patients had ischemic and 13 pts on-ischemic cardiomyopathy. Median NYHA before SV was 3 and mean LV EF 27%. Mean SV loading daily dose was 137 mg (median 100 mg). Any VT was revealed in 15 patients before SV therapy, from that group in 7 patients before, but not after SV therapy, and in 8 before and after SV therapy. In 4 patients, VT was not present before SV therapy but after SV therapy, in 5 patients none VT before and after therapy. Difference was not significant.
Conclusion: Loading dose of sacubitril-valsartan had no effect on the incidence of VTs in our HFrEF patients cohort. Our observation is limited by a small number of subjects. We need more evidence on the effect of SV on the incidence of VTs as the current available data are contradictory.

P406

Primary prevention of implantable cardioverter-defibrillator in systolic heart failure: result of Korean multicenter study

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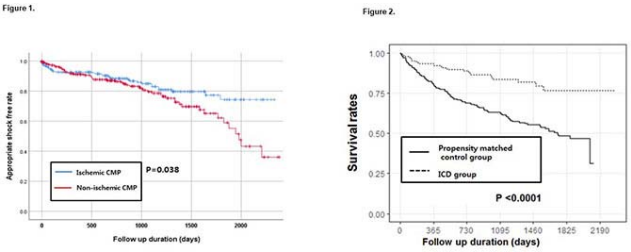
Background The benefit of implantable cardioverter-defibrillator (ICD) has been well documented in systolic heart failure from randomized trials, however, real world data of efficacy of ICD in Asian heart failure patients is very limited.
Purpose We investigated efficacy of primary prevention ICD using a large multicenter Korean registry cohort.
Methods Retrospective multicenter study was performed in 15 Korean hospitals. A total of 568 patients with systolic heart failure (LVEF ≤ 35%) who referred for ICD for primary prevention during Jan 2012- Dec 2016 were enrolled. Efficacy of ICD was compared to propensity matched control group from Korean Acute Heart Failure (KorAHF) registry (n=1406). All-cause mortality were compared between 216 patients from ICD group and corresponding propensity matched control group (n=216). All-cause mortality and incidence of appropirate shock and inappropriate shock were compared between ischemic vs. non- ischemic cardiomyopathy patients in ICD group.
Results During follow up durations of 35.1 ± 19.6 months, 39 patients died in ICD group. Mean age of ICD group was 65 year old and 67% were men. In ICD group, 195 (34%) were ischemic cardiomyopathy. In ICD group, all-cause mortality did not differ between ischemic and non-ischemic cardiomyopathy, however, incidence of appropriate shock was significantly higher in non-ischemic cardiomyopathy (HR: 1.58, 95% CI: 1.022-2.436, p=0.038) (Figure 1). Appropriate shock-free survival started to show difference after 40 months of follow up. All-cause mortality was significantly lower in ICD group compared to propensity matched control group (HR:0.357, 95% CI: 0.233-0.547, p<0.001) (Figure 2).
Conclusion From our multi-center real-world data, ICD for primary prevention in Korean systolic heart failure patients showed significant benefit over mortality. Although overall survival did not differ between ischemic and non-ischemic patients were similar, appropriate therapy was significantly higher in non-ischemic cardiomyopathy, reflecting delayed benefit of ICD in non-ischemic cardiomyopathy patients.



Figure

P407

Etiology of dilated cardiomyopathy as the leading predictor of efficiency of implantable cardioverter-defibrillators in prevention of sudden cardiac death

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Purpose: to study the predictors of efficiency of ICD/CRTD in prevention of sudden cardiac death (SCD) in patients with dilated cardiomyopathy (DCM).
Methods: 275 patients with DCM syndrome were included (185 males; 46.8±12.5 years). Inclusion criteria were left ventricular end-diastolic diameter (LV EDD) more than 5.5 cm and LV ejection fraction (EF) less than 50%.The average EF 37.8±11.6% and EDD 6.5±0.8 cm. Patients with coronary artery stenoses more than 50% were excluded. Cardioverter-defibrillators were implanted in 78 (28. 4%) of patients (54 males, 48.8±12.8 years): 43 ICD, 35 CRTD. The follow-up was 14 [6; 120] months.
Results: defibrillators were implanted in patients with more severe dysfunction: EDD (6.7±0.8 vs 6.4±0.8 cm in patients without devices, <0.005), EF (32.5±9.5 vs 40.1±11.8%, <0.001), RV (3.4±0.8 cm vs 3.1±0.8 cm, <0.05), pulmonary artery systolic pressure (45.4±16.6 vs 49.6±15.0 mmHg, =0.02), mitral regurgitation (2.0 vs 1.5, <0.005). The following causes of DCM syndrome have been identified: the isolated myocarditis (n=137, 49.8%), the primary (genetic) DCM (n=54, 19.6%), the genetic basis with myocarditis (n=68, 24.7%) and anthracycline-induced cardiomyopathy (n=4, 1.5%). Genetic forms of DCM were represented by non-compact myocardium (n=64), ARVC (n=12), TTR-amyloidosis (n=1), myopathy (n=6). The pathogenic mutations in the genes LMNA (n=1), DES (n=2), DSP (n=2), EMD (n=2), PKP2 (n=1), MUH7+MyBPC3 (n=2), MyBPC3 (n=4) were detected. The appropriate shocks rate (ASR) was 21. 8%. The only reliable predictor of ASR was identified the genetic nature of DCM syndrome (in combination with myocarditis in 67% or isolated in 30% in comparison with 35/20% in patients without ASR, p<0.005, AUC 0.733, RR 1.66, 95% CI 0.711-3.885). In patients with shocks were detected the higher frequencies of stable/unstable VT (22 / 67%) in comparison with patients without shocks (1.7 / 73%, =0.06), a low QRS voltage (39 vs 13%, <0.05), absence of LV hypertrophy signs on the ECG (83% vs 53%, =0.07). The average LVEF was higher in patients with ASR (34.4±9.4%) in comparison with patients without ASR (25.9±9.0%), <0.003. There were no differences of NYHA class, the sizes of cardiac chambers. The mortality in patients with DCM was 18.9% (n=52), death + transplantation 22.5% (n=62), SCD 2.9% (n=8); in patients with defibrillators – 23.0%, 31.0%, 2.6%; in patients without devices – 17.3%, 19.3%, SCD 3.1%. There were no differences between the groups.

onclusion. Due to effective ICD therapy, death rate did not exceed those of less severe patients without devices. As criteria for ICD implantation, it is necessary to use the genetic nature of DCM, sustained / unsustained VT, the low QRS voltage, and the absence of LV hypertrophy (ECG). The genetic nature of DCM syndrome (alone or in association with myocarditis) is the more important predictor of appropriate shocks than EF.

P408

Temporal trend and outcome of de novo and upgrade CRT procedures; a ten year single centre retrospective analysis

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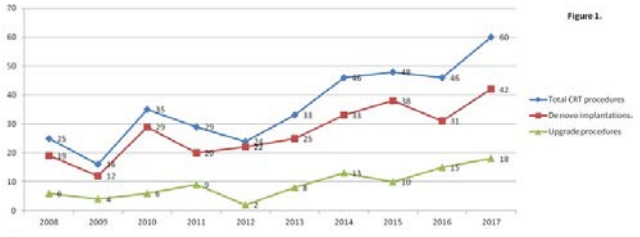
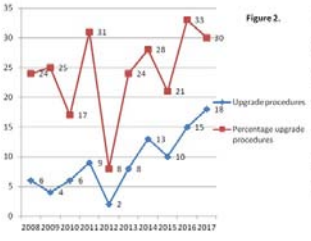
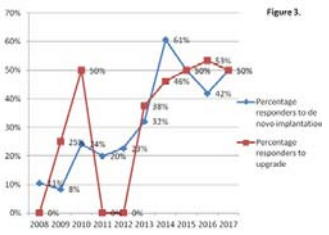
Introduction In appropriately selected patients with heart failure and reduced ejection fraction (HFrEF), cardiac resynchronisation therapy (CRT) reduces morbidity and mortality and improves symptoms and quality of life. As right ventricular pacing may induce heart failure, patients with a permanent pacemaker or implantable cardioverter-defibrillator (ICD) and high degree of right ventricular (RV) pacing can benefit from upgrade to CRT.
In 2016, the Heart Failure Association (HFA) published modified indications for CRT implantation. A class IA recommendation was given for patients with HFrEF, an indication for ventricular pacing and high degree AV block, regardless of New York Heart Association (NYHA) class. This might imply a similar recommendation for CRT upgrade in symptomatic patients with HFrEF and a high degree of RV pacing. However, due to lack of clinical trial evidence, a class IIbB recommendation was provided. The 2013 European Heart Rhythm Association (EHRA) guidelines provide a class IB recommendation for CRT upgrade, but only for NYHA class III and ambulatory IV.
Methods
A single centre retrospective analysis was performed. Data on every CRT implantation from January 2008 to December 2017 was collected. The CRT procedures were divided into de novo implantations and upgrades. The left ventricular ejection fraction (LVEF), as measured by the referring cardiologist, was used to assess response to treatment. We defined CRT-response as an improvement of LVEF to ≥45% after six months. Line plots were constructed, showing the number of procedures, the percentage of upgrades and the percentage of responders over the ten year period.
Results
From January 2008 to December 2017, 362 CRT devices were implanted. 25% of all procedures were upgrades (figure 1). The number of procedures increased yearly, up to 60 in 2017. The number of upgrades increased as well, from 6 in 2008 to 18 in 2017. There was no upward trend in percentage of upgrades, remaining 30% in 2017 (figure 2). Response to treatment was high, remarkably so in the last 4 years. Response rates were similar between de novo implantations and upgrades (figure 3).
Conclusion There is an increase in both de novo and upgrade CRT implantations. There is no upward trend in the percentage of upgrades, but the overall percentage is higher than would be suggested by the current HFA and EHRA guidelines. Previous surveys demonstrated an equally high number of upgrade procedures, reflecting the schism between guidelines and clinical practice.
Importantly, we report a similarly high rate of echocardiographic response to treatment in upgrades as in de novo implantations.







The current rate of upgrade procedures across Europe and the high rates of response in our single centre experience suggest that the current HFA and EHRA guidelines can be reinforced. Prospective randomised trials are needed to confirm the high response rates in CRT upgrade procedures to broaden current recommendations.

P409

The dynamics of quality of life in patients with congestive heart failure according to cardiac resynchronisation therapy response

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Background: Research studies showed that cardiac resynchronisation therapy (CRT) improve the prognosis and quality of life (QoL) in patients with congestive heart failure (CHF) both in short- and long-term follow-up periods. However, the studies about QoL related to CRT response in patients are insufficient.
Purpose: To assess the QoL changes in patients with CHF during one year after CRT according to the response.
Methods: The study included 82 patients (68 males and 14 females) aged from 30 to 74 years (mean age 55.8±9.2) who underwent implantation of a biventricular cardiac pacemaker for CRT. Based on left ventricular end systolic volume (LVESV) all patients after CRT were divided into two groups: group 1 included 56 patients with reduction of LVESV by 15% and more (responders), and group 2 comprised 26 patients with reduction of LVESV by less than 15% (non-responders). The SF-36 questionnaire was used to measure QoL. The results of the questionnaire were represented as scores over the eight subscales: physical functioning (PF), role-physical functioning (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role-emotional (RE), and mental health perceptions (MH). Each item is scored on 0 to 100 range with 100 considered as absolute health. A higher score indicated a higher level of QOL. QoL assessment was performed before and one year after CRT. A total of 82 pair comparisons were performed (56 in responders group and 26 in non-responders group). Student's paired t-test was applied in statistical analysis for comparing normally distributed values, while the Wilcoxon nonparametric test was used when the sample data were not normally distributed.
Results. Group of responders one year after CRT had significantly higher rates of improvement of QoL in PF (45.2±26.0 before CRT vs 57.1±26.4 after CRT, p=0.001); in VT (46.5±20.8 vs 54.4±19.7, p=0.01) and in SF (60.9±26.4 vs 70.8±20.8, p=0.01). The statistical tendency towards QoL improvement was revealed in BP (57.5±25.1 before CRT vs 64.8±23.8 after CRT, p=0.08), in GH (45.3±16.4 vs 49.1±18.0, p=0.08) and in MH (57.7±18.9 vs 62.5±17.7, p=0.08). In the group of non-responders the statistical tendency towards decrease in QoL was detected during one year after CRT in RE (46.2±45.3 before CRT vs 26.9±41.1 after CRT, p=0.07). No significant differences were found in paired comparisons of other QoL indicators.
Conclusion: The study showed that QoL was generally improving one year following CRT in responders while a tendency towards decrease in RE was detected in non-responders.

P410

The impact of CRT therapy on valvular regurgitation differ between men and women

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Funding Acknowledgements: No financial support

Introduction: This study was conducted on patients with symptomatic chronic heart failure (CHF) and implanted cardiac resynchronization therapy device (CRTD) according to guidelines in order to evaluate possible differences in mitral (MR) and tricuspid (TR) valvular regurgitation grades and left ventricle ejection fraction (LVEF) between male and female CRTD patients during follow up of 6 months after CRTD implantation.
Methods: We analyzed 135 patients (89 M, 46 F) with CHF due to any cause, implanted CRTD, optimal medical therapy with atrial fibrillation or in sinus rhythm. Clinical (NYHA class) and echocardiographic data (valve pathology, LVEF) were assessed before and 6 months after CRTD implantation. Using color and continuous flow Doppler, PISA, regurgitation volume and vena contracta measurements, MR and TR were stratified in 3 grades.
Results: Mean age of patients was 60 (±10) years.The results showed improvement in LVEF from 28% up to 37% (p<0.001) in all patients regardless of sex and age, as well as worsening of TR (p<0.001) and no difference in MR (p=0.195). In male patients (N=89), significant worsening in MR and TR was present (p<0.05) while there was no significant worsening in MR (p=0.42) nor TR (p=0.06) in female patients (N=46). In patients older than 60 years (N=82, female 27 (33%), male 55 (67%)), as

well as younger than 60 years (N=53, female 19 (36%), male 34 (64%)) significant worsening of TR grade was observed (p<0.05) while the grade of MR remained the same (p=0.255 and p=0.534).
Conclusion: Six months after CRTD implantation the grade of MR and TR remained the same in female patients while significant worsening in MR and TR grade was found in male patients. TR worsening was probably due to implanted electrodes. The changes in LVEF, TR and MR did not differ in patients younger and older than 60 years of age. Despite improvement in NYHA class and LVEF, the changes of MR did not meet our expectations.

P411
Efficacy, safety and cost of comprehensive versus standard remote monitoring of patients with cardiac resynchronisation therapy: design and rationale of the ECOST-CRT Study

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Background/Introduction: Heart Failure (HF) patients implanted with a cardiac resynchronisation (CRT) pacemaker or defibrillator warrant a close follow-up. Their hospitalisation rate for heart failure has a significant impact on their quality of life and health costs, and their risk of death remains high. Previous studies have demonstrated the clinical and economical benefit of remote monitoring considering rhythmic and technical parameters transmitted by conventional defibrillators. These results have yet to be confirmed in HF patients with CRT devices. In addition, remote monitoring of heart failure related parameters, combined with assessment of patients' symptoms, could improve their management.
Purpose: The primary objective of the ECOST-CRT study is to determine whether comprehensive remote follow-up in HF patients with CRT devices will reduce the combined endpoint of all-cause mortality or worsening heart failure hospitalisations, whichever comes first, when compared to basic remote monitoring, over a 27-month follow-up.
Methods: The ECOST-CRT study is a prospective, interventional, randomized, parallel group, national multicentre, open and blinded endpoint study. Approximately 652 HF patients just implanted with a CRT device will be randomized 1:1 to the standard (control) or the comprehensive remote monitoring (active) group before hospital discharge. Scheduled in-office visits will be mandatory 1-3 months after implantation, and after 9, 15, 21 and 27 months of follow-up. Remote monitoring will only address ventricular arrhythmias and technical parameters of the CRT device in the control group, while it will also include supraventricular arrhythmias, HF parameters, and patients' symptoms and clinical signs in the active group. Active patients will have to answer to automatically sent symptoms and signs questionnaires, monthly or triggered by worsening of remotely monitored parameters. Data will be available on line and will trigger notifications. The management of notifications will be performed according to decisional trees. Additional ambulatory visits will be scheduled if appropriate.
Results: The study should complete recruitment in 2019.

P412
Differential effect of CRT in diabetes mellitus: a retrospective cohort study

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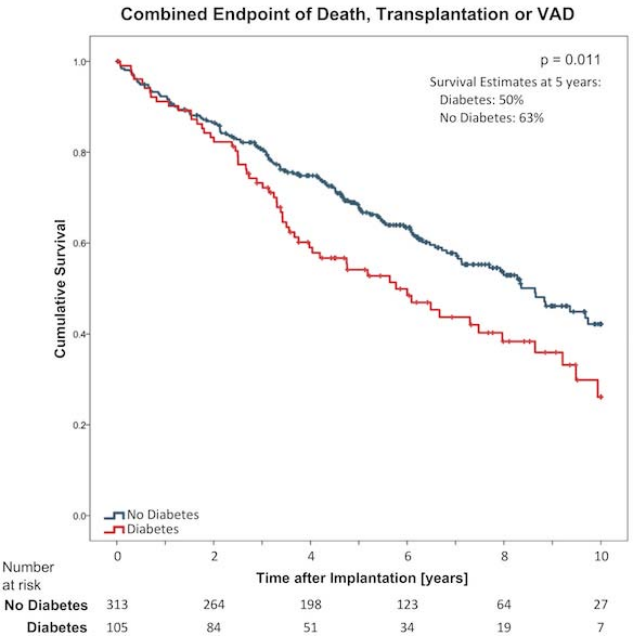
Background: Cardiac resynchronization therapy (CRT) has become an important therapy in selected patients with heart failure with reduced left ventricular ejection fraction (LVEF), reducing morbidity and mortality. The effect of diabetes mellitus (DM) on long-term outcome in these patients is controversial.
Purpose: This study sought to assess the effect of DM on long-term outcome in patients undergoing CRT implantation, and to elucidate the role of DM in the subgroups of ischemic and non-ischemic cardiomyopathy.
Methods: All patients undergoing CRT implantation at our institution between November 2000 and January 2015 were consecutively enrolled. The study endpoint was a composite of all-cause mortality, heart transplantation or implantation of a ventricular assist device (VAD).
Results: 418 patients (average age 64.6 years, 22.5% female, 105 (25.1%) with DM) were followed over a median of 4.8 years. In the overall population, diabetic patients had an increased risk to reach the composite endpoint (HR 1.50, 95%CI 1.10-2.04, p=0.011, see Figure). Reverse remodeling (improvement of LVEF ≥10%) did not differ between diabetic and non-diabetic patients. In ischemic cardiomyopathy, survival rates were not significantly different in diabetic vs. non-diabetic patients, whereas diabetic patients had a higher risk of reaching the composite endpoint (HR 1.65, 95%CI 1.06-2.58, p=0.027) in non-ischemic cardiomyopathy. However, the latter effect was not independent of other risk factors.
Conclusions: Among patients undergoing CRT, long-term follow-up revealed an increased risk for all-cause mortality, heart transplantation or VAD in diabetic compared with non-diabetic patients. The detrimental effect of DM appeared to weigh heavier in patients with non-ischemic compared to ischemic cardiomyopathy.



P413
New hemodynamic index to identify different profiles in patients implanted with HM3

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Introduction LVAD (Left Ventricle Assist Device) represents a valid alternative to heart transplantation in patients who suffer from end-stage heart failure. The ventricular devices show a different performance related to preload, afterload and the fixed set revolutions per minute (RPM). Our main intention was to introduce a new hemodynamic index that accounting for the RPM setted, can easily identify different hemodynamic profile occurring during LVAD support.
Methods
From November 2015 to March 2018, 19 patients implanted with HM 3 underwent ramp tests during right heart catheterization. Basal data were collected and Hemodynamic Index (HI) was calculated according to the following formula:
Results
Three main profile could be identified. Profile 1 HI less than 60 and a higher risk of right failure. Profile 2: HI between 65-90, requiring speed optimization, Profile 3 HI > 90 requiring afterload optimization. A ROC curve analysis identified an HI value of 60 as highly predictive of late right ventricular failure.
Conclusion
RPM should be set balancing optimal unloading with adequate afterload and preload and accounting for the right ventricular function. We proposed a new hemodynamic index that integrating different variables can stratify patients into three main profile according to which the best treatment can be provided.

P414
Pulse oximeter usefulness for blood pressure monitoring in patients implanted with latest generation L-VAD (left ventricle assist device).

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INTRODUCTION The measurement of blood pressure (BP) in patients with CF-VADs can present unique challenges because traditional BP measurement by auscultation or automated cuff is less reliable. We tested the efficacy of blood pressure estimation by using the sphygmomanometry combined with finger pulse oximetry.

METHODS 4 implanted with HVAD, 25 implanted with HM3 were prospectively studied during follow up period and mean arterial pressure was estimated by using 3 different methodologies; ultrasound Doppler, pulse oximeter and automated blood pressure cuff. For each method, 3 consecutive evaluations were conducted in 3 follow-up visits.
RESULTS For each patient 9 different evaluations were obtained, 3 for each method. The overall success rate was 100% for blood pressure assessment conducted with doppler and pulse oximeter, 80% - 87% the rate for automated monitor evaluations. 100 was the percentage of three successful consecutive measurements for the first two methodologies and 60 the percentage for the last one. Pearson's correlation analysis showed a good correlation when measurements of Doppler and pulse oximeter were compared. High variability emerged between estimations obtained by using an automated monitor and poor correlation was found when this method was compared with Doppler and pulse oximeter.
CONCLUSION According to our results pulse oximeter method showed d high success rate and a good correlation level with the standard proedure. Our data encourage the use of oximeter for domiciliary blood pressure assessment in patients implanted with h centrifuge flow device.

P415

Development of a co-designed written resource for carers of patients with heart failure.

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On behalf of: Queen's University Belfast
Funding Acknowledgements: Northern Ireland Chest Heart and Stroke

Background: There is growing evidence that carers of patients with heart failure (HF) have unique unmet needs that impair their own quality of life and potentially that of their loved one. Studies found carers requested better communication with healthcare professionals, more information on symptoms and current and future management . A recent systematic review found that a written material was a common and useful resource that could significantly improve a range of carer outcomes including quality of life, depression and HF knowledge. Indeed, there is an urgent clinical need for tailored information and support that would suitably equip carers in their daily caregiving role.
Purpose: To co-design a written resource for carers of patients with heart failure.
Methods: All written resources available for carers and published in English were retrieved. Booklets from organisations including Northern Ireland Chest Heart and Stroke, British Heart Foundation and Irish Heart Foundation were analysed, along with online information available from HeartFailureMatters.org. Key topics were combined with those that were considered important from studies included within a recently completed systematic review.
Results: No information booklets were found that were designed exclusively for carers of patients with HF. The resources that were found were primarily targeted towards patients, with brief information sections for carers consisting of 2-3 pages at the back. They provided general information on areas such as the financial implications of becoming a carer, symptoms of HF, managing medications and dealing with emotions that may be experienced such as depression and stress. Topics that were considered important from written resources used within studies included in a systematic review included: communicating with the patient in a positive and motivating way, practical skills to assist with self-management at home, palliative care and problem-solving skills. Following feedback and discussions with key stakeholders made up of carers of patients with HF and health care professionals, a written booklet was developed. The booklet comprises of five chapters: 1. What is heart failure? 2. Your role as a carer, 3. Looking after yourself, 4. Communication and 5. Planning for the future.
Conclusion: There are currently no written resources specifically designed for carers of patients with HF. This innovative and co-designed resource is unique for carers and will be piloted among carers across Northern Ireland. It provides useful information with key contact numbers to signpost carers to further support and adds to the information currently available online for carers. It has the potential to influence clinical practice and could be a useful information tool that health care professionals managing HF can disseminate.

Chronic Heart Failure - Prevention

P416

Differences in the quality of life related to health among informal primary caregivers of right heart failurepatients according to the level of perceived burden

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Introduction: The attention and the daily care of patients with heart failure is on charge of non-professional persons called caregivers, whose responsibility is based in to the treatment and the well-being of the patient. Caregivers present affectations in different aspects of their life from the physical to the psychological, which together deteriorates their quality of life and the care provided, making them a silent patient.
Purpose: To evaluate the differences in the quality of life related to health in the caregivers of right heart failure patients, according to the level of perceived burden.
Methods: In a cross-sectional participated 57 caregivers of patients diagnosed with right heart failure.Was evaluated the quality of life through the SF-12 health questionnaire and the perceived burdenwith the Zaritburden interview.In agreement to this latter, they were classified into 3 groups: without burden(G1, n=23), mild burden (G2, n=18) and intense burden (G3, n=16). For a statistical analysis it was used ANOVA to compare the quality of life means according to the burden groups in SPSS v.25.
Results: In relation to sociodemographic data, the groups by age and sex were G1: 55±15 years, 69.6% men; G2: 55±13 years, 61.1% men; G3: 56±9 years, 87.5% men. There were statistically significant differences ($p<0.05$) between groups (G1, G2, G3) in quality of life (76.35±16.01, 66.74±24.31, 59.03±18.07); mainly in the dimensions: physical function (81.52±26.34, 72.22±34.18, 67.19±36.19), physical role (79.35±31.67, 68.06±40.95, 67.19±37.32), bodily pain (75±35.35, 68.06±40.95, 67.19±37.32), general health (64.13±33.56, 43.06±37.18, 45.31±33.19), vitality (75.22±31.89, 60.56±35.88, 46.88±43.62), social function (82.06±27.13, 87.5±24.25, 58.59±31.53), emotional role (83.15±18.14, 68.33±40.86, 62.03±29.21) and mental health (74.34±15.9, 62.59±23.88, 57.91±24.21).
Conclusions: The caregivers develop had higher perceived burden and a lower quality of life, in comparison with caregivers with burden mild or null. The responsibilities involved in caring for patients and monitoring treatment can lead to burden in the caregivers and reduce their quality of life, so it is important to implement preventive interventions in this population to avoid the development of chronic diseases.

P418

Hand strength measured by dynamometry related to cognitive function in patients with right heart failure associated with COPD

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Introduction: As age increases, hand strength decreases, while the presence of cognitive impairment increases. In right heart failure patients, even more in comorbility with COPD, whose state of health compromises cerebral perfusion. Notwithstanding, a relationship between these variables has not been established, being important indicators of the health status of these patients.
Purpose: To investigate the relation between hand strength and cognitive impairment in patients with right heart failure related with COPD.
Methods: In a cross-sectional study, 80 patients with right heart failure patients related with COPD was participated. Hand strength was evaluated with a YAMAR brand hand dynamometer, model GRIP-A, establishing the mean strength for men in 38 kg and 22 kg for women, standardized in mexican population from 60 to 70 years. The Montreal Cognitive Assessment (MOCA) was applied for determines the presence of cognitive impairment with a score of ≤26. Pearson correlation was performed in the SSPS v25 software.
Results: The average of age of the patients was 65.5±16.2 in men (n=34, 70.6% with cognitive impairment) and 68.6±12.9 for women (n=46, 89.1% with cognitive impairment).
The hand strength mean in men was 26.4±8.6 kg, with relation statistically significant differences ($p<0.05$) with cognitive function (rP=.411), particularly with the components: conceptual alternation (rP=.447), viso-spatial (rP=.501), visuoconstructive (rP=.327) y attention (rP=.352).
In women, the hand strength mean was 16.6±7.1 kg, relating cognitive performance (rP = .524) especially with the skills of identification (rP = .377), visuoconstructive (rP = .385), attention (rP = .566), repetition of sentences (rP = .326), verbal fluency (rP = .392) and orientation (rP = .459), presenting higher correlations and with more components, compared to men.
Conclusions: The hand strength, according to established standards, as well as a significant presence of cognitive impairment were present. In both aspects, women

are more affected, mainly in executive functions. The relationship between both variables could predispose the patient to a worse state of health and prognosis.

P419

Predictive factors of depression in patients with cardiorespiratory failure

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Introduction: One of the most common comorbidities within the Chronic Obstructive Pulmonary Disease (COPD) is the Heart Failure (HF), leading to Cardiorespiratory distress syndrome. In patients with this condition, the presence of depression is common, and this can lead to complications in the treatment such in the patient's quality life, even increasing the mortality rate. Nevertheless, there are few information about the factors that predict this complication.
Purpose: To research the predictive factors of depression in patients with cardiorespiratory distress syndrome.
Methods: A descriptive cross-sectional study was conducted, involving 83 patients with COPD and HF. The following test was used: SF-12 Questionnaire for evaluating the quality life, the Hospital Anxiety and Depression Scale (HADS), the Montreal Cognitive Assessment (MoCA) for evaluated the cognitive impairment, the Psychological Well-being Scale. A multiple regression model analysis was performed by means of the SPSS software version 25.
The Results: The average age was 67±14 years old, 55.42% were men, the regression model (F (3, 51) = 51.20, p < .001, R2 = .62) that includes: psychological well-being (t= -6.3, p= .000, β= -.441), Cognitive impairment (t= -3.7, p= .000, β = -2.45), and anxiety (t= 5.8, p= .000, β = .414), they explain 62% of the total variance of the model, over the others variables clinic and psychological adjusted for age and sex.
Conclusions: The present research shows that the psychological well-being, the cognitive impairment and the anxiety influence in the depression prevalence in these patients, hence is important a multidisciplinary treatment focused on the management of these factors.
Conclusions: The present research shows that the psychological well-being, the cognitive impairment and the anxiety influence in the depression prevalence in these patients, hence is important a multidisciplinary treatment focused on the management of these factors.

P420

Cognitive impairment in hospitalized patients with right heart failure according to the length of hospital stay

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Background: Heart failure has become a public health problem. One of the main comorbidities occurs at the respiratory level, with COPD, leading to right heart failure, which presents a particular pathophysiology, nonetheless, the cognitive impairments in these patients have not been studied. It is known that when a patient with left heart failure is decompensated and hospitalized, it has higher rates of mortality, dependence, functional deterioration and cognitive impairment. Successively, the latter is associated with a higher risk of functional deterioration and death after hospital discharge in patients with this syndrome.
Purpose: To research the cognitive affectations in patients with right heart failure according to the length of hospital stay.
Method: A cross-sectional comparative study was recorded. Forty patients with right heart failure participated. The patients were classified into within two groups according to the length of hospital stay: G1 (≤5 days, n = 26, 61.58 ± 14.32 years, 53.8% were women) and G2 (> 5 days, n = 14, 65.00 ± 12.21 years, 64.3% were men). Cognitive dysfunction was measured through the Montreal Cognitive Assessment (MOCA), which establishes a cut-off point in the total score where ≤26 is considered mild cognitive impairment. This test evaluates cognitive processes such as visual-spatial ability, attention, language, abstraction, memory and orientation. A student T test for independent samples by means of was realized the SPSS software version 25.
Results: Statically significant differences (p <.05) were found between both groups (G1 vs G2) for the cognitive impairment (15.42 ± 7.19 vs 10.50 ± 4.53), specifically in the visuospatial processes (0.35 ± 0.48 vs 0.00 ± 0.00), attention (2.88 ± 2.00 vs 1.79 ± 1.36) and orientation (4.50 ± 1.72 vs 3.29 ± 1.43). No significant differences were found in processes as identification (2.46 ± 0.811 vs 2.71 ± 00.469), language (00.81 ± 00.849 vs 00.36 ± 0.633), abstraction (1.19 ± 00.849 vs 00.64 ± 842) and memory (1.27 ± 1.61 vs 00.43 ± 1.08), although its performance was clinically better.
Conclusion: There are differences in the cognitive status of patients according length of hospitalization, presenting a higher level of cognitive dysfunction in relation to a longer hospitalization time. Which is related to a worse prognosis and a higher mortality in the literature. Therefore, it is suggested to evaluate the cognitive function in this population and to study its usefulness as a forecast indicator, as well as to train caregivers and health personnel about this condition.

P421

Differences in quality of life and burden between caregivers of right heart failure and COPD patients with different levels of family functionality

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Background: The patients with right heart failure (RHF) present limitations in their daily life due to their health condition. Therefore, they require constant care, which generally provided by a family member (caregiver). Caring a chronic patient generates difficulties and problems for the caregiver, which, combined with poor family functioning, generates burden and affects their quality of life.
Purpose: To research the differences in quality of life and burden between caregivers of right heart failure and COPD patients with different levels of family functionality.
Method: A cross-sectional comparative study was recorded, 57 caregivers of patients with RHF participated. The subjects were classified within three groups according to the degree of family functionality, which was measured through Family Apgar: G1 (normo functional, N = 3, average age 60.00 ± 12.16 years, 100% of the subject were women), G2 (mild dysfunction, N = 11, average age 53.09 ± 9.82 years, 54.5% women) and G3 (severe dysfunction, N = 43, average age 55.84 ± 13.35 years, 74.4% women). The Quality of life was measured using the SF-12 inventory, where to higher score, greater presence of the variable. The burden was measured through the Zarit caregiver's burden scale, which yields results in a total score of the burden and their impact in dimensions of care, interpersonal relationship and expectation of self-efficacy. An ANOVA analysis was realized by means of the SPSS software version 25.
Results: Statically significant differences were found between groups (p <.05) for the quality of life (G1= 41.11 ± 5.74, G2= 65.65 ± 26.27 and G3= 71.08 ± 18.19). Care Impact (G1=32 ± 13.45, G2=16.09 ± 8.84 and G3=12.79 ± 7.24), interpersonal relationship (G1= 9.67 ± 8.14, G2= 4.27 ± 3.58 and G3= 2.56 ± 2.80), expectation of self-efficacy categories (G1= 10.67 ± 2.30, G2= 7.45 ± 2.84 and G3=4.53± 3.34), burden (G1= 52.33 ± 22.36, G2= 27.82 ± 13.71 and G3= 19.88 ± 10.39) and mental health (G1= 33.33 ± 25.16, G2= 59.09 ± 25.78 and G3= 70.07 ± 18.66) the differences were significant at the p <.01 level.
Conclusion: The obtained results demonstrates that the caregivers with a normal family functionality have a lower level of burden and a higher perception of quality of life, highlighting the importance of social support for caregivers. Those caregivers whom have few family support and a serious family dysfunction, present a greater level of burden, which can lead to a risk of claudication and abandonment of the patient; furthermore the development of chronic diseases.

P422

Association of Isolated cardiometabolic syndrome and the incidence of heart failure

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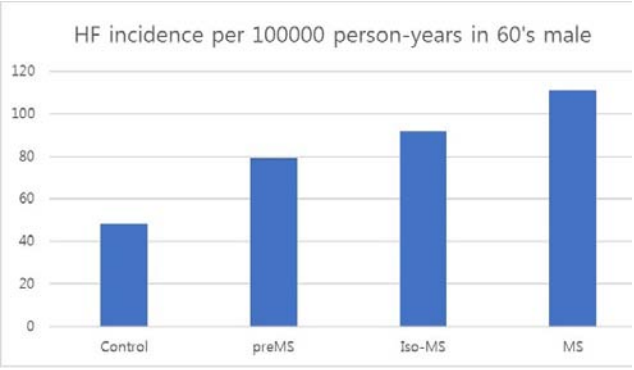
Background: Studies on association with HF (HF) and the cardiac metabolic syndrome (MS) have been conducted in a few because of the need of long term follow up. Moreever there are few data on the association between HF and Isolated MS (Iso-MS), furthermore in Asian.
METHODS: In this study, 7,077,015 study subjects who were aged between 30 and 70 years and had received national health checkups in 2009 were retrospectively included and followed up for 7 years. Participants excluded were those with cardiovascular disease and cancer. Iso-MS is defined by MS without the prescription of any medications on Hypertension, DM and lipid. Based on revised National Cholesterol Education Program-Adult Treatment Panel III criteria, subjects were

divided into three groups according to their number of MS factors: the control group (0), Pre-Iso MS Group (1-2), and Iso-MS group (3-5). The occurrence of HF was defined by the ICD-10 coding system after considering medication history and admission to a tertiary hospital. The incidence of HF was presented as the rate per 100,000 person-years, and the risk of HF with respect to MS was analyzed through Cox proportional hazard regression analysis. Confounding variables were gender, age, health behavior (e.g., smoking and exercise), family history (e.g., stroke, hypertension, heart disease, and diabetes), body mass index, and blood creatinine and hemoglobin values. The results are presented as hazard ratio (HR) and 95% confidence interval (95% CI).

RESULTS: A total of 895,774 (12.7%) of the 7,077,015 subjects were assessed as having MS. The incidence rate per 100,000 person-years was 21.2 for HF. The incidence of HF in the Pre-Iso MS and Iso-MS groups was 24.44 and 41.62, higher than that in the control group (12.45, $p<0.05$). The incidence of HF in Iso-MS groups was located between the pre MS and MS (Fig1). The risk of HF in Iso-MS was 1.4 times higher than that in the control group, even after adjustment for all confounding variables.

Conclusion: Isolated MS, which is far away from medical service, was associated with a higher risk of HF in Korea.



P423

Heart failure awareness status in Korea -Rationale and design of the KNOW-HF Study

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On behalf of: the KNOW-HF Study

Funding Acknowledgements: The Korean Society of Heart Failure

Background Heart failure has become one of the most important diseases worldwide in terms of prevalence, morbidity, life expectancy, and in health care management and costs. Despite significant improvements in prevention and treatment, heart failure remains increasing incidence and a high hospitalization and death rate.

As major health care problem it deserves full attention of health care authorities. Unfortunately, the seriousness of heart failure and the therapeutic possibilities are often not recognized by patients, doctors and health care authorities.

Objectives

Several activities were challenged to improve HF awareness in recent years. The KNOW-HF study aims improving HF care by increasing awareness and perception of the disease in Korea. This manuscript describes the rationale and design of the study.

Methods and Results

Total of 1000 participants selected based on sex, age groups and urban vs. rural location will be surveyed using a 23 question telephone interview. Questions for the general public focus on recognition, incidence and prevalence, severity, prognosis of the disease and therapeutic possibilities in comparison to other disease areas.

A minimum of 100 primary care physicians, 100 hospital internists and 100 cardiologists will be surveyed using an e-mail. The specialist's questionnaire contains 20 questions focusing on current status of knowledge on HF. Questions are concerning diagnostic procedures and various treatments carried out in their own office and their knowledge of newly developed concept, diagnostic tools and therapeutic options.

Conclusion The KNOW-HF study will provide important information about the level of knowledge and understanding of HF of the general public, as well as appropriate diagnostic and therapeutic approaches by primary care physician, hospital internists and cardiologists in Korea. This knowledge will be valuable when it comes to defining optimal educational programmes in the different target groups.

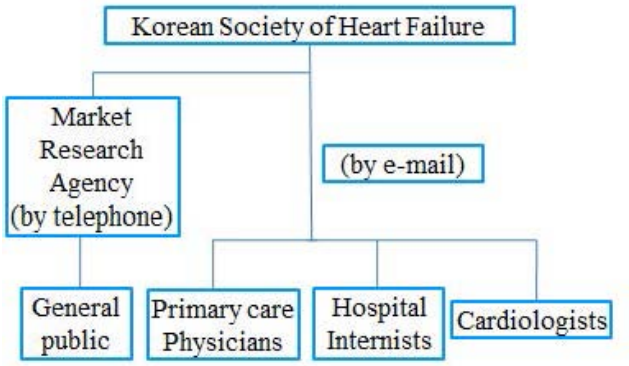

Fig. 1 Flowchart of The KNOW-HF study

P424

Cardiovascular risk in caregivers of right heart failure patients

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Background: Caregiver is the responsible person for patient care. Generally, the caregivers share the patient's habits and they are submitted to high levels of stress, putting their physical and mental health at risk.

Purpose: To research the presence of cardiovascular risk factors in caregivers of right heart failure patients and their level of cardiovascular risk.

Methods: A descriptive cross-sectional study was performed, this included 29 caregivers of right heart failure patients, who were evaluated through blood chemistry, resting blood pressure and tobacco consumption. The SCORE modified of the European Society of Cardiology was utilized to determine the cardiovascular risk for at 10 years; higher (> 10%), high (5-10%), moderate (1-5%) or low (<1%). The Zarit Burden Interview, the Beck Depression Inventory and the Beck Anxiety Inventory were applied. The data was analysed of the SPSS software version 25.

The results: The subjects had an average age of 58±12.3 years, 65% were women. Regarding with the blood test, a high percentage of the subjects had abnormal levels of triglycerides (72.4%, ≥150 mg/dL), total cholesterol (34.5%, ≥200 mg/dL), Cholesterol LDL (35.5%, ≥100mg/dL), Cholesterol HDL (41.4%, ≤60mg/dL), and glucose (20.7%, ≥100mg/dL). The mean of systolic blood pressure was 133.7±23.3 mmHg and the mean of diastolic blood pressure was 80.0±10.7 mmHg. The 20.7% of the subject currently smoke, 58.6% are sedentary and 65% don't have a healthy diet. According to the SCORE, the 89.7% of the IPC's presents cardiovascular risk (44.8% moderate, 17.2% high 27.6% higher). Furthermore, reported 27.6% had depressive symptoms, 41.3% anxiety and 62% chronic stress (burden).

Discussion: The caregivers have a high level of cardiovascular risk at 10 years, due to the their several risk factors. In general present physical and psychological effects, which can be aggravated due to unhealthy lifestyles. Is necessary to focus on this population at risk and perform interdisciplinary preventive interventions.

P425

Characteristics of patients with cardiovascular disease and increased plasma concentrations of NT-proBNP: the HOMAGE randomised trial

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On behalf of: HOMAGE consortium
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Background: Accurate prediction of the development of heart failure and identification of underlying biological processes that drive disease progression, which may also be therapeutic targets, could inform strategies to improve the prevention of heart failure. Myocardial fibrosis may be one relevant pathway for which spironolactone might be an appropriate intervention.
Purpose: To describe the baseline characteristics of patients with cardiovascular disease and an elevated plasma concentration of natriuretic peptides (who are thought to be at increased risk of developing heart failure) enrolled in a randomised trial investigating the effects of spironolactone on clinical, biochemical, biomarker (including collagen fragments) and echocardiographic variables.
Methods: A randomised, open-label trial comparing spironolactone (up to 50mg/day) or control, given for up to nine months, to patients with, or at high risk of, coronary artery disease who had a plasma NT-proBNP between 125-1,000ng/L or BNP 35-280ng/L but excluding those with atrial fibrillation, heart failure, those treated with loop diuretics or with an eGFR <30ml/min/1.73m2. Results are described as proportions and median [interquartile range].
Results: Of 877 patients screened, 527 were randomised (median age 73 [69-79] years), of whom 135 (26%) were women, 412 (78%) had hypertension, 377 (72%) had coronary artery disease, 212 (40%) had diabetes and 121 (23%) had an eGFR ≤60ml/min/1.73m2. Body mass index was 28 [25-32], heart rate was 61 [55-67]bpm, systolic blood pressure was 140 [128-154]mmHg and (site measurements) NT-proBNP was 214 [137-356]ng/L and BNP was 68 [48-111]ng/L. By echocardiography (not indexed to body surface area and for the control group only), left ventricular (LV) ejection fraction was 63 [56-67]%, LV end-diastolic volume was 83 [68-96]mL, LV mass was 184 [149-225]g, e/e' was 9.4 [7.5-11.8] and left atrial volume was 61 [48-71]mL. The most frequently prescribed treatments were lipid-lowering agents (82%), aspirin (71%), beta-blockers (70%), ACE inhibitors (52%), ARB (28%), calcium channel blockers (21%) and thiazide diuretics (16%).
Conclusions: Patients with, or at high risk of, coronary artery disease often have modestly elevated plasma concentrations of natriuretic peptides which are often associated with left atrial dilation and LV hypertrophy but normal LV volumes and ejection fraction. Such patients thus appear to have a high prevalence of 'diastolic' LV dysfunction. This may indicate a greater propensity to develop heart failure which might be prevented by interventions such as spironolactone.

P426

To evaluate the efficacy of heart failure reversal therapy using NT-proBNP levels in patients with chronic heart failure

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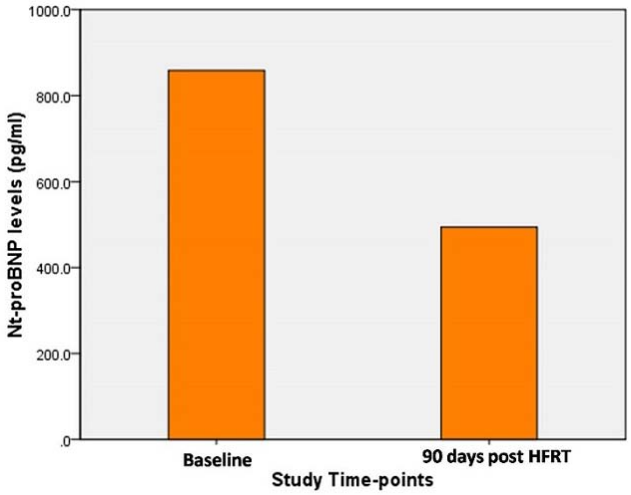
Funding Acknowledgements: Vaidya Sane Ayurvedic Education and Agricultural Trust

Background: Heart failure is considered as a life-threatening epidemic disorder affecting about 26 million world's population and associated with considerable morbidity, mortality and healthcare expenses. Despite the availability of a range of advanced treatments and sophisticated therapies the prevalence of heart failure represents a herculean challenge.Purpose: To address the challenge, the current investigation was conducted by evaluating the efficacy of Heart Failure Reversal Therapy (HFRT) in reducing left ventricular distress by assessing N-terminal pro-brain natriuretic peptide (NT-proBNP) levels in congestive heart failure (CHF) patients.
Methods: Total 76 CHF patients with NYHA Class II and III were screened from March to May 2017 and 15 CHF patients with NT-proBNP = 300-1500pg/ml were selected for the study. NT-proBNP is measured as a marker, the value of which increases with an increase in severity of CHF. The study therapy, HFRT comprises of traditional procedure of panchkarma that includes snehana (external oleation), swedana (passive heat therapy), hrudaydhara (concoction dripping treatment) and basti (medicated enema) was administered twice daily for 7 days. Post HFRT, ARJ kadha was administered for next 12 weeks follow-up. NT-proBNP levels were measured after a follow-up period of 90 days along with some other parameters like BMI, VO2peak (evaluated by cardiac stress test with modified Bruce protocol) and weight.
Results: The findings of the investigation revealed significant reduction in NT-proBNP levels (42.46%, p = 0.009), weight (4.82%, p = 0.0007) and BMI (3.67%, p = 0.034) at the end of the follow-up period. The study also yielded significant improvements in VO2peak (50.96%, p = 0.004).
Conclusions: The overall results suggest that HFRT can possibly be explored as add-on therapy or a feasible alternative for the effective management of CHF.

Change in the levels of study parameters

TimeParameter	Baseline	90 days Post HFRT
Metabolic Equivalent	4.88±2.12	7.37±1.71 (p=0.001)
VO_{2peak}	17.09±7.41	25.80±5.99 (p=0.001)

VO_{2peak}: peak oxygen uptake



NTproBNP_Figure 1

P427

Self-efficacy, burden, anxiety and depression in caregivers of heart failure and chronic obstructive pulmonary disease patients

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Introduction: Heart failure (HF) is a frequent chronic affection associated with Chronic Obstructive Pulmonary Disease (COPD) in approximately 20.9% of the cases. The patients with both conditions have multiple symptoms and limitations, so they need a caregiver. Generally, caregivers do not receive preparation or support, so their perception of self-efficacy is affected and they frequently present psychological effects, affecting both caregiver and patient. Nevertheless, the relationship between self-efficacy, caregiver burden, anxiety, and depression has been rarely explored, even when they're frequent conditions. Purpose: To explore if there is a relationship between self-efficacy, caregiver burden, anxiety and depression in caregivers of patients with HF and COPD. Method: Transversal study in 57 caregivers of patients with COPD and HF. The assessment was made with Beck Depression Inventory, Beck Anxiety Inventory, Zarit Burden Interview, and the Perceived Self-efficacy Scale for Informal Caregivers of Chronically Ill; in all the scales higher score equals to higher presence of the variable. According to the level of self-efficacy, participants were classified into three groups: low (G1, n=19, 55.21 ± 11.11 years, 68.4% women), moderate (G2, n=21, 56.33 ± 12.19 years, 85.7 % women), and high (G3, n=17, 54.88 ± 15.12 years, 58.8% women). ANOVA analyze was utilized to determine the differences between groups, and Pearson correlation analyze was utilized for the association between quantitative variables, on SPSS V25 software. Results: The caregivers presented multiple psychological affectations: 35.1% depression, 63.4% anxiety and 39.6% caregiver burden. There was significant differences between groups (G1/G2/G3) for depression scores (10.88±9.93 / 8.86±6.45 / 4.35±4.01) [F(2,54)=3.55, p<0.05], caregiver burden (32.74±15.96 / 18.24±9.93 / 18.41±10.38) [F(2,54)=8.85, p<0.01] and anxiety (15.26±11.74 / 8.67±5.54 / 3.24±3.56) [F (2, 54) = 10.70, p<0.01]. Significant correlations were found between self-efficacy

with caregiver burden (r=-.39; p<0.01), and anxiety (r=-.39; p<0.01). Conclusion: Caregivers with mayor perception of self-efficacy show low levels of anxiety, depression, and caregiver burden, in comparison with informal caregivers with reduced self-efficacy. Thus, it's important to give the necessary tools to caregivers to fulfill their role, increase their self-efficacy, prevent the onset of own diseases and promote a better quality of care.

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Gender differences in anxiety, depression, and functional capacity in heart failure patients

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Introduction: There is a large body of evidence that indicates that anxiety and depression symptoms are common outcomes in patients with heart failure, impacting on patient's quality of life and, therefore, functional capacity. Nevertheless, there is either not enough or non-consistent evidence that indicates the differences between genders in symptoms of anxiety and depression and functional capacity in heart failure patients.
Purpose: To explore the differences between genders in anxiety, depression and functional capacity in patients heart failure patients.
Method: Transversal study was conducted. A total of 97 patients were included in this study. The assessment of anxiety and depression was made with the Hospital Anxiety and Depression Scale (HADS). Functional capacity was assessed with the 6 Minute Walk Test (6MWT). To determinate the differences between gender groups, t test was utilized, on SPSS V25 software.
Results: Fifty-six percent of the sample was female, the average age for females was 68±12 years, and for males was 65±16 years. There were significant differences (p<0.05) for males and females in anxiety (4.07±3.90 vs 5.93±4.40), depression (4.86±3.78 vs 6.67±4.02) and 6MWT distance (313.20±137.39 vs 213.12±135.80).
Conclusion: Female heart failure patients tend to present higher levels of anxiety and depression and walk lower distances in contrast with male patients. Thus, it's important to approach functional and psychological symptoms in heart failure patients, considering gender differences.

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Comorbidity of recurrent angina pectoris and depression

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Objective. To assess the presence and severity of depression in patients with recurrent (post-operation) angina pectoris in long-term period after CABG.
Materials and methods. A total of 150 individuals with NYHA class II and III recurrent angina pectoris complicated by NYHA class II and III chronic heart failure (CHF) (CHF class II – 56.7%, CHF class III - 43.3%), mean-age 58.6±4.72 y.o. Time after CABG was 19.6±2.79 months. Signs of angina pectoris had appeared in patients following 8.6±1.13 months after surgery. All patients underwent clinical examinations. Heart US imaging was performed using Vivid−7 (GE, USA - Belgium), left ventricular ejection fraction (LVEF) in class II CHF was 54.6±5.13%, in class III CHF – 45.7±4.76%. Medical treatment included standard antianginal therapy combined with aspirin and statins. The CES-D (Center of Epidemiological studies of USA-Depression) questionnaire was used as a screening instrument to identify depression. The assessment of clinical depression was performed using the Beck Depression Inventory-BDI and HADS (the Hospital Anxiety and Depression Scale). All the individuals were queried about the quality of life (QOL) estimated in scores using the Seattle Angina Questionnaire. Results. The psychological testing (CES-D score) has shown that 25.3% patients had signs of depression: 17.3% of individuals showed signs of mild depression, while 8% showed signs of moderate depression. For a stricter verification, we opted for an identification of the presence and severity of depression using two more tests. Data obtained from the Beck Depression Inventory have shown that 26% of individuals had signs of mild to moderate depression, whereas 9% had a clinically severe condition. Correlation analysis has shown positive correlations between QOL and the severity of depression (r=0.51, <0.001). Based on the HADS, sings of depression were established in 24.6% of cases. Moreover, signs of clinically severe depression were identified in 8% individuals, while subclinically severe depression was present in 16.6% of individuals. The QOL in the individuals with depression is 1.3 times worse compared to those with normal psychoemotional status. Correlations between the QOL and the severity of depression were identified (r=0.55, <0.01). Additionally, the QOL index in the individuals with concurrent depression was 1.5 times worse than in those without a comorbidity. The group of individuals with class III CHF were more frequently prone to show signs of clinically severe depression compared to those with class II CHF (<0.01).
Conclusion. Irrespective of the test used, the results of the investigation suggest that even in the long-term after CABG, a quarter of all the individuals maintain signs of depression, with the quality of life deteriorating significantly in the presence of depression. Individuals with recurrent angina pectoris aggravated by class III CHF, more frequently demonstrate a clinically severe depressive disorder.

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Co-morbid pathology in long-time prognosis in patients with chronic heart failure decompensation

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Relevance. We estimated long-term lethality in patients with chronic heart failure decompensation, hospitalized in "Neftyanic" hospital, depending on comorbidity, pharmacotherapy prescribed, and left ventricular ejection fraction.

Materials and methods. 177 patients have been investigated (88 males, 89 females, average age 73.2 +11.1 years old). We estimated lethality end point probability during 4 years of follow up in this group of patients.
Results. Factors, affecting lethality in long-time period were: low left ventricular ejection fraction (<0,001); Charlson comorbidity index > 4 at admittance (χ^2=5.1; =0.024); chronic kidney disease with low glomerular filtration rate <60ml/min/1.73 m2 (χ^2=5.4, =0.02); diabetes mellitus (χ^2=4.7, =0.03); hemodynamic disorders (hypotension, hypertension) (χ^2=10.8, =0.001); valvular heart diseases (χ^2=9.8, =0.0018); class 3 obesity (<0,1). Some factors showed association with negative prognosis at a certain period of follow up: mild and moderate anemia affected prognosis during 750 days of follow up (χ^2=9.6, =0.002); pneumonia at admittance increased lethality during 100 days of follow up (χ^2=11.03, =0.0009); NT-proBNP plasma level more 1200 fmol/ml increased lethality during 500 days of follow up (χ^2=5.4, =0,045). Left ventricular ejection fraction at admittance showed no relation with long-term prognosis.
Conclusion. Prospective survey showed that lethality long-term prognosis in patients with CHF decompensation mostly depend on comorbidity rather than onleft ventricular ejection fraction at admittance.

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Relation between reduce ejection fraction and severity of ischemic stroke

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Background: Altough we know that the presence of reduced ejection fraction (rEF) with ischemic myocardipathy means a worse prognosis, it still not clear the relationship between ischemic stroke and rEF.
Objectives: To evaluate if patients with rEF have more severe ischemic strokes or if there are different etiologys in comparison to preserved ejection fraction (pEF). We seek to measure the relationship between rEF and atrial fibrillation in our population.
Materials and methods
We retrospectively evaluated patients admitted in the stroke unit in one center of our city, between October 2016 and October 2018. The hospitalizations were consecutive and for the first time.
Ejection fraction (EF) was measured with echocardiography during hospitalization. The population was divided in three groups, pEF (≥53%), mild to moderate ejection fraction (mmEF) (>30 and <53%) and severe ejection fraction (sEF) (≤30%) In all patients a sample of high sensitive troponin was taken at 24 hs of admission and NIHSS scale calculated.
Results: 711 patients were included with a mean age of 70 years (interquartile range 58 – 79 [IQR]; 57.6% were men. 31.5% had a transient ischemic attack (TIA) and 68.6% were ischemic strokes. The mean hospitalization stay in days was 2. Mortality during hospitalization was 1.4%.
In terms of EF, 90% was preseverd EF; 6.5% mild to moderate EF and 2.8 severe EF
We found a trend to higher mortality in groups with reduced EF. (rEF 1.1%, FEy mmEF 4.4% y sEF 5%, p=0,075).
Conclusions
Patiens with reduce EF were older, had a higher NIHSS score at admission, positive troponin and a longer hospitalization stay. They also presented a higher percentage

of cardioembolic stroke, atrial fibrillation history and new onset of atrial fibrilation. There was also a trend in terms of mortality and lower EF values.
We didn't find any significant differences between mmEF and sEF, probably due to the low number of the sample.

Table 1

Characteristics	Preserved EF	Mild/Moderate EF	Severe EF	p
Age	70 (58-78)	76 (65-84)	76.5 (70-81)	0.0008
Hospital stay	2 (2-5)	4 (2-7)	3.5 (2-6)	0.039
TIA	32.7 %	21.7%	10%	0.034
NIHSS admission	1 (0-3)	1 (1-6)	2 (1-5.5)	0.0015
NIHSS >15	5.6%	10.9%	15%	0.06
AF during hospitalization	3.97%	17.24%	7.7%	0.008
Troponin +	9%	26.1%	45%	<0.0001
Ischemic stroke	10.2	45.7%	35%	<0.0001

IQR between pharentesis

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Hypothyroidism versus hyperthyroidism in patients with heart failure. Which is worse?

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Introduction . The relationship between thyroid hormones and cardiovascular disease is well-known, being the subject of research in numerous clinical trials. However, the results of these studies have not always been consistent, some demonstrating a benefit of correcting thyroid dysfunction in patients with heart failure, while others have been prematurely discontinued due to a trend towards increased mortality in patients with heart failure undergoing thyroid hormone replacement therapy. The purpose of this study was to evaluate the causal relationship between serum TSH levels and the severity of heart failure and to evaluate which type of thyroid dysfunction is associated with a worse prognosis.
Methods. The study population consisted of 68 patients with a history of thyroid dysfunction and heart failure diagnosed according to the European Cardiology Society's Cardiovascular Society Cardiovascular Review published in 2016, who were clinically evaluated, echocardiographically and by determining NT-proBNP (N-terminal-pro-Brain natriuretic peptide) and to which the serum level of TSH and FT4 have been dosed.
Results. The study included 31 men with average age 70.3 ± 9.1 years and 37 women with mean age 72.2 ± 9.6 years. Of the total patients, 16 (23.5%) had TSH values within normal range, 31 (45.58%) had elevated TSH, with an average of 14.64 ± 12.56 U / mL and 21 (30.88%) had low TSH levels, with a mean value of 0.13 ± 0.09 U/mL. 16 (76.19%) of patients with hyperthyroidism and 14 (45.16%) of those with hypothyroidism were under specific endocrinological treatment at the time of evaluation. The mean FT4 in the group of patients with elevated TSH was 1.23 ± 0.27 ng/dL, whereas in those with low TSH it was 1.83 ± 0.34 ng/dL. In the euthyroid group, the average values of NT-proBNP were 1213.8 ± 1012.5 pg/mL, with an ejection fraction (FE) of 47.37 ± 10.8%, in the hypothyroidism group, the mean value of NT-proBNP was 6214.2 ± 4325.8 pg/mL (p = 0.008), with FE = 41.23 ± 11.78%, and in those with hyperthyroidism, NT-proBNP = 3450.9 ± 3125.6 pg/mL (p = 0.006), FE = 50.21 ± 4.58%.
Conclusion. Abnormal TSH values are associated with significantly higher NT-proBNP levels in patients who associate heart failure and thyroid dysfunction than in those with euthyroidism. Although patients with hyperthyroidism had a better ejection fraction, their NT-proBNP levels were higher compared to those with hypothyroidism, presumably by heart failure with preserved ejection fraction.

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Analysis of the level of anxiety and depression, and personality type in outpatients with chronic heart failure and the influence of these factors on quality of life and commitment to therapy

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Aim: to identify the level of anxiety and depression, the prevalence of personality type D (distressing) in ambulatory patients with chronic heart failure (CHF), as well as their impact on patient adherence to prescribed therapy

Material and methods. The study included 98 people, observed on the basis of MMAU "city polyclinic 5" with CVD and concomitant CHF, of which 24.6% men and 75.4% women , mean age 71 ± 2.1 years. All patients initial screening, including hospital scale of anxiety and depression (HADS), the test Moriscos green to determine adherence to treatment, a test for detecting psycho (DS-14) questionnaire for measuring quality of life (SF-36). Statistical processing of research results, preparation of registers for long-term dynamic observation was carried out using the software package Microsoft Office Excel 2007.
Results: Basically, the group was represented by patients with 1-stage CHF – 78%, CHF 2A stage in 22% of subjects. The main reason for the development of CHF was a combination of CHD and hypertension - 71%, only hypertension was found in 29%. According to the questionnaire HADS subclinical anxiety was diagnosed in 25% of the observed, clinical anxiety is diagnosed in 16.5% and mainly among women (82,4% of the subgroup). Subclinical depression was diagnosed in 23.5% of patients; the clinical depression was 14.1%, also mainly women (75% of the subgroup). Psycho D was found in 17 patients (22,07%), of which 76.5% of women. Assessing adherence to therapy may be noted that in our patients is mainly observed with high - 88,2% and the average at 11.7%. Moreover, among patients with identified psycho D – high commitment to treatment and medical appointments indicated 70% of patients, 30%- medium. Among patients with an average adherence to treatment 60% had abnormalities in the HADS test, while among patients with high adherence to therapy was 55%, while the level of anxiety and depression in these groups differed.
Conclusions: Based on the results obtained, it is advisable to study the influence of the level of anxiety and depression, as well as behavioral type of the individual (psycho) on the course of CHF, and to determine the individual approach to the treatment and correction of psychological features to enhance compliance in patients with CHF, depending on individual psychological characteristics

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Changes in respiratory pulmonary function in patients with advanced heart failure listed for heart transplantation.

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Introduction and Objectives: Respiratory function is commonly affected in advanced heart failure (HF) patients waiting for Heart Transplantation (HT). They frequently have a resting restrictive ventilatory defect caused by their cardiomyopathy with a reduction of total pulmonary volumes and diffusion capacity for carbon monoxide (DLco). Moreover, an obstructive pattern may also be present in many patients and its relation to mortality is not well defined. The aim of this study was to evaluate the prevalence and type of respiratory functional patterns in advanced HF patients and how it affects their outcomes after HT.
Methods: We evaluated retrospectively all consecutive patients listed for HT in one single centre from 2014 to 2018. Patients were classified in three groups depending on their functional pulmonary test: a) Normal pattern if force vital capacity (FVC) ≥ 80% and forced expiratory volume in 1 second (FEV1)/FCV ≥ 70%; b) Restrictive pattern if FEV1/FCV ≥ 70% and FCV < 80%; and c) Obstructive pattern if FEV1/FVC < 70%. We also evaluated if DLco were diminished (DLco < 80%) and the presence of an altered FEV1 (<70%) . Patients listed for urgent HT or from other centres without a complete pulmonary function test were excluded from analysis.
Results: From a total of 77 patients, 48 patients were included in the study. They were 73% male, mean age 57± 10 y (18-70), IMC 25 ± 4 kg/m2, 6.3% active smokers, 25% former smokers. 47.9% showed an obstructive pattern, 41.7% a restrictive pattern and 10.4% a normal pattern. 77.8% of them had an altered DLco and 54.2% an altered FEV1. Kaplan Meier analysis showed a higher mortality after HT for patients with FEV1<70% compared to other groups (p=0.01)
Conclusions: Patients with advanced heart failure show a high prevalence of altered respiratory functional patterns. Patients with a low FEV1 had a higher mortality after HT.

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Iron status and correlates of its deficiency in chronic heart failure patients in a west african cardiology practice

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Background: Iron deficiency (ID) is the commonest nutritional deficiency in chronic heart failure (HF) and might suggest severe HF. Iron deficiency and its correlates in HF appears to have received inadequate research attention in Sub Saharan Africa.
Purpose: This study therefore tried to establish the iron status and correlates of ID in a cohort of HF patients in a cardiology practice in West Africa.

Methods: Eighty-eight (88) chronic stable HF patients with eGFR >60% and no demonstrable cause of blood loss or iron deficiency were recruited and their demographic and clinical parameters obtained. They underwent laboratory (full blood count, iron studies and eGFR) and echocardiography assessments. Full blood count parameters, serum ferritin and transferrin saturation were used to assess the iron status and its relationship with age, NYHA (New York Heart Association) functional class, pulse rates, LVEF (Left Ventricular Ejection Fraction) among other parameters in chronic HF.
Results: There were 47 (53%) females and 41 (47%) males with a mean age of 53.93+12.52; BMI 27.61+6.42; pulse rate of 78.45+10.19; SBP 120.91+19.21mmHg and DBP 76.22+12.28mmHg. The mean eGFR was 91.06+30.90 mL/min. The median NYHA class was 2(2-3) with 60 (68.2)%) in NYHA II, 15 (17%) in NYHA III and 13 (14.8%) in IV. The mean haemoglobin concentration (Hb) was 12.54+1.62g/dl for males and 12.28+1.65g/dl females; mean cell volume was 86.08+6.73fl; mean cell haemoglobin 28.5+2.26pg, mean cell haemoglobin concentration 32.94+1.25g/dl. The median serum ferritin was 145.76mcg/L and mean transferrin saturation (Tsat) was 18.91+8.69%. Iron deficiency was found in 30 (34%) of chronic HF patients; !5 (17%) had absolute while 15 (17%) had functional ID. ID was worse with higher NYHA functional class but did not change remarkably with LVEF. Only 16 (53%) of the ID participants had anaemia. NYHA functional class was the strongest independent predictor of ID, followed by advancing age.
Conclusion: Iron deficiency occurs in about one-third of chronic HF patients, is more common and worse in advanced functional classes, and anaemia is present in only about half of the ID patients.

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Etiology of community-acquired pneumonia in patients with chronic heart failure

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Background: Comorbidity may influence the etiology of community-acquired pneumonia (CAP). Chronic heart failure (CHF) is one of the most common concomitant diseases in elderly patients with CAP. The knowledge of predominant microbial patterns of CAP in this subpopulation represents the basis for empirical antibiotic therapy (ABT).
Purpose: To assess the etiology of CAP in patients with concomitant CHF.
Methods: Prospective observational study recruited adult patients hospitalized with radiographically confirmed non-severe CAP and concomitant CHF. CHF had to be present for at least 3 months before hospitalization and supported by previous medical documentation. Sputum or oropharyngeal swabs (OPS) and urine samples were collected in all eligible patients prior to the first dose of systemic ABT. Sputum culture was performed for typical bacterial pathogens (Streptococcus (S.) pneumoniae, Staphylococcus (S.) aureus, Enterobacterales, etc.) in accordance with standard methods and procedures. Detection of Mycoplasma (M.) pneumoniae, Chlamydophila (C.) pneumoniae and respiratory viruses (influenza, parainfluenza viruses, coronavirus, human metapneumovirus, respiratory syncytial virus, etc.) in sputum or OPS was performed by real-time polymerase chain reaction. Urine samples were used to determine the soluble antigens of Legionella (L.) pneumophila serogroup 1 and S.pneumoniae using immunochromatographic test kits directly at the bedside.
Results: Altogether 50 patients, mean age 72.2±9.5 years old, 27/50 (54%) females, were enrolled. The etiology of CAP was confirmed in 52% (26/50) cases. S. pneumoniae was the most commonly identified pathogen – 16/26 (61.6%) cases, followed by respiratory viruses – 6/26 (23.2%), namely rhinovirus, parainfluenza virus, coronavirus, human metapneumovirus (3/6, 1/6, 1/6 and 1/6, respectively), Haemophilus influenzae – 1/26 (3.8%), S. aureus – 1/26 (3.8%) and Klebsiella pneumoniae – 1/26 (3.8%). Co-infection of S.pneumoniae and parainfluenza virus was revealed in 1/26 (3.8%) of patients.
Conclusions: S.pneumoniae and respiratory viruses were predominant causative agents of non-severe CAP in hospitalized adults with concomitant CHF. It is worth mentioning that atypical bacterial pathogens (M.pneumoniae, C.pneumoniae, L.pneumophila) were not identified; gram negative bacteria as well as S.aureus were rarely seen.

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Depleted iron stores are associated with decreased exercise capacity in patients with non-ischaemic cardiomyopathy

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BackgroundIn patients with chronic systolic heart failure (HF) concomitant iron deficiency (ID) was demonstrated as independent predictor worse functional capacity. However, available data regarding negative consequences of ID for the exercise tolerance in HF are based mainly on heterogenous (regardine aetiology) groups of patients diagnosed with either ischaemic or non-ischaemic HF.PurposeWe prospectively investigated whether ID independently predicts decreased exercise capacity in patients with symptomatic non-ischaemic cardiomyopathy (NICM).
Methods We analyzed clinical data and examined 50 patients with stable NICM (36 men; age: 53±13 years; left ventricular ejection fraction [LVEF] 31±10 % [min-max: 13-49]; median N-terminal pro-B-type natriuretic peptide (NT-proBNP): 730 pg/mL [lower and upper quartile: 277-1894]; NYHA class I/II/III: 24/74/2 %). Iron deficiency was defined as ferritin <100 μg/L (absolute ID - depleted iron stores) or ferritin 100-299 μg/L with transferin saturation <20% (functional ID). Exercise capacity was objectively evaluated using comprehensive cardiopulmonary exercise testing (CPET) on a treadmill.ResultsAmong studied patients with NICM 27 (54%) met the criteria of predefined ID, out of which 23 had absolute ID and the remaining 4 had functional ID. Patients with ID (compared to those without this condition) had lower haemoglobin concentration (Hb, 13.8±1.6 vs. 15.3±1.0 g/dL, p<0.001), and there was a trend towards younger age (50±14 vs. 56±11 years, p=0.09) in this subgroup. 13 female patients were iron-deficient (93%) as compared with 14 male subjects (39%, p<0.001). There were no differences regarding NYHA class distribution, high-sensitive C-reactive protein, NT-proBNP, LVEF, and serum creatinine in patients with vs. without ID (all p>0.1). In univariable linear regression models peak oxygen consumption per kg body mass (peakVO2/kg) correlated with body mass index (BMI, r=-0.54, p<0.001), NYHA class (r=-0.40, p=0.006), serum creatinine (r=-0.36, p=0.01), uric acid (r=-0.39, p=0.006), C-reactive protein (r=-0.32, p=0.03), and serum ferritin (r=0.31, p=0.03). PeakVO2/kg was not related to sex, age, LVEF, haemoglobin concentration, plasma NT-proBNP, and TSAT. Finally, in multivariable linear regression model serum ferritin and BMI remained independently related to peakVO2/kg (β=0.37, p=0.002; and β=-0.54, p<0.001; respectively; p for model <0.001, corrected R2=51%) when adjusted for aforementioned significant predictors from univariable analyses.
ConclusionsIn patients with stable HF due to NICM depleted iron stores are independently associated with objective measures of exercise intolerance. Beneficial effects of intravenous iron therapy in this population of patients are anticipated.

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Relationship between domains of Kihon Checklist with frailty status and exercise capacity in stable elderly patients with heart failure

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Background: The Kihon Checklist (KCL) is used extensively in Japan to identify elderly persons who are at risk of requiring support or care. The KCL has 25 yes/no questions that are categorized into the following domains: instrumental activities of daily living (IADL), physical, nutrition, eating, socialization, memory, and mood. There is little information about the relationship between these KCL domains with frailty status and exercise capacity in patients with heart failure (HF).
Aim: To determine whether or not the scores in each domain of the KCL could be used to estimate exercise capacity in HF by the use of cardiopulmonary exercise testing (CPX) and to support a diagnosis of frailty.
Methods: In a cross-sectional study, 120 elderly patients (>65 years) with stable HF were evaluated by the KCL and CPX. Patients with total KCL scores of ≥8 were classified as frail.
Results: Mean age was 81.6 years, mean left ventricular ejection fraction was 57.9%, mean plasma brain natriuretic peptide (BNP) content was 184 pg/mL, and mean total KCL score was 13.1. Peak VO2 was closely, and BNP moderately, correlated with total KCL score (r = −0.52 and r = 0.26, respectively). The IADL domain score was significantly correlated with peak VO2 and BNP (r = −0.50 and r = 0.21, respectively); the physical domain score was significantly correlated with peak VO2 (r = −0.47), but not with BNP. The nutrition and eating domain scores were not correlated with either peak VO2 or BNP. The socialization domain score was significantly correlated with peak VO2 (r = −0.34), but not with BNP. The memory domain score was weakly correlated with peak VO2 and BNP (r = −0.19 and r = 0.21, respectively). The mood domain score was significantly correlated with peak VO2 and BNP (r = −0.41 and r = 0.25, respectively).

	Lot 1post-stoke patients	Lot 2pre-strokepatients	Lot 3 control group	P values[1 vs 3]	P values[2 vs 3]	P values[1 vs 2]
Nr of Patients	153	153	30			
Age Mean±SD	57.04±6.54	57.04±6.54	52.27±8.35			
Pacient with ED Nr (%)	127 (83%)	76 (49.67%)	9 (30%)	<0.001	0.048	<0.001
Severity of ED (Nr (%)) Mild Mild to moderate Moderate Severe	74 (48.37%) 1 (0.01%) 28 (18.30%) 24 (15.69%)	29 (18.95%) 11 (7.19%) 21 (13.73%) 15 (9.80%)	7 (23.33%) 1 (3.33%) 1 (3.33%) 0	0.015 0.302* 0.052* 0.016*	0.581 0.694* 0.134* 0.136*	<0.001 0.127* <0.001* <0.001*
IIEF5 (Erectile function) Mean±SD Median (Q1-Q3)	15.53±5.89 17 (10-20)	17.83±6.18 22 (12-23)	21.83±3.31 22.5 (21-24)	<0.001	<0.001	<0.001
Hamilton Score Normal Mild depression Moderate depression Severe depression Very severe depression	91 (59.4%) 40 (26.1%) 11 (7.1%) 9 (5.8%) 2 (1.3%)	144 (94.1%) 1 (0.6%) 0 (0.0%) 6 (3.9%) 2 (1.3%)	23 (76.6%) 5 (16.6%) 1 (3.3%) 1 (3.3%) 0 (0.0%)			
Comorbidities Diabetes mellitus Hypercholesterolemia Hypertension Obesity Smoking Atrial fibrillation Carotid artery stenosis Coronary hearth disease	59 (38.5%) 104 (67.9%) 121 (79.0%) 36 (23.5%) 53 (34.6%) 22 (14.3%) 18 (11.7%) 26 (16.9%)		3 (10.0%) 6 (20.0%) 8 (26.6%) 6 (20.0%) 5 (16.6%) 2 (6.6%) 1 (3.3%) 1 (3.3%)	0.003* <0.001 <0.001 0.674 0.056* 0.377* 0.321* 0.086*		
Medication ACE inhibitors Calcium Antagonists Beta-Blokers Diuretics Statins Oral antidiabetics Insulin Antiplatelet drugs Oral anticoagulants Antidepressants	72 (47.0%) 49 (32.0%) 65 (42.4%) 43 (28.1%) 99 (64.7%) 39 (25.4%) 20 (13.0%) 131 (85.6%) 22 (14.3%) 28 (18.3%)	32 (20.9%) 17 (11.1%) 36 (23.5%) 14 (9.1%) 25 (16.3%) 25 (16.3%) 15 (9.8%) 14 (9.1%) 8 (5.2%) 12 (7.84%)	2 (6.6%) 4 (13.3%) 3 (10.0%) 3 (10.0%) 4 (13.3%) 1 (10.0%) 0 (0.0%) 2 (6.6%) 0 (0.0%) 2 (6.6%)	<0.001* 0.047* 0.001* 0.039* <0.001* 0.007* 0.048* <0.001* 0.028* 0.176*	0.075* 0.755* 0.142* >0.999* 0.791* 0.084* 0.136* >0.999* 0.357* >0.999*	<0.001 <0.001 <0.001 <0.001 <0.001 0.442 0.369 <0.001 0.007 0.007

Conclusions: Not only the total KCL score but also the scores in its domains may be useful for assessing the frailty and exercise capacity of stable elderly patients with HF. For interventions in frail patients with HF we should check the domains of KCL.

P439

Comorbidities in patients with coronary artery disease: gender differences

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Background: Comorbidities in patients with coronary artery disease have received significant attention due to increasing social significance of cardiovascular diseases. However, problem solution involves studying cardiac pathology along with concomitant diseases, such as diabetes mellitus, pulmonary pathology, kidneys, etc.), but not a comprehensive approach, which takes into account all available comorbidities. An important issue that should be considered in the shift to the personalized medicine is the presence of gender differences, which varies greatly and depends on different correlations with specific comorbidities.
Purpose: To study gender differences in comorbidies in patients with coronary artery disease (CAD).
Material and Methods: 742 patients with stable coronary artery disease, examined in the Research Institute for Complex Issues of Cardiovascular Diseases in 2011 before elective surgical treatment were included in the study. All the patients were enrolled into 2 groups depending on the gender: Group 1 - females (n = 147), Group 2- males (n = 595).
Results: The obtained results reported that women were commonly older than men and more often had excess body weight (p <0.001). The majority of current smokers were males (p <0.001). 12.9% of women and 7.4% of men suffered from myocardial infarction (MI) in the preoperative management (p = 0.031). However, positive history of MI was more often found in male patients (p = 0.004). The evaluation of the severity of clinical signs and symptoms of angina pectoris and chronic heart failure (CHF) reported that men had predominant angina functional classes 1-2 (p = 0.057 vs. p = 0.007) and stage I CHF (p <0.001), whereas women had angina functional classes 3-4 (p = 0.005 vs. p = 0.050) and stage IIa CHF (p <0.001). Women more often than men suffered from hypertension (p = 0.01) and atrial fibrillation (p = 0.024). But, significant peripheral artery disease prevailed among men (p = 0.022).
The analysis of comorbidities in the study groups showed that disorders of carbohydrate metabolism, thyroid disease, bronchial asthma and varicose veins were more common in female patients (p <0.05), whereas chronic hepatitis (p = 0.079) and urolithiasis - in males (p = 0.028). The comorbidity score did not differ significantly between the study groups (p>0.05). However, the mean score was 66.0% in women and 70.4% in men. Conclusion: Detection of comorbidities in CAD patients based on gender differences is advisable to improve both the immediate results of surgical management and further preventive measures.

P440

Prevalence of post-stroke erectile dysfunction and associated cardiovascular risk factors and co-morbidities

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Objectives: The aim of this study was to establish a correlation between prevalence and severity of erectile dysfunction (ED) and cardiovascular (CV) co-morbidities and ongoing medication and other risk factors associated with post-stroke ED.Materials and MethodsFor 153 patients (57.04 ± 6.54 years) with ischemic stroke, we

evaluated the pre- and post-stroke prevalence of ED using the five-item International Index of Erectile Function questionnaire (IIEF5).
Erectile Function questionnaire (IIEF5). Within 5 days of admission we determined the stroke site location and severity using the National Institute of Health Stroke Scale (NIHSS). The pre- and post-stroke data obtained were compared with those of 30 control non-stroke patients (52.27 ± 8.35). Additional cardiovascular co-morbidities, medication and risk factors were asset and analyzed.
Results The IIEF5 scores were much lower [median 17 interquartile range (IQR) 10-20] post stroke than pre-stroke (median 22 IQR 12-23) and lower than in control group (median 22.5 IQR 21-24).
From the analysis of comorbidities and risk factors for stroke of post- stroke group and the control group, we infer that diabetes (p = 0.003), hypercholesterolemia (p <0.001), and hypertension (p <0.001) were more common in patients with stroke than those in the control group. (Table 1).
From the statistical analysis of data on medication use by patients, results that more patients have used ACE inhibitors, calcium antagonists, beta blocking agents, diuretics, statins, oral agents, antiplatelet and oral anticoagulants after the stoke than before, and in terms of consumption of drugs before stroke compared with the control group, differences were not significant.
Conclusions The prevalence and severity of ED increase after stroke due to disruption of autonomous central structures. The depression, functional impairment, CV co-morbidities and medication used after stroke may contribute to ED.

P441
Cheyne-Stokes respiration in patients with atrial fibrillation is associated with high left ventricular filling pressure

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Introduction: Sleep disordered breathing (SDB) is a common comorbidity in patients with several cardiovascular diseases. In particular, SDB is highly prevalent in either atrial fibrillation (AF) or heart failure (HF). It was reported that SDB plays important roles in the pathogenesis and/or progression of both AF and HF. In patients with HF, coexisting AF was associated with the presence of Cheyne-Stokes respiration (CSR) which is one form of SDB, possibly through the high left ventricular (LV) filling pressure. Thus, there might be an interaction across AF, HF and SDB. However, limited data is available regarding the presence of SDB in patients with AF, and regarding the relationship between SDB and LV filling in those with AF.
Methods: AF patients followed in Juntendo University Hospital were studied. Apnea-hypopnea index (AHI) and Cheyne Stokes respiration (CSR) pattern were determined by cardiorespiratory polygraphy. In addition, patients' profiles and echocardiographic parameters were prospectively collected. Multiple regression analyses were performed treating AHI or CSR as dependent variables.
Results: Overall, cardiorespiratory polygraphy was done in 135 patients with AF. Among them, 121 patients were included in the final analysis and SDB (defined as AHI≥15/hour) was detected in 52 (43%) of these patients, in which the average of AHI and 3% oxygen desaturation index (ODI) were 22.8/hour and 26.2/hour, respectively. Male gender, body mass index (BMI), and left atrium diameter were significantly high in patients with SDB. Multiple linear regression analysis showed that male gender, BMI, history of HF, and beta blocker were independent correlates of the AHI (p=0.035, 0.015, 0.024, and 0.005, respectively). On the other hand, chronic AF, age, use of diuretics, and E wave in LV inflow by echocardiography were significantly associated with the percentage of Cheyne-Stokes Respiration (CSR) (p=0.008, 0.008, 0.018, and 0.029, respectively).
Conclusion: SDB is prevalent in patients with AF. CSR was associated with LV high filling pressure and the chronic AF.

P442
"Obesity Paradox" in patients with chronic heart failure and comorbidity

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The improved survival in obese patients compared with patients with normal body weight (obesity paradox) has not been insufficiently studied in patients with chronic heart failure (CHF). The aim of this study was to investigate nutritional status of patients with CHF, depending on comorbidity.

Methods. 200 patients with CHF (130 males and 70 females, mean age was 61.5±9.6 years) were studied. CHF was defined according to ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure, 2016. Age-adjusted Charlson Comorbidity Index (ACCI) was estimated. The studied patients were divided into 3 groups: I group (low comorbidity) with an index ≤ 3 scores; II group (moderate comorbidity) with an index 4–5 scores and III group (high comorbidity) with an index ≥ 6 scores. Follow-up period was 12 months.
Results. Age-adjusted Charlson Comorbidity Index was 5.0±2.1 scores. Metabolic syndrome was observed in 89 (43.8%) patients, obesity with a BMI ≥ 30 kg/m2 - 97 (48.5%), overweight - 62 (31.0%) patients with CHF. Metabolic syndrome was diagnosed more often in patients with CHF with low comorbidity compared patients with high comorbidity: 38 (71.6%) vs 24 (31.2%), resp., $\chi 2$ =19.05; PI-III=0.009. Waist circumference in CHF patients with high comorbidity was less than in patients with low comorbidity: 100.4±15.6 vs 106.8±14.5 cm, resp., PIII-I=0.01. Patients with CHF and low comorbidity had higher body mass index compared with patients with high comorbidity: 32.1±6.1 vs 28.9 ± 5.5 kg/m2, resp., PI-III=0.04. Relative risk of death within 12 months in patients with CHF and high comorbidity was 1.68 (95% CI 1.35 - 2.09) in comparison with patients with low comorbidity. According to the results of our study, patients with CHF and higher body mass have lower comorbidity, i.e. more favorable long-term prognosis.
Conclusions. Patients with chronic heart failure and high comorbidity have lower body mass index, higher waist circumference and a poor prognosis compared with patients with chronic heart failure and low comorbidity . This fact may be one explanation for the 'obesity paradox' in patients with chronic heart failure.

P443
Plant Gain, Chemoreflex Gain, Circulation Time and Cheyne-Stokes Respiration in Heart Failure

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RATIONALE. The contribution of the plant gain (PG) to Cheyne-Stokes respiration (CSR) in heart failure (HF) has never been directly evaluated, but only hypothesized by mathematical models.
OBJECTIVES. To evaluate the PG together with the chemoreflex gain (CG), and the circulation time (Ct) in patients with systolic HF (LVEF<50%) with or without CSR and to identify predictors of CSR severity and cycle length.
METHODS. A group of 20 HF patients (age 72.4±6.4 years, LVEF 31.5±5.8%), 10 with relevant CSR (24-hour apnea-hypopnea index, AHI≥10 events/hour) and 10 without (AHI<10 events/hour) underwent 24-hour cardiorespiratory monitoring to assess CSR severity and cycle length, as well as the lung-to-finger Ct (LFCt), CG to hypoxia (CGO2) and hypercapnia (CGCO2) by rebreathing technique, and PG assessment through a visual system, also performed in 10 healthy subjects.
MEASUREMENTS AND RESULTS. PG test was feasible and showed high repeatability (ICC 0.98, 95% CI 0.91-0.99); the best-fitting curve to express the PG was a hyperbola (R2≥0.98). Patients with HF and CSR showed increased PG, CGCO2 (but not CGO2), and LFCt compared with patients without CSR. PG was the only predictor of the daytime AHI (R=0.56, p=0.01) and together with the CGCO2 also predicted the nighttime AHI (R=0.81, p=0.0003) and the 24-hour AHI (R=0.71, p=0.001). LFCt was the only predictor of CSR cycle length (R=0.82, p=0.00006).
CONCLUSION. Plant gain appears to be a powerful contributor to CSR in HF, beyond chemoreflex gain and circulation time.

P444
Ensuring the "safety" of cancer octogenarian patients with comorbid chronic heart failure during non-cardiac operations in a multidisciplinary surgical clinic.

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Background. Heart failure (HF) is very common in the elderly and there are numerous challenges in diagnosis, prognostication, and treatment. HF octogenarian patients have a higher risk of postoperative cardiac problems . Oncocardiology is an actual medical discipline focusing on the detection, prevention and treatment of chronic heart failure (CHF) associated with the treatment of cancer.
Aim. To evaluate the risks of progression of concomitant CHF in octogenarian cancer patients after radical surgery for colorectal cancer.
Material and methods. From 2015 to 2018 a 26 elderly patients (pts) with verified cancer and history of CHF (42% female, 89% with LVEF ≤45%) were analyzed after radical surgery for colorectal cancer. The mean age was 85±2,7 years. 17(65%) pts

had II FC NYHA (functional class, New York Heart Association), 27% - III FC and 8% - IV FC NYHA due to 6-min walk test. 12(46%) pts had diabetes Mellitus, 21(81%) pts – hypertension, 12 (47%) pts – atrial fibrillation, 20(78%) pts - atherosclerosis of the aorta and its branches, 5(19%) - obesity. The level of NT-proBNP- 1269±44pg\ml, cTnI – 2,52±0,23ng/mL , CKD 41,2 ± 3,7 ml\min\1.73m2. Aldosterone antagonists received 10(%)pts, ACE-inhibitor/angiotensin or BRA receptor blockers – 21(81%)pts, beta-blockers-13(50%)pts, diuretics 11 (42%)pts, statins 17(65%)pts. According to ECHO, there was registered diastolic dysfunction also, /' 17,1±3,2.
Results. Postoperative death was observed in one case due to septic shock. 25 pts were discharge from hospital within 17±3,5days after operation with no clinical changes in FC NYHA.
Conclusion. We conclude that standard HF therapies is beneficial in the elderly patients, who have a higher risk of postoperative cardiac problems.Only in close cooperation with all members of the multidisciplinary team in surgical clinic and careful weighing of risks, according to stratification scales, can noticeable success be achieved in treating oncological octogenarius patients with comorbid CHF.

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Needs for psychological support in heart failure patients

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Heart failure (HF) is a serious health problem that affects a large population worldwide, with great impact on hospitalizations, mortality, costs and quality of life. Our purpose was to identify prevalence of: psychological stress, anxious or depressive symptomatology, asssociated with HF deterioration.
Material and Method
Patients over 18 years old with a HF diagnosis according to ESC guidelines criteria were included. In addition, with clinical stability six months prior to inlusion, without any HF treatment modification or hospitalizations in abscense of psychological disorder diagnosis or treatment. We evaluated demographic, clinical and therapy parameters. Psychological distress level was tested through the Distress Thermometer (DT), adapted for HF patients, Anxiety/Depressive symptomatology, with Hospital Anxiety and Depression Scale (HADS). Comparative bivariate statistics were performed. We declare p value <0.05.
Results
A total of 45 outpatients participated, age 59.3 + 13.3 years, (60% men). History of: diabetes 31.1%, Hypertension 35.5%, ischemic etiology: 33.3%. 84% NYHA class I-II with optimal therapeutic levels. The psychological evaluation indicated that 59.3% of patients tend to have dysfunctional thoughts about their illness, 48.1% have experienced nervousness, 44.4% distress, 66.7% have gradually lost interest in their personal appearance, 35.7% reported perceiving a high level of psychological distress that requires assistance, and only 10.7% have high levels of depressive symptomatology.
Conclusions
Psychological evaluation on HF patients is relevant to assess and identify the main emotional, cognitive and instrumental needs that gives information about the psychological impact, as well as tools for integral management.
This type of studies in HF patients allows to identify psychological support needs, in order to design psychological-intervention programs with specific and personalized topics. These patients have high risk of anxious, depressive symptomatology and psychological distress, we recommend psychological evaluation and effective intervention.

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High risk of ischemic stroke but not of cerebral bleeding in patients with heart failure without atrial fibrillation: a longitudinal 2-year follow-up study based on the Swedish Heart Failure Registry

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Background. Few studies have compared the risk of incident stroke among heart failure (HF) patients in a population-based and nationwide setting; moreover, the risk rates for ischemic- and haemorrhagic stroke were not examined separately, and patients with concomitant atrial fibrillation and/or anticoagulant treatment were not excluded.
Purpose. To compare the risk of TIA/ischemic stroke (IS), haemorrhagic stroke (HS), and death in incident HF patients without atrial fibrillation (AF) with that of a control population.
Methods. Data from incident HF patients without AF and /or anticoagulants, reported in the Swedish Heart Failure Register (SwedeHF) from January 2003 until December 2013, were analysed. For each case, maximum two age- and gender-matched controls without HF, AF and/or anticoagulants at inclusion were randomly selected from the Swedish Population Register. Information regarding use of medication was extracted from the Swedish National Drug Register and data on medical diagnoses were collected from the National Patient Register for both cases and controls, during a two-year follow-up period after the diagnosis.
The study population was categorized in three groups according to left ventricular ejection fraction: HFrEF (EF<40%); HFmrEF (EF 40-49); and HFpEF (EF ≥ 50%). Proportions were compared by Chi-square test. Hazard ratios (HR) with 95% confidence intervals (CI), for IS, HS, and death were estimated by Cox proportional hazard regression model, with adjustment for age, gender, and comorbidities (hypertension, diabetes mellitus, previous TIA/ischemic stroke, COPD, and kidney dysfunction).
Results. We identified 16,865 patients with incident HF (38.9% women) and 31,347 control individuals (39.2% women); 19.4% - HFpEF; 20.9% - HFmrEF; and 59.7% - HFrEF. Two years after diagnosis, the rate of events in the HF compared with the control group were; IS, 3.3% vs 1.5%, (p<0.001); HS, 0.3% vs 0.3% (p=0.838); mortality, 26% vs 4.9% (p<0.001). No significant difference in IS (p=0.970) and HS (p=0.076) incidence was found across EF groups; In a sex-, age, and comorbidity-adjusted Cox regression analysis, the HR for IS in HF patients vs controls was 2.09 [1.83-2.38; p<0.001], while the HR for HS was 0.95 [0.65-1.40; n s].
Conclusions. In this nationwide, population-based study, patients with HF without atrial fibrillation have a markedly increased risk of ischemic stroke but a similar risk of haemorrhagic stroke regardless of left ventricular ejection fraction.

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Diabetes increases long-term risk of new-onset heart failure and mortality in atrial fibrillation: impact of glycaemic control and diabetes treatment

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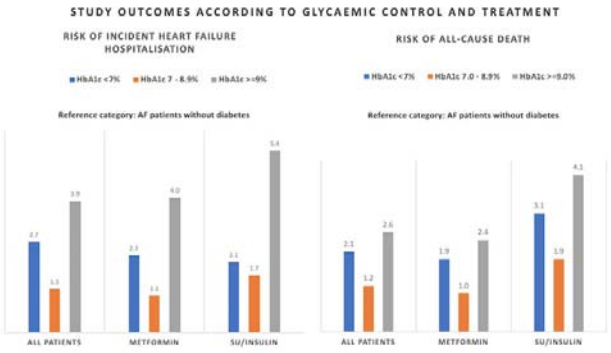
BACKGROUND: In patients with atrial fibrillation (AF), type-2 diabetes (T2D) portends a worse prognosis, but how glycaemic control and drug treatment modify outcomes is unclear. In a cohort of AF patients without prior HF, we aimed to assess whether the associations between T2D and risk of new-onset HF and mortality are influenced by glycaemic control and antidiabetic treatment.



METHODS: We included diabetic and nondiabetic AF patients, without prior HF. In diabetic patients, mean glycosylated haemoglobin (HbA1c) was calculated from all HbA1c measurements taken from inclusion to the end of the prospective follow-up. Study outcomes were: first hospitalisation for new-onset HF (HFH) and all-cause mortality. Cox analysis, adjusted for relevant confounders, was used to assess the association between T2D, stratified by categories of the mean HbA1c (<7.0%, 7.0-8.9%, ≥9.0%), and outcomes. The association between drug treatment (metformin; sulfonylurea[SU]/insulin) and outcomes was also analysed.
RESULTS: Among 1,288 AF patients (mean-age: 68±11 years; 61% male) without prior HF, 17% had T2D. During a median 5.4-year follow-up, HFH occurred in 298 (rate, 3.9; 95% confidence interval [CI] 3.5-4.4) and 424 died (rate, 5.5; 95%CI,

P448: Risk of HFH and all-cause death

	HR (95% CI)					
	All patients, n=1288		Metformin, n=122		SU/insulin, n=90	
	HFH	All-cause death	HFH	All-cause death	HFH	All-cause death
AF without T2D	1.0 (ref.)	1.0 (ref.)	1.0 (ref.)	1.0 (ref.)	1.0 (ref.)	1.0 (ref.)
AF with T2D	1.9 (1.3-2.8)	1.6 (1.1-2.1)	1.8 (1.4-3.0)	1.3 (1.1-2.8)	2.5 (2.1-3.4)	2.3 (1.9-3.1)
HbA1c						
<7.0%	2.7 (1.9 3.4)	2.1 (1.7-3.2)	2.3 (1.7 - 3.3)	1.9 (1.5 3.8)	2.1 (1.7-3.2)	3.1 (1.9-5.2)
7.0-8.9%	1.3 (1.2-2.0)	1.2 (1.1-2.1)	1.1 (1.0-2.2)	1.0 (0.9-2.2)	1.7 (1.1-2.1)	1.9 (1.4-2.5)
≥9%	3.9 (3.1-4.8)	2.6 (2.0-3.1)	4.0 (3.2-4.9)	2.4 (2.0-3.9)	5.4 (2.0-5.1)	4.1 (2.7-5.1)

5.0-6.1). Compared with nondiabetic patients, there was a U-shaped relationship between HbA1c categories and the risk of HFH and all-cause mortality in patients with T2D, irrespective of treatment (Table & Figure). Patients on metformin had lower risk of both outcomes compared to patients on SU/insulin, across all HbA1c categories (Figure).

CONCLUSIONS: In AF patients without prior HF, T2D confers greater long-term risk of HFH and all-cause mortality. There is a U-shaped relationship between HbA1c and outcomes, with the lowest risk in patients with moderate glycaemic control and those treated with metformin. This suggests that lenient glycaemic control may be an optimal strategy to improve outcomes in patients with AF and T2D.

P449

Prognostic role of diabetes and of medium-term glycemic control in heart failure

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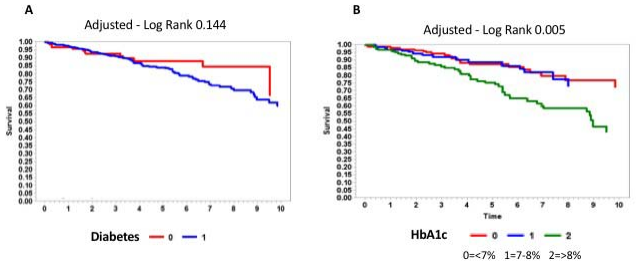
On behalf of: MECKI score

Background: Diabetes mellitus (DM) is common in heart failure (HF) patients and seems to adversely influence long-term morbidity and mortality. However, many variables affect HF prognosis and the exact role of DM and of glycemic control in presence of other well-known prognostic indicators is not clear. Aim of the present analysis was to assess in a large HF population the prognostic role of DM, the prognostic effect of insulin treatment, and the relationship among glycated hemoglobin (HbA1c) and prognosis over time and in presence of other prognostic predictors.

Methods: Data from HF patients with reduced ejection (HFrEF) fraction enrolled in the MECKI score database were retrospectively analyzed. In a first step analysis we compared the 10-year prognosis of diabetic and non-diabetic patients; then we compared the prognosis at 10 years of diabetic insulin and non-insulin dependent patients; last we compared the 10-year prognosis of diabetics according to HbA1c values (<7%, 7-8%, >8%). All the survival analyses were made at baseline and after correction for the variables included in the MECKI score (EF, Hb, Na, peakVO2, VE/VCO2 slope, MDRD). The primary endpoint was a composite of cardiovascular death, urgent heart transplantation and ventricular assist device implantation.

Results: Data from 3927 HFrEF patients (79% M, 61.7±13.2 years) were included in the present analysis; 897 patients (23%) presented a definite diagnosis of DM at baseline. Not-adjusted Kaplan-Meier analysis showed a worst prognosis in diabetic compared to non-diabetics as regards the primary study endpoint (Log Rank p=0.04), however after correction for the MECKI score variables no further prognostic differences were observed (Log Rank p=ns) (Figure 1A). The comparison between insulin (n=304) and non-insulin (n=567) diabetics showed an increased occurrence of the primary endpoint in patients on insulin (Log Rank p=0.05), however this difference disappeared after correction for the MECKI score variables (Log Rank p=ns). Last, the three groups of HbA1c showed significant survival differences (Log Rang p<0.001), having patients with HbA1c >8% (n=149) a worst prognosis, with comparable survival in patients with HbA1c <7% (n=266) and between 7-8% (n=133). These differences persisted even after correction for the MECKI score variables (Log Rank p=0.005) (Figure 1B). Conclusion: DM is a prognostic predictor in HFrEF patients, however its role may be mitigated by the presence of other important prognostic indicators. Differently, impaired medium-term glycemic control, expressed by elevated HbA1c, maintains over time its prognostic role independently from the presence of other well-known prognostic indicators. Thus, our efforts in diabetic patients needs to be concentrated on glycemic homeostasis stability over time.



P450

A multicenter, randomized, parallel-group pilot study of patiromer in optimizing mineralocorticoid receptor antagonist therapy in hyperkalemic heart failure patients (CONTINUE-HF): study design

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Background/Aims:
Mineralocorticoid receptor antagonists (MRAs), e.g. eplerenone and spironolactone, are recommended in heart failure (HF) guidelines for reduction of morbidity and mortality in HF patients with reduced ejection fraction (HFrEF). However, as inhibitors of the renin–angiotensin–aldosterone system (RAAS), MRAs can induce hyperkalemia (HK), especially in patients with renal dysfunction, and are frequently discontinued or underdosed due to hyperkalemia concerns.
Patiromer is a new potassium-binder using calcium as a counterion exchange. The CONTINUE-HF study (EudraCT number 2017-003555-35) will evaluate, if patiromer added to standard treatment (including MRA) in hyperkalemic HFrEF patients will enable more patients to continue or achieve the guideline recommended target MRA dose compared to standard of care (SoC).

Methods: This is a multicenter, randomized, prospective, open-label, controlled, parallel group pilot study of patiromer in HFrEF patients with intended dose reduction or discontinuation of MRA therapy due to hyperkalemia.
The study consists of a screening period (up to 14 days), a 42-day treatment phase and a safety follow-up. Inclusion criteria include HFrEF (EF <40%), NYHA Class II/III, eplerenone or spironolactone therapy, and HK (serum potassium ≥5.1 mmol/l) that limits ability to maintain or increase MRA dose. Eligible patients are randomized 1:1 to receive patiromer or SoC (potassium dietary restriction, enhanced renal potassium elimination, reduction of potassium-sparing drugs) in addition to the MRA. Patients in both treatment groups receive dietary counselling.
The primary endpoint is the proportion of subjects maintaining or achieving the guideline recommended target MRA dose of 50 mg/day in the patiromer versus the SoC group at D42. Secondary endpoints are Patient Global Assessment (PGA), change in EQ-5D-5L, NYHA class, functional capacity, and eplerenone/spironolactone dosage from baseline over time. Additionally, the proportion of subjects on same or higher MRA dose compared to baseline, the change in HF and kidney related parameters such as NT-proBNP, troponin, and urine albumin/creatinine ratio will be analyzed.

CONTINUE-HF is an ongoing study being conducted across 25 sites in Germany and will randomize approximately 100 subjects stratified based on current MRA therapy (eplerenone or spironolactone) and serum potassium level (≥5.1 mmol/l to <5.5 mmol/l or ≥5.5 mmol/l).
Conclusions: We anticipate that in CONTINUE-HF the proportion of subjects maintaining or achieving optimal (guideline recommended, maximal tolerated dose) eplerenone/spironolactone dosage in the patiromer group will be larger than in the SoC group. The results of this pilot study could be used to design future studies assessing the beneficial effects of enabling eplerenone/spironolactone in this population.

P451
Improving management of iron deficiency in patients with CHF: an online educational intervention

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Background: Iron deficiency (ID), independent of anemia is a common co-morbidity present in patients with chronic heart failure (CHF). However, routine screening of ID, independent of anemia in patients with CHF is lacking in clinical practice worldwide, and, as a consequence, many patients who develop ID are not optimally managed.
Purpose: To determine if an online continuing professional development (CPD) intervention could improve knowledge/competence and confidence of cardiologists and primary care physicians related to diagnosis and management of iron deficiency in the setting of CHF.
Methods: Cardiologists and primary care physicians electively participated in a video-based, 4-faculty educational discussion on diagnosing and treating iron deficiency. The effects of education were assessed using a repeated pair, pre-assessment/post-assessment study design. For all questions combined, a chi-square test assessed differences from pre- to post-assessment. P values <.05 are statistically significant. Cramer's V was used to assess level of educational effect. The activity launched on June 29, 2018 and data were collected through August 13, 2018.
Results: Overall significant improvements were seen after education for both cardiologists (N=438; P <.001; considerable educational effect, V=.270) and primary care physicians (N=619; P <.001; considerable educational effect, V=.287). Pre-assessment, the average correct response rate was 38% for cardiologists and 35% for primary care physicians, while post-assessment average correct response rates were 68% and 60%, respectively. Significant improvements were observed in cardiologists' and primary care physicians' knowledge and competence related to the guideline-recommended treatment of ID in the setting of CHF (Table).
As a result of the education, 26% of cardiologists and 28% of primary care physicians reported greater confidence in ability to treat ID in patients with CHF.
Conclusion: The statistically significant improvements observed in this intervention demonstrate the benefits of using education to increase knowledge, competence and confidence of cardiologists and primary care physicians and suggest that this type of intervention has the potential to positively impact recognition and treatment of ID in patients with CHF.

Knowledge and competence improvements

Topic	Cardiologists (N=438)Relative % improvement (post-assessment vs pre-assessment; P value)	Primary care physicians (N=619)Relative % improvement(post-assessment vs pre-assessment; P value)
Assessing ID treatment response	146% (25% vs 62%; P<.001)	101% (26% vs 53%; P<.001)
Knowledge of safety and efficacy of IV therapies for ID in the setting of CHF	60% (45% vs 71%; P<.001)	79% (36% vs 65%; P<.001)

P452
Contributing factors to anemia in acute decompensated heart failure patients with or without preserved ejection fraction

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Background: Anemia is known as one of the most important comorbidity and associated with poor prognosis in heart failure (HF) patients. Anemia in HF is complex and multifactorial. The major factors contributing to HF related anemia involve chronic kidney disease (CKD) and iron deficiency (ID). CKD and ID were also common in HF patients. However, the relationship between anemia and CKD or ID in HF patients is not fully understood.
Purpose: We hypothesized that contributing factors to anemia might be different between HF with reduced vs. preserved ejection fraction (HFrEF vs. HFpEF). This study aimed to investigate contributing factors of anemia in HF patients and its prevalence.
Methods and Results: We analyzed 255 patients hospitalized for acute decompensated HF between January 2015 and December 2017. Patients were categorized into two groups based on left ventricular ejection fraction assessed by echocardiography, HFrEF (EF < 40%, n = 85) and HFpEF (EF ≥ 50%, n = 111). HF with mid-range EF (EF 40 – 49%) patients were excluded. Anemia was defined as the hemoglobin level < 13 g/dL in male and < 12 g/dL in female. ID was defined as serum ferritin < 100 ng/mL or 100 – 200 ng/mL if transferrin saturation <20%. CKD was defined as eGFR < 60 ml/min/1.73m2. Anemia (54.1% vs. 73.9%) and ID (54.1% vs. 74.5%) were more frequent in HFpEF patients than HFrEF patients. In HFrEF patients, the prevalence of anemia was significantly higher in patients with CKD than those without CKD (62.3% vs. 18.8%, p = 0.002), whereas in HFpEF patients it was higher in patients with ID than those without ID (80.8% vs. 62.1%, p = 0.04). Multiple logistic regression analysis revealed that in HFrEF patients CKD and use of anti-platelet agents were independently associated with anemia (OR 0.97, 95% CI 0.94 - 0.99, p = 0.04, and OR 3.16, 95% CI 1.10 - 9.07, p = 0.03, respectively), whereas in HFpEF patients only ID was independently associated with anemia (OR 3.40, 95% CI 1.31 - 8.82, p = 0.01).
Conclusion: Our study suggests that CKD in HFrEF and ID in HFpEF are the major contributing factors to anemia. Further study is required for fully understanding of pathophysiological mechanisms of anemia in HF patients.

The prevalence of anemia in HF patients

	Iron deficiency (ID)	Chronic kidney disease (CKD)				
without ID	with ID	p value	without CKD	with CKD	p value	
HFrEF	Hemoglobin (g/dL)	13.1 ± 2.6	12.1 ± 2.2	0.05	13.7 ± 2.3	12.3 ± 2.4	0.03
Anemia (%)	48.7 (19/39)	58.7 (27/46)	0.39	18.8 (3/16)	62.3 (43/69)	0.002	
HFpEF	Hemoglobin (g/dL)	11.3 ± 2.4	10.4 ± 2.1	0.04	11.6 ± 2.1	10.4 ± 2.2	0.02
Anemia (%)	62.1 (23/37)	60.8 (59/73)	0.04	66.5 (19/29)	76.8 (63/82)	0.22	

Acute Heart Failure

P454
The significance of plasma osmolarity for in-hospital course and long-term outcome in patients with acute heart failure.

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Background. Plasma osmolarity reflects an electrolyte-water balance and is related to the pathophysiological pathways as neurohormonal activation, cardiorenal interaction and treatment used in patients with acute heart failure (AHF). The clinical relevance of plasma osmolarity in AHF has not been well established.
Purpose. The aim of the study was to interlink the plasma osmolarity with clinical characteristic and outcome in patients hospitalized with AHF.
Methods: Baseline plasma osmolarity was calculated using concentrations of plasma sodium, plasma glucose, and blood urea nitrogen (osmolarity = 1.86×sodium mmol/L + (glucose mg/dL/18) + (BUN mg/dL/2.8) + 9). The primary endpoints were: in-hospital heart failure worsening (WHF) and 1-year all-cause mortality.
Results. We investigated 340 patients with mean age: 68±13 years, 76 % were men. The median with interquartile range [IQR] of serum osmolarity was 294 [287;304] mmol/l. Patients were divided according to the quartiles baseline plasma osmolarity into four groups (A: < 287, B: 287-294, C: 294-304, D: >304 mmol/L, n=85 in all subgroups). Patients from group A and D had more frequent decompensated

chronic heart failure (76 vs 60 vs 62 vs 73 %). There was increasing age gradient in the subsequent groups (63±14 vs 66±13 vs 69±12 vs 74±11 years) and patients differ in occurrence of arterial hypertension (60 vs 74 vs 80 vs 80 %) and diabetes (30 vs 30 vs 39 vs 56 %). At admission there were identified differences in mean systolic blood pressure (122±27 vs 135±29 vs 140±35 vs 133±31 mmHg), mean haemoglobin level (13±2 vs 13±2 vs 13±2 vs 12±2 g/dL), mean creatinine level (1.0±0.3 vs 1.1±0.3 vs 1.3±0.4 vs 1.9±0.8 mg/dL), median NTproBNP level (6124 [3189;11958] vs 4191 [2608;7550] vs 5363 [2671;9930] vs 7611 [5255;8654] pg/mL). Regarding to the treatment before hospitalization and at admission there were no significant differences between the groups, except catecholamine use (14 vs 4 vs 8 vs 17 %). Additionally, there was a difference in incidence of in-hospital WHF (20 vs 9 vs 10 vs 22 %) and one year all-cause mortality (31 vs 18 vs 22 vs 37 %). In all above mentioned comparisons A vs B vs C vs D group P<0.05. Figure 1 presents Kaplan-Meier curves demonstrating 12-month survival rate of patients with AHF divided according to the baseline plasma osmolarity quartiles.

Conclusions. Among AHF patients, baseline plasma osmolarity is associated with clinical presentation and carries an important prognostic information. The U-shaped distribution for short and long-term prognosis according to baseline plasma osmolarity is seen in AHF.

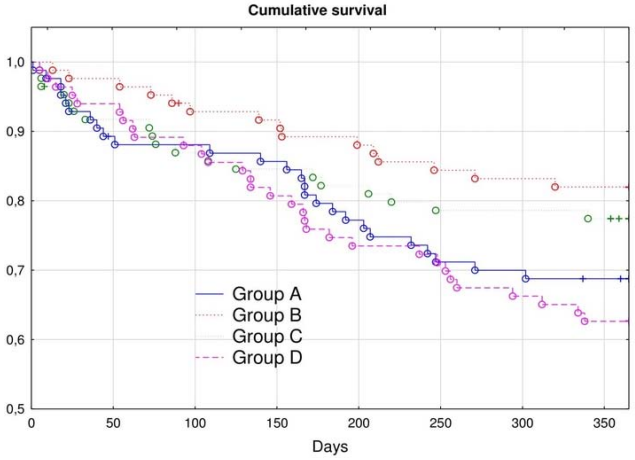

Figure 1

P455

Functional phenotyping of cardiac macrophages in patients with myocardial infarction: prospects for implementation to clinical practice

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Introduction . To the date we have accumulated a large amount of knowledge related to the role of macrophages in development of the cardiovascular pathology. However, there is no significant advancement in clinical studies.

Purpose. The purpose was to assess prospects for implementation of cardiac macrophage phenotyping in patients with MI in clinical practice.

Methods. The study included 41 patients with fatal MI type 1. Group 1 (n=24) comprised patients who died within 72 hours of MI (the inflammatory phase of MI) and group 2 (n=17) comprised patients who died 4-28 days after MI (the regenerative phase of MI). Macrophage infiltration in the heart was assessed by double immunofluorescence. We used CD163, CD206 and stabilin-1 as markers of M2-like macrophages, while α-smooth muscle actin (α-SMA) was considered as a marker of macrophage transdifferentiation. Cells were counted in the infarct and non-infarct area. Each area was evaluated in 20 random fields.

Results. We identified CD163+/CD206-, CD163-/CD206+, CD163+/CD206+, stabilin-1+/α-SMA-, stabilin-1+/α-SMA+ macrophages. In the infarct area, the number of CD163+/CD206-, CD163+/CD206+, stabilin-1+/α-SMA- macrophage was lower during the inflammatory phase of MI than during the regenerative phase. Group 1 vs group 2 (number of cells in 20 random fields, median): 22 vs 83 (CD163+/CD206-, p=0.03), 12 vs 94 (CD163+/CD206+, p<0.0001), 30 vs 103 (stabilin-1+/α-SMA-, p=0.03). The number of CD163+/CD206+ macrophages in the infarct area (IA) correlated with the incidence of recurrent MI (R=0.46, p=0.006). The number of CD206+/CD163- cells in the IA correlated with in-hospital mortality according to the GRACE risk score: R=-0.43, p=0.01. The number of stabilin-1+/α-SMA+ macrophages in the IA correlated with the incidence of type 2 diabetes (R=-0.4, p=0.04), hypertension (R=-0.6, p=0.003), ventricular aneurysm (R=0.4, p=0.03), and the relative number of peripheral blood monocytes prior to the onset of death (R=-0.6, p=0.04). In the non-infarct area, the quantity of CD163+/206- cells correlated with the history of prior MI (R=0.4, p=0.02) and the incidence of recurrent MI (R=0.4, p=0.02), while the quantity of CD206+/163- macrophages correlated with the absolute number of peripheral blood monocytes at admission (R=0.4, p=0.04).

Conclusions. We revealed subpopulation of stabilin-1+/α-SMA+ macrophages, that indicated the possibility of cellular transdifferentiation and macrophage plasticity. CD206+/CD163- macrophages were proposed as a subpopulation that correlated with adverse scenario of MI. CD206+/CD163- and stabilin-1+/α-SMA- macrophages were proposed as subpopulations that correlated with the development of chronic inflammation in the heart. Our study supports prospects for implementation of macrophage phenotyping in clinical practice that might become a step to precision medicine, a breakthrough in the development of new methods for management of MI and following complications.

P456

T-lymphocytes and natural killers cells in patients with acute myocardial infarction complicated by acute heart failure

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The level of lymphocytes and natural killers (NK) cells in myocardial infarction (MI) is relatively reduces, while the neutrophil-to-lymphocyte ratio (NLR) increases. CD16+ T-lymphocytes and NK cells have a cytotoxic effects. Their significance in the development of acute heart failure (AHF) has been little studied.

The aim was to assess changes in the count and ratio of lymphocytes and neutrophils in patients with MI and AHF.Materials and methods: 142 patients with MI were included in the prospective cohort study. Group 1 included 37 patients (26%) who developed AHF Killip II-IV, group 2 – 105 patients with AHF Killip I. The total number of leukocytes, neutrophils, CD16+ and CD16-T-lymphocytes and NK-cells were evaluated using flow cytometry with Cytodiff panel in 1, 3 and 14 days of MI. The NLR is the ratio of neutrophils to lymphocytes counts. Statistical analysis was performed using the STATISTICA 10.0 package. Non-parametric methods of statistical analysis were used.

Results: Patients in 1 group were older than patients in the 2 group: 73.5(63; 80) vs 64.5 (58; 73) years. On the 1 day, leukocytes and neutrophils counts were equal high in both groups and normalized up to the 14th day. The total number of leukocytes did not differ in both groups during the observation period. On 3 day, the number of neutrophils was higher in group 1 then in the group 2: 5821(4921;8936)/μl vs 4935(4100;6843)/μl, p=0.03. On the 14th day, the number of neutrophils is equal in both groups. The total number of lymphocytes in groups 1 and 2 was: on 1st day, 1334(906;1855)/μl vs 2007(1368;2308)/μl, p=0.03; on 3rd day, 1374(1015; 1920)/μl vs 2150(1721;2578)/μl, p=0.0041; on the 14th day, 1917(1528;2264)/μl vs 2322(1983;2659)µl, p=0.011, respectively.The counts of CD16- T-lymphocytes and NK cells in 1 and 2 groups were: on 1st day, 1061(659;1196)/μl vs 1396(913;1683)/μl, p=0.02; on 3rd day, 1094(781;1467)/μl vs 1587(1166;1854)/μl, p=0.008; on the 14th day, 1351(1965;1886)/μl vs 1728(1298;2028)/μl, p=0.08, respectively.The number of CD16+ T-lymphocytes and NK cells in groups 1 and 2 was: on 1st day, 116(97;190)/μl vs 222(186;272)/μl, p=0.004; on 3rd day, 205(61;295)/μl vs 345(202;453)/μl, p=0.0005; on the 14th day, 289.8(124;335)/μl vs 342(236;518)/μl, p=0.05, respectively. The number of B-lymphocytes in both groups were the same.NLR on the 1st day was high and comparable in all patients. On days 3 and 14, NLR decreased in both groups, but was higher in 1 group: 5.38(2.43;8.98) vs 2.21(1.76;3.75), p=0.0014 and 2.73(1.8;4.32) vs 1.81(1.51;2.54), p=0.02.

Conclusions: in patients with MI, the development of severe AHF is associated with higher and prolonged absolute and relative neutrophilia, as well as lower level of T-lymphocytes and NK cells, both regulatory (CD16-) and cytotoxic (CD16+). AHF develops in patients with more significant inflammatory response. And NK cells seems to play a protective role during MI.

P457

Frequency and predictors of mortality in arrhythmia-induced cardiomyopathy: a diagnosis not to be missed

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Background: Arrhythmia-induced cardiomyopathy (AIC) is characterized by left ventricular (LV) systolic dysfunction caused by arrhythmia which is reversible once

the arrhythmia is properly controlled. There is scarce scientific evidence regarding the clinical features and therapeutic implications of this condition.
Purpose: To characterize the population of patients with suspected AIC and to determine predictors of recovery of LV systolic function and of all-cause mortality.
Methods: Retrospective analysis of patients admitted in a Cardiology department with a probable diagnosis of AIC between 2012 and June 2018. Logistic and Cox regression analyses were used to determine predictors of recovery of LV systolic function (improvement of LV ejection fraction – EF of ≥10%) and of mortality, respectively.
Results: Fifty-eight patients were included, with a mean age of 62±10 years, and male predominance (66%). The most common associated arrhythmia was AF (50%), followed by atrial flutter (AFL – 26%), both AF and AFL (19%) and other tachyarrhythmias (5%). The mean body mass index was 29±5kg/m2, the prevalence of arterial hypertension was 57%, cerebrovascular disease 13% and hypothyroidism 9%. On admission most patients were on functional class III or IV (61 and 23%, respectively), the median NT-proBNP was 2511 pg/ml, the mean LV EF was 28±10%, 54% had a dilated LV, 87% a dilated left atrium and 68% right ventricular systolic dysfunction.
During follow-up (median 637 days), 84% of patients converted to sinus rhythm (SR); 50% were submitted to electric cardioversion, 17% to pharmacological conversion and 41% to catheter ablation (success rate of 88%). Among patients who converted to SR, 52% had recurrence of AF or AFL during follow-up.
On reassessment (median 257 days after admission) 60% of the patients were in SR, and the heart rate (HR) was controlled in 93% (median HR 70 bpm). There was an improvement in functional class (4% in class III and none in class IV), NT-proBNP (median 639 pg/ml), and LV systolic function (88% had recovery and 60% normalization of systolic function – mean LV EF 51±10%).
Recovery of LV function was associated with both SR and controlled HR in reassessment. On multivariate logistic regression analysis, the predictors of recovery of LV function were the presence of hypothyroidism and the mean HR on reassessment, with an increase in HR by 1 bpm associated with a reduction of 9% in the likelihood of recovery.
During follow-up 17% of patients died and the independent predictors of all-cause mortality were an history of cerebrovascular disease and absence of recovery of LV function.
Conclusions: In our population AIC was more commonly associated with AF, and patients usually presented with severe symptoms and LV systolic dysfunction. Both maintaining SR and controlling the HR are important for the recovery of LV systolic function, which was a predictor of survival in this population.

P458
Initial blood pressure variability in patients with acute heart failure is associated with increased rehospitalization

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Background: Blood pressure variability (BPV) is associated with adverse clinical outcomes in patients with hypertension. However, there are few established data about the impact of BPV on prognosis in patients with acute heart failure (AHF). The aim of this study was to investigate the impact of BPV on long-term clinical outcomes in patients with AHF.
Methods: A total of 123 patients (69.6±13.6 years, 63 males) with acute heart failure consecutively admitted to a tertiary hospital between 2012 and 2013. All patients were diagnosed with acute heart failure according to symptoms, signs, biomarkers, and echocardiography. The initial 24hr of blood pressures in intensive care unit (ICU) were recorded for all patients and the standard deviation (SD) and coefficient of variation (CV) reflecting BPV were calculated in the patients. Patients were divided into two groups according to BPV during the first 24hr in ICU; the high BPV group (SD ≥11 mmHg) (n=70, 72.4±11.5 years, 33 males) vs. the low BPV group (SD <11 mmHg) (n=53, 65.9±15.4 years, 30 males). Receiver operating characteristics-curve analysis identified the SD of 11 mmHg as a cut-off value for long-term adverse outcomes. Baseline characteristics, echocardiographic findings, laboratory findings, and clinical outcomes were compared between the two groups.
Results: The mean value of 24hr mean SBP was 124.0±20.9 mmHg and DBP was 68.9±10.2 mmHg. Patients in the High BPV group were older than those in the low BPV group (72.4±11.5 vs. 65.9±15.4 years, p=0.011). There was no gender difference between the two groups (males: 47.1% vs. 56.6%, p=0.299). There was no significant difference in SD (11.1±3.3 vs. 12.0±4.3 mmHg, p=0.281) and CV (8.9±2.0% vs. 9.7±3.0%, p=0.114) between the patients who died and those who survived at 1-year follow-up. However, SD (13.1±4.0 vs. 11.3±4.0 mmHg, p=0.031) and CV (10.4±2.8 vs. 9.2±2.7, p=0.034) in patients with any rehospitalization during 1-year follow-up was higher than in those without rehospitalization. Rehospitalization rate was higher in patients with high BPV group than in those with low BPV group (37.1% vs. 13.2%, p=0.003). Multivariate analysis using binary logistic regression showed that high BPV was an independent predictor of rehospitalization in AHF patients (OR 3.37, 95%CI 1.30-8.71, p=0.012).
Conclusion: There was no difference in 1-year mortality among AHF patients with high BPV and low BPV. However, rehospitalization was more frequent in AHF patients with high BPV than in low BPV.

P460
Renal function and electrolyte assays in patients with heart failure - a comparison between patients with reduced and preserved ejection fraction

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Background/Introduction: Renal congestion due to acute decompensated heart failure is associated with worse outcomes in hospitalized patients. Furthermore, literature date (ESCAPE trial) showed that persistent hyponatremia was an independent factor for mortality and rehospitalization for patients with heart failure.
Purpose The aim of our study was to evaluate what kind of impact diuretic therapy administered to patients with heart failure had on serum electrolytes (sodium, potassium) and renal functions (assessed through serum creatinine and urea).
Methods We performed a retrospective study on 100 heart failure patients admitted to our clinic during a 12 month period. Data regarding patient demographics, medical history, comorbidities, laboratory results, echocardiography and in-hospital treatment were collected for all patients. Those with unavailable laboratory assay results, echocardiographic assessment or in-hospital treatment were not included. Data analysis was performed using SPSS, version 20 in order to obtain descriptive and inferential statistics using parametric and non-parametric tests.
Results Of the 100 patients enrolled, 50 had heart failure with preserved ejection fraction (HFpEF) and 50 had heart failure with reduced ejection fraction (HFrEF). The mean age was 71,10 ± 10,93 with patients in the HFpEF slightly older (74,66 ± 9,44 vs. 67,54 ± 11,24). More women had HFpEF (82% vs. 36%).
Patients has urea, creatinine, sodium and potassium levels assessed throughout their hospital stay and both minimum and maximum values noted for all. It is apparent that the maximum urea level has a different distribution across the two patient subgroups (mean value in HFpEF 55.99 ± 33.41 vs. 71.87 ± 43.06, p=0.031), as had the minimum level of sodium (mean value in HFpEF 140.66 ± 5.79 vs. 137.64 ± 9.40, p=0.013), but not maximum creatinine (mean value in HFpEF 1.04 ± 0.53 vs. 1.31 ± 0.46, p=0.180) as suggested through the use of non-parametric tests such as the Mann-Whitney U Test. Minimum sodium levels correlated with the total dose of spironolactone used during the entire hospital stay (r=0.211, p=0.047) and maximum urea correlated with the total dose of oral furosemide (r=0.297, p=0.005) but not with intravenous furosemide (r=0.123, p=0.252).
Conclusion(s) Patients with a reduced ejection fraction, rather than those with HFpEF, more often present to hospital with decompensated heart failure, exhibiting signs and symptoms of pulmonary and systemic congestion and thus require higher doses of diuretics. It is quite expected that they would have higher maximum urea and lower minimum sodium values as compared to HFpEF patients. However, unexpectedly, creatinine does not seem to follow the same trend.

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Both admission hypo- and hyper-glycemia are associated with increased 1-year mortality in patients with acute heart failure

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Background: Hyperglycemia is common, regardless of diabetes mellitus (DM), and is associated with increased short-term mortality in patients with acute heart failure (AHF). However, relationships between abnormal blood glucose levels, especially hypoglycemia, and long-term mortality in AHF remain undetermined.

Purpose: This study sought to investigate the effect of hypo- or hyper-glycemia at admission on 1-year all-cause mortality in AHF patients.
Methods: From the GREAT (Global Research on Acute Conditions Team) registry, 13840 patients presenting with AHF whose admission glucose levels were available were included and followed up for 1-year all-cause mortality. Hyperglycemia was defined as a glucose levels of ≥7 mmol/L for patients without history of DM and ≥10 mmol/L for those with history of DM and hypoglycemia was defined as a glucose levels of ≤4 mmol/L.
Results: There were 193 (1.4%) patients with hypoglycemia, 6418 (46.4%) patients with hyperglycemia, and 7229 (52.2%) patients with normoglycemia. One-year mortality was higher in patients with hypo- and hyper-glycemia than those with normoglycemia (81 [42%], 1911 [30%], and 1821 [25%], respectively). Even after adjustment, the risk for 1-year mortality was significantly higher in hypo- (hazard ratio [HR] 1.69, 95%-confidence interval [CI] 1.18-2.44, P=0.004) and hyper-glycemia (HR 1.14, 95%-CI 1.04-1.26, P=0.008) compared with normoglycemia. Detrimental effects of dysglycemia on 1-year mortality were similar in DM and non-DM patients (p for interaction 0.05 for hypoglycemia and 0.75 for hyperglycemia), while more severe in de novo AHF patients than in patients with history of HF (p for interaction 0.05 for hypoglycemia and 0.004 for hyperglycemia).
Conclusions: In patients with AHF, both hypo- and hyper-glycemia at admission are associated with increased risk for 1-year mortality, especially in de novo HF patients.

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Relationship between early drop 13.5% in systolic blood pressure, worsening renal function and long-term outcome in patients with acute heart failure

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Background: Worsening renal function (WRF) is associated with poor prognosis in patients with heart failure (HF). Previous studies suggested that early drop in systolic blood pressure (SBP) was associated with increase in the risk of WRF.
Purpose: Our purpose was to identify the optimal cut-off value of early drop in SBP for WRF and to evaluate the association between early drop in SBP and long-term composite outcome of HF re-admission and cardiovascular mortality in HF patients.
Methods: We retrospectively enrolled acute decompensated HF patients who admitted our hospital from March 2010 to July 2016. WRF was defined as a relative increase in serum creatinine of at least 25% or an absolute increase in serum creatinine 0.3 mg/dL from the baseline. SBP was measured on admission and each 4 hours within first 24 hours. The early drop was defined as drop in SBP within first 24 hours. We investigated that the relationship between early drop in SBP, WRF, and long-term composite outcome using multivariate analyses.
Results: A total of 413 patients with acute HF were enrolled. The mean age was 77.0±14.8 years and 60.7% were male. During the median 897 days (interquartile range, 186 to 1568 days) follow up period, 138 patients (34.4%) had HF re-admission or cardiovascular death. WRF occurred in 143 patients (34.6%). Mean SBP on admission was significantly higher in patients with WRF than in patients without WRF. However, mean SBP after 24 hour from admission was significantly lower in patients with WRF than in patients without WRF. The receiver operating characteristic curve analysis identified that the optimal cut-off value for WRF was 13.5% drop in SBP. Multivariate Cox regression analysis showed that early drop in SBP ≥13.5% (Odds ratio, 9.05; 95% confidence intervals, 4.36-20.02; P <0.001), inotropic agents, creatinine level, female gender, and tolvaptan were associated with WRF. Regarding to composite endpoint of HF re-admission and cardiovascular mortality, Cox proportional hazard models showed that age, previous history of HF admission, WRF, and creatinine level were associated with increase in composite endpoint risk. The early drop in SBP was not associated with increase in composite endpoint risk.
Conclusion: Early drop in SBP ≥13.5% was a strong predictor of WRF in patients with HF. However, early drop in SBP ≥13.5% was not the independent predictor of HF re-admission or cardiovascular mortality.

P463

Validation of radiofrequency determined lung water using thoracic CT: findings in acute decompensated heart failure Patients

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Introduction: To date, noninvasive outpatient monitoring for heart failure (HF) to track disease status has been met with limited success. We validated radiofrequency (RF) determined lung water's ability to identify volume overload compared to thoracic CT's ability to do the same.
Methods: Two different groups were studied: 27 acute HF (AHF) inpatients (pts) and 26 subjects without AHF (Control – 16 healthy and 10 stable HF). All underwent supine thoracic CT scans (age= 78±8 vs. 56±16 yrs.; female= 37 vs. 27%; BMI=31.6±7.4 vs. 26.8±4.5, AHF vs. Control respectively; p < 0.05 for all). This was followed with supine RF readings from a wearable patch device (ZOLL LifeVest, Pittsburgh, PA) placed on the left mid-axillary line. RF based lung fluid model was built using reflected RF signals and anthropometric data. Lung fluid was reported as percentage of lung volume. Classification analyses were used to compare RF and CT performance.
Results: AHF pts presented with higher lung water levels measured by both CT and RF model (CT: 20.2±3.8 % vs. 14.8 ± 2.5 %; RF: 18.7±2.5 % vs. 16.4±1.5 %, AHF vs. Control respectively; p < 0.05 for all). The RF model performed as well as CT to identify AHF pts from Control subjects (Table).
Conclusions: Noninvasive nonionizing RF determined lung water provides a potential alternative to other measures for diagnosing and monitoring pulmonary fluid overload and the presence of pulmonary congestion. Further studies will guide the clinical utility of RF determined lung water in HF patient management.

RF and CT Classification Analyses

AHF vs. Control	Sensitivity [%]	Specificity [%]	Positive Predictive Value [%]	Negative Predictive Value [%]	Positive Likelihood Ratio	Negative Likelihood Ratio
RF Model	78	85	84	79	5.1	0.3
CT	74	85	83	76	4.8	0.3

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Decongestion by bioimpedance analysis in patients hospitalized with decompensated heart failure depending on ejection fraction

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Objective: Similar congestion and decongestion by clinical data had been reported in patients with acute heart failure (HF) depending on ejection fraction (EF) phenotypes. The aim of the study was to evaluate decongestion by bioimpedance analysis (BIA) in patients with decompensated HF (DHF) based on EF.
Methods: Congestion was assessed on admission and at the day of discharge by tetrapolar BIA. Resistance (R) and reactance (Xc) values on single 50kHz frequency were standardized by height (h). Congestion status was defined by graphical results of R/h and Xc/h depending on deviation from validated BIA data in the normal population. Decrease of R/h and Xc/h means increase of severity of congestion. Patients were divided into 3 groups based on EF: HF with reduced EF<40% (HFrEF), HF with mid-range EF 40-49% (HFmrEF) and HF with preserved EF≥50% (HFpEF). Mann-Whitney and Wilcoxon tests were performed. P<0.05 was considered significant.
Results: Study included 149 patients with DHF (104 male, 69 (60;78) years, arterial hypertension 93%, history of MI 48%, diabetes 41%, NT-proBNP 4046 (1956;5456) pg/ml, EF 39 (29;50)%. 50, 21 and 29% of patients had HFrEF, HFmrEF and HFpEF, respectively. On admission mild, moderate and severe congestion was revealed in 13, 26% and 40% of patients. Incidence of corresponding baseline congestion was 8, 31 and 41% in HFrEF group, 13, 19 and 36% in HFmrEF and 23, 23 and 40% in HFpEF (p=0,15).
Patients with HFrEF vs HFmrEF and HFpEF tended to have more pronounced baseline congestion according to lower values of R/h (229 [188;289] vs 257 [223;285], p=0.062 and 252 [212;306] Om/m, p=0.022) and Xc/h (18.9 [14.1;25] vs 23.3 [15;30], p=0.049 and 20.8 [15.7;24], p=0.31 Om/m) and tented to receive longer (p=0.052) and higher total dose of iv furosemide (560 [300;860] vs 420 [180;600] and 320 [200;640] mg, p=0.033), more commonly were treated with spironolactone (89.3 vs 71 and 42%, p<0.001). Patients with HFpEF vs HFmrEF and HFrEF were more often additionally treated with thiazides (23 vs 16.1 and 5.3%, p=0.014).
Significant changes of weight, R/h and X/c were revealed (p<0.001) without differences between groups based on EF.
Mild, moderate and severe congestion at discharge was identified in 15, 31 and 7% patients with HFrEF, 10, 13 and 10% in HFmrEF, 28, 28 and 5% in HFpEF. Patients with HFpEF had higher rate of congestion at discharge comparing to HFmrEF (61 vs 33%, p=0.02).
HFrEF group vs HFmrEF and HFpEF was characterised by tendency to a lower R/h (269 [231;301] vs 301 [280; 335], p=0.011 and 296 [260;335], p=0.005 Om/m) and Xc/h at discharge (24.4 [19.9;28.9] vs 30.4 [23.5;34.2], p=0.007 and 25.3 [21.8;29.3], p=0.45 Om/m).
Conclusion: There were no significant differences in the decongestion by BIA between different EF phenotypes of DHF. Patients with HFrEF tended to be more

congested both on admission and at discharge and to receive more intensive diuretic therapy.

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Serum sodium and chloride levels in relation to congestion and outcomes in decompensated heart failure

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Objective: Recently similar or even higher prognostic significance was attributed to hypochloremia (HypoCl) as compared with hyponatremia (HypoNa) in stable chronic heart failure (HF). HypoCl associations and impact on outcomes in decompensated HF (DHF) are less well understood. We examined the incidence of HypoNa and HypoCl and their associations with congestion and outcomes in patients with DHF.
Methods: Incidence of HypoNa≤135 mmol/l and HypoCl<96 mmol/l was assessed on admission and discharge (median at 9 [8;10] day) in 167 DHF patients with signs of congestion (120 males, 68±12 years [M±SD], hypertension 93%, myocardial infarction 46%, atrial fibrillation 61%, diabetes mellitus 39%, chronic kidney disease 27.5%, ejection fraction [EF] 39±14%, EF<40% 51.5%, NT-proBNP 4218 [1943;5726] pg/ml). Congestion was assessed and graded by bedside clinical assessment scale (ESC Scientific Statement 2010) and by bioimpedance analysis (BIA). Outcomes data were available for 163 patients. p<0.05 was considered significant.
Results: Baseline HypoNa and HypoCl were revealed in 5.9 and 7.2% cases (both were presented in 6 patients). Only HypoCl was associated with higher clinical congestion (5.5 [4;7.5] vs 4 [2;6] points, p=0.031), both were not associated with BIA congestion and outpatient diuretic therapy. During hospitalization incidence of HypoNa and HypoCl increased to 15.6% and 18.6%, respectively (only HypoNa, only HypoCl and both were presented in 11, 16 and 15 cases). Na and Cl moderately correlated (r=0.45 and 0.49 on admission and discharge, p<0.001). HypoCl at discharge was associated with more pronounced baseline clinical congestion (6 [4;6] vs 4 [2;6] points, p=0.035), higher haematocrit changes (6 [2;15] vs -2[-10;6.7]%, p=0.010) and decongestion by BIA (R/h 28 [19;41] vs 15 [5.4;29]%, p<0.001, X/c 51[28;88] vs 27[4.4;53]%, p<0.001), lower potassium (4.1±0.6 vs 4.4±0.6 mmol/l, p=0.008) and Na (135±4 vs 139±3, p<0.001) at discharge, more intensive iv loop diuretic (start dose 120 [80;160] vs 80 [60;120] mg, p=0.016, total iv dose 720 [490;1040] vs 480 [280;820] mg, p=0.024) and thiazide therapy (35.5 vs 7.4%, p<0.001), but characterised by similar incidence of outcomes comparing to patients without HypoCl. Patients with vs without HypoNa at discharge did not differ by decongestion, also received longer and higher doses of loop diuretics, but characterised by negative prognosis (higher 1 and 3-month death (15.4 and 19.2 vs 2.2 and 6.6%, p=0.002 and 0.035) and HF readmissions (15.4 and 26.9 vs 3.6 and 12.4, p=0.016 and 0.056). Electrolytes disturbances had no impact on 6- and 12-month outcomes.
Conclusions: HypoCl at discharge diagnosed in 18.6% patients was not associated with outcomes showing significant associations with decongestion and higher doses of loop diuretics, while HypoNa at discharge, revealed in 15.6% of cases and also related with more intensive diuretic therapy, was associated with higher short-term negative outcomes.

P466

Diagnostic value of remote dielectric sensing (ReDS) technology to predict pulmonary congestion on computed tomography in consecutive patients with acute dyspnea

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Background Remote Dielectric Sensing (ReDS) is a non-invasive electromagnetic energy-based technology that quantifies lung fluid content in less than 2 minutes without radiation. However, it is not known if ReDS can diagnose congestion on a chest computed tomography (CT) in unselected consecutive patients with dyspnea and possible comorbidities in the emergency department (ED).
Purpose
The primary aim is to examine if increased lung fluid content on ReDS can predict or exclude congestion on a low dose CT in consecutive dyspneic patients in the ED.
Methods
Patients >50 years of age with acute dyspnea in max 14 days admitted to the ED were included. All patients had a physical examination, chest X-ray, lung ultrasound (LUS), low-dose CT, ReDS-examination and echocardiography within 12 hours.
We defined ReDS as positive for congestion, if the average of right and left lung exceeded 35%. A normal ReDS estimated lung fluid content has previously been shown to be in the range of 20 to 35%. Congestion on CT was defined according to the Fleischner society, and CT scans were reviewed by two radiologists blinded for clinical data. Congestion on LUS (14-zone protocol) was defined as at least one zone bilateral with a minimum of 3 B-lines or bilateral pleural fluid.
Results
37 consecutive patients were examined on January 2019, 13 females and 24 males, with a mean age of 74 years, 23% had chronic heart failure, 81% active/past smokers, 23% had diabetes, 60% had copd, 30% had AFLI and 25% IHD. Out of 37 patients 6 (16%) had congestion on CT of whom 5 also had a positive ReDS-examination. Thus, 31 of 37 patients did not have congestion on CT: 7 of these patients had a positive ReDS while 24 had a negative ReDS. Therefore, a positive ReDS-examination was significantly (p=0.005) associated with congestion on CT with a specificity of 81% and a sensitivity of 83%.
Patients with versus without congestion on CT differed according to ReDS, mean (SD), 38.2 % (4.6) vs 29.4% (5.9), p=0.002; Total number of B-lines 19 (9) vs 6 (5), p=0.014; NT-proBNP 845 pmol/L (902) vs 175 pmol/L (265) p=0.13. Comparison of ROC analyses showed no statistically significant difference between ReDS, B-lines on LUS or NT-proBNP to predict congestion on CT (AUC 0.84; 0.89; 0.88, respectively: p=0.62 and p=0.76 for comparison with ReDS).
Conclusion These preliminary results show that increased lung fluid content on ReDS is significantly associated with pulmonary congestion on a chest CT in consecutive breathless patients in the ED. ReDS seem to predict congestion on CT as effectively as LUS and NT-proBNP. A normal ReDS-examination may exclude congestion on CT in patients with acute dyspnoea, but thresholds for abnormality should be further explored. Firm conclusions must await more patients, and during the congress we will present updated data on anticipated 90 patients.

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The reliability of Lung ultrasound and conventional X-ray in the stage differentiation of pulmonary congestion

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Introduction: Pulmonary congestion is one of the most frequent complications of acute decompensated heart failure usually presenting with acute dyspnea. In emergency units the differentiation of the origin of dyspnea is sometimes a big challenge especially when time is of great importance for the administration of decongestive therapy.
Purpose: To evaluate the reliability of lung ultrasound and conventional X-ray in the diagnosis of different stages of pulmonary congestion in patients with dyspnea and acute decompensated heart failure.
Methods: Positive LUS B-lines score (>15) detection was tested against conventional X-ray in 100 dyspneic patients (n=44 NYHA III; n=56 NYHA IV) with pulmonary congestion and 58 healthy controls. Focus echocardiography (E/e>15) and NT-proBNP (>1000pg/ml) were used as referred methods.
Results: X-ray pulmonary blood flow redistribution was detected in all NYHA III patients and in no NYHA IV patients. Pulmonary alveolar edema was found in all NYHA IV patients and in no NYHA III patients. Interstitial pulmonary edema was found both in NYHA III and NYHA IV patients with a little prevalence for NYHA III patients. Positive LUS B-lines score >15 was detected in all NYHA IV patients (n=56; 100%). Bilateral LUS B-lines between 11-14 were detected in 35 NYHA III (79,5%) patients: 29 (66%) NYHA III patients with X-ray detected pulmonary blood flow redistribution and in 15 NYHA III patients (34%) with X-ray detected interstitial pulmonary edema. Positive LUS B-lines score was not detected in 9 NYHA III patients (20%) with X-ray estimated pulmonary blood flow redistribution. The difference in results between NYHA III and IV subgroups demonstrated excellent possibilities for LUS in differentiation of interstitial and alveolar edema in NYHA IV patients and moderate possibilities in differentiating of pulmonary blood flow circulation in NYHA III patients. X-ray staging of pulmonary congestion demonstrated an advantage in NYHA III patients. Focus echocardiography detected elevated left ventricle filling pressure (E/e>15) in all NYHA IV patients and corresponded with NT proBNP > 1000pg/ml and alveolar pulmonary edema detected with X-ray. E/e between 8 and 15 (grey

zone) was detected in most of the NYHA III patients which moderately correlated with NT-proBNP and strongly with pulmonary blood flow redistribution and interstitial pulmonary edema from X-ray.
Conclusions: X-ray differentiation of the stages of pulmonary congestion is preferable in NYHA III patients where LUS shows moderate reliability because of no positive B-lines score detection in most of the patients. LUS B-lines positive score is detected in all NYHA IV patients with interstitial and alveolar edema and demonstrates excellent reliability in these patients with acute dyspnea when time saving is of great importance for the choice of therapy.

P469
The clinical significance of interleukin-6 in heart failure: results from the BIOSTAT-CHF study.

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Background/Introduction: Inflammation is a central process in the pathophysiology of heart failure (HF), but trials targeting tumor necrosis factor-α (TNF-α) were largely unsuccessful. Interleukin-6 (IL-6) is an important inflammatory mediator and a potential pharmacologic target in HF. Little is known regarding the association between IL-6 and clinical characteristics, outcomes and other inflammatory biomarkers in HF.
Purpose: We aimed to characterize the association between IL-6 and clinical characteristics, other inflammatory biomarkers and outcomes in HF.
Methods: IL-6 was measured in 2329 patients [89.4% with a left ventricular ejection fraction (LVEF)≤40%] of the BIOSTAT-CHF cohort. The primary outcome was all-cause mortality and HF hospitalization during 2 years, with all-cause, cardiovascular [CV], and non-CV death as secondary outcomes.
Results: Elevated brain-type natriuretic peptide, procalcitonin, hepcidin and having iron deficiency, atrial fibrillation (AF) and LVEF>40% independently predicted elevated IL-6 levels. In a dendrogram-based correlation analysis IL-6 clustered with leukocyte counts, C-reactive protein, procalcitonin, transferrin saturation and hepcidin and was distinct from other inflammatory biomarkers, including TNF-α-related markers. IL-6 independently predicted the primary outcome (HR [95%CI] per doubling: 1.16 [1.11-1.21], p<0.001), all-cause mortality (1.22 [1.16-1.29], p<0.001) and CV as well as non-CV mortality (1.16 [1.09-1.24], p<0.001; 1.31 [1.18-1.45], p<0.001), but did not improve discrimination in previously published risk models.
Conclusions: In a large, heterogeneous cohort of HF patients, elevated IL-6 levels were observed in iron deficiency, LVEF>40%, AF and poorer clinical outcomes. IL-6 was distinct from other inflammatory biomarkers, including TNF-α-related biomarkers. These findings support further exploration of IL-6 as a therapeutic target in HF.

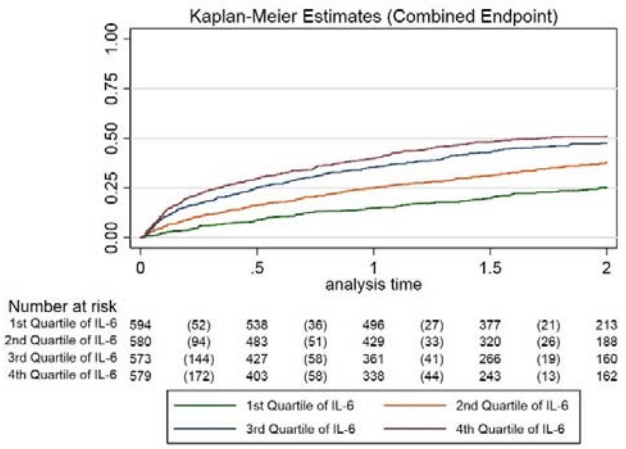

Figure 1. Kaplan-Meier Plot

P470
Liver stiffness assessed by fibrosis-4 index; noninvasive marker using serum biomarkers is associated with right ventricular function and cardiovascular prognosis in HFpEF

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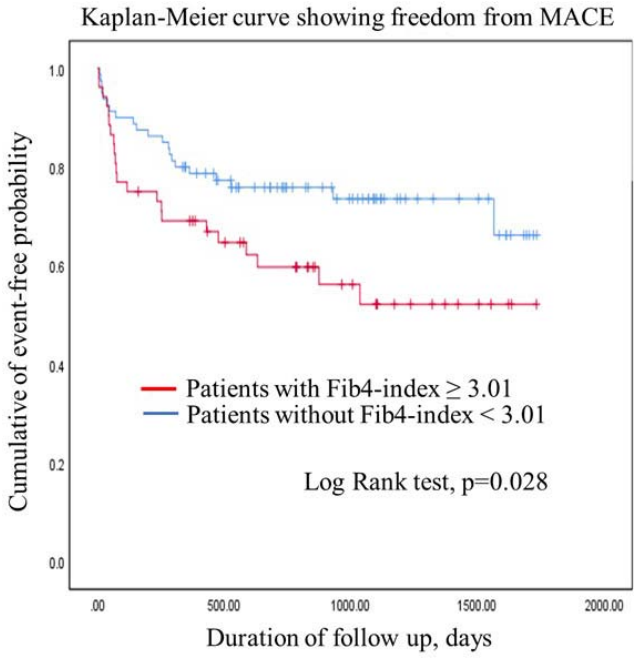
Background: Liver stiffness is reported to be associated with right atrial pressure and worse prognosis of heart failure. Fibrosis-4 (FIB4) index (age (years) × aspartate aminotransferase (IU/L) / platelet count (109/L) × square root of alanine aminotransferase (IU/L)) is known as a useful and simple marker for evaluating liver stiffness. However, the association between FIB4 index and prognosis in heart failure with preserved ejection fraction (HFpEF) was not elucidated.
Purpose: This study aimed to clarity the association between FIB4 index and right ventricular (RV) function and major adverse cardiac events (MACE) of HFpEF.
Method: From February 2012 to December 2015, 132 subjects diagnosed as HFpEF after hospitalization of acute decompensation were enrolled (79 years, 59 male). Subjects performed thoracic surgery or percutaneous coronary intervention within half a year and died before discharge were excluded. All subjects were measured FIB4 index and tricuspid annular plane systolic excursion (TAPSE) to assess RV function before discharge. In addition, patients were classified into two groups: high-(≥3.01, n=52) and low-FIB4 index groups(<3.01, n=80). MACE incidence during the follow-up period were compared between these groups.
Results: Patient with high-FIB4 index were older and higher level of blood pressure. There was no difference in prevalence rates of history of liver disease. In multivariate Linear regression analysis, FIB4 index was significantly association with TAPSE independently confounding factors. Kaplan-Meier analysis showed that patients with high-FIB4 index experienced more CV events during the 1734 days of follow-up (42.3% vs 26.2%, p=0.028) (figure).
Conclusions: FIB4 index is associated with RV dysfunction and a high risk of future CV event of HFpEF.



Kaplan-Meier curve freedom from MACE

P471
The trajectory of biomarkers in patients with acute heart failure and atrial fibrillation

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Background: Atrial fibrillation (AF) and/or atrial flutter (AFL) and heart failure (HF) frequently coexist. The clinical impact of AF/AFL has not been fully investigated in patients with acute HF (AHF), especially in relation to biomarker values.

Purpose: To characterize the trajectory of biomarkers among patients hospitalized for AHF with AF/AFL on admission.
Methods: The Acute Kidney Injury Neutrophil gelatinase-associated lipocalin (NGAL) Evaluation of Symptomatic heart fallure Study (AKINESIS) was a multicenter, prospective cohort study of AHF patients. We retrospectively analyzed the relationship between AF/AFL detected on admission electrocardiogram and relative changes in biomarkers during therapy. Brain natriuretic peptide (BNP), high sensitivity cardiac troponin I (hs-cTnI), urine and serum NGAL (uNGAL and sNGAL), and galectin 3 (Gal-3) were measured at admission, 4-hours, day 1, 2, 3 and discharge. Clinical outcomes were 60-day composite of death or HF hospitalization and death at 1 year.

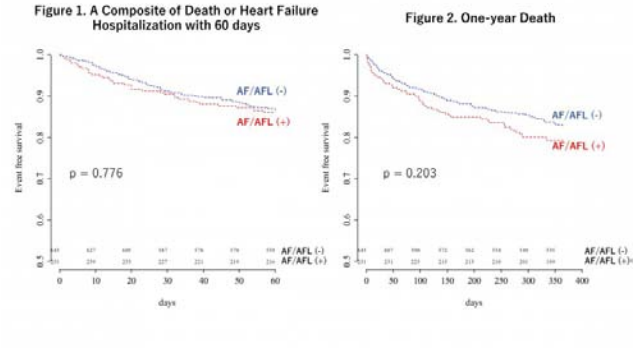

Figure
Results: Among 895 patients analyzed, 28% had AF/AFL. Patients with AF/AFL had smaller decreases in BNP and hs-cTnI during the first 3 days than those without AF/AFL. Levels of uNGAL trended higher in those with AF/AFL, while levels trended lower in those without AF/AFL. There was no association between AF/AFL and clinical outcomes (Figure). In multivariate Cox analysis, BNP and hs-cTnI were significantly associated with 60-day composite endpoint and BNP, hs-cTnI and Gal-3 were significantly associated with death at 1 year. AF/AFL did not predict these outcomes.
Conclusions: Presence of AF/AFL on admission for AHF was associated with unfavorable trajectories of BNP, hs-cTnI, and uNGAL; however, biomarkers, but not AF/AFL, were significantly associated with short- and long-term outcomes.

P472

Prediction of 30-day readmission for Heart Failure by N-terminal pro-brain natriuretic peptides. Results of IMPEDANCE-HF extended trial

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The aim of secondary analyses of the IMPEDANCE-HF extended trial was to find out if N-terminal pro-brain natriuretic peptides (NT-proBNP) on discharge for HF could predict 30-day readmission.
The analysis of IMPEDANCE-HF extended trial was based on the data collected during the index hospitalization for HF. The IMPEDANCE-HF extended trial was a randomized controlled single-blinded trial of HF with reduced LVEF patients. Inclusion criteria were LVEF ≤ 45%, NYHA class II-IV and patients were hospitalized for HF within 12 months (ClinicalTrials.gov NCT01315223). Half of the patients (N=145) were assigned to the active Lung Impedance (LI)-guided treatment arm where clinicians were based therapy on LI level. The other half was assigned to the control arm where LI values were recorded but not conveyed to the clinical treatment team. In the case of hospitalization, LI and NT-proBNP were recorded in all patients at discharge. The decisions regarding discharge and choice of treatment were at the discretion of the hospital staff .
Method. Values of NT-proBNP at discharge for HF hospitalization were divided according quartiles. Quartile 1: 800-3112, Quartile 2: 3113-5200, Quartile 3: 5201-7900, Quartile 4: > 7901 pg/ml.
Results: LI-guided patients were followed for 61.9.4±39.6 months and control patients for 46.7±33.3 months (p<0.01) accounting for 269 and 470 HF hospitalizations, respectively (p<0.01). Average NT-proBNP at discharge was 7351±5906 and 9060±7290 pg/ml in LI-guided and control groups, respectively (p<0.01). The distribution of study patients according to NT-proBNP level at discharge by quartiles was: 32%, 24%, 34%, 20% and 20%, 28%, 26%, 26%, in the LI-treated and control group, respectively (p<0.01). The probability to 30-day readmission calculated for both groups together according quartiles of NT-proBNP on discharge was: HR Quartile 2 to 1 = 1.7 [1.4 – 2.2, p <0.01], HR Quartile 3 to 1 = 2.5 [2.0 – 3.2, p <0.01], HR Quartile 4 to 1 = 4.1 [3.1 – 5.3, p <0.01].
Conclusion NT-proBNP at discharge for HF hospitalization is a reliable predictor for 30-day readmission.

P473

Catestatin serum levels are inversely associated with adverse structural and hemodynamic profile among patients with acutely decompensated heart failure: preliminary echocardiographic findings

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Funding Acknowledgements: Nothing to declare.

Background: Catestatin is a novel peptide with pleiotropic roles in the cardiovascular system that might have pathophysiological implications in terms of structure and function of the left ventricle (LV) among acutely decompensated heart failure (ADHF) patients.
Purpose: This study tested associations of serum catestatin levels with structural and functional echocardiographic parameters of LV (Table 1).
Methods: Thirty-five patients diagnosed with ADHF according to ESC 2016 HF criteria were consecutively enrolled during January-April of 2018. Each patient underwent physical and transthoracic echocardiography examination and antecubital venous blood sampling. Catestatin serum levels were determined by using an enzyme-linked immunosorbent assay (ELISA).
Results: Mean age of the analyzed sample was 68 ± 10.2 years and 54.3% were men. Catestatin serum levels were in negative and significant correlation with LVEDd (r=-0.445, p=0.009), LVESd (r=-0.450, p=0.010), LVEDV (r=-0.407, p=0.021), LVESV (r=-0.407, p=0.009) and LV mass (r=-0.376, p=0.031) while they positively correlated with FS (r=0.422, p=0.016) and EF (r=0.311, p=0.039) (Figure 1). Remaining echocardiographic LV parameters did not significantly correlate with catestatin.
Conclusions: Higher levels of circulating catestatin measured at admission of ADHF patients are significantly associated with more favorable structural remodeling and hemodynamic performance of the left ventricle.

Table 1. Baseline echo characteristics

VARIABLE	N (%) or mean ± SD
LVEF, %, biplane Simpson	35.8 ± 14.4
End-diastolic diameter, mm	61.9 ± 8.8
End-systolic diameter, mm	48.7 ± 11.8
IVSd, mm	11.1 ± 1.9
LVPWd, mm	10.9 ± 1.8
End-diastolic volume, mL	194.3 ± 63.9
End-systolic volume, mL	116.8 ± 64.4
Fractional shortening, %	22.3 ± 10.8
Stroke volume, mL	77.5 ± 30.7
LV cardiac output, L/min.	3.4 ± 1.6
LV mass, g	297 ± 101
LA diameter, mm	51.5 ± 8.5
Ascending aorta diameter, mm	35.6 ± 4.5

IVSd-interventricular septum thickness at end-diastole; LVEF-left ventricular ejection fraction; LWPWd-left ventricular posterior wall thickness at end-diastole

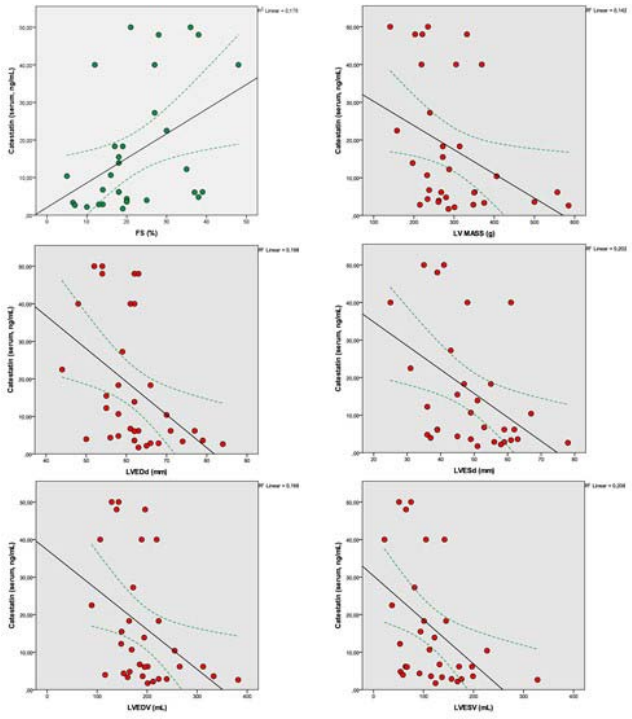

Figure 1. Catestatin and LV variables

P474

Acid-base balance disorders are markers of an increased overall mortality risk in patients with acute dyspnea

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On behalf of: on behalf of the GREAT network
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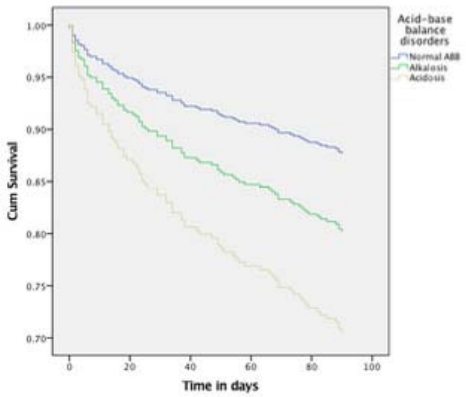
INTRODUCTION
The predictive role of an acid–base disbalance remains scarcely investigated in a broader population of acute dyspnea patients.
PURPOSE
To determine whether arterial blood gas test at the time of hospital admission can predict 1- and 3-month all-cause mortality of patients presenting with acute dyspnea due to different causes.
METHODS
Prospective multicenter observational cohort study enrolled 1457 dyspneic patients admitted with acute heart failure (AHF) and other diagnoses. Current analysis included 517 patients for whom arterial blood gas samples could be obtained. Patients were distributed into 3 groups: alkalosis group (pH > 7.45), a normal acid–base balance (normal ABB) group (7.35 pH 7.45) and an acidosis group (pH < 7.35). Chi-square test, logistic regression, Kaplan-Meier curves and Cox proportional hazard model were used to analyze survival differences in the groups. Multivariate analysis was adjusted to age, gender, history of chronic heart failure, coronary artery disease, diabetes mellitus, amount of C-reactive protein, anemia and eGFR < 60 ml/min/1.73m2.
RESULTS
In 517 patients of current analysis 57% were female, mean age was 69±13, mean pH value was 7.41±0.09, mean pCO2 38.4±13.0 mmHg, mean HCO3- 23.37±4.64 mmol/L, 59% were diagnosed with AHF. At admission, acidosis was found in 79 (15.3%), alkalosis in 121 (23.4%) and normal ABB in 317 (61.3%) patients. In-hospital mortality rates were: 12 (15.2%), 9 (7.4%) and 19 (6.0%) patients of the acidosis, alkalosis and normal ABB groups, respectively (p=0.02). Multivariate logistic regression showed that acidosis was associated with significantly increased in-hospital mortality risk with odds ratio 3.35 (95% confidence interval [CI]: 1.36 to 8.27, p=0.01). Meanwhile, mortality rates after 1 and 3 months were: 14 (17.7%) and 24 (30.4%) in acidosis; 15 (12.4%) and 27 (22.3%) in alkalosis; 26 (8.2%) and 46 (14.5%) patients in normal ABB group (p=0.04 and p<0.01, respectively). The presence of acidosis and alkalosis was associated with higher risk of 1- and 3-month mortality in univariate and multivariate analysis (Table 1).
CONCLUSIONS
Acid-base balance disorders at admission likely show more advanced disease stage in acute dyspnea patients. Alkalosis was associated with deteriorated survival, while acidosis was even worse increasing short-term all-cause mortality by three times.

Analysis for 1- and 3-month mortality

	Acidosis	Normal ABB	Alkalosis			
	HR (95% CI)	AHR (95% CI)	HR (95% CI)	AHR (95% CI)	HR (95% CI)	AHR (95% CI)
1-month mortality	2.34* (1.22-4.49)	2.79* (1.39-5.59)	1 (1-1)	1 (1-1)	1.55 (0.82-2.92)	1.58 (0.81-3.1)
3-month mortality	2.33* (1.42-3.82)	2.73* (1.61-4.62)	1 (1-1)	1 (1-1)	1.61 (0.99-2.59)	1.69* (1.02-2.79)

*p<0.05

Figure 1. Overall survival rates for patients presenting with acute dyspnea due to different causes according to acid-base disbalance.



P475

Postoperative high-sensitivity troponin T as a predictor of sudden cardiac arrest in patients undergoing valve surgery

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Introduction The usefulness of high-sensitivity Troponin T (hs-TnT) as a predictor of sudden cardiac arrest in patients undergoing valve surgery is currently unknown.
Methods A prospective study was conducted on a group of 815 consecutive patients with significant valvular heart disease that underwent elective valve surgery. The primary end-point was postoperative sudden cardiac arrest.
Results The postoperative sudden cardiac arrest occurred in 26 patients. At multivariate analysis hs-TnT measured immediately after surgery (hs-TnT I) and age remained independent predictors of the primary end-point.
The area under receiver operator characteristic curve for postoperative sudden cardiac arrest for hs-TnT I is 0.776 (95% CI 0.702–0.850)(Figure 1).
Conclusions Elevated postoperative hs-TnT was associated with a higher risk of postoperative sudden cardiac arrest.

Preoperative characteristics of patients	Values
Age, years*	64 ± 13
Chronic kidney disease (GFR < 60 mL/min/1,73 m^2), n (%)	250 (31%)
NYHA, (classes)*	2.5 ± 0.5
Postoperative characteristics of patients	Values
Hs-TnT I, ng/L*	925 ± 802
Hs-TnT II, ng/L*	1321 ± 1103
Main procedures:	
AVR, n (%)	411 (50%)
AVR + MVR, n (%)	61 (7.4%)
AVP, n (%)	30 (3.6%)
MVR, n (%)MVP, n (%)	162 (30)151 (18.5%)

Baseline characteristics of the study population.

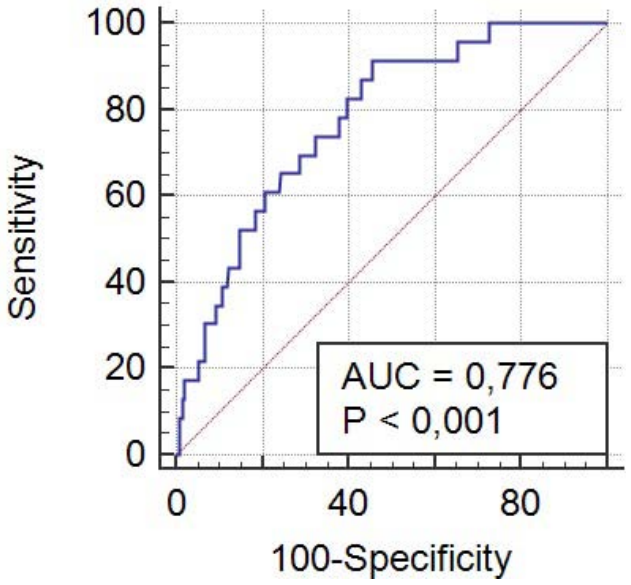

Figure 1.

P476

Endocan and resolvin-D1 association with ventricular dysfunction, lactic acidosis and prognostic scores in human acute heart failure

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Funding Acknowledgements: Funded by FCT/FEDER (COMPETE, Portugal 2020), PTDC/MEC-CAR/32188/2017

Introduction: Endothelial dysfunction contributes to the pathophysiology of heart failure (HF), being associated with adverse outcomes. Endocan has recently emerged as a novel biomarker of endothelial dysfunction but remains scarcely explored in HF. Resolvins (Rvs) are specialized proresolving mediators that actively contribute to the resolution of inflammation and tissue regeneration and appear to attenuate ventricular dysfunction after myocardial infarction and endothelial disruption. Nevertheless, their role in clinical settings of acute HF (AHF) has not been investigated.
Purpose: To evaluate serum endocan and RvD1, and to determine their correlation with each other and with ventricular dysfunction, lactic acidosis and prognostic scores in human AHF.
Methods: Patients with the diagnosis of AHF (n=11) and cardiogenic shock (CS) (n=9) were included and blood samples were collected at 3 time points: I - days 1-2 (admission), II - days 3-4 and III - days 5-7. Blood donors were used as controls (n=10). RvD1 and endocan were measured with ELISA kits. Ventricular dysfunction was assessed by echocardiogram and B-type natriuretic peptide (BNP) and lactic acid plasma concentration were evaluated using automated analyzers. Calculation of APACHE II and SAPS II scores were performed in all patients.
Results: Endocan (ng/mL) at admission was significantly increased in patients with AHF and CS when compared to control values (controls: 1.9±0.3; AHF: 8.8±3.7; CS: 20.0±3.8; controls vs AHF, p=0.036; controls vs CS, p<0.0001; AHF vs CS, p=ns). RvD1 (μg/mL) at admission was significantly higher in AHF than in CS although there were no significant differences compared to control values (controls: 1.8±0.3; AHF: 3.0±0.4; CS: 1.4±0.2; AHF vs CS, p=0.024; AHF or CS vs controls p=ns). Endocan and RvD1 values were not significantly different during hospitalization when comparing time points I, II and III. Within patients, we observed significant correlations between RvD1 and endocan (r=-0.38, p=0.009), RvD1 and lactic acid (r=-0.51, p=0.041), RvD1 and SAPS II (r=-0.50, p=0.029) and also between endocan and BNP (r=0.51, p=0.006) and endocan and lactic acid (r=0.55, p=0.024). Furthermore, when patients were stratified according to EF, endocan (ng/mL) significantly increased in line with the degree of EF impairment (preserved/mildly impaired:2.4±0.6; moderately impaired: 9.8±2.5; severely impaired:18.4±4.2; p=0.014, preserved/mildly impaired vs severely impaired).
Conclusions: Endocan is significantly associated with the deterioration of cardiac function and haemodynamics in human AHF. RvD1 appears to be exhausted or inactivated in worse clinical scenarios in the spectra of AHF and is probably a protective mediator, as inferred from its inverse correlations with endocan, lactic acidosis and SAPS II score.

P477

Thirty day and one-year risk stratification of Heart Failure Death According N-terminal pro-brain natriuretic peptide at discharge for Heart Failure hospitalization. Results of IMPEDANCE-HF extended t

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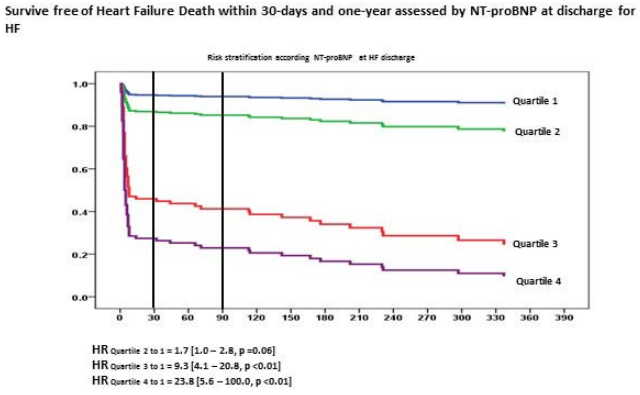
The aim of secondary analyses of the IMPEDANCE-HF extended trial was to find out if N-terminal pro-brain natriuretic peptide values (NT-proBNP) on discharge for HF could predict 30-day and one-year Heart Failure death.
The analysis of IMPEDANCE-HF extended trial was based on the data collected during the index hospitalization for HF. The IMPEDANCE-HF extended trial was a randomized controlled single-blinded trial of HF with reduced LVEF patients. Inclusion criteria were LVEF ≤ 45%, NYHA class II-IV and patients were hospitalized for HF within 12 months (ClinicalTrials.gov NCT01315223). Half of the patients (N=145) were assigned to the active Lung Impedance (LI)-guided treatment arm where clinicians were based therapy on LI level. The other half was assigned to the control arm where LI values were recorded but not conveyed to the clinical treatment team. In the case of hospitalization, LI and NT-proBNP were recorded in all patients at discharge. The decisions regarding discharge and choice of treatment were at the discretion of the hospital staff .
Method. Patient's NT-proBNP of both groups at discharge for HF were divided according quartiles. Quartile 1: 800-3112, Quartile 2: 3113-5200, Quartile 3: 5201-7900, Quartile 4: > 7901pg/ml.



Heart Failure associated death

Results: LI-guided patients were followed for 61.9.4±39.6 months and control patients for 46.7±33.3 months (p<0.01) accounting for 269 and 470 HF hospitalizations, respectively (p<0.01). Twenty-five (38%) and 57 (66%) HF-associated deaths

were recorded during follow-up (p<0.01) representing a mortality rate of 0.03 and 0.1 per patient×year follow up in the LI-guided and control group, respectively (p<0.01). Probability of HF death within 30-day and one year for both groups is presented on figure.
Conclusion The level of pre-discharge NT-proBNP is reliable predictor for 30-day and one-year HF death.

P478

Short-term prognostic role of galectin-3 in Vietnamese patients with acute heart failure

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Background: Galectin-3 as a biomarker has made its way to the ACC/AHA 2017 for prognosing patients with acute heart failure. In Vietnam, there hasn't been any study assessing this role of galectin-3.
Objectives: The aim of this study was to examine the role of plasma galectin-3 concentrations measured at time of admission in predicting 30-day all-cause mortality in patients with acute heart failure.
Methods: We performed an exploratory study including 113 patients diagnosed with acute heart failure. We measured galectin-3 in plasma at time of admission using a two-step immunoassay procedure . The primary endpoint was 30-day all-cause mortality.
Results: 32 patients (28,3%) died within 30 days. The median galectin-3 plasma concentration of patients with acute heart failure was 34.6 (27.35 – 44.1) ng/mL. Galectin-3 had an area under the ROC curve of 0.844 (95% CI, 0.763 – 0.925, p < 0.001) for predicting outcome with the best cut-off being 37.9 ng/mL (sensitivity: 81.3%, specificity: 70.4%). Patients with galectin-3 concentrations > 37.9 ng/mL had an OR = 10.3 (95% CI, 3.76 – 28.2, p < 0.001). This increased short-term risk remained statistically significant after adjustment for age, estimated glomerular filtration rate and BNP.
Conclusions: Galectin-3 had the ability to predict 30-day all-cause mortality with good discriminatory capacity.

P479

Coincidence or connection: cardiac sarcoidosis in a patient with multiple benign naevi on a background of suspected rare somatic mutation

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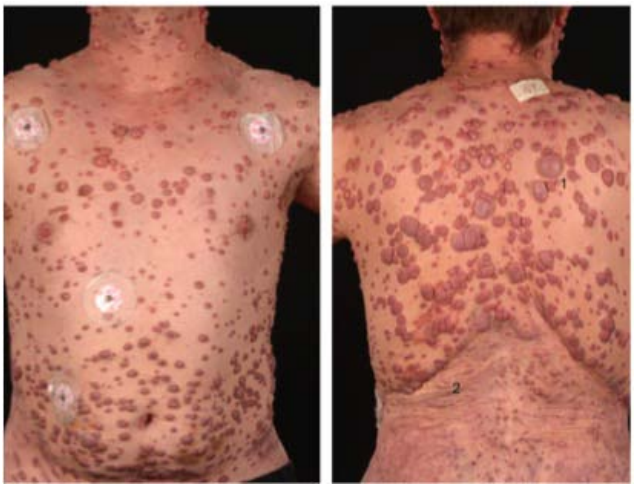
A 37-year-old male with a background of extensive skin lesions originally attributed to giant benign compound naevus and neurofibromatosis presented with a four month history of exertional breathlessness and palpitations. Echocardiography revealed impaired left ventricular systolic function (40-45%) and an akinetic apex with apical thrombus. Coronary angiography excluded any coronary obstruction and the cardiac MRI showed extensive late gadolinium enhancement (LGE) involving both ventricles. The patient was referred to our centre for exclusion of cardiac sarcoidosis.
FDG PET found diffuse patchy activity matching the cardiac MRI LGE pattern. The chest CT findings were compatible with pulmonary sarcoidosis but not pathognomonic. The differential diagnosis of the cardiac MRI and FDG PET appearances included cardiac sarcoidosis, although a cardiac lymphoma could not be excluded. A right ventricular septal biopsy revealed non-caseating granulomatous inflammation accompanied by an atypical eosinophilia. Integration of all the above findings led to a multidisciplinary diagnosis of cardiac sarcoidosis.In an attempt to unify the skin with the cardiac abnormalities the patient was reviewed by dermatologists experts in neurofibromatosis who supported the diagnosis of benign naevi on a background of somatic kinase mutation after repeating a skin biopsy.An ICD was inserted for primary prevention of sudden cardiac death and the patient was commenced on immunosuppressive induction treatment with IV methylprednisolone infusions.
This case illustrates the importance of investigating new onset heart failure with advanced imaging modalities to exclude inflammatory cardiomyopathic processes such as cardiac sarcoidosis. The differential diagnosis may be wide and a myocardial biopsy may be considered when extra-cardiac sarcoidosis cannot be confirmed. Recently significant clinical response of another patient with cutaneous sarcoidosis with the use of a JAK inhibitor highlighted the potential role for JAK-STAT signaling in cutaneous sarcoidosis, which could represent pathogenetic association between the skin and cardiac abnormalities in this patient's case.



Benign naevi and cardiac sarcoidosis

Acute Heart Failure - Epidemiology, Prognosis, Outcome

P480

Mortality predictors, in the first 24 hours, in patients admitted in Non-cardiac Intensive Care Unit with Cardiogenic Shock

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Introduction: Cardiogenic shock (CS) is a state of critical end-organ hypoperfusion due to primary cardiac dysfunction. Most epidemiological data for CS focus on patients with acute myocardial infarction managed in intensive care units (ICUs) of cardiology departments.
Objectives: Identify main predictors of mortality in a general ICU, in the first 24h of cardiogenic shock, and evaluate their impact in the outcome.
Methods: Retrospective analysis of patients (P) admitted in our ICU, with confirmed diagnosis of CS, within a period of 5 years (January 2012- December 2016). We analyzed common epidemiological variables, evolution during ICU stay, established therapeutics and outcome.
Results: 90 P were included. The mean age of the population was 69,59 ± 12,23 years, with a predominance of males (56,7%). Majority of P coming from the Emergency Room (45,6%) and 26,7% presenting cardiopulmonary arrest at admission. Admission SOFA of 10,39 ± 3,19. The main cause of CS (defined by clinical and echo evaluation) was non-ischemic (66,7%). In 27,8% of P the presence of mixed shock was verified. 68,9% needed mechanical invasive ventilation in the first 24h. Maximum PEEP of 8,22± 2,76 and median weaning of 3 days during ICU stay, respectively. PaO2/FiO2 ratio and lactactes at admission of 178,5 and 2,85, respectively. All the patients needed aminergic support. 34,4% needed renal replacement therapy.
At discharge, the patients presented median ICU stay of 5 days with SOFA, APACHE II and SAPS II of 7.6±5,06, 24,5 and 56,61 ± 19,71, respectively. Hospital mortality of 45,6%.
We found a statistically significant association between outcome and: admission SOFA (p=0,006), APACHE II (p<0,001), etiology (p=0,024) and variation (v) of lactates in the first 24h (p=0,027). We also point out that after applying a logistic regression, only APACHE II (OR: 1,12; IC95%: ,049-1,196) and v24h lactates (OR 0,811; IC95%: 0,672-0,979) had relevant prediction power.
Conclusion CS requires rapid diagnosis and appropriate therapy to have a positive influence on the outcome. In our study, we found that APACHE II and v24h lactates were the best predictors of mortality.

P481

Predictors of all-cause mortality in patients hospitalized for acute heart failure

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[1]Institute of Cellular Biology & Pathology Nicolae Simionescu, Bucharest, Romania; *[2]Colentina University Hospital, Bucharest, Romania*

Introduction: Heart failure is increasingly prevalent worldwide, especially among old persons. It is associated with high mortality rates and high costs.

Purpose: Our aim was to evaluate the predictors for mortality in a population of hospitalized patients with acute heart failure.
Methods: We performed a retrospective cohort study on 489 patients admitted in the Cardiology department over a 6-months period for heart failure with NT-proBNP more than 300 pg/m. Demographic, personal history, clinical, biological and imagistic data were collected from internal registry and archive documents. After a 4.5 years-following period, we retrieved all-cause mortality data. We excluded the patients deceased in the hospital. We analyzed our data using the Cox regressive model to assess the predictors of mortality.
Results: During the study period, almost 40% of heart failure patients deceased. NT-pro BNP at admission was twice higher in the deceased's group, compared to the survivors' group. The mean age of the deceased patients was 74.35(±10.07) years, being older than the survivors whose mean age was 70.05(±10.55) years. Each additional year of age was associated with a 3.1% increase of the mortality hazard. There was no difference in survival of the young group (under 65 years) and the young-old (65-74 years), while the old group (75-84 years) and oldest-old group (over 84 years) was associated with an increase in all-cause mortality about twice and three-times, respectively, in the univariate analysis. Also, this analysis identified resting dyspnoea, atrial fibrillation, pulmonary rales, ejection fraction, pulmonary artery pressure in systole, maximal LV/aortic gradient, end diastolic volume of left ventricle, aortic and tricuspid valve regurgitation and hemoglobin level under 11.82 mg/dl as predictors for mortality. In the multivariate analysis, each unit increase of the ejection fraction and maximal LV/aortic gradient was associated with a decrease in mortality of 3.3% and an increase in mortality of 2.2%, respectively. Also, resting dyspnoea was an independent predictor, associated with a 2.5-times increase in mortality when compared to dyspnoea on exertion. Nonetheless, the old age over 85-years was associated with more the 5-times increase in mortality.
Conclusion: We identified four independent predictors of mortality in a population of hospitalized patients with acute heart failure: ejection fraction, maximal LV/aortic gradient, resting dyspnoea and age over 85-years old. For the oldest-old group, age was the most important predictor.

P482

Seasonal variation in Takotsubo syndrome compared with myocardial infarction in Sweden: A report from the Swedish Angiography and Angioplasty Registry

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AIM: Acute myocardial infarction (MI) shows well-defined temporal patterns in occurrence throughout the year characterized by a peak in winter and a trough in summer. Takotsubo syndrome (TTS) is a potentially life-threatening acute cardiac syndrome with a clinical presentation very similar to myocardial infarction (MI) and for which the natural history, management, and outcome remain incompletely understood. This study aimed to evaluate whether the incidence of TS varies throughout the year in Sweden.
METHODS AND RESULTS: Using the nationwide Swedish Angiography and Angioplasty Registry (SCAAR) we identified almost all (n=153,400) patients who underwent coronary angiography due to TTS (N= 2,673 [1.7%]), STEMI (N= 42,744 [27.7%]) or UA/NSTEMI (N=108,688 [70.5%]) in Sweden between January 2009 and February 2018. Patients with TS were more often women as compared with patients with STEMI or UA/NSTEMI. We calculated the number of cases of TTS, STEMI, UA/NSTEMI per month and used Edwards test to evaluate whether the occurrence of events differs throughout the year. The onset of TTS differed as a function of the season (p<0.001), with the events most frequent in winter (n= 696, 26.1%) and least in spring (n=625, 23.4%). The incidence of STEMI and UA/NSTEMI also varied by season (both p<0.001), with highest events in winter [(STEMI, n= 21,489, 26.7%) (UA/NSTEMI, n= 57,696, 26.5%)] and lowest in summer [(STEMI, n= 18,536, 23.0%) (UA/NSTEMI, n= 50,535, 23.2%)].
CONCLUSIONS: In Sweden, the pattern of seasonal variation in TTS is similar to STEMI and UA/NSTEMI with peaks during winter. While the lowest incidence of TTS was during spring, the incidence of STEMI and UA/NSTEMI was lowest during summer.

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Five year outcomes, India

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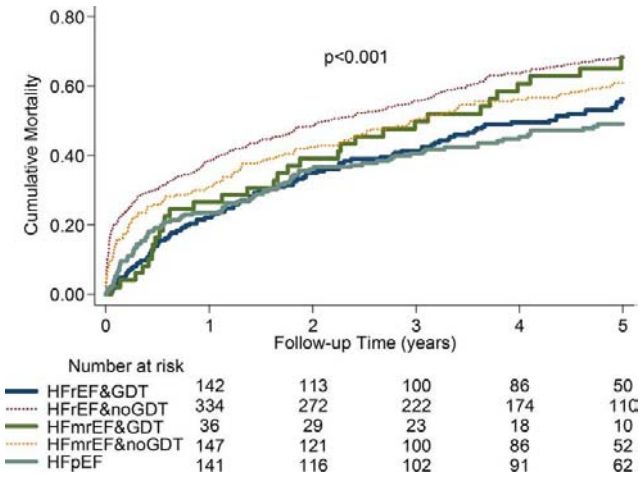
On behalf of: Trivandrum HF registry Investigtaors
Funding Acknowledgements: Indian Council of Medical Research - ICMR New Delhi

Introduction: Heart failure (HF) is emerging as an important cause of hospitalization in India, but long term longitudinal follow-up data are not available.
Objective: To evaluate the long-term outcomes of mortality and readmission rates in patients hospitalized for HF in India.
Methods: We enrolled consecutive admissions among patients with a diagnosis of HF defined by the European Society of Cardiology 2012 criteria from January to December 2013. We longitudinally followed-up these patients for five years and collected both hospitalisation and mortality data. "Guideline-directed therapy" (GDT) was defined as the combination of beta-blockers, angiotensin converting enzyme inhibitors or angiotensin receptor blockers, and aldosterone receptor blockers in patients with left ventricular systolic dysfunction.
Results: We collected data from 1,205 patients (69% males, mean [SD] age 61.2+13.7 years) during the study period. The most common etiology was ischemic heart disease (72%), followed by dilated cardiomyopathy (14%) and rheumatic heart disease (8%). More than half of the patients reported diabetes (52%) and hypertension (55%) at baseline. Smoking rate at baseline was 44%. One out of every six patients reported chronic kidney disease (stage III or greater). Heart failure with preserved ejection fraction (HFpEF: EF>45%) constituted 26% of the population.
Cumulative five-year mortality was 58.8% (n=709 deaths). Median survival time was 3.05 years and the overall mortality rate was 22.6 per 100 person years (95% CI: 21.0-24.3). Only one out of every six patients received GDT, which was associated with lower mortality and longer survival time (Figure 1). Sudden cardiac death (SCD) was the cause of death in 45.5% of the patients, while pump failure caused 49.4% of the deaths. The 5-year cumulative mortality rate among different types of HF were as follows: HFrEF=61.3%, HFmrEF=60.46% and HFpEF=46.84%.
The re-admission rate was 48.8%. The 5-year cumulative mortality rate in individual with no-readmission was 50.41%, while it was 69.22% in individual with >1 readmission.
CONCLUSIONS: Compared to previously published data from high-income settings, this younger cohort of HF patents from India report higher 5-year mortality rate. The uptake of GDT is very low and that leads to worse outcomes. Almost half of the patients experienced at least one re-admission over the 5-year follow-up period and they report higher mortality rate. Quality improvements programmes in evidence-based management may improve HF outcomes in this region.



GDT and Survival at 5 years follow-up

P485

Clinical presentation, practice patterns and in-hospital mortality: findings from the Kerala heart failure registry (KHFR) of 5789 patients.

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On behalf of: Kerala Heart Failure Registry
Funding Acknowledgements: Cardiological Society of India

Background: Heart failure is emerging as a major public health problem in India. However, limited data are available on its presentation, practice patterns, and mortality data.
Methods: Kerala Heart Failure registry (KFHR) recruited acute decompensated heart patients from 50 hospitals in Kerala. The data collection period ranged from Jan 2016 to June 2018. Consecutive patients who satisfied ESC 2016 criteria were recruited from all participating hospitals. Data were captured using structured study tool.
Results: In total, 5789 patients (mean age 64.5 years; SD=12.9, women 37%) were included in the analyses. More than two-third (65%) belonged to heart failure with reduced ejection fraction, while the proportions of patients in the mid-range and preserved ejection fraction were 19.2% and 15.6%, respectively. Diabetes and hypertension was prevalent in 61% and 50% of the study population, respectively. Similarly, smoking and alcohol use was prevalent in 14% and 6% of the study population, respectively. More than one of ten (11.5%) reported atrial fibrillation. Nearly one of six (17.8%) patients presented with anaemia. Pulmonary hypertension was prevalent in one-tenth (9.2%) of the population, while chronic obstructive pulmonary disease and renal failure was prevalent in 18.3% and 20.1%, respectively. Nearly one of 20 patients (5.7%) were presented with history of stroke. Ischemic heart disease was the predominant etiology in over two third of the population (63.5%), while dilated cardiomyopathy and rheumatic heart disease were cited as the etiological factor in 10.4% and 3.4% of the study population, respectively. More than one-tenth (13%) reported hypertensive heart disease. Guideline directed therapies such as beta-blockers, ACEI, ARBs, aldosterone antagonists, angiotensin receptor-neprilysin inhibitors were prescribed during admission in 57.1%, 26.7%, 18.9%, 43.1% and 3.3%, respectively. The corresponding prescription rate at discharge were 58.9%, 26.5%, 18.9%, 42.7% and 2.8%, respectively. Combination of ACEI/ARB and BB were prescribed in 31.8%, 26.7% of patients in HFrEF and HFmrEF respectively. In hospital devise treatment was given in 3.1% (45 ICDs and 41 CRTs) of the patients. Only nine patients were listed in the heart failure transplant register. The in hospital mortality rate was 6.4% in the study population (7.0%, 5.7% and 5.0% in HFrEF, HFmrEF and HFpEF, respectively).
Conclusion: The heart failure population in India is relatively younger and predominantly men. Ischemic heart disease is the predominant etiology in over two-third of the study population. Prescription rates of guideline directed therapies were less than optimal. In hospital mortality rate was relatively higher than data reported from high-income countries. Less than optimal prescription of guideline directed therapies in the KHFR calls for innovative quality improvement programmes in the management of heart failure.

P486

Prognostic impact of comorbidities on mortality and re-hospitalization in acute decompensated heart failure in real world clinical settings: Interim results from a multi-center longitudinal registry

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On behalf of: Indian College of Cardiology
Funding Acknowledgements: Indian College of Cardiology

Background: High burden of heart failure remains major public health issue in India. Acute Decompensated Heart Failure (ADHF), in particular, is the leading cause of mortality and morbidity; hence, identifying clinical and treatment related factors that predict them, can guide optimal management and resource utilization. The Indian College of Cardiology National Heart Failure Registry (ICCNHFR) was started in August 2018 with the aim to assess prognostic factors and overall management of ADHF patients in real world setting in India.
Methods: This interim analysis of this prospective longitudinal registry was planned to evaluate data from the initial 1230 patients who were enrolled at 19 centers across India and completed follow-up at 30 days. The primary objective was to study the impact of comorbidities on all-cause mortality and re-hospitalization. A logistic regression analysis was performed to identify predictors of in-hospital and 30 days post-discharge mortality, and re-hospitalization. The prognostic factors included in the model were age, gender, comorbid diabetes, hypertension, ischemic heart disease, chronic kidney disease, pulse rate, blood pressure, Echo left ventricular ejection fraction (LVEF), medications.
Results: Mean age of patients was 61.2±14.4 years and majority were men (64.58%). Diabetes (52.4%), hypertension (49.5%), ischemic heart disease (58.3%), and left ventricular ejection fraction (LVEF)<40% (70.6%) were the most prevalent risk factors. Of 1005 patients, 88 died during index hospitalization leading to mortality rate of 8.8%. Increasing age (odds ratio[OR]: 1.078, confidence interval [CI]: 1.015-1.145, p=0.0149), male gender (OR: 5.512, CI:1.102-27.56, p=0.0376), abnormal ECG (OR: 9.39, CI:1.165-75.67, p=0.0354), and LVEF <40% (OR: 0.305, CI: 0.104-0.896 , p=0.0308) were independently associated with in-hospital mortality. During post-discharge follow-up at 30 days, 49 patients died (5.3%) leading to cumulative mortality rate of 13.6%. LVEF <40% (OR: 0.178, CI: 0.053-0.6, p=0.0054). Treatment with diuretics was found to reduce the in-hospital (OR: 0.007, CI:<0.001-0.058, p= < .0001) and post-discharge (OR: 0.002, CI:<0.001-0.034, p= < .0001) mortality risk, whereas use of β-blockers and aspirin was associated with reduction of in-hospital mortality. No prognostic factor was found to correlate with re-hospitalization.
Conclusion: Several comorbidities are associated with mortality risk in hospitalized patients with ADHF. LVEF<40% was a common risk factor predicting both, in-hospital and post-discharge mortality risk. Continued follow up will further inform and enhance our understanding of management practices in the real-world setting. Our data may help identify potential predictors which could guide optimal management and direct appropriate resource utilization.

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Predictive factors for all cause mortality and readmissions at follow up for patients presented with acute decompensated heart failure.

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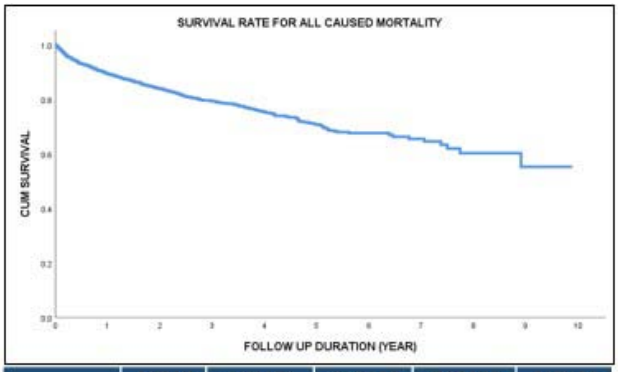
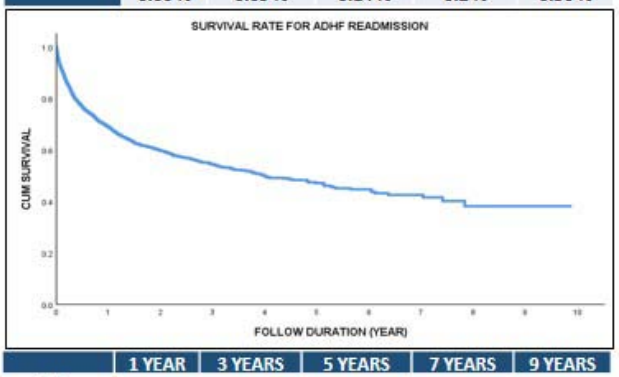
BACKGROUND: The prevalence of heart failure continues to rise in tandem with an aging population, advent of disease-modifying heart failure drugs and survival from cardiac events. Unfortunately heart failure related morbidity and mortality remains unacceptably high.
PURPOSE: Identify predictive factors that influence outcomes of mortality and ADHF readmission after first admission for acute decompensated heart failure (ADHF).
METHODS: An observational cohort study of 2965 patients admitted to National Heart Institute from 2009 to 2017 were followed up retrospectively till end points of all cause mortality and/or ADHF readmission were met. Data was analysed using descriptive, ROC curve and cox regression.
RESULTS: 17.6% patients died, 38.5% patients were readmitted for ADHF during median follow up of 1.7 [0.7, 3.3] years. Independent predictors for increased mortality were presence of Coronary artery disease (CAD) (adjusted hazards ratio [aHR] 1.42; 95% CI 1.02-1.63; p 0.001), Systolic blood pressure at discharge (SBP)≤100mmHg (aHR 1.29; CI 1.02-1.63; p 0.035), NTProBNP≥3000pg/ml (aHR 1.65; CI 1.31-2.06; p<0.001), Urea >7mmol/L (aHR 1.34; CI 1.1-1.65; p 0.004). Predictors for reduced mortality were SBP 121-139mmHg, (aHR 0.75; CI 0.58-0.97; p 0.026), SBP≥140mmHg (aHR 0.69; CI 0.50-0.95; p 0.024), intake of Angiotensin-Converting Enzyme inhibitor (ACEi) /Angiotensin II Receptor Blocker (ARB) + Beta Blockers (BB) (aHR 0.50; CI 0.32-0.78; p 0.003), ACEi/ARB + BB + Mineralocorticoid Receptor Antagonist (MRA) (aHR0.61; CI 0.41-0.9; p 0.013). As for ADHF readmission, independent predictors for increased risk were CAD (aHR 1.33; CI 1.13-1.55O; p<0.001), Diabetes Mellitus (DM) (aHR 1.25; CI 1.08-1.45; p 0.003), Uric Acid ≥460μmol/L (aHR 1.25; CI 1.09-1.43; p 0.002), Urea >7mmol/L (aHR 1.23; CI 1.07-1.42; p 0.004), heart failure reduced ejection fraction (HFrEF) <40% (aHR 1.36; CI 1.15-1.59; p<0.001). Independent predictors for reduced ADHF readmission were SBP 121-139mmHg (aHR 0.79; CI 0.67-0.94; p 0.006), SBP ≥140mmHg (aHR 0.74; CI 0.59-0.92; p 0.006), intake of BB (aHR 0.70; CI 0.52-0.95; p 0.023), ACEi/ARB+BB (aHR 0.68; CI 0.50-0.92; p 0.012), ACEi/ARB+BB+MRA (aHR 0.57; CI 0.43-0.75; p<0.001), BB+MRA (aHR 0.71; CI 0.52-0.97; p 0.029).
CONCLUSIONS: At median follow up of 1.7 years from hospital discharge for ADHF, background CAD and raised urea were consistent at increasing the risk of both mortality and ADHF readmission, whilst SBP≥121mmHg and medications (ACEi/ARB+BB or ACEi/ARB+BB+MRA) at discharge were consistent at reducing those risks. Low SBP at discharge and raised NTProBNP increased the risk of mortality but not for ADHF readmission, whereas DM, hyperuricaemia and presence of HFrEF increased the risk of readmission but not for mortality. Although BB alone was enough to confer benefit in reducing ADHF readmission, this benefit was further increased with each addition of disease-modifying heart failure medication.



	1 YEAR	3 YEARS	5 YEARS	7 YEARS	9 YEARS
(NO. AT RISK)	(1996)	(850)	(287)	(71)	(11)
SURVIVAL	89.3 ± 0.06 %	79.4 ± 0.09 %	70.7 ± 0.14 %	65.5 ± 0.2 %	55.2 ± 0.56 %



	1 YEAR	3 YEARS	5 YEARS	7 YEARS	9 YEARS
(NO. AT RISK)	(1509)	(571)	(186)	(45)	(8)
SURVIVAL	68.9 ± 0.09 %	54.4 ± 0.11 %	47.1 ± 0.14 %	41.5 ± 0.20 %	38.1 ± 0.30 %

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Patients with peripartum cardiomyopathy display a high incidence of subfertility and fertility treatments

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Background Over the past decades the use of assisted reproduction technology (ART) gradually increased worldwide. Pregnancies conceived by in vitro fertilisation (IVF) or intracytoplasmatic sperm injection (ICSI) have a higher risk for hypertensive complications, which in turn are a risk factor for peripartum cardiomyopathy (PPCM). PPCM is a devastating cardiomyopathy with acute or subacute heart failure and reduced ejection fraction in previously healthy women. Here we investigate the incidence and outcome of patients with reported reduced fertility (subfertility) with and without ART procedures in PPCM patients.
Methods and Results
Data were collected in n=108 PPCM patients in our outpatient clinic or by phone interview. Plasma levels of markers associated with infertility and preeclampsia were measured at diagnosis of PPCM (n=30), and in healthy postpartum matched controls (n=24), using Multiplex Immunoassays.
No history of subfertility was present in 70% (PPCM-f; n=76), whereas 30% (n=32) of the patients reported subfertility. Out of the subfertile PPCM patients 56% (n=18) received IVF/ICSI (PPCM-I), 34% (n=11) hormonal treatment and 9% (n=3) conceived naturally. The share of live births conceived by IVF/ICSI in the total number of live births of all interviewed PPCM patients was 12.1%, while it is 2.2% in the German total population (Federal Statistical Office of Germany, IVF registry).
Twin pregnancy (12/32 vs. 12/76; p=0.0213) and C-section rate (27/32 vs. 41/66; p=0.0347) were higher in subfertile PPCM patients, otherwise both groups had comparable clinical histories at diagnosis. In PPCM-I age (37±4 vs. 34±4; p=0.0160), twin pregnancy and C-section rate were significantly higher and gravidity as well as parity were significantly lower compared to PPCM-f. At PPCM diagnosis, plasma markers associated with impaired fertility and/or preeclampsia, i.e. PAI-1, VEGFA, IL-8, Endoglin were altered overall in subfertile PPCM patients compared to PPCM-f. At 12 months follow-up, LVEF was significantly higher in all subfertile PPCM patients (55±7% vs. 50±9%; p=0.0371) and also in the subgroup of PPCM-I (56±6% vs. 50±9%; p=0.0396) compared to PPCM-f.
Conclusion In the present PPCM collective one third of the patients had documented subfertility and the application of ART was high with more live births conceived by IVF/ICSI compared to the total population in Germany. The recovery rate of PPCM with reported subfertility is better compared to PPCM-f, which could be due to better clinical monitoring leading to earlier diagnosis and treatment. This holds also true for PPCM-I suggesting that IVF/ICSI may be a risk factor for PPCM but are not associated with adverse outcome in PPCM patients. The observed alterations in plasma markers may point to a specific pathophysiology in PPCM with subfertility. To examine whether ART procedures or subfertile conditions per se are risk factors for PPCM, more studies in this context are necessary.

P490

Beta-blockers do not reduce cardiovascular events in patients with CAD and an LVEF > 40%: A propensity-score matched analysis of patients hospitalized for acute heart failure

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On behalf of: GULF-CARE group

Background: The prognostic impact of beta-blockers (BB) in coronary artery disease (CAD) without heart failure (HF) is controversial, specially in the reperfusion-era. Moreover, it is not known whether patients with CAD and heart failure (HF) without left ventricular dysfunction might benefit from BB use
Purpose: We sought to assess the impact of BB on cardiovascular outcomes in patients with CAD and no LV dysfunction, hospitalized for acute HF.
Methods: The Gulf-CARE (Gulf aCute heArt failuRe rEgistry) is a prospective multicenter cohort of acute HF in the GULF Middle East.We studied in-hospital cardiovascular events in patients hospitalized for acute HF, with a previous history of CAD and a LVEF ≥40%, in relation to BB on admission; and one-year outcome in relation to BB on discharge, in the GULF-CARE, a prospective multi-center cohort of acute HF.
Results: From a total of 5005 patients included in the GULF-CARE registry,824 had a previous history of CAD and a LVEF ≥40%. 303 patients on BB were propensity-matched to 303 patients without BB. Mean age was 65 (11) and 53% were males. BB did not reduce in-hospital mortality (OR= 0.82; 95%CI [0.35-1.94]), stroke, and cardiogenic shock. On discharge, 306 patients on BB – including the ones newly diagnosed for myocardial infarction as a precipitating cause of HF- were propensity-scored matched with 306 patients without BB. Mortality (OR= 0.86; 95%CI [0.51-1.45], hospitalization for HF or PCI/CABG at 12 months were also were also not reduced by BB use at discharge. Further sensitivity analysis showed that BB treatment was not an independent predictor of in-hospital and 12-month mortality.
Conclusions: In this cohort of patients with acute HF, BB do not reduce in-hospital and one-year cardiovascular outcomes in patients with a previous history of CAD and a LVEF ≥40%.

P491

Left atrial size and the risk of long-term all-cause mortality in patients with atrial fibrillation and heart failure

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Aim: Many studies had reported that left atrial size was associated with atrial fibrillation (AF). And left atrial size might be a predictor of adverse events in patients with AF. This study aimed to determine whether left atrial size was associated with long-term risk of all-cause death in patients with AF and heart failure.

Methods: Patients admitted with atrial fibrillation and heart failure in emergency room(ER) were included and followed up. The anteroposterior diameter of the left atrium was used to represent the size of the left atrium, which measured by using transthoracic echocardiography at ER. Univariate and multivariate Cox regression analysis was performed to explore the association between the anteroposterior diameter of the left atrium and the risk of all-cause death.

Results: Total 632 patients (48.6% female) were included in this study. The median and interquartile range of the anteroposterior diameter of the left atrium and age was 4.8(4.2-5.4) centimeter,63.0(55.0-72.0) years, respectively. During follow-up for 3.17(1.57-3.96) years, 202 patients (32.0%) died. In univariate analysis, an increased left atrial anteroposterior diameter (per 1 cm) was significantly associated with elevated risk of all-cause death (hazard ratio 1.170, 95% CI 1.038-1.319).After adjusted for age, sex, admission systole blood pressure, admission heart rate, serum creatinine at admission, history of diseases(acute coronary syndrome, revascularization, myocardiopathy, chronic obstructive pulmonary disease, valvular disease, rheumatic heart disease, valvular surgery, chronic kidney diseases, hypertension, diabetes, stroke, peripheral vascular disease, major bleeding, gout),medications(diuretics, beta blockers, angiotensin converting enzyme inhibitors or angiotensin receptor inhibitors, spironolactone, digoxin, anticoagulants),CHA2DS2-VAS score, the anteroposterior diameter of left atrium was still significantly associated with all-cause death(hazard ratio 1.267, 95% CI 1.1-1.459).

Conclusion: Patients with AF and heart failure were at high risk of all-cause mortality, and the risk increased with the enlargement of the anteroposterior diameter of left atrium.

P492

Regional differences in the incidence and outcome of acute ischemic heart failure after ST-elevation myocardial infarction in Sweden

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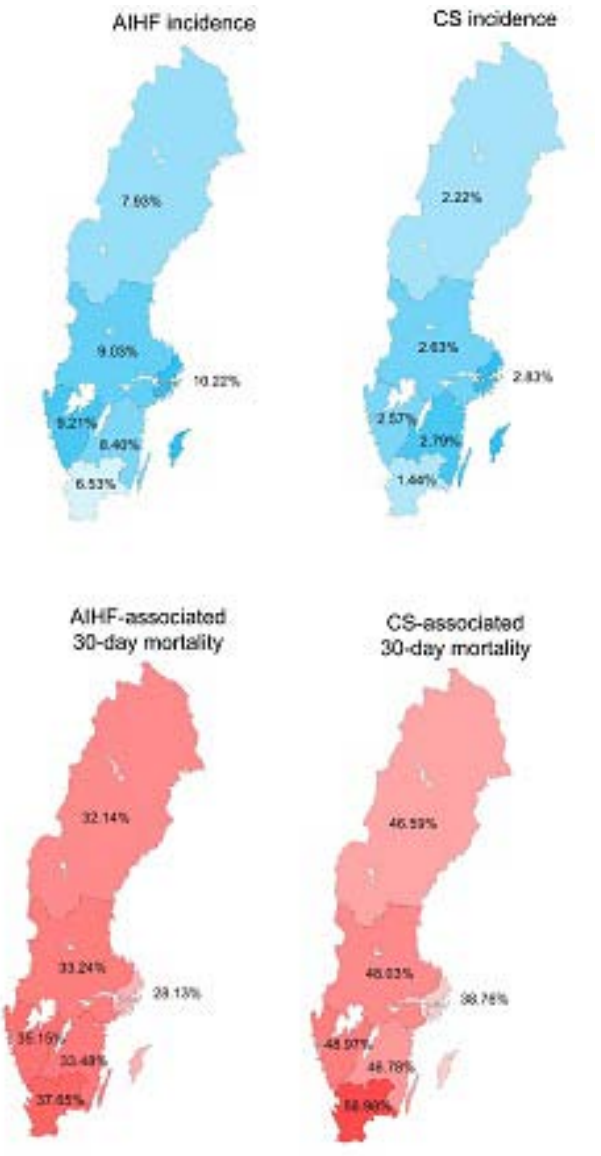
Background: Acute ischemic heart failure (AIHF) is the most common cause of death for patients with ST-elevation myocardial infarction (STEMI). The risk of AIHF in STEMI has been linked to factors such as choice of reperfusion strategy and time to reperfusion, and other patient-related factors that could theoretically differ between rural versus urban areas.

Purpose:We assessed whether the incidence and prognostic impact of AIHF in STEMI differ across the different health care regions in Sweden.

Methods: Using the nationwide Swedish Angiography and Angioplasty Registry (SCAAR) we identified patients who underwent primary PCI due to STEMI in Sweden between January 2010 and April 2018. Patients were grouped according to which of the six the health care region they were treated in. We defined IAHF as Killip class ≥2 and cardiogenic shock (CS), the most severe form of AIHF, as Killip class 4. The primary endpoint was mortality at 30 days.

Results: We identified 40,701 patients who underwent primary PCI during the study period with known vital status at 30 days, for whom Killip class was reported for 40,365 (99.2%). The highest number of patients were treated in the Western region (N=10,741 [26.6%]), followed by South (7,905 [19.6%]), Stockholm (6,505 [16.1%]), Northern (5,991 [14.8%]), Uppsala-Örebro (5,713 [14.2%]) and South-East (3,510 [19.6%). AIHF and CS incidences were highest in Stockholm and lowest in the South, whereas prognosis for patients with AIHF and CS was most favorable in Stockholm and least favorable in the South (Figure).

Conclusions: The incidence and prognosis of AIHF among patients with STEMI vary across health care region, with the lowest incidence and worst prognosis in the South and the highest incidence and best prognosis in Stockholm. These findings could be explained by less severely compromised patients being diagnosed with AIHF in Stockholm compared to the South.



P493

Comparing predictive factors for mortality between elderly and non elderly patients after an event of acute decompensated heart failure.

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BACKGROUND: The burden of heart failure (HF) continues to rise globally with increasing average life expectancy and improvement in cardiac event survival due to novel interventions. It is a common preconception that elderly patients fare worse when they have HF and most studies on HF focused on this group.

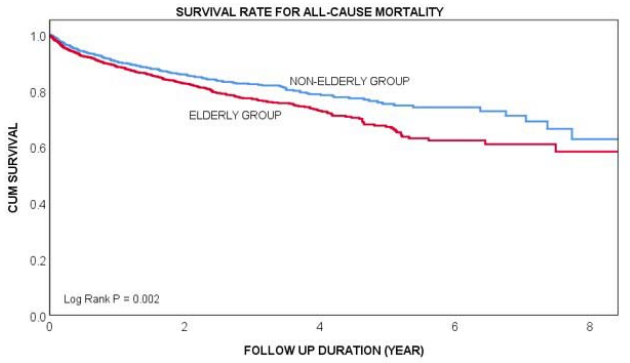
PURPOSE: To evaluate demographic differences and predictive factors which influenced the all-cause mortality between the elderly (EL≥6o years) and non-elderly (NEL<60 years) patients after admission for acute decompensated heart failure (ADHF).

METHODS: An observational study of 2965 patients admitted from 2009 to 2017 were followed up retrospectively till endpoint of mortality was met. Data was analyzed using descriptive, ROC curve, cross tabulation and Cox regression analysis.

RESULTS: Total of 17.6% of deaths were recorded during the median follow up of 1.7 [0.7,3.3] years. Majority were from the EL group (64%). The EL had more coronary artery disease (CAD) (46.4 vs 24.2% p<0.001), renal insufficiency (19.3 vs

8.2%, p<0.001), atrial fibrillation (14.1 vs 6.8%, p<0.001), diabetes (40 vs 22.7%, p<0.001), hypertension (48.3 vs 24.5%, p<0.001), dyslipidaemia (26.8 vs 15%, p<0.001), chronic obstructive pulmonary disease (6.3 vs 3%, p0.001). Interestingly, EL had more non-smokers (65.8 vs 34.2%, p<0.001). Amongst the EL, independent predictors which increased the mortality risk were CAD (adjusted hazard ratio [aHR] 1.44; 95% CI 1.05-1.99; p0.024), estimated glomerular filtration rate [eGFR (ml/min/1.73m^2)] 30-59 (aHR 1.80; CI 1.02-3.19; p0.04), eGFR <30 (aHR 2.54; CI 1.38-4.66; p0.003), ejection fraction (EF) < 40% (aHR 1.44; CI 1.10-1.89; p0.007). Predictors which reduced this risk were systolic blood pressure at discharge [SBP(mmHg)] 121-139 (aHR 0.72; CI 0.53-0.98; p0.037), SBP≥140 (aHR0.612; CI 0.42-0.90; p0.013). Angiotensin Converting Enzyme inhibitor (ACEi)/Angiotensin II Receptor Blocker (ARB) + beta blockers (BB) were the only drug combination to reduce mortality risk (aHR0.53, CI0.33-0.84; p0.007) in the univariate analysis. This was however not significant in the multivariate analysis. In the NEL group, independent predictors that increased mortality risk were SBP≤100 (aHR 1.49; CI 1.07-2.08; p0.018, heart rate at discharge [HR(bpm)] ≥100 (aHR 1.98; CI 1.14-3.44; p0.016), NTProBNP(pg/ml) ≥3000 (aHR 1.74; CI 1.23-2.46; p0.002), Urea(mmol/L) >7 (aHR 1.56; CI 1.15-2.10; p0.004). The risks were non-independently reduced by BB (aHR 0.36, CI 0.15-0.84; p0.02) and ACEi/ARB + BB (aHR 0.4; CI 0.17-0.91; p0.029) but not seen in multivariate analysis.

CONCLUSIONS: EL and NEL patients with ADHF are not identical. At median follow up of 1.7years from hospital discharge for ADHF, EL patients had more comorbidities and mortalities. Although predictive factors that influenced mortality risk were heterogenous between these 2 groups, SBP at discharge played a major role in both groups at discriminating mortality risks after discharge for ADHF.



	1 YEAR (NO. AT RISK) SURVIVAL	2 YEARS (NO. AT RISK) SURVIVAL	4 YEARS (NO. AT RISK) SURVIVAL	6 YEARS (NO. AT RISK) SURVIVAL	8 YEARS (NO. AT RISK) SURVIVAL
NON-ELDERLY	(824) 90.4 ± 0.09 %	(561) 85.8 ± 0.11 %	(235) 78.4 ± 0.16 %	(76) 74.1 ± 0.21 %	(12) 62.7 ± 0.54 %
ELDERLY	(1172) 88.5 ± 0.08 %	(758) 82.6 ± 0.10 %	(265) 72.9 ± 0.15 %	(61) 62.3 ± 0.24 %	(15) 58.3 ± 0.37 %

*Survival rate was presented as survival ± S.E

P494

Hyponatremia in acute heart failure

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Background: Hyponatremia is a common electrolyte abnormally in acute heart failure (HF), being associated with worst prognosis.

Purpose: Evaluate the impact of hyponatremia in the prediction of clinical gravity (Killip III and IV) at admission and the outcome in acute HF patients.

Methods: Single-centre retrospective study, engaging patients hospitalized for acute HF between 1/01/2008-31/12/2017. Demographic, clinical and blood work data at admission were collected. Hyponatremia was defined as serum sodium level of less than 135 mEq/L. T-student, U Mann-Whitney, Qui square test and Spearman's rank correlation coefficient were used to compare categorical and continuous variables. Logistic regression was performed to assess mortality rates based on the serum sodium levels.

Results: 423 patients were included, mean age 67.81±12.16 years, with 29.8% females, presenting a in-hospital mortality rate of 5.9%. Patients with hyponatremia (27.19%) were similar regarding gender, age, cardiovascular history and mortality rates compared to patients without hyponatremia. On the other hand, hyponatremia patients had higher levels of blood urea nitrogen (67.00±68 vs 54±36, p<0.001) (r= 0.097, p=0.049), creatinine (1.36±0.74 vs 1.15±0.51, p<0.001) (r= -0.239, p0.001) and B-type Natriuretic peptide (1850±2712 vs 1337±3574, p<0.001) (r= -0.216, p0.001) at admission. Also, at admission more patients presented with Killip IV (37.7 vs 18.8%) on the hyponatremia group, with an odds ratio 1.008, p=0.004 (confidence interval 1.002-1.013). Logistic regression revealed that hyponatremia was not a predictor of in-hospital, 6-months and 1-year mortality, as well of hospital readmission in the same period.

Conclusions: Hyponatremia was associated with higher Killip class at admission, however, without a direct mortality impact. Hyponatremia was weakly correlated with low hemoglobin values, and higher blood urea nitrogen, creatinine and B-type Natriuretic peptide levels.

P495

BAUN score, a predictive model of in-hospital mortality in acute heart failure

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Introduction Patients hospitalized due to heart failure (HF) compose a heterogeneous population whose prognosis and in-hospital mortality (IHM) are difficult to forecast. The purpose of this study was to create a simple model capable of accurately predicting IHM in these individuals.

Methods A retrospective analysis of 1052 patients admitted to a Cardiology ward due to decompensated HF was performed. 141 patients were excluded due to data omission. The variables systolic blood pressure (SBP), urea, brain natriuretic peptide (BNP) and sodium at admission were selected for score inclusion. The Mann-Whitney U and T-test were used for mean comparison between groups. Subgroups were created for each variable. For each subgroup, an odds ratio (OR) for the risk of IHM was calculated, and a numerical value proportional to the OR was subsequently attributed. The reference values for BNP, urea and sodium in healthy individuals were classified with 0 points, as well as an SBP>140 mmHg. A score (BAUN) was created, ranging from 0-28 points, corresponding to the sum of the classification attributed to each variable. A ROC curve analysis was then performed to evaluate the predictive value of the score for IHM.

Results Mean patient age was 77 (±10) years; 51% were men. Mean LVEF was 49% (±16,4). A LVEF<40% was present in 31% of patients. IHM was 6.5%. A statistically significant association between IHM and the variables SBP and sodium was found on T-test (p<0.001). The same was verified for BNP and urea in the Mann-Whitney U test (p<0.001). Pearson correlation test did not reveal significant correlation between variables; thus, an independent variation between them was assumed. ROC curve analysis revealed an AUC of 0.752 (p<0.001). The cut-off point with the most sensitivity (S) and specificity (E) obtained using the Youden index (IY=0.3626) was 4 (S≈92% e E≈45%). The analysis of mortality by score interval revealed an IHM of 1.3%, 7.5%, 17.6% e 35%, respectively, for the intervals <5, 5-15, 16-22, >22. A BAUN score>22 predicts death in 1 out of 3 patients hospitalized due to HF. A score <5 predicts a very low risk of IHM (≈1%).

Conclusion The BAUN score is a good predictive model of IHM in patients hospitalized due to HF. It is also objective and easy to apply. Its use may help to identify patients with a very high risk of IHM in need of specialized care, and those patients with very low risk of death, who might be candidates for early discharge.

P496

Incidence and prognostic value of residual pulmonary congestion by clinical data and lung ultrasound in decompensated heart failure

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Introduction: Recently lung ultrasound (LUS) based on B-lines measurement has been proposed as an effective tool for assessment of pulmonary congestion (PC) in patients with decompensated heart failure (DHF). The aim of this study was to assess the incidence and prognostic significance of residual PC by clinical data and LUS in DHF patients.

Material and methods: Routine clinical assessment and eight-zone LUS were performed in 162 patients with DHF (men 66%, age 69±12 years (M±SD), AH 97%, history of MI 44%, AF 60%, EF 40 (30;50)%, EF<40% 46%, baseline NT-proBNP 4246 (1741;6837) pg/ml) on admission and at the day of discharge. Sum of B-lines <5 was considered as normal, 6-15, 16-30 and >30 – as mild, moderate and severe PC, respectively. Presence of at least one clinical sign or sum of B-lines >5 at discharge were considered as residual PC. Mann-Whitney, McNemar and Wilcoxon tests, multivariable Cox regression analysis were performed. P<0.05 was considered significant.

Results: Using LUS on admission PC diagnosed in all patients (moderate and severe in 31 and 68%, respectively). During hospitalization the median of B-lines sum decreased from 35 (28;53) to 6 (3;12) (relative -82 (-90;-67)%), p<0.001. At discharge normal LUS profile was observed in 48% of patients, 52% patients sill

had PC (mild, moderate and severe PC in 33, 15 and 4% cases). Patients with vs without residual PC by LUS had higher median of B-lines sum on admission 43 (28;57) vs 35 (27;48), p=0.002) and at discharge (12 (8;21) vs 3 (3;4), p<0.001), lower relative B-lines (-69 (-80;-48) vs -91 (-94;-85)%, p<0.001), and surprisingly were characterized by lower incidence of dyspnea at exertion at discharge (29.8 vs 46.1% p=0.031).
Incidence of PC by clinical data decreased: orthopnoea from 78 to 15%, dyspnea at rest from 33 to 0%, dyspnea at exertion from 100 to 38%, bilateral pulmonary rales from 87 to 11%, p<0.05 for all. 46.3% of patients with at least one clinical sign of PC at discharge did not differ by B-lines sum neither on admission nor at discharge.
Residual PC was diagnosed in 76.5% of patients (only by clinical data in 32.3%, only by LUS in 39.5%, by both in 28.2% of patients).
Only residual PC revealed by LUS was characterized by negative prognosis. Sum of B-lines >5 was associated with higher probability of 12-month all-cause death (HR 4.30, CI 1.71-10.78, p=0.002). Sum of B-lines >15 – with higher probability of 12-month all-cause death (HR 2.99, CI 1.32-6.79, p=0.009) and HF readmission (HR 2.65, CI 1.45-4.85, p=0.002) after adjustment by age, gender, EF and clinical PC at discharge.
Conclusion: Residual PC by clinical data or LUS was revealed in 76.5% patients, in 39.5% of them only by LUS. Presence of at least one clinical sign of PC had no impact on outcomes. Sum of B-lines >5 at discharge was independently associated with higher risk of 12-month death, >15 – with higher risk of 12-month death and HF readmission.

P497
Impact of functional mitral regurgitation at discharge upon survival in patients with acute decompensated HFpEF, HFmrEF and HFrEF

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Background: The relationship between the severity of functional mitral regurgitation (FMR) at discharge, left ventricular ejection fraction (LVEF), and outcomes in acute decompensated heart failure (HF) patients remains not fully understood. The aim of this study was to assess the impact of FMR at discharge upon survival in patients with acute decompensated HF with preserved, mid-range and reduced EF (HFpEF, HFmrEF, HFrEF, respectively).
Methods: We retrospectively analysed 1485 patients (mean age: 74 years, 60% were men) admitted with an episode of de novo, acute decompensated HF in a tertiary HF centre between February 2010 and March 2018. Mean follow-up time was 1045 ± 702 days. Based upon LVEF at time of the index hospitalization, 37%, 19% and 45% of patients were classified as HFpEF, HFmrEF and HFrEF respectively. FMR was assessed at time of discharge and graded as none/mild (grade 0, 0.5 and 1), moderate (grade 2) or severe (grade 3 and 4). Moderate or severe FMR was present in 41% of patients. The primary focus of this study was to determine the survival probability of the HF patients, according to the severity of FMR.
Results: HFpEF patients showed higher all-cause mortality as compared to HFmrEF and HFrEF patients (42%, 38% and 35% respectively; p = 0.034). Among all HF patients, the presence of severe FMR was associated with higher all-cause mortality as compared to moderate and mild FMR (44%, 42% and 35% respectively; p = 0.027). However, interestingly, the association between severity of FMR and outcome was only seen in HFrEF (see figure), not in HFpEF and HFmrEF (p < 0.001). HFrEF patients with moderate/severe FMR showed higher mortality as compared to those with none/mild FMR (p < 0.001).
Conclusion: According to our findings, it seems that although FMR is prevalent at time of discharge in all HF patients, it only bears prognostic information in HFrEF patients. Therefore, HFrEF patients with severe FMR despite optimal medical therapy, should be followed intensively in the HF clinic.

Overall survival of HFrEF patients ~ FMR

Coronary Artery Disease

P498
The antiplatelet therapy and pro-inflammatory cytokines with stable coronary artery disease: is there any connection?

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The connection between cytokine inflammation and atherothrombosis suggests evaluability of the antiplatelet effect by values of pro-inflammatory interleukins, notably IL-1β and IL-6.
Purpose. The goal is to study the connection between the antiplatelet effect and cytokine inflammation with stable CAD.
Methods. The evaluation of thrombocyte aggregation against mono- and dual antiplatelet therapy was carried out in 147 patients with stable clinical progression of CAD, of whom 121 patients received aspirin mono-therapy, while 26 patients received clopidogrel/aspirin therapy. The
platelet aggregation was assessed by a spontaneous and adenosine diphosphate (ADP) - induced aggregometry. IL-1β and IL-6 concentration was determined by a solid-phase enzyme immunoassay.
Results. The stable progression of CAD is characterized by the absence of activation of cytokine inflammation (in IL-1β and IL-6 levels) in 73% of patients. Subclinical inflammation was seen in 23% of patients during both mono- and dual antiplatelet therapy, which was reflected by higher-than-normal values of predominantly IL-6 (12% vs. 1%). Evaluation of the connection between the cytokine activity and the spontaneous and ADP-induced platelet aggregation in patients undergoing coronary revascularization showed insufficient anti-inflammatory effect of aspirin mono-therapy vs. the combined effect of aspirin and clopidogrel, which was expressed by higher levels of pro-inflammatory interleukins IL-1β and IL-6 (χ2=4.01, p=0.04). At the same time, spontaneous platelet aggregation activity was observed during mono or double antiplatelet therapy, mainly in stented patients (23%) vs. shunting patients (7%), and correlated with higher-than-normal values of pro-inflammatory interleukins.
Conclusion. The efficacy of antiplatelet therapy correlates with low ADP-induced platelet activity and cytokine inflammation. Persistence of high spontaneous platelet aggregation during antiplatelet therapy, mainly in stented patients, against the higher-than-normal values of pro-inflammatory interleukins indicates subclinical inflammation and thrombogenic risk retention.

P499
The prevalence of heart failure after acute coronary syndrome in patients with nonobstructive coronary atherosclerosis

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The aim of the study was to evaluate the frequency of heart failure during 1 year after acute coronary syndrome in patients with nonobstructive coronary atherosclerosis.
Material and methods: This non-randomized open controlled investigation (NCT02655718). The study included data of patients admitted at the Emergency Department of Cardiology due to ACS in 2015-2016. Inclusion criteria was nonobstructive coronary atherosclerosis (normal coronary arteries / plaques <50%), confirmed by invasive coronary angiography, age ≥ 18 years at the time of randomization. The exclusion criterion was previous revascularization of the coronary arteries. Forty two patients were underwent cardiac MRI.
Primary outcomes were hospital mortality, incidence of recurrent ischemia, stroke, and as final diagnosis acute myocardial infarction, unstable angina, Takotsubo syndrome, and myocarditis. Secondary outcomes were death, reccurent myocardial infarction, stroke, the development of heart failure during 1 year after presence of acute coronary syndrome. During 1 year after discharge visit was hold for assessment secondary outcomes. Descriptive statistics was used for analysis of data.
Results: Among 913 people who were hospitalized with acute coronary syndrome at the Emergency Department of Cardiology in 2015 - 2016, 4.8% (44) patients had nonobstructive coronary atherosclerosis confirmed by coronary angiography. One patient died. Forty two patients were underwent cardiac MRI. One year mortality was 2(5%). In 24 (55%) cases were diagnosed acute myocardial infarction, in 6(14%) - unstable angina, and 10(23%) cases had pseudo-coronary scenario of myocarditis, in 4(9%) cases was other causes of ACS, such as: ongenital heart disease - 1(25%), WPW-syndrom-1(25%), acute aortic dissection-1(25%), posttraumatic cardiosclerosis-1(25%).
During 1 year after discharge 17 (39%) cases of re-hospitalization was due to cardiac causes in 11(65%) such as: unstable angina- 4 (36%), recurrent myocardial infarction in 1 (9%), arterial hypertension-1(9%), cardiac arrhythmias - 4(36%),

planned hospitalization after surgical treatment of acute aortic dissection -1 (9%); noncardiac causes had 6 (35%) patients. The development of heart failure was observed on a half patients, 23(52%): NYHA I- 10(43%), II-3 (13%), III-8 (35%), NYHA IV-2(9%).
Conclusion: The proportion of patients with nonobstructive coronary atherosclerosis was 4.8% (44) in 2015-2016. Heart failure in patients with nonobstructive atherosclerosis in 1 year after acute coronary syndrome occurred on a half of the patients.

P500
Impact of different reperfusion strategies in primary myocardial infarction on microvascular obstruction and intramyocardial haemorrhage

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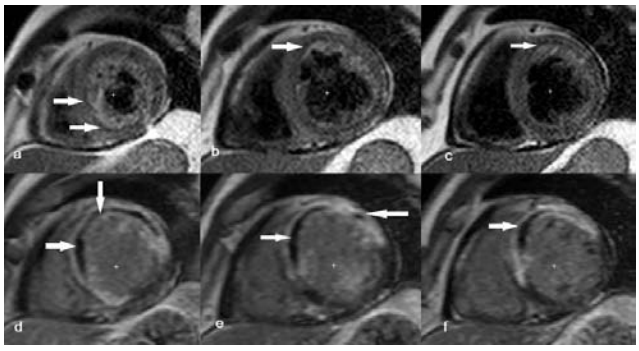
Background: Wide adoption of reperfusion strategies has led to decrease in mortality but remains still unresolved why postinfarction heart failure does progress unequally in various groups. There is suggestion the reperfusion therapy leads to ischemia-reperfusion injury and worsening of myocardial microcirculation. Intramyocardial haemorrhage (IMH) and microvascular obstruction (MVO) or no-reflow phenomenon represent components of reperfusion injury. Nowadays, contrast CMR is the optimal diagnostic technique to image and quantify these phenomena. Prevalence of IMH in patients with STEMI in primary PCI is as high as 40-50% and of MVO is 50-60%. There's not enough data on quota of these phenomena in patients who are treated with pharmacoinvasive strategies.
Purpose: To evaluate the prevalence of IMH and MVO with different reperfusion strategies in patients with primary STEMI.
Materials and methods: The study included 47 patients with primary STEMI in the first 12 hours of symptom onset. Exclusion criteria: pulmonary edema, cardiogenic shock, creatinine clearance <30 mL/min or dialysis, severe comorbidity, acute psychotic disorders and unability to undergo or contra-indications for CMR. According to the strategy of reperfusion, patients were divided into 2 groups at the admission. Patients of the 1st one (n=30) have been treated with pharmacoinvasive strategy. Fibrinolysis was performed in all patients at the pre-hospital stage. The 2nd group (n=17) was treated with primary PCI. CMR imaging was performed at 2nd day post-STEMI in everybody. MVO was imaged using late gadolinium enhancement and T2-weighted CMR imaging for IMH (Fig.1). The study was registered in ClinicalTrials.gov, with identification number NCT03677466.
Results: IMH and MVO were revealed in majority of the patients with primary STEMI. In group of primary PCI the IMH was observed in 11 of 17 patients (64,7%), whereas MVO – in 12 of 17 patients (70,5%). In group of pharmacoinvasive strategy IMH was revealed in 12 of 30 patients (40 %), MVO – also in 12 of 30 patients (40%). There was not difference between frequencies of IMH in two groups, whereas occurrence of MVO was significantly highly in the group of primary PCI (=0.05). The combination IMH with MVO were occurred in 14 patients (29,8%): in group of pharmacoinvasive strategy – 6 patients (20%) and in group of primary PCI – 8 patients (47%). The combination of IMH with MVO was presented also more frequently in group of primary PCI (p=0.03). LV ejection fraction was significantly lower in patients with combination of IMH and MVO, if compared to those without it (p=0.001).
Conclusion: IMH and MVO were common findings in patients with primary STEMI with different reperfusion strategies and were present from 40 % to 70% of the patients. There was no difference in the prevalence of IMH with different reperfusion strategies. On the contrary - the MVO occurred more frequently among patients treated with primary PCI.



Patient with IMH (a-c) and MVO (d-f)

P501
Association of rs2891116 polymorphism in CDKN2B gene with the extent of myocardial injury and left ventricular ejection fraction in patients after ST elevation myocardial infarction.

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Background. History of previous myocardial infarction has significant impact on the development of heart failure. Genome-wide association studies reveal polymorphisms in the CDKN2B gene link to the susceptibility of coronary artery disease and myocardial infarction. Recent studies show there is an association of CDKN2B with the development of heart failure.
Purpose. To evaluate the extent of myocardial injury with regard to the Left Ventricular Ejection Fraction (LVEF) according to echocardiography data in patients with different genotypes of rs2891116 CDKN2B gene, after being diagnosed with ST elevation myocardial infarction (STEMI).Materials and Methods. A total of 113 patients diagnosed with STEMI were included in the study, composed of 41 females and 72 males. Female mean age was 69±11.7 years, male mean age was 60±11.3 years. All patients provided informed consent and a blood sample from each was taken for genetic testing. During hospitalization, echocardiography was conducted. Data was analysed using STATISTICA 10 software via nonparametric methods – Mann-Whitney test, Kruskal-Wallis test and Spearman rank correlation test.
Results. Significant differences were discovered among groups with different genotypes in CDKN2B gene, in terms of the number of affected segments and Wall Motion Score Index value (WMSI) (Table 1). Participants with TT genotype of CDKN2B gene had a higher rate of incidence of left ventricular contractile function impairment (5.5±0.8 (CI 3.4;5.9) in comparison to CT genotype carriers (3.5±0.4 (CI 2.2;3.2); p=0.032). The mean value for carriers of the CC genotype compared to CT and TT genotype carriers was not significantly different. WMSI mean value in patients with TT genotype in CDKN2B gene was 1.4±0.06 (CI 0.2;0.4); and in patients with CT genotype – 1.25±0.03 (CI 0.1;0.2), (p=0.025). In patients with CC genotype compared to CT and TT the mean value of WMSI was not significantly different. A significant correlation between WMSI and LVEF is evident in patients with TT (r = -0.48, p<0.05) and CT (r = -0.50, p<0.05) genotypes. In CC carriers group WMSI-LVEF correlation is indefinite.
Conclusions. Patients diagnosed with STEMI and carrying TT genotype in CDKN2B gene exhibited a higher number of affected segments and WMSI value compared to patients with CT genotype. In patients with TT and CT genotypes there is a strong association between WMSI and LVEF.

Table 1

	n=30 (26%)	CTn=55 (49%)	TTn=28(25%)	p
Mean amount of affected segments	4.07±0.4	3.47±0.4	5.46±0.8	0.042
Mean value of WMSI	1.32±0.05	1.25±0.03	1.41±0.06	0.036

P502
Gut microbiota and coronary artery disease - preliminary results

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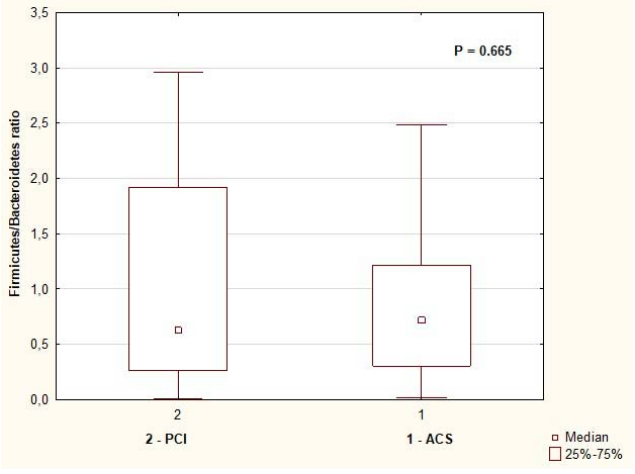
Background: Coronary artery disease (CAD) is one of the most common causes of hospitalization, death and disability in Europe. Despite the knowledge of classical CAD risk factors, the morbidity and mortality associated with this disease remains high. As a consequence, new factors that may lead to CAD, like gut microbiome, are taking into consideration.

Purpose: To evaluate gut microbiota composition in CAD patients. To compare intestinal microbiome of patients with acute coronary syndrome (ACS) in relation to patients who underwent elective percutaneous coronary intervention (PCI).
Methods: The study included stool microbiome of 92 CAD patients, aged 64.6±7.6 years (72 males) who were hospitalized 12-18 months prior recruitment due to an ACS (ST-elevation myocardial infarction, n=22; non-ST elevation myocardial infarction, n=22; unstable angina, n=14) or PCI (n=34). All patients underwent detailed assessment of health status, including biochemical tests and stool sample collection.
Stool samples were collected in Stool Tubes with DNA stabilizer. DNA was isolated with the use of the PSP-Spin Stool-DNA kit. Further analyses were based on the V3-V4 region of the 16S rRNA gene (Next Generation Sequencing method).
Results: We identified 8 clusters of bacteria (Table). The analysis revealed that the gut microbiome consists mostly of Bacteroidetes, Firmicutes and Actinobacteria, with the largest abundance of reads for Bacteroidetes (Table). Study groups did not differ in terms of the most abundant bacteria (Table). There was no difference in Firmicutes/Bacteroidetes ratio between study groups (Figure).
Conclusions: Among CAD patients, there are no significant differences in gut microbiome composition between patients with ACS and PCI. The analysis in larger CAD population as well as patients without CAD is required.

Table

Cluster	Patients with acute coronary syndrome (n=58)	Patients with elective percuta-neous coronary intervention (n=34)	All coronary artery disease patients (n=92)	P value
Bacteroidetes	9147 IQR: 5891 - 15639	8572 IQR: 5565 - 16069	9011.5 IQR: 5698 - 15854	0.977
Firmicutes	6000 IQR: 3468 - 8742	5285.5 IQR: 2740 - 10641	5896 IQR: 3210 - 9595.5	0.958
Actinobacteria	205.5 IQR: 57 - 625	234 IQR: 29 - 689	214.5 IQR: 46 - 684	0.799
Lentisphaera	1.5 IQR: 0 - 15	4 IQR: 0 - 14	2 IQR: 0 - 14.5	0.555
Proteobacteria	3 IQR: 0 - 8	4 IQR: 2 - 9	3 IQR: 1 - 9	0.328
Cyanobacteria	0 IQR: 0 - 0	0 IQR: 0 - 0	0 IQR: 0 - 0	0.843
Verrucomicrobia	0 IQR: 0 - 3	0 IQR: 0 - 0	0 IQR: 0 - 2	0.026
Tenericutes	0 IQR: 0 - 0	0 IQR: 0 - 0	0 IQR: 0 - 0	0.749
Other	1 IQR: 0 - 100	0 IQR: 0 - 48	0 IQR: 0 - 62	0.365

The distribution of operational taxonomic unit reads in CAD patients.



Firmicutes/ Bacteroidetes ratio

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Adiponectin and t-cadherin level in patients with coronary artery disease and heart failure.

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Introduction: Adiponectin, an adipocyte-derived circulating protein, accumulates in the heart, vascular endothelium, and skeletal muscles through an interaction with t-cadherin (t-cad), a unique glycosylphosphatidylinositol-anchored cadherin. Recent studies have suggested that this interaction is essential for adiponectin-mediated cardiovascular protection.
Adiponectin stimulates phosphorylation and amp (adenosin mono phosphate) kinase activation, exerting direct effects on vascular endothelium, diminishing the inflammatory response to mechanical injury and enhancing endothelium protection. : low adiponectin levels may be an independent risk factor for severe coronary artery disease(cad) and heart failure(hf).
Methods: 41 patients with cad after coronary artery bypass surgery were enrolled: 29 males (70,7 %) and 12 females (29,3 %), age 58,7±1,1 years. All patients with stable class ii to iii hf. Adiponectin and t-cad level and lipid profile were measured. Statistical analyses were performed with spss 20.0 for windows.
Results: the distribution of adiponectin(ad), t-cad levels and ad/t-cad ratio differed significantly between cad patients with class ii to iii hf(27,1±0,09 pg/ml vs 9,4±0,1 pg/ml; 34,2±0,9 pg/ml vs 6,6±0,8 pg/ml; 1,1±0,1 vs 1,8±0,1; accordingly, p<0,05). Adiponectin, t-cad levels was significantly lower in cad patients with myocardial infarction in history(25,5±0,1 pg/ml vs 31,1±0,09 pg/ml ; 32,7±0,8 pg/ml vs 40,0±0,9 pg/ml ; accordingly, p<0,05). Ad/t-cad ratio was significantly lower in post-infarction patients (1,8±0,2 pg/ml vs 0,8±0,1 pg/ml, p<0,05).
Among lipid parameters whereas the high-density lipoprotein cholesterol level correlated positively (r=0,684; p=0,01).
Conclusion: cad after coronary artery bypass surgery and myocardial infarction in history had a lower level cardioprotective adipocytokines.

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The impact of short term amiodarone treatment on hsCRP level in patients with ischemic heart failure and paroxysmal atrial fibrillation

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INTRODUCTION: The role of inflammation in the development of coronary heart disease (CAD) and atrial fibrillation(AF) is well established, high sensitivity C reactive protein (hsCRP) being the most studied biomarker of inflammation in patients with cardiovascular diseases. It can be used as a prognostic or risk factor in patients with heart failure (HF), CAD or AF. Despite the progress in pharmacology , amiodarone (AM) remains the only antiarrhythmic drug used for rhythm control in patients with depressed left ventricular ejection fraction. Its mechanism of action is still not entirely discovered.
PURPOSE The aim of this study was the impact of short term amiodarone treatment on hsCRP level in patients with ischemic heart failure and paroxysmal AF (PAF).
METHODS We have enrolled 50 patients with CAD, left ventricular ejection fraction(LVEF) <40% and PAF documented on baseline ECG or 24 hour Holter monitoring (Group A). Amiodarone treatment was initiated as a rhythm control strategy. In the control group we have selected 50 consecutive patients with CAD and no evidence of PAF (Group C). All patients underwent transthoracic echocardiography and dosage of serum hsCRP, both at study initiation and at 3 months. All patients received betablockers, ACE and statins at maimum tolerated dose.
RESULTS At baseline there was no significant difference in age, sex, renal function, thyroid stimulating hormone (TSH) and glycated hemoglobin between the two groups. The mean LVEF was similar in both groups (Group A= 34±5% vs Group C= 32±4, p=0.852), but mean atrial volumes were significantly higher in PAF group (Group A= 33±10 ml/m2 vs Group C= 27±8 ml/m2, p=0.0017). hsCRP values were similar regardless of group (Group A=0.524±0.312 mg/dl vs Group C=0.485±0.371 mg/dl, p=0.91).
At 3 months evaluation no statistically significant difference was reported in renal function and glycated hemoglobin. TSH level sufferred an insignificant increase in Group A (2.440±0.812 µUI/ml vs 3.189±1.383 µUI/ml, p=0.76) compared with Group C (2.19±1.042 µUIml vs 2.227±1.5 µUI/ml, p=0.68). Short term AM treatment had a neutral impact on LVEF (34±5% vs 35±4%; p=0.87), but significantly decreased the volume of LA from 33±10 ml/m2 to 29±8 ml/m2; p=0.031, CI 95% 5-23 in Group A. No important changes of LVEF (32±4% vs 34±3%; p=0.77) and LA volumes (27±8 ml/m2 vs 28±3 ml/m2; p=1.1) were observed in Group C. The level of hsCRP decresed to a median of 0.471±0.118 mg/dl (p=0.002 CI 95% 0.375-0.592) after 3

months of amiodarone treatment in Group A. No significant changes in hsCRP level were observed in Group C (0.485±0.371 mg/dl vs 0.451±0.187 mg/dl (p=0.715, CI 95% 1.64-16).
CONCLUSION Short term AM treatment significantly decreased the level of hsCRP and LA volume.

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Feasibility of single-photon emission computed tomography in the diagnosis of obstructive coronary artery lesions in stable coronary aretry disease

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Background: Patients with suspected coronary artery disease (CAD) are recommended to undergo non-invasive tests (NIT) for detecting ischemia (stress echocardiography, myocardial scintigraphy, etc.). Since these tests are beneficial in early diagnosis of myocardial ischemia (before pathological ECG alterations and the presence of chest pain syndrome), their high sensitivity and specificity do not cause much doubt. However, recent study has shown that NIT data had minimal added value compared to clinical data in predicting obstructive CAD.
Purpose: To evaluate the diagnostic capabilities of single-photon emission computed tomography (SPECT) in the detection of obstructive CA, depending on the meeting appropriate use criteria.
Material and Methods: 107 patients with previously diagnosed CAD or with the need to exclude it, who were admitted to the inpatient departments in the period from 2012 to 2015, were included in the retrospective study. All the patients underwent coronary angiography (CAG) and SPECT to detect hemodynamically significant CA stenoses. All the patients were enrolled into two groups according to the scores for SPECT imaging: Group 1 – patients, who had 7-9 scores (in whom SPECT imaging was reasonable, n = 88), Group 2 – patients who had 1-6 scores (in whom SPECT imaging was questionable or did not have any indications for its performance, n = 19).
Results: Clinical signs and symptoms of angina pectoris were predominantly found in Group 1 patients (p = 0.499). Asymptomatic patients were more likely to be found in Group 2 (p <0.001). Group 1 patients commonly had high pre-test probability (PTP; p <0.001), whereas Group 2 patients commonly had low PTP (p <0.001). The mean PTP was 77% in Group 1 and 58% in Group 2 (p = 0.003). According to positive SPECT imaging, significant CA lesions were more often found in Group 1 (31.8%), compared to Group 2 (10.5%, p = 0.060). Two- and three-vessel disease prevailed in Group 1 (25% and 14.7%) according the analysis of the prevalence and the location of hemodynamically significant CA lesions, although the data did not reach the statistical significance (p = 0.057 vs. p = 0.073). Stenoses > 70% were more commonly detected in Group 1 patients, compared to Group 2: the anterior descending artery (52.3% vs. 5.3%, p <0.001), the circumflex artery (35.2% vs. 10.5% ; p = 0.034), and the right coronary artery (34.1% vs. 10.5%, p = 0.041). The sensitivity in both groups was rather low (40% vs. 25%), whereas the specificity was 83% in Group 1 and 93% in Group 2. Conclusion: According to the clinical examination, patients with CAD and the indications for SPECT imaging commonly had obstructive CA lesions (63.6%), compared to the patients with the lack of indications (21.1%). However, the rate of the positive findings during the stress tests with SPECT imaging was low in both groups and did not differ significantly (p = 0.06). Despite high specificity of SPECT imaging, its sensitivity was low in both groups.

Valvular Heart Disease

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Edge-to-edge percutaneous mitral repair for functional ischemic and non-ischemic mitral regurgitation: a systematic review and meta-analysis.

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Aim: Recently published randomized controlled trial comparing the use of the Mitraclip device in addition to guideline directed medical therapy alone in patients with secondary mitral regurgitation (MR) have shown conflicting results. Only few studies have assessed if these differences could be due to the underlying secondary MR etiology; the aim of this study is to systematically review the available literature about percutaneous edge-to-edge repair outcome in patients with secondary MR and perform a meta-analysis of studies investigating the differences after percutaneous edge-to-edge repair in patients with ischemic and non-ischemic secondary MR.
Methods: PubMed, EMBASE, Google scholar database and international meeting abstracts were searched for all studies about MitraClip. Studies where results were not delineated between MR aetiology, with <25 patients or with overlapping population were excluded.
The prespecified primary efficacy endpoint was the composite of all cause death and heart failure related hospitalization. Secondary endpoints were the single components of the primary endpoint.
Results: A total of seven studies investigating the midterm outcome of percutaneous edge-to-edge repair in patients with ischemic versus non-ischemic MR were included in the meta-analysis (n=2,908).
At 2 years, the risk of the prespecified primary endpoint was similar among patients with ischemic and non-ischemic MR (risk ratio (RR) 1.06; 95% CI: 0.91 to 1.23).
Conversely, the rate of all-cause death was significantly higher in patients with ischemic MR compared to patients with non-ischemic MR (RR 1.26; 95% CI: 1.06 to 1.52), while the rate of rehospitalization for heart failure was similar in the two groups (RR 1.21; 95% CI: 0.91 to 1.61).
Conclusions: This meta-analysis suggests that percutaneous edge-to-edge repair is likely to be more efficacious in terms of mortality in patients with non-ischemic rather than ischemic MR, despite a similar rate of rehospitalization for heart failure.

P510
Heart failure in aortic stenosis: extra-valvular cardiac damage according to the novel 2017 staging classification is differentially reflected by certain biomarkers of cardiovascular remodelling

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Background: Heart failure is one of the leading clinical characteristics in patients suffering from severe aortic valve stenosis (AVS) and is mainly determined by extra-valvular cardiac damage. In 2017, a novel staging classification integrating left ventricular, left atrial, pulmonary vascular and right ventricular remodelling has been introduced. In this study, we aimed to analyse a panel of serum biomarkers reflecting cardiovascular remodelling in correlation to this classification.
Methods: A clinically well-characterized patients' collective of the Jenaer Aortenklappenregister (JAKR) was categorized according to the 2017 staging classification into stage 0 to 4. Serum levels of the following biomarkers have been determined by ELISA: MMP-9, TIMP-1, B and C domain containing Tenascin-C (B+ Tn-C, C+ Tn-C), ED-A and ED-B domain containing Fibronectin (ED-A+ Fn, ED-B+ Fn), Endothelin 1 (ET-1) and Neutrophil gelatinase associated lipocalin (NGAL). Results: The patients included in the current study (n=94; age: 78.3 ± 7.3 years; 46.8% males; STS-score (STS): 4.4 ± 2.2) could be divided in to the following stages: stage 0 (4.3%), stage 1 (16%), stage 2 (54.3%), stage 3 (16%) and STAGE 4 (9.6%). To investigate the association of the different biomarkers to disease progression, we firstly compared stage 0+1 with stage 2 and than dichotomized the entire collective into stage 0+1+2 and 3+4 to compare the cohort exhibiting left heart damage and the group additionally showing pulmonary hypertension ± right heart damage.
We could show significantly decreased serum levels of MMP-9 (p=0.038) as well as a reduced MMP-9/TIMP-1 ratio (p=0.024) and increased levels of B+ Tn-C (p=0.002) and C+ Tn-C (p=0.007) when comparing stage 0+1 with stage 2. For these markers, no significant differences could be proven between the stage 0+1+2 and the stage 3+4 group. On the contrary for TIMP-1 (p=0.028), ED-A+ Fn (p=0.009), ET-1 (p=0.004) and NGAL (p=0.013), significantly increased serum levels occurred in the stage 3+4 compared to stage 0+1+2 group. For these markers, no significant differences were detectable between the groups of stage 0+1 and stage 2. To elucidate the predictive value of TIMP-1, ED-A+ Fn, ET-1 and NGAL for the probability of stage 3+4, logistic regression analysis (backward elimination WALD) including 9 relevant covariates was performed. Only ED-A+ Fn (OR: 1.134; CI: 1.044 – 1.231; p=0.003) and ET-1 (OR: 1.674; CI: 1.029 – 2.723; p=0.038) could be identified as independent predictors.
Conclusions: This is the first study identifying novel biomarkers differentially reflecting left and right heart damage in patients suffering from AVS. MMP-9 and B+ as well as C+ Tn-C are associated especially with left atrial or mitral damage. In contrast, TIMP-1, ED-A+ Fn, ET-1 and NGAL are associated with pulmonary vascular or tricuspid ± right ventricular damage. These findings might contribute a more precise initial diagnosis and risk stratification.

P511

Response of right ventricular longitudinal and radial fiber contractility to mitral valve surgery: a PREPARE-MVR substudy

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Despite mitral regurgitation is a valvular disease primarily affecting the left ventricle, significant changes in right ventricular (RV) morphology and function are also expected. Elevated pulmonary pressures are the main drives of concomitant RV remodelling, which can be partially restored by mitral valve repair/replacement (MVR). Following MVR, RV deformation markedly changes, while the role of these alterations in context of RV contractility is less known. The PREPARE-MVR study (PRediction of Early PostoperAtive Right vEntricular failure in Mitral Valve Replacement/Repair patients) aims to determine parameters, which may predict the perioperative risk of acute RV failure.
In this preliminary analysis we aimed to investigate the changes of RV global, longitudinal and radial contractility pre- and postoperatively in patients undergoing MVR.
Our study group consisted of 22 MVR patients (mean age: 60±11 years, m/f: 16/6). Transthoracic 3D echocardiography was performed before the operation and following intensive care unit discharge. 3D beutel model of the RV was created and RV end-diastolic volume index (EDVi) among with RV ejection fraction (RVEF) were calculated using commercially available software. For in-depth analysis of RV mechanics, we have decomposed the motion of the RV using our custom software (ReVISION) to determine longitudinal (LEF) and radial ejection fraction (REF). Right heart catheterization was also performed before MVR and 24 hours after the procedure as well to measure pulmonary arterial systolic pressure (sPAP). Using the aforementioned parameters, we have calculated RV global end-systolic elastance (Ees), along with longitudinal (EesL) and radial end-systolic elastance (EesR), which represent load-independent contractility indices of the RV global, longitudinal and radial systolic function.
RV morphology was unaltered by surgery according to RVEDVi (preop vs. postop: 73±19 vs. 76±21 mL/m^2, p=NS). RVEF slightly decreased after MVR (50±6 vs. 48±7 %, p<0.05), however, RV motion pattern markedly changed. Postoperative LEF was significantly lower compared to preoperative values (25±5 vs. 16±6%, p<0.0001), among with an increase in REF (21±8 vs. 26±6%, p<0.01). As expected, sPAP decreased in response to MVR (38±15 vs. 34±11 mmHg, p<0.05), in parallel with global RV contractility (1.09±0.40 vs. 0.90±0.33 mmHg/mL/m^2, p<0.01). While EesL was significantly lower after the operation (0.72±0.25 vs. 0.56±0.20 mmHg/mL/m^2, p<0.0001), EesR did not change (0.70±0.29 vs. 0.63±0.23 mmHg/mL/m^2, p=NS).
MVR results in complex changes of RV function and hemodynamics. Novel parameters of RV contractility reveal different response of the longitudinal and radial fibers to the altered RV load, which may have significance in postoperative patient management. The PREPARE-MVR study aims to determine the role of perioperative parameters on patient outcome.

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Cardiac filling pressures in left-sided valvular regurgitation

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Background -Assessing left-sided valvular regurgitation (LVR) by transthoracic echocardiography (TTE) is rather difficult and time-consuming due to a required guideline based multiparametric approach
-In these conditions,ventricular remodelling is often a late sign of prolonged volume, and in case of aortic regurgitation (AR) also pressure overload, and possible interventions should mostly take place before remodelling has occurred-Evaluation of diastolic function including evaluation of left-sided cardiac filling pressures is often routinely done whenever TTE is performed
- Since both LVRs pool up elevated pressures in the left atrium, either directly in mitral regurgitation (MR) or via left ventricular diastolic pressure in AR, left-sided filling pressures might provide a rapid and sensitive method for detecting significant LVR
Methods -30 patients scheduled for LVR follow with TTE without significant structural heart disease other than LVR were enrolled in this prospective registry trial
-A guideline-based multiparametric evaluation of diastolic function including filling pressure assessment was done at the very beginning of each TTE exam, followed therafter by a thorough multiparametric guideline-based evaluation of valvular disease
Results - Medial E/e‘ with a cutoff of 15 reached a 100 % sensitivity and a 100 % specificity for detecting significant LVR, as did a multiparametric guidelined-based evaluation of filling pressures as well (p <0.001 for both)
-The sensitivity of left ventricular remodelling for detecting significant LVR was only 33.3 %
-Compared to the other two groups, the mean E-wave was larger in the MR-group (164 vs 121 cm/s, p<0.001) and the tissue doppler e‘-wave smaller in the AR-group (5.5 vs 7.5 cm/s, p=0.03), while systolic pulmonary pressure, Inferior Vena Cava measurements, LA size, E/A-ratio, tissue doppler velocities or dTE alone did not differ between groups (p=NS)Conclusions- Significant LVR seems to be very unlikely in the absence of elevated left-sided filling pressures on TTE-Evaluation of filling pressures at least by the E/e‘ ratio, which also is known to be feasible and rapid to perform, should thus probably be included in TTE exams evaluating LVR

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Immediate changes on aortic hemodynamics and wave reflections after surgical aortic valve replacement

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Introduction: Aortic hemodynamics and wave reflections are predictors of adverse cardiovascular events. Surgical aortic valve replacement (SAVR) is the most effective treatment of patients with aortic stenosis. Purpose:Our aim was to evaluate the immediate changes on aortic hemodynamics and wave reflections after surgical aortic valve replacement.
Methods: ιn this pilot study, twenty-five patients (mean age 71.0±7.1 years, 11 female) with severe aortic stenosis undergoing SAVR were included. Aortic hemodynamics and wave reflections (aortic pressures, aortic augmentation index [AIx@75], augmented pressure, subendocardial viability ratio [SEVR]) were measured with Sphygmocor. Measurements were performed preoperatively and postoperatively.
Results: There was a statistically significant decrease in aortic systolic blood pressure (SBP) (134±24 vs 118±17mmHg with p=0.002, respectively) that was not apparent in peripheral SBP. We observed a marginally significant decrease in aortic AIx@75 (29±13 vs 22±12% with p=0.05, respectively) and a decrease in aortic AIx (p<0.001, Figure) and augmented pressure (20±10 vs 8±7 mmHg with p<0.001, respectively). Moreover, there was a marginally non-significant trend for an increase in SEVR (137±30 vs 149±35%, p=0.095).
Conclusions: The results of this study indicate that shortly after SAVR subjects show a decrease in aortic wave reflections with a small improvement of myocardial perfusion. These findings imply the short-term hemodynamic consequences of SAVR.

P514

Evaluation of the relationship between platelet indices and spontaneous echo contrast in patients with mitral prosthetic heart valves

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Introduction: Spontaneous echo contrast (SEC) is defined as dynamic smoke-like echoes within the cardiac cavities with a characteristic swirling motion in echocardiography. Previous clinical studies have demonstrated that SEC is a risk factor for left atrial thrombus formation and an important indicator of potential systemic embolism. Platelet indices have been associated with the presence of SEC in patients with mitral stenosis previously. However, the relationship between platelet indices and SEC in patients with prosthetic heart valves has not been investigated yet.
Methods: This study enrolled a total of 89 patients [female: 38 (42.4%), median age: 52 (36-67) years] with SEC formation in the left atrium, and 257 control subjects [female: 123 (47.5%), median age: 56 (45-65) years] without SEC formation. All patients were evaluated by transthoracic and transesophageal echocardiography and laboratory tests including complete blood count and biochemical parameters.
Results: Patients with SEC formation had more frequent atrial fibrillation, higher left atrial diameter (LAD) and lower left ventriular ejection fraction values. Platelet indices including platelet count, platelet distribution width, mean platelet volume,

and plateletcrit did not differ between the groups (Figure 1). Increased LAD was detected as the only independent predictor of SEC development. In the receiver operating characteristic curve analysis, LAD values above 50.5 mm predicted SEC formation with a sensitivity of 78%, and a specificity of 61% (area under the curve= 0.641; 95% confidence interval: 0.571-0.712; p<0.001)

Conclusion: Platelet indices were not found to be associated with the presence of SEC formation in the left atrium in patients with mitral prosthetic valves. Therefore, it is debatable to use platelet indices with previously known echocardiographic and clinical risk factors to predict SEC development in patients with mitral prosthesis.

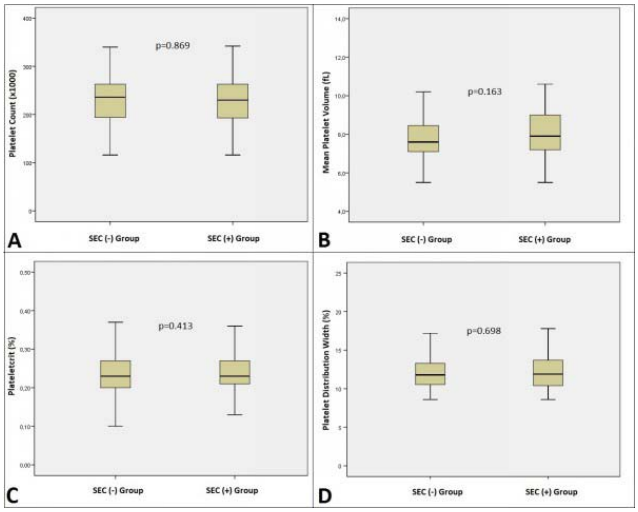

Figure 1

P516

N-terminal of the prohormone brain natriuretic peptide is a predictor of hemodynamic instability in patients undergoing valve surgery

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Introduction The usefulness of N-terminal of the prohormone brain natriuretic peptide (NT-proBNP) as a predictor of perioperative hemodynamic instability is currently unknown.

Methods A prospective study was conducted on a group of 455 consecutive patients with significant valvular heart disease that underwent elective valve surgery. The primary end-point was postoperative hemodynamic instability. The secondary end-point was death from all causes in patients with perioperative hemodynamic instability.

Table 1.

Preoperative characteristics of patients (n=455)	Values
Age, years*	62 ± 12
NYHA, (classes)*	2.4 ± 0.5
LV ejection fraction, (%)*	57 ± 11
Pulmonary blood pressure, mmHg*	45 ± 18
Hs-TnT,ng/L*	19 ± 15
NT-proBNP,pg/mL*	1089 ± 874
Main procedures:	
AVR, n (%)	240 (30%)
MVR, n (%)MVR + AVR, n (%)MVP, n (%)	90 (19.7)46 (8.4%)79 (14.6%)

Results The postoperative hemodynamic instability occurred in 85 patients. At multivariate analysis NT-proBNP, NYHA classes and Glomerular Filtration Rate remained independent predictors of the primary end-point. Age and NT-proBNP were associated with an increased risk of death. The area under receiver operator characteristic curve for primary end-point for NT-proBNP is 0.802 (95% CI 0.756–0.842) (sensitivity: 74%; specificity: 78%) (Figure 1).

Conclusions Elevated preoperative NT-proBNP was associated with a higher risk of postoperative hemodynamic instability and death.

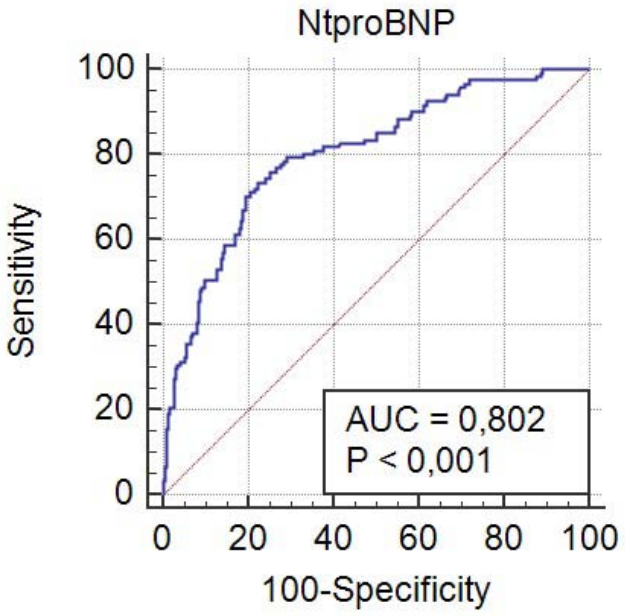

Figure 1.

Myocardial Disease

P517

Genetic spectrum of left ventricular non-compaction presented in children and adolescent.

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Background: left ventricular non-compaction (LVNC) is considered to be a separate form of cardiomyopathy often presented with heart failure, arrhythmic and embolic events. It often has developmental origin with a wide spectrum of genes being a cause of LVNC. The genetic landscape of LVNC crossovers with that of other types of cardiomyopathies with sacromeric gene mutations prevailing as a dominant cause of the disease. However, in paediatric and adolescent patients, LVNC is often associated with other types of cardiomyopathies such as restrictive and hypertrophic cardiomyopathy. Paediatric cases of LVNC are often associated with congenital heart defects and present with a higher proportion of familial cases with great phenotypic intrafamilial variability compared to adult LVNC. Recently, a wider genetic spectrum of pediatric/adolescent LVNC was demonstrated compared to adult cases with unexpectedly high proportion of causative genes encoding for structural and ion channel genes. There for the aim of our study was to identify the genetic spectrum of LVNC in paediatric and adolescent patients in Russian population.Material and methods: the study was approved by the Institute Ethical Review Board. On behalf of the children enrolled in the study, written informed consent was obtained from the next of kin. The study included 15children with LVNC presented with heart failure class II-IV. Patients with inborn errors of metabolism and congenital syndromes as Noonan and Barth syndrome were also included into the study. The genotyping was performed using HaloPlex target enrichment panel on MiSeq (Illumina). In those patients, where no pathogenic or likely pathogenic

variant as well as variant of unknown significance within a gene highly expressed in myocardium were not identified, exome sequencing was performed. The identified genetic variants were classified according to ACMG guidelines.
Results: Mean age of LVNC manifestation was 7,6 [1,1 – 10,1] with HF as a main clinical feature. In two patients the diagnosis of LVNC was established within the first year of life. Within 3 year follow up three patients reached endpoints such as cardiovascular death (1) and heart transplantation (1). In 8 patients pathogenic or likely pathogenic genetic variants were detected in TAZ, ACTN2, DSP, TTN, MYPN, MYH7, BRAF and MYBPC3 genes. In 6 patients, variants of unknown significance were detected in MYPN, OBSCN, ANK2, SCN1B, MYLK2, and SCN5A genes. In one patient no pathogenic, likely pathogenic or variant of unknown significance were detected.
Conclusions: In patients with LVNC presented in childhood (likely)pathogenic genetic variants were detected in 53% of the cases. Importantly, variants of unknown significance were mainly represented by structural and ion channel encoding genes, rather than sarcomeric genes with pathogenic role to be further determined.

P518

Screening for transthyretin amyloid cardiomyopathy in everyday practice

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Funding Acknowledgements: Pfizer provided logistical support and funding to allow the expert group to meet. Editorial support was funded by Pfizer.

Background: Transthyretin amyloid cardiomyopathy (ATTR-CM) is a life-threatening, progressive, infiltrative disease caused by the deposition of transthyretin amyloid fibrils in the myocardium.
ATTR-CM is often overlooked as a cause of common cardiovascular conditions in older heart failure patients. Lack of disease awareness, misdiagnosis and misconceptions about the diagnostic process are, in part, responsible for a delay to diagnosis and application of appropriate patient management strategies, which can lead to a poor prognosis. Today, with the availability of bone scintigraphy as an inexpensive, non-invasive tool to diagnose ATTR-CM, the rationale to screen for this disease within certain populations of patients is increasingly warranted.
Purpose: Here, we aimed to develop a clinical framework to aid clinicians in identifying appropriate patients to be screened for ATTR-CM among the wider heart failure population.
Methods: An international panel of 11 amyloidosis experts convened to develop a consensus on the patient characteristics and clinical scenarios that further heighten suspicion or support the possibility of an underlying ATTR-CM, as well as a list of 'red flags' that should provide further evidence to support screening for ATTR-CM in general practice.
Results: The expert panel advised that men over 65 years or women over 70 years with heart failure and left ventricular wall thickness ≥14 mm should be screened for ATTR-CM. Some of the cardiac 'red flags', providing further evidence as to the possibility of ATTR-CM as an underlying condition, include: reduction in longitudinal strain with apical sparing; discrepancy between left ventricular wall thickness and QRS voltages; the presence of atrioventricular block and infiltrative features; and a diffuse late gadolinium enhancement with cardiac magnetic resonance. The presence of extra-cardiac symptoms such as sensorimotor polyneuropathy, dysautonomia and a history of bilateral carpal tunnel syndrome further support the possibility of ATTR-CM. Once a suspicion of ATTR-CM has been raised, a non-invasive diagnostic approach is recommended. The combination of bone scintigraphy and free light chain testing is the basis for the appropriate non-invasive screening of patients with suspected ATTR-CM.
Conclusion: This framework should assist clinicians in recognising patients at risk of having an underlying ATTR-CM. Awareness and timely diagnosis of ATTR-CM will facilitate the provision of optimal patient care.

P519

The left ventricular noncompaction and hypertrabecularity in adult patients: clinical classification and follow-up

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Purpose: to study clinical variants and follow-up of the left ventricular noncompaction (LVN) in comparison with hypertrabecularity (HT) in adult patients.
Methods. The diagnosis of LVNC was established in 116 adults (67 males, 46.3±15.1 y.), diagnosis of HT (ratio noncompact to compact layer 1:1 – 1:2) - in 42 adults (24 males, 43.5±15.2 y.). To diagnose LVNC / HT were performed Echo-CG, CT (n = 77 / 24) and MRI (n = 51 / 11). In 31 / 10 patients three visual methods were used, in 77 / 27 patients using any two methods. The average LV EDD was 6.0±0.8 / 5.9±1.1 cm, LV EF 38.5±14.0 / 44.6±18.3%. We performed NGS sequencing, followed by Sanger sequencing and also investigation of anti-heart antibodies, virus genome by PCR, coronary angiography (n = 29), scintigraphy (n = 27), a morphological study of the myocardium in 22 patients (14 endomyocardial, 1 intraoperative biopsy, 3 explanted heart studies, 6 autopsies). The mean follow-up was 15 [5; 40] / 6 [2; 19] months.
Results. The pathogenic mutations / VUCS in the genes MYH7, MyBPC3, LAMP2, DES, DSP, TTN were found in 12 / 5 (15%) of patients with LVNC and 0 / 1 (2%) of patients with HT. We identified six clinical variants (forms, diagnostic scenarios) of the LVNC: 1. Asymptomatic ('accidental find', 2%). 2. Arrhythmic ('idiopathic' arrhythmias, 15%). 3. Ischemic ('coronary heart disease', 7%). 4. Dilated ('idiopathic' dilated cardiomyopathy, 42%). 5. Acute / subacute myocarditis in the patients with LVNC, 12%. 6. LVNC in association with other cardiomyopathy (hypertrophic, restrictive, arrhythmogenic right ventricular cardiomyopathy, myodystrophy, Danon disease), 22%. The mutation only in forms 4-6 were detected, VUCS – also in form 2. In patients with HT met the same six clinical forms with a frequency of 2.4%, 31.0%, 2.4%, 45.2%, 9.5% and 7.1% respectively. Myocarditis was diagnosed in 51.7% of patients with various forms of LVNC and in 59.5% of patients with HT. The main clinical manifestations of the LVNC / HT were CHF (82.7 vs 57.1%, $p < 0.05$), PVBs more than 500 / day (46.6 vs 31.0%, $p < 0.05$), sustained / unsustained ventricular tachycardia (49.1 vs 26.2%, $p < 0.05$), atrial fibrillation (31.0 / 14.3%), ischemia (angina pectoris in 20.7 vs 2.4% and myocardial necrosis in 13.8 vs 2.4%, $p < 0.05$), thromboembolism (22.4 vs 7.1%, $p < 0.05$). Initial clinical forms were stable over time. LV EF and LV EDD showed a significant improvement only in the group with acute / subacute myocarditis (EF increased from 27.3% to 39.2%, $p < 0.05$), most of which received basic therapy of myocarditis. In other groups, there was a nonsignificant improvement. The end-point "mortality + transplantation" was 18% in LVNC and 2% in HT.
Conclusions. LVN syndrome in adults is vary polymorphic and often associated with other cardiomyopathy (22%). LV HT may be a softer (latent) form of noncompact cardiomyopathy. The clinical forms of LVNC are stable over time. We have proposed an extended clinical classification of LVNC.

P520

Clinical spectrum and outcome of advanced heart failure in hypertrophic cardiomyopathy: from pathophysiology to contemporary unmet needs

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On behalf of: Heart Failure in Hypertrophic Cardiomyopathy

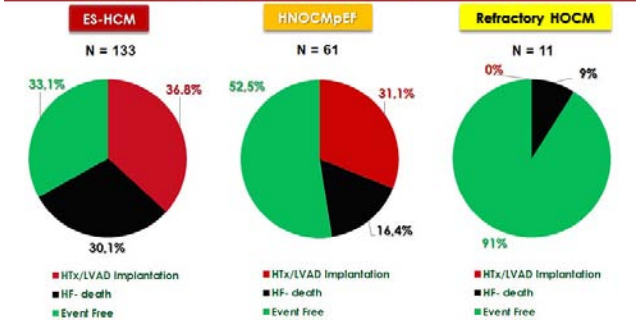
Background Advanced heart failure (AdvHF) in hypertrophic cardiomyopathy (HCM) was overlooked. Neither large case series nor clinical trials on this topic have been described. The main clinical-pathological profiles responsible for AdvHF in HCM are: 1) End-stage HCM (ES-HCM) defined by an ejection fraction (EF) ≤50%; 2) LV outflow obstruction despite optimal pharmacological and not pharmacological therapy (Refractory HOCM); 3) Nonobstructive HCM with preserved EF (HNOCMpEF).
Purpose
Based on a systematic revision of all published manuscripts on this topic, this study describes prevalence and outcomes of the 3 main HCM phenotypes responsible for AdvHF, heart transplantation (HTx), left ventricular assist device (LVAD) implantation and death for heart failure (HF-death) with the contemporary management of HCM.
Methods
The study screened 120 manuscripts in MEDLINE and EMBASE on AdvHF in HCM patients published from 2000 until December 2018, in adult patients (≥18 years old). The authors identified 8 manuscripts eligible for the analysis. 205 patients with AdvHF due to HCM, despite optimal therapy, were included in the main analysis. AdvHF was defined in presence of severe NYHA symptoms (class III and IV), because in all the manuscripts this definition was used. Mean follow-up = 7.6 years.
Results
Figure 1 shows the prevalence of phenotypes responsible for AdvHF and HTx/LVAD implantation/HF-Death. Please notice on the right the combined outcome split in two HTx/LVAD implantation separated from HF-Death. Of 205 HCM patients, 119 (58%) underwent HTx, LVAD implantation or died for HF.

Figure 2 shows the outcome per each clinical phenotype.

Conclusion

AdvHF in HCM has an ominous prognosis, indeed 58% of patients underwent HTx/LVAD implantation or died for HF. AdvHF in HOCM has a good outcome with the contemporary management. Less than 1/3 of cases of AdvHF in HCM was determined by HNOCMpEF due to massive hypertrophy and restrictive physiology and only 16.4% of them died due to HF. Nowadays, ES-HCM represents the main cause of AdvHF in HCM (64.9% of all HCM patients) and the major determinant for poor outcome (74.8% of Htx/LVAD/HF-death among all HCM patients). Although it has been managed with HTx or LVAD implantation, 1/3 of these patients died due to HF. This reflects poor attention and portrays an unmet need for HCM patients, in particular for ES-HCM patients that are younger than all others HCM patients. These findings reinforce the emphasis on long-term surveillance of HCM patient in order to timely identify patients at risk of ES evolution and early start the standard HF therapeutic (pharmacological and non-pharmacological) armamentarium. Finally, developing specific therapies for these HCM patients it is of paramount importance.

FIGURE 1	Adv HF (=205)	HTx/LVAD implantation/HF-Death (=119)	HTx/LVAD implantation (=68)	HF-Death (=51)
ES-HCM	133 (64.9%)	89 (74.8%)	49 (72.1%)	40 (78.5%)
Refractory HOCM	11 (5.4%)	1 (0.8%)	0 (0%)	1 (1.9%)
HNOCMpEF	61 (29.7%)	29 (24.4%)	19 (27.9%)	10 (19.6%)



P521

Echocardiographic deformation imaging improves assessment of structural disease progression in arrhythmogenic cardiomyopathy

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Background: Arrhythmogenic cardiomyopathy (AC) is an inherited cardiomyopathy characterized by both electrical and structural cardiac disease. Remarkably, progression of structural disease is uncommon during the early stages of AC, while progression of electrical disease is seen frequently. We hypothesize that this discrepancy is caused by the inability of conventional imaging methods to detect subtle changes over time. Echocardiographic deformation imaging may be more sensitive than conventional imaging techniques for detection of structural disease progression in AC.

Objective: To study the incremental value of serial echocardiographic deformation imaging over conventional imaging for detection of structural disease progression in AC.

Methods: We included patients who fulfilled criteria for AC diagnosis (i.e. definite AC) and their mutation-carrying relatives who did not fulfil criteria for definite diagnosis (i.e. early AC). All study participants underwent a baseline and follow-up cardiac evaluation, including conventional echocardiography and deformation imaging. Global right ventricular strain (RV-GLPS) and regional analysis in the right ventricular (RV) subtricuspid region. The deformation pattern in this region was scored as type I (normal deformation), type II (delayed onset, decreased systolic peak, and post-systolic shortening), or type III (systolic stretching and large post-systolic shortening). All measurements were compared between baseline and follow-up to assess disease progression.

Results: 81 subjects were included (50 definite AC, 31 early AC). The mean follow-up duration was 6.7±3.0 years. In definite AC, measurements by conventional echocardiography and deformation imaging both indicated disease progression ($p<0.001$). In early AC, conventional functional measurements did not reveal disease progression: left ventricular ejection fraction went from 57.5% [IQR 5.5] at baseline to 57.0% [IQR 4.7] after follow-up ($p=0.146$), and RV fractional area change went from 47.6 ± 6.6% to 47.1 ± 7.2% ($p=0.279$). However, with deformation imaging, a small but significant decrease in RV global strain was seen in early AC (from 24.9 ± 3.9% to 23.3 ± 3.8%, $p=0.035$). More pronounced was the deterioration of regional strain patterns, 14 subjects (45%) with early AC showed a change of the deformation pattern in the subtricuspid region ($p<0.001$), of which 12 subjects progressed to type II and two progressed to type III.

Conclusion: While conventional imaging approaches indeed lack sensitivity to detect disease progression in early AC, echocardiographic deformation imaging reveals progressive mechanical dysfunction in the RV in half off our study population. Serial evaluation by echocardiographic deformation imaging may therefore be helpful in risk stratification of patients during the earliest stages of AC. The prognostic implications of this finding warrants further investigation.

P522

Evaluation of myocardial gene expression profiling for superior diagnosis of idiopathic giant cell myocarditis in a large cohort of patients with acute cardiac decompensation

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Background –Idiopathic giant cell myocarditis (IGCM) diagnostics is based on differential patterns of inflammatory cell infiltration, and multinucleated giant cells (GCs) in histological sections of endomyocardial biopsies (EMBs). However, the sampling error is high for the detection of focally GCs by histopathology. We report on a clinical evaluation of a recently published method for improved differential diagnosis of this frequently fatal disease by myocardial gene expression profiling.

Objective – This is to improve the diagnostics of IGCM by gene expression profiling, and to demonstrate the feasibility of this method in clinical practice in a large cohort of patients.

Methods – In this multicenter study, EMBs of n=427 patients with clinically acute cardiac decompensation and suspected acute myocarditis were screened (mean age 47.03±15.69 years). In each patient, EMBs were analyzed by histology, immunohistology, molecular virology, and gene expression profiling.

Results – Out of the total of n=427 patient samples examined, GCs could be detected in 26 cases (6.0%) by histology. An established myocardial gene profile – consisting of 27 genes – was revealed resulting in a specified profile of 5 genes (chemokine receptor 5 (CCR5), chemokine receptor 6 (CCR6); carnitine palmitoyltransferase I (CPT1), toll-like receptor 8 (TLR8), and chemokine (C-C motif) ligand 20 (CCL20)) which identified histologically proven IGCM with high specificity in 25 of the 26 patients (96.2%). Applying this newly established profiling on the remaining patient samples, additional n=31 (7.3%) patients were identified for IGCM without any histological proof of myocardial GCs.

In a subgroup study we analyzed clinical hemodynamic outcome at follow-up (mean follow-up 6.4±4.3 months) of n=40 patients treated under immunosuppressive therapy after EMB- or geneprofil-based diagnosis. Immediate immunosuppressive treatment of patients with histologically diagnoses IGCM revealed a significant improvement of left-ventricular function (LVEF) ((19.0±14.22 to 47.25±12.27; $p=0.0049$) at follow-up). Similarly, a significant increase of LVEF (31.3±15.0 to 49.9±12.4; $p=0.0028$) in patients with positive myocardial gene profiling for GCs without histological proof was observed. Simultaneously, baseline highly deregulated genes were normalized in the follow-up EMBs after treatment. No treated patient died within the observation period.

Conclusions – Myocardial gene expression profiling is a reliable method in clinical practice to predict IGCM even without direct histological proof of GCs in EMB section. The gene profiling is of high clinical relevance to overcome the sampling error of purely histological examination, and to control the effectiveness of the therapy. The data clearly show the importance to take EMB in unexplained acute decompensation to get a diagnosis and improve the prognosis.

P523

Plasminogen activator inhibitor type-1 (PAI-1) expression relates to the presence of myocardial inflammation in patients with nonischemic cardiomyopathy

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Background: Plasminogen activator inhibitor type-1 (PAI-1) is an important inhibitor of the fibrinolytic pathway and an acute phase reactant in response to inflammatory cytokines, resulting in thrombosis, arteriosclerosis, and tissue fibrosis. It has been identified as a potential biomarker for coronary artery disease and metabolic

syndrom. However, so far, nothing is known about its importance in nonischemic cardiomyopathy.
Aims: To analyzed PAI-1 expression in patients with different forms of cardiomyopathies and evaluate possible influence of PAI-1-dependent pathomechanisms in patients with intramyocardial inflammation.
Methods and Results: In this study, endomyocardial biopsies (EMBs) from 309 patients (mean age 48.0±13.9 years) with different forms of cardiomyopathies were enrolled, including 123 patients with dilated cardiomyopathy (DCM) (mean LVEF 28.01+9.06%) and 186 patients with EMB-proven virus-negative inflammatory cardiomyopathy (DCMi) (mean LVEF 31.76+14.14%). 10 patients (mean LVEF 60.50+4.76%) without viral or inflammation in EMB served as controls. Hemodynamic parameters were measured by catheterization and echocardiography. EMBs were performed at first admission after exclusion of ischemic of valvular heart disease. In EMBs PAI-1 was assessed by immunohistology including digital imaging analysis. PAI-1 expression was significantly higher in patients with DCMi in contrast to DCM patients and controls (0.517+2.20 vs. 0.187+0.598 vs. 0.023+0.032 % Area Fraction; =0.0002). PAI-expression correlates significantly with lymphocytic infiltrates (for CD3 = 0.56, < 0.0001, and LFA-1 = 0.59, < 0.0001). This was found to be independent of hemodynamic parameters, and age.
Conclusion: Myocardial inflammation is associated with a significant increase in PAI-1 expression in DCMi independently of the hemodynamic conditions. This new pathophysiological axis could be a potiential therapeutic target in future treatment stategies in DCMi.

P524
Prognostic values of new biomarkers in patients with AL amyloidosis

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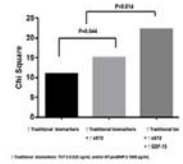
Background Cardiac involvement is the most important prognostic marker in light-chain amyloidosis (AL). Revised Mayo staging, which is widely used staging system for prognosis in AL amyloidosis incorporated N-terminal pro-brain natriuretic peptide (NTproBNP) and troponin T (TnT) because of importance of cardiac involvement. Soluble suppression of tumorigenicity 2 (sST2), growth differentiation factor 15 (GDF15), and osteopontin (OPN) are currently emerging biomarkers in acute and chronic heart failure patients.
Purpose We investigated additive prognostic values of new biomarkers, sST2, GDF15, and OPN for overall mortality in AL amyloidosis.
Methods Levels of sST2, GDF-15, and OPN were assessed at time of diagnosis in 73 AL amyloidosis from 2010 to 2015. All patients were biopsy-proven amyloidosis confirmed by Congo red staining and immunohistochemistry of any tissue specimen. AL amyloidosis was diagnosed when at least 1 antibody stained the amyloid deposits (anti- lambda light chain, anti-kappa light chain). Cardiac involvement was defined by the presence of amyloid deposits on endomyocardial biopsy (n=50, 69%). Primary endpoint was all cause mortality. All patients underwent baseline assessment including 12-lead electrocardiogram, transthoracic echocardiography, and blood sampling.
Results During median follow-up duration of 18.0 (12.4-28.1) months, a total of 25 deaths occurred. sST2 and GDF-15 showed satisfactory predictive performances for both one-year and overall survival from ROC analysis and best cut-off values were selected. Elevated sST2 and GDF-15 levels showed significant incremental prognostic values in addition to NT-ProBNP and TnT for overall mortality (Figure 1). Patients were assigned 1 point for elevated sST2 or GDF-15. The mean values of NT-proBNP, TnT, mean LV wall thickness, and septal e' velocity differed significantly according to the scores (Figure 2). Patients with higher scores showed significantly worse prognosis even in patients with advanced revised Mayo staging (Figure 3). Conclusion sST2 and GDF-15 showed satisfactory prognostic value for overall survival of AL amyloidosis patients. Furthermore, sST2 and GDF-15 showed additive incremental values over conventional biomarkers and further discriminated prognosis of patients in advanced stages.

Figure 1.



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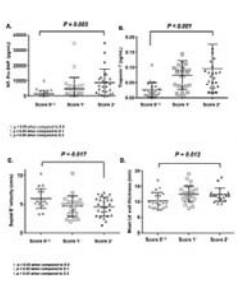

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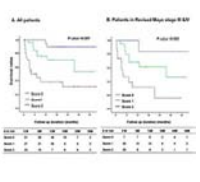

P525
Nitric oxide and kinins system plasma levels in patients with chronic Chagas heart disease and systemic arterial hypertension

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Background. Nitric oxide (NO) is one of the most important metabolic modulators of blood pressure and cardiovascular function. Its production can be stimulated by bradykinin, the main peptide generated by the kinins system (KS), as well as by inflammatory mediators such as cytokines. Purpose. Considering that, 30% to 40% of patients infected with T. cruzi develop chronic Chagas' Heart Disease (CCHD), and in previous studies, we observed increased cytokines serum levels in patients with CCHD and systemic arterial hypertension (SAH) (CCHD-SAH), the aim of this study was to determine the potential association between NO and the KS in patients with CCHD-SAH.
Methods. About 15 patients with CCHD, 22 with CCHD-SAH, 11 with SAH without Chagas disease, and 28 controls matched by age and sex were included in this study. The KS activity was assessed by kininogen levels, enzymatic activities of kallikreins, and kininase II (Kin II). The concentration of low molecular weight kininogen (LKg), high molecular weight kininogen (HKg), and NO were determined by ELISA. The activity of tissue kallikrein (Tkal), plasma kallikrein (Pkal) and Kin II were assessed by their activity upon selective specific substrates. A quantitative detection kit of nitrate and nitrite concentrations using colorimetric assay determined nitric oxide. Results. We observed increased plasma levels of all variables of the KS in patients with CCHD-SAH when compared with those with CCHD and controls (p<0,001). NO plasma levels were also higher in patients with CCHD-SAH and in those with CCHD in comparison with controls (p<0,001). No difference was observed between CCHD-SAH and CCHD patients regarding NO plasma levels. Median values observed in different groups are as follows: SAH (LKg: 0.7uEqBK/mL; HKg: 0.45uEqBk/mL; KinII: 0.75umLHis-Leu/mL; Tkal: 1.89uMPNa/mL; Pkal: 1.5U/mL; NO: 0.7umol/L). CCHD (LKg: 0.3uEqBK/mL; HKg: 0.4uEqBk/mL; KinII: 1.04umLHis-Leu/mL; Tkal: 2uMPNa/mL; Pkal: 1.55U/mL; NO: 1.6umol/L). CCHD-SAH (LKg: 0.15uEqBK/mL; HKg: 0.2uEqBk/mL; KinII: 0.8umLHis-Leu/mL; Tkal: 2.5uMPNa/mL; Pkal: 2.3U/mL; NO: 1.45umol/L). Control (LKg: 1uEqBK/mL; HKg: 0.6uEqBk/mL; KinII: 1.4umLHis-Leu/mL; Tkal: 1.3 5uMPNa/mL; Pkal: 1U/mL; NO: 1umol/L). Conclusion. In this study, we observed increased KS activity in CCHD-SAH compared to CCHD, in those with SAH, and in controls. Plasma levels of NO were higher in CCHD-SAH and CCHD patients in comparison with controls, but not between both groups. These data allow a better understanding of the inflammatory mechanisms occurring in patients with CCHC-SAH, thus suggesting a potential role for both the KS and plasma NO in the pathogenesis of patients with this condition.

P526
Late gadolinium enhancement at right ventricular insertion points, in subjects with structurally normal hearts, is prognostically irrelevant

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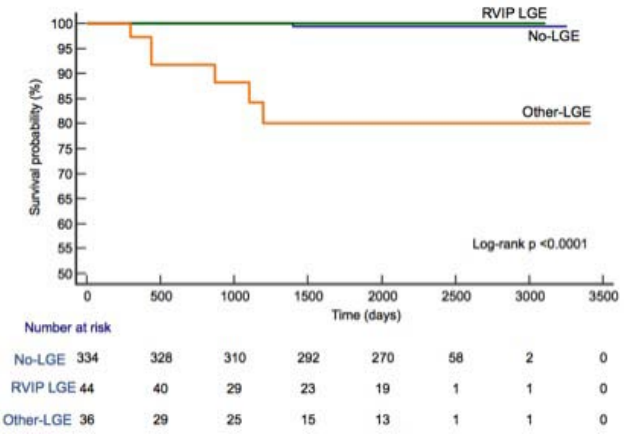
Aims: Late gadolinium enhancement (LGE) is the current non-invasive gold standard for fibrosis assessment. Diagnostic and prognostic significance of different LGE patterns have already been described but the clinical importance of isolated right ventricular insertion points (RVIP) LGE is yet to be defined.Methods and results: We retrospectively analyzed 420 patients (270 males, mean age 38±17 years) with structurally normal hearts except for the presence of RVIP-LGE (44 patients), other-LGE (midwall or subepicardial; 36 patients) or no-LGE (340 patients). Clinical follow-up was performed for a median of 2177 days. Primary composite endpoint included cardiac death, resuscitated cardiac arrest, and appropriate implantable cardiac defibrillator shock.
Prevalence of cardiac events was significantly lower in RVIP-LGE than those with other-LGE (p=0.006). Kaplan Meier curve analysis demonstrated no significant differences between patients with RVIP-LGE and no-LGE for the primary endpoint. On contrast, patients with other-LGE had worse prognosis than those with RVIP-LGE or no-LGE (p<0.0001). Among patients with other-LGE, midwall pattern of LGE distribution was associated with worse prognosis than subepicardial one (p =0.0044).
Conclusions: RVIP-LGE in subjects without additional evidence of cardiac damage does not convey worse prognosis when compared with subjects without LGE and it is therefore not to be considered a marker of disease. Its diagnostic and prognostic significance is to be considered irrelevant.



Primary endpoint Kaplan-Meier curves

Pulmonary Circulation, Pulmonary Embolism, Right Heart Failure

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Delayed diagnosis of Idiopathic Pulmonary Hypertension in woman with heart failure.

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Introduction Idiopathic Pulmonary Arterial Hypertension (IPAH) is a rare condition which usually presents with the nonspecific symptoms in which shortness of breath takes the first place. We present a case of a patient with the delayed diagnosis, whose first symptoms were cough and shortness of breath.
Purpose
To show the importance of early recognition and treatment of pulmonary hypertension.
Clinical case
A 36-year-old woman presents to our department with the one year history of cough and progressive shortness of breath. Her primary care physician assessed the X-ray and ECG as inconclusive one year ago and the patient‘s cough was connected with the occupational exposure at work and the trial of antihistamines were prescribed. The patient‘s condition continued to deteriorate. After several months she was admitted to the infectious clinic because of jaundice. Diagnosis of chronic Hepatitis C, 3a genotype, was established and woman underwent 3 months treatment with sofosbuvir and daclatasvir. Shortly after the treatment she was admitted to our clinic. On physical examination the patient was pale with mild acrocyanosis, marked leg edema, breathless at rest with the RR of 26 and mildly confused. The ECG showed right ventricle hypertrophy. On ECHO- RV size-6.0cm (N-0.5-2.8), RV EF<30%, LV EF-64%, marked tricuspid regurgitation with TAPSE-0.6cm (N>2.0). The right heart catheterization measured the mean pulmonary artery systolic pressure of 69 mm Hg, PCWP 7 mm Hg, PVR 2058,1 dyn.sec/m5. NT-pro-BNP was 9188 pg/ml. USG showed moderate ascites. Total bilirubin-52.0 mcmol/L (with indirect-27.1 mcmol/L). ALT 14,3, AST 29,8 mcmol/L. 6 MVT -195 meters with SaO2 98% at rest and exertional desaturation 89%. The diagnosis of IPH WHO FC III, high risk was made and the patient started with the specific treatment with inhaled Iloprost and oral Sildenafil, symptomatic treatment of congestive heart failure with furosemide and thorasemide. After 6 months of treatment patient admits the improvement of her symptoms. WHO FC from III to II and became euvolemic. NT-pro-BNP was 6034 pg/ml. On ECHO- RV size-5.6cm, TAPSE 1.5cm. 6 MVT-306 meters. Total bilirubin 16.6 mcmol/L. But the patient remained at high risk and the treatment with bosentan was added.
Conclusion Although Pulmonary Arterial Hypertension is not common condition the physicians from different areas should be aware of its most common symptoms and consider it after the common illnesses are excluded. The primary care providers should learn how to define early ECG and ECHO changes of PH early to avoid the progression of the disease to the terminal state.

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Prevalence of adverse pronostic factors in pulmonary hypertension

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Pulmonary hypertension (PH) is a multi-factorial condition associated with high morbidity and mortality. This requires for its diagnosis and treatment a multidisciplinary approach. There have been many advances in the epidemiological, pathophysiological and therapeutic knowledge of the disease in the past decades. However, there is little information available regarding clinical and prognostic factors in patients diagnosed with PH in Latin America.
Purpose: Determine the prevalence and clinical characteristics of adverse prognostic factors in a population with recent diagnosis of PH.
Methods: Patients with recent diagnosis of PH (< 7 days), confirmed by right heart catheterization, with a mean pulmonary-artery pressure (MPAP) ≥ 25 mm Hg (using a Swan Ganz Catheter) from three heart failure and pulmonary hypertension services were analyzed between March 2012 and December 2018. According to the recommendations of international guidelines, the following data were recorded: Personal data; PH group (G); clinical features: symptoms, functional class (FC); Direct hemodynamic parameters: pulmonary pressures (PP), wedge pressure (WP), right atrium pressure (RA) and cardiac index (CI); Functional: 6 minute walk (6MW) test distance; Echocardiographic variables: right ventricle systolic function (RVSF), systolic pulmonary pressure and presence of pericardial effusion (PE). Data obtained weas analyzed with STATA 14 program. Adverse prognosis factors identified were: history of heart failure (HF), syncope, advance functional class (III-IV), performance in the 6MW test < 440 m, presence of PE, RA ≥ 14 mm Hg e CI ≤ 2,2 litres/min/mt2
Results: Multicenter, observational, descriptive, consecutive and prospective study. 148 patients were included, from which 75% were women. Mean age was 57.8 (±19) years, 27% ≥ 70. The mean delay in diagnosis was 23 months after the first sign or symptom recorded. PH group distribution: GI 68%, GII 13%, GIII 7%, GIV 6% and GV 6%. FC of presentation: I 4%, II 39%, III 36% and IV 21%. History of HF in 79%, syncope in 24%. 6MW mean walked distance was 317 (±144) meters, 74% performed ≤ 440 meters. RHC: MPAP 48 (±16) mm Hg, RAP 9 mm HG (±5) and ≥ 14 mm Hg 19 %; CI 2,8 litres/min/mt2 (≤ 2,2 22%). Ecocardiographic data showed: 80 % impaired FSVD (40% slight, 19% moderate and 21% severe) and PE in 25%.
Conclusions: In our population with confirmed pulmonary hypertension, with a group I predominance, we had a high prevalence of presentation in patients over 70 years of age. At diagnosis time a high number of patients presented adverse prognosis factors. These findings remark the need of using early diagnosis and therapeutic strategies.

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Pulmonary arterial hypertension associated with corrected CHD vs Eisenmenger syndrome.

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Background: Up to now question about necessity and advisability of surgical correction of borderline (operable/inoperable) left to right shunts congenital heart defects (CHD) remains a big problem. Due to recent dates children with pulmonary arterial hypertension (PAH) after CHD repair may have worse outcome than other forms of PAH.
Purpose: to compare disease course and quality of life in patients with PAH after CHD correction and Eisenmenger syndrome (ES).
Methods: from January 2012 up to August 2018 81 children’s were under observation in our center. Median age - 10,5 years (range 6 - 18 years). Boys 49 (60%), girls - 32 (40%). PAH was diagnosed according to ESC guidelines. For all patients standard clinical investigations, pro-BNP levels, 6-minute walk test (6-MWT) were performed every 6 month during follow-up. We have used PedsQl for estimation physical, emotional, social QoL aspects and school functioning. Mean follow-up period was 3,5 year (range 1-7 years).
Results: patients were devided for 2 groups: I - PAH after defect correction (37%), II - ES (63%). Patients with ES had worst exercise capacity at first admission 352 ± 83 m vs 392 ± 105 m in I group (p<0,005), but slow desiase progression. Patients in I group demonstrated rapid deterioration: during 3 year follow-up mean 6-MWT decrease was 24 ± 11,8 m/year, in ES patients - 13,5 ± 8.7 m (p<0,003). In contrast pro-BNP level increased averagely on 12 ± 7.8 pg/ml and 23.8 ± 10.1 pg/ml in ES and patients with PAH after defect closure respectively (p<0,003). Total QoI score in I group was significantly lower - 48,4 ± 3,8 scores vs. 60,78 ± 6,9 scores in patients with Eisenmenger syndrome (p<0,001). Analysis of QoL different aspects showed significantly lower scores in emotional and social scales in patients with PAH after defect correction (I group): emotional - 47.8 ±4.9 vs. 61.4 ± 10.1 in ES (p<0,005); social scale - 54.4 ± 7.6 and 62.2 ± 5.8 in I and II group accordingly. We didn’t find any significant difference in physical scale between two groups - 54.1 ± 4.9 and 58.6 ± 7.1 in I-st and II-nd group accordingly.

Conclusion: We receive convincing evidence that desiase course characterized by significuntly rapid
progression in patients with PAH after defect correction than in ES patients. Quality of life in this group was also significantly lower than in patients with Eisenmenger syndrome (p<0,001), especially in emotional and social aspects. Further evaluation is required for determine optimal operability criteria and time of correction.

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Lactate predicts short-term mortality in acute pulmonary embolism more accurately than shock index and modified shock index.

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Background: Increasing blood lactate concentrations are more closely related to outcome than blood pressure, particularly in sepsis. Shock index (SI) and modified shock index (MSI) have been shown to predict adverse prognosis in severe trauma, heart failure, and acute coronary syndromes. Data on lactate, SI and MSI as prognostic factors in acute pulmonary embolism (PE) are scarce.
Purpose: We aimed to (1) evaluate whether blood lactate, SI and MSI are associated with short-term mortality in acute PE patients; (2) determine the correlation between lactate concentration and SI and MSI; and (3) compare the prognostic accuracies for short-term mortality of lactate, SI and MSI in acute PE patients.
Methods: We retrospectively reviewed 483 consecutive patients admitted for acute PE in one single emergency department (ED) along 3 years until December 2016. Lactate concentration on arterial blood collected within the first 6 hours after ED admission was recorded. SI was defined as the ratio of heart rate to systolic blood pressure (SI=HR/SBP), and MSI was defined as the ratio of heart rate to mean arterial blood pressure (MSI=HR/MAP). Outcome was all-cause 7-day mortality. Differences in lactate, SI and MSI between non-survivors and survivors groups were analysed by $\chi 2$ (chi-square) test. Correlation of lactate to SI and to MSI was evaluated by Pearson correlation coefficient. Prognostic accuracy for all-cause 7-day mortality of lactate, SI and MSI was performed by C-statistical analysis.
Results: Among the 483 acute PE patients comprising study population, mean age was 66.3 ± 17.6 years and 40% (n=192) were male. Mean lactate concentration was 1.65 ± 1.14 mmol/L. Mean SI was 0.73 ± 0.24 and mean MSI was 1.01±0.33. All-cause 7-day mortality was 9.9% (n=48). Compared to survivors, non-survivors had significantly higher lactate concentration (6.80 ± 5.02 mmol/L in non-survivors, vs. 1.96 ± 1.59 mmol/L in survivors, p <0.001), SI (0.97 ± 0.36 in non-survivors vs. 0.71 ± 0.23 in survivors, p <0.001), and MSI [1.33 ± 0.55 in non-survivors vs. 0.97 ± 0.28 in survivors, p <0.001). Lactate had a significantly positive correlation with SI (r=0.353, p<0.001) and MSI (r=0.370, p<0.001). Prognostic accuracy for all-cause 7-day mortality of lactate, SI and MSI was as follows: lactate (AUC=0.856, CI 95% 0.788-0.923, p<0.001), SI (AUC=0.721, CI 95% 0.639-0.803, p<0.001), MSI (AUC=0.720, CI 95% 0.639-0.803, p<0.001). Lactate concentration >2.12 was the optimal cutt-off point (Youden´s index) for prediction of all-cause 7-day mortality (sensitivy=81.1%, specificity=71.5%).
Conclusions: In our analysis, higher lactate concentration, SI and MSI are all associated with higher short-term mortality in acute PE patients. Lactate prognostic accuracy for short-term mortality is superior to SI and MSI prognostic accuracies. Our study supports the role of lactate, SI and MSI as prognostic factors in acute PE.

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SaO2/FiO2 ratio is associated to short-term outcome in acute pulmonary embolism

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Background: SaO2/FiO2 ratio is an indicator of oxygenation status and has been shown to predict adverse outcome in some acutely-ill populations, such as septic patients. However, SaO2/FiO2 ratio is not so widely used in respiratory dysfunction assessment as the PaO2/FiO2 ratio. We aimed to know whether SaO2/FiO2 ratio and PaO2/FiO2 ratio are associated to prognosis in acute pulmonary embolism (PE).
Purpose: (1) To assess the association between acute short-term prognosis in acute PE patients and SaO2/FiO2 ratio and PaO2/FiO ratio; and (2) to examine correlation between SaO2/FiO2 ratio and PaO2/FiO ratio in acute PE patients.
Methods: We retrospectively studied 483 consecutive patients hospitalized for acute PE along 3 years. Arterial blood gas analysis was performed within the first 6 hours of hospitalization. SaO2/FiO2 ratio was the quotient between oxygen saturation of arterial haemoglobin and oxygen fraction in inspired air. PaO2/FiO2 ratio was the quotient between oxygen partial pressure in arterial blood gas and oxygen fraction in inspired air. Measured outcome was all-cause 7-day mortality.
Results: Among the 483 acute PE patients comprising study population, mean age was 66.3 ± 17.6 years and 40% (n=192) were male. Mean Pulmonary Embolism Severity Index (PESI) score was 116.9 ± 49.4 points. Mean SaO2/FiO2 ratio was 348.3 ± 114.5 and mean PaO2/FiO2 ratio was 272.4 ± 116.8. All-cause 7-day mortality rate was 9.9% (n=48). Non-survivors had significantly lower SaO2/FiO2 ratios (267.5 ± 139.7 in non-survivors vs 356.2 ±108.8 in survivors, p=0.002). On the other hand, PaO2/FiO2 ratio was not significantly different between non-survivors and survivors (p=0.195). SaO2/FiO2 and PaO2/FiO2 had a good correlation (r=0.714, p<0.001). In acute PE patients with SaO2/FiO2 <200, all-cause 7-day mortality rate was 23.8%, and significantly higher than patients with SaO2/FiO2 ≥200 (p=0.002). In acute PE patients with SaO2/FiO2 200-299, 300-399, and ≥400, all-cause mortality rate at 7 days was 11.7%, 4.7% and 5.5%; however, these mortality rates did not significantly differ from the remaining patients (p=0.455, p=0.455 and p=0.052, respectively).
Conclusions: Short-term mortality was higher in acute PE patients with lower SaO2/FiO2 ratio. All-cause 7-day mortality was as high as 23.8% in SaO2/FiO2 ratio <200. SaO2/FiO2 ratio is well correlated to PaO2 ratio. Our study suggests SaO2/FiO2 ratio within the first hours of hospitalization may be useful in prognostic assessment of acute PE patients.

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Pattern of anticoagulation therapies in pulmonary embolism in the current era of non antivitamin k anticoagulants (NOACs); experience of a tertiary emergency care hospital.

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On behalf of: Emergency Clinical Hospital Floreasca

Introduction NOACs have emerged in the recent years as an useful alternative to unfractionated heparin (UFH)/vitamin K antagonists (VKAs) in non-high risk pulmonary embolism (PE), therefore we aimed to assess weather physicians from a tertiary emergency care hospital are prescribing NOAC in PE more lately compared with times when there was less evidence from studies.
Methods We conducted a retrospective study from 2014 to 2017, including all patients admitted for PE in a tertiary care emergency hospital. We retrieved demographic, clinical and treatment pattern data from the electronic charts. They were divided according to the period they were admitted in the E group (early, 2014-2016) and the L group (late, 2017). High risk (HR) PE was defined as shock/hypotension while all other cases as non HR PE.
Results We included in the study 339 patients with PE, 219 (64.6%) in the E (48.8% men, mean age 61.7±16.4 years) and 120 (35.4%) in the L (51.6% men, mean age 65.4±15.8). During hospitalization, in the non HR PE, 19.3% received NOAC in the E versus 16.6% in the L (p=0.59), 73.2% received UFH in the E versus 64.4% in the L (p=0.13) and 7.3% received LMWH in the E versus 15.5% in the L (p=0.03). In the HR PE, 96% received UFH in the E versus 77.2% in the L (p=0.054), 4% received LMWH in the E versus 22.8% in the L (p=0.054). At discharge, in the non HR PE, patients were recommended NOACs in 26.8% of case in the E versus 57.3% in the L (p=0.000001) while VKAs were recommended in 70.8% in the E versus 37% in the L (p<0.001). In the HR PE patients the recommended anticoagulant at discharge was VKA in 100% in the E versus 89.4% in the L. LMWH was recommended in 2.4% in the E versus 5.7% in the L (p=0.15) in non HR PE, while in HR PE in 0% in the E versus 10.6% in the L.
Conclusion Our results show that NOACs are becoming more popular as a first choice anticoagulant in the settings of non HR PE while UFH remains the first choice during hospitalization. NOACs however became the first choice for long term anticoagulation of non HR PE. In HR PE UFH remains the first choice for anticoagulation in the acute settings while AVK is the most frequent choice for long term secondary prevention.

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Pre-hospital thrombolysis of high-risk pulmonary embolism- patient characteristics, management and outcome

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Funding Acknowledgements: Helsinki University Hospital, department of emergency medicine and services

Background: Massive, high-risk pulmonary embolism (PE) is manifested by shock or cardiac arrest. Rapid reperfusion is the key of therapy but data on prehospital thrombolysis are scarce.
Purpose: To assess the safety and outcome of prehospital thrombolysis of suspected high-risk PE.
Methods: All patients with clinically suspected PE treated with intravenous thrombolysis (92% tenecteplase) by EMS (prehospital emergency medical services) were

collected from EMS registry and hospital database. Diagnosis was confirmed in emergency department or by autopsy.
Results: Twelve patients were included. Characteristics, management and outcome are shown in Table. Eight (67%) had cardiac arrest and were resuscitated before thrombolysis. Four (33%) had cardiogenic shock. Five out of 8 resuscitated patients survived to hospital where two of them died. All three patients who suffered cardiac arrest at scene after arrival of EMS died whereas those with initial VF or PEA (2) survived to hospital. Altogether, five (42%) died.
Conclusions: Mortality of prehospitally suspected PE is high. Prehospital thrombolysis of PE may be life-saving and seems safe.

Initial clinical picture and outcome

	All	Alive to hospital	Died at scene
Patients, nAge, yearsWomen	1257(13) 6 (50)	954 (15) 4 (44.4)	365 (3) 2 (66.7)
Cardiac arrest Initially After arrival of EMSCardiogenic shock before thrombolysis Systolic blood pressure (mmHg)Initial rhythm of cardiac arrest Ventricular fibrillation VF Pulseless electrical activity PEA	8 (66.7) 3 (37.5) 5 (62.5) 4 (33.3) 80 (13.6) 1 (12.5) 7 (77.5)	5 (62.5) 3 (100) 2 (20) 4 (100) 80 (13.6) 1 (20) 4 (80)	3 (37.5) 03 (100) 0N.A 03 (100)
EMS arrival from dispatched alert (min)Time from arrival to thrombolysis (min)	9 (3) 34 (23)	9 (3)36 (26)	7 (3) 26 (9)
Resuscitated ROSC (min)Died, total Died after arrival to hospital	8 (66,.7) 23 (18.8) 5 (41.7) 2 (16.7)	5 (55.6) 23,3 (18.8) 2 (22.2) 2 (100)	3 (100) N.A 3 (100) 0

Numbers are given mean (SD) or n (%). N.A, non-applicable.EMS, Emergency Medical Services. ROSC, return of spontaneous circulation.

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Clinical and hemodynamic 5-year mortality predictors in patients with pulmonary hypertension

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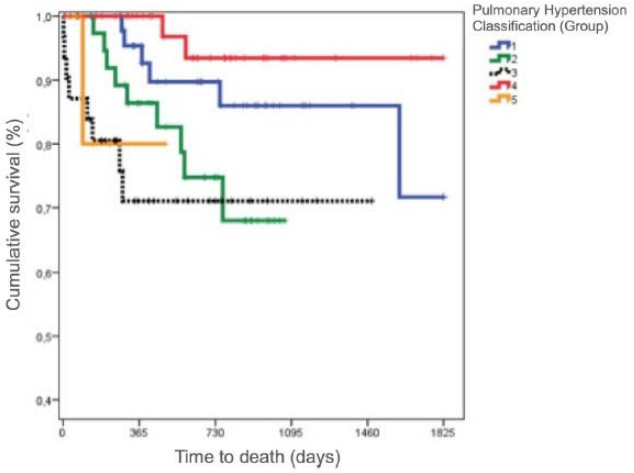
Introduction: Pulmonary hypertension (PH) is associated with high morbidity and mortality rates, making early prognostic stratification essential. Although several predictors of mortality have already been established, the emergence of novel therapies and the evolution in the management of these patients makes it urgent to reassess and validate prognostic markers.
Purpose: To ascertain clinical and hemodynamic 5 year mortality predictors in patients with the diagnosis of PH.
Methods: It was made a retrospective single center study (PH reference center) of consecutive patients with hemodynamic diagnosis of PH. At diagnosis demographic and clinical data [WHO functional class and presence of right-sided heart failure (HF) signs], non-invasive diagnostic tests [6-minute-walk test (6MWT) and carbon monoxide diffusion capacity (DLCO)] and hemodynamic parameters [right atrial pressure (RAP) and mean pulmonary artery pressure (MPAP)] were collected. The association of these variables with any cause 5-years mortality was evaluated using Kaplan-Meier survival analysis and Cox regression analysis.
Results: A total of 176 patients were included, 69.9% (N = 123) female, with a median age of 68 years (IQR: 24). Based on the clinical classification, 28.4% (N = 50) belonged to group 4, 27.3% (N = 48) to group 1, 23.3% (N = 40 to group 2, 17.6% (N = 31) to group 3 and 3.4% (N = 6) to group 5. The 5-year mortality rate from any cause was 27.3%. Were identified as predictors of mortality being of male gender (p <0.001) and had group 2, 3 and 5 PH (p 0.017, p 0.004, p 0.042; versus group 4 and 1).
Conclusion: In this study, male sex and group 2, 3 and 5 PH were identified as 5 year mortality predictors. These results allow the identification of patients groups who may benefit from earlier multidisciplinary therapeutic interventions.



P536
Acute hemodynamic effects of inhaled nitric oxide during right heart catheterization in cardiac transplant candidates with and without pulmonary hypertension

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Background and Aim
Right heart catheterization (RHC) should be performed on all candidates evaluated for cardiac transplantation (CT) since elevated pulmonary vascular resistance (PVR) is associated with right heart failure and mortality after CT. A vasodilator challenge is recommended for those with pulmonary hypertension (PHT), to assess the reversibility of PVR. The effects of inhaled nitric oxide (NO) on pulmonary and systemic hemodynamics have been reported only in small series. Our purpose was to describe the response to NO in this population.
Population and Methods
From 167 right heart catheterization procedures performed between 2010 and 2018, vasodilator challenge with inhaled nitric oxide (NO) was used in 88 patients, of which 60 had end-stage cardiac disease under evaluation for CT (55±11 years old; 72% male gender; 42% with ischemic cardiomyopathy; LVEF 30±12%; peak VO2 of 11.9±3.1; 63% with systolic PAP≥50 mmHg). NO was administered through a tight-fitting facial mask at a mean dose of 34±10 ppm, regardless of baseline pulmonary pressure. LV pressures were measured simultaneously in all but 3 cases. Cardiac output was measured using the Fick method. Pressure measurements were made at end-expiration.
Results There were no relevant side effects of NO administration. Hemodynamic profiles at baseline and after NO are represented in Table 1. In summary, typical response consisted of a reduction in PVR, concordant with an increase in both PCWP and LV end-diastolic pressures and no significant change in mean pulmonary artery pressure (resulting in a lower mean transpulmonary gradient). Cardiac index and systemic vascular resistance were unaffected (p=NS). PVR fell to < 5 Wood units with NO in 11/20 pts with higher baseline PVR; in 2 cases (3.3%) PVR increased paradoxically. Patients with hypertrophic cardiomyopathy (n=13) displayed higher PVR (mean 5.4 ± 1.5; p<0.01), but responded similarly to NO.
Conclusions Inhaled NO is safe and produces a reasonably predictable response in patients undergoing vasodilator challenge prior to heart transplant listing. As opposed to patients with predominant type 1 pulmonary hypertension, the absence of significant reductions in pulmonary artery pressures may not mean that the PVR is fixed.

Table 1. Hemodynamic profile at baseline and during inhaled Nitric Oxide (NO)			
Variable (mmHg)	Baseline	NO	p
PAP systolic	58.7 ± 18.3	56.3 ± 16.6	0.01
PAP diastolic	26.6 ± 7.6	26.4 ± 7.7	0.79
PAP mean	39.6 ± 11.0	38.4 ± 10.5	0.05
PCWP (mean)	26.0 ± 7.5	30.3 ± 9.5	<0.01
LVEDP	23.3 ± 9.1	25.8 ± 10.4	<0.01
Mean TPG	13.5 ± 7.3	8.1 ± 6.0	<0.01
PVR (Wood Units)	5.0 ± 3.4	2.9 ± 2.5	<0.01
Cardiac Index (L/min/m2)	1.6 ± 0.4	1.76 ± 0.6	0.06
SVR (dynes*cm5/seg)	1861 ± 756	1902 ± 772	0.28

Risk factors and prevention

P537
Asian Diabetes Outcome Prevention Trial (ADOPT)

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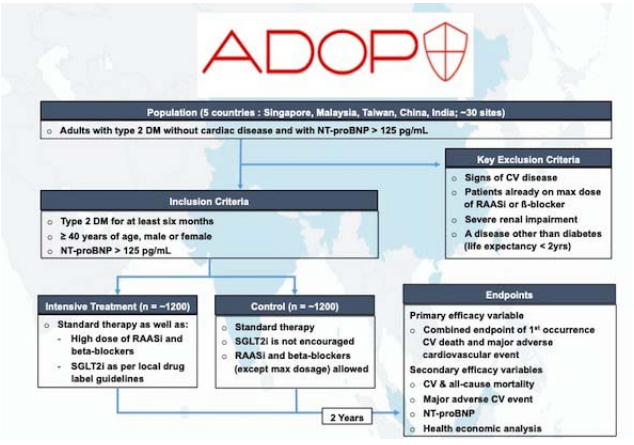
On behalf of: ADOPT Investigators
Funding Acknowledgements: National Medical Research Council of Singapore, Roche Diagnostics Switzerland

Background: Cardiovascular (CV) events are the leading cause of death among patients with type 2 diabetes (DM). Early biomarker-based identification of high-risk patients with DM for intensive preventive therapy (high dose renin-angiotensin-aldosterone system inhibitors [RAASi], beta-blockade and sodium-glucose co-transporter 2 inhibitors [SGLT2i]) may prevent CV events. No previous CV outcome trial has tested the strategy of targeting a high-risk DM population using biomarkers for primary prevention.
Purpose: Among biomarker (N-terminal pro-B-type natriuretic peptide, NT-proBNP)-identified high-risk DM patients without pre-existing CV disease, to test whether intensive preventive therapy (RAASi, beta-blockers, SGLT2i) may be associated with reduced cardiovascular events, compared to standard of care.
Method: Asian Diabetes Outcome Prevention Trial (ADOPT) is a prospective multinational randomized open-label, parallel group, active-controlled, two-arm, long-term morbidity and mortality trial involving 5 countries (Singapore, Malaysia, China, Taiwan, India; estimated 6 sites each) with patients followed for 2 years. The target population are adults with type 2 DM without CV disease (defined as history of coronary heart disease [prior myocardial infarction of significant coronary artery disease] or heart failure [reduced ejection fraction or hospitalization for heart failure]) and with NT-proBNP>125 pg/mL. Approximately 3000 patients to be screened to achieve the target of 2400 patients randomized. Patients will be randomized to either (1) Intensive Treatment group (high dose of RAASi and beta-blockers as well as SGLT2i) on top of standard therapy; or (2) Control group (standard of care). The primary endpoint is the combined endpoint based on the first occurrence of CV death and CV hospitalization.



ADOPT flow chart

Significance: Recruitment is expected to occur between March 2019 – March 2021. The trial is event driven, with total expected trial duration of four years (two years recruitment, two years follow-up). Results of this trial will present a treatment strategy that may change management of patients with DM in Asia, improve patients' outcomes and healthcare costs.

P538
Combined therapy with rosuvastatin and ezetimibe on inflammatory state and pro-inflammatory cytokines in patients with coronary heart disease and metabolic syndrome

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Background: Aim of the study was to investigate the influence of combined lipid lowering therapy with rosuvastatin and ezetimibe on lipid profile, inflammatory state and pro-inflammatory cytokines in dyslipidemic patients with coronary heart disease (CHD) and metabolic syndrome (MS).
Methods: 128 patients with CHD and MS were randomly divided into two groups per 64. First group was provided rosuvastatin (10 mg) + ezetimibe (10 mg) and the second group (control) was provided only rosuvastatin (10 mg). Plasma lipids, inflammatory state (hs-CRP), and pro-inflammatory cytokines (IL-1β, IL-6, TNF-α) were measured at baseline and in 12 weeks.
Results The level of TC, LDL-C was decreased significantly in combination group than controls (P<0.05), however there was not significant difference between 2 groups on HDL-C (P>0.05). Hs-CRP was decreased by 38% in the first group (P=0.003) vs. 31% in control group (P=0.005) from baseline, however there was no obvious changes between 2 groups. Even though, pro-inflammatory cytokines: TNF-α (from 1.42±0.98 to 0.87±0.18 in 12 weeks, P=0.018), IL-6 (from 7.8 pg/mL to 4.1 pg/mL, P=0.012), IL-1β (from 28.4±19.5 pg/ml to 17.5±15.8 pg/ml, P=0.010) in the combination group vs. TNF-α (from 1.48±1.12 to 1.12±0.25, P=0.047), IL-6 (from 8.0 pg/mL to 5.9 pg/mL, P=0.037), IL-1β (from 29.6±20.6 pg/ml to 20.6±17.4 pg/ml, P=0.040) significantly decreased in both groups from baseline however, there were statistically significant changes observed only in the first group (P<0.05) when compared two groups.
Conclusions: Therapy with rosuvastatin and ezitemibe is superior than rosuvastatin alone to improve TC, LDL-C and pro-inflammatory cytokines in patients with CHD and MS.

P539
Nesfatin-1 activity in hypertensive obese patients changes with the duration of hypertension

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Background: Nesfatin-1 was discovered in 2006 as a satiety peptide produced by hypothalamus and adipose tissue mainly. It was found that activity of nesfatin-1 may be related to the occurrence of hypertension, obesity, type 2 diabetes mellitus and thereby affect the cardiometabolic risk. However, the mechanisms which lead to progressive deterioration after long-term hypertension remain unclear.
Objective: The study aimed at identifying the relationship between nesfatin-1 activity and duration of elevated blood pressure in patients with arterial hypertension and abdominal obesity.
Methods: 83 patients with essential hypertension and abdominal obesity were divided by known hypertensive anamnesis into group A (< 5 years of hypertension), group B (5-10 years) and group C (> 10 years). The control group D consisted of 12 healthy individuals. The levels of nesfatin-1 (ng/ml) as well as parameters of carbohydrate and lipid metabolisms were determined by enzyme immunoassay method. Obtained data were analyzed with the methods of nonparametric statistics by Statistica10.0 software with the significance (p) < 0.05.
Results: The hypertensive patients had higher nesfatin-1 levels compared with the control group (7.51 [6.76;8.17] vs 4.53 [4.23;4.87], p < 0.001). Short-term hypertension was associated with higher activity of nesfatin-1 (7.74 [7.40;8.12]) compared with results of the group B (7.41 [6.70;8.10], p = 0.007) and the group C (7.21 [6.44;8,07], p = 0.04).
Cardiometabolic features of the group A showed lower levels of fasting glucose compared with both, B (p = 0.04) and C (p < 0.001), postprandial glucose compared with the group C (p < 0.001), higher levels of insulin compared with the group B (p = 0.007), higher index of insulin resistance HOMA-IR than in the group C (p = 0.009), lower index of β-cell activity HOMA-β than in groups B (p < 0.001) and C (p < 0.001) and higher levels of triglycerides compared with the group C (p < 0.001).
Nesfatin-1 correlated with systolic (r = 0.475; p < 0.01) and diastolic blood pressure (r = 0.486; p < 0.01), fasting glucose (r = 0.601; p < 0.001), insulin (r = 0.325;

p < 0.01), index of insulin resistance HOMA-IR (r = 0.334; p < 0.01), index of β-cell activity HOMA-β (r = -0.566; p < 0.001) and triglycerides (r = 0.431; p < 0.001) in patients with short-term hypertension (< 10 years) only.
Conclusions: Presence of hypertension is associated with higher levels of nesfatin-1 compared with those in healthy individuals and slight gradual decreasing of its levels with the duration of the disease. In case of concomitant abdominal obesity nesfatin-1 may be involved in metabolic control processes during first years of hypertension.

P540
Anthropometric measurements of central adiposity are superior predictors of heart failure in the general population - data of PREVEND

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Funding Acknowledgements: Netherlands Heart Foundation, Netherlands Organization for Scientific Research, European Research Council

Background: Obese individuals have a greater risk of developing heart failure (HF), and prevalence of both obesity and HF are expected to rise greatly by 2030. However, It is not clearly known whether central obesity confers a greater risk of developing HF compared to general obesity.
Purpose: To evaluate whether associations between obesity and incident HF differ among anthropometric measurements of general and abdominal adiposity.
Methods: Observational study in general population setting; included 8567 community-dwelling individuals from the PREVEND (Prevention of Renal and Vascular ENd-stage Disease) cohort. Mean age = 49 years and 50% women. Measurements include BMI (body-mass index), WC (waist circumference), WHR (waist-hip ratio) and incident HF. HF cases were identified according to HF guidelines issued by the European Society of Cardiology. Cox proportional-hazards models were employed to evaluate the predictive utility of BMI, WC and WHR for incident HF. Models were adjusted for age, sex, classical HF-risk factors, EKG-assessed left ventricular hypertrophy and also for NT-proBNP (N-terminal pro-B-type natriuretic peptide).
Results: WC and WHR are stronger predictors of HF compared to BMI in the general population. During a mean follow-up of 12 years, 373 developed HF. Hazard ratio (HR) for one standard deviation (SD) increase in BMI was 1.47 (95% confidence interval: 1.25-1.72). Corresponding HR for WC was 1.52 (1.23-1.87) and for WHR was 1.59 (1.26-2.02); Pall<0.001. Even after excluding individuals with prevalent cardiometabolic disease, WC and WHR outperformed BMI in predicting HF; HRWC-1.69 (1.11-2.58) and HRWHR-1.66 (1.11-2.48) vs HRBMI-1.47 (1.09-1.99]; Pall<0.05.
Conclusions: Measures of abdominal obesity are stronger predictors of HF compared to general obesity measures. Primary HF prevention strategies should focus on curbing obesity and screening individuals with abdominal obesity.

P542
Diabetes mellitus is a predictor of development of heart failure independent of HTN, CAD and diastolic function: a population based study

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Funding Acknowledgements: National Institutes of Health [R01HL84155, and R01-HL136440]

Background: Diabetes mellitus (DM) is associated with comorbidities such as hypertension (HTN), coronary artery disease (CAD) and diastolic dysfunction (DD) resulting in adverse cardiovascular (CV) outcomes. The impact of DM has on CV outcomes independent of HTN, CAD and DD in the general population is not well defined.
Methods: Cross-sectional survey of 2,042 randomly selected residents of Olmsted County, aged 45 years or older from June 1997 through September 2000. All subjects underwent clinical, echocardiographic and humoral assessment. This cohort included all subjects with DM and were compared to a group of non-DM subjects matched 1:2 for age, gender, HTN, CAD and diastolic dysfunction. Multi-variable proportional hazards regression analysis was applied to identify predictors of heart failure.
Results: 116 subjects with DM were compared to 232 matched non-DM subjects. Subjects with DM had higher BMI (31±5 vs 29±5, kg/m2; p=0.001), plasma insulin (8.5 [5,15]vs 5.8 [4,9], uU/ml; p<0.001), and triglycerides (183±121 vs 146±80,mg/dL p<0.001) as compared to the non-DM subjects. E/e' ratio (9.7±2.9 vs 8.5±2.9, p=0.001) was higher in DM vs non-DM suggesting increased LV filling pressure in DM.
Over a median follow-up of 10.8 years (IQR: 7.8-11.7), DM subjects had higher incidence of CHF, 21% vs 12%; HR 2.13(1.25, 3.62;p=0.012) as compared to non-DM. Using multivariate cox regression analysis adjusted for age and gender, DM was predictive of HF, HR 1.92(1.11, 3.32; p=0.02). We also examined the subgroup of subjects without diastolic dysfunction. In this subgroup of DM subjects and matched non-DM subjects, DM subjects had higher incidences of CHF, HR 2.52 (1.01, 6.27; p=0.04) over 10.9 years.
Conclusions: In this community-based cohort, subjects with diabetes have increased incidence of HF over a 10-year follow up period even in the absence of underlying diastolic dysfunction. These findings suggest that DM is an independent risk factor for the development of heart failure and supports the concept of DM cardiomyopathy.

P543
The receptor for advanced glycation end products and its ligands modulate cardiovascular cell apoptosis in diabetic patients

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Introduction The accumulation of ligands of the receptor for advanced glycation end products (RAGE) and the soluble form of the receptor sRAGE may play key roles in cardiovascular remodeling in diabetic patients.
Purpose: We aimed to determine whether the concentration of RAGE ligands and soluble form present in the serum of individuals with and without type 2 diabetes modulates their pathogenic potential.
Methods: Individuals were stratified according to normal glucose tolerance (control) (n=10, 5 male (M), 5 female (F), mean+SEM age 59.6+1.23 yrs), impaired glucose tolerance (n=10, 5M, 5F, age 59.4+2.2) and type 2 diabetes (n=10, 7M, 3F, age 59.8+1.6). The titers of sRAGE, the RAGE ligands, AGEs (quantified by N-carboxymethyllysine (CML)), S100B, S100A1, S100A6, and the apoptotic marker Fas ligand (FasL) were measured by enzyme-linked immunosorbent assay in plasma. We also measured the apoptotic potential of circulating concentrations of RAGE ligands and sRAGE in cultured rat aortic smooth muscle (AVSMC) and cardiac myocytes (CM).
Results: Circulating levels of RAGE ligands and sRAGE were not different among individuals with normal and impaired glucose tolerance. Type II diabetics had a 3-5 fold increase in circulating CML and FasL compared to individuals with normal or impaired glucose tolerance tests. Type II diabetics also demonstrated an approximate 35-70 per cent decrease in circulating sRAGE, S100B, S100A1 and S100A6 compared to subjects with normal or impaired glucose tolerance. Treatment of AVSMCs or CMs with CML (0.5 μg/mL –quantified in the plasma of type 2 diabetics) for 24 hrs induced cellular apoptosis measured as DNA fragmentation, increased FasL and caspase-3/9 activation, responses attenuated by concomitant administration of sRAGE, S100B, S100A1, or S100A6 at concentrations measured in the plasma of subjects with normal glucose tolerance.
Conclusion: In type 2 diabetes, a decrease in circulating sRAGE may no longer decoy and trap the accumulating deleterious pro-apoptotic RAGE ligands (CML) thereby contributing to diabetic complications including cardiovascular apoptosis.

P544
Impact of antidiabetic treatment on mortality and heart failure readmissions: beyond hipoglucemic effect

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Introduction: In recent years we have witnessed a growing interest on antifiabetic treatment, especially in patients with heart failure (HF), following the publication of the trials EMPAREG, CANVAS and the latest DECLARE, due to the proven benefits of SGLT2 inhibitors (SGLT2i).
Purpose: The aim of our study was to asses the antidiabetic treatment in patients with HF with reduced ejection fraction (HFrEF) and its impact on mortality and cardiovascular events.
Methods: Diabetic patients with a hospitalization due to HF who had HFrEF were consecutively included between september 2016 and april 2018 and then follow-up. A survival analysis was performed using the Kaplan-Meyer method.

Table 1.

Age (years) mean±SD	71.8±11.1
Women n (%)	33 (24.4)
Hypertension n (%)	117 (88)
Dyslipemia n(%)	104 (79.4)
Smokers n(%)	28 (21.4)
Left ventricular ejection fraction mean±SD	29.6±7.0
Charlson index mean±SD	6.6±1.9
HbA1C mean±SD	7.1±6.8
glomerular filtration rate ml/min/Kg mean±SD	62.1±26.7

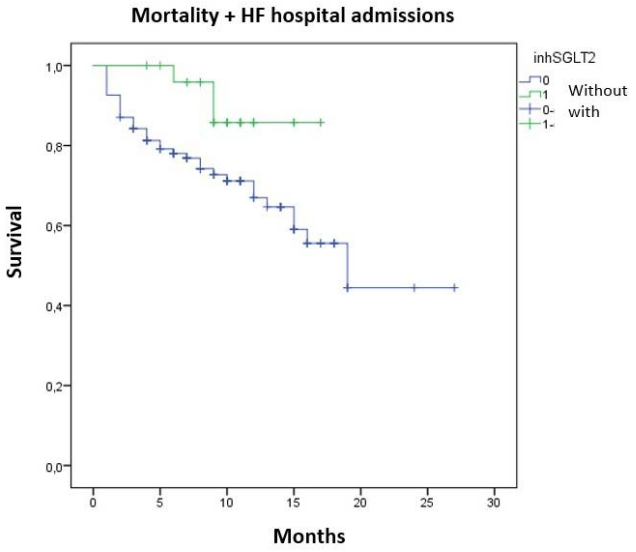

Image 1

Results: Of a total of 453 patients with HFrEF, 135 with type 2 diabetes were included (baseline characteristics are shown in table 1). At discharge the most used antidiabetic drug (AD) was metformin 88 (67.7%), followed by insulin 55 (42.3%). SGLT2i were used only in 26 patients (19.3%), with 34 (26.2%) being treated with other AD. Patients with SGLT2i were younger (65.3 ± 11.1 vs 73.3 ± 10.6 years, p = 0.001), had lower comorbidity (Charlson index 5.8 ± 1.9 vs 6.8 ± 1.9, p = 0.018), better renal function (glomerular filtration rate 71.9 ± 23.9 vs 59.7 ± 26.9 ml /min/1.73m2 p = 0.036) and had higher HbA1c (7.0±1.3 vs 7.6±1.3p=0.024). During follow-up, which was of a median of 12 months (RIQ 8-14.5), the composite endpoint of mortality or HF hospitalization was higher in patients without SGLT2i p = 0.05, analyzed by the method of Kaplan-Meier. The survival graph is shown in Image 1. Furthermore, the use of insuline was a predictor of poor prognosis with higher mortality and more hospitalizations (HR 3.6 95% CI (1.7-7.8) p=0.001)
Conclusion: There is no still enough widespread use of SGLT2i despite of its proven benefit in patients with HF. Treatment with SGLT2i in diabetic patients with HF was associated in our cohort with lower mortality and HF hospitalizations

P545

The incidence of the first onset diagnosed type 2 diabetes mellitus in patients with cardiovascular diseases

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Introduction: The development of type 2 diabetes mellitus (T2DM) and cardiovascular diseases (CVD) is parallel. However, there is a high incidence of undiagnosed diabetes, reaching 45.8% globally, and 20% among patients with heart failure. Undiagnosed diabetes is an unfavorable and expensive condition due to the development of complications for individuals and the health care system.
Purpose: To estimate the incidence of the first onset diagnosed T2DM among patients with CVD.
Methods: The registry included patients ≥40 years with established CVD admitted to the city hospital from 08/01/2018 to 08/31/2018 (n=256). 39.1% (n=102) patients had the diagnosis of T2DM at admission. All patients, except those with pre-diabetes or T2DM, were screened for T2DM and pre-diabetes. Glucose metabolism was measured by glycated hemoglobin (HbA1c), fasting plasma glucose and glycemic profile or 2-hour plasma glucose if need. The diagnosis of T2DM required at least two measurements above the diabetes cut-off point according to current American Diabetes Association and World Health Organization criteria. HbA1C and glucose were evaluated within 1-3 days after admission. Statistical analysis was performed with STATISTICA 10.0 software package.
Results: Among patients with CVD, the first onset T2DM was diagnosed in 10.9% (n=27). The median age was 55 [52;63] years, men 42.9%. The median HbA1c was 9,4 [7,6;11,7]%, median fasting glucose was 11,4 [7,5;13,1] mmol/l. The incidence of CVD in this group was the following: hypertension 94.4%, chronic heart failure (CHF) 83.3%, coronary heart disease (CHD) 55.6%, atrial fibrillation (AF) 33.3%, previous myocardial infarction (MI) 27.8%, a history of stroke 22.2%.
Pre-diabetes was diagnosed in 17.4% (n=44) of patients. The median age was 77 [57;85] years, men 38.4%. The median HbA1c was 6,1 [5,5;6,4]%, median fasting glucose was 7,1 [6,4;7,8] mmol/l. The incidence of CVD in this group was the following: hypertension 95.9%, CHF 79.6%, CHD 65.3%, previous MI 36.7%, AF 30.6%, a history of stroke 18.4%.
For comparison, in the group of patients with previously established T2DM, the median age was 67 [58;81] years, men 44%. The incidence of CVD in this group was the following: hypertension 97.6%, CHF 88%, CHD 73.5%, previous MI 45.8%, AF 28.9%, a history of stroke 20.5%.
Conclusions: Thus, the incidence of the first onset diagnosed T2DM among hospitalized patients with CVD was 10.9%, and the overall incidence of T2DM and pre-diabetes among patients with CVD was 67.4%. Our data suggest a high incidence of disorders of carbohydrate metabolism and patients with CVD need for careful screening for the detection of T2DM and pre-diabetes.

P546

Reduced coronary flow reserve is associated with impaired ventriculoarterial interaction in patients with obstructive sleep apnea

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Backgrounds: Obstructive sleep apnea (OSA) is associated with cardiac and arterial damage, and adverse cardiovascular outcome. Microvascular dysfunction is subclinical pathologic condition.
Purpose: We aimed to whether coronary flow reserve (CFR), which represents microvascular dysfunction, might be associated with ventricular-vascular coupling index (VVI), which represents the afterload-adjusted contractility.
Methods: 315 patient (282 males, mean 4311 years) with newly diagnosed OSA were enrolled. Transthoracic echocardiography was performed, and adenosine-associated coronary flow reserve (CFR) was measured in left anterior descending (LAD) coronary artery. We evaluated the differences between the patients with

	Normal CFR group (n=243)	Reduced CFR group (n=72)	P-value
Age, years	42±12	43±10	0.752
LA volume index, ml/m^2	20.2±5.8	20.9±5.9	0.432
LV EF, %	64±5	64±6	0.764
E/e'	8.1±2.0	7.7±2.0	0.148
DT, ms	188.8±40.8	188.7±41.7	0.980
Ed, 1/ml	0.16±0.06	0.15±0.06	0.362
Ees, m/^{2}	8.17±2.30	7.26±2.29	0.007
VVI	2.76±1.16	3.18±1.58	0.023
Tricuspid annular velocity ,cm/s	13.93±2.33	12.67±2.09	0.029
LA strain, %	44.45±13.36	44.39±12.29	0.971
LV GLS, %	-19.57±2.14	-19.67±2.17	0.732

Baseline characteristics according to CFR

normal CFR (≥2.5) and reduced CFR (<2.5). VVI was calculated using effective arterial elastance (Ea) and left ventricular end-systolic elastance (Ees).
Results: Normal CFR group (n=243) showed increased Ees compared with reduced CFR group (n=72) (8.17±2.30 vs 7.2±2.29m/s2, p=0.007) and preserved VVI (2.76±1.16 vs 3.18±1.58, p=0.023). Normal CFR group showed higher systolic tricuspid annulus peak velocity (13.93±2.33 vs 12.67±2.08cm/s, p=0.029) compared to reduced CFR group. There were no differences in LV dimension, LV ejection fraction, left atrial (LA) volume index, E/e', LA strain and LV global longitudinal strain between two groups (all p>0.05).
Conclusions: Reduced CFR is associated with decreased Ees and impaired VVI in OSA patients. Microvascular dysfunction might affect myocardial contractility, which supports the necessity of more intensive observation in OSA patients with reduced CFR to improve cardiovascular outcome.

P547

Ischemic preconditioning, a potential cardioprotective mechanism of sleep apnea during acute myocardial infarction

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Background: Sleep apnea (SA) is associated with intermittent hypoxemia that may lead to ischemic preconditioning in the myocardium. This potential cardioprotective effect of SA may play a role in the development of non-ST-elevation myocardial infarction (NSTEMI) versus ST-elevation myocardial infarction (STEMI) during acute ischemia. Purpose: We prospectively investigated the prevalence of these two types of MI in patients with SA. Methods: We prospectively studied 607 consecutive patients admitted with the diagnosis of acute MI (both NSTEMI and STEMI). All subjects underwent sleep evaluations using a portable diagnostic device after at least 48 h post-admission, provided they were in stable condition. Results: SA was present in 65.7% and NSTEMI in 30% of patients. The prevalence of NSTEMI increased with increasing severity of SA (p<0.001). The relative frequency of NSTEMI vs STEMI in patients without SA and with mild SA was 59.4% vs 70.1% respectively (p=0.01). In patients with moderate to severe SA (AHI ≥ 15 events/hour), the relative frequency of NSTEMI and STEMI was 40.6% vs 29.9% respectively (p=0.01). Moderate to severe SA was an independent predictor of having a NSTEMI (p=0.021). In moderate to severe SA patients, those with NSTEMI had lower peak troponin T than those with STEMI (1.538±2.771 μg/l vs 3.085±3.127 μg/l, p<0.001) and similar left ventricular ejection fraction (49.07±13.43% vs 47.60±11.53%, p=0.413).
Conclusion: The prevalence of NSTEMI increases with increasing severity of SA. This finding may suggest a cardioprotective role of SA, which may attenuate the development of STEMI, perhaps through ischemic preconditioning.

P548

Respiratory arousal index independently predicts the presence of hypertension in patients with obstructive sleep apnea rather than apnea-hypopnea index (AHI)

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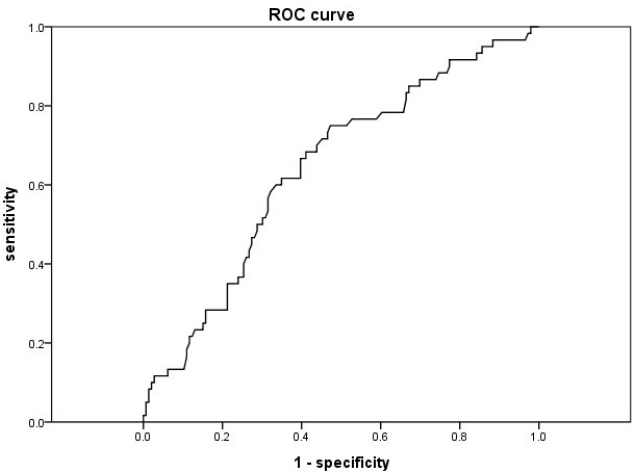
Backgrounds: The prevalence of hypertension (HTN) is higher in OSA patients. Increased sympathetic drive might be the leading mechanism of HTN in OSA.
Purpose: We aimed to identify the association between the sleep-related indices and hypertension, and the predictive value of these indices for prevalent HTN in OSA patients.



ROC curve respiratory arousal index

P548: Determinants of hypertension

	Univariate analysis			Multivariable analysis			Multivariable analysis		
	OR	95% CI	P	OR	95% CI	P	OR	95% CI	P
Age, per year	1.068	1.034-1.104	<0.001	1.077	1.039-1.116	<0.001	1.074	1.036-1.113	<0.001
Male	1.089	0.264-4.496	0.906						
BSA, per m*	1.474	0.224-9.676	0.686						
AHI, per events/hour	1.014	0.999-1.029	0.073	0.976	0.905-1.052	0.523	0.988	0.954-1.022	0.482
Mean duration of apnea-hypopnea, per min	1.015	0.975-1.057	0.469						
Longest duration of apnea-hypopnea, per min	1.000	0.988-1.012	0.949						
RMI, per events/hour	1.017	0.984-1.052	0.315						
RERA, per events/hour	1.017	0.953-1.084	0.617						
Lowest saturation <85%	1.880	0.947-3.735	0.071				1.364	0.629-2.959	0.432
RAI, per events/hour	1.026	1.008-1.044	0.005	1.040	1.001-1.081	0.043	1.041	1.003-1.082	0.035
ODI, per events/hour	1.014	0.999-1.029	0.069	1.016	0.944-1.095	0.669			

Methods: 206 patients (197 males, 44±11 years) with newly diagnosed moderate-to-severe OSA (AHI≥15) were enrolled from May 2009 to September 2012. All patients underwent full-night laboratory polysomnography and transthoracic echocardiography.
Results: Among 206 patients, 32% (65/206) had HTN. HTN group was older, and had a higher AHI, oxygen desaturation index (ODI), respiratory arousal index (RAI), and lower e' velocity, higher E/e' than non-HTN group (all p<0.05). Multivariate logistic regression analysis revealed that RAI and age were significantly associated with HTN after adjustment of AHI, ODI or lowest saturation <85%. The area under the receiver operating curve for RAI was 0.642 (p=0.001).
Conclusions: This results suggests that respiratory arousal index better reflects the contribution to the activation of sympathetic tone leading to the prevalent HTN rather than AHI, ODI or lowest saturation.

P549
The relation of obstructive sleep apnea syndrome with acute coronary syndromes

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Purpose: Obstructive Sleep Apnea Syndrome (OSA) is a clinical entity that is often under-diagnosed, although it has been associated with many cardiovascular complications. Polysomnography is the method of choice for the diagnosis of obstructive sleep apnea, but it has been shown that the use of appropriately weighted questionnaires is a reliable alternative. The study aimed to investigate the correlation between the possibility of obstructive sleep apnea in a patient who suffered an acute coronary event.
Method and results: Eighty patients who were hospitalized for an acute coronary event in our hospital clinic were weighted for the likelihood of sleep apnea with the STOP-Bang questionnaire and Berlin questionnaire, and assessed for Epworth sleepiness within thirty days of the onset of the syndrome. Depending on the questionnaire used, 48 (Berlin) and 45 (STOP-Bang) patients were found to be at high risk for OSA, while 32 (Berlin), 35 (STOP-Bang) patients were not at risk of suffering from OSA. Also, 38 patients were likely to suffer from excessive daytime sleepiness and 42, probably, did not run such a risk according to the Epworth scale.
Conclusions: The high proportion of high-risk patients for OSA among ACS patients is a serious indication of a pathophysiological correlation between the two entities. By using easy-to-use questionnaires, it is possible to timely risk stratification for OSA in patients who suffered an ACS, with a possible effect on the course of their treatment.

Pharmacology and Pharmacotherapy

P552
Sacubitril valsartan in real life: tolerance, clinical evolution and remodeled long term

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1. INTRODUCTION: The introduction of Sacubitril / Valsartan (S/V) has led to a paradigm shift in patients with heart failure with reduced ejection fraction. There are few data on its use and long-term follow-up in real life and no specific data are available to improve echocardiographic parameters during follow-up.
2- MATERIAL AND METHOD: An observational, prospective study of patients with HFrEF in a non-acute situation, seen in a HF clinic and who began treatment with S / V between October 2016 and December 2018. We analyzed the baseline characteristics, functional class, analytical and echocardiographic parameters, and long-term follow-up.
3-RESULTS: The sample consists of 202 patients 68 ± 10 years of age. 83% males. Prevalence of HBP and DM 64.4% and 45% respectively. The most frequent cause of myocardiopathy was of ischemic origin (61.9%), followed by idiopathic origin (30.2%). 20.3% were carriers of DAI +/- TRC. The initial LVEF was 33.6%. Prior to the start of S / V, patients received optimal medical treatment (Beta-blocker 98%, mineralocorticoid receptor antagonists 93%, Ivabradin 31.7% and diuretics 84%); with ACEI 64.9% and the rest with ARA II. The patients started with S / V at low doses 43%, average doses 42.1% and high doses 9.9%. Table 1 shows the parameters of SBP, DBP, functional class and analytical parameters with more relevance.
After one month there was a significant decrease in SBP figures (120.6 vs 116.5mmHg, p = 0.008), without changes in DBP. There was a slight decrease in GFR attending to CKD EPI (68.8 vs 66.5ml / min / 1.73m2) without major changes in long-term follow-up. No significant differences were found in levels of Na and K.
Regarding echocardiographic parameters in 6 months, an inverse remodeling of the LV and the size of the LA was observed (LV diastolic diameter61.8 vs 60.3mm, p = 0.021, AI 44.9 vs 44.1mm, p = 0.042) and improvement of LVEF (33.6 vs 37.2, p <0.001) that leads to the non-indication of ICD in 39.72% of patients who had an initial LVEF of less than 35%. Figure 1 shows the significant improvement of the functional class from the beginning of treatment with S / V during the follow-up. During follow-up, despite the slight decrease in BP, S / V titration was achieved with medium doses in 40.5% and high doses 32.7%. Only 10 patients presented intolerance to the drug, most of them due to arterial hypotension followed by economic problems.
In a follow-up of 12.5 ± 7.9 months, cardiovascular mortality 10.4% and admission due to heart failure were registered in 18.3%, data similar to the pivotal study, our series presenting patients with greater age and comorbidity .
4-CONCLUSIONS: The treatment with S / V in real life is well tolerated, achieves a clinical improvement of the functional class maintained long-term. There are a inverse remodeling of the LV and improvement of the EF that leads to a decrease in the indication of ICD in a high percentage of patients.

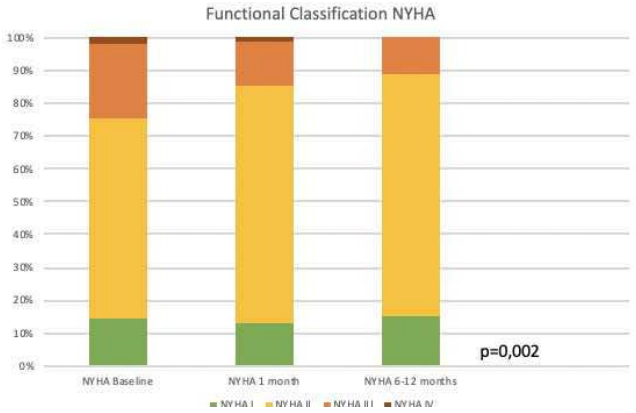

Figure 1

P553
Security of neurohormonal blocking with sacubitril / valsartan, iSGLT2 and mineralocorticoid receptor antagonist in patients with heart failure with reduced eyection fraction and diabetes mellitus

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Introduction: After the onset of sacubitril / valsartan (S/V) studies have been developed with oral antidiabetics such as iSGLT2 that have shown an improvement in the prognosis of patients with heart failure (HF). There is little evidence on tolerability and safety in patients with HF who are on combined S/V, iSGLT2, MRA and diuretic therapy.
Material and method: This is a prospective, observational study of patients with HF and type 2 diabetes mellitus with S/V and iSGLT2. We analyzed the baseline characteristics, tolerability and safety of the combination of both drugs.
Results: A total of 29 patients were treated with S/V and iSGLT2, 93.1% males of mean age 66.7 ± 10.5 years. 62.1% had HBP and 24.1% AF. The cause of HF in 72.4% was ischemic origin. Table 1 shows the figures for both SBP, DBP and analytical parameters. 93.1% of patients were under treatment with MRA (72.4% low doses). S/V is started with low-doses in 37.9%, medium-doses 55.2% and rest high-doses. 75.9% were treated with loop diuretic therapy (6.9% low-dose, 48.3% medium-dose and 20.7% high-dose). In the month and year follow-up, there was a decrease in SBP, DBP, HbA1C, weight and a slight decrease in GFR atrending to CKD-EPI (Table 1). We found slight significant increase in K. In 6 months of treatment, loop diuretics were reduced to a small number of patients in a non-significant way and the MRA and S/V were increased to a maximum dose in 31% and 31.7% respectively. In a mean follow-up of 8±5 months, 17.2% were admitted due to HF and 6.9% of patients had death due to cardiovascular causes.

Conclusions: In patients with HFrEF and DM the combined use of S/V+MRA+iSGLT2 in the short term is safe, well tolerated, with a slight initial increase in K, not maintained over time and weight loss. The potential risk of the association of S/V+iSGLT2+MRA is not observed in our cohort in the medium term. More long-term studies are needed to confirm whether this group of patients would have a better cardiovascular prognosis than those without S/V or iSGLT2.

P554

Improvement of NT-proBNP and NYHA values in patients with HFrEF and Sacubitril/Valsartan treatment

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Introduction: Sacubitril/Valsartan (SV) has shown to reduce symptoms and improve survival in patients with HFrEF.
Objective: Analyze in real life if outpatients with HF, NYHA≥II and LVEF<40% treated with loop diuretics have improvement of the NYHA class and the NTproBNP values 3 months after reaching the SV maximum dose.
Methods: Retrospective and multicenter study in outpatients with optimized medical treatment and implantable devices at the time of onset of SV and loop diuretic intake (≥20 mg of Furosemide or ≥5 mg of Torasemide). Doses are recorded before and 3 months after reaching the maximum tolerated SV (low (L) <150 mg/24h, moderate (M) 150-200 mg/24h or high (H) ≥300 mg/24h). Admissions, diuretic dose adjustments and prerenal events were recorded during follow-up.
Results: 260 patients included (75% men, mean age 69±10 years, mean LVEF: 28±6 %). Comorbidities: 64.5% HBP, 35% DM, 49.4% ischemic cardiomyopathy (IC) and 13.5% severe MR. Base treatment: 89% BB, 76% MRA and 86.7% ACEi/ARA. 96% patients took ≥ 20 mg of furosemide and 4% ≥ 5 mg of torasemide. Reached dose of SV: L=65 (25%), M=100 (38.46%), H=95 (36.53%). Final SV doses were higher in men (p=0.003), IC (p=0.02), use of BB (p=0.03) and previous ACEi/ARA intake (p=0.006). Adverse events such as non-HF admissions: 25(9%), HF admissions: 37(13%), diuretic adjustment: 73(27%) and prerenal event: 34(12.5%) did not show significant differences between groups or depending on the SV reached dose. Baseline NYHA was II:120 (44%), II-III:95 (35%), III:58 (21%).Functional class 3 months after reaching the maximum SV dose improved significantly although there were no differences depending on the SV dose: 12 patients (4.4%) worsened, 107 (39%) did not change and 154 (56%) improved: I:46 (16.8%), II:162 (59.3%), II-III:46 (16.8%), III 19 (7%). Patients who presented greater improvement were the most symptomatic at the beginning of treatment with SV: NYHA III and II-III have a 7-fold and 5-fold improvement respectively (p<0.0001). Baseline NTproBNP mean values were 2563±4017 pg/ml and 1753±3552 at the end of the study. The percentage of NTproBNP reduction was 14% and 79% of patients reduced their baseline values regardless the achieved dose of SV. Significant differences in baseline NTproBNP values were recorded (p=0.001): L: 4413±7315, M: 2168±2216, H: 1871±1905). NTproBNP decreased in all groups and differences between them were maintained depending on the dose (p=0.03): L:2870±6468, M:1671±2620, H:1182±1073. Improvement in NYHA class and decrease in NTproBNP levels matched with a decrease in loop diuretic dose in 42% of the patients in the sample.
Conclusions: SV treatment improves the functional class and NT-proBNP values within 3 months of reaching the optimal dose. This improvement is associated with a decrease in loop diuretic requirements and is independent of the SV dose achieved but is more pronounced in advanced functional status (NYHA III) and with higher baseline NT-proBNP values.

P555

Long-term prognostic impact of beta-blocker prescription during hospitalization for acute myocardial infarction

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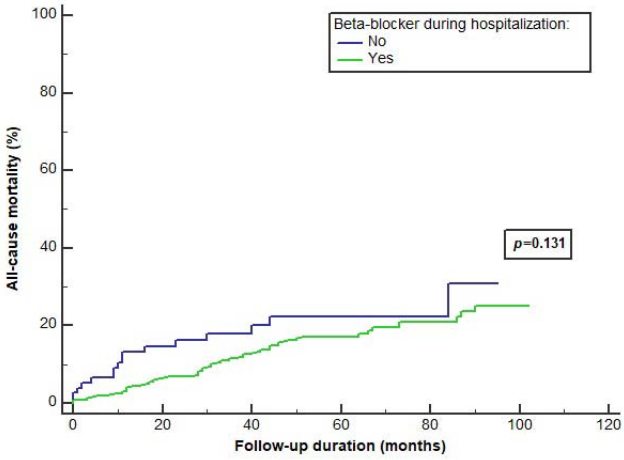
Introduction: The use of beta-blockers (BB) was classically considered a sine qua non condition in ischaemic heart disease treatment. However, some recent studies question its use in this setting nowadays. This study aimed to assess the long-term impact of the prescription of BB during hospitalization for an acute myocardial infarction (MI).
Methods: This was a retrospective study of patients with non-fatal MI, included periodically in our center registry between October 2010 and November 2017. The endpoints evaluated were MI, decompensated heart failure (DHF), death and MACE (MI, coronary revascularization and cardiovascular death), in a median follow-up of 42 months (IQR 24-59). The endpoint analysis was adjusted for age, left ventricular ejection fraction, MI subtype, angiotensin-converting enzyme inhibitors or angiotensin II receptor blockers prescription during hospitalization and at discharge and BB prescription at discharge.
Results: A total of 544 patients were selected, 74.4% male, of which 45.2% had ST-segment elevation MI and 86% had BB prescribed during hospitalization. These latter patients also had increased prescription of BB at discharge (86.9% vs 34.8%, p <0.001).
During follow-up the group of patients medicated with BB during hospitalization was not associated with significant lower mortality rate (14.7% vs. 21.1%, p = 0.131).
In the multivariate analysis, the prescription of BB during hospitalization was not associated with a statistically significant reduction of endpoint events, including MI (HR 0.84, 95% CI 0.28-2.48), DHF (HR 95% CI 0.41, 0.91-2.02), death (HR 0.84, 95% CI 0.38-1.85) and MACE (HR 0.73, 95% CI 0.37-1.43).
Conclusion: The prescription of BB during hospitalization was not associated with an independent and significant decrease of long-term cardiovascular events.



BB Mortality Kaplan Meier curves

P556

Diabetic patients need higher loop diuretic doses: a report on acute and chronic heart failure patients

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INTRODUCTION: Diuretics are first line drugs in symptomatic heart failure (HF) treatment. Diabetes mellitus (DM) has been suggested to be determinant of diuretic resistance. Studies comparing the dose and efficacy of diuretics in patients with and without DM are lacking. We aimed to study if furosemide dose differed according to DM status.
METHODS: We studied two cohorts of HF patients: a cohort of acute HF patients consecutively hospitalized with the primary diagnosis of HF and a cohort of stable and optimized patients followed in a specialized HF clinic. Data on comorbidities and medication were abstracted from patients' files. High diuretic dose was considered as the use of ≥80mg of furosemide per day. Use and doses of the furosemide were compared between diabetic and non-diabetic patients. Regression analysis was used to determine the association of variables with diuretic dose. The independent association of DM with loop diuretic dose was assessed using multivariate models.
RESULTS: We studied 865 HF patients: 601 acute HF patients and 264 chronic stable HF patients. Acute HF patients with DM were more likely to be medicated with loop diuretics and in higher doses; diabetics were more likely to need intravenous diuretic therapy and they were also more often discharged under higher doses of loop diuretics. The presence of DM was independently associated with use of higher dose of loop diuretic both at admission as well as at discharge. Diabetic patients were under additional 8mg furosemide upon admission when compared with non-diabetics independently of gender, hypertension history, atrial fibrillation, left ventricular systolic dysfunction and ischemic aetiology. Also, diabetic HF patients needed multivariate adjusted extra 6mg furosemide at discharge in

comparison with their non-diabetic counterparts. Diabetic acute HF patients had an independent 24% higher odds of being under high furosemide dose upon admission and an also independent 26% higher odds of being discharged with high loop diuretic. Chronic patients were also more prescribed loop diuretics and on higher doses, however, and diversely from what was documented in the acute HF setting, neither in the crude nor in the multivariate approaches was diabetes associated with the use of higher doses of loop diuretics

CONCLUSIONS: Diabetic patients are more intensively treated with loop diuretics. In acute HF, diabetes is an independent predictor of loop diuretic dose. For yet to uncover reasons, DM does not appear to be an independent predictor of the loop diuretic dose in patients with chronic HF under optimized medical therapy.

P557

Progression of markers of cardiac structure and function in the Personalised prospective comparison of ARni with ArB in patients with natriuretic peptide eLEvation (PARABLE) clinical trial

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On behalf of: STOP-HF Investigators
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Background: Elevated B-type natriuretic peptide (BNP) in asymptomatic patients with cardiac abnormalities can provide a protective response to fibro-inflammation. The PARABLE study is investigating the hypothesis that augmenting BNP pharmacologically with sacubitril/valsartan versus valsartan alone can modulate progression of left atrial volume index (LAVI) over 18 months measured using cardiac Magnetic Resonance Imaging (cMRI). In addition, all patients in PARABLE undergo Doppler-echocardiography at baseline, 9 months and 18 months. The purpose of this report is to evaluate overall, blinded progression of cardiac structural and functional abnormalities in the first 100 patients over 9 months and the first 74 patients at 18 months.

Methods: PARABLE is an investigator-led, prospective, randomised, double blind, double dummy, phase II trial comparing treatment with sacubitril/valsartan versus valsartan alone. PARABLE will enroll 250 patients aged over 40 years with hypertension and/or diabetes, with BNP from 20-280 pg/mL or NTproBNP from 100 to 1000 pg/mL) and with LAVI above 28 mL/m2. We excluded patients with a history of heart failure, left ventricular systolic dysfunction, haemodynamically significant mitral and /or aortic valve disease, persistent atrial fibrillation, hepatic dysfunction and severe chronic kidney disease. The primary endpoint is change in LAVI measured by cMRI over 18 months. We evaluated blinded Doppler-echocardiographic measures of left ventricular structure, systolic function and diastolic function at baseline, 9 months and 18 months.

Results. Of the first 100 patients to complete the study, 35% were female, average age 72.7 ± 8.0 years, 94% had hypertension and 22% had Type 2 diabetes. Population baseline blood pressure was 136/78 ± 21/13 mmHg, heart rate was 63.5 ± 10.8 bpm and body mass index was 28.8 ± 4.9 kg/m2. Other baseline medical history included dyslipidaemia (83%), coronary artery disease (52%), other vascular disease (5%), stroke/TIA (10%), paroxysmal atrial fibrillation n (7%) and chronic kidney disease (2%). Median BNP was 79 pg/mL [interquartile range 47, 117 pg/mL] and baseline Doppler-echocardiography showed the average ejection fraction was 68.5 ± 6.5%, left ventricular mass index was 113.3 ± 28.2%, E/e' was 11.3 ± 3.2 and LAVI was 34.3 ± 4.9 mL/m2. There were no changes from baseline in Doppler-echocardiography measures at 9 months. At 18 months, in the subgroup that completed the study, the only observed change was a significant increase in LAVI from 34.0 ± 4.6 mL/m2 to 36.0 ± 5.0 mL/m2 ($p<0.01$).

Conclusions: Participants in the PARABLE clinical trial with elevated BNP and LAVI at baseline show significant progression of LAVI abnormalities over an 18-month time period. The PARABLE study is on target to define the impact of preserving circulating BNP using sacubitril on LAVI progression as a personalised therapy for prevention of progression of left ventricular diastolic dysfunction.

P558

Comparative efficacy of renin-angiotensin aldesteron system modulators and angiotensin receptor neprilyzin inhibitor in chronic heart failure with mid-ranged and preserved ejection fraction

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The aim of study was to compare efficacy of long-term therapy with ramipril (R, up to 10 mg) + spironolacton (S, up to 25 mg), valsartatan (V, up to 160 mg) + spironolacton (S, up to 25 mg) and sacubitril/valsartan (S/V, up to 97/103 mg) on prognosis, left (LV) and right ventricular (RV), left (LA) and right atrial (RA) functional parameters by Doppler and tissue echocardiography, transforming growth factor-beta (TGF-β, ng/ml) and high sensitivity C reactive protein (hsCRP, ng/ml) levels by EIISA method

Baseline Characteristics & Side Effects

	Group 1Non-diabetic N = 141 (51.1%).	Group 2DM with iSGLT2N = 51 (18.5%).	p-value(group 1 Vs 2)	Group 3DM without iSGLT2N = 84 (31.5%).	p-value(group 2 Vs 3)	
Age (years)Women n (%)	65.1± 12.7939 (27.7%)	66.49± 1112 (23.5%)	0.489 0.567	67.9± 9.9 17 (20.2%)	0.414 0.652	
IHD n (%)	61 (43.3%)	29 (56.9%)	0.095	53 (63.1%)	0.472	
Hypertension n (%)Dyslipidemia n (%)Atrial Fibrillation n (%)	85 (60.3%); 70 (49.6%);48 (34%)	41 (80.4%); 32 (62.7%); 20 (39.2%)	0.010; 0.108; 0.508	75 (89.3%); 55 (65.5%); 31 (37.3%)	0.150; 0.748; 0.829	
B-Blockers n (%)ACEI/ ARB n (%)Aldosterone antagonistIvabradine n (%)	117 (83%)124 (87.9%)100 (70.9%)14 (9.9%)	49 (96.1%) 47 (92.2%) 35(68.6%) 13 (25.5%)	0.019 0.409 0.759 0.006	75 (90.4%), 75 (90.4%), 50 (60.2%), 12 (14.5%)	0.221 0.724 0.328 0.111	
GFR	Before ANRI n (%)	70.41 ± 35.5	69.8± 21.3;	0.724;	63.6± 18.8;	0.148
After ANRI n (%)	67.6 ± 35.6	65.2 ± 23.8	0.994	63.2 ± 26.9	0.154	
Diferential GFR	- 3.35	- 4.59	0.626	- 0.4	0.224	
Mean N-BNP reduction	- 1912	- 888	0.874	-514	0.619	
Acute Renal Failure n (%)Symt. Hypotension n (%)Asymp. Hypotension n(%)Hiperpotasemia n (%)	19 (13.5%) 11 (7.8%) 15 (10.6%) 18 (12.8%)	10 (20%) 7 (14%) 7 (14%) 11 (22%)	0.269 0.197 0.522 0.118	16 (19%) 6 (7.1%) 5 (6%) 13 (15.5%)	0.893 0.195 0.115 0.241	

IHD: Ischemia heart disease; HFrEF: Heart Failure with reduced ejection fraction

in patients (pts) with III NYHA functional class (FC) chronic heart failure in relation to mid-ranged (HFmEF) or preserved (HFpEF) ejection fraction (EF).

Methods. 82 pts (mean age 59.9) with HFmEF (40% ≤EF<50%) and 79 pts (mean age 63.1) with HFpEF (EF≥50%) in sinus rhythm were randomly assigned to groups, receiving R+S (n=28 and n=27), V+S (n=27 and m=26) and S/V (n=27 and m=26) in addition to diuretics and beta-blockers.

Results. 1-year mortality and hospitalization rates were 35.7% and 57.1%; 40.7% and 59.3% and 25.9% and 40.7% in pts with HFmEF, receiving R+S, V+S and S/V, respectively. 1-year mortality and hospitalization rates were equal to 33.3% and 55.5%; 38.5% and 57.7% and 23.1% and 38.5% in pts with HFpEF, receiving R+S, V+S and S/V, respectively. Survival analysis revealed relative risk (RR) reduction of 1-year mortality and hospitalization rate at 27.5% and 28.7% (p<0.05) and 36.4% (p<0.01) and 31.3% (p<0.05) in pts with HFmEF, treated by S/V, compared to groups, receiving R+S and V+S, respectively. Similarly, significant reduction of 1-year mortality and hospitalization at 30.6% and 30.6% (p<0.05); 40.4% (p<0.01) and 33.3% (p<0.05) was revealed in V/S treatment group with HFpEF, compared to groups, using R+S and V+S, respectively. 1-year S/V treatment significantly (p<0.01 for all) decreased levels of TGF-β at 31.3% and 33.3%, e' at 30.2% and 30.6%, Ar-A at 55.1% and 57.2%, increased PV SC at 42.1% and 43.4%, RAFI at 32.9% and 33.6%, LAFI at 34.9% and 35.2%, LV EF at 22.1% and 23.4% in pts with HFmEF, and significant changes (p<0.01 for all) of hsCRP at 34.6% and 35.2%, levels of TGF-β at 30.2% and 31.2%, TAPSE at 42.2% and 43.4%, e' at 26.2% and 28.2%, PA ET at 19.8% and 20.3% in pts with HFpEF, compared to groups, receiving R+S and V+S, respectively. .

Conclusions: 1) V/S treatment associated with significant reduction of morbidity and mortality compared to use of R+S and V+C in pts with both HFmEF and HFpEF. 2) Changes of Ar-A, RAFI and LAFI, e'≥40%, TGF-β≥30% identified pts with cardiovascular risk reduction in HFmEF group, while changes of TGF-β, hsCRP≥30%; PAET ≥30% revealed pts with improvement of morbidity and mortality in pts with HFpEF. 3) Prognostic improvement in pts treated by V/S has related to improvement of TGF-β, LV systolic and diastolic functional parameters, LA and RA functional parameters in HFmEF and to TGF-β hsCRP, LV diastolic functional and RV functional parameters changes in HFpEF

P559

Combined therapy with angiotension receptor-neprilysin inhibitor and sodium-glucose transport protein 2 inhibitors, a real life register data

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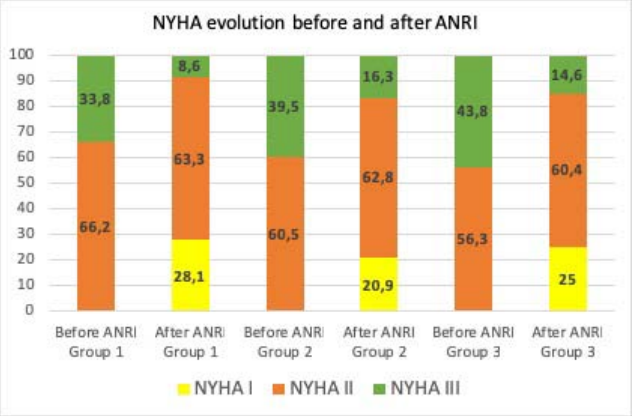
On behalf of: SAVE-RLife group

Background: Angiotensin receptor-neprilysin inhibitor (ARNI) and Sodium-Glucose Transport Protein 2 inhibitors (iSGLT2), beside there different targets, have shown reduction in cardiovascular mortality in patients with heart failure. Few data is known about the efficacy and safety of their combination. Purpose: To analyse the clinical and analytical evolution of patients with HFrEF under combined therapy with ANRI and iSGLT2.

Methods: SAVE-RLIFE (SAcubitril-Valsartan Evidence in Real Life) is an observational, ambispective, multicentre study that included patients with HFrEF under treatment with ANRI between SEP2016 and DEC2018. A subanalysis of 3 groups of patients was performed: Group 1 non-diabetic patients, Group 2 diabetics with iSGLT2 and Group 3 diabetics without iSGLT2.

Results: 276 patients were included, 50% were diabetics, 18.5% of them received combined therapy and 31.5% only ANRI. The mean age was 66.16±11.23 and ischemic cardiomyopathy the main etiology, without significant differences between the three groups. Clinical evolution assessed by NYHA classification, was similar in all groups (Figure 1). No significant difference was observed in terms of side effects between the groups (Table 1). Glomerular Filtration Rate (GFR) before and after ANRI initiation shows similar progression (in group 1 70.41 to 67.6ml/min, group 2 69.8 to 65.2ml/min, group 3 63.6 to 63.2ml/min), without a statistically or clinically relevant reduction.

Conclusions: ANRI and i-SGLT2 seem to have good security profile with their combined usage, without any significant increase in the side effects, neither decrease in their clinical efficacy. Further follow-up of these patients is necessary.



NYHA progression after ANRI

P560

Long-term treatment with inotersen and potential improvement of amyloid transthyretin cardiomyopathy

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Introduction: Amyloid transthyretin (TTR) amyloidosis cardiomyopathy (ATTR-CM) is a progressive and fatal disease caused by deposition of TTR in the heart. ATTR-CM may be caused by mutations in TTR (hereditary ATTR [hATTR]) or misfolding of normal TTR in older individuals (wild-type ATTR [wtATTR]). Natural history data show a progressive decline in cardiac functional and structural parameters including a reduction in 6-minute walk test (6MWT) distance and increase in left ventricular mass (LVM). Inotersen, an antisense oligonucleotide inhibitor of TTR production, showed efficacy in treating neuropathy in the NEURO-TTR study in patients with hATTR, including those with cardiac involvement. We previously reported stabilization of hATTR-CM and wtATTR-CM after 1 year of treatment with inotersen. We now report updated results for patients treated for up to 3 years.

Purpose: To study whether longer-term treatment with inotersen improves CM in patients with hATTR-CM and wtATTR-CM

Methods: Patients with biopsy proven hATTR-CM or wtATTR-CM, interventricular septum (IVS) thickness ≥ 1.3 cm on echo, and evidence of congestive heart failure [CHF]) received 300 mg inotersen by subcutaneous injection weekly in a single-center, ongoing, open-label, investigator-initiated study. Safety monitoring included platelet counts, serum creatinine, and urine protein. Efficacy assessments included plasma TTR levels, 6MWT distance, B-type natriuretic peptide (BNP) and echocardiograms and cardiac MRIs.

Results: As of October 2018, 35 patients (10 hATTR, average age 63.4 years and 25 wtATTR, average age 76.1 years) have enrolled. Of the 35 patients, 5 are newly enrolled, 21 completed 1 year, 17 completed 2 years, 14 completed 3 years, 3 completed 4 years, 8 voluntarily withdrew, and 1 died from a nondrug related cause. Inotersen was well-tolerated. No drug-related serious adverse events (AEs), cases of severe thrombocytopenia, or renal AEs occurred. Sustained TTR reduction resulted in a mean decrease in LVM by 0.54%, 8.5%, and 11.4% and improvement in 6MWT of 5.6, 23.2, and 18.6 meters compared to baseline at 1, 2, and 3 years respectively in all patients. Improvement in 6MWT was more striking in the hATTR subgroup, who demonstrated a mean improvement of 29. 3, 40.9, and 50.2 meters compared to baseline at 1, 2, and 3 years respectively. BNP and IVS thickness decreased or remained stable in most patients and left ventricular ejection fraction (LVEF) increased or remained stable in most patients.

Conclusions: Long-term treatment with inotersen was well-tolerated and resulted in improvement or stabilization in cardiac function and structure in patients with hATTR-CM and wtATTR-CM. Our findings showing that long term inotersen therapy resulted in an increase in 6MWT distances, stabilization of the LVEF and BNP, and decreased LVM suggest that inotersen has the potential to decrease amyloid burden, reverse amyloid cardiomyopathy, and improve quality of life and survival.

P561

Impact of serum levels variability of calcineurin inhibitors on heart transplant outcomes

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On behalf of: Spanish Heart Transplantation Registry
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Introduction . Serum levels variability (SLV) of calcineurin inhibitors (CNI) has been associated with poor outcomes in solid-organ transplantation. Its impact on heart transplantation (HTx) outcomes remains unestablished.
Purpose. To evaluate the relation of SLV with HTx outcomes.
Methods. Study population: patients aged ≥18 years with a first HTx performed between 2000 and 2014, and surviving > 1 year. Information regarding recipient's and donor's characteristics and outcomes was gathered retrospectively from the Spanish Heart Transplantation Registry database. SLV was assessed by the coefficient of variation (CV) of serum levels from 4 to 12 months post-HTx. End-points were death and treated rejection 1 to 5 years post-HTx. Cox regression models were used for analysis.
Results. Study population comprised 1581 patients (median age, 56 years; Females, 21 %). 1-year immunosuppression was Cyclosporine (50%), standard-release Tacrolimus (33%), prolonged-release Tacrolimus (17%), Prednisone (87%), Mycophenolate (80%). Median CV was 27.8%. Predictors of mortality and rejection are summarized in Table. SLV showed a marginal statistical significance (p = 0.06) for both 5-year mortality and treated rejection.
Conclusion. SLV of CNI over the first year post-transplantation has a marginal impact on mid-term mortality and rejection incidence in HTx.

Variable	Univariate		Multivariate	
	Hazard Ratio	P value	Hazard Ratio	P value
MORTALITY				
CV > 27.8 %	1.50 (1.08-2.09)	0.02	1.41 (0.98-2.02)	0.06
Donor's age > 39 y	1.78 (1.27-2.50)	0.001	1.95 (1.35-2.82)	<0.001
CNI type		0.10		0.02
Cyclosporine	1		1	
Tacrolimus standard-release	0.78 (0.54-1.13)	0.19	0.69 (0.46-1.04)	0.07
Tacrolimus prolonged-release	0.56 (0.39-1.00)	0.05	0.45 (0.24-0.84)	0.01
Diabetes prior to HTx	1.97 (1.34-2.84)	<0.001	1.55 (1.03-2.33)	0.03
One-year LEVF > 64 %	0.73 (0.50-1.01)	0.08	0.67 (0.47-0.97)	0.03
REJECTION				
CV > 27.8 %	1.22 (0.85-1.75)	0.27	1.46 (0.98-2.19)	0.06
Induction therapy at transplant	0.69 (0.44-1.06)	0.09	0.43 (0.27-0.67)	<0.001
One-year allograft vasculopathy ≥ 1	1.74 (0.96-3.18)	0.07	1.99 (1.07-3.64)	0.03
History of first-year rejection	1.41 (0.98-2.02)	0.06	1.54 (1.03-2.30)	0.04

Predictors of 5-year mortality and treated rejection in heart transplantation

P562

Sacubitril/Valsartan and SGLT2i: a safe combination?

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Introduction: SGLT2i have been shown to reduce HF hospitalization and have become the second step after Metformin in the treatment of type 2 DM. Sacubitril/Valsartan (SV) is indicated in the treatment of symptomatic HFrEF, however SGLT2i were not included among the drugs co-administered in the PARADIGM-HF assay.
Purpose: Estimate the prevalence of treatment with both drugs and adverse events in SV titration.
Methods: Diabetics under treatment with SGLT2i and SV are selected retrospectively from a multicenter registry. The inclusion criteria were: outpatient, optimized medical treatment and devices at the time of onset of SV and loop diuretic intake (≥20 mgr Furosemide or ≥5 mgr Torasemide). SV doses (low (L) low <150 mgr/24h, moderate (M) 150-200 mgr/24h or high (H) ≥300 mgr/24h), admissions, diuretic dose adjustments and prerenal events were recorded during follow-up.
Results: From a sample of 260 patients: 35% have DM type 2 (N=97). 17 of them were treated with iSGLT2 during SV titration. Baseline characteristics: 14 (82%) men and 3 (18%) female, HBP 13 (76%), CAD 6 (35%), CRT 3 (17%), Severe MR 2. Adverse events during follow-up were 5 HF admissions, 1 non-HF admission, 5 diuretic adjustments and 1 prerenal event. The treatment at the beginning of the study showed no difference compared to the rest of the patients in the registry: Torasemide (N=1), Furosemide (N=16), BB (N=14, 82%), MRA(N=14, 82%), previous ACEi/ARAII (N=13,76%). Baseline NYHA was II (N=3, 17.6%), II-III (N=12, 70.6%), III (N=2, 11.7%) and at the time of analysis there was a very remarkable improvement: 12 patients improved functional class and NYHA became II (N=14) in 82% and III (N=3) in 18%. Diuretic requirements were reduced by > 30% compared to basal dose in 6 patients and 3 patients discontinued it entirely. All but 2 patients reduced NT-proBNP levels. There were no statistically significant differences in renal function. High doses of SV were achieved in most patients: 6 (35%) ≥300 and 9 (53%) 150-200. In none of the cases the SGLT2i was a limiting factor to increase the SV dose.
Conclusions: Although the sample size is small, initial data suggest that administration of SGLT2i and SV is not associated with serious adverse effects and does not delay correct titration of the SV. Improvement in NYHA and NT-proBNP levels is documented along with decrease in diuretic dose.

e-Cardiology/Digital Health

P563

Method of the logistic regression analysis in forecasting of development of atrial fibrillation

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Introduction . The method of carrying out multiple logistic regression analysis was used for forecasting of emergence of atrial fibrillation.
Purpose. By means of a method of logistic regression to predict development of AF.
Methods. Research object – the main group of a research was made by 234 persons, from them 86 men (36.8%) and 148 women (63.2%). Average age of men was 39.60±18.65 years, women of 50.93±16.78 years. In group of patients with primary AF of 40 patients, from them 26 (65.0%) men and 14 (35.0%) women. From them 90 probands with the confirmed diagnosis of AF. From them it was distinguished: 40 probands with primary AF (this group of patients had no communication of developing of arrhythmia with cardiovascular pathology); 50 probands with secondary AF (in this group the accurate interrelation of emergence of an attack of arrhythmia with existence of the accompanying cardiovascular pathology prolezhivatsya).
Results. Existence of atrial fibrillationis presented in the form of a binary variable where 0 – absence of arrhythmia, 1 – heart beat disorder.At creation logistic regression models with step-by-step inclusion of each predictor the assessment of value of coefficient of determination of R2 (Naydzhelkerk's square) which shows a share of influence of all predictive factors of model on dispersion of dependent variable was carried out.
The assessment of parameters was carried out on the basis of the value exp (b): if b coefficient positive, then exp(b) more than 1 and chances increase if coefficient negative – decrease.Check of the importance of model of logistic regression was estimated with use of value $\chi 2$. At <0,05 a hypothesis of insignificance of model. By means of Hosmera-Lemeshev's indicator compliance of model to basic data was defined. The hypothesis of coherence of model was accepted at >0,05.
Statistically significant model only for a genotype of the II gene of ACE was received. This model is presented by the equation: where – probability of development of

AF, x – existence of a genotype of the II gene the ACE (is – 1, is not present - 0) (b = 0.654), constant b0 =-0.297. – mathematical constant 2.72. The model is statistically significant (=0.04).
Among the main group of patients as the most probable predictors of development of heart beat disorder rare genotypes of the following genes were evaluated: ACE, AGTR1, AGT.
The dependence of a logarithm of chance of approach of the predicted event (logit) on linear combination of factor variables represents a mathematical model of logistic regression:
Conclusions. For this model an indicator of determination R2=0.024, therefore statistically significant definition by this genetic factor of probability of development of AF in the studied group of patients only for 2.4%. At the same time the model correctly predicts lack of AF in 83.3% of cases, and existence of AF in 27.8%. In total 57.7% of forecasts were correct.

P564

Numerous published biomarker prognostic models for heart failure exist, but none is officially recommended in clinical guidelines:a paradox or a research scandal/failure?

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Background/Introduction: Heart failure (HF) is a major public health problem. Risk stratification along with tailored intensive therapy may alter HF patients' prognosis. Two decades of biomarker research highlighted the prognostic ability of certain markers, and encouraged the development of prognostic models. Despite numerous publications with a prognostic theme and ESC's recognition of the need for prognosis information, no such models have been adequately established in clinical practice.
Purpose: To systematically assess the quality of published prognostic models and the evidence they present, for the first time. This is a complex time-constrained project with potential to advise on future HF prognostic model design and reporting, and contribute to improved HF research resources and clinical management.
Methods: We applied Cochrane methodology for searching and assessing published studies on prognostic HF models. Using validated prognostic filters in a sensitive search, more than 40,500 titles with at least one HF-related biomarker and prognosis-related information were initially identified. Of these only 10% (4224) were relevant to HF biomarker prognostic models and factors. We used established tools of prognostic methodology to assess the eligible studies3.
Results: Despite the extensive research on prognostic HF-biomarkers, only a maximum of 200 papers (5% of 4224 and only 0.5% of 40500) hinted on employing appropriate prognostic methodological processes, but less than 50 adequately reported their methods. As a preliminary result the adequately developed and validated models would not exceed 10.
In the vast majority of the papers there was a rather confusing marriage of HF-biomarker research and prognostic modelling methodology. Most were based on a simple logistic regression, which is merely explanatory of a causal or association hypothesis but doesn't qualify as a prognostic model on its own. Prediction research aims to provide an estimate of outcome probability to assist clinical management; it is independent of a causal hypothesis, and needs to be validated and if necessary, calibrated. The development and reporting of prognostic models was often misunderstood and/or misreported, while the adequate conduct and reporting of models' validation and calibration was usually absent.
Conclusions: Our project is the first known attempt to assess systematically the evidence from HF prognostic models. We found largely inadequate use of prognostic methodology leading to multiple papers, with very little prognostic information for HF. This area of HF research would benefit from adopting REWARD alliance initiatives on avoiding research waste. Research teams should consider prognostic methodology training, before embarking on such projects. Responsibility also lies with the Journals for ensuring the quality of conduct of prognostic research through their peer review processes. Until such time use of prognostic models would be limited.

P565

Advancements of artificial intelligence in the management of heart failure in a clinical setting

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On behalf of: /
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Artificial intelligence (AI) and machine learning (ML), which is a subset of AI that allows for systems to autonomously learn through data and experience, have been of increasing use in the field of cardiology and heart failure (HF). These systems allow for the detection of patterns and signs used in early detection, monitoring and treatment with a higher degree of accuracy in comparison to human capability. In theory, this improvement in accuracy combined with the technological nature of these systems allows for efficient and quick intervention to be delivered, improving prognosis and allowing human resources to be spent elsewhere, increasing the efficiency of the entire healthcare system. Hence, attempts at incorporating AI and ML feasibly in heart failure treatment have been increasing.
We conducted a systematic review, across the three primary databases, Embase and Medline and the most comprehensive machine learning database Arxiv. The search strategy yielded a total of 235 results, after which two independent authors filtered out publications according to the clinical relevance. We performed a quantitative meta-analysis and qualitative assessment of both published and unpublished literature of AI in HF in a real-world clinical setting that we plan to present at the conference to inform the general HF community about this rapidly developing field.
Selected uses of AI in HF include the improvement of detection of HF using ECGs by incorporating a newly proposed algorithm which can classify whether the patient has HF using a mere 2 second segment to an impressive accuracy. Telemedicine interfaces that have been developed with the aim of integrating at home health monitoring, using connected wearable devices and Bluetooth instruments such as weighing scales, with the aim of improved monitoring and early detection of relapse post release. Furthermore, these platforms also have the capability of using coding clinical guidelines in the treatment of HF, incorporating the patient information that was collected and producing treatment recommendations to the clinicians. Wearable devices have also been a new fitness trend that has shown variable successes when incorporated into HF management, with learning algorithms showing an improvement over conventional predictive readmission guidelines while allowing for consistent patient monitoring and prompt intervention upon any alarming signs suggesting relapse, thus reducing hospitalisations. Lastly, we reviewed some of the ethical and regulatory challenges of implementation of these new technologies. In conclusion, we aim to present the findings of our recently conducted systematic review and meta-analysis to allow busy clinicians to stay up to date with the developments of AI in HF.

P566

Guideline recommended therapies in HFrEF, online medical education improves cardiologists' knowledge and competence

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Introduction Clinicians who treat patients with chronic heart failure require education on current guideline recommendations for the treatment of heart failure with reduced ejection fraction (HFrEF) and on the appropriate use of established and new therapies.
Purpose We sought to assess whether online education, based on the latest evidence, directed at cardiologists, could improve knowledge and competence on the application of guidelines-recommended therapies – mineralocorticoid receptor antagonists (MRA) and angiotensin receptor neprilysin inhibitors (ARNi) – in HFrEF.
Methods The education consisted of a 30-minute, case-based, online video discussion between 2 heart failure experts, with synchronised slides. Educational effect was assessed using a 3-question repeated pairs, pre/post assessment survey. A chi-squared test assessed changes pre- to post-assessment. P values < 0.05 were statistically significant. Cramer's V test was used to calculate the effect size (<0.05 modest; 0.06-0.15 noticeable effect; 0.16-0.26 considerable effect; >0.26 extensive effect) overall and for each question. The activity launched on 11thMay 2017 and data were collected through 14thJune 2017.
Results 376 cardiologists completed the pre- and post-assessment. Overall, education had an extensive impact on cardiologists' knowledge/competence (V=0.264). At baseline, 6% of cardiologists answered all 3 questions correctly, which, on post-assessment, increased six-fold to 36%. For each of the three questions, there was a greater than 50% relative improvement for (57%, 84% and 57%). Specific observations include:
• There was a low level of baseline knowledge (35% pre-assessment) on selective MRAs having a better safety profile in men with a significant absolute increase of 20% (to more than half of cardiologists correctly answering this question) post-assessment ($p<0.001$; V=0.201).

• On the benefit of ARNi vs ACE inhibitor therapy in the PARADIGM-HF trial, there was a low level of baseline knowledge (37%) which increased to 68% post-assessment (p<0.001; V=0.311).
• Nearly half of cardiologists were aware of the percentage of hyperkalaemia in clinical trials with ACE inhibitors and an MRA pre-education, which increased to nearly three-fourths post-education (p,0.001; V=0.286).
Conclusion This study demonstrates an extensive impact of case-based, online video discussion on cardiologists' knowledge of HFrEF and guidelines-recommended therapies.

P567

Reduction of potentially preventable hospitalization rates with a multidisciplinary program of heart failure

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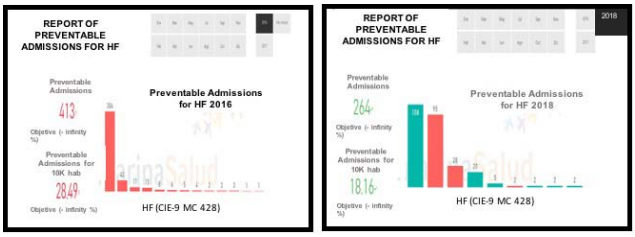
INTRODUCCION: Potentially preventable hospitalization rates (PPH) have been used as an indicator of access to primary care since these are hospital admissions that could be prevented through accessible, effective and high-quality outpatient care.Heart failure (HF) is often the final stage of heart disease and currently one of the most relevant public health problems. Its prevalence has increased due to an aging population and the improvement of acute myocardial infarction treatment, among others.Patient or medical care preventable precipitating factors represent 30-60% of the causes of HF, and 40% of HF hospitalizations could be potentially preventable. Among all these factors, surveillance to recognize early HF decompensation, and the role of health care to ensure continuity after hospital discharge play a key role.
OBJECTIVES: to evaluate the PPH rate and the cost effectiveness of the development of a multidisciplinary program such as the heart failure unit (HFU) over the last two years.
METHODS: development and implementation of the community multidisciplinary HFU, including primary care, cardiology, internal medicine and palliative care. Programs are developed for early follow-up at discharge, outpatient clinic, home hospitalization and palliative care, remote patient follow-up, nursing consultation, available for patients during the 5 working days of the week. The PPH rate is analyzed using the indicator provided by Health department.
RESULTS: In 2016, with the start of the HFU activity, a total of 304 PPH were recorded in HF. In 2018 the PPH has been reduced to a total of 108. Therefore, with the development of the care integration programs of the HFU a total of 196 PPH have been reduced in two years. The average stay in the cardiology service is 5.3 days (expected 6.15). With an average cost per Law of 2017 Fees of the Department of Health of 310.17 €/day, (€ 1644 /admission). Therefore a potential reduction of € 322,224 in 2018 vs. 2016.
CONCLUSIONS: The clinical interventions which lead to the integration and coordination of the different levels of health care involved in HF affect the number of admissions, patient quality of life and health care efficiency.



Report of preventable admissions for HF

P568

Optimising guideline recommended medical therapy for heart failure, impact of medical education on cardiologists knowledge and competence using case simulations

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Introduction Application of evidence-based guidelines recommendations to clinical practice is not always optimally achieved. Clinicians who treat patients with chronic heart failure frequently fail to optimise medical therapies. It is important to educate them on the inclusion of an ARNi in the 2016 European HF guidelines, considerations on dose-titration, discontinuation and modification of treatment strategy in HF patients with moderate renal impairment.
Purpose: We sought to assess whether online education, directed at cardiologists, could improve knowledge and competence on optimising medical therapy for heart failure patients.
Methods: The educational activity consisted of a 20-minute online video patient-case simulation interspersed with expert commentary provided by a European heart failure expert. Educational effect was assessed using a 3-question repeated pairs, pre-/post-assessment survey. A chi-squared test assessed changes pre- to post-assessment. P values < 0.05 were statistically significant. Cramer's V test was used to calculate the effect size (<0.05 modest; 0.06-0.15 noticeable effect; 0.16-0.26 considerable effect; >0.26 extensive effect) overall and for each question. The activity launched on 18thMay 2017 and data were collected through 21stJune 2017.
Results: 319 cardiologists completed the pre- and post-assessment. Overall, education resulted in considerable impact on cardiologists' knowledge and competence (V=0.244). At baseline, 10% of cardiologists answered all 3 questions correctly and this, on post-assessment, increased nearly five-fold to 48%. Specific observations include:
• There was a good level of baseline knowledge (66% pre-assessment) on the importance of adding an MRA to beta-blocker and ACEi to optimize medical therapy and reduce CV outcomes in heart failure patients. This increased to 71% post-education (p=0.233; V=0.047)
• On determining the rationale to stop or not uptitrate an ARNi, there was a good level of baseline knowledge (62%) which increased to 80% post-assessment (p<0.001; V=0.193).
• Only 27% of cardiologists correctly identified that reduction of diuretic dose might help to compensate for reduced renal function in HF patients taking an ARNi. Post-education, there was a near three-fold increase to 76% correct responses (p<0.001; v=0.486).
Conclusion: This study demonstrates the positive effect of an online video patient-case simulation, interspersed with expert commentary, on cardiologists' knowledge and competence regarding practical application of HF guidelines. Despite improvements in knowledge and competence, implementation into clinical practice is still suboptimal and application-based education in different formats may be required to truly improve patient outcomes.

P569

Key changes to the 2016 European heart failure guidelines, effect of medical education on cardiologist knowledge

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Funding Acknowledgements: Developed through independent educational funding from Novartis

Introduction Clinicians who treat patients with chronic heart failure require education on the latest updates to guidelines recommendations for the treatment of heart failure to improve clinical practice and patient outcomes.
Purpose We sought to assess whether online education directed at cardiologists could improve knowledge of the key changes to European heart failure guidelines.
Methods The educational activity was a 30-minute online video discussion between 4 heart failure experts, with synchronised slides. Educational effect was assessed using a 3-question repeated pairs, pre-/post-assessment survey. A chi-squared test assessed changes pre- to post-assessment. P values < 0.05 were statistically significant. Cramer's V test was used to calculate the effect size (<0.05 modest; 0.06-0.15 noticeable effect; 0.16-0.26 considerable effect; >0.26 extensive effect) overall and for each question. The activity launched on 16thMay 2017 and data were collected through 21stJune 2017.
Results 326 cardiologists completed the pre- and post-assessment. Overall, cardiologists experienced a considerable impact from the education (V=0.187). At baseline, 10% of cardiologists answered all 3 questions correctly which, on post-assessment, more than doubled to 25%. Specific observations include:
• There was a modest level of baseline knowledge (48% pre-assessment) on key changes to the 2016 European heart failure guidelines which increased to 60% at post-assessment (p=0.002; V=0.123).
• There was a modest level of baseline knowledge (51%)on assessing the characteristics of natriuretic peptides, which increased to 63% at post-assessment (p=0.002; V=0.124).
• At baseline, only 28% of cardiologists correctly responded to a question on BNP or NT-proBNP levels as a criterion for ACEi or ARNi use in patients with HFrEF.

Following the programme, this increased to 60% correct responses (p<0.001; V=0.318).
Conclusion This study demonstrates the positive effect of online medical education in the form of video discussion with slides on cardiologists' knowledge of key changes to the 2016 European heart failure guidelines. Remaining gaps were also identified that require further educational initiatives.

P571
The correlation analysis of polymorphisms system renin-angiotensin-aldosteron system with development of atrial fibrillation

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Introduction: Methods of the mathematical analysis given for forecasting of emergence of atrial fibrillation. The correlation analysis of the genes of renin-angiotensin-aldosterone system with indicators of the electrocardiogram and an echocardiography at probands from primary AF was carried out.
Purpose. Studying of correlation bonds of polymorphisms of genes of ACE, AGTR1, AGT with indicators of the electrocardiogram and echocardiography at probands from primary and secondary AF.
Methods. Research object – the main group of a research was made by 234 persons, from them 86 men (36.8%) and 148 women (63.2%). Average age of men was 39.60±18.65 years, women of 50.93±16.78 years. In group of patients with primary AF of 40 patients, from them 26 (65.0%) men and 14 (35.0%) women. From them 90 probands with the confirmed diagnosis of AF. From them it was distinguished: 40 probands with primary AF (this group of patients had no communication of developing of arrhythmia with cardiovascular pathology); 50 probands with secondary AF (in this group the accurate interrelation of emergence of an attack of arrhythmia with existence of the accompanying cardiovascular pathology prolezhivatsya).
Results. When carrying out the correlation analysis of the studied genes with indicators of the electrocardiogram and an echocardiography at probands from primary AF it was established that left ventricular ejection fraction decreases at carriers of a widespread homozygous genotype of the CC polymorphism T174M and widespread homozygous genotype of a TT of polymorphism of M235T of a gene of AGT. Among probands from secondary AF at carriers of a homozygous genotype of the II gene the ACE of duration of a P wave increases while at carriers of a homozygous genotype the DD P wave remains the normal sizes.
Conclusions. Studying of polymorphic allelic variants of genes of RAAS (I/D of polymorphism of a gene of ACE, A/C of polymorphism of a gene AGTR1, T174M of polymorphism of a gene of AGT and M235T of polymorphism of a gene of AGT) in families of AF will allow to reveal molecular and genetic distinctions, to carry out the genetic forecast of development of diseases and also to define risk groups on development of AF for dispensary observation and implementation of prevention.

Basic Science

P572
Swallow syncope: a review of the current evidences

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Background: Syncope is defined as transient loss of consciousness due to cerebral hypoperfusion. Swallow or deglutition syncope is an unusual type of neurally-mediated syncope associated with life-threatening bradyarrhythmia and hypotension. It is a difficult condition to diagnose, often missed by the physician, resulting in delayed diagnosis and treatment. We reviewed and summarized literature available regarding this rare condition, providing guidance for physicians encountering swallow syncope.
Purpose: To elucidate the basic demographic, clinical characteristics and management of swallow syncope based on the published literature.
Methods: A PubMed search for English language manuscripts published at any point in time using the MeSH terms "swallow syncope" and "deglutition syncope" was conducted. A total of 117 articles on swallow syncope were identified between 1949 and 2018. Sixteen cases were either reported in non-English literature or were not retrievable. 101 suitable case reports were statistically analyzed with regards to clinical presentation, underlying diseases and management. The statistical software SPSS, version 24 was used.
Results: A total of 101 swallow syncope patients reported in the literature were reviewed. The demographics were as follows: mean age 57.7 years at presentation, more common in older age groups (55.4%, n= 56, more than 60 years old); and males (59.4%, n=60). Presyncope or syncope was the most common presenting symptom (99%, n=100) followed by dysphagia (11.9%, n=12). Types of arrhythmia associated with swallow syncope were reported as follows: Atrioventricular (AV) conduction blocks (34.7%, n=35) including first, second and third-degree AV blocks were the most common electrophysiological problems; followed by sinus node dysfunctions (33.7%, n=34) including sinus bradycardia, sinus arrest and asystole. Any type of food (54.5%, n=55) be it liquids or solids were the most common trigger factor. Swallow syncope is frequently associated with underlying gastrointestinal diseases (32.7%, n=33). For instances, Hiatal hernia (18.8%, n=19), esophageal stricture (3%, n=3), achalasia (3%, n=3) were the most common gastrointestinal disorders. Followed by cardiac diseases (32.7%, n=33) and metabolic diseases (27.7%, n=28). More than half of the patients (55.5%, n=56) were treated with a permanent pacemaker, (98.1%, n=52) of them reported to had complete resolution of syncopal symptom. Second most common treatment modality was the treatment of an underlying causative factor (15.8%, n=16), all (100%, n=4) cases of hiatal hernia that were corrected surgically had a complete resolution of swallow syncope.
Conclusions: Swallow syncope is extremely rare, but still needs to be considered during diagnostic workup. Permanent pacemaker implantation is usually the first line treatment, with the exception of underlying gastrointestinal disease, where treatment of underlying diseases has more favourable outcomes.

P573
Lifestyles as risk for cardiovascular diseases in medical students

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The aim of this study was to show the connection between the lifestyles, physical activity, BMI and risk for cardiovascular diseases.
Material and methods: This was a prospective study, which was included 150 medical students within the regular systematic review. Self-administered questionnaires provided family history of hypertension, daily energy expenditure, smoking habit, daily fat intake, and socioeconomic status.
Results: Both genders were equally represented among the students. A significant difference was found between the values of BMI of males and females examined (p<0.001). Male students is more overweight then the female students. The majority of students (41.3%) are feeding in the student cafeteria, almost none are vegan (2.7). Students with higher value of BMI are consuming sweets on daily basis (p=0.006). Only 3.3% drink alcohol every day, energy drinks are consumed daily by 4.7% and coffee by 46.7% of students. There is a statistically significant difference in BMI in smoking (p = 0.019). Students with elevated systolic blood pressure were more likely to be overweight (OR = 1.22), and with a personal history of cardiovascular disease (OR = 3.68). No significant difference was established between physical activity and nutritional status of the students.
Conclusion: The main predictor for cardiovascular disease is overweight, consumed energy drinks and daily fat intake.

P574
Quality of life in patients with transthyretin amyloidosis accompanied by congestive heart failure

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Background: Transthyretin (ATTR) amyloidosis is a rare, systemic, progressive, and fatal disease in which transthyretin proteins misfold and deposit as amyloid in the tissue. Amyloids can infiltrate cardiac tissues, resulting in cardiomyopathy and eventually congestive heart failure (CHF). ATTR amyloidosis is a significantly undiagnosed cause of CHF, possibly representing 15% of patients with CHF with preserved ejection fraction. The burden of ATTR amyloidosis with CHF on quality of life (QOL) is not well known.
Purpose: To examine the QOL burden of patients with ATTR amyloidosis and CHF.
Methods: Adult patients with ATTR amyloidosis were enrolled in an online, longitudinal observational survey study. The current analysis is based on data collected at the initial assessment; patients included were a subset of the full sample who self-reported CHF. Measures administered included the 12-item Kansas City Cardiomyopathy Questionnaire (KCCQ-12), which captures the impact of CHF and its symptoms on patients' functioning and QOL, and the SF-36v2 Health Survey, a measure of generic physical and mental QOL. To examine the burden of ATTR amyloidosis and CHF, SF-36v2 scores for the current sample were compared to scores from age- and gender-matched benchmark samples of the United States general population and of patients with CHF. Cardiac-specific burden was examined by linking KCCQ-12 mean scores to the New York Heart Association (NYHA) Functional Classification.
Results: SF-36v2 scores from 25 patients with ATTR amyloidosis and CHF were significantly lower than that of the general population, particularly for physical

domains (physical functioning and role limitations due to physical health problems), general health, and the physical component summary score (all p < 0.01). Scores were also significantly lower for patients with ATTR amyloidosis and CHF on vitality and social functioning domains (both p<0.05), although not for the mental component summary score (p=0.72). The burden on QOL of patients with ATTR amyloidosis and CHF did not statistically differ from that of the CHF benchmark sample on any SF-36v2 domain or summary scores (all p>0.05). Patients with ATTR amyloidosis and CHF had a mean KCCQ-12 score of 57.8 (standard deviation = 18.6), which corresponds most closely to NYHA class III, marked limitation of physical activity. Conclusion: Patients with ATTR amyloidosis and CHF show significant burden on both generic and cardiac-specific QOL. Furthermore, patients with ATTR amyloidosis exhibit similar QOL burden as patients with CHF, with both patient populations showing significant burden compared to the general population. Therefore, patients with ATTR amyloidosis and CHF would greatly benefit from new treatments targeting physical functioning and overall physical health.

P575

The definition of left bundle branch block and non-specific intraventricular conduction delay influences long-term mortality in the general population: the health 2000 survey

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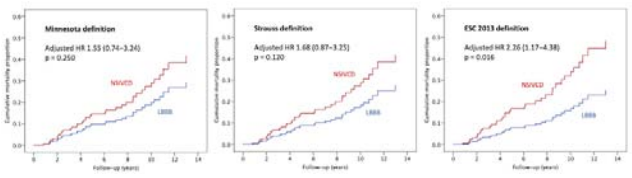
Background: Left bundle branch block (LBBB) may represent a benign intraventricular conduction disorder, but it is also a well-established marker of structural heart disease. The definition of LBBB is known to influence the response to cardiac resynchronization therapy, but the significance of the definition of LBBB in the general population is not well-known. A broad QRS complex not typical for right bundle branch block (RBBB) or LBBB is defined as non-specific intraventricular conduction delay (NSIVCD), which has also been associated with worse outcome. The definition of LBBB influences the number of subjects classified as NSIVCD.
Purpose: We determined the prevalence and prognostic impact of three different definitions of LBBB and of NSIVCD in the standard 12-lead ECG in a Finnish population cohort.
Methods: Data were collected from a large nationally representative (random sample) health examination survey of 6,299 subjects. Three different definitions of LBBB were applied: Minnesota, Strauss et al and ESC 2013 definition. NSIVCD was defined as QRS duration ≥120 ms not meeting RBBB or LBBB criteria. Subjects were followed up for 16.5 years with primary study end points of all-cause and cardiovascular (CV) death.
Results: Minnesota, Strauss and ESC 2013 definitions identified LBBB in 59 (0.9%), 47 (0.7%) and 50 subjects (0.8%), and NSIVCD in 33 (0.5%), 45 (0.7%), 42 (0.7%) subjects, respectively. Chronic heart failure was present in 20.7% and NYHA class II-IV in 34.8% of subjects. After adjustment for age and gender, the hazard ratio (HR) for CV mortality for different definitions of LBBB was 1.93 (p = 0.003) for Minnesota, 1.62 (p = 0.058) for Strauss and 1.56 (p = 0.079) for ESC 2013 criteria. The HR for CV mortality for different definitions of NSIVCD was 2.83 (p = 0.004) for Minnesota, 3.18 (p < 0.001) for Strauss, and 3.47 (p < 0.001) for ESC 2013 criteria. In multivariate analysis, NSIVCD remained as an independent predictor of all-cause (HR 2.02, p = 0.003) and CV mortality (HR 3.39, p < 0.001); the ESC 2013 definition had the highest HR. Compared to LBBB, subjects with NSIVCD were associated with increased CV mortality only for the ESC 2013 definition of LBBB (HR 2.26, p = 0.016).
Conclusions: The definition of LBBB determines the number of subjects in the general population. Regarding mortality, the ESC 2013 definition of LBBB identifies NSIVCD subjects with the worst outcome better than two other LBBB criteria.



Multivariate Cox curves for def. of LBBB

P576

Evolution of diastolic dysfunction of patients with acquired heart diseases in the postoperative period

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Background: There are only a few studies concerning diastolic dysfunction (DD) in perioperative period. We examined the development of left ventricular DD after cardiac surgery.
Purpose: Assessment of DD dynamic, revealing of the newly emerging DD in patients with acquired heart diseases in the postoperative period
Methods: The study involved 112 patients (90 men and 22 women) with aortic and mitral valve diseases. The median age was 51 years Q1-Q3 (35-57). All patients underwent echocardiography, tissue Doppler, speckle tracking prior to surgery, in the early postoperative period (8 - 14 days) and 12 - 36 months after surgery. The patients were divided into group 0 - patients without complications, group 1 - patients with heart failure with preserved ejection fraction (HFpEF) after surgery. Initially, patients with DD 1, 2, 3 types were identified. DD was determined using the following parameters: septal velocity es < 7 cm/sec, lateral el < 10 cm/sec, average E/e ratio > 14, left atrial (LA) volume index > 34 ml/m2, peak tricuspid regurgitation (TR) velocity> 2.8 m/sec and appropriate /A ratio.

Results: Initially, patients with DD had shortness of breath (80% of patients), high blood pressure (70%), atrial fibrillation (52%). The worsening of diastolic function and appearance of HFpEF after surgery was associated with: dyspnea, severe pulmonary edema, prolonged ventilation, atrial fibrillation, reduced O2 consumption, encephalopathy, renal dysfunction. Diastolic function deteriorated in 15 patients (19%) after surgery. Normal diastolic function was determined primarily in 34 of 112 patients. DD occurred in 9 (26.5%) of 34 patients with originally normal diastolic function and was due to surgery. In these patients, the septal diastolic velocity es decreased immediately after surgery and continued to reduce progressively from 8.50± 0.71 to 4.60±0.53 cm/sec (p=0.005) in the long-term period. LA volume index declined from 28.49±6.9 to 13.8±5.4 ml/m2 (p=0.05), the lateral el increased from 6.9± 1.8 to 11±2.3 cm/sec (p=0.037) in patients with type 1 DD after surgery. The lateral el also significantly enhanced from 6.48±1.5 to 8.46±2.8 cm/sec (p= 0.0007), the septal es increased less from 5.3±1.5 to 6.4±2.0 cm/sec (p= 0.004), the E/e ratio decreased in the group with type 2 DD. A falling in the E/A ratio from 2.6 ± 0.6 to 1.6 ± 0.6 (p = 0.007) was typical for type 3 DD. Thus, the septal function has not improved to the normal indicators. The lateral el accomplished to normal from 6.5 ± 1.5 cm/sec to 10 ± 2.8 cm/sec (p = 0.0001) only in long-term period.
Conclusions: Patients with HFpEF after surgery have a severe clinical picture. There was positive diastolic function dynamics after surgery during 1 - 2 years, but the septal function did not reach the normal values. The emerging and worsening of diastolic function was due to damage of the septum function and subsequent progressive decreasing in the long-term after surgery.

P577

Correlation between the occurrence of cardiac arrhythmias and symptoms of heart failure in pregnant women with underweight

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Purpose: To evaluate the correlation between the occurrence of cardiac arrhythmias and symptoms of heart failure in pregnant women with underweight.
Methods: We examined 90 pregnant women in the II-III trimester of pregnancy. The first group consisted of 45 (50%) pregnant women with body mass deficiency (body mass index less than 18.5), the second group included 45 (50%) pregnant women with normal body weight (body mass index 18.6-24.9). The median age of the patients included in the study in 1st group was 27.4±1.2 years, in 2nd group it was 26.8±1.9 years. In order to asses the state of the cardiovascular system, all patients underwent echocardiography, 24-hours ECG Holter monitoring, the 6-min walk test (6 MWT).
Results: According to echocardiography, mitral valve prolapse was detected in 92% of pregnant women with underweight and in 30% of pregnant women with normal body weight. In pregnant women with a deficiency of body weight, mitral regurgitation of the 1st degree (35.6% vs 17.8%, p<0.05) and 2nd degrees (48.9% vs 8.9%, p<0.05) were more often registered. According to the results of ECG monitoring, ventricular premature beats were significantly more frequently recorded in pregnant patients with a body weight deficit (37.8% vs 6.7%, p<0.05). Episodes of ventricular tachycardia were recorded in 11.1% of pregnant patients with underweight. In the group of patients with underweight, more patients with supraventricular extrasystoles (71.1% vs 33.3%, p<0.05) and episodes of supraventricular

tachycardia (62.2% vs 20%, p<0.05) were identified. According to the 6 MWT, class 1st by NYHA (48.9% vs 77.8%, p<0.05), 2nd class (46.7% vs 20%, p<0.05) and 3d class (4.4% vs 2.2%, p<0.05).
Conclusions: In pregnant patients with a deficiency of body weight, mitral valve prolapse with mitral regurgitation, ventricular and supraventricular extrasystoles, supraventricular tachycardia and the severity of heart failure were significantly more common. The correlation between the number of rhythm disturbances and the severity of heart failure was traced by NYHA (r=0.45, p=0.042).

P578
CHA2DS2-VASc score and B-type natriuretic peptide in predicting stroke, transient ischemic attack,thromboembolism and death in at-risk patients without atrial fibrillation-the STOP-HF experience

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Background In recent years, use of the CHA2DS2-VASc score in predicting stroke/TIA has extended beyond AF. It is recognized that the cluster of multiple stroke risk factors included within the CHA2DS2-VASc score increases the risk of stroke/TIA whether or not AF has been defined. Similarly, natriuretic peptides have gained interest as a marker of cardiovascular risk. Increased blood levels of natriuretic peptides have been repeatedly associated with cardioembolic stroke.
Purpose: To determine the accuracy of the CHA2DS2-VASc score and BNP separately for predicting stroke or transient ischaemic attack (TIA) and the composite endpoint of Stroke/TIA/Thromboembolism (TE) and Death in patients without a history of atrial fibrillation or flutter, and to evaluate the incremental benefit of adding BNP to CHA2DS2-VASc for predicting stroke or TIA, in a community-based population.
Methods The study included 801 patients without known AF enrolled in the STOP HF follow-up study between 2012 and 2017. The end points measured were stroke/TIA and the composite end point of ischaemic stroke/TIA/TE and death.
Results: The study population (N=801) had a mean age (SD) of 64.4 years (10.4) with 381 (47.6%) male. The median B-type Natriuretic peptide was 24pg/ml (Interquartile range:12- 52). A total of 33 (4.1%) patients had a CHA2DS2-VASc of 1, while 175 (21.9%), 282 (35.2%), 186 (23.2%), 94 (11.7%), 31 (3.9%) had CHA2DS2-VASc score of 1,2,3, 4 and ≥5 respectively.
The composite endpoint of stroke/TIA/TE/Death occurred in 115 (14.4%) of the population. The incidence of stroke/TIA/TE and death occurred more frequently as the CHA2DS2-VASc score increased. The outcome occurred in 1 (3%), 15(8.6%), 33 (11.7%) and 35 (18.8%) 19 (20.2%), 12 (38.7%) of those with a CHA2DS2-VASc score of 0, 1, 2, 3, 4 and ≥5 respectively. Separately, at baseline, both the CHADS2-Vasc score and the BNP predicted Stroke/TIA. The adjusted odds ratio for Stroke/TIA using the CHADS2-Vasc score and the baseline BNP were 2.05 (95% CI, 1.43 -2.93) and 1.33 (95% CI, 0.88- 2.0) respectively. Both the CHA2DS2-VASc score and the BNP had a respectable discrimination performance in this group with a c-statistic of 0.72 for the former and 0.67 for the latter. Adding the BNP to the CHADS2Vasc score improved the stroke/TIA predictive value further, producing a c-statistic of 0.75.
The adjusted odds ratios for Stroke/TIA, TE and Death using the CHA2DS2-VASc score and the baseline BNP were 1.35 (95% CI, 1.12 -1.63) and 1.5 (95% CI, 1.21-1.87) respectively (both p<0.01). Addition of BNP to the CHA2DS2-VASc improved c- statistics from 0.64 to 0.68 for stroke/TIA/TE and death.
Conclusion: Both the CHA2DS2-VASc tool and BNP predict Stroke and TIA and the composite end-point of stroke/TIA/TE and death in patients with out atrial fibrillation at baseline. The predictive value of CHA2DS2-VASc is further enhanced with the addition of BNP for outcome measures.

P579
Genetic screening of patients with non-compact cardiomyopathy using next generation sequencing

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Background: Left ventricular non-compaction cardiomyopathy (LVNC) is characterized by prominent left ventricular trabeculae and deep inter-trabecular recesses. The myocardial wall is often thickened with a thin, compacted epicardial layer and a thickened endocardial layer. In some patients, LVNC is associated with left ventricular dilatation and systolic dysfunction. LVNC is frequently familial and genetic studies identified causative mutations in genes encoding taffazin, alpha dystrobrevin, ZASP, actin, and lamin A/C.
Aims: We performed genetic analysis of Hungarian patients with LVNC using next-generation sequencing.
Patients and methods: We examined 9 patients with non-compact cardiomyopathy (3 males, avg. age 58±20 years). Five of the patients were in the dilated phase of LVNC. Using next-generation sequencing we screened 103 known causative cardiomyopathy genes covering a target region of 500.000 base pairs.
Results: Pathogenic or likely pathogenic variants were identified in 6 patients (6/9, 67%). Two of these variants were identified in the beta myosin heavy chain gene (MYH7, Gly181Val, Tyr283Cys), and four in the titin gene (TTN, Gln34219*, Glu16261fs, Glu19847fs, Lys22311fs). TTN variants (all novel) were truncating variants, mostly affecting LVNC patients in the dilated phase (3/5, 60%).
Summary: Our results suggest that pathogenic variants can be found in a large proportion of Hungarian patients with LVNC. These variants mostly affect the titin gene and are associated with LVNC in dilated phase.

P580
It's not so rare to have a rare disease- single centre experience with wild type transthyretin amyloid cardiomyopathy

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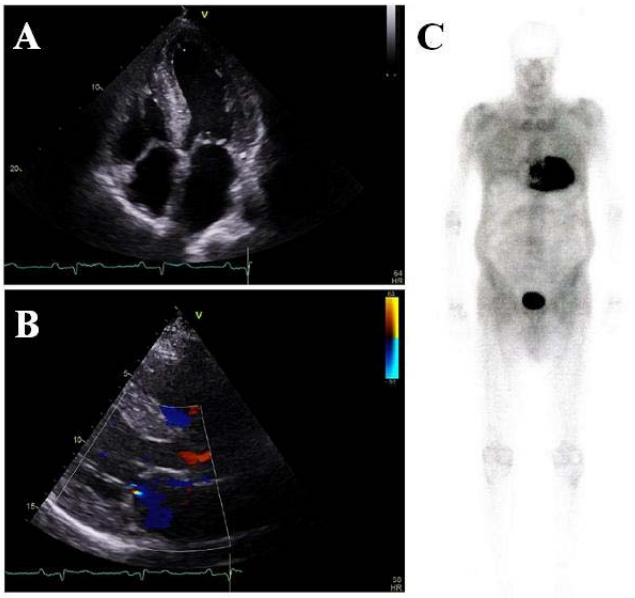
Background: Transthyretin (TTR) amyloid cardiomyopathy is caused by mutations in the TTR gene or by the deposition of wild-type TTR protein (wild type TTR amyloidosis-ATTRwt). According to literature, ATTRwt may present as heart failure with preserved ejection fraction, severe aortic stenosis, hypertrophic cardiomyopathy (HCM) or resctrictive cardiomyopathy.
Purpose: We describe the clinical heterogeneity of ATTRwt patients from our centre diagnosed in 2018.
Methods: All patients were diagnosed histologically and/or non-invasively (intensive cardiac uptake at 99mTc-DPD scintigraphy -Figure 1C). Light chain amyloidosis and mutations in TTR gene were excluded.
Results: Six patients (5 males) were diagnosed with ATTRwt (Table 1). Age of onset differed among the patients. Characteristic clinical features included cardiomyopathy with increased left and right ventricular wall thickness. Only one patient had

Table1

Patient	1.	2.	3.	4.	5.	6.
Gender	F	M	M	M	M	M
Age of onset	50	77	78	80	77	76
Electrocardiogram	AF	AF, RBBB	LVH	LVH	pseudo-infarct pattern, low QRS voltage	AF, low QRS voltage
Echocardiography						
Maximal wall thickness [mm]	22	28	22	23	18	20
Asymmetric hypertrophy pattern	-	-	+	+	-	+
Restrictive filling pattern	+	-	-	-	-	-
LVEF [%]	50	60	65	60	45	55
Cardiac magnetic resonance	subendocardial late gadolinium enhancement					
NYHA	IV	II/III	II	II/III	II	IV
NT-proBNP [pg/ml]	29000	2755	222	2630	2428	9600
Troponin-T [range:0-14ng/l]	156	65	35	63	64	77
Carpal tunnel syndrome	-	+	+	+	-	+

F-female; M-male; AF-atrial fibrillation; LVH-left ventricular hypertrophy; LVEF - left ventricular ejection fraction.

restrictive filling pattern. Three patients had atrial fibrillation. Laboratory examination showed increased level of troponin T and NT-proBNP. Four patients had bilateral carpal tunnel syndrome.
Conclusions: Although ATTRwt is known for its broad clinical spectrum, patients from our center presented mostly as HCM phenocopies but in different stages of heart failure. Appropriate diagnosis of ATTRwt is very important and soon will have a direct therapeutic impact.



TTE and DPD-scintigraphy of patient 5.

P581
Expanding the phenotype of loss-of-function mutations in the PPP1R13L gene causing paediatric dilated cardiomyopathy

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Paediatric DCM is characterised by rapid progression and high mortality. More than 70 genes have been associated with DCM, but new genes and mechanisms are still being discovered. Recently a novel form of syndromic DCM associated with mild ectodermal abnormalities was described in five children from a large consanguineous Arab-Christian pedigree who were homozygous for a loss-of-function variant in the PPP1R13L gene (Falik-Zaccai 2017).
Purpose. To expand the phenotypic spectrum of biallelic loss-of-function variants in the PPP1R13L gene using clinical data from three unrelated families of different ethnic backgrounds.
Methods. DNA samples extracted from venous blood or formalin-fixed paraffin-embedded post mortem tissue from probands with DCM were subjected to either whole genome sequencing (WGS) through The 100,000 Genomes Project Protocol v3 or whole exome sequencing (WES). Cases were brought together using GeneMatcher, a tool for connecting investigators with an interest in the same gene. Detailed clinical evaluation and archive clinical data analysis were performed for the 3 families.
Results. Biallelic loss-of-function variants in the PPP1R13L gene were identified in 3 children from 2 unrelated DCM families. A homozygous missense variant c.2167A>C p.(T723P) was identified in a proband3. This variant affects a highly conserved ANK2 repeat within iASPP, and was predicted as probably damaging by in silico prediction tools. This patient had a mild learning disability and no ectodermal findings. Clinical and genetic findings are summarised in Table.
Conclusion. Loss-of-function mutations in the PPP1R13L gene cause an autosomal recessive form of severe paediatric DCM with variable extra-cardiac involvement. This is the first genetic form of DCM where an abnormal inflammatory response appears to play a key role in cardiomyopathy pathogenesis. These additional presentations provide sufficient evidence for a robust gene-disease association and the PPP1R13L gene should be included in targeted panel-based genetic testing for DCM.

Clinical and genetic findings

	Proband1	Proband1's sibling	Proband2	Proband3
Findings in the PPP1R13L gene	g.45899643_45899671del homozygous	g.45899643_45899671del homozygous	c.2486_2487del_insTC// c.1610del	c.2167A>Chomozygous
Oro-facial cleft	Yes, repaired	Yes, repaired	No	No
Unusual hair	Blondy thin hair	No	Sparse distribution, wiry hairs	No
Frequent upper airways infections	Yes	Yes	Yes	Yes
Motor and intellectual development	Normal	Normal	Normal	Moderate intellectual delay
Histological findings	Large-scale diffuse fibrosis	Was not performed	Extensive fibrosis with a features of storage disease	No data
Clinical outcome	Death due to HF progression at 4y.8m.o.	Death due to HF progression at 2 y.o.	Death due to HF progression at 3 y.o.	HF, HTx at the 9 y.o.

LoF loss-of-function, HF heart failure

P582
CD68+ and M2 macrophage infiltration in the human brain following myocardial infarction

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Background. Myocardial infarction (MI) remains the leading cause of mortality all over the world. The development of acute organic brain syndrome significantly increase lethality rate. However pathogenesis of acute organic brain syndrome is less clear. One of available mechanism is low-grade neuroinflammation. Glial macrophages are key cells which may perform inflammation in the brain.
This study investigated the temporal dynamics of common macrophage population and M2 macrophages in brain following fatal MI type 1.
Materials and Methods. The study included 31 patients with fatal MI type I. The control group comprised 10 persons of 18-40 age group who died from injuries incompatible with life. Patients with MI were divided into two groups. Group 1 comprised patients who died during the first 72 hours of MI; group 2 comprised patients who died on days 4-28. Macrophage infiltration in the brain was assessed by immunohistochemical analysis. We used CD68 as a marker for the cells of the macrophage lineage and CD163, CD206, stabilin-1 as M2-like macrophage biomarkers.
Results. The number of CD68+ macrophages in the group 1 was significantly higher than in the control group. In the group 2 the intensity CD68+ cells infiltration was lower than in the group 1 and higher than in the control group. Small number of CD163+, CD206+ stabilin-1+ M2 macrophages were observed in all three groups. There were no significant differences in the number of CD163+, CD206+ and stabilin-1+ cells between group 1 and group 2. Correlation analysis revealed the presence of positive correlation between the number of CD68+ macrophages in the infarct, peri-infarct, and non-infarct areas of the myocardium and the number of CD68+ macrophages in the brain in patients with MI. There were not correlations between the number of CD68 + and stabilin-1+ cells and the presence of diabetes mellitus, history of stroke, history of MI, and pre-infarction angina.

Conclusions. The number of CD68+ macrophages in brain significantly increased during the first three days of MI. The number of brain CD163+, CD206+, stabilin-1+ M2 macrophages did not differ between groups. We observed a positive correlation between the number of CD68+ macrophages in brain and myocardium following MI.

P583
Circulating pro-inflammatory intermediate monocytes relate to right ventricular pressure in heart failure of adult congenital heart disease

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Funding Acknowledgements: Deutsche Herzstiftung e.V. (German Heart Foundation)

Background: Heart failure (HF) is a leading cause of mortality in adults with congenital heart disease (ACHD). ACHD is characterized by predominant right heart disease. In non-congenital heart disease inflammation and its mediators such as monocytes/ macrophages play an important pathophysiological role in HF. We aimed to evaluate the role of monocyte subsets in ACHD-HF.
Methods: This cross-sectional study includes 209 ACHD outpatients (mean age: 35.3±11.0 years; NYHA class I/II/III-IV 58.3%/19.6%/13%; male: 59.8%) and 21 healthy controls (age: 29.8±12.6 years; male: 47.6%). Patients with clinical signs of infection, inflammatory diseases or malignancies were excluded. Multivariate analysis was used to relate monocyte subsets to NYHA class and echocardiographically derived parameters of right and left ventricular function.
Results: Compared to control, ACHD had significantly higher circulating levels of HLA-DR+CD14++CD16+ intermediate monocytes (43.6±1.7 vs. 23.97±3.3 cells/μL; p<0.001). Independent predictors of NYHA class were intermediate monocytes (p=0.022), plasma noradrenaline (p=0.002), albumin (p=0.001) and NT-proBNP (p<0.001). NT-proBNP was independently associated with reduced left (p<0.001) and right (p<0.001) ventricular function, diastolic dysfunction (p<0.04) and vena cava diameter (p<0.02).
Elevated right ventricular pressure (upper tertial >35 mmHg) was independently associated with both, higher intermediate monocyte counts (OR 1.36; 95% CI: 1.13–1.62; p=0.001) and lower oxygen saturation (OR 0.8; 95% CI: 0.7–0.92; p=0.001).
Conclusions: Right ventricular pressure and low oxygen saturation are related to elevated intermediate monocytes, suggesting an important link between inflammation and HF in ACHD. Intermediate monocytes represent a promising biomarker in ACHD.

P585
Association between NT-proBNP and common carotid artery intima-media thickness in young healthy adults

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The intima-media thickness (IMT) of the common carotid artery is considered as a predictor of cardiovascular events and is associated with cardiovascular risk factors. Elevated serum level of N-terminal fragment of B-type natriuretic peptide (NT-proBNP) is also well-known risk factor for future cardiovascular events. The association between NT-proBNP and IMT is still unclear, especially in young healthy people without hypertension. The aim of this study was to investigate the association between NT-proBNP and IMT in young apparently healthy adults.
Material and methods: We investigated 282 healthy young adults, mean age 18,5±1,7 years, 47% male. NT-proBNP, blood pressure (BP), body mass index, fasting plasma glucose, glycated haemoglobin (1), lipid profile, growth hormone (GH), C-reactive protein, interleukin−6 (IL-6) were evaluated. IMT was measured with High-resolution B-mode carotid ultrasonography.
Results: IMT was 0,60±0,10 mm (M+ SD), NT-proBNP level was 58, 61+2,39 pg/ml (M+m). Multivariate regression analysis showed positive association between IMT and NT-proBNP, systolic BP, 1 and negative association between IMT and IL-6, GH (see table).
Conclusions: IMT of the common carotid artery is appeared to be associated with serum NT-proBNP level even in the young people with normal blood pressure.

Predictor	*β*	Standard Error	p
Systolic BP	0,003±0,001	0,111	0,009
NT-proBNP	0,001±0,0004	0,100	0,013
IL-6	-0,002±0,001	0,073	0,032
1	0,061±0,016	0,207	<0,001
GH	-0,013±0,006	0,071	0,035

P586
Alterations of serum metabolites in patients with endothelium dysfunction associated with cardiovascular diseases.

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Purpose: The aim of the study was to identify the metabolic features of endothelial dysfunction associated with cardiovascular diseases (CVD).
METHODS Blood samples from two groups of individuals (n=51): 36 patients with cardiovascular diseases and 15 controls was analyzed. Endothelial function was evaluated by photoplethysmography (PPG): occlusion index, stiffness index (m/s). Untarget metabolic profiling was performed by gas-chromatography quadruple mass-spectrometry (GC\MS) and target analysis were made by liquid chromatography -triple quadruple mass-spectrometry (LC\MS\MS). Untarget results were analyzed by multivariate statistics with SIMCA-P. Statistical analyses for target data were performed with STATISTICA® 8.0. The distribution of the variables was checked with the Shapiro-Wilk test. Unpaired t-test for normally distributed and Mann-Whitney U-test for nonnormaly distributed metabolites were used to compare differences across groups.RESULTS A total of 106 metabolites were identified. Orthogonal projection to latent structurediscriminant analysis (OPLS-DA) identified metabolic clusters related to the studied groups (R2 0,991 and Q2 0,245). According to the results of the target analysis, statistically significant differences (p <0 05) of proteins, such as cysteine, alanine, valine, leucine, serine, threonine, proline, aspartic acid between ED group and controls are revealed. This alterations may be associated with impaired metabolic pathways of cysteine and glutathione synthesis. The levels of some acylcarnitines in patients with ED, which are caused by impaired energy metabolism, are elevated.
CONCLUSIONS We observed significant alterations of serum metabolites in patients with endothelium dysfunction. The alteration in phospholipids and cysteine metabolic pathways was revealed. Acylcarnitines were strongly related to ED.

Clinical Cases

P587
A rare case of atrial septal defect with mitral valve papillary fibroelastoma

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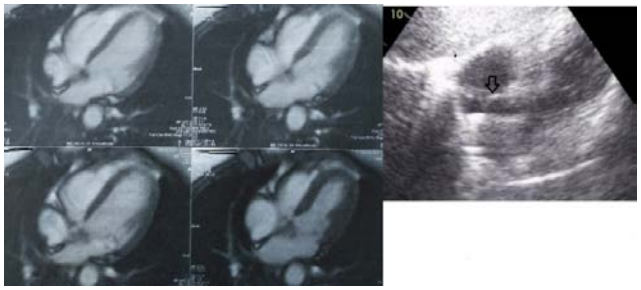
We report on a 40-years old female patient who referred at our department for further investigation after a neurological examination (asymptomatic). She has a history of smoking, hepatitis C, drug use and ischemic stroke (3 years ago).
Taking into consideration the history of ischemic stroke, we performed ecg, 24hours holter monitoring and transthoracic echocardiography (TTE) to exclude arrhythmias, thrombus and septal defect. Ecg and holter were unremarkable. TTE revealed atrial septal aneurysm, patent foramen ovale (PFO) and a small echogenic mobile formation on the atrial surface of the posterior mitral leaflet. The patient was sent for a transesophageal echocardiography test which confirmed these findings. The patient underwent cardiac MRI which also confirmed PFO with left to right flow, without RV or LV dilation, without RV volume overload, and a small mobile elongated formation (11mm) with minor local turbulent jet. On SSFP sequences the signal was low. LGE did not show any visible nodule/formation.
So, was the atrial septal defect or the mobile lesion responsible for the ischemic stroke? Is this formation vegetation, myxoma or papillary fibroelastoma?
Our patient has no clinical signs of possible endocarditis. From the images we do not have significant mitral regurgitation and the mass is not attached on the edge of



Fibroelastoma-asd

the leaflet (in favor of endocarditis). On the other hand myxomas tend to be larger and have multi-focal LGE. So, from the TEE and the MRI images the most probable diagnosis is mitral valve papillary fibroelastoma (small size, minor MR, low signal on SSFP, high mobility).
From bibliography fibroelastomas are more common in aortic valve. There are cases with atrial septal defect associated with aortic valve fibroelastomas but very few associated with mitral valve fibroelastomas. Papillary fibroelastoma in the left heart which is mobile and/or larger than 10mm is treated surgically (in asymptomatic patients). Atrial septal defect with embolism without other cause should be considered for intervention. Because our patient is symptomatic (ischemic stroke) we decided that surgery (PFO closure and fibroelastoma resection) is the most suitable solution and the operation has been set for the next month.

P588

Belated diagnosis of non-ischemic dilated cardiomyopathy in a patient with previous bypass surgery

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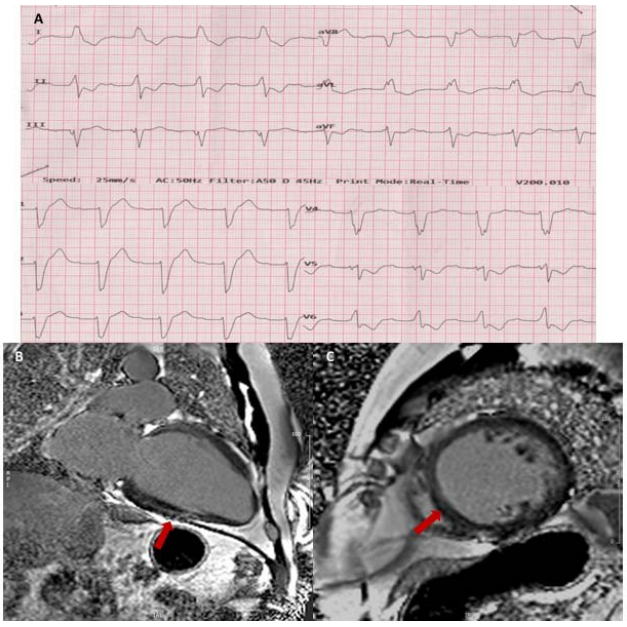
Introduction and Background: Accurate identification of heart failure etiology is important for risk stratification and treatment planning. Cardiac magnetic resonance (CMR) is a well-established imaging modality for investigating heart failure etiology primarily due to its ability to provide tissue characterisation.
Case report description: A 67-year-old man with previous bypass surgery (2009) but no history of myocardial infarction presented with decompensated heart failure (NYHA class III). He had no evidence of ischemia on myocardial scintigraphy. His past history included dyslipidemia and he was an ex-smoker. Twenty years ago, left bundle branch block was found on ECG (panel A). At that point the patient had a mildly dilated left ventricle (LV) with preserved ejection fraction on echo. A second angiogram eight years ago revealed three-vessel coronary artery disease and surgical revascularization was performed.Description of the problem, procedures and patient management: Despite a technically successful bypass surgery, the patient continued to complain for breathlessness on exertion with further LV dilation and systolic dysfunction on echo. Multiple SPECT scans over the past 7 years failed to demonstrate any degree of myocardial ischemia. A CMR study showed a markedly dilated LV with severely reduced ejection fraction (EF 20%), global hypokinesis and dyssynchrony, and moderate mitral regurgitation. Late gadolinium enhancement showed no previous myocardial infarction. Some patchy midwall fibrosis was noted in the inferior wall (panel B) and septum (panel C). A diagnosis of non-ischemic dilated cardiomyopathy was entertained which together with functional mitral regurgitation could explain patient's heart failure symptoms. Patient's initial treatment included small doses of ACE inhibitor, b-blocker and mineralocorticoid receptor. The patient remained symptomatic (NYHA II) despite uptitration and fine-tuning of his HF treatment with the replacement of ACE inhibitor by sacubitril/valsartan. We therefore proceeded to cardiac resynchronization defibrillator therapy. An echocardiogram post CRT-D implantation revealed significant increase in LV stroke volume and ejection fraction rendering the patient an excellent responder to cardiac resynchronization therapy.
Conclusions and implications for clinical practice: The ischemic etiology of heart failure should be questioned in a patient who continuous to have symptoms despite complete and successful revascularization for coronary artery disease (CAD), or if the extent of CAD is not sufficient to explain the degree of systolic dysfunction. CMR offers unique insights into the etiological diagnosis of heart failure and may have a decisive role for treatment planning.



Figure

P589

Successful percutaneous transcatheter closure of a prosthetic mitral paravalvular leak causing heart failure

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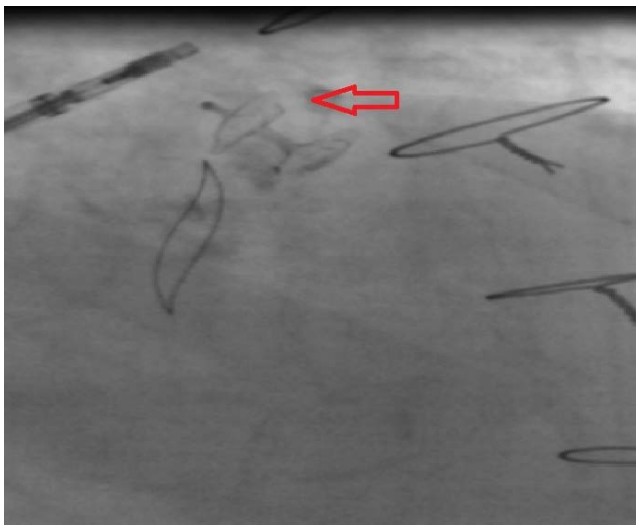
Introduction: Paravalvular leak (PVL) is a known complication after valvular replacement. Although most paravalvular leaks are asymptomatic (depending on its size and location), 1–5% of patients exhibit serious clinical consequences, including hemolysis, infective endocarditis or heart failure.
Case report: A 70-year old male patient with a history of diabetes, significant coronary artery disease and severe mitral insufficiency was treated with ACBG (4x) and mitral valve replacement (Sorin 27 pericarbon bioprosthesis) at 2016. Transesophageal echocardiography (TOE) was performed due to postoperative fever, but it showed a well-functioning bioprosthesis without complications. During the 2-year follow-up the outpatient transthoracic echocardiographies (EF: 55%) showed preserved ejection fraction and normally functioning mitral bioprosthesis. In 2018 the patient was hospitalized twice with heart failure. TTE and TOE revealed previously unknown left ventricle dysfunction (EF: 40%), mild central mitral valve regurgitation and lateral paravalvular leak (outside the sewing ring) with 9x5 mm jet diameter. Lab tests didn't show hemolysis or elevated inflammatory parameters. Cardiac MRI revealed viable myocardium and confirmed the anterolateral paravalvular leak with 30 ml regurgitant volume. Coronarograpy was performed without stenosis enabling intervention. After that the PVL was successfully treated with transseptal, catheter closure technique (Occlutech PVL occluder - 12x5 mm). Follow-up TTE and chest X-ray showed optimal position of the device without significant regurgitation. After the intervention the patient's condition improved, he was in NYHA class II. stage at the last outpatient visit.
Conclusion: Our case report demonstrated, that PVL can be undiagnosed or develop late after surgery. Transcatheter PVL closure is a safe, effective and less invasive alternative to surgical re-intervention.



Mitral PVL occluder

P590

Significant reduction of insulin dose after administration of sacubitril/valsartan in the patient with heart failure due to dilated cardiomyopathy, a case report.

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Background: Diabetes is considered to be an independent risk factor for heart failure progression. Sacubitril/valsartan (S/V) is able to augment glucagon-like peptid-1 (GLP-1) pathway, because of GLP 1 receptor analogues are degraded not only by dipeptidyl peptidase 4, but also by neprilysin. In adition, it has been documented that S/V improves peripheral insulin sensitivity. With the wider use of S/V fot the heart failure treatment, it turns out that S/V appears to have the potential to improve diabetes compensation. We present a case report with a significant reduction in insulin doses with a subsequent weight reduction after S/V treatment in patient with heart failure due to dilated cardiomyopathy (DCM).
Case report :
We present case of 61-old man with a type 2 diabetes on insulin and metformin treatment, with diagnosis of DCM (documented since 2010), with normal coronary angiography, with severe left ventricle systolic dysfunction , EF 20%, mild mitral regurgitation and sustained good right ventricular function. He has been treated for the last four years in our out-patient heart failure department. We have up-titrated doses of heart failure medication. Achieved medication: ramipril 7,5mg, spironolacton 50mg, metoprolol 100mg, FSM 60mg per day. By the end of 2017, the patient worsened clinically to NYHA class III. In 2/2018 we replaced ramipril with S/V in dose 49/51mg twice a day. Already after two months of treatment with S/V, there was not only clinical improvement, but also a reduction in the long-term insulin dose by 35%. For the next 3 months the patient lost 4kg, BMI fell from 34,7 to 33,5. In November 2018 the patient was in NYHA class II, with total weight loss of 10 kg and BMI of 31,7. Weight loss did not occur due to diet or lifestyle change.
Conclusion: We present the clinical case, where the introduction of Sacubitril/valsartan treatment led not only to the clinical improvement of heart failure but also to a favorable metabolic effect in patient with type 2 diabetes. Treatment with S/V resulted in reduced insulin dose requirements and significant weight loss. Based on previous experience, it would be beneficial to initiate a study with S/V in patients with heart failure and diabetes.

P591

Have we found the Holy Grail in Heart failure with reduced ejection fraction? - First experiences with sacubitril/valsartan among heart transplant candidates

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Background: Heart failure is even today a life-limiting disease throughout the world. Mortality and morbidity of heart failure with reduced ejection fraction (HFrEF) is comparable with malignancies, despite the available pharmacological and non-pharmacological treatment possibilities. Over the last few years, a new, very promising family of substances – angiotensin receptor neprilysin inhibitors (ARNi) – has appeared. Sacubitril/valsartan, first-in-class of ARNi, has been proven effective, surpassing all expectations in a PARADIGM HF study published in 2014. Based on the evidence from this study, the current ESC guidelines for the diagnosis and treatment of acute and chronic heart failure published in 2016 recommend the use of the drug for stable HFrEF patients. However the drug became available worldwide very recently.
Cases: We report the cases of 9 patients (NYHA: 3.3±0.5; LVEF: 26.2±3.7%; age: 51.3±13.7years; male: 88.9%; ischemic: 55.6%; atrial fibrillation: 33.3%; diabetes: 11.1%; systolic blood pressure: 103.9±8.3mmHg; eGFR: 54.3±16.1ml/min/1.73m^2) who were suffering from advanced HFrEF in spite of optimized therapy (ACEi/ARB: 100%; at target dose (TD) of ACEi/ARB: 55.5%; βB: 100%; at TD of BB: 77.8%; MRA: 100%; ICD: 100%; CRT-D: 22.2%) and were referred to our heart failure clinic for heart transplantation (HTx) evaluation. After baseline non-invasive (6 minute-walking test (6MWT), cardiopulmonary exercise test) and invasive evaluation (right heart catheterization) for heart transplantation (NTproBNP: 3608.5±2375.5pg/ml; peakVO2: 11.1±2.1ml/kg/min; 6MWT: 424.2±162.9m; CI: 1.83±0.44l/min/m^2) sacubitril/valsartan was initiated and successfully titrated to the maximal tolerated level (275mg±116.5mg/die). After 3 months of follow-up the non-invasive and invasive tests were reapplied showing significant improvement in the clinical condition (NTproBNP: 1589.9±692.9pg/ml; peakVO2: 13.8±3,31ml/kg/min; 6MWT: 500.7±71.5m; CI: 2.91±0.1l/min/m^2). Based on these results only 3 out of 9 patients remained eligible for HTx and were referred to the HTx Committee.
Conclusions: HFrEF even nowadays is a deadly disease. In case of its progression in spite of optimized therapy and without the presence of any contraindication, HTx should be performed. However the time on the waiting list can be quite long, potentially resulting several complication. Based on our preliminary experience, with sacubitril/valsartan as part of a complex heart failure treatment, significant improvement could be achieved even among HTx candidates, which improvement in the clinical status could make the HTx temporary unnecessary or the time on the waiting list safer.

P592

Reversible left bundle branch block after sacubitril/valsartan in patient with severe heart failure

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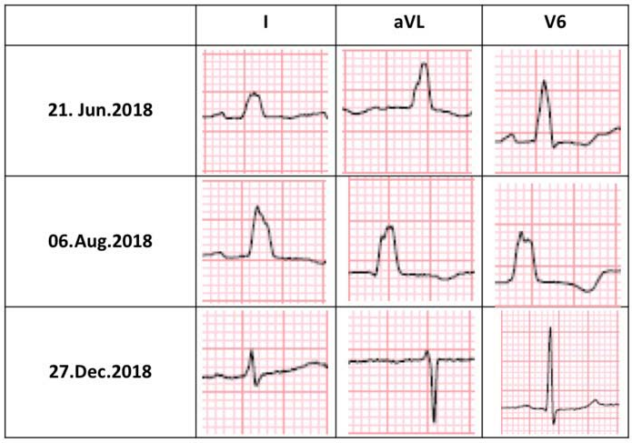
Background A complete left bundle branch block (CLBBB) is often encountered in patients with structural heart disease. Currently, a severely reduced left ventricular (LV) function with CLBBB can be treated with cardiac resynchronization therapy (CRT). We report a case with reversible CLBBB following sacubitril/valsartan.
Case report A 38-year-old woman presented herself at our hospital with increasing complaints of dyspnea on exertion. Electrocardiogram (ECG) demonstrated sinus rhythm, 115 bpm, with complete LBBB and QRS duration of 133 ms. No previous ECGs were present. Laboratory findings were non-contributory expect high NT-pro BNP (852 pg/mL). Echocardiography showed left ventricular (LV) dyssynchrony and severely compromised LV function with a LVEF ejection of 33%. 99mTC MIBI scintigraphy revealed diffusedly reduced uptake of the myocardium, most notably anterior wall and apex. Coronary angiography showed no significant coronary artery disease. Result was consisted with non-ischemic cardiomyopathy. The patient was started with standard heart failure (HF) medications including angiotensin II receptor blocker, aldosterone antagonist, diuretic and beta blocker. After beta blocker was continued for 2 weeks, her resting heart rate (HR) was around 100 bpm then Ivabradine was administered. After Ivabradine was administered for 1 month, repeated ECG showed sinus bradycardia (HR 57 bpm) with wide QRS duration (157 ms). According to 2016 ESC guidelines for the diagnosis and treatment of acute and chronic HF, cardiac resynchronization therapy was indicated but patient hesitated it. ARNI was administered after stabilization of acute decompensated HF. Within five months after ARNI initiation, her complaints disappeared and cardiac function and disturbance of the conduction system dramatically improved. The LVEF increased to 57%, LBB resolved and QRS duration shortened to 97 ms.
Discussion The mechanism of narrowing of QRS duration in the present case was unclear. It may be due to either changes in specialized cardiac conduction system, or changes in intra-myocardial impulse transmission. The neprilysin inhibitor of sacubitril/valsartan could block the degradation of natriuretic peptide (NP). NPs have potential beneficial actions in HR including decreasing cardiac fibroblast proliferation. Both of cardiac fibroblast and connexin hemichannels could modulate cardiac electrophysiology, ventricular conduction system and lead to blockage of cardiac fibrosis. The idea of reversible LBBB after sacubitril/valsartan in non-ischemic cardiomyopathy warrants further investigation.



QRS duration

P593

Reversal of pulmonary hypertension with sacubitril-valsartan in a candidate to heart transplantation.

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In patients with end-stage heart failure (HF) severe pulmonary hypertension (PH) represents a contraindication to heart transplantation (HT). We describe the effect of sacubitril/valsartan in a HT candidate with PH. A 48-year-old male, ex smoker, underwent an anterior myocardial infarction (MI) treated with primary PCI on the LAD. Nevertheless, 5 months later he developed a severe LV dysfunction (LVEDD 73mm, akinesia of the apex, anterior and septal walls, EF 20%). ECG did not meet the criteria for resynchronization therapy and an ICD was implanted. Despite optimal medical therapy he progressively deteriorated towards end-stage HF and was evaluated for HT. Right heart catheterization (RHC) showed low cardiac index (1.93 L/min/m2) with pharmacologically reversible PH (baseline PVR 4.15 UW, after enoximone 2.04 UW) and in 2015 the patient was listed for HT. Unfortunately, he waited for 2 years, showing a progressive worsening of the hemodynamics. In 2017 a diagnosis of irreversible PH was made with mPAP=41mmHg, CPWP=20mmHg, DPG=12mmHg and PVR=8.6 UW, CI=1.15L/min/m2, which did not respond to multiple acute pharmacological challenges. For that reasons the patient was removed from the HT list and the HT Team considered him for LVAD. Concomitantly, following the access to the angiotensin receptor-neprilysin inhibitors (ARNI), medical therapy was optimized with sacubitril/valsartan, up-titrated to the maximal tolerated dose (24/26 mg bid). After 3 months the patient reported symptoms amelioration and hemodynamics improved dramatically (RHC after pharmacological challenge: mPAP=25mmHg, CPWP=15mmHg, DPG=5mmHg, PVR=3.3UW, CI=1.44L/min/m2). Seven months later basal RHC showed normalization of the PVR and DPG with only mild PH (mPAP=29mmHg, CPWP=20mmHg, DPG=2mmHg, PVR=2.6UW, CI=1.64L/min/m2). The patient was consequently readmitted on active HT list. Although the clinical effects of ARNI in advanced stable HF and in secondary PH are still under investigation, this report suggests that this new drug should be considered as a tool to reverse severe PH in candidates to HT. A better understanding of the pharmacological effect on the pulmonary circulation is needed. Moreover, apart from European Society of Cardiology group 2 PH, the use of ARNI should also be tested in different PH categories.

P594

Familial cardiomyopathy with a high risk of sudden cardiac death

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A 38-year-old woman with personal history of ventricular extrasystole was diagnosed with dilated cardiomyopathy (DCM) and moderate left ventricular (LV) systolic dysfunction. Magnetic resonance imaging (MRI) revealed intramyocardial enhancement in the basal and mid septum, suspecting previous myocarditis as first diagnosis. One year later she was admitted to hospital for sustained ventricular tachycardia (VT) that required electrical cardioversion. Coronary angiogram confirmed absence of coronary lesions. During electrophysiological study right bundle branch block and inferior axis VT was induced. Single-chamber defibrillator was implanted but one year later the patient was admitted to the coronary care unit (CCU) for arrhythmic storm due to same morphology VT. Radiofrequency ablation of multiple morphologies of VT was made in the mitroaortic continuity.

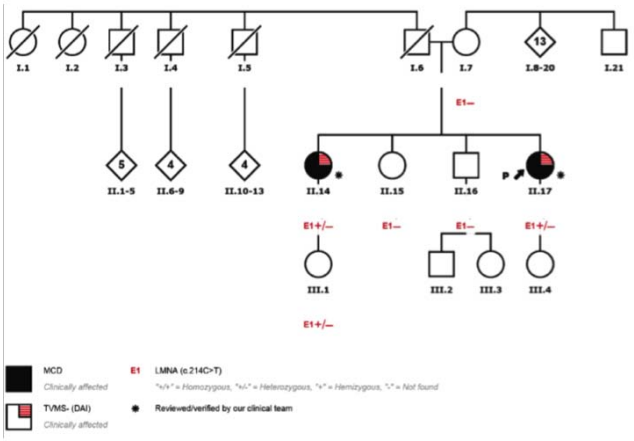
Index patient's sister was also referred for paroxysmal atrial fibrillation (AF) at the age of 51, after presenting a cerebrovascular accident. Echocardiogram displayed mild-to-moderate LV systolic dysfunction due to diffuse hypokinesia, markedly at the septal level. Catheter ablation of AF was practiced with early recurrence. Two years later she was admitted to the CCU for right bundle branch block VT clinically poorly tolerated. MRI showed dilated cardiomyopathy with septal intramyocardial enhancement. VT ablation was performed, being the arrhythmia located in the mitroaortic continuity. Single-chamber cardioverter defibrillator was implanted.

In outpatient follow-up study of familial cardiomyopathy was completed. Their father had passed away at the age of 43 because of cardiopathy, but no history was available. Two aunts and one uncle had also passed away at a relatively young age; history was neither available. They had other two uncles who had died older and who had children awaiting study.

Our second patient's daughter is a completely asymptomatic 32-year-old woman with a normal echocardiogram, although MRI reveals small focal myocardial enhancement of the septum. Holter recordings do not show any evidence of premature ventricular complexes. Index patient's daughter is 7 years old and she has not been studied yet.

Genetic study demonstrated a pathogenic heterozygous mutation in the LMNA gene in the index patient, her sister and sister's daughter.

LMNA encodes for proteins of the nuclear membrane and it is one of the most prevalent mutated genes in DCM, causing up to 10% of familial DCM. The earliest cardiac finding is usually conduction system disease, associated with atrial or ventricular arrhythmias, atrioventricular conduction abnormalities and myocardial dysfunction. Carriers of LMNA mutations are at a high risk of arrhythmias, heart failure and sudden cardiac death, even in absence of left ventricular dysfunction, emphasizing the importance of being recognised at an early stage, which may lead early implantation of an automatic cardioverter defibrillator.



P595

Early paradoxical steroid induced ventricular tachycardia in cardiac sarcoidosis

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A 39 year old former athlete was admitted with recurrent shocks from his ICD (implantable cardiac defibrillator). Medication history included sotalol, eplerenone and an angiotensin receptor neprilysin inhibitor. Electrolytes were within normal range and his ECG (electrocardiogram) was unremarkable.

A year prior he had been diagnosed with a dilated cardiomyopathy (left ventricular ejection fraction 40%) after an out of hospital VF (ventricular fibrillation) arrest. A secondary prevention ICD was implanted. PET-CT (Positron emission tomography–computed tomography) was suggestive of cardiac sarcoidosis (CS) and this diagnosis was later confirmed on a second cardiac biopsy.

The patient completed a three day course of intravenous steroids (methylprednisolone 970mg followed by oral prednisolone) two days prior to the ICD therapies. Device interrogation revealed two episodes of VF (ventricular fibrillation) each successfully terminated by defibrillation. The device EMG (electromyography) revealed a slow rhythm with an occasional PVC (premature ventricular contraction) leading to polymorphic VT (ventricular tachycardia) and subsequent VF. Sotalol was changed to bisoprolol and amiodarone. The lower rate of his pacemaker was increased to supress PVCs and prevent a long cycle post PVC. He experienced frequent runs of NSVT (non sustained ventricular tachycardia) and on day seven of steroid use he experienced VT with successful ATP (anti tachycardia pacing). The patient was unable to tolerate a higher base rate of 70bpm due to marked anxiety. His mood improved with clinical psychology input and his symptoms and arrhythmias abated with steroid reduction and commencement of methotrexate. He maintained sinus rhythm and has had no further ICD shocks since discharge.

Problem: Cardiac sarcoidosis is a multisystem infiltrative condition characterised by non-caseating granuloma. It is termed the "great masquerader" due to the diverse range in presenting symptoms and the difficulty in diagnosis. CS carries a higher risk of life-threatening tachyarrhythmia and can manifest as VT without any prior clinical features. There is a high recurrence rate of VT and it is notoriously difficult to control with antiarrhythmic therapies. Inflammation and re-entry due to scar are postulated mechanisms of VT, however there are currently no models to predict risk. Gallium scintigraphy, reduced ejection fraction and a prior VT have been suggested as predictors of VT recurrence. Firstline steroid therapy reduces the progression of myocardial inflammation and fibrosis, however steroid commencement is also associated with VT in the first year. This case illustrates an

early paradoxical proarrhythmic effect of steroid use in CS. In this case arrhythmias abated after antiarrhythmic adjustment, pacing at a higher rate and with persistence of steroid use. We advise close monitoring on a cardiac unit for patients with cardiac sarcoidosis commencing steroid therapy.

P596

His bundle pacing, an alternative to CRT? Our first experience

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Background: first temporary pacing of His bundle (HBP) was reported in 1970 in an experimental study, the permanent HBP was reported in clinical series from 2000 in several clinical scenarios. Several studies has reported lower incidence of heart failure after HBP compared to conventional right ventricle pacing in patients with A-V block. HBP was also used as an alternative to cardiac resynchronization therapy (CRT) in patients with LBBB and cardiomyopathy. We report our first experience with HBP in our center.
Patients and method: HBP was realized between 6th October 2017 to 11th December 2018 in eight patients (two males and six females) with mean age 65 (range 38 to 77 years). In two patients, HBP was indicated in prevention of pacing-induce cardiomyopathy, in six patients HBP was indicated as an alternative to CRT. The mean QRS width before HBP was 160 ms (92-200 ms range). The special HBP lead was used and the lead was navigated by quadripolar catheter to His bundle area, catheter was inserted from right femoral vein.
Results: implantation of the lead for HBP was succesfull in all subjects without any complication. In patients with LBBB at baseline, QRS width immediately decreased from mean 160 ms to 112 ms.
We report a case study of a 77 years old female patient with ischemic cardiomyopathy, with with LV EF 25% and atrial fibrillation and advanced HF symptoms (NYHA IV). The patient was indicated for CRT-D, implantation of LV lead was unsuccesull. Surgical implantation was contraindicated because of un acceptable risk and patient stayed long term in the hospital (long-term facility) because of recurrent episodes of decompensation. After succesfull HBP QRS width decreased from 156 ms to 110 ms. The patient was discharged from the hospital and is followed on outpatient basis with clinical improvement to NYHA III.
Conclusion: HBP is a relatively young method of physiological pacing. Indication for HBP is prevention of paceding induced cardiomyopathy and an alternative to CRT. We have to think of possibility of HBP in subjects with LBBB and cardiomyopathy, when CRT cannot be implanted because of anatomical or clinical issues.

P597

Sudden cardiac death in a patient with complicated peripartum cardiomyopathy and long QT syndrome

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Introduction: Peripartum cardiomyopathy with long QT syndrome is extremely rare. linical case. A 38-year-old woman, who had delivered her child 5 months previously, was admitted after resuscitation in connection with ventricular fibrillation, circulatory and respiratory arrest. Her condition was extremely acute - coma, tonic seizures, crepitation present upon palpation of the front of the neck, bilateral diffuse wheezing, blood pressure 70/50 mm Hg, SpO2 84%. Sinus rhythm of 124 per min, SIQIII, inverted T wave in V3-V6, and a long QTc of 518 ms were recorded on ECG.
Artificial ventilation was commenced with BIPAP after tracheal intubation with bronchoscope, which revealed aspiration signs of gastric material and blood. Gastrointestinal bleeding was excluded during esophagogastroduodenoscopy. CT chest scan revealed an infiltration in S1, S2, S6 right, and S6 left, lung segments, pneumomediastinum. CFP10-ESAT6 test was negative. CT abdomen scan revealed a pneumoperitoneum, and an absence of organ perforation. The reason for the hemoaspiration, subcutaneous emphysema, pneumomediastinum and pneumoperitoneum, was probably due to microtrauma of the trachea, resulting from unsuccessful pre-hospital attempts at intubation.
Blood tests showed leukocytosis 23x109/L, CK total 263 IU/L, MB 174 IU/L, creatinine 128 μmol/L, lactic acid 4.6 mmol/L, NTproBNP 33300 mg/L, troponin I 0.8 hg/mL, D-dimer 14325 pg/mL, procalcitonin 11 mg/mL, and CRP 125 mg/L.
ECHO indicated an akinesis of the apical and middle segments of the anterior wall and of the ventricular septum, and the apex, a left ventricle (LV) volume of 84 ml, and an LV ejection fraction (EF) of 32%. Angiopulmonography, coronary angiography excluded pulmonary embolism and coronary heart disease. CT brain scan did not reveal any acute pathology. CSF liquor test showed cytosis, elevated level of protein, therefore secondary meningitis was suspected. Markers for rheumatological diseases were normal.
Fluid, antibacterial, inotrope, anticoagulant therapy and hemodiafiltration lead to the regression of the heart, renal, respiratory, brain failure. After 5 days, artificial ventilation and inotropic support were stopped, treatment with ACE inhibitors, beta-blockers (BB), and antagonists of mineralcorticoid receptors was started. LVEF increased to 40% in 10 days, and to 56% in 20 days, and local contractility was restored. Control X-ray revealed the resolution of the pneumonia. The patient was discharged after 27 days. After 4 months, she was feeling well and continued to take BB. A cardioverter-defibrillator implantation was planned.
Conclusions. The simultaneous presence of a peripartum cardiomyopathy and long QT syndrome, with the development of ventricular fibrillation, sudden death and multiple complications was discovered. The management of multimorbid patients should be carried out by a multidisciplinary team, in strict accordance with guidelines for the successful treatment of rare, severe diseases.

P598

Prosthetic mitral valve thrombosis during extracorporeal membrane oxygenation treated with functional closing of aortic valve

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We report a case of 25-year-old woman with Marfan syndrome who was admitted at our hospital for acute cardiogenic shock. In her past medical history, the patient suffered from valvular dilated cardiomyopathy who had undergone mitral valve replacement with a prosthetic mechanical valve at age 14, Bentall intervention (prosthetic mechanical aortic valve and Dacron graft) at age 22 and CRT-D implantation at 23.
During admission, the patient remained hypotensive and progressed to INTERMACS level 1 cardiogenic shock despite treatment with inotropes, vasoactive drugs and intra aortic ballon pump. Therefore, we decided to implant a peripheral veno-arterial extracorporeal membrane oxygenator (ECMO) and the patient was included in heart transplantation waiting list with highest priority. Despite an initial clinical improvement, the patient developed prosthetic mitral valve thrombosis 24 hours after ECMO implantation. We decided to remove the mitral valve and to perform functional closing of the prosthetic aortic valve with a supra anular bovine pericardial patch and extensive atrial septostomy (Figure 1). Six days after ECMO implantation the patient underwent successful heart transplantation with no further complications.

P599

High-dose insulin therapy of acute heart failure during left ventricular reconstruction surgery

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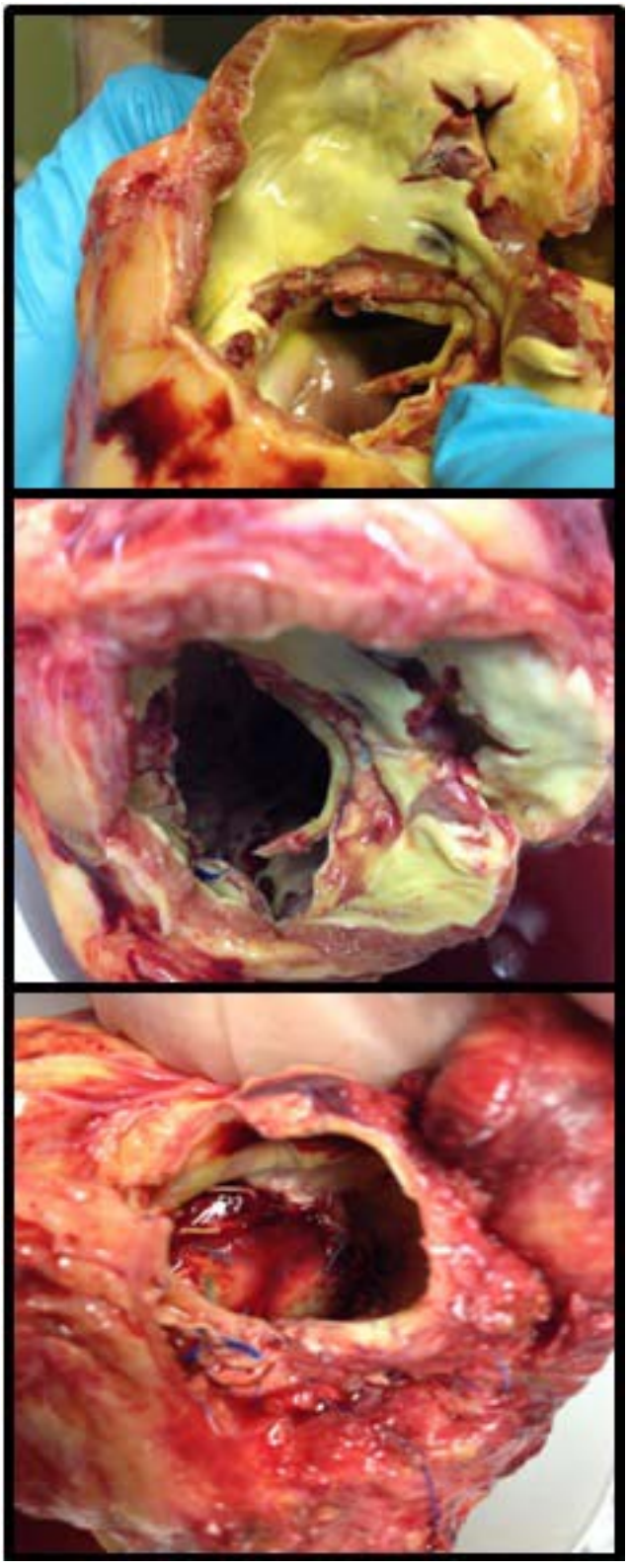
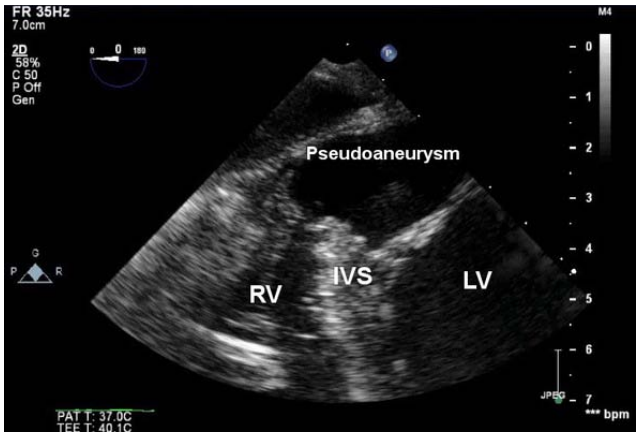
High-dose insulin is not a well known therapeutic method of refractory myocardial failure. Insulin has been known to have positive cardiac inotropic properties, although the mechanisms are not fully understood [1]. Only a minor experience of this technique has been reported in cardiac surgery [2].
A 75 years old man was scheduled for left ventricular (LV) reconstruction with myocardial revascularization. Eleven months before, he had suffered a myocardial infarction, complicated by rupture of the inferior wall of the LV, followed by the formation of a pseudoaneurysm (Fig., RV - right ventricle, IVS - interventricular septum). Preoperative examination revealed a reduction of the ejection fraction to 32% and an increase in pseudoaneurysm size to 4 cm as well as the three-vessel coronary artery disease. Dyspnea was the most significant symptom in the patient's condition. LV repair using a patch and triple coronary artery bypass grafting were performed. Aorta was clamped for 164 min.
During trial weaning from cardio-pulmonary bypass (CPB), despite the infusion of increasing doses of epinephrine (>400 ng•kg•min-1), severe myocardial failure was detected. The inability to wean from CPB and the lack of technical opportunity of hemodynamic mechanical support were recognized as an indication for the administration of totally 1000 units of insulin. We relied on its previously described cardioprotective and inotropic effects [1,2]. This led to a visible improvement in ventricular contractility, a decrease in epinephrine doses down to 100 ng•kg•min-1, and successful weaning from CPB. Despite the high-dose insulin therapy the blood glucose level varied within 8-14 mmol•l-1 without its additional administration, which is consistent with previously published data [1,2]. Duration of postoperative

inotropic therapy was 82 hours; mechanical ventilation time – 21 hours. The patient was discharged from hospital 18 days after surgery.
Thus, in present case of refractory post-CPB acute heart failure, high-dose insulin therapy was an effective tool to restore myocardial contractility.



P598: Figure 1



PreCPB transoesophageal echocardiography

P600
A rupture of cardiac pseudoaneurysm - Devastating complication

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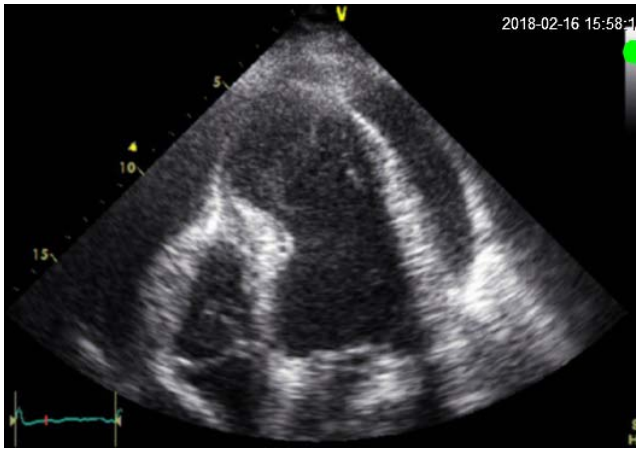
Background/Introduction
Left ventricular (LV) pseudoaneurysm is usually associated with myocardial infarction and rupture of ventricular wall. The clinical presentation of these patients is non-specific, making the diagnosis challenging. It needs to be differentiated from a true aneurysm by the fact that there is lack of myocardial tissue in the wall of a pseudoaneurysm. There are no treatment guidelines considering the exact time of the surgery, which may be complicated due to the necrosis of the myocardium as well as risk of thromboembolic events prevention.
Case presentation
A 42-year-old previously healthy male presented to emergency department with abdominal pain for 7 day before hospitalization. In addition, he reported an attack of acute chest pain that lasted ≥ 24 hours 3 weeks ago. Upon examination, the patient had stable vital signs (heart rate 65/min, blood pressure 130/70mmHg), no murmurs, crackles bilateral over lower lung field.
Confirmation of diagnosis
An electrocardiogram showed deep Q waves and 2 mm ST elevation with biphasic T wave in V1-V4. His white blood cell count: 8.71 x 10*9 /L, hemoglobin: 143 g/L, troponin I: 12.8 ng/mL, BNP: 308.9 ng/L. Transtoracic echocardiograpram (TTE) revealed a poor LV systolic function due to an akinetic anterior wall, dyskinetic apex containing a thrombus (19 x 12 mm) and massive pericardial effusion with signs of right ventricle compression. The acute abdominal patology was excluded, hepatomegaly was comfirmed by ultrasound.
Procedures
Aspirin, clopidogrel, ramipril, metoprolol, atorvastatin, spironolactone, intravenous furosemide were initiated. The patient refused for angiographic investigations. The Heart Team decided to proceed to surgery in order to graft the left coronary artery in addition to pseudoaneurysm repair after a few days. We discontinued clopidogrel before the surgery and added low molecular weight heparin to the treatment. Patient was stable and TTE was performed daily. Unfortuantelly, on the 7th day the patient collapsed due to cardiac arrest. During the cardiopulmonary resuscitation, pericardiocentesis was performed and 1 liter of the blood was drained. The patient was operated urgently the same day. Intra-operatively a ruptured apical LV pseudoaneurysm was idetified; the rupture was covered with thrombus. Dor's operation was performed. Postoperative period was without complications, but the patient suffered from post-hypoxic encephalopathy due to the long duration of brain's hypoperfusion. On the 3 months follow up patient had heart failure symptoms NYHA class I.
Questions/problems: As this condition is lethal, prompt diagnosis and timely treatment is life preserving. This case reveals the dilemma of anticoagulation prescription in patients with LV pseudoaneurysm against the risk of bleeding or rupture of pseudoaneurysm.



Picture 1

P601

Additional LV systolic functional recovery after PVC ablation in a peripartum cardiomyopathy patient

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Case

A 32-year old woman suffered from severe dyspnoea days after delivery of her first child. A transthoracic echocardiography (TTE) presented a new onset of major left ventricular dysfunction (ejection fraction (EF) of 30%) with signs of congestion. Nor electrocardiogram (ECG) or TTE showed sings of acute myocardial ischemia.

Patient management

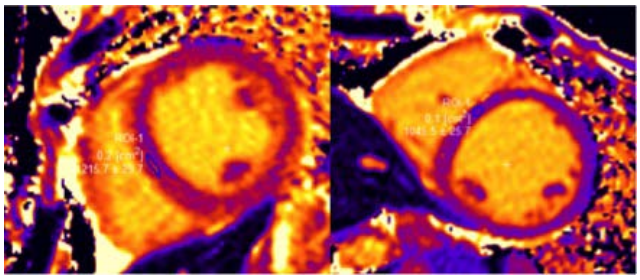
The patient was admitted to Intensive Cardiac Care Unit (ICCU), were supportive medical treatment was started. Subsequent, a seven-day treatment with bromocriptin 2,5mg daily was initiated in addition to standard heart failure treatment. Coronary angiography excluded significant coronary atherosclerosis. Cardiac magnetic resonance imaging (MRI) showed an enlarged myocardial relaxation time (T2 value of 65 milliseconds and T1 value of 1215 milliseconds (image)). Focal myocardial fibrosis was excluded using late gadolinium enhancement imaging. There was a good response to the medical treatment with gradual functional recovery (LV EF 40-45%). Due to low blood pressures, a combination of maximal tolerated carvedilol therapy and ivabradin associated with enalapril and spironolactone was used.

One month after the initial diagnostic implications, an ambulatory check-up showed no signs of congestion, however the TTE showed only partially improved LV function (EF 45%). Moreover, a 24-hour Holter analysis, conducted at that time, demonstrated highly frequent unifocal premature ventricular complexes (PVC's) (39029/24-hour, under maximal tolerated beta-blocker treatment) originating from the right ventricular outflow tract. Therefore the patient was sent for a PVC-ablation because medical treatment was limited.Differential diagnosis

Three months after treatment for PPCM and one month after PVC-ablation, new TTE revealed complete recovery of the LV EF (55%). A control 24-hour Holter monitoring measurement showed only eight PVC's. At that time, a second cardiac MRI showed a LV EF of 57 percent, myocardial relaxation T2 native and myocardial relaxation T1 native of respectively 50.5 milliseconds and 1045 milliseconds. Due to ventricular extrasystoles seen in her newborn child, a genetic analysis was performed in our patient, but could not conceal any abnormalities. Possibly a tachycardiomyopathy due to frequent PVC's was responsible for the incomplete recovery of systolic function after an initial PPCM cardiomyopathy.

Implications for clinical practice

This case report demonstrates an additional recovery of the LV function after PVC ablation in a PPCM patient suffering from residual pathologic burden located at the right ventricular outflow tract on top of standard heart failure and bromocriptin treatment. Referring PPCM patients to a specialized heart failure and electrophysiological centre for optimal medical treatment, genetic testing and potentially, in presence of a significant amount of PVC's, ablation is therefore indicated to obtain full functional recovery and good clinical outcomes.



P602

A case of cardiomyopathy with severe reversible systolic dysfunction

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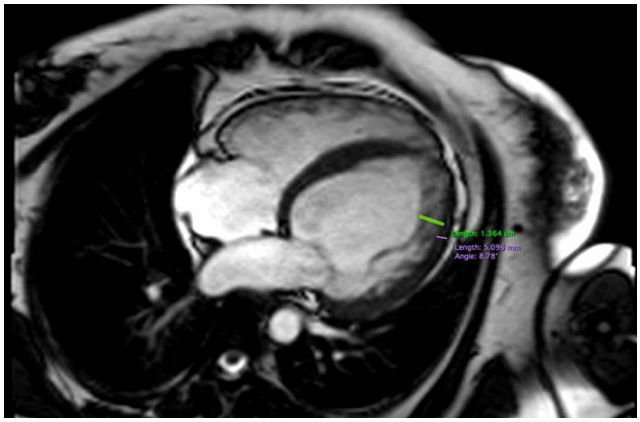
A 35-year-old female presented to the emergency room with severe dyspnea with orthopnea and anterior chest pain. She denied any personal or family history of cardiovascular disease, but reported two recent episodes of pneumonia for which she was treated with empirical antibiotic therapy with cefuroxime and clarithromycin. Physical examination revealed an overweight patient, mild bibasilar crackles, a systolic cardiac murmur over the mitral area and bilateral leg edema. Her blood pressure was 190/100 mmHg and heart rate 120 bpm. Initial laboratory data showed elevated CK-MB and NT-proBNP, elevated liver enzymes and normal renal function. There were no particular findings on the surface ECG.

The echocardiography revealed a dilated left ventricle (LV), severe systolic dysfunction (ejection fraction 20%) due to global hypokinesia, intraventricular dyssynchrony despite a narrow QRS complex on the surface ECG and moderate secondary mitral regurgitation. To clarify the cause of chamber dilation, a CMR was pursued which confirmed both left and right ventricle (RV) dilation (LV 171 ml/m2, RV 136 ml/m2) and severe systolic dysfunction. In addition, no oedema or areas of focal myocardial fibrosis were noticed. The apical region of the LV was hypertrabeculated with a non-compacted/compacted myocardium radio of 2.2 in long axis views suggestive of non-compaction. No thrombus was seen. In this context, the optimal treatment for heart failure with reduced ejection fraction was initiated (at first perindopril then combination sacubitril-valsartan, metoprolol, spironolactone, furosemide). On follow-up echocardiographic examinations, the ejection fraction gradually increased up to 45% at 8 months examination.

Several diagnoses were discussed as the underlying cause of left ventricle dysfunction. First of all, we excluded an ischaemic etiology considering the absence of coronary lesions, the diffuse hypokinesia on echocardiography and the lack of ischaemic changes on CMR. In addition, acute myocarditis was unlikely due to the non-suggestive CMR aspect. Finally, the 24-hour ECG monitoring showed very rare ventricular extrasystoles accounting for only 0.5% of total ventricular beats and no tachyarrhythmia, making a diagnosis of tachycardiomyopathy improbable.

In conclusion, myocardial non-compaction may be the expression of a genetic cardiomyopathy or may be the phenotypic appearance of other causes of left ventricle dysfunction. The reversibility of the disease in our patient does not support the diagnosis of genetic non-compaction cardiomyopathy. The patient was nonetheless programmed for genetic testing given the psychological burden that



CMR- left ventricle non-compaction

this diagnosis implies. So far, we were not able to determine a trigger for the reversible ventricular dysfunction in this patient. A question remains whether the optimal medical treatment for heart failure with reduced ejection fraction could nowadays reverse even a genetic form of non-compaction.

P603

Hypertensive hypertrophic cardiomyopathy with low ejection fraction.

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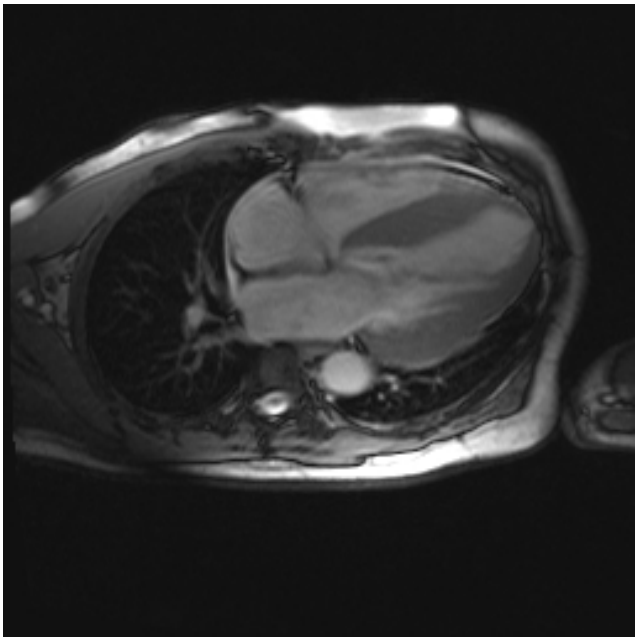
Introduction: Hypertensive cardiomyopathy is a structural cardiac disorder, generally accompanied by left ventricular hypertrophy, associated with diastolic or/and systolic dysfunction, in patients with persistent systemic hypertension. We present a case of a patient with hypertrophic cardiomyopathy, and signs and symptoms of heart failure with no prior history.
Case report and description: A 46 years old male was admitted to our hospital with deteriorating shortness of breath, excessive tiredness and legs oedema. His medical history was unremarkable. The physical examination revealed the presence of a third sound, absence of murmurs, wheezing on pulmonary auscultation, distended neck veins and large oedema of the lower extremity. His blood pressure was 210/100 mmHg. Findings from electrocardiography showed sinus rhythm and signs of LV hypertrophy. Echocardiography showed LVH, mildly dilated LV, reduced EF and mildly dilated LA. The blood test results revealed impaired renal function, elevated liver transaminase levels and negative troponin.
The differential diagnosis included all of the following: hypertensive hypertrophic cardiomyopathy, hypertrophic cardiomyopathy with hypertension, amyloidosis and Fabry's disease.
The patient underwent CMR, which confirmed the hypertrophy with low EF, full scanning for detecting lesions in target organs due the hypertension. Secondary causes of hypertension, amyloidosis and Fabry's disease were excluded.
The patient was discharged with antihypertensive treatment and was reevaluated regularly. After a year of optimal blood pressure control findings from ECG were improved. The echocardiogram showed significant reduction in LV wall thickness and normal EF, which were also confirmed by CMR.

CMR results	EDV (ml)	ESV (ml)	EF%	SV (ml)	LVmass (g)
LV (during hospitalization)	336	234	30	102	416
LV (after a year)	223	70	69	153	238

CMR, LV volume and mass during hospitalization and a year after



4 chamber view, CMR

Conclusion: Hypertension is a major global health issue and can cause structural and functional myocardial abnormalities. The finding of severe LVH in hypertensive patients may sometimes create difficulties: Is a coexistent cardiomyopathy present? Or is LVH a secondary consequence of severe chronic hypertension? A definitive diagnosis may be difficult to resolve. Reduction of LVH by optimal blood pressure control after antihypertensive treatment reveals hypertension as the underlying cause of LVH, excluding hypertrophic cardiomyopathy.

P604

The great masquerader strikes again: cardiac sarcoid, an unusual cause of sudden cardiac arrest in a 37 year old athlete

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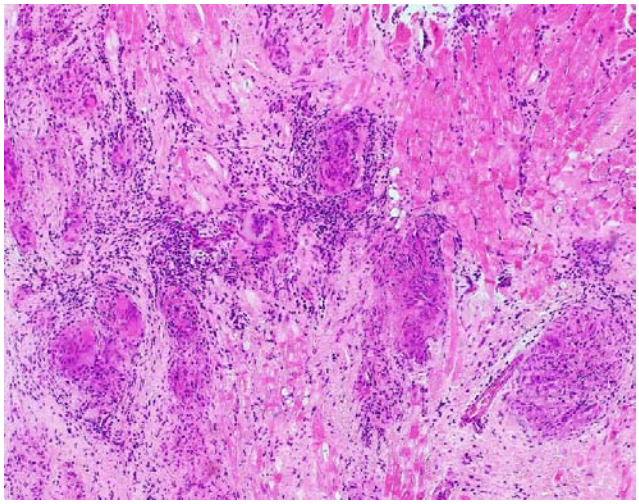
A 37 year old athletic male with a history of asthma suffered an out of hospital VF arrest whilst playing Gaelic football. He was resuscitated after 8 minutes of bystander cardiopulmonary resuscitation and defibrillation with the club's automated external defibrillator. The patient had a recent history of a viral illness but was otherwise asymptomatic prior to this. A three generation family history was unremarkable. ECG and chest x-ray were normal. His echocardiogram revealed a dilated left ventricle (diastolic diameter 6.5cm) and an ejection fraction of 25%. Right ventricular function was normal. Initial cardiomyopathy screening bloods including serum ACE (angiotensin converting enzyme) were within normal limits. Coronary catheterisation showed angiographically smooth arteries. Cardiac magnetic resonance imaging demonstrated moderate-severe left ventricular systolic dysfunction (ejection fraction 40%) with partial wall thinning and inferior hypokinesis. Midwall contrast was noted in the basal anterior, mid inferior walls in addition to the right ventricular aspect of the mid septum. Transmural contrast was noted in the basal inferior wall. Cardiac biopsy was normal. Cardiac genetics screened for a dilated cardiomyopathy phenotype. He received a secondary prevention implantable cardiac defibrillator and after heart failure medication optimisation his device was upgraded to a cardiac resynchronization therapy defibrillator. The differential diagnosis of this non-ischaemic dilated cardiomyopathy was myocarditis, arrhythmogenic left ventricular cardiomyopathy or cardiac sarcoidosis. Subsequent high-resolution computerised tomography chest disclosed numerous confluent areas of nodularity prominent in the upper zones highly suspicious of parenchymal sarcoidosis. Cardiac PET revealed lung, liver and spleen lesions in keeping with sarcoid. A second cardiac biopsy confirmed granulomata formation, confirming a diagnosis of sarcoidosis. He was commenced on methotrexate and steroids with ongoing respiratory and cardiology specialist input.Problem: The prevalence of cardiac involvement in systemic sarcoidosis is approximately 1 in 4, yet it is often clinically silent. The range of clinical manifestations include asymptomatic ECG abnormalities, heart failure and sudden cardiac death. Serum ACE has a low sensitivity and specificity and therefore has limited utility as a diagnostic test. Cardiac biopsy is the gold standard for diagnosis however due to the patchy infiltration pattern of sarcoidosis and predisposition for the left ventricle it has a relatively low sensitivity. This case highlights the importance of having a high suspicion for sarcoidosis, particularly in younger patients with newly diagnosed atrioventricular block, VT or unexplained syncope. Current diagnostic



Biopsy confirming cardiac sarcoidosis

methods are flawed and this condition is likely underdiagnosed. Furthermore, this case highlights the success of community defibrillator schemes and public education in resuscitation.

P605

Left anterior fasicular ventricular tachycardia induced stress-iInduced cardiomyopathy

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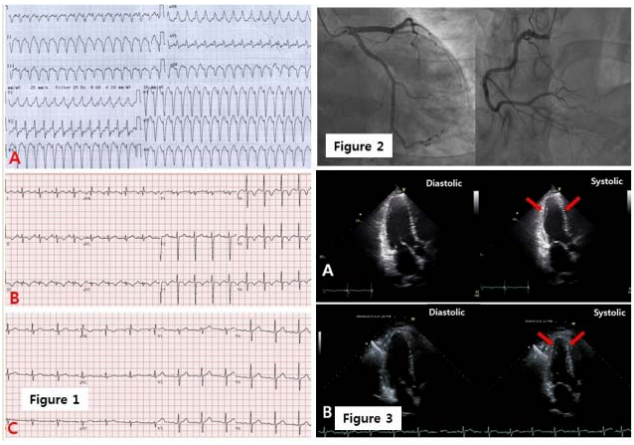
A 35-year-old man with no risk factors presented to the emergency room with palpitation and dyspnea. His clinical signs were blood pressure, 100/50 mmHg; heart rate, 180 beats/min (bpm); respiratory rate, 20/min; and body temperature, 36°C. His 12-lead ECG showed wide QRS tachycardia of 190 bpm (Fig. 1A). After administration of repeated electrical shock, the Electrocardiogram showed sinus tachycardia with ST-segment depression, and T-wave inversion in leads II, III, avF, and V3-V6 (Fig. 1B). Chest X-ray finding was normal. The levels of serum Creatinine kinase-MB (3.0 ng/mL) was within normal limits. And hs-troponin-I (0.04 ng/mL) was mild elevation. However, plasma N-terminal pro-brain natriuretic peptide (2,502 pg/ mL) were elevated. Kidney and liver enzymes were elevated (total bilirubin : 4.0, aspartate aminotransferase 1310 IU/L, alanine aminotransferase 1125 IU/L, γ-guanosine triphosphate 130 IU/L, lactate dehydrogenase 1320 IU/L, blood urea nitrogen 24.9 mg/dL, Creatinine 1.43 mg/dL). Transthoracic echocardiography revealed an ejection fraction of 38%, with hypokinesia of the left ventricular apical and anterior, lateral wall with apical ballooning (Fig. 2A). Coronary angiography with spasm test showed no significant stenosis (Fig. 3). The patient was treated with aspirin, perindopril, and torasemide. A follow-up ECG on the one month showed a normal sinus rhythm and normalized ST-segment and T-wave (Figure1C). Follow-up echocardiography revealed normalized left ventricular wall motion and systolic function (Fig. 2B). The patient underwent successful catheter ablation for left anteroseptal fascicular ventricular tachycardia. He was followed for 3 years without any medication.



Figure

P606

Pulmonary edema following acute ischemic stroke

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Neurogenic pulmonary edema (NPE) is defined as acute pulmonary edema that develops after a significant nervous system insult. NPE following ischemic stroke is rare and few cases have been reported. We report a twice repeated NPE in the same patient.

A 71 year old woman with history of arterial hypertension and atrial fibrillation with normal ejection fraction, was brought to the emergency department by ambulance because of acute onset dyspnea. At admission she suddenly presented disturbance of consciousness. Lung auscultation disclosed bilateral rales and neurologic examination revealed right side weakness. Oxygen saturation decreased below 85% needing emergent intubation. Non-contrast CT showed no significant abnormality in the head but marked interlobular septal thickening and diffuse ground glass opacities. Angiography revealed occlusion of the right M2 proximal segment(A). The echocardiography showed a preserved biventricular systolic function with no valvular disease (D). Thrombolytic treatment with recombinant tissue plasminogen activator was initiated.

She was admitted to the Cardiology Intensive Care Unit. She was maintained with mechanical ventilation and intensive diuretic treatment was started. Pulmonary wedge pressure was rapidly normalized and pulmonary infiltrations were solved in 2 days. She was weaned from the ventilation a week after admission. She underwent rehabilitation therapy without any residual disability after it.

One year later, she was admitted again with a new onset left superior limb weakness and short of breath that lead to emergent intubation. The CT revealed again an acute ischemic stroke of the right medium cerebral artery (C) and pulmonary edema. The clinical course this time was similar to the previously described.

NPE usually occurs within minutes to hours after cerebral injury. The possible mechanisms of NPE after cerebral infarction include abrupt increase of intracranial pressure by large infarction or direct damage of so called "NPE trigger zones" including insular cortex, hypothalamus and medulla. This can lead to activation of the sympathetic nervous system. Massive sympathetic discharge can cause direct myocardial injury, pulmonary vascular bed injury, indirect left ventricular failure caused by increased systemic and pulmonary pressures and pulmonary endothelial injury with increased endothelial permeability.

Sudden disruption of blood supply toward left insular cortex could suggest as a possible etiology of NPE in this case. The initial management should focus on treating the underlying neurological insult. Some NPE patients require mechanical ventilation but with adequate treatment NPE resolves in 48-72 hours.

NPE is a rapidly developing and sometimes life-threatening complication of acute ischemic stroke. The clinicians should consider NPE as one of the possible etiologies of sudden respiratory compromise after acute cerebral infarction, when other causes have been excluded.

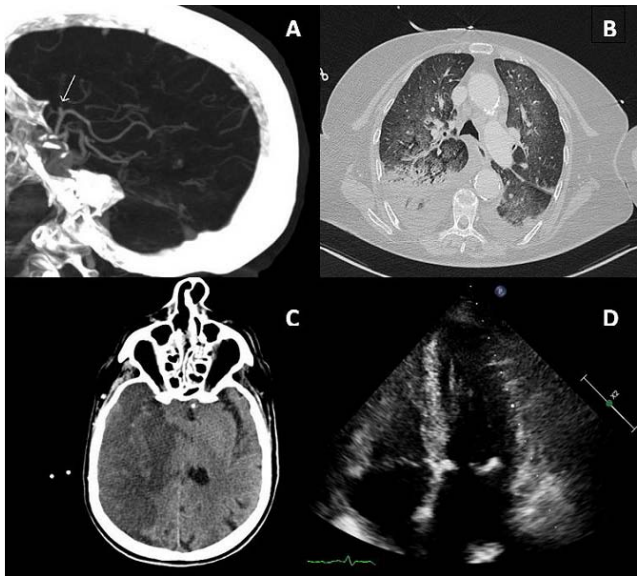

Figure 1.

P607

A case of systemic lupus erythematosus myopericarditis

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Introduction: Systemic lupus erythematosus (SLE) is a chronic, recurrent multi-systemic auto-immune disease characterised by the production of auto-antibodies that cause widespread tissue damage. The most common diagnostic features of SLE include mucocutaneous lesions, nephritis, arthritis and haematological disorder. Serositis in the form of pericarditis is an uncommon first-line clinical manifestation. We report on an 31-year-old Vietnamese man who presented with myopericarditis as the initial clinical manifestation of SLE.

Case Report: An 31-year-old man was referred to us with a complaint of central chest pain of 1 months' duration with severe worsening over the past 2 weeks. Intermittent excruciating chest pain lasting a few minutes to an hour often radiated to the back and shoulder. He was neither pale nor cyanosed, but was in severe intermittent agonising chest pain. The jugular venous pressure was not elevated. The apex beat was located to the 5th intercostal space, mid-clavicular line; percussion suggested a normal area of cardiac dullness. There was neither pericardial nor pleural friction rub and no cardiac murmurs. There was no peripheral oedema, and

neither finger nor toe clubbing. None of the joints was tender. His weight, height, and body mass index at baseline were 60 kg, 168 cm, and 21.26 kg/m2 , respectively. The temperature, respiratory rate, pulse (regular and of good volume), blood pressure were 37oC, 25 cycles/min, 118 beats/min, 115/75 mmHg, respectively, at baseline. Patient was previously healthy, referring no prior cardiac surgery, chest radiotheray or tuberculosis. His family were normal.

Results: Electrocardiogarphy showed sinus tachycardia with diffuse ST elevation (except avR and V1) and depression of PR segments in leads (except avR and V1). Chest X-ray: showed showed cardiomegaly and moderate left pleural effusion and mild right pleural effusion. Echocardiography: moderate pericardial effusion (12mm), EF: 62%, PASP: 30mmHg. Hemoglobin was low 10.5g/dl. TSH mild elevated 5.31μUI/ml (0.35-4.94) but normal fT4 1.41 ng/dL (0.89-1.76); Troponin T elevated 1018 ng/L (<14ng/L); hsCRP: 264.31 mg/L(<5mg/L); ANA test; Anti-dsDNA were positive. C3: low 64.36 mg/dl (80-170); C4: low 8.84 mg/dl (15-45)Pericardial effusion analysis depicted exudate fluid, adenosine deaminase (ADA) 26.74 UI/l (<30) with mild cellularity and without atypical cells. Polymerase chain reaction (PCR) for detection of Mycobacterium tuberculosis was negative. Blood and plericardial effusion cultures were negative. Urinary protein 0.6g/24h. A diagnosis of systemic lupus erythematosus myopericarditis and pericardial effusion was made.

Conclusion: Myopericarditis with a pericardial effusion as the initial presenting feature of SLE is uncommon. The timely recognition and early steroid administration are imperative in SLE-related myopericarditis with cardiomyopathy to prevent the mortality associated with this condition.

P608

Systemic lupus erythematosus initially presented as acute heart failure

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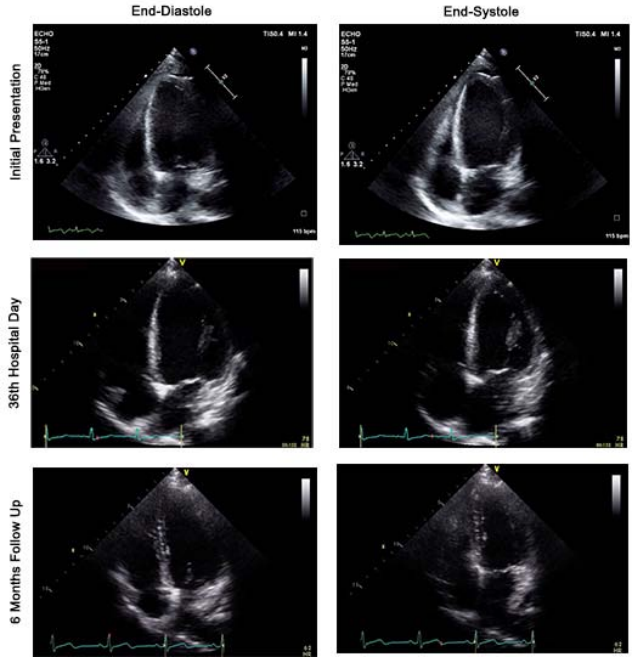
37 years old female visited emergency department due to dyspnea, peripheral pitting edema and decreased mentality. She delivered second baby without complications



Lupus myocarditis

4 months before the presentation. After the delivery, she experienced fatigue and quitted the job. Peripheral edema and dyspnea developed 1 week before the presentation. Her past history showed thrombocytopenia 2 years ago during her first pregnancy. Upon arrival, her blood pressure and heart rate were 120/60 mmHg and 118/min, respectively. Mentality was stupor. Laboratory findings were as follows: Hemoglobin 7.8 g/dL, creatinine 1.21 mg/dL, Na/K/Cl 125/4.2/95 mEq/L, CPK/LDH 787/1560 IU/L. The level of NT proBNP was >35000 pg/mL. Chest roentgenogram and electrocardiogram showed cardiomegaly and sinus tachycardia, respectively. Chest and abdominal computed tomography showed edema. Left ventricular ejection fraction (LVEF) was decreased (24%) and volume was increased (end-diastole volume index (LVEDVi) /end-systolic volume index (LVESVi) 99/68 mL/m2). Further laboratory findings showed that anti-nuclear antibody (1:3200) and Coomb's test were positive. According to the diagnostic criteria, she was diagnosed as systemic lupus erythematosus. She underwent steroid pulse therapy. During the therapy, renal failure was developed so she also undertook continuous renal replacement therapy (CRRT). At 36th hospital day, CRRT was removed and her echocardiogram showed improved LVEF (51 %) although there were no differences in left ventricular volumes. Cardiac magnetic resonance imaging (cMRI) did not show late gadolinium enhancement. 6 months after the initial presentation, echocardiogram was followed and it showed normal LVEF (60%) and cardiac volume (LVEDVi/LVESVi 59/24 mL/m2). In this case, appropriate diagnostic procedures and therapy resulted in the complete recovery of heart failure due to lupus myocarditis. cMRI was useful tool to predict the complete recovery of the cardiac function.

P609

A young lady's fight or flight during the cardiogenic shocking

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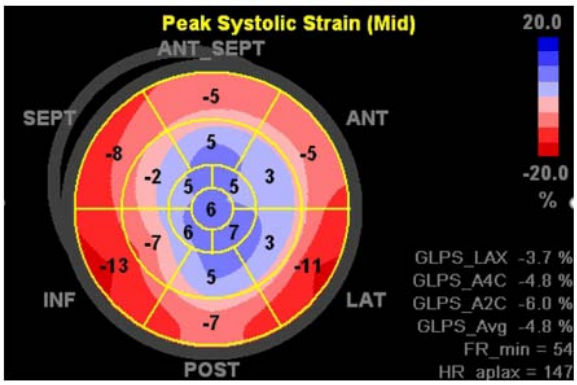
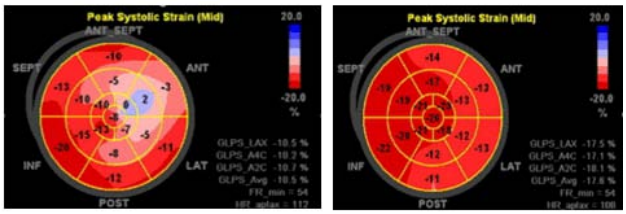
Introduction: A 31-year-old housewife was admitted to the emergency room with recurrent choking feeling exacerbating with nausea and vomiting for 24 hours.She mentioned blood pressure surged sometimes but could return to normal.On admission,she was sweaty with cold limbs.Blood pressure ranged from 90/50 to 159/122mmHg. Heart rate ranged from 70 to 140 bpm.Oxygen saturation was above 95%.EKG showed 1–2 mm ST segment elevation in leads II/ III/ aVF. Troponin I and BNP were elevated (50 pg/ml; 10683 pg/ml).Coronary artery obstruction was excluded by coronary angiography.She went to sudden dyspnea,extracorporeal membrane oxygenation (ECMO) was employed immediately.Cardiac magnetic resonance imaging(CMR) was held back because she could not finish it.Following EKG showed ST segments dropped gradually and T waves of all leads except aVR inverted.Serial following TTE showed gradually improved LV contraction. Speckle tracking echocardiography(STE) depicted restoration of contractile activity in a "patchy" way. Taketsubo cardiomyopathy (TTC) was suspected.Blood catecholamines were elevated.Abdominal computed tomography showed a right adrenal tumor.The final diagnosis was TTC associated with pheochromocytoma(TTC-pheo).Patient was put on β-blocker and phenoxybenzamine and finally underwent removal of the adrenal mass.Pheochromocytoma was confirmed on histopathology.In the follow-up,patient was asymptomatic and TTE was normal.Conclusion:Diagnosis of TTC-pheo has important implications for clinical management. CMR becomes widely acceptable to differentiate troponin positive chest pain associated causes. However, when the situation was unfitted for CMR,



a STE of patient on the day of admission



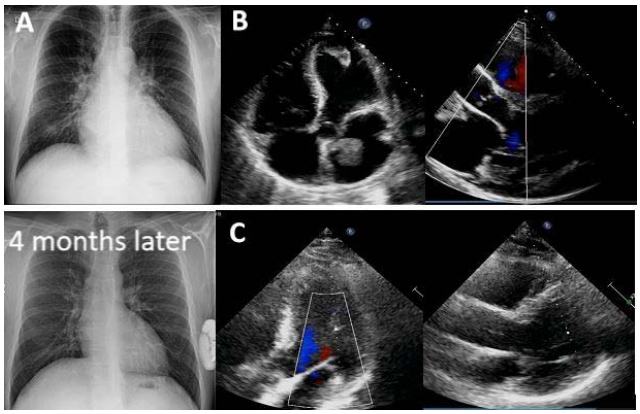
b STE changes during the following days (noticing the "pathy" recovery)

Speckle tracking echocardiography

echocardiography is an important method to track the pathophysiological changes. Besides,clinical routine tests can provide information: the EKG changing pattern and bizarre BNP to troponin I ratio. TTC-pheo may cause crisis. Commonly used vasoactive drugs may cause worsening of hemodynamics in TTC patients while ECMO can stabilize the patients and extend the diagnosis time window.

TTE findings					
	LA(mm)	LV(mm)	IVS(mm)	EF(%)	Decreasedleft ventricular wall motion
Day2	32	52	10	33	GeneralLV ventricle
Day3	33	52	11	16	GeneralLV ventricle
Day4	35	50	11	49	Midto apical portion of LV
Day5	30	47	11	48	Apicalsegment of ventricular septum
Day7	28	45	11	57	Apicalwall of LV ventricle
Day10	27	42	10	73	Relativelydecreased apical wall of LV ventricle
Day13	27	41	10	80	NormalLV ventricle

Table 1. Serial TTE findings



Temporal evolution of the patient.

P610

Myocarditis as a cause of reversible dilated cardiomyopathy

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We report the case of a 37 year-old-male with a clinical background of arterial hypertension and a sporty lifestyle. In January 2018, patient was admitted to emergency department complaining of shortness of breath related to exercise, weakness and progressive dyspnea for almost a week. He referred cold symptoms four weeks prior to admission. He denied drug or alcohol abuse. No family history of cardiomyopathy was reported. On initial examination, patient was hypertensive (147/111 mmHg), tachycardic with 110 rpm heart rate and slightly tachypneic.

ECG showed sinus rhythm and negative T waves in precordial and lateral leads, without alterations on ST segment. Chest X-ray (Figure A) demonstrated cardiomegaly with mild bilateral pleural effusion and blood tests showed the following: mildly increased CRP (12 mg/L), acute renal failure with a mild increase of creatinine (1.4 mg/dl) and increased levels of hepatic parameters (bilirubin 2 mg/dl and GPT 504 U/L).

Echocardiography (Figure B) demonstrated a severely dilated left ventricle with global left ventricular hypokinesia, ejection fraction (EF) 15% and two masses, one located in the left atrium and another attached to the LV apex. During his hospital stay, anticoagulation was initiated with heparin and he was treated with diuretics and heart failure treatment, including IECAs, B –blockers and spironolactone, improving his clinical course.

Coronary angiography was made with normal coronary arteries. Cardiac MRI was also performed, finding dilated cardiomyopathy (DCM) with severely reduced EF and intracardiac masses suggestive of thrombus without pathological enhancements. Considering the MRI findings, diagnosis of myocarditis versus idiopathic DCM was suspected.

Finally, an endomyocardial biopsy detected parvovirus B19 IgG antibodies. Parvovirus B19 IgM and other antibodies were negative. Additionally, a subcutaneous ICD was implanted because of the severe dilatation and dysfunction. During the following weeks, patient clinically improved and was discharged under periodical follow-up by Cardiology. Four months later, an echocardiogram (Figure C) was repeated showing complete recovery of the diameter and EF of heart. Nowadays, patient remains asymptomatic with good functional capacity.

Our differential diagnosis was between myocarditis and idiopathic DCM. However, the evolution and complete recovery of heart diameters and EF only four months later made the diagnosis of myocarditis more probable.

Myocarditis is a complex disease which can present in various ways rendering diagnosis and treatment difficult. During the last years there is growing evidence that myocarditis and DCM are closely related due to the existence of an important inflammatory component in the pathogenesis of DCM.

Our patient represents a case of reversible DCM in the context of myocarditis.

P611

A case of arrhythmogenic right ventricular cardiomyopathy

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Introduction: Arrhythmogenic right ventricular cardiomyopathy (ARVC), also known as arrhythmogenic right ventricular dysplasia, is a heritable heart-muscle disorder that predominantly affects the right ventricle. Progressive loss of right ventricular myocardium and its replacement by fibrofatty tissue is the pathological hallmark of the disease. ARVC is one of the leading causes of arrhythmic cardiac arrest in young people and athletes. We present a clinical case of Arrhythmogenic right ventricular cardiomyopathy

Case Presentation: A 25-year-old female presented with a one year dyspnea after being diagnosed as systemic lupus erythematosus by a hospital in our city one year ago. She was diagnosed with brain tumor 17 years ago at the age of 8. Her treatments for brain tumor were surgery, chemotherapy and radiation therapy And then her family history decided for her to stop taking medicine and did not to follow treatment plan. Since then she has noticed she has no period. Her symptoms include fatigue, weakness, inability to lose weight (or weight gain), puffiness, constipation, Physical examination may, periorbital puffiness, brittle hair and eyebrow loss. Other findings were normal.

Results: Echocardiogram: EF 53%, normal size and wall thickness of the left ventricle, slightly dilated left atrium, enlargement of the right ventricular 50mm and RVOT 47mm with reduced contractile function TAPSE 11mm, apical, aneurysm-akinesia and endocardial ventricular hypertrabeculation especially at apex. Mild mitral regurgitation and severe tricuspid regurgitation. Medium pericardial effusion without right ventricular depression. Cardiac MRI showed normal volume and function of the left ventricle (EF 55%), right ventricle with 114 ml/m2 indexed end diastolic volume, reduced right ventricular function (EF 29.6%), areas of dyskinesia of the free wall at the mid and apex. Late gadolinium enhancement of the free wall right ventricular at the mid and apex. Hypertrabeculation of septal wall at the apex. Medium pericardial effusion, no cardiac tamponade.

Discussion: Diagnosis of ARVC relies on a scoring system, formulated in 2010 by the revisited Task Force, with two major or one major and two minor criteria or four minor criteria based on the demonstration of a combination of defects in right ventricular morphology and function, characteristic depolarization/repolarization electrocardiogram abnormalities (negative T waves and/or "epsilon" waves in right precordial leads), characteristic tissue pathology, typical arrhythmias, family history, and the results of genetic testing.

Conclusion: In ARVC symptoms usually appear between the ages of 30–50. Especially in young patients the most common clinical presentation of ARVC are palpitations and syncope due to ventricular tachycardia with left bundle branch morphology. Cardiac magnetic resonance (MRI) is considered the best imaging modality in evaluating the RV in ARVC

P612

Case of dual mechanism for tacotsubo cardiomyopathy (ttc) (migraine and ergothamine toxicity), presented with atrial fibrillation and tachycardia induced systolic dysfunstion

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Case presentation: 69 year old female with arterial hypertension, atrial fibrillation (AF) and migraine was admitted in Emergency Departement, due to chest pain, dizziness,

palpitations, dyspnea. The day before hospitalization with severe migraine crisis, treated with 12 mg Ergothamine tartarate (maximal daily dose is 6 mg). At hospital admission BP 80/60 mmHg, irregular rhytm, HR 120 bp/min. Blood tests are normal exept high-sensitive cardiac troponin T 0,037; 0,042 ng/ml (normal range<0,014 ng/mL). ECG showed atrial fibrillation, ST elevation 2 mm in V2,V3, inverted T waves in I, aVL, V4 and V6. Transthoracic echocardiogram (TTE) demonstrated systolic dysfunction with ejection fraction (EF) 37%, apical akinesia and basal hyperkinesia. Sinus rhytm was restored after 300 mg amiodarone with HR 50/min. Coronary angiography showed normal coronary arteries with no stenosis, but ventriculography was demonstrative for an apical balooning. Thus, according clinical and imaging findings TTC was established as diagnosis. Pre-discharge 5 days after admission TTE showed recovery of LV systolic function EF 54%(with mild apical hypokinesia) and without symptoms. Two years later with heart failure III functional class of NYHA. ECG - AF, HR 130bp/min, EF 36% and diffuse hypokinesia.
Discussion: the current knowledge gives a connection between increased catecholamine levels in migraine and TTC. Although the trigger is mostly endogenous, some drugs with sympathetic effect have also been reported. Ergotamine is a commonly used drug in the treatment and prevention of migraine. It is structurally similar to endogenous catecholamines. In toxic doses the proposed mechanisms of TTC is vasoconstriction and neurogenic myocardial stunning. Differential diagnosis is made by acute coronary syndrome and myocarditis. The evidence of normal coronary arteriography, nonsignificant increase of troponine levels, ECG, TTE and ventriculography makes a diagnosis most likely TTC. AF is a common arrhythmia in TTC. The pathogenesis involves electrical, structural remodeling of the left atrium and excessive sympathetic activity with high catecholamine levels.
Conclusion: TTC has been described in the setting of intense physiologic or emotional stress. It has also been reported in a number of acute neurological illnesses. We report a case of TC apparently precipitated by two triggers (migraine and ergothamine toxicity) presented with AF. In our patient despite recovery of EF, lately diagnosed permanent AF, leads to tachycardia induced cardiomyopathy. TTC is a reversible condition, but the association between TTC and AF, is associated with poor clinical outcome.

P613
Left ventricular involvement in arrhythmogenic right ventricular cardiomyopathy assessed by cardiac magnetic resonance imaging: a case report

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Introduction: Arrhythmogenic right ventricular cardiomyopathy (ARVC) is an inherited myocardial disease characterized by fibro-fatty replacement of the right ventricle (RV) and is considered the second most prevalent cause of sudden cardiac death (SCD) in young and athletes. The disease is usually manifested by paroxysms of life-threatening ventricular arrhythmias. We reported a case of a man affected by this rare cardiomyopathy which was manifested by left ventricular (LV) involvement.
Case report : We describe a case of a 46-year-old male who referred to our clinic presenting with complains of palpitations and irregular heartbeats. The patient presented with a history of palpitations for many years for which he received amiodarone and bisoprolol. During hospital treatment, the patient developed a paroxysm of hemodynamically unstable wide complex ventricular tachycardia (VT) which was treated by electrical cardioversion. He underwent coronary angiography which did not detect any hemodynamically significant stenoses of coronary arteries. The family history was unremarkable. The 24-hour Holter ECG monitoring revealed sinus rhythm with an episode of monomorphic VT consisting of 5 ventricular complexes with a ventricular rate of 120 bpm and without clinical manifestation. The transthoracic echocardiography revealed concentric hypertrophy of LV, enlargement of RV and right atrium (RA). The left ventricular ejection fraction (LVEF) was estimated 45% with no regional LV asynergy. The RV diameter at the basal level was 60 mm. The aneurysm was present in the subvalvular region and along the lateral wall of RV. The Doppler examination revealed 1st degree mitral regurgitation and 3rd degree tricuspid regurgitation. The patient was preliminary diagnosed with stable ventricular tachycardia, syncope, arrhythmogenic shock, status after electrical cardioversion and arrhythmogenic right ventricular dysplasia/cardiomyopathy. The cardiac magnetic resonance imaging (MRI) study was performed for confirmation of clinical diagnosis which revealed the presence of LV aneurysm, RV free wall aneurysm and dilatation (Fig. 1A). The late gadolinium enhancement (LGE) showed the presence of RV fibrosis (Fig. 1B). The patient underwent the implantation of a dual-chamber implantable cardioverter defibrillator (ICD) for the secondary prevention of SCD. Conclusion: Possible biventricular involvement should be considered in ARVC in radiological studies and may be misdiagnosed by echocardiography. The cardiac MRI has a key role in finding biventricular involvement in this form of cardiomyopathy.

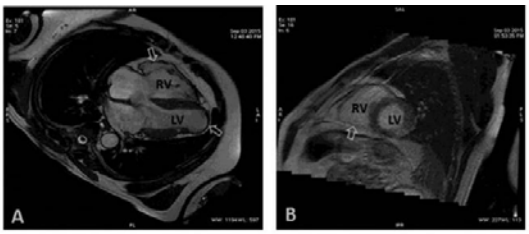

Figure 1. Cardiac magnetic resonance imaging. A-Cine study: Long axis view shows RV dilatation with dyskinesia and LV aneurysm (arrows); B-short axis view after LGE reveals RV wall fibrosis (arrow). LV=left ventricle; RV=right ventricle

P614
A case of cardiac fibroma

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Introduction: Cardiac fibroma is a rare benign primary tumor of the heart, which has been reported as the second most common benign cardiac tumor following rhabdomyoma in the pediatric population. Fibroma accounts for between 12 and 16% of primary cardiac tumors in children. Signs and symptoms are nonspecific, including arrhythmias, dyspnea, cyanosis, chest-pain and sudden mortality. However, a number of patients with cardiac fibroma are asymptomatic. The prevalence of cardiac fibroma is rare in the adult population. Echocardiography is the initial diagnostic modality for evaluating cardiac fibroma, and computed tomography (CT) or magnetic resonance imaging (MRI) can be as supplementary diagnostic techniques. The present case report describes an adult with cardiac fibroma arising from the left ventricle.
Case Presentation: A 34-year-old man presented with chest pain, which continued for 1 months and no association with regular activities such as walking. Physical examination revealed normal blood pressure and regular pulse. Patient was previously healthy, referring no prior cardiac surgery, chest radiotheray or tuberculosis. His family were normal.
Results: Electrocardiogram indicated normal sinus rhythm. Subsequently, echocardiography was performed, and revealed a large mass located in the left ventricular lateral wall. Cardiac magnetic resonance imaging (MRI) indicated a large mass located in the lateral wall of the left ventricle. The mass was regular and well defined, with a size of 7×4 cm are MRI images captured of the T1 transaxial section, T2 transaxial section, T2 coronal section and T2 sagittal section, respectively. The mass was T1 iso-intense compared with cardiac muscle and T2 hypo-intense compared with cardiac muscle. Myocardial first-pass perfusion images indicated an enhancement in the mass compared to the myocardial wall and in delayed phase perfusion images, the mass showed homogeneous enhancement. In addition, MRI functional analysis reported mild reduction in cardiac function.
Discussion: Echocardiography is non-invasive, fast and does not involve the use of radiation. It is generally the initial diagnostic modality for evaluating cardiac fibroma. Supplementary diagnostic techniques include computed tomography (CT) or MRI. CT and MRI can provide the location of the tumor, as well as identifying its surrounding structures and hemodynamic effects. In addition, MRI can provide additional functional data. Therefore, cardiac MRI is the modality of choice for further evaluation of cardiac fibroma. In this case, the cardiac MRI showed a regular solid lesion, which was iso-intense relative to muscle on T1-weighted and hypo-intense on T2-weighted images, which suggested fibrosis.
Conclusion Cardiac fibroma is very rare in adults. Echocardiogram, CT and cardiac MRI can provide valuable findings. Surgical excision is a reliable and effective method for treatment.

P615
Role of cardiac resynchronization therapy in optimizing the recovery of left ventricular function in a patient with peripartum cardiomyopathy and left bundle branch block

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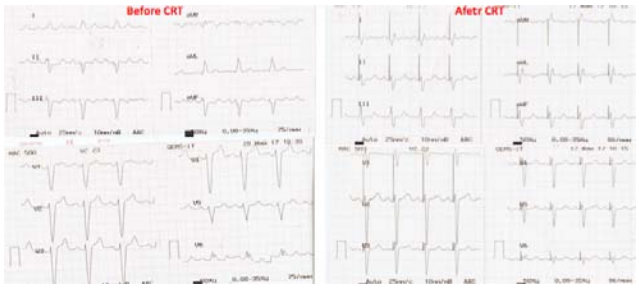
Introduction: Peripartum cardiomyopathy (PPCM) is presenting at the end of pregnancy or within 6 months postpartum with left ventricular dysfunction with EF <45%. Incidence is estimated to be 1:1000-4000. Rates of recovery ranging from 29 – 72% and mortality 25%.Management including medical therapy, cardiac devices, and heart transplant. Available published data showing three reported cases of PPCM with LBBB for whom Cardiac resynchronisation therapy [CRT] was implanted

Case Presentation: A 36-year-old woman, presented 3 months postpartum with severe dyspnea (NYHA III), she has non relevant past medical history. Echocardiography showed LVEF 25% and severe MR, diagnosed as PPCM
Management: Medical therapy was started with carvedilol, ramipril, indapamide, and spironolactone. After 17 months, despite the maximum tolerated dose of medical therapy, LV function did not improve and her symptoms worsen. Her ECG showed LBBB. Post CRT implantation, her LVEF recovers after 3 months, reaching 60% at 7 month follow up with dramatic improvement in her symptoms (NYHA I).
Conclusion and implication for clinical practice
CRT could be considered for optimizing LV function recovery in patients with PPCM despite optimal medical therapy. Comparing with the other two published cases, first case was refractory for medical therapy for 9 years with EF 28%, reached 55% six-month after CRT. Second case, her EF was 25% over 6 years, then 45% six-month post CRT. According to the current guideline in heart failure, eligibility for CRT should be evaluated after 6 months, however, the possibility of PPCM recovery make the early decision of CRT challenging. Moreover, the current data regarding use of CRT in PPCM is limited and there is a lack of precise follow up. Therefore, we need focus and orientation regarding this topic to bridge the gap of evidence to determine predictor factors for optimum time of CRT implantation in patients who are refractory to medical management

Case Study Follow-Up Data

	Follow-up data							
Initial	6month	12month	15month	17month	20month	24month		
NYHA	III	I	II	II-III		I	I	
ECG	QRS [msec]	140	120	120	120		80	80
QT[msec]	280	360	400	400		340	360	
Echo	LVEDD [mm]	59	68	60	54		——-——-	
LVESD [mm]	52	59	45	40		——-	——-	
GLS%	——-	-10	-9	——-		-12	-13	
EF%	25	28	40	39	35[CRT implanted]	52	60	



Case study ECG before and after CRT

Basic Science-Metabolism

P617
The pineal hormone melatonin inhibits doxorubicin-induced mitochondrial dysfunction and apoptosis in cardiomyocytes

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Background: Heart failure (HF) is a major end-point of cardiovascular diseases (CVD). The pathogenesis of HF is mostly unresolved but involves metabolic alterations. Treatment of animals and cardiomyocytes with β-adrenergic receptor agonists induces HF. Mitochondrial dysfunction and HF are common complications of anticancer drugs such as doxorubicin (DOX). Melatonin synthesis dramatically decreases with age and in patients with CVD.
Purpose: The aim of this study was to investigate whether DOX-induced cardiac dysfunction can be attenuated by melatonin.
Methods: The Seahorse XF analyser was utilised (with the XFp Cell Energy Phenotype kit) to measure oxygen consumption rate [OCR; oxidative phosphorylation (OXPHOS)] and extracellular acidification rate (ECAR; glycolysis) in living rat cardiomyocyte-derived H9c2 cell line. Mono-layers of cells were treated with cardiotoxic drugs [isoproterenol (ISO, 100μM) or DOX (0.1μM)] for 24hr with and without melatonin co-treatment (MEL, 1μM). Cyan ADP flow cytometry was used to examine the anti-apoptotic properties of MEL (1μM) on DOX-treatment (0.5μM, 24hr). Data are given as mean$\pm$SEM (n=separate experiments) and analysis was performed using ANOVA and two-tail unpaired Student's T-test, as applicable.
Results: Isoproterenol-treatment increased peak OCR of H9c2 cells by ~30% which was inhibited by MEL [CON, 384$\pm$17; ISO, 496$\pm$33; ISO+MEL, 412$\pm$31pmol/min; n=3 (six replicates); CON vs. ISO, $p<0.05$; ISO vs. ISO+MEL, $p<0.05$; CON vs. ISO+MEL, $p>0.05$]. Doxorubicin-treatment decreased OCR by ~40% which was reversed by MEL. [CON, 934$\pm$69; DOX, 554$\pm$52; DOX+MEL, 858$\pm$97pmol/min; n=3 (six replicates); CON vs. DOX, $p<0.05$; DOX vs. DOX+MEL, $p<0.05$; CON vs. DOX+MEL, $p>0.05$]. ISO and DOX significantly increased (~30%) and decreased (~25%) ECAR respectively (n=3, $p<0.05$) which was not inhibited by MEL. Melatonin alone had no significant effect on OCR and ECAR. Melatonin inhibited DOX-induced apoptosis in H9c2 cells [CON, 6.3$\pm$0.8%; DOX, 22$\pm$1.8%; DOX+MEL, 11$\pm$1.7%, n=4 (two replicates); CON vs. DOX, $p<0.001$; DOX vs. DOX+MEL, $p<0.004$; CON vs. DOX+MEL, $p>0.05$].
Conclusions: ISO and DOX-treatment induced mitochondrial dysfunction in H9c2 cells by alteration of OXPHOS and glycolysis; changes in OXPHOS were prevented by MEL. These data indicate that DOX-induced apoptosis in cardiac cells may be mediated, at least in part, by OXPHOS dysfunction which was attenuated by MEL treatment.

P618
Reactivation of fetal gene program, cardiomyocyte dedifferentiation and hypertrophy in heart failure

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In heart failure (HF) cardiomyocyte remodeling includes: restructuring of the contractile apparatus; changes in energy metabolism. Dedifferentiation represents a key feature of cardiomyocyte remodeling. It is characterized by reactivation of the fetal gene program. Compared to normal myocytes, dedifferentiated cells become more fetal with increased diameter and surface area. Dedifferentiation arises in vivo, in fibrillating atria, ischemic myocardium, and in the border zone of myocardial infarcts. Such dedifferentiated myocytes are not apoptotic and presumably reflect adaptations to abnormal myocardial stress. Re-expression of alpha skeletal actin (alpha SKA) is a marker of cardiomyocyte dedifferentiation but in the same time it is a marker of cardiomyocyte hypertrophy too. Cell dedifferentiation is accompanied by a shift from oxidative phosphorylation to glycolysis. A key regulator of cardiac energy metabolism is transcription factor peroxisome proliferator-activated receptor alpha (PPAR alpha).
The aim of the work to study cardiomyocyte dedifferentiation and hypertrophy in dilated cardiomyopathy (DCM) and HF, the expression of alpha SKA, PPAR alpha and of myosin protein kinase zipper interacting protein kinase (ZIPK) in cardiomyocytes. Endomyocardial biopsies (EMB) were obtained from 28 patients with DCM and HF. Transmission electron microscopy was used to detect cell ultrastructure. The gene expression levels of PPAR alpha, alpha SKA and ZIPK were determined using real time PCR.
Revealed cardiomyocytes have main features of dedifferentiated cardiomyocytes - increased diameter and surface area, sarcomere disorganization, enhanced glycogen content. Gene expression levels of PPAR alpha decreased, gene expression levels of alpha SKA and ZIPK increased in DCM and HF.
PPAR alpha expression level decrease shows shift from oxidative phosphorylation to glycolysis, a transition to dedifferentiated state of cardiomyocytes. Our results demonstrate the reactivation of the fetal gene program, features of fetal heart include the preference of carbohydrates over fatty acids as energy substrate. ZIPK expression level is elevated, perhaps ZIPK is involved in sarcomerogenesis during hypertrophy in HF. The level of alpha SKA may be a useful determinant for the degree of dedifferentiation in HF and an indicator for possible redifferentiation. Since the reactivation of the fetal cardiac gene program is also a characteristic feature of hypertrophic cardiomyocytes during HF, it is possible that the main distinction between hypertrophy and dedifferentiation was made by the presence or absence of glycogen accumulation. We propose that cardiomyocytes detected in our study are dedifferentiated cardiomyocytes. Dedifferentiated cardiomyocytes may take part in cardiac regenerative processes in HF and the understanding of the mechanisms of dedifferentiation, proliferation and redifferentiation of cardiomyocytes is important for heart regeneration and repair.

P620

Desmin s head domain is important for interaction with mitochondrial and lysosomal proteins: implications for cardiomyopathy

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Posttranslational modification of serine residues 27 and 31 in desmin head domain have been implicated in heart failure by preamyloid oligomers (PAO) formation (1). To better understand the functionality framework of desmin's head domain interactions, in health and disease we have used a yeast two hybrid system in order to identify new binding partners. We described a mitochondrial and a lysosomal protein, NDUFS2 and saposin D respectively, as direct desmin binding partners. The protein-protein interactions were confirmed in vitro by GST-pull down assays. A homology modeling approach was employed to determine 3D structure of desmin and NDUFS2, as for saposin D an actual crystal structure already existed. These 3D structures were further used as an input for protein-protein docking analysis by which we observed that both interactions occur in a very similar pattern by forming a three helix bundle that comprises one α-helix from desmin's head domain and two α-helical domains from NDUFS2 or saposin D. The desmin interacting part of both NDUFS2 and saposin D is almost identical. The latter adds up to the confirmation of the reliability of our 3D homology model of NDUFS2 protein, since its identical saposin-D counterpart is an actual crystal structure of high reliability. Deletion of desmin's head domain (aa 1-35) and GST-pull down analysis confirmed its importance for desmin binding to NDUFS2 and saposin D. Analysis of cell lines transfected with truncated desminΔ1-35 (missing aa 1-35) indicated increased aggregate desminΔ1-35 co-localization with Rab5, suggesting possible dysregulation of protein and/or organelle trafficking.
Conclusions: Our results indicate that desmin's head domain is necessary for the interaction with NDUFS2 and saposin D, proteins of key organelles for cardiomyocytes function in health and disease. Also cleavage of desmin head domain increases desmin-positive protein aggregates, a mechanism that has been linked to PAO formation.

P621

The novel butyrate derivative phenylalanine-butyramide protects from doxorubicininduced cardiotoxicity

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Introduction: With advancements in cancer survival, an increasing number of patients are at risk of anticancer drug-cardiotoxicity. Butyric acid (BUT), a short chain fatty acid produced daily in nanomole concentrations by the gut microbiota, has proven beneficial in models of cardiovascular diseases, but its translation into clinical practice is difficult because of its unpleasant organoleptic properties and its rapid degradation that alters its stability.
Purpose: Here we assess whether the novel BUT-derivative Phenylalanine-butyramide (FBA) protects from doxorubicin (DOXO) cardiotoxicity, by decreasing oxidative stress and improving mitochondrial function.
Methods: C57/BL6 mice (2-4 mo. old) were randomly divided in four groups. At day 0, mice in the FBA and FBA + DOXO groups were pre-treated with FBA daily for 21 days by oral gavage, while SHAM and DOXO mice received vehicle as control. At day 15, DOXO and FBA+DOXO mice were injected with Doxorubicin (1 mg/kg day, 1h after daily pre-treatment with vehicle or FBA) for the next 7 days, while SHAM and FBA mice were treated with saline solution. At day 21, mice were sacrificed for ex-vivo analysis. Heart function was monitored by echocardiography analysis at days -1, 14, 17 and 21.
Results: In C57BL6 mice, DOXO produced LV dilation assessed by echocardiography. FBA prevented LV dilation, fibrosis (assessed by PicroSirius Red staining) and cardiomyocytes apoptosis (assessed by TUNEL) when co-administered with DOXO. DOXO increased atrial natriuretic peptide, brain natriuretic peptide, connective tissue growth factor, and matrix metalloproteinase 2 mRNAs significantly, which were not elevated on co-treatment with FBA. DOXO, but not FBA+DOXO mice, also showed significantly higher nitrotyrosine levels, and increased iNOS expression. Accordingly, DOXO hearts showed significantly lower levels of intracellular catalase vs SHAM, while pretreatment with FBA prevented this decrease. We then assessed for ROS emission: DOXO induced significant increased activity of mitochondrial SOD and higher production of H2O2, which were blunted by FBA pretreatment. FBA also ameliorated mitochondrial state 3 and state 4 respiration rates that were significantly compromised by DOXO. Furthermore, in DOXO animals the mitochondrial degree of coupling was significantly increased vs SHAM, while FBA was able to prevent such increase, contributing to limit ROS production, Finally, FBA significantly reduced the toxicity of DOXO in hiPSC cardiomyocytes as measured by relative LDH release, protected HUVEC against DOXO-induced mortality and increased the tumor-killing action of DOXO in MCF7 cancer cells
Conclusions. FBA protects against experimental doxorubicin cardiotoxicity. Such protection is accompanied by reduction in oxidative stress and amelioration of mitochondrial function. Thanks to its organoleptic and pharmacokinetic features, oral assumption of FBA could be easily tolerated by
oncological patients.

P622

Catalpol ameliorates neointimal hyperplasia in streptozotocin induced diabetic rats

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Background/purpose: Diabetes is a prime risk factor of cardiovascular diseases, and results from the glucose and lipid metabolic dysregulation attribute to vascular and myocardial damage, then lead to heart failure. Catalpol, an iridoid glycoside, is an isolated natural product of Rehmannia glutinosa, which has been reported to have antidiabetic properties. This study investigated the vascular protective effects of catalpol in hyperglycemic rats with balloon-injured carotid arteries. Methods:Balloon injury stress led to the upregulation of monocyte chemoattractant protein-1 (MCP-1) expression in rats with streptozotocin (STZ)-induced diabetes. Western blotting, and real-time polymerase chain reaction (PCR), immunohistochemistry and confocal analyses were performed. Results: MCP-1 levels were increased through STZ induction or balloon injury. Catalpol and MCP-1 siRNA treatment significantly ameliorated the neointima after balloon injury. The area of neointima decreased by 58.8% after MCP-1 siRNA delivery and 54.8% after administrating catalpol treatment compared with the control group after 2 weeks. The lumen size increased by 90.2% and 91.1% after catalpol and MCP-1 siRNA treatment, respectively. Real-time PCR and immunohistochemical analysis demonstrated reduced levels of MCP-1 2 weeks after balloon injury. MCP-1 expression was significantly increased in balloon-injured rats compared with the control groups. Thus, treatment with catalpol affected MCP-1 expression. Conclusion:This study demonstrated that catalpol downregulated MCP-1 expression in carotid artery and ameliorated neointimal hyperplasia in hyperglycemic rats. The results imply that catalpol play an important role in neointimal hyperplasia and potentially effective for preventing hyperglycemia related ischemic cardiac diseases.

P623

Resveratrol and sacubitril/valsartan reduce cardiac oxidative stress, inflammation and fibrosis in myocardial infarction induced rats

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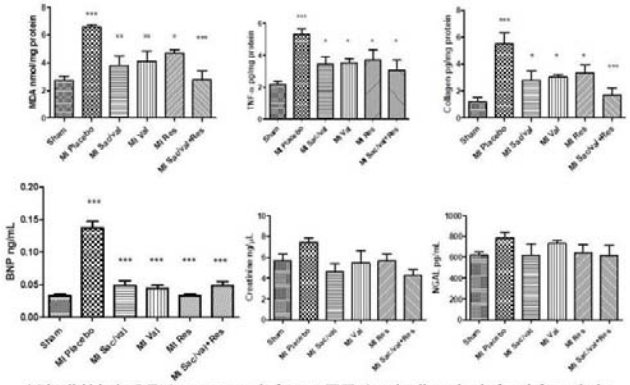
Background: Resveratrol (res) is a plant polyphenol which offers cardioprotection as reported by both pre-clinical and emerging clinical studies. Our previous work showed that sacubitril/valsartan (sac/val), valsartan (val) and resveratrol (res) alone improved cardiac function and remodeling linked to heart failure (HF) in myocardial infarction (MI) induced rats. In addition combination therapy with sac/val+res was found to be more cardioprotective with a trend towards improving LVEF.
Objective: To investigate the mechanism of action of standalone and combination treatment with sac/val and res in MI rats. To delineate the post-MI renal changes and effects of sac/val, and res on renal function and injury following an MI.
Methods: The left anterior descending coronary artery was occluded in young male Sprague Dawley rats. Sham-operated male rats served as age-matched controls. Sham and MI study groups received either, placebo alone, sac/val alone

(68mg/kg/day), val alone (31mg/kg/day), res alone (2.5mg/kg/day) or sac/val+res combination (68+2.5 mg/kg/day) daily for 8 weeks and blood plasma and heart tissues were obtained at the endpoint. All treatments were started immediately after surgery to simulate clinical scenarios. Malondialdehyde (MDA), tumor necrosis factor (TNF-α), and collagen levels were determined from left ventricular tissue from all groups. Plasma brain natriuretic peptide (BNP), creatinine and neutrophil gelatinase associated lipocalin (NGAL) levels were also measured. The study was approved by the Animal Ethics Board.

Results: The MI group that previously showed significant improvement in cardiac remodeling and dysfunction with sac/val, val, res and sac/val+res treatment had significantly lower levels of MDA compared to MI placebo group (6.59 vs 3.786±0.72, 4.11±71($p < 0.01$), 4.68±0.24 ($p < 0.05$), and 2.78±0.64, ($p < 0.001$)). Sac/val, val, res, and sac/val+res also significantly reduced the level of TNF-α in MI rats compared to MI placebo (5.33±0.31 vs 3.44±0.45, 3.52±0.28, 3.67±0.64, and 3.06±0.61, ($p < 0.05$)). MI rats treated with sac/val, val, res, and sac/val+res had significantly decreased levels of collagen compared to MI placebo (5.50±0.80 vs 2.78±0.71, 3.09±0.20, 3.35±0.59, and 1.67±0.58 ($p < 0.05$). Sac/val, val, res, and sac/val+res also significantly reduced the level of BNP in MI rats (0.13±0.01 vs 0.05±0.007, 0.04±0.005, 0.03±0.002, and 0.05±0.006 ($p < 0.001$)). Creatinine and NGAL levels comparable between the groups.

Conclusion: Sac/val, val, res and sac/val+res prevented cardiac remodeling and dysfunction in MI rats via cardioprotective mechanisms mitigating oxidative stress, inflammation and fibrosis. These findings further support the study of sac/val and resveratrol as treatment strategies in post-MI patients with HF and warrants consideration of future translational clinical trials. In addition, there was no evidence of post-MI renal dysfunction or injury with the standalone or the combination treatments.



Malondialdehyde (MDA), tumor necrosis factor-α (TNF-α), and collagen levels from left ventricular tissue and plasma brain natriuretic peptide (BNP), creatinine and neutrophil gelatinase associated lipocalin (NGAL). All values are expressed as mean±SEM, n=4-6. *** $p<0.001$ vs Sham; ***$p<0.001$, **$p<0.01$ and *$p<0.05$ vs MI Placebo.

P624

Parathyroid hormone causes endothelial dysfunction by inducing mitochondrial ROS and specific oxidative signal transduction modifications

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Background: Vitamin D deficiency contributes to cardiovascular risk (CVR), with subsequent hyperparathyroidism advocated as a putative mechanism. Indeed, mounting evidence supports the hypothesis that parathyroid hormone (PTH) impairs endothelial function, even though mechanisms are not fully elucidated. Purpose: The present study was designed to verify in vitro the ability of sustained exposure to PTH to cause endothelial dysfunction, exploring the underlying mechanisms. Methods: In bovine aortic endothelial cells (BAEC) in response to acetylcholine (Ach) and Bradykinin (BK) we evaluated Ca2+ handling and NO production using Fluo4/Rhod2 and DAF-FM respectively. The production of mitochondrial ROS (mROS) and total ROS (tROS) was assessed by cytofluorimetry using MitoSOX and DCFH respectively. The oxidation levels of Ach, BK and VEGF receptors was determined using oxiblot kit. The angiogenic competence was assessed determining the formation of capillary like structures on matrigel. Results: we evaluated the effects of PTH exposure ([0,1 nM]-24 hours) on both endothelial responsiveness to vasodilators, such as Bk [30 nM] and Ach [1 μM], and angiogenic competence. Pretreatment with PTH impaired endothelial response to Bk, but not to Ach, in terms of cytosolic Ca2+ fluxes and NO production. In order to explore the underlying mechanisms, we assessed the production of tROS and mROS in response to PTH (at 1 and 3 hours). PTH increased ROS generation, in a minor extent when compared to hypoxia, but enough to determine oxidation of Bk-receptor B2. Conversely, oxidation of Ach-receptors M1 and M3 was not affected by PTH. A mROS selective scavenger (MitoTEMPO, [5 μM]) restored the endothelial responsiveness to Bk while Vitamin D ([100 nM]) failed to counteract PTH-mediated oxidative stress, although its antioxidant properties are well-established. PTH determined mitochondrial calcium fluxes ([Ca2+]mt) and the inhibition of Mitochondrial Calcium Uniporter with Ru360 [10 μM] reduced mROS production and prevented the following PTH-mediated endothelial dysfunction. The evaluation of Angiogenic competence was impaired in PTH-pretreated cells ([0,1 nM]-24 hours), despite the increase in VEGF transcriptional levels. VEGF-R2 oxidation occurred in response to PTH, suggesting that even the impairment of angiogenesis was due to ROS surge.

Conclusions: These results indicate that PTH affects endothelial function through ROS production, driven by mitochondrial calcium overload. PTH-induced oxidative stress might act as signaling modifiers, altering specific pathways (Bk and VEGF) and preserving others (Ach).

Basic Science - HFpEF and Pulmonary Hypertension

P626

Increasing the intensity of preconditioning training reduces the systolic right ventricle pressure in the heart of rats with pulmonary hypertension

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Objective. For many diseases recommended physical activity, but not in the case of pulmonary hypertension (PH). It is known that exercise increases the postload on the right ventricle of the heart, which is risky for PH patients. However, recently there is more and more evidence of improving the overall physical condition of a patient with pulmonary hypertension in response to physical activity. The aim of this work was to study the effect of different types of exercise preconditioning on the degree of hPH on female Wistar rats.

Design and method. Female Wistar rats were used. Animals were divided into 4 groups. Two groups were with exercise preconditioning. For exercise preconditioning rats were subjected to exercise training by everyday swimming for a period of 2 weeks to hypoxia. First group was with aerobic swimming during 30 min/day without additional weight (hEx0). Second group was with swimming during 15min/day with additional weight equal to 4% of body weight (hEx4). The other two groups were not trained (and hC). 14 days after the start of exercises all rats except half untrained were exposed to hypoxia 10h/day, 2wk. with 10% in hypobaric chamber. Two weeks after the onset of hypoxia systolic right ventricle pressure (SRVP) was measured as indices of hPH.

Results. Two weeks after the onset of hypoxia all groups of rats developed hPH with different extent of the disease. Thus, hypoxia was accompanied by an increase in SRVP by 38% between C and hC groups ($p<0,05$). Aerobic exercise resulted in an increase in SRVP from 54±2 (hC) to 67±4 (hEx0) mmHg ($p<0,05$). The increase in training intensity caused a decrease in SRVP by 40% in the hEx4 group compared to the hEx0 group ($p<0,05$) and was 46±3,4 mmHg. Between hypoxic rats of all groups were not difference in RV hypertrophy.

Conclusions. Increasing the intensity of exercises training preconditioning from aerobic swimming to swimming with additional weight is accompanied by a decrease in SRVP but does not affect RV hypertrophy in the rat with hypoxia pulmonary hypertension.

P627

Protective effects of soluble ubiquinol in monocrotaline model of pulmonary hypertension in rats

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Objective: Due to its high antioxidant activity ubiquinol (U) potentially could be used for the treatment of cardiovascular diseases coupled with the development of oxidative stress and inflammation. There are several papers, showing the positive effect of ubiquinol on endothelium-dependent vasodilation. Pathogenesis of pulmonary hypertension (PH) is associated with inflammation and endothelial dysfunction. Effects of ubiquinol on PH development has not been studied before. Therefore, the aim of this work was to investigate the possible effects of ubiquinol on PH development in experiments on rats.

Design and method: Experiments was performed on male Wistar rats divided into 3 groups. All animals were subcutaneously injected with a solution of monocrotaline (MCT) (60 mg/kg, 0.5 ml) on the first day of the experiment. On 7th and 14th days

after the start of experiment animals of the group 1 were injected with a solution of solubilized U (30 mg/kg, iv), group 2 – with vehicle (V) and group 3 - physiological saline, (PS) in appropriate volumes. On the 21st day after MCT injection rats of each group were anaesthetized (urethane, 1.2 g/kg) and systolic right ventricular pressure (SRVP) and arterial blood pressure were measured. For testing vascular reactivity phenylephrine (PE) (6 μg/kg) and sodium nitroprusside (SNP) (6 μg/kg) were injected iv. After decapitation of narcotized rats the weight of right ventricle (RV) was measured and RV hypertrophy (RVH) was calculated as RV weight/body weight. Endothelium-dependent vasodilatation (evoked by acetylcholine (ACh) of isolated segments of pulmonary and systemic vessels were investigated as well.
Results: PH developed in all groups of animals 3 weeks after injection of MCT, that was confirmed by the increase in SRVP and RVH. Differences between of SRVP levels between groups (44.4 mmHg for U-group, 45.7 mmHg for V-group, and 44.5 mmHg for PS-group) were not significant Values of RVH demonstrated a significantly lower degree of hypertrophy development in U group compared to PS group (0.00076 vs 0.00085, $p<0.05$). The response of systemic blood pressure to intravenous injection of SNP in group U was 5.27% higher than in PS group and 18.29% higher than in the V group. A similar pattern was found for reaction to PE, that shows the capability of U to restore reactivity of blood vessels of systemic circulation to vasoactive factors. Study of reactivity of isolated segment of pulmonary artery at ACh showed that in group U compared with V-group there was a statistically significant increase in vasodilator response to ACh at concentrations of 10-7M(23% vs 17.2%), 10-6M (30.3% vs 25.1%), 10-5M (36.9% vs 30.9%) ($p<0.05$ for all).
Conclusions. Double intravenous administration of ubiquinol on an MCT model of PH on rats was able to inhibit the degree of RVH, being one of the major symptoms. In addition, it contributes to the restoration of reactivity of both systemic and pulmonary vessels.

P628

In the sugen/hypoxia model of pulmonary arterial hypertension in mice, abrogation of S100A1 exacerbates right ventricular dilation and fetal gene expression

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Introduction: The calcium sensor protein S100A1 is expressed in myocardium and endothelial cells and regulates cardiac muscle contractility. Previously, we demonstrated that under basal conditions in vivo, S100A1 knockout mice (KO) exhibited an elevation in right ventricular systolic pressure (RVSP), accompanied by an increase in RV hypertrophy.
Purpose: Since RV dysfunction occurs with progression of pulmonary arterial hypertension (PAH), we aimed to determine the impact of deleting S100A1 on progression of PAH in the Sugen-hypoxia (SUHx) model in mice.
Methods: C57BL6 (WT) and S100A1 KO mice (n=10 per group) were injected once weekly subcutaneously with SU (20mg/kg) and exposed to chronic Hx (10% O2) for 3 weeks. PAH was assessed by hemodynamic parameters, RV morphology and echocardiography. RV and lung tissue were collected for molecular analysis.
Results: In WT and S100A1 KO mice exposed to SUHx, RVSP was similar 31.0±1.90 vs.31.4±2.08, (mean+SEM) respectively. In RV and lung tissue of WT mice, S100A1 mRNA and protein decreased approximately 40% in response to SUHx. SUHx induced similar increases in RV weight calculated as the Fulton index (0.43±0.06 in WT vs. 0.41±0.04 in S100A1KO) but in contrast to WT, S100A1 KO demonstrated a 3.7-, 2.5-, and 1.5- fold increase in the mRNA levels of the hypertrophic genes, atrial natriuretic factor, β-myosin heavy chain and skeletal α-actin, respectively ($p<0.05$). In S100A1 KO mice SUHx reduced heart rate (S100A1KO - 305.41±54.69 vs. WT-443 ±54.82 bpm, $p < 0.001$) compared to WT. Furthermore, serial echocardiographic assessment indicated increased RV dilation in the S100A1KO compared to the WT in response to SUHx as assessed by increases in RV internal diameter in both diastole (S100A1KO, 1.92±0.08 vs. WT, 1.53 ±0.08, p=0.004) and systole (S100A1KO, 1.34±0.1 vs. WT, 0.97±0.01, p=0.02) .
Conclusion: Our results show that PAH is associated with decreased expression of S100A1 in the RV and lack of S100A1 increases RV dilation and expression of fetal gene markers in the SUHx model. S100A1 may serve to limit severity of RV structural changes in PAH and represents a potential therapeutic target in this disease.

P629

Impact of sympathectomy upon myocardium

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Rationale:Studies suggest that sympathectomy could be used to treat heart failure. However, its physiological effects on the heart have been minimally studied. Objective:We sought to evaluate the effects of sympathectomy on myocardium in an experimental model. Methods and Results:The study evaluated 3 groups of male Wistar rats: control (CT) (15), left unilateral sympathectomy (UNI) (15), and bilateral sympathectomy (BIL) (31). We assessed chronotropic properties at rest and stress, cardiovascular autonomic modulation, myocardial and peripheral catecholamines, and beta-adrenergic receptors in the myocardium. The proposed variables for analysis were obtained by resting ECG, echocardiography, maximal exercise test, heart rate (HR) and systolic blood pressure (BP) variability measured in the time and frequency domain. The information regarding β-receptors and myocardial and peripheral catecholamines was obtained by PCR, ELISA and HPLC, respectively. The BIL group had basal tachycardia immediately before the exercise test and more tachycardia at peak exercise (CT: 387±47 vs BIL: 461±22 bpm, $p<0.01$). Blood pressure had the same pattern (CT: 104±13 vs BIL: 121±8 mmHg, P=0.0365). The variables related to autonomic modulation had no statistical significance except the high frequency (HF) variable, which had significant differences in CT vs UNI. We observed that beta receptor expression had no statistical difference between groups. Despite no statistical significance difference β2 receptor had 1/3 expression in the base and apex compare to control, and β1 at the apex had the double expression. There was a higher concentration of peripheral norepinephrine in the BIL group (CT: 1.08±1.22 ng/mL vs BIL: 3.94 ±1.73 ng/mL, P=0.0001). There was no difference in myocardial norepinephrine (P=0.09). It may suggest that the animals in the bilateral group had higher levels of peripheral catecholamines, consequently a higher heart rate, and blood pressure levels.
Conclusions: These findings suggest an extra cardiac compensatory pathway increases the sympathetic tonus and maintains a higher HR, higher levels of peripheral norepinephrine, and downregulation of beta 2 receptors in the procedure groups. The increase in HF activity can be interpreted as an attempt to increase the parasympathetic tonus to balance the greater sympathetic activity.

P630

Pulmonary infarction in acute pulmonary embolism: a sign of poor prognosis?

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Introduction Pulmonary infarction (PI) is a common complication in patients with pulmonary embolism (PE), and its impact on prognosis is still uncertain. The main purpose of this study was to evaluate the association between the presence of PI and clinical characteristics and prognosis in patients with PE.
Methods A retrospective analysis of 209 patients admitted to a Cardiology ward due to PE was performed. Patients without data on PI were excluded (n=143). The Mann-Whitney U or T-test were used to compare means of selected variables: leukocytes, neutrophils, C-reactive protein (CRP), troponin I, BNP, heart rate (HR), oxygen pressure in arterial blood gas analysis (pO2), right ventricle diameter (RVD), pulmonary artery diameter (PAD), days of hospitalization (DH) and PESI score. The Chi-square test ($\chi 2$) was used to evaluate the association between fever, chest pain, hemoptysis, tachypnea or syncope at presentation and PI, as well as the association with in-hospital mortality. Mortality at 2 years of follow-up was evaluated with a Kaplan-Meier survival analysis. A multivariable logistic regression (MRlog) model was used to assess the predictive value of the significant variables for the presence of PI.
Results Mean patient age was 63 (±18) years. 60% were female. PI was present in 25%. There was no significant association between PI and neutrophil count, troponin I, BNP, HR, RVD, PAD, DH and PESI score. Higher leukocyte count (p=0.02) and CRP value ($p<0.001$) revealed significant association with PI. There was a trend towards association between higher pO2 and PI (p=0.052). Chi-square test test revealed a significant association with hemoptysis (p=0.001) and chest pain (p=0.014). There was no difference between patients in terms of fever, tachypnea or syncope. There was no significant association between the presence of PI and the risk of in-hospital mortality. The logrank test in Kaplan-Meier survival curves did not reveal a significant difference in mortality after 2 years of follow-up (p=0.17). In MRlog model, only CRP (p=0.001), hemoptysis (p=0.015) and chest pain (p=0.049) retained statistically significant association with PI.
Conclusion PI might be related with a more pronounced inflammatory process, associated with greater rise in CRP levels. Patients with PI appear to present more often with hemoptysis and chest pain than patients without PI. There is no apparent association between PI and in-hospital mortality or mortality at 2 years of follow-up.

P631

HFWM: Inhibition of the pro-inflammatory neutrophil mediator S100A8/A9 alleviates heart failure development post-myocardial infarction

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Background: The potent immune and inflammatory response to myocardial infarction (MI) aggravates myocardial damage and precipitates the development of heart failure (HF). The pro-inflammatory alarmin S100A8/9 rises rapidly in blood and myocardium after MI and has been linked with increased risk for recurrent MI and CV death in these patients.
Purpose: In MI patients, we studied whether S100A8/A9 at the time of the MI is associated with impaired cardiac function and incident HF. Further, we assessed whether inhibition of S100A8/A9 activity in the acute phase can improve cardiac function post-MI in mice.
Methods: In a cohort of 524 MI patients, we studied the associations between S100A8/A9 and incident HF during a 2-year follow-up. In a subgroup of 114 of these patients we also examined the correlations between S100A8/A9 and left ventricular function at 1 year after MI, measured by echocardiography. To assess the role of S100A8/A9 in HF development, we induced MI by permanent left coronary artery ligation in C57BL/6 mice. The mice were subsequently treated with the S100A8/A9 blocker ABR-238901 (30mg/kg) or PBS for 3 days. ABR-238901 inhibits the binding of S100A8/A9 to its receptors RAGE and TLR4. Immune cell populations in blood and myocardium were analyzed by flow cytometry, and cardiac function was assessed by magnetic resonance on days 3, 7 and 21 post-MI.
Results: In a Cox proportional regression analysis adjusted for age and sex, patients with acute S100A8/A9 values in the highest tertile had a 1.3 (95%CI 1.0 – 1.7) higher risk to develop HF compared to the lowest tertile (P=0.026). Higher acute S100A8/A9 also correlated with lower left-ventricular ejection fraction (r=-0.332, P=0.001) and larger end-systolic volume (r =0.201, P=0.037) at 1 year. In mice, S100A8/A9 blockade post-MI had potent local and systemic anti-inflammatory effects, leading to significantly reduced numbers of neutrophils and inflammatory Ly6C(hi) monocytes in blood and myocardium on days 3 and 7 post-MI. Left ventricular ejection fraction was significantly higher on day 7 (25% vs 16%, P<0.01) and on day 21 (26% vs 12%, P<0.001) in mice treated with ABR-238901 compared to the PBS control. We recorded a remarkable hemodynamic recovery in the ABR-238901-treated mice, with an approximately 40% increase in cardiac output from 6.4mL/min on day 3 to 8.9 mL/min on day 21. On day 21 post-MI, the average cardiac output in the ABR-238901-treated group reached 83% of the baseline pre-MI value, compared to 51% in the control mice.
Conclusions: Our study identifies a deleterious role of S100A8/A9 in the immediate post-ischemic phase, mediating the development of cardiac dysfunction and chronic HF. We identify S100A8/A9 as an important target for immunomodulatory therapies aiming to ameliorate the development of post-ischemic HF, as S100A8/A9 blockade led to significant gains in cardiac function and hemodynamic parameters.

P632

Sleep-disordered breathing is associated with ventricular arrhythmias in postmenopausal women with hypertension and coronary artery disease.

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Background: Arterial hypertension (AH) and coronary artery disease (CAD) hold leading position in the structure of cardiovascular morbidity. High risk of developing AH and CAD becomes clinically significant after a woman enters menopause. The problem of sleep-disordered breathing is also being actively studied recently, as more and more information is accumulating about the negative effect of sleep apnea on the cardiovascular system.
Purpose: To study the role of sleep-disordered breathing on ventricular arrhythmias (VA) in postmenopausal women with AH and CAD
Methods: 144 postmenopausal women with AH 1–2 degrees and chronic forms of CAD (mean age 66.6 ± 7.5 years) were examined. 27.1% of women had heart failure (NYHA I-II). The first group included 96 patients with VA. The second group consisted of 48 women without VA. The groups were divided into subgroups: A - index of apnea / hypopnea (AHI) <5 per hour of sleep; B - AHI ≥ 5 per hour of sleep. Patients underwent holter monitoring of ECG and respiratory monitoring.To characterize the VA, the Lown and Wolf classification was used in the Ryan modification. VA 3 and higher gradations were taken to arrhythmias of high gradations.
Results: Patients with sleep-disordered breathing (AHI ≥ 5 per hour of sleep) were found in the I (36.5%) and II (22.9%) groups, but in the group with VA of such patients there was a 13.6% increase (χ^2 with the Yates correction = 1.9 p> 0.05). Patient didn't significantly differ in the frequency of detection of VA I, III, IV and V grades (> 0.05). Frequent ventricular extrasystole (VE) by 22.2% (p <0.01 in the Fisher test) was more often recorded in patients in the IA subgroup (29.9% and 5.7% accordingly). Polymorphic pair VE more often (by 20.8%; p <0.01 by Fisher test) was detected in women of the IB subgroup. In patients with IB subgroups, arrhythmias of high gradations (51.4%) were more frequent (21.9% χ^2 = 4.56 p <0.05) compared with the IA subgroup.Using the method of calculating the odds ratio, it was found that the AHI ≥ 5 episodes per hour of sleep increases the chance of development of high-grade VA by 2.5 times, polymorphic pair VE by 7 times.
Conclusions: Sleep-disordered breathing (AHI ≥ 5 per hour of sleep) is associated with high-gradation VA and polymorphic paired VE.

Odds ratio of developing VA

Indicator	index of apnea / hypopnea		
OR	95%CI	P criteria χ^2	
High gradations ventricular arrhythmias	2,52	1,16 - 5,92	<0,05
Polymorphic pair ventricular extrasystole	7,0	1,75 - 28,22	<0,01

OR - odds ratio; CI - confidence interval

P633

Effects of early vs. late initiated pressure unloading on myocardial reverse remodeling and recovery of cardiac dysfunction in a rat model of left ventricular hypertrophy induced by pressure overload

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Background: Left ventricular hypertrophy (LVH) induced by pressure overload (PO) regresses after pressure unloading. However, distinct structural alterations become irreversible during the progression of LVH, which might influence the recovery of cardiac function.
Purpose: Here, we investigated how an early- versus late initiated pressure unloading affects reverse remodeling and different aspects of LV function.
Methods: PO was induced by abdominal aortic banding (AB) of rats for 6, 12 and 18 weeks. Sham-operated animals served as controls. Pressure unloading was evoked by removing the aortic constriction at week 6 (early-debanded) and week 12 (late-debanded). Echocardiography and histology were carried out to detect structural alterations. Pressure-volume analysis was performed to assess LV function. Molecular alterations were analyzed by qRT-PCR and western blot.
Results: LV hypertrophy regressed to a similar degree in early- and late-debanded groups (similar regression regarding LV mass, cardiomyocyte diameter, heart weight - to - tibial length ratio and beta-to-alpha myosin heavy chain expression). In contrast, resorption of myocardial fibrosis was only detected in the early-debanded group (LV collagen fraction: 7.7±0.7 vs. 5.4±0.3% ABw12 vs. early-debanded; p<0.05, while it persisted in the late-debanded group (7.4±0.9 vs. 6.9±0.6% ABw18 vs. late-debanded; ns.). Debanding normalized ventriculo-arterial coupling and increased systolic performance in both groups. However, the residual dysfunction in active relaxation (Tau normalized to control: 18±5 vs. 38±8% early-debanded vs. late-debanded; p<0.05) and increased stiffness was more severe in the late- compared to the early-debanded group.
Conclusion: Early debanding led to complete structural reverse remodeling and full restoration of LV function. In contrast, late debanding resulted in partial regression of PO-induced structural alterations, which impeded the normalization of diastolic but not systolic function.

P634

Dapagliflozin improves diastolic performance in an animal model of heart failure with preserved ejection fraction

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Background: Heart failure with preserved ejection fraction (HFpEF) that share co-morbidities like hypertension and diabetes, is a challenging clinical syndrome and represents yet unresolved pathophysiological continuum with a consequent perception of lack of effective treatments. In a non-diabetic, hypertensive model of HFpEF we tested the effects of SGLT2 inhibitor dapagliflozin on the progression of heart disease.
Methods: Dahl salt-sensitive rats were fed a high salt diet (8% NaCl) to induce hypertension. Then, rats continued with a high salt diet and were orally administered with either dapagliflozin (0.1 mg/kg/day) or vehicle for the following 6 weeks. Heart function were monitored by echocardiography.
Results: The animals progressively developed hypertension and after 5 weeks of high-salt diet, before initiation of pharmacotherapy. Diastolic function was compromised as documented by decrease of E/A ratio along with increase of E deceleration time and isovolumetric relaxation time. At treatment completion, hypertrophied LV had normal systolic parameters and diastolic parameters were partially recovered when compared to high-salt animals. These results define an improved ventricular relaxation. Interestingly, urine albumin-to-creatinine ratio (UACR), indicative of endothelial dysfunction, that was higher in animals on high-salt diet, was reduced by treatment with dapagliflozin. Decreased UACR was associated with the declined activation of NF-kB in coronary endothelium.
Conclusions: Dapagliflozin positively modulates diastolic compliance with the specific molecular mechanisms yet to be identified. Because of a non-diabetic nature of our model and unaltered blood glucose levels, the improvement of cardiovascular profile by dapagliflozin can depend on endothelium-related mechanisms rather than its anti-hyperglycaemic effect.

P635

Cholesterol-lowering gene therapy prevents HFpEF in obese type 2 diabetic mice

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Background: Hypercholesterolemia may be causally related to heart failure with preserved ejection fraction (HFpEF) even in the absence of coronary artery disease.
Purpose: The objectives of this study were to establish a model of HFpEF associated with hypercholesterolemia in obese diabetic mice and to evaluate the preventive effect of cholesterol lowering induced by adeno-associated viral serotype 8 (AAV8)-low-density lipoprotein receptor (LDLr) gene transfer in this model.
Methods: Gene transfer with 5 x 1010 genome copies of AAV8-LDLr or with the same dose of AAV8-null was performed in C57BL/6J LDLr-/- mice at the age of 11 weeks. The standard chow (SC) diet was continued in part of the mice whereas the high-sucrose high fat (HSHF) diet was initiated at the age of 12 weeks and continued for 16 weeks. All endpoint analyses were performed at the age of 28 weeks.
Results: Body weight in the AAV8-null HSHF diet mice progressively increased and was 1.49-fold ($p<0.001$) higher at 16 weeks after the start of the diet compared to AAV8-null SC diet mice (32.8 ± 1.0 g versus 22.1 ± 0.4 g). This weight gain was associated with hyperinsulinemia and type 2 diabetes mellitus. AAV8-LDLr gene transfer significantly ($p<0.001$) decreased plasma cholesterol in SC diet mice (66.8 ± 2.5 mg/dl versus 213 ± 12 mg/dl) and in HSHF mice (84.6 ± 4.4 mg/dl versus 464 ± 25 mg/dl. The HSHF diet induced cardiac hypertrophy (1.23-fold ($p<0.001$) increase of left ventricular weight) and resulted in pathological remodelling as evidenced by a 21.1% ($p<0.01$) decrease of myocardial capillary density and by increased interstitial ($p<0.001$) and perivascular fibrosis. AAV8-LDLr potently counteracted cardiac hypertrophy and pathological remodelling. Moreover, wet lung weight was 19.0% ($p<0.001$) higher in AAV8-null HSHF diet mice than in AAV8-null SC diet mice whereas no increase of lung weight was present in AAV8-LDLr HSHF diet mice. Pressure-volume loop analysis was consistent with HFpEF in AAV8-null HSHF diet mice as evidenced by a preserved ejection fraction (52.2 ± 2.5% versus 57.2 ± 2.1% in AAV8-null SC diet mice), a significant reduction of the end-diastolic volume (25.1 ± 1.4 µl versus 31.5 ± 1.5 µl; $p<0.01$), of cardiac output (7.76 ± 0.46 ml/min versus 10.9 ± 0.6 ml/min; $p<0.001$), and of the peak filling rate (509 ± 52 µl/min versus 712 ± 22 µl/min; $p<0.01$). The slope of the end-diastolic pressure to volume relationship ($p<0.01$), ventriculo-arterial coupling ratio ($p<0.05$), and the time constant of isovolumetric relaxation ($p<0.001$) were significantly higher in AAV8-null HSHF diet mice than in AAV8-null SC diet mice. AAV8-LDLr HSHF diet mice were characterized by a completely normal cardiac function. Treadmill exercise testing showed that the total distance covered was reduced by 62.0% ($p<0.001$) in AAV8-null HSHF diet mice compared to AAV8-null SC diet mice and was not reduced in AAV8-LDLr HSHF diet mice.
Conclusion: Cholesterol-lowering AAV8-LDLr gene therapy prevents HFpEF.

P636

Reconstituted HDL reverses pathological remodeling and cardiac dysfunction in a murine model of HFpEF associated with hypertension

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Background: Drug strategies with strong evidence in heart failure with reduced ejection fraction have proved unsuccessful in heart failure with preserved ejection fraction (HFpEF).
Purpose: The objectives of this study were to establish a murine model of HFpEF associated with hypertension and to evaluate the effect of reconstituted HDL Milano administration on established HFpEF in this model.
Methods: Subcutaneous infusion of angiotensin II (600 ng/kg/min) in combination with 1% NaCl in the drinking water was initiated at the age of 12 weeks to induce hypertension and HFpEF in male C57BL/6N mice. To evaluate the effect of reconstituted HDL Milano on HFpEF, five intraperitoneal injections of MDCO-216 (100 mg/kg protein concentration) or of an equivalent volume of control buffer were executed with a 48-hour interval starting at the age of 16 weeks. Endpoint analyses were performed at the age of 16 weeks in the reference control and reference hypertension groups and at the age of 16 weeks plus 9 days in the control buffer and the MDCO-216 groups.
Results: Peak systolic pressure was significantly ($p<0.01$) higher in reference hypertension mice (113 ± 3 mm Hg; n=12) than in reference control mice (99.6 ± 2.1 mm Hg; n=12). Left ventricular weight and cardiomyocyte-cross sectional area were 1.44-fold ($p<0.001$) and 1.48-fold ($p<0.001$) higher, respectively, in reference hypertension mice than in reference control mice. Pathological remodelling in reference hypertension mice was evidenced by increased interstitial (8.37 ± 0.71% versus 1.92 ± 0.11%; $p<0.001$) and perivascular (0.543 ± 0.068 versus 0.284 ± 0.013; $p<0.001$) fibrosis and a reduction of myocardial capillary density (3720 ± 140 mm-2 versus 4710 ± 190 mm-2; $p<0.001$). Pressure-volume loop analysis was consistent with HFpEF in reference hypertension mice as evidenced by a preserved ejection fraction (52.2 ± 1.4% versus 58.7 ± 2.7%), a significant reduction of the end-diastolic volume (24.2 ± 1.1 µl versus 28.4 ± 0.8 µl; $p<0.01$), of cardiac output (7.78 ± 0.56 ml/min versus 10.5 ± 0.7 ml/min; $p<0.01$), and of the peak filling rate ($p<0.01$). Arterial elastance ($p<0.001$), ventriculo-arterial coupling ratio ($p<0.001$), and the time constant of isovolumetric relaxation ($p<0.05$) were significantly increased in reference hypertension mice. Treatment with MDCO-216 (n=14) completely normalised all parameters of cardiac function whereas no effect was observed in control buffer mice (n=16). In addition, perivascular fibrosis and cardiomyocyte cross-sectional area were significantly lower and capillary density was significantly higher in MDCO-216 mice than in both reference hypertension and control buffer mice. Wet lung weight in the MDCO-216 group (152 ± 4 mg) was significantly ($p<0.01$) lower than in the control buffer group (182 ± 9 mg) and similar than in the reference control group (150 ± 4 mg).
Conclusion: Reconstituted HDL is an effective treatment for HFpEF associated with hypertension.

P637

Plasma proteome analysis of patients with heart failure identifies HFmrEF with unimproved EF as an intermediate state between HFpEF and HFrEF, HFmrEF with improved EF as a distinct biological state

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Background : Patients with EF 40-49% have been identified as having Heart Failure with Mid-Range Ejection Fraction (HFmrEF). However, this group of patients is heterogeneous and it remains unclear whether they constitute a distinct entity.
Purpose : To investigate whether HFmrEF and its subgroups identified based on prior EF trajectory are characterized by the activation of specific biological pathways.
Methods: Within the Heart Failure Registry of our institution we identified 87 patients with a documented LVEF between 40–50% (HFmrEF) at the time of enrollment and sex/age matched patients with HFrEF (LVEF <40%, n=51) or HFpEF (LVEF>50%, n=43). HFmrEF patients were further sub-categorized based on the prior trajectory

of EF as either HFmrEF with improved EF (63) or HFmrEF with unimproved EF (24). Plasma samples collected from each patient at the time of enrollment were profiled using the SOMAscan protein array platform, a technology that renders quantitative measurements of over 1300 protein analytes.

Results: Analysis of the plasma proteome via Principal Component Analysis (PCA) centroid estimation suggested that HFmrEF is a state more similar to HFpEF than HFrEF (Fig1 A). However, when we sub-divided HFmrEF patients based on the prior trajectory of their EF, we found that HFmrEF with improved EF is a separate biological state that deviates markedly from the straight line connecting HFrEF and HFpEF while HFmrEF with unimproved EF is merely an intermediate state between HFpEF and HFrEF (Figure 1B). The spatial distance between patient subgroups on the PCA matched both the number of differentially expressed proteins and the number of differentially activated pathways identified through network analysis.

Conclusions: HFmrEF with unimproved EF is an intermedite state between HFpEF and HFrEF. HFmrEF with improved EF is a distinct biological state characterized by the activation of several specific biological pathways.

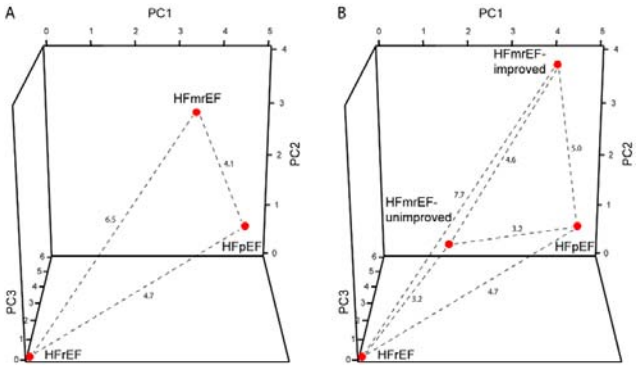

Figure 1

Young Investigator Award - Clinical

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Heart preservation with the organ care system for mechanical circulatory support recipients

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Background: The Organ Care System (OCS) Heart is non-inferior compared to standard cold storage for preservation of donor hearts.
Purpose: We hypothesized that its properties for prolonged heart preservation might be especially beneficial for high-risk on Mechanical Circulatory Support Recipients.
Methods: Patients transplanted using the OCS Heart at our center between 10/2012 and 10/2018 were prospectively followed. All recipients were potentially considered eligible.
Results: During the study period among the 70 transplanted patients, 55 (78.5%) high-risk recipients (median age 39 years, 80% male) were transplanted using the OCS for donor (median age 41year, 74% male) heart preservation. Before transplantation, 24(43%) recipients (VAD, n=16; CARMAT, n=2; BiVAD, n=3; ECLS, n=2) had a median 2 previous cardiac operation. Among the 16 VAD patients, 6(37%) and 2(14%) had show VAD/driveline infections and VAD dysfunctions, respectively. All OCS hearts successfully transplanted. Median OCS perfusion and donor aortic cross-clamp to recipient aortic clamp opening times were 5 and 7 hours, respectively. In addition, due to geographical distant retrievals (more than 1000km) were only realized for their respective recipients without exceeding the maximum ischemic time because the OCS was available. Postoperatively 10(41%) and 12(50%) patients required re-sternotomy for bleeding and temporary dialysis, respectively. Six (37%) patients required postoperative ECLS due to right heart failure that completely recovered after median 6 days. One (4%) patient died in hospital due to sepsis. At discharge, all patients showed a left ventricular ejection fraction >55% in echocardiography. At follow up end survival was 96%.
Conclusion: OCS Heart allowed safe transplantation of recipients on Mechanical Circulatory Support. Despite preservation time was approaching 9 hours (maximum 16) enabling allocations otherwise not acceptable, patient and graft conditions were favorable.

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Donor-recipient size-mismatching by predicted heart mass and survival after heart transplantation.

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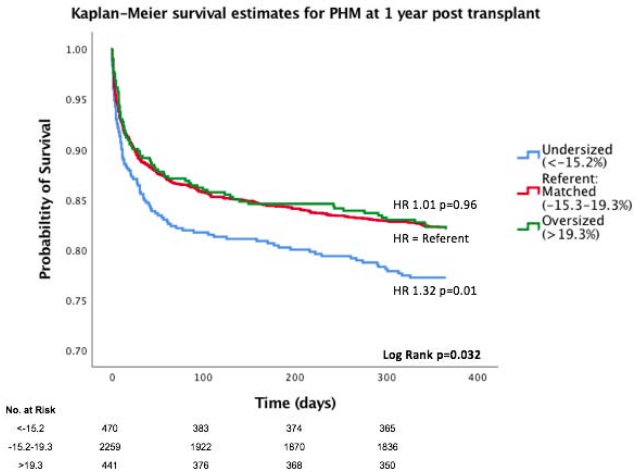
Introduction: Current international (ISHLT) guidance for donor-recipient size matching in cardiac transplantation is based on body weight differences, yet recent studies have demonstrated that this approach has minimal association with survival post transplantation. The use of population-based, cardiac MRI derived equations for predicted left and right ventricular mass incorporating weight, height, age and gender have been recently proposed as a potential alternative to evaluate donor sizing. These equations can be applied retrospectively to classify discrepancies between donor and recipient predicted heart mass (PHM).
Purpose: To determine whether there is an association between clinical outcomes following cardiac transplantation and donor-recipient size mismatch, as defined using cardiac MRI-derived equations, in the UK.
Methods: The study cohort comprised of 3266 adut heart transplant recipients from the NHS UK transplant registry, who received their first, isolated heart transplant between 1995-2017. The data was normally distributed and the cohort was divided into 3 groups based on being above or below one standard deviation, with the central cohort used as reference. Kaplan-Meier plots and univariate Cox proportional regression modelling performed to evaluate the association with 1-year mortality.
Results: Ninety-six patients were excluded due to missing data, resulting in a total of 3170 patients in the analysis. Baseline demographics are demonstrated in Table 1. Undersizing (<-15.2%) by PHM was associated with increased mortality at one year (HR 1.32, 95%CI 1.01-1.50, p=0.01) compared to the reference cohort. In contrast, oversizing had no effect on mortality (HR 1.01, 95%CI 0.79-1.28, p= 0.96).
Conclusion: Receiving an undersized donor heart by PHM was associated with decreased survival in cardiac transplant recipients in the UK. Further studies are needed to explore the mechanisms that lead to deleterious outcomes in these patients and strategies to optimise size mismatching.

Table 1- Baseline demographics

	Undersized (<-15.2%) n=470	Referent: Matched (-15.2-19.3%) n=2259	Oversized (>19.3%) n=441	p Value
1 year mortality	22.8% (n=107)	17.7% (n=400)	17.9% (n=79)	
Donor Age (years)	39±12	36± 12	35 ± 12	<0.001
Donor Male	18.4%	73.9%	80.8%	<0.001
Recipient Age (years)	48±12	48±12	44 ±12	<0.001
Recipient Male	96.2%	81.1%	42.8%	<0.001
Ischaemic Time (hours)	3.3±1	3.3±1.1	3.2±1	0.22



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Heart failure from cardiac ATTR-amyloidosis is a highly malignant disease

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Background: Cardiac amyloidosis is an underappreciated cause of morbidity and mortality. Light chain (AL) and transthyretin (ATTR) amyloidosis have different disease trajectories. Recent evidence suggests that ATTR is probably much more

common than widely appreciated. ATTR was evident in patients with heart failure with preserved ejection fraction (HFpEF) and in elderly patients with aortic stenosis.
Purpose: No data are available on subtype-specific comparisons of prognosis with other heart failure etiologies.
Methods: In this single-centre registry 2181 patients treated for heart failure according to prevailing guidelines between 2000 and 2018 were analysed. Underlying CMPs were classified into eight groups: cardiac amyloidosis (6.6%) [ATTR 3.0%; AL 3.6%], ischemic (25.7%), idiopathic (25.4%), hypertensive (15.3%), inflammatory (14.5%), toxic (4.4%), HCM (4.4%), and valvular (3.6%). Primary endpoint was death of any cause. Kaplan-Meier estimator was used to calculate 5-year survival. A multivariate cox regression analysis was performed to compare survival between groups.
Results: Patients were followed for a median of 87 months (IQR 44–138). Five year overall survival in the whole cohort was 80.6% (ATTR-amyloidosis 51.3%, AL-amyloidosis 36%, ischemic 72.4%, toxic 77.7%, valvular 79.9%, hypertensive 81.1%, idiopathic 85.3%, HCM 92.8, inflammatory 93.1%).
In multivariate analysis adjusted for age, gender, LV-EF, and NYHA class, individuals with ATTR-amyloidosis were 2.6 time (95% CI 1.4 – 4.7; P=0.002) and AL-amyloidosis 7.1 time (95% CI 4.4 – 11.6; P<0.001) more likely to die of any reason than were individuals with inflammatory CMP. Differences in mortality between ATTR-amyloidosis and ischemic CMP were not significantly different (HR 1.5, 95%CI 0.9 – 2.5; P=0.096). In the multivariate model, mortality was significantly higher in AL (HR 2.9, 95%CI 1.5 – 5.6; P=0.001) compared with ATTR-amyloidosis.
Conclusion: Data from this single-centre registry study that compared cardiac amyloidosis with various reasons of cardiomyopathies indicate worst prognosis in patients with cardiac amyloidosis. Although outcome in ATTR is better than in AL, ATTR-amyloidosis is still associated with poor long-term survival. From this perspective, thorough etiologic evaluation and targeted therapy should be mandatory in patients with heart failure and suspected ATTR-amyloidosis.

Figure 1
Long-term survival according to heart failure etiology

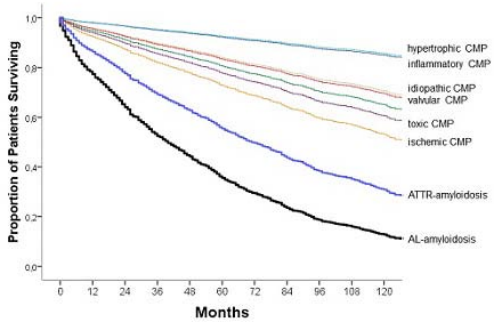

Figure 1

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Effect of SGLT2 inhibitor on cardiac function in diabetic patients with or without heart failure: an echocardiographic study

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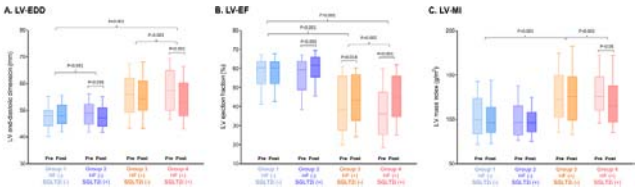
Background: Recent trials showed that the use of sodium-glucose cotransporter 2 inhibitor (SGLT2i) reduces the occurrence of heart failure (HF). However, the effect of SGLT2i on cardiac function is not fully understood.
Purpose: We aimed to assess the changes in cardiac function assessed by echocardiography in diabetic patients with or without HF.
Methods: Diabetic patients who underwent repetitive echocardiographic examinations from 2014 to 2018 were retrospectively enrolled (n=1107). Among these patients, we identified 202 patients underwent echocardiography before and 1- or 2-year after the initiation of SGLT2i, and compared with 227 diabetic patients without SGLT2i who underwent repetitive echocardiography with same interval. Using propensity score matching, we categorized the study population into 4 groups: patients without HF nor SGLT2i (group 1; n=76), patients without HF and received SGLT2i (group 2; n=78), patients with HF but without SGLT2i (group 3; n=72), and patients with HF and received SGLT2i (group 4; n=74). The changes in echocardiographic parameters were compared between these 4 groups.
Results: After 1- or 2-year of SGLT2i treatment, the left ventricular end-diastolic dimension (LV-EDD) decreased and LV ejection fraction (LV-EF) increased in patients without HF (p=0.036 for LV-EDD, p<0.001 for LV-EF) as well as in those with HF (p<0.001 for both LV-EDD and LV-EF). A modest reduction in LV mass index (LV-MI) was also noted in patients with HF treated with SGLT2i (p=0.05). There were significant differences in changing patterns of LV-EDD, LV-EF, and LV-MI according to the use of SGLT2i in both patients without HF and with HF.
Conclusions: The use of SGLT2i reduced LV-EDD and improved LV-EF in diabetic patients regardless of the presence of HF. These hemodynamic effect of SGLT2i would contribute to the reduction in HF morbidity and mortality in diabetic patients.



Figure

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Splanchnic nerve blockade in chronic heart failure (Splanchnic HF-2)

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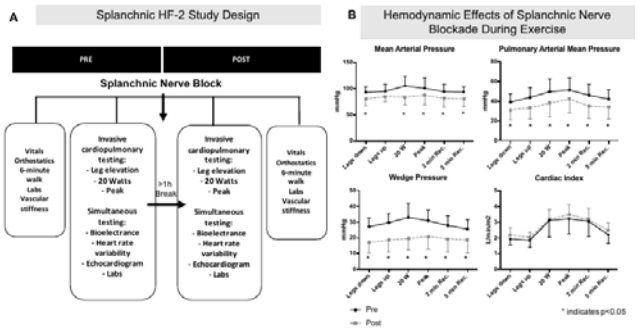
Funding Acknowledgements: Translating Duke Health and National Institute of Health

Background Chronic heart failure (HF) is characterized by limited exercise capacity driven by an excessive elevation of intra-cardiac pressure during exercise. In acute HF patients, splanchnic nerve blockade (SNB) decreased intra-cardiac pressures and improved cardiac output.
Purpose We hypothesized that SNB would attenuate exercise-induced cardiac filling pressures.
Methods Prospective, open-label, interventional study in chronic HF patients regardless of ejection fraction. Eligible patients were enrolled from May 2018 to January 2019 and had NYHA class II/III symptoms with elevated intra-cardiac filling pressures on baseline right heart catheterization. Patients underwent invasive cardiopulmonary exercise testing on a supine bike followed by a temporary percutaneous SNB with bupivacaine (Figure), followed by repeat exercise testing. Primary outcomes were changes in the pulmonary arterial mean, wedge and exercise capacity on repeat testing from before and after SNB. Additional testing parameters are presented in the Figure.
Results Of the 10 enrolled patients, 50% were male, 50% had ischemic cardiomyopathy, with an overall mean age of 56 ± 15 years and median left ventricular ejection fraction of 18%. No procedural complications were encountered. SNB significantly reduced resting and exercise-induced mean arterial pressure, pulmonary arterial and wedge pressure (Figure). SNB did not result in significant changes in resting (1.9 L/min/m2±0.5 vs 2.2 L/min/m2±0.7; p=0.83) or peak exercise (3.2 L/min/m2±1.3 vs 3.5 L/min/m2±1.0, p=0.84) cardiac index or peak VO2 (8.6 ml/kg/min ±2.5 vs 8.9ml/kg/min ±1.8, p=0.41). Post SBN patients had a lower degree of intra-thoracic fluid shifts as measured by bioelectrance technology (1.6 ±0.9 vs 1.0 ±0.5; p<0.05) and lower central vascular stiffness (pulse wave velocity: 7.04 m/s ±0.8 vs 6.47 m/s±0.5; p<0.05).



Study design and hemodynamic results

Conclusions In this preliminary analysis of the Splanchnic-HF2 study, SNB reduced resting and exercise-induced pulmonary arterial and wedge pressure without an effect on peak cardiac index in patients with chronic HF. SNB induced favorable changes in central and peripheral hemodynamics without significant effects on exercise function. Continued efforts to investigate short- and long-term effects of SNB in chronic HF are warranted.

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cmR Pulmonary transit time has additional prognostic value over cMR-RVEF and estimated systolic pulmonary artery pressure in predicting outcomes in Hf-rEF

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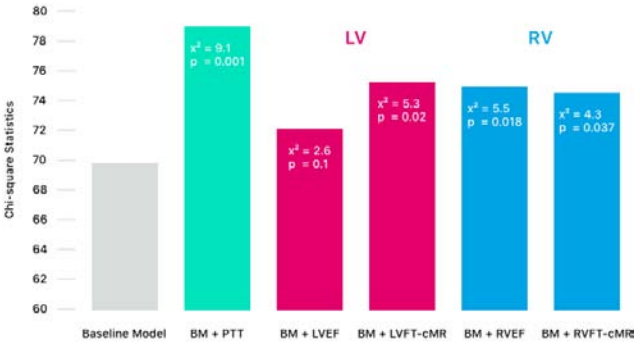
Funding Acknowledgements: Fond national de recherche (FNRS)

Background: Right ventricular (RV) ejection fraction and hemodynamic congestion are known as powerful predictor of mortality in HF-rEF. Pulmonary transit time (PTT) assessed by cMR is a novel parameter, which reflects multiple indicators of cardiopulmonary status, including not only left ventricular(LV) and RV function but also hemodynamic congestion.
Purpose: We sought to explore the prognostic value of the PTT above well-known risk factor for predicting outcomes in HF-rEF in direct comparison with cardiac function assessed either by the conventional cMR-systolic parameters or by cMR-feature tracking (FT).
Methods: 410 patients in sinus rhythm with a LVEF <35% (age 61 ± 13 years; 25% female) underwent a cMR and an echocardiography. Patients were followed for a primary endpoint of overall mortalit.
Results: Average cMR-LVEF was 23% ± 7%, average cMR-RVEF was 43 ± 15%, average cMR-FT-RVGLS was -11.7±4.5%, average cMR-FT-LVGLS was-6.6±2.7% average estimated systolic pulmonary pressure (eSPAP) was 33 ± 12mmHg and PTT was 11± 6s. After a median follow-up of 6 years, 192 (47%) patients reached the primary endpoint. In univariate cox regression, age, female sex, ischemic cardiomyopathy, diabetes, NYHA class III-IV, eSPAP> 40mmHg, E/A ratio, e/e'ratio, cMR-RVEF, LVEF, LV scar, PTT, GFR, beta blockers and diuretics were associated with primary endpoint. For the multivariate analysis, a baseline model was created where age, female sex, ischemic etiology, diabetes, eSPAP>40mmHg, diuretics, beta blockers were found to be significantly associated with the endpoint. PTT (X2 to improve = 9.05, HR: 1.04; 95%CI: [1.02; 1.07]; P=0.001) showed a significantly higher additional prognostic value over the baseline model than cMR-LVEF (X2 to improve = 2.61, HR: 0.99; 95%CI: [0.98; 0.99]; P=0.11), cMR-RVEF (X2 to improve = 5.53, HR: 0.99; 95%CI: [0.98; 0.99]; P=0.018), LV-cMR-FT(X2 to improve =5.31, HR: 1.08; 95%CI: [1.01; 1.14]; P=0.023) and RV-cMR-FT (X2 to improve =4.34, HR: 1.04; 95%CI: [1.00; 1.08]; P=0.037).Conclusion:Pulmonary transit time provides higher prognostic information than cardiac function assessed by cMR or by cMR feature tracking over well-known risk factors with high power to stratify prognosis in HF-rEF and might be promising tools to identify patients at higher risk among HF patients



The additional value of the pulmonary transit time (PTT), left ventricular ejection fraction (LVEF), left ventricular feature tracking cardiac magnetic resonance (LVFT-cMR), right ventricular ejection fraction (RVEF) and right ventricular feature tracking (RVFT) in predicting overall mortality over a baseline model (BM) including age, female sex, ischemic etiology, diabetes, estimated systolic pulmonary pressure >40mmHg, diuretics and beta blockers. LV and RV indicate left ventricle and right ventricle respectively.

Clinical Case Corner 2 - A story of success. Recovering in heart failure

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Recovery of heart failure due to severe malnutrition and marked electrolyte abnormalities.

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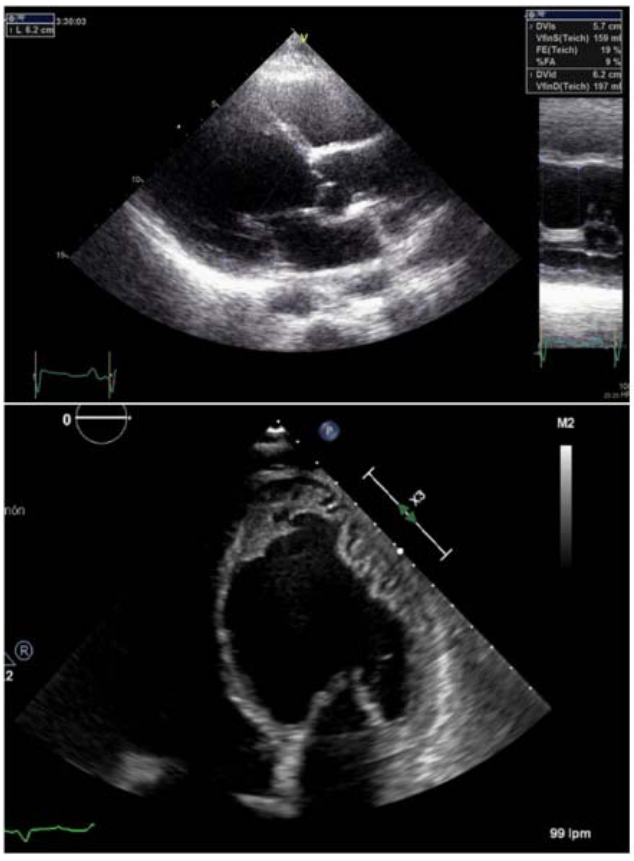
We present a 55 year old male who was a heavy smoker and consumed 25-38 grams of alcohol per day (2-3 beers and 1 glass of wine). He had Diogenes syndrome and had no social support. He lived alone in a flat with deficient hygienic measures. He also had a poor diet, based in processed carbohydrates. He had no past medical history and had not visited foreign countries.

He presented with a history of 4 months of worsening heart failure symptoms, finally with dyspnea at rest. At presentation he was cachectic, tachycardic, normotensive but with clinical signs of hypoperfusion and venous congestion. An EKG showed sinus tachycardia, a narrow QRS complex and a Q wave in V1. A chest X-ray exhibited signs of emphysema, bilateral pleural effusion and cardiomegaly. Blood tests displayed signs of intravascular disseminated coagulation, ischemic hepatitis, rhabdomyolysis and hyperlacticaemia. A TTE revealed biventricular dilation and failure, with a LVEF of 19%, restrictive filling pattern, moderate pulmonary hypertension and a thrombus in the apex of the LV.



TTE showing DCM and apical thrombus.

He was admitted in the cardiac ICU and was managed with dobutamine and furosemide with a slow but favorable response, with progressive correction of organ failure. A diagnostic study was performed including a coronary angiogram that was normal. Infections including HIV, CMV, EBV, varicella, parvovirus, hepatitis B and C, syphilis and coxiella were all negative. A nutritional panel showed normal levels of selenium, vitamins B1 and B3; but signs of protein-energy malnutrition and low levels of sodium (126.8 NV 135-150), chloride (93 mmol/L NV 95-110), ionic calcium (0.88 mmol/L NV 1.05-1.35), magnesium (0.45 mmol/L NV 0.66-0.99), phosphorus (1.96 mg/dL NV 2.7-4.5) and vitamin D (4.6 ng/L NV >20). He was started on supplementation until correction. Due to persistent signs of hypervolemia, he received an infusion of levosimendan. Afterwards, euvolemia was achieved. He was discharged after 30 days of hospitalization with oral anticoagulation and low doses of ACEI, betablocker, MRA, ivabradine and 40 mg of furosemide per day.

His cardiomyopathy was attributed either to malnutrition with severe electrolyte abnormalities or to alcohol, although his intake was lower than what is usually associated with DCM (>80-90 g/day). He was followed up by social services, a nutritionist, his primary care center and the nurses and physicians of the heart failure clinic. He changed his diet and living, abstained from alcohol and during the first year of follow up remained in NYHA class I and did not have any hospitalizations. At the one-year follow up a TTE revealed normal biventricular size and function. A cardiac MRI corroborated the TTE and showed no regional fibrosis in LGE sequences.

In conclusion, we present a patient with severe malnutrition, dilated cardiomyopathy and cardiogenic shock that recovered after a multidisciplinary management and correction of the nutritional deficits and abstention from alcohol.

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Carbon monoxide induced cardiomyopathy: a rare cause of Takotsubo symdrome

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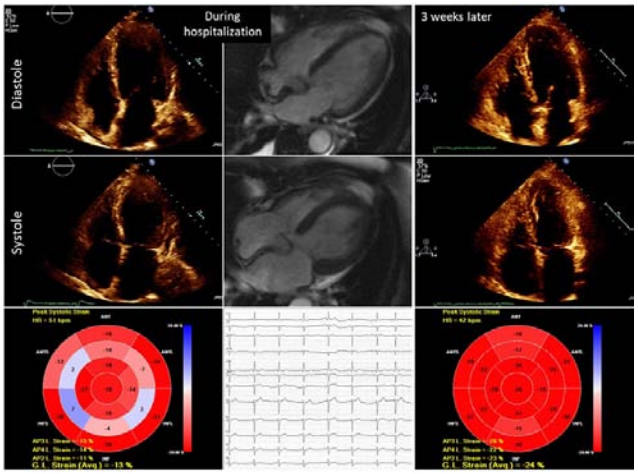
Introduction: Carbon monoxide (CO) poisoning is known to cause cardiac toxicity. Although the exact pathophysiological mechanism is not completely understood, it is usually classified as a type of Takotsubo syndrome (TTS). Diagnosis can sometimes be challenging due to possible concomitant respiratory symptoms from CO exposure.

Case summary: A 75-year old female with a history of hypothyroidism was admitted to the emergency department of our hospital as one of the many victims of the tragic wildfire in Mati, Greece the past summer. She sought medical attention 24 hours after inhaling smoke from the fire, with symptoms of dyspnea, nausea, burning sensation in the chest, and dizziness. With no significant findings from the electrocardiogram, the patient's symptoms were initially misinterpreted as of respiratory origin. Upon admission, cardiac enzymes were found elevated and left ventricular function was significantly impaired, displaying mid-ventricular hypokinesia. A coronary angiogram was performed which ruled out coronary artery disease and cardiac magnetic resonance showed no signs of inflammation or scarring of the myocardium. At this point, Takotsubo cardiomyopathy induced by carbon monoxide inhalation seemed the most reasonable diagnosis. Heart failure therapy with zofenopril, carvedilol and eplerenone was initiated resulting in gradual improvement of the symptoms. The patient was discharged after eight days of hospitalization, only to return home to the devastating aftermath of the wildfire. At the follow-up after three weeks, she was completely asymptomatic. Her left ventricular function had returned to normal and medical treatment was adjusted accordingly.

Conclusion: Different triggers of Takotsubo syndrome have been increasingly recognized since its first initial report, both emotional and physical. Carbon monoxide exposure should alert the clinical doctor to the possible cardiac involvement. Victims of wildfires, who are exposed to CO in an uncommon way, should receive the appropriate attention, since cardiac manifestations can be easily misinterpreted as respiratory symptoms from smoke inhalation injury.

Laboratory exams during hospitalization				
Day 1	Day 2Day 3	Day 4Day 5	Day 6Day 7	Day 8
AST	IU/L (5-40)120	8248	3930	28—
CPKIU/L (10-170)858	311137	9168	5252	45
CK-MBng/mL (0.0-3.6)35.8	7.94.0	2.82.7	1.91.8	1.4
cTnIng/mL (<0.056)9.639	4.6011.676	0.9070.447	0.3040.202	0.123
ProBNPpg/mL (<300)6244	4110—	30012090	14251306	767



Imaging: hospitalization and follow-up

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Bilateral pheochromocytoma presenting with inverted takotsubo cardiomyopathy and cardiogenic shock

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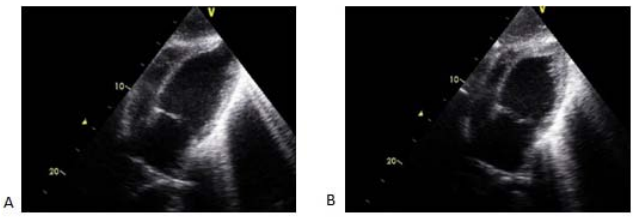
Takotsubo cardiomyopathy show transient left ventricular dysfunction and rarely presents with cardiogenic shock. Basal or inverted takotsubo cardiomyopathy is a variant of this syndrome important to identify because it tends not to be recognized as readily as the typical presentation and is associated with the presence of Pheochromocytoma.

Pheochromocytoma is a rare, catecholamine-secreting neuroendocrine tumour arising from the adrenal medulla. Recent studies have focused on estimation of the prevalence of Takotsubo cardiomyopathy in patients with pheochromocytoma but very little is reported about the management of these complex cases. Here, we report the case of a 26-year-old woman who presented with an inverted Takotsubo cardiomyopathy (picture 1) secondary to a catecholamine crisis, caused by an occult bilateral pheochromocytoma. The initial presenting crisis manifested with symptoms of severe headache, palpitations and breathlessness triggered by surgery procedure and exogenous corticosteroid. In the emergency department, the patient clinical condition rapidly deteriorated, developing respiratory failure and cardiogenic shock and she was transferred to a VA-ECMO support center, which in this case was life-saving therapy, allowing myocardial recovery, and stabilization for tumors excision.

Pheochromocytoma should systematically be considered for patients with Takotsubo cardiomyopathy, and/or unexplained cardiogenic shock. Extracorporeal life support devices provide temporary mechanical circulatory support in patients on refractory cardiogenic shock who have an underlying potentially reversible heart condition, like Takotsubo cardiomyopathy.



Picture 1: Admission echocardiography showing subcostal view of the LV at end-diastole (A), and end-systole (B).

Picture 1

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I am hurt, but I will be okay- An unusual case of reversible heart failure

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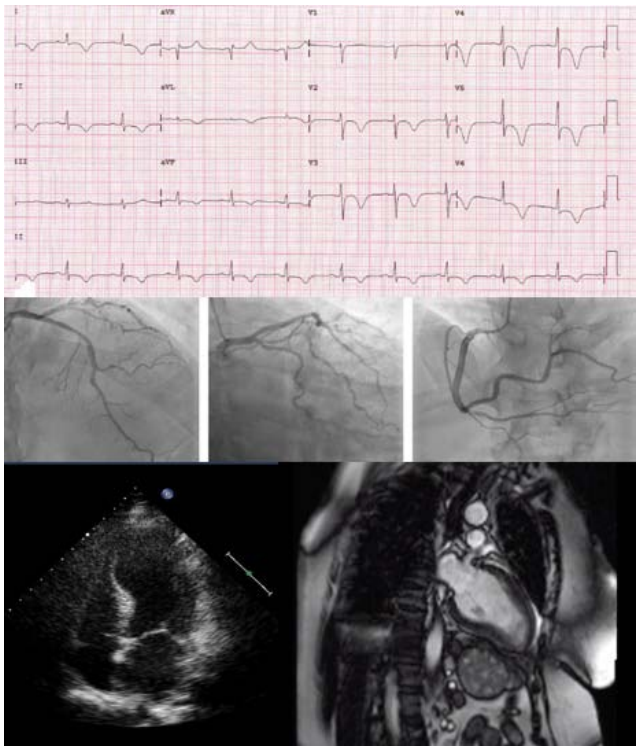
Funding Acknowledgements: No

A 56-year-old lady with underlying mild coronary artery disease, diabetes mellitus and hypertension presented with typical angina radiating to the left arm. Upon arrival at the emergency department, she had stable hemodynamic with BP 140/80mmHg and HR of 80/min. Lungs were clear to auscultation and cardiovascular examination was unremarkable. Electrocardiogram revealed sinus rhythm without ST-T changes. Rapid troponin test was positive. Subsequent ECG in the ward showed dynamic T inversion from lead V1 through V6. Serum hs Trop T was elevated; 324pg/ml (NR <14pg/ml). A transthoracic echocardiogram demonstrated reduced left ventricular ejection fraction of 31% with akinesia at apical wall and hypokinesia at the anteroseptal wall. Her baseline echocardiogram in the year 2017 showed normal left ventricular function with no evidence of regional wall motion abnormalities. Diagnosis of Non-ST elevation MI was established.

Coronary angiogram showed non-obstructive coronary arteries. Standard medical therapies were started; dual antiplatelets, statin and S/C low molecular weight heparin were given. Electrocardiogram post catheterization revealed deepening of T inversion from lead V1-V6. She was observed in the ward and anti-failure therapies were initiated; beta blocker and renin-angiotensin-aldosterone blockade agents. Cardiac MRI was performed which showed apical hypokinesia with viable myocardium and normal left ventricular ejection fraction; 60% suggestive of Takotsubo Cardiomyopathy



Picture

Takostubo Cardiomyopathy or "Transient Apical Ballooning/ Stress Cardiomyopathy" is a rare cause of acute reversible heart failure presented with an entity called MINOCA; Myocardial Infarction in Non-Obstructive Coronary Arteries. It occurs predominantly in postmenopausal women soon after exposure to sudden, unexpected emotional or physical stress. The aetiology remains unclear and most patients attained full recovery within weeks.

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A tricky case of rapid ejection fraction improvement in patient with preeclampsia and peripartum cardiomyopathy complicated by subsequent heart failure readmissions

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Introduction: Acute heart failure (AHF) in late pregnancy is a rare and potentially life-threatening complication. As many conditions can lead to AHF in this setting, making an accurate diagnosis could be difficult.
Case report: A 28-year-old primigravida developed cardiogenic shock with need to mechanical ventilation after 3 days of normal vaginal delivery at 39 weeks of gestation. Her medical history was unremarkable. 3 weeks before delivery a progressing ankle swelling with shortness of breath and fatigue developed. 1 week before she had persistent proteinuria (PU) up to 5g/d, BP 135/95 mmHg, hypoalbuminemia to 23,7 g/L. Her weight gain during pregnancy was 30 kg. Laboratory tests showed increased NT-proBNP level (1944 pg/ml), normal GFR (90 ml/min/1,73m2). Low ejection fraction (EF) 32% without regional contractility impairment, severe mitral regurgitation (MR) were revealed. Causes of AHF were discussed. Myocardial infarction, myocarditis and autoimmune disorders were excluded given the normal values of troponin and autoimmune markers. Clinical probability of pulmonary embolism was low. BP tended to be normal or even hypotension was noted, so hypertensive disorders as a reason for AHF were ruled out. Further PU decreased to 1.9 g/l. Because of obvious criteria of preeclampsia and significant weight gain, AHF due to hypervolemia was considered. However, peripartum cardiomyopathy (PPCM) as a most serious cause of AHF during pregnancy was the main concept given the acute deterioration and low EF. Bromocriptine (2.5 mg b.i.d.) therapy was added to AHF treatment consisted of 24h infusion of levosimendan (12.5 mg), and IV furosemide (40 mg o.d.), enoxaparin (sc. 4000 IU), magnesium sulfate infusion. After extubation and hemodynamic stabilization therapy with metoprolol succinate (12.5 mg o.d.), enalapril (2.5 mg b.i.d.), spironolactone (25 mg o.d.) was started and fastly uptitrated. Notably, at 4th day of treatment patient's clinical status was stable and euvolemic, EF remarkably improved to 50% which questioned PPCM. At 5th day of hospital stay woman was discharged on her own. Enalapril (2.5 mg b.i.d.), metoprolol succinate (75 mg o.d.), bromocriptine (2.5 mg b.i.d.), enoxaparin (sc. 4000 IU) and non-breastfeeding were recommended. However, resulting from low adherence, 1 week after discharge patient was readmitted with severe AHF with EF 30%. Emergency heart transplantation was discussed but this was managed to avoid. After that there were 2 more readmissions with AHF and drug-induced hypotension. In 3 months of stable HF therapy EF was 45%, mild MR, kidney function was normal, PU regressed.
Conclusions: Diagnosis of PPCM as a cause of AHF in late pregnancy, especially in cause of concomitant preeclampsia and misleading fast EF improvement thought is challenging but should be kept in mind given high risk of complications. Patient education and depth counseling regarding the risks of non-adherence are the important parts of PPCM management.

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Atypical HUS associated cardiomyopathy and its recovery on warfarin in a hemodyalisis patient

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A 29 year old man was admitted to his local hospital after painting work with acute abdominal pain, vomiting, high fever, fatigue, high blood pressure, black urine, oliguria progressing to anuria, oedema, ascitis. His analyses showed leukocytosis, mild thrombocytopenia, anemia with Hb = 50g/l, creatinine = 919mcmol/l, proteinuria of 5-9g/l. The examination including laparotomy did not find any obvious cause. Patient was treated by hemodialysis, erythrocyte and plasma infusions. Renal failure did not recover and chronic dialysis was started. After several months the patient presented with biventricular heart failure, LVEF = 28% and LV dilation. Screening for systemic connective tissue diseases and antiphospholipid syndrome was negative. Treatment with bisoprolol, losartan, statin and digoxin was started. In 1,5 years the patient was admitted to our hospital with atrial fibrillation and decompensation of heart failure. CMR showed marked LV enlargement and noncompaction with EF of 11% and late gadolinium enhancement of non-ischemic type. Diagnosis and treatment. The onset with intravascular haemolysis, acute renal impairment and thrombocytopenia was characteristic of thrombotic microangiopathy. History and blood ADAMTS 13 level excluded STEC-HUS and thrombotic thrombocytopenic purpura. Atypical haemolytic uraemic syndrome (aHUS) was diagnosed. The importance of LV noncompaction was questionable. The patient was given beta-blocker. ACEi, amiodarone, enoxaparine. His sinus rhythm with grade 1 AV block was restored by electrical cardioversion. LVEF on echo at discharge was 27%. After discharge the patient continued ACEi, amiodarone and warfarin. He was also recommended eculizumab, but he failed to get it. During the 2-year follow up the condition of the patient markedly improved. He has sinus rhythm and there are no symptoms of heart failure and no AV block. He has normal platelet count. LV size normalized and LVEF has grown to 64%. Kidney transplant with eculizumab is being considered. Discussion. Atypical haemolytic uraemic syndrome (aHUS) is an extremely rare disorder attributed to defective alternative complement pathway regulation which leads to thrombotic microangiopathy with organ damage and poor prognosis. Data on cardiovascular complications come from scarce case reports and small series. In our patient the disease was not recognized on its onset though it presented with typical triade of hemolytic anemia, thrombocytopenia, and acute renal failure. Eculizumab - a monoclonal antibody to complement C5 is approved as a first line treatment of aHUS but the patient did not get it. The recovery of aHUS associated cardiomyopathy was achieved on anticoagulant treatment started due to atrial fibrillation. It must be noted that anticoagulation in afib hemodialysis patients is not mandatory. Conclusion: This is the first report on aHUS associated cardiomyopathy not on eculizumab treatment but on anticoagulation.

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The clinical case of successful treatment of heart failure due to tachycardia-induced cardiomyopathy in a patient with paroxysmal atrial flutter.

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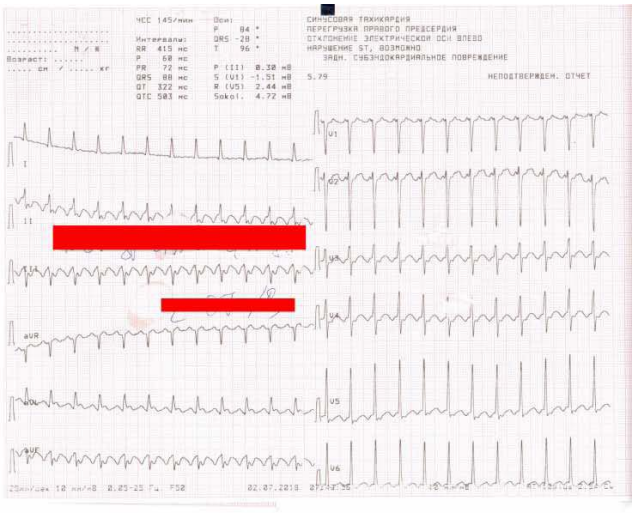
The patient, a 56-year-old Caucasian male, was admitted to the emergency room because of progressive dyspnea. He experienced shortness of breath, weakness, and recurrent palpitations for 6 months before this admission but did not seek medical help or take any medications.
Upon prior admission, the patient's condition was regarded as severe. His skin was cyanotic and cold. His legs were swollen. His RR was 35 per minute; SpO2 was 92%. His BP was 90/40 mmHg, and his HR was 78 beats per minute, the beats were correct. The abdomen was soft and increased in volume due to ascites. The liver was enlarged. No urine was in the urinary catheter.The ECG obtained upon admission revealed sinus rhythm. The CT scan revealed submassive pulmonary thromboembolism and, hydrothorax. TTE revealed dilatation of ventricles and atriums, global hypokinesia and reduced EF to 33%, and grade 2 mitral and tricuspid regurgitation. The sPAP was 56 mmHg. During ECG monitoring, the series of atrial flutter paroxysms were registered.
Laboratory tests revealed the following changes: 189 μmol/L of creatinine, 3165 U/L units of ALT, 4130 U/L units of AST, 78 μmol/L of total bilirubin 78 μmol/L, and 2.73 for the INR range.During the hospital stay, other causes of renal and hepatic dysfunction were excluded. The coronary angiograms did not show any significant stenosis. We performed active diuretic therapy and also initiated low-dose therapy of beta blockers and ACE inhibitors, which were satisfactory tolerated. We used amiodaron to stop the patient's arrhythmia, but it recurred repeatedly. The acute renal failure was resolved, allowing us to give the patient rivaroxaban as an anticoagulant agent.We suspected the tachycardia-induced cardiomyopathy due to atrial flutter to be the cause of a chronic heart failure decompensation with ischemic hepatitis and acute renal failure in a patient who had already suffered from pulmonary thromboembolism. An electrophysiology study with catheter ablation was proposed. We performed radiofrequency catheter ablation across the cavotricuspid isthmus; this resulted in the termination of the atrial flutter. The cardiac MRI after the procedure did not show any pathologic changes of the myocardium. The EF was 55% and the size of the atriums and ventricles was normal. The patient was discharged with directions to take the following medications: 200 mg daily of amiodarone, 20 mg daily of rivaroxaban, 10 mg daily of fosinopril (raised gradually), and 2.5 mg daily of bisoprolol. The diuretic therapy was gradually canceled after discharge. He has maintained sinus rhythm since the ablation. The patient has not had any signs of heart failure and is now back to his normal lifestyle.
Tachycardia-induced cardiomyopathy is a rare case of heart failure. In spite of being widely reported in literature nowadays the differential diagnosis between tachycardia-induced cardiomyopathy and other cardiomyopathies complicated with arrhythmias is challenging.



flutter paroxysm on ECG

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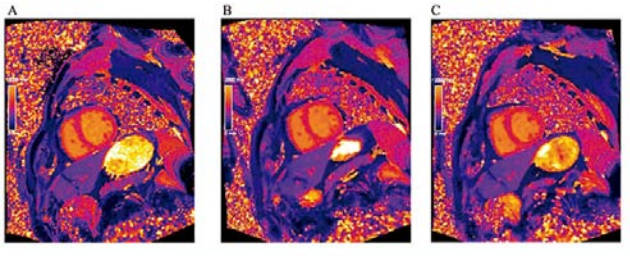
Myocardial iron repletion and changes in left ventricular function

M Soler Costa[1]; I Cardells[1]; G Minana[1]; M Amiguet[1]; J Gonzalez[1]; E Valero[1]; E Santas[1]; MP Lopez-Lereu[1]; JV Monmeneu[1]; R De La Espriella[1]; J Nunez[1]
[1]*University Hospital Clinic of Valencia, CARDIOLOGY, Valencia, Spain*

Introduction: In patients with chronic heart failure and reduced ejection fraction, iron deficiency has emerged as a common co-morbidity that affects up to 50% of these patients. It is associated with an impaired quality of life, exercise capacity and higher risk of adverse events. Importantly, treatment with intravenous ferric carboxymaltose has shown beneficial effects in patients with heart failure and reduced ejection fraction. However, the mechanisms behind these effects are not well established. Scarce evidence suggests myocardial iron repletion would improve myocardial energetic efficiency and left ventricular systolic function in heart failure and reduced ejection fraction.
Description of the case: We describe a case of a 63-year-old man with non-ischemic stable heart failure and reduced ejection fraction and iron deficiency in which cardiac magnetic resonance with evaluation of T1 mapping (as a surrogate of tissue iron) and 2D-echocardiography with global longitudinal strain were evaluated before, 7- and 30-days following administration of 1000 mg of ferric carboxymaltose. Myocardial iron repletion, ascertained by a reduction in T1-mapping cardiac magnetic resonance relaxation times at 7 and 30 days, was observed. Likewise, this change was in parallel with improvement in left ventricle ejection fraction, global longitudinal strain and surrogates of exercise capacity and quality of life.
Conclusions: This case suggests that myocardial iron repletion plays a role improving ventricular systolic function in heart failure and reduced ejection fraction. Therefore, treatment of iron deficiency might be considered a therapeutic target in patients with heart failure and reduced ejection fraction.

FIGURE 1



Images from T1 mapping cardiac magnetic resonance at A) Baseline (1082ms), B) 7 days after iron repletion (1045ms) and C) 30 days after iron repletion (1037ms). Reduction in T1 mapping values over time suggest myocardial iron repletion.

T1 mapping Cardiac Magnetic Resonance

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Pheochromocytoma as cause of heart failure with recovered ejection fraction.

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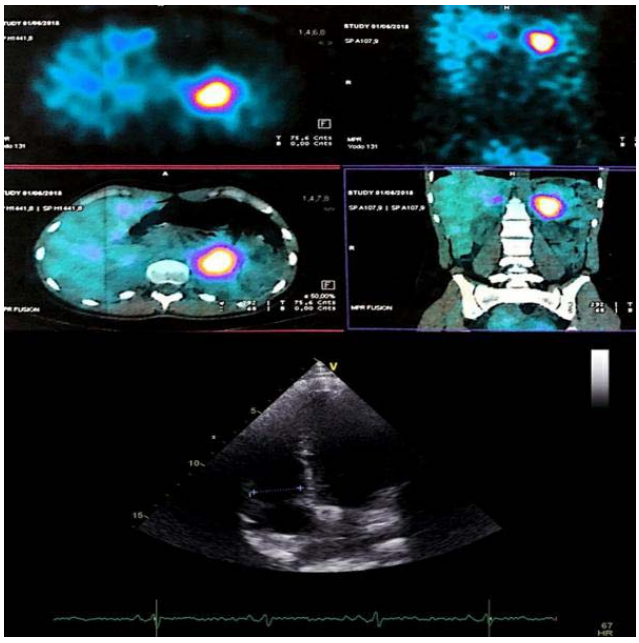
Case report: A 24-year-old woman with no significant medical history, NYHA I, consults due to the evolution of respiratory symptoms during the past six days worsening during the last 24 hours prior to consult with oppressive chest pain and palpitations. On admission, tachycardia and hypoperfusion are diagnosed and an electrocardiogram was performed showing sinus tachycardia, chest x-rays showed signs of acute pulmonary edema and a transthoracic echocardiogram reported a 20% left ventricle ejection fraction with diffuse hypokinesia, dilated left atrium, normal right atrium and a right ventricle with global hypokinesia and a 12 mm TAPSE; integral valves without pericardial effusion. The patient was admitted into the intensive care unit in cardiogenic shock while presenting cardiorespiratory arrest, which after 26 minutes of advanced resuscitation returned to spontaneous circulation. Extracorporeous membrane oxygenation (ECMO), vasopressors and inotropics were initiated, which were removed after 72 hours due to clinical improvement. A control transthoracic echocardiography was performed, in which, an ejection fraction of 44% was found, left ventricle with normal diameter, parietal thickness with concentric remodeling and myocardial contractility with diffuse hypokinesia. With the patient's clinical picture and evolution, viral myocarditis was considered as the first diagnostic option. Due to clinical improvement and recovery of echocardiographic parameters, the patient continued the treatment in an outpatient setting. Two weeks later, the patient checked into the emergency room with headache, arterial hypertension and palpitations. In this opportunity a tumor producing catecholamines was suspected, a metanephrines urine test was requested testing positive afterwards, a contrasted abdominal resonance was performed finding a lesion compatible with pheochromocytoma in the left adrenal gland. A cardiac resonance was carried out as well, in which produced no signs of acute myocarditis or its sequelae, no ischemia or infiltrative diseases. A normal valvular function was also evident, thus demonstrating that the origin of the patient's heart failure was pheochromocytoma. Patient underwent a left adrenalectomy and three months after the procedure an echocardiography was performed, reporting an ejection fraction of 60%, left ventricle of normal size and thickness with global and normal segmental myocardial contractility.
Discussion: Improved left ventricular function occurs in up to 40-50% of patients with heart failure due to acute myocarditis, peripartum cardiomyopathy, some forms of chemotherapeutic cardiac dysfunction, and tachycardia-induced cardiomyopathy. Although the presence of cardiogenic shock by pheochromocytoma, as occurred in our patient, is highly unusual with an incidence of 0.8% per 100,000 people per year in non-family pheochromocytomas. A high rate of suspicion must be at scene since it may be a reversible cause of heart failure.



Pheochromocytoma Image and Heart Failure

Moderated Poster Session - Chronic heart failure

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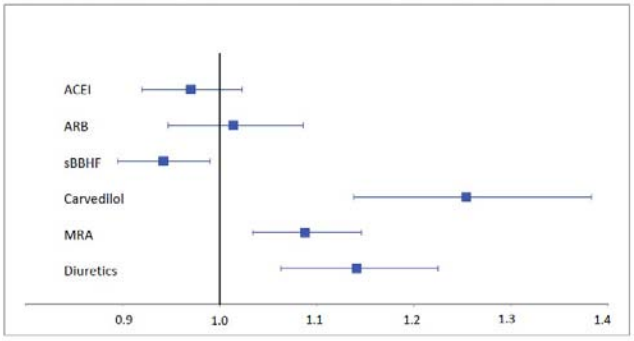
Association between heart failure medication at discharge and heart failure readmission

W J Willemien Kruik-Kolloffel[1]; J Van Der Palen[2]; CJM Doggen[2]; HJ Kruik[3]; EM Heintjes[4]; KLL Movig[5]; GCM Linssen[3]
[1]Röpcke-Zweers Hospital, Clinical Pharmacy, Hardenberg, Netherlands (The); *[2]University of Twente, Enschede, Netherlands (The)*; *[3]Hospital Group Twente, Cardiology, Hengelo, Netherlands (The)*; *[4]Pharmo Institute, Utrecht, Netherlands (The)*; *[5]Medical Spectrum Twente, Clinical Pharmacy, Enschede, Netherlands (The)*

Introduction and purpose: The aim of this large population-based cohort study is to compare hospital readmission rates of patients with heart failure (HF), prescribed core HF medications versus non-use in a real-world scenario. Angiotensin-converting-enzyme inhibitors (ACEI), angiotensin-receptor blockers (ARB), beta-blockers (BB) and mineralocorticoid-receptor antagonists (MRA) have demonstrated in randomized clinical trials in selected groups of HF patients to reduce the risk of readmission for HF. Diuretics, being indispensable for most patients with HF, are also investigated.
Methods and results: Medication at hospital discharge was determined on the basis of dispensing data from the Dutch PHARMO Database Network including 22,476 patients with a diagnosis of HF between 2001 and 2015. Median follow-up was 29.3 months. One third of all patients were readmitted for HF. Propensity scores were calculated as a proxy for comorbidities and hazard ratios were adjusted (HRadj) accordingly. ACEI and ARB were not associated with readmission. Only β1-selective BB (sBBHF; bisoprolol, metoprolol and nebivolol) decreased risk of readmission (HRadj 0.94; 95%CI 0.90-0.99). Carvedilol, a β- and partly α1-blocking agent, (HRadj 1.25; 95%CI 1.14-1.38), MRA (HRadj 1.09; 95%CI 1.03-1.15) and diuretics (HRadj 1.14; 95%CI 1.06-1.23) were associated with an increased risk of readmission.
Conclusion Based on our results, sBBHF should be preferred to the non-selective BB carvedilol, whereas they are considered equivalent in current guidelines. Further investigations are necessary to confirm our results in other real-world HF patients.

Figure 1 Forest plot for hazard ratios* associated with heart failure medication



*HR versus non-use adjusted for age, gender, number of drugs (excl particular medication), year of admission propensity score of particular medication (based on baseline covariates and co-medication)
ACEI: angiotensin-converting enzyme inhibitor
ARB: angiotensin receptor blocker
sBBHF: Selective beta1- receptor blocker with a market autorisation for heart failure
MRA: mineralocorticoid-receptor antagonist

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Association of loop diuretics use and dose with outcomes in outpatients with heart failure: a systematic review and meta-analysis involving 48,628 patients

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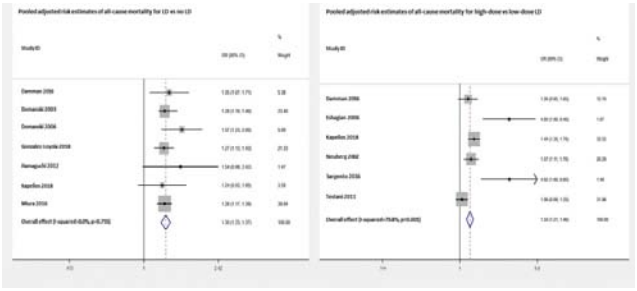
Background: There is an ongoing controversy regarding association between loop diuretics (LD) receipt, especially in high doses, and adverse clinical outcomes in outpatients with heart failure (HF).
Purpose: We performed a systematic review of the evidence for LD in outpatients with HF.
Methods: We searched MEDLINE, EMBASE, clinicaltrials.gov and Cochrane Clinical Trial Collection to identify controlled studies, evaluating the association between LD and morbidity and mortality in outpatients with HF. Two reviewers independently identified citations and extracted data. Primary end-point was all-cause mortality and secondary measure HF hospitalizations. Quantitative analysis was performed by generating forest plots and calculating effect sizes by random-effect models. Between-study heterogeneity was assessed through Q and I2 statistics.
Results: Fifteen studies with a total of 48,628 patients were included. No randomized studies were identified. Use of LD was associated with increased all-cause mortality compared with non-use (30.7% vs 16.9% [pooled adjusted risk estimates: 1.30; 95% CI: 1.23-1.37, P<0.001]) and increased rates of hospital admissions for HF (30.7% vs 10.2% [pooled adjusted risk estimates: 1.89; 95% CI: 1.65-2.16, P<0.001]). High-dose LD (median dose 80 mg) were also associated with increased all-cause mortality (39.4% vs 24.6% [pooled adjusted risk estimates: 1.33; 95% CI: 1.21-1.46, P<0.001]) compared with low-dose LD.
Conclusions: The totality of evidence indicates that LD, especially in high doses, are associated with increased all-cause mortality in outpatients with HF. Use of LD are also associated with higher rates of HF hospitalizations. For this reason, and until prospective, randomized studies clarify whether this association indicates causality or is merely an epiphenomenon, LD should be administered at the lowest, possible dose in outpatients with HF.



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Combined effects of growth hormone and testosterone replacement treatment in heart failure

A Salzano[1]; AM Marra[2]; M Arcopinto[3]; R D'assante[4]; D Pasquali[5]; G Rengo[4]; T Suzuki[1]; E Bossone[3]; A Cittadini[4]
[1]University of Leicester, Leicester, United Kingdom of Great Britain & Northern Ireland; *[2]SDN Foundation IRCCS, Naples, Italy*; *[3]Cardarelli Hospital, Naples, Italy*; *[4]Federico II University of Naples, Naples, Italy*; *[5]University of Campania Luigi Vanvitelli, Caserta, Italy*

Funding Acknowledgements: AS receives research grant support from CardioPath

Aims: Multiple hormone deficiencies (MHD) are common in heart failure (HF). Although preliminary studies have demonstrated effectiveness of single replacement

therapy for growth hormone deficiency (GHD) or testosterone deficiency (TD) in HF, no data are available regarding combined treatment with GH and T. Aim of the present study was to evaluate the effects of multiple hormonal replacement therapy in HF. Methods and results: Five stable GHD and TD patients affected with HF, after completing 1 year of GH replacement treatment, started simultaneous GH and T replacement therapies. After 1-year, a significant improvement in left ventricular ejection fraction ($p<0.01$), New York Heart Association class ($p<0.05$), and peak oxygen consumption (VO2 peak) ($p<0.01$) with a significant reduction in NT-proBNP levels ($p<0.01$) were observed. GH+T replacement therapies resulted in a further increase in VO2 peak, and in a significant improvement in muscular strength, as assessed by handgrip dynamometry ($p<0.01$) leading to an improvement of the overall clinical status. Of note, neither adverse effects nor cardiovascular events were reported.
Conclusions: Combined replacement therapy with GH and T is safe and therapeutic in HF patients with MHD. MHD syndrome can be considered as a novel and promising therapeutic target in HF.

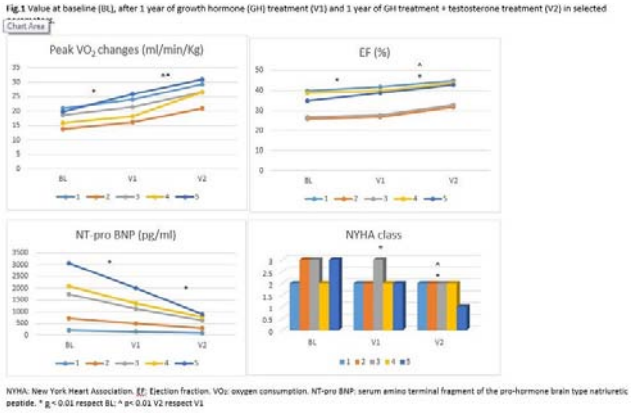

Figure 1.

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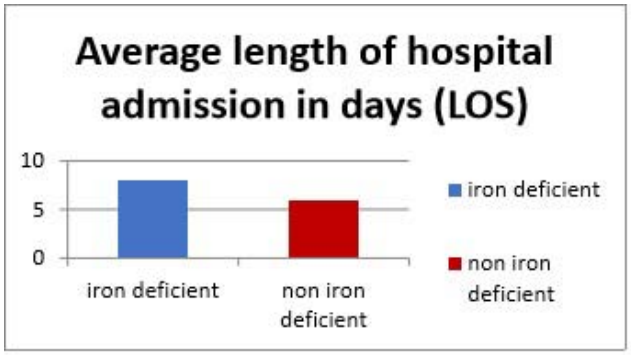
FE- IRON (First Ever Irish heart failure nurses group Review On implementation of ESC iroN guideline in Ireland)

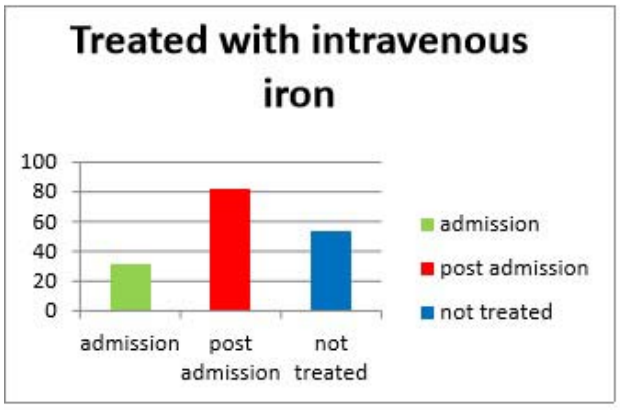
N Norma Caples[1]; L O'connor[2]; C Blaine[3]; C Mcnally[4]; R Mcclure[4]; S Murray[5]; K Mannix[6]; J Walsh[7]; C Farrell[8]; E Kavanagh[9]; C Howley[10]; M Lehane[11]; R Corrigan[12]; C Murphy[13]; M Carey[14]
[1]Waterford Regional Hospital, Waterford, Ireland; *[2]Beaumont Hospital, cardiology, Dublin, Ireland*; *[3]Connolly Hospital Blanchardstown, cardiology, Dublin, Ireland*; *[4]Cavan General Hospital, cardiology, Cavan, Ireland*; *[5]Mid-Western Regional Hospital Ennis, cardiology, Clare, Ireland*; *[6]University Hospital Limerick, Limerick, Ireland*; *[7]Nenagh General Hospital, cardiology, Nenagh, Ireland*; *[8]Letterkenny General Hospital, cardiology, Donegal, Ireland*; *[9]Mater Private Hospital, cardiology, Dublin, Ireland*; *[10]Mater Misericordiae University Hospital , cardiology, Dublin, Ireland*; *[11]Mallow General Hospital, cardiology, Cork, Ireland*; *[12]Monaghan General Hospital, cardiology, Monaghan, Ireland*; *[13]Wexford General Hospital, cardiology, Wexford, Ireland*; *[14]Tallaght University Hospital, cardiology, Dublin, Ireland*

On behalf of: Irish Heart Failure Nurses Group

Background: In Ireland seven percent of all inpatient bed days are heart failure (HF) related. Cardiomyocyte ferroportin is essential for intracellular iron homeostasis which affects cardiac function. Up to fifty percent of stable HF patients are frequently observed to be iron deficient (ID). Iron replacement improves HF outcomes. According to the current ESC guidelines the administration of intravenous iron for HFrEF patients is currently a class IIa level A recommendation. This first national collaborative clinical audit was undertaken to examine the extent to which this ESC guideline has been implemented for heart failure patients.
Purpose
1. Identify patients enrolled in a specialised heart failure clinic (HFC) who were ID.
2. Identify if iron deficiency screening occurred as an inpatient or in the HFC.
3. Assess if patients received iron replacement as per ESC guidelines.
4. Assess if average length of stay (LOS) in hospital differed between the groups reviewed.
Methods: Retrospective audit and cohort analysis was conducted by HF nurses at eleven hospital centres across Ireland. A total of 474 patient-level data was extracted from both electronic and written health records. Intravenous iron replacement to patients was identified as per ESC guidelines. Standard Bayesian statistics were employed to assess for associations within this cohort.
Results: 168 patients admitted with HF and had ID: 61(36.3%) were screened while an inpatient , 104 (61.9%) in HFC, 2 (1.2%) levels unknown, 1(0.6%) died. In this subgroup;31 (18.5%) were treated with intravenous iron while inpatient, 82 (48.8%) were treated in HFC, 53 (31.5%) not treated.
Conclusion: The prevalence of ID in heart failure patients included in this audit was 54 %. The group who had ID had a longer LOS compared to those who did not. The total number of inpatients screened for ID was 27%, of this group, 49% were not treated as per ESC guidelines. Heart Failures nurses play a significant role in the implementation of ESC guidelines for optimisation of treatment for patients with heart failure, as the majority of screening (61.9%) took place post discharge in the HFC. Further studies are needed to explore the barriers to screening for ID in heart failure inpatients/HFC and ways to improve implementation of this ESC guideline.

Results			
Total	ID	Non ID	P VALUE
N=474	255	197	
LOS	8.1 DAYS	5.9 DAYS	0.0215 T-Test





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Effect of ferric carboxymaltose on LVEF as assessed by cardiac MRI in patients with chronic heart failure and iron deficiency: a randomized, double-blinded, placebo-controlled, dual-center trial

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On behalf of: iCHF study group
Funding Acknowledgements: Investigator initiated trial -funded in part by means of Vifor Pharma

Background: Iron deficiency is a common comorbidity in patients with heart failure (HF) and is associated with poor outcomes. Intravenous (i.v.) ferric carboxymaltose (FCM) has been shown to improve symptoms, quality of life and functional capacity.

Purpose
Whether correction of iron deficiency with intravenous ferric carboxymaltose affects the left-ventricular ejection fraction (LVEF) has not been examined to date using an objective and prognosis-relevant measure in HF.
Methods: We studied patients with systolic HF (LVEF ≤ 45%) and mild to moderate symptoms (NYHA 2 and NYHA 3) despite optimal HF medication. Patients were randomized 1:1 to treatment with FCM or placebo (saline). Treatment covered correction of iron deficiency during first 4 weeks. The primary endpoint, change in LVEF measured using cardiac MRI from baseline to 12 weeks, was assessed by an independent external core-lab. Secondary endpoints included further MRI-based parameters like stroke volume, six minute walking test (6MWT), renal function, cardiac biomarkers, quality of life, and safety.
Results: Due to poor recruitment of the study after departure of the principal investigator, only 18 subjects were randomized. Of the 18 subjects, 10 were randomized to FCM, and 8 to saline. At month 3 there was an increase of 2.1% in the LVEF within the FCM group, in contrast to a decrease of 3.5% in the saline group (mean difference between groups: 5.5% ± 3.8%; p = 0.009) during the same period. Moreover, systolic stroke volume increased by 6.0 mL in the verum group, while it decreased by 11.1 mL in the placebo group from baseline to end of study (mean difference between groups: 17.1 mL ± 13.5 mL; p = 0.008). Similarly, there was an increase of 55.0 meters (m) in the 6MWT in the i.v. iron group, while the placebo group experienced a mean decrease of 27.1 m during follow-up, although the difference did not meet statistical significance (mean difference between groups: 82.1 m ± 104.3 m; p = 0.121). Regarding safety, 1 out of 10 patients in the verum (FCM) group, and 2 out of 8 patients in the control group experienced a serious adverse event (SAE). In addition, 5 out of 10 patients in the verum group, and 5 out of 8 patients in the control group experienced an adverse event (AE). All events were judged as "not related" to application of verum/ placebo.
Conclusion: Correction of existing iron deficiency with intravenous FCM in patients with HF improves systolic heart function and further remodeling parameters as assessed by cardiac MRI. Current cardiovascular guidelines recommend screening of iron status in all newly diagnosed patients with systolic HF and consideration to administer FCM in symptomatic patients with iron deficiency. By using the gold standard cardiac MRI, our study clearly documents that even one-time correction of iron efficiency using FCM not only improves symptomatic endpoints and functional capacity, but also heart function itself.

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Sacubitril/valsartan reduces ventricular arrhythmias in parallel with left ventricular reverse remodeling in HFrEF.

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Background: Sacubitril/valsartan reduced the occurrence of sudden cardiac death in the PARADIGM-HF trial. However, no information is available about the mechanism.

Methods: Heart failure (HF)-patients receiving sacubitril/valsartan for a class-I indication equipped with an implantable cardioverter defibrillator (ICD) or cardiac resynchronization therapy (CRT) with remote tele-monitoring were retrospectively analyzed. Device registered arrhythmic-events were determined (ventricular tachycardia/fibrillation[VT/VF], appropriate therapy, non-sustained VT [NsVT;>4beats and <30seconds], hourly premature-ventricular-contraction [PVC]-burden), following sacubitril/valsartan initiation (incident-analysis) and over an equal time-period before initiation (antecedent-analysis). Reverse remodeling to sacubitril/valsartan was defined as an improvement of left ventricular ejection fraction (LVEF) of ≥5% between baseline and follow-up.
Results: A-total of 151 HF-patients with reduced LVEF (29±9%) were included. Patients were switched from ACE-I or ARB to equal doses of sacubitril/valsartan (expressed as %-target-dose; before=58±30% vs. after=56±27%). The mean follow-up of both the incident and antecedent-analysis was 364-days. Following the initiation, VT/VF-burden dropped (individual-patients with VT/VF pre_n=19 vs. post_n=10, total-episodes of VT/VF pre_n=51 vs. post_n=14, both p<0.001), resulting in reduced occurrence of appropriate therapy (pre_n=16 vs. post_n=6; p<0.001). NSVT-burden per patient also dropped (See table). There was no impact on atrial-fibrillation burden (see table). PVC-burden dropped significantly, which was associated with an improvement in BiV-pacing in patients with <90% BiV-pacing at baseline. A higher degree of reverse remodeling was associated with a lower burden of NsVT and PVCs (both p<0.05). Following initiation of sacubitril/valsartan 44% of patients exhibited beneficial reverse remodeling.
Conclusion: Initiation of sacubitril/valsartan for a class-I recommendation, is associated with a lower degree of VT/VF, resulting in less ICD-interventions. This beneficial effect on ventricular arrhythmias might be related to cardiac reverse remodeling.

Parameter	Before initiation(N=151)	After initiation(N=151)	P-value
Ventricular arrhythmiasNumber of patients ≥1 VT/VF episodeTotal amount of VT/VF-episodesNumber of patients with ≥1 appropriate therapyTotal amount of appropriate therapy-episodesNumber of patients with ≥1 inappropriate therapyTotal amount of inappropriate therapy-episodesNsVT (mean episodes/patient)Mean NsVT-duration (seconds)Mean PVCs per hour	19 5116 20337.7±11.8 6.3±5.214 (4-22)	1014 6622 3.7±5.4 5.3±3.82 (0-4)	<0.001 <0.001 0.007 0.007 0.319 0.319 <0.001 0.041 <0.001
Atrial arrhythmiasMedian percent of time per day in AFPatients with ≥1 paroxysmal AT/AF-episode > 30s	9 (5-14) 48	9(5-14)33	0.332 0.159
Pacing parameters% of Atrial pacing% of Biventricular pacingBiV-pacing < 90%	7 (1-14) 96±45 (4.7%)	7 (1-14) 99±11 (0.9%)	0.578 <0.001 0.045

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Security of vacubitril-valsartan in Naive patients. Subanalysis of SAVE-RLife study

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On behalf of: SAVE-RLife Group

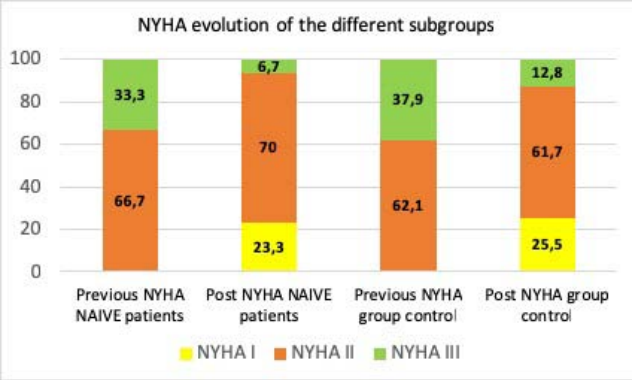
Background: In the PIONEER-HF and TRANSITION-HF studies, sacubitril-valsartan (SV) was used in naive hospitalized patients (52.7%) without increasing side effects. However, few data are known about the use of SV in naive patients in real life.
Objective: To analyze the safety of starting SV in patients with optimal medical treatment compared to naive patients.

Methods: A subanalysis of the SAVE-RLife (SAcubitril-Valsartan Evidence in Real Life) study was performed. This is an observational, ambispective study that included all patients with stable HFrEF who started SV between SEP2016 and DEC2018. The safety results of the naives patients were compared with the patients with ACE or ARB treatment prior to the start of SV.
Results: 31 out to 276 patients were naives (11.2%), with a follow-up of 204 (48;320) days and an average age of 66.9±9.4 years. The baseline characteristics are shown

Baseline Characteristic & Adverse events

	ACE/ARB baseline N = 245 (88.8%)	Naive Patients N = 31 (11.2%)	P value
HBP n (%) / DM n (%)	180 (73.5%) / 121 (49.4%)	21 (67.7%) / 14 (45.2%)	0.499 / 0.657
Dyslipidemia n (%) AF n (%)	138 (56.3%) / 90 (36.9%)	19 (61.3%) / 9 (29%)	0.599 / 0.391
SBP pre/post (mmHg)	128.8±20.4 / 119.7±20.5	119.5±20.9 / 110.1±17.7	0.233 / 0.027
GFR pre/post (mmHg)	69.66±27.2 / 63.29±19.5	68.96±24.1 / 68.06±19.5	0.681 / 0.554
Potassium pre/post (mEq/L)	4.55±0.44 / 4.77±0.52	4.71±0.78 / 4.66±0.63	0.968 / 0.578
Δ N-BNP (pg/mL)	-1332	-2110	0.702
Acute Kidney failure n(%)	42 (17.2%)	3 (9.7%)	0.285
Symptomatic hypotension	23 (9.4%)	1 (3.2%)	0.249
Asympt. hypotension n(%)	23(9.4%)	4(12.9%)	0.540
Hiperkalemia n(%)	38 (15.6%)	4 (12.9%)	0.697

in Table 1. There is no significant worsening of renal function in both subgroups and a similar trend to a greater reduction in N-BNP levels. Naive patients had less visits to the emergency room compared to the control group (p=0.009) at follow up. There were no differences in the side effects between the control group and the naive group, 3 patients (9,7%) suffered an acute renal failure, 4 (12,9%) episodes of asymptomatic hypotension and 4 (12,9%) hyperkalemia. There were no major adverse effect, including angioedema in the naive group, and none of the naive patients died during the follow-up. Evolution of NYHA class is shown in Figure 1.
Conclusions: Despite the limitations of our SV naive sample, it seems to be a safe and effective drug in naives patients, without increasing side effects and with the same efficacy in our population, in concordance with the results of recent clinical trials.



NYHA evolution of naive vs control group

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In-hospital initiation of sacubitril/valsartan in stabilized patients with heart failure and reduced ejection fraction naive to renin-angiotensin system blocker: An analysis of the TRANSITION study

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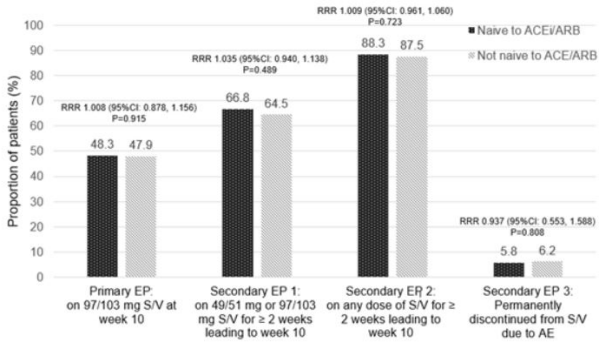
On behalf of: TRANSITION study Investigators
Funding Acknowledgements: Novartis Pharma AG

Background: In-hospital initiation of sacubitril/valsartan (S/V) in patients with reduced ejection fraction (HFrEF), after an acute episode (ADHF), was associated with superior than enalapril reduction in NT-proBNP in PIONEER-HF study, that was not different in patients naïve to angiotensin converting-enzyme inhibitor (ACEI) or angiotensin receptor blocker (ARB).
Methods: TRANSITION (NCT02661217) randomized 1002 patients with HFrEF, admitted for ADHF. After stabilization, patients were randomized to start open-label S/V either pre-discharge or during days 1–14 post-discharge, stratified by ACEI/ARB use status. Primary endpoint was the proportion of patients achieving the target dose of 97/103 mg S/V bid at 10 weeks. Endpoints, adverse events (AE), study treatment discontinuations were compared by ACEI/ARB status in the combined pre- and post-discharge arms.
Results: 326 patients (32.9%) were ACEI/ARB naïve and 665 (67.1%) were not. At baseline, ACEI/ARB naïve patients had lower systolic blood pressure, serum creatinine, and fewer comorbidities but had higher heart rate and more often non-ischemic HF etiology. Similar proportions of ACEI/ARB naïve patients achieved the target dose of S/V compared to subjects with prior ACEI/ARB use (48.3% vs. 47.9%, RRR 1.008, 95% CI 0.878, 1.156) and 88% of subjects in both groups were maintained on any S/V dose at week 10. The rate of permanent discontinuation of S/V due to AEs was low and comparable. (Figure 1). Overall incidence of AEs and SAEs were similar in both groups. Hyperkalemia as an AE occurred in fewer naïve patients (Table 1).
Conclusion: In hospitalized patients with HFrEF who are naïve to ACEI or ARB, S/V can be safely initiated pre-discharge or shortly after discharge, and up-titration is well tolerated.

Table 1

Event	Naive to ACEI/ARB (N=326) n (%)	Not naive to ACEI/ARB (N=665) n (%)	P-value
At least one AE	210 (64.4)	446 (67.1)	0.432
Selected AEs of interest			
Hyperkalemia	20 (7.1)	86 (12.9)	0.005
Hypotension	29 (8.9)	79 (11.9)	0.193
Cardiac failure	17 (5.2)	54 (8.1)	0.115
Renal failure	6 (1.8)	13 (2.0)	1.000
Blood creatinine increased	6 (1.8)	23 (3.5)	0.228
Renal impairment	8 (2.5)	32 (4.8)	0.086
At least one serious AE	47 (14.4)	116 (17.4)	0.237
Temporary treatment interruption due to AE	32 (9.8)	77 (11.8)	0.450

AE, adverse events



EP, endpoint; S/V, sacubitril/valsartan

Figure 1

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Empaglifozin in real-world chronic heart failure

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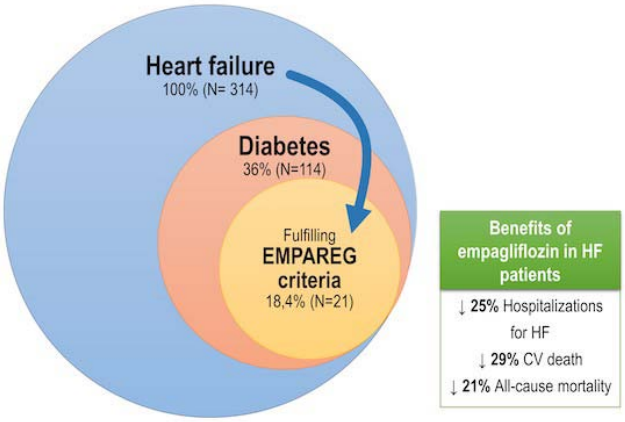
Introduction: Heart Failure (HF) is a burdensome syndrome with significant mortality, morbidity and costs. Its prognosis is further aggravated by diabetes mellitus (DM). The EMPA-REG OUTCOME trial suggested that empagliflozin significantly reduced HF hospitalizations compared to placebo in patients with DM.
Purpose: We aimed to investigate which patients with chronic HF and DM in an outpatient setting could have been enrolled in the EMPA-REG OUTCOME trial.
Methods: This analysis is based on a retrospective cohort enrolling consecutive chronic HF patients who attended the HF appointment between January and July 2018. Of these, those with concomitant DM were selected and further analysed. The key EMPA-REG OUTCOME trial inclusion criteria [(i.e., hemoglobin A1c 7-10%, high cardiovascular (CV) risk and glomerular filtration rate [GFR] ≥30mL/min/1,73m2) were considered. Further, the European Medicine Agency (EMA) restriction (GFR>60mL/min/1,73m2) was also considered in an additional analysis.
Results: Of 316 patients with HF, 114 (36%) concomitantly had DM. Mean age was 74 ± 10 years, 63% were male and most (54%) had HF with preserved left ventricular ejection fraction. Ischemic (51%) and hypertensive (27%) HF were the most often observed etiologies. According to the inclusion criteria, 21 (18.4%) (or 5.3% when further considering the EMA restriction) HF patients could have been potentially enrolled in the main trial and derive a HF hospitalization reduction benefit from starting empagliflozin. The remainder would be excluded due to GFR<30mL/min/1.73m2 (2.6%), absence of "high CV risk" as per trial's definition (7%), HbA1c off target (18,4%) or a combination of the above criteria (53.6%).

Conclusions: Roughly 1 in every 5 patients with HF and DM could have been enrolled in the main empagliflozin trial, as per key inclusion criteria, and potentially derive CV benefit from it. Thus, only a minority of our cohort shared the features for EMPA-REG OUTCOME trial inclusion, limiting the extrapolation of the trial's observed CV benefits to our HF cohort. Indeed, whether these benefits also expand to overall HF cohort is eagerly awaited by ongoing trials.



HF and DM enrolled in EMPA-REG trial

Nursing Investigator Award

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Development and feasibility testing of an avatar-based education application for improving heart failure patients' knowledge and self-care behaviours

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Funding Acknowledgements: A Heart Foundation Future Leader Fellowship, Establishment Grant, a Tom Simpson Trust Fund, and the Faculty of Nursing, Khon Kaen University, Thailand

Background: Self-care is an essential part of heart failure (HF) management. Interactive patient education using technology has the potential to improve self-care particularly in people with low literacy.
Purpose: Develop and evaluate an interactive avatar-based application for improving HF knowledge and self-care.
Methods: Participatory action research and feasibility testing using pre-post methods.
Results: An avatar-based application was developed by 6 HF patients, 2 HF family members, and 15 cardiovascular and information technology experts through two cycles of development and critical reflection. Based on feedback, the application was updated to improve user experience including avatar characteristics, illustration, concepts and random quizzes.
Feasibility testing was conducted on 11 HF participants to assess improvements in HF knowledge (Dutch HF Knowledge Scale), self-care behaviours (The Self-Care of HF Index), and satisfaction. Mean age was 67.7 $\pm$ 13.9 years, 72.7% male. After using the app there was a significant improvement in HF knowledge (11.6 $\pm$ 2.2 to 12.6 $\pm$ 2.2, p = 0.004), self-care maintenance (30.3 $\pm$ 3.1 to 34.2 $\pm$ 5.2, p = 0.045) and self-care confidence (19.1 $\pm$ 2.7 to 23.3 $\pm$ 1.3, p < 0.0005). Self-care management did not significantly improve (14.3 $\pm$ 5.2 to 15.7 $\pm$ 6.7, p = 0.245). Overall satisfaction with the revised avatar application was high at 88.2%.
Conclusion: The final version of the app had improved navigation, was shorter in time to completion in order to enhance technology confidence and enjoyment. The avatar-based technology demonstrated positive improvements in enhancing HF knowledge and self-care behaviours.

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Unexpected loss in advanced heart failure

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Funding Acknowledgements: NIH/NINR R01 NR013419

Background: Over 6 million Americans have been diagnosed with heart failure (HF) with half of newly diagnosed predicted to die within 5 years. HF has an unpredictable trajectory and death is often unexpected. Palliative care has been recommended to meet the needs of persons living with advanced HF and their family members. Palliative care services/consultations often do not occur or occur too late to benefit the person living with HF and their family caregiver.
Purpose: To investigate how caregivers' perceptions and understanding of the terminality
of advanced HF impacted their expectations of death and subsequent bereavement.
Methods: Descriptive qualitative study of bereavement interviews of family caregivers (n=39) of persons with advanced HF. The caregivers were individually interviewed after the death of their family member living with advanced HF. Interviews were analyzed to determine whether caregivers perceived the patient's death as expected, expected but not at the time of death, or unexpected. Interviews were analyzed using qualitative content analysis. A review of the electronic medical record was conducted to determine palliative care service utilization.
Results: Thirty-nine family caregivers were interviewed. Of the 39 caregivers who participated in this study, 90% (35/39) of the caregivers were female with a mean age of 65 years of age. The majority of the caregivers (64%; 25/39) were the spouse of the person living with advanced HF. The majority (61%; 24/39) of caregivers were completely surprised or did not expect the patient's death. Few caregivers (15/39) acknowledged the patients' decline and subsequent death. Twenty-six percent of the caregivers (10/39) described difficulty coping in the bereavement period. Palliative care consultations or services were not initiated in the majority (65%) of the patients whose death was perceived as unexpected by the caregiver. The majority of the palliative care consults were received during the terminal admission within a few days or hours prior to death. Some exemplar quotes from the caregivers who participated in the study:
"I never thought when he went to the hospital with a bloody nose that would be the time that
he wouldn't come home."
"The grief nurse came in prior to him dying to make sure we were in agreement with everything,
but then it all hit me, I said, are you telling me he is dying?'"
Conclusions and Implications: Most caregivers were surprised by the patient's death despite the advanced HF diagnosis. The lack of palliative care services in the advanced HF illness trajectory may contribute to the poor perceptions by family caregivers of the seriousness of HF. Caregivers may experience complicated bereavement due to a lack of anticipatory grieving. Palliative care consultation and end-of-life discussions may help caregivers perceive disease terminality. Healthcare providers need to initiate more end-of-life conversations and timely palliative care consultations.

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Motivations and barriers towards physical activities in heart failure patients with focus on age differences

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Background: Physical activity is important for all heart failure (HF) patients in order to improve prognosis. Since adherence is low, it is essential to explore motivations and barriers of patients. Since elderly persons in general are less active, it is important to explore if there are differences in motivations and barriers related to age.
Purpose: To examine motivations and barriers to physical activity in HF patients with special focus on differences between patients older and younger than 65 years.
Methods: A cross-sectional study, including baseline data of HF patients participating in the HF-Wii trial. Motivations were measured with the Exercise Motivation Index, including 15 motivations with answers ranging from 0 (not important) to 4 (extremely important), with 3 subscales (physical, psychological and social motivations). Self-efficacy was measured with the Exercise Self-Efficacy Scale, including 6 possible barriers, with answers ranging from 1 (not confident to overcome the barrier) to 10 (very confident to overcome the barrier).
Results: In total 605 HF patients participated (mean age 67$\pm$12; 60% NYHA I/II; 71% men). Mean motivation per item was 2.3$\pm$0.9 and physical and psychological motivations were rated as the most important (2.7$\pm$0.9 and 2.5$\pm$0.9). The most important physical motivation was 'I want to be healthier and perhaps live longer' (80% rated important/very important) and most important psychological motivation was 'exercise increases my overall sense of wellbeing' (63% rated important/very important). Although social motivations were seen as the least important (mean 1.6$\pm$1.1), 39% of the patients found it important 'to be as active as their family and friends'. Most difficult barrier to overcome was 'physical fatigue' (64% rated little/no confidence to overcome), with a mean confidence to overcome barriers of 5.0$\pm$2.0. Elderly HF patients (65 years, n=393) were more motivated to be physically active than patients younger than 65 years (n=212; 2.4$\pm$0.9 vs. 2.1$\pm$0.9, p-value<0.01), with a higher social (1.9$\pm$1.1 vs 1.5$\pm$1.1) and psychological motivation (2.6$\pm$0.9 vs 2.4$\pm$0.9 p-value=0.03). The largest difference was found in the item 'I want to belong to groups with people in good shape' (with 43% of the elderly rated as important/very important vs. 26% of younger patients, p-value<0.01) and the psychological item 'I feel I have more control over my life when I exercise' (with 58% of the elderly rated as important/very important compared to 47% of younger patients, p-value<0.01).

Conclusions: Since younger and elderly patients experience different motivations towards physical activity, physical activity programs may need to use different strategies in elderly and younger patients and focus on the individual motivation. Physical activity programs should include tools to increase patients' self-efficacy, in able to be confident to exercise when barriers occur.

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The effect of multiple interventions by a specialist nurse on the heart failure patients knowledge in self-care management

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Funding Acknowledgements: Cyprus University of Technology's state funded budget [Startup Fund EX2007 (04)]

Background: In order to improve knowledge and self-care management of heart failure (HF) patients, different disease management programs have been developed at the discharged and follow-up phase.
Purpose: To determine the effectiveness of a three-month telephone follow-up, a telephone follow-up with education before discharge, or education only before discharge, on the development of knowledge and the improvement of self-care in patients with HF by a nurse specialist.
Method: This is a multicenter randomized clinical trial with three different intervention groups (IGs) and one control group (CG). The first intervention group included patients' education (E) before discharged from the hospital and a telephone follow-up (T) for three months. The second intervention group included only the telephone follow-up after discharge for three months (T) and the third intervention included only a patient's education before discharge (E). The Greek versions of the Dutch Heart Failure Scale (Gr- DHFS) and the European Heart Failure Self-Care Behavior Scale (Gr9-EHFScBS) were used. The statistical analysis of the impact of the intervention was done using the analysis of covariance (ANCOVA). The magnitude of the effect of the intervention was studied by the Cohen's d(rm) coefficient for repeated measurements
Results: The study included 334 patients. The complete case analysis (N=239) demonstrated that the study group differentiates the level of Knowledge and Self-Care behavior in the post-intervention measurement ($F = 3.06$, $p = 0.029$; $F = 5.38$, $p<0.001$) while adjusting for the pre-intervention measurements. The adjusted mean level of Knowledge in the control group was found: 8.6 (SE=0.3) while the IGs were found to be improved (Higher Average Score) [E: 9.6 (0.3), E and T: 9.8 (0.3), T: 9.5 (0.3)]. The adjusted mean level of Total Gr9-EHFScBS in the CG was found: 27.3 (SE=0.7) while the IGs were found to be improved (Lower Average Score) [E: 246(0.8), E and T: 23.3(0.8), T: 24.6(0.8)]. Total Gr9-EHFScBS score was found to have a low negative correlation with Knowledge (r = -0.30). Knowledge had a moderate correlation with Fluid and sodium Management (r = -0.341) and a low correlation with Adhering to Recommendations (r = -0.235), and with Physical activity and recognition of deteriorating symptoms (r = -0.198). A separate ANCOVA showed that the three intervention groups do not significantly differentiate the patients' total Gr9-EHFScBS or Knowledge scores. However, with respect to the Fluid and sodium Management dimension, E&T (drm = 0.73) and T (drm = 0.75) IGs exhibit significantly higher adherence compared to the CG (drm = 0.53) and the E (drm = 0.55) intervention group.
Conclusion: Telephone has been found to be very important on the controlled intake of fluid and sodium. Continuing follow-up even via telephone seems to be very important for the management one of the most common reasons of HF decompensation which is not adherence to fluid/salt intake.

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Diuretic adjustment algorithm and nonpharmacologic management in patients with heart failure reduce readmission: a randomized clinical trial

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Funding Acknowledgements: Fundo de Incentivo à Pesquisa do Hospital de Clinicas de Porto Alegre

Background: Approaches such as self-monitoring and the use of telemonitoring technologies are strategies that have been effective in reducing clinical outcomes in patients with heart failure by identifying early signs and symptoms of decompensation in North American and European countries. The use of validated diuretic adjustment protocols is poorly explored in developing countries. Aiming to fill this gap this study proposed to test a diuretic adjustment protocol combined with non-pharmacological management.
Purpose: To compare the effectiveness of a Diuretic Adjustment Algorithm (DAA) on clinical outcomes (reduction of hospital admissions and maintenance of clinical stability) within 90 days. Methods: Randomized Clinical Trial. Patients with indication for furosemide adjustment during routine outpatient visits were randomized. The intervention group (IG) had the diuretic dose adjusted with the DDA and received four phone calls (one per week) for 30 days to reinforce the guidance on non-pharmacological management. Participants in the control group (CG) had the diuretic dose adjusted by a physician at the time of study inclusion and they did not receive the phone calls. Patients from both groups returned for clinical evaluation in one month. Primary outcomes (admissions for HF and all causes) and the combined outcome (admissions and modification in the Clinical Congestion Score - ECC in two points) were analyzed.
Results: A total of 206 patients, mean age 62 ± 13 years, predominantly male 119 (58) and white 174 (84) were included. The hospital admission rate at 90 days for HF was 5% in IG and 14% in CG, Odds Ratio (OR) = 0.36, p = 0.03. For the combined outcome, IG had 19 (9.2) events and CG 23 (11.2), OR = 0.89, p = 0.73. When the Kaplan-Meier survival curve was evaluated for the occurrence of HF admission, the longrank value was 5.26, p = 0.02. That is, CG patients presented 3x the number of hospitalizations of IG patients. Conclusion: The use of DDA added to non-pharmacological guidelines reduced admissions by HF. In the evaluation of the combined outcome, there was no difference. The result was favorable and significant for the use of DDA, reducing admissions for HF in outpatients.

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Validation of the ELAN HF model and selfcare behaviour in patients with acute decompensated heartfailure. A single centre cohort study in the Netherlands.

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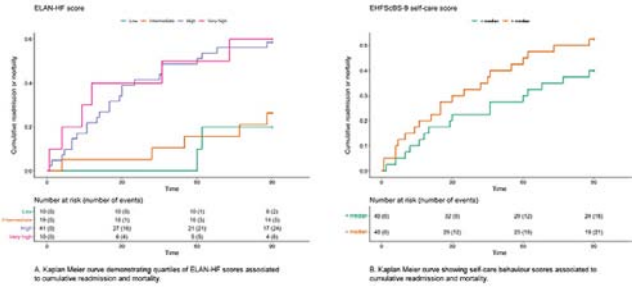
On behalf of: SMASH study group

Introduction The European collaboration on acute decompensated heart failure (ELAN-HF) score is a validated prognostic model used at discharge for patients admitted for acute decompensated heart failure (ADHF). It predicts readmission and mortality at 6 months can therefore be used for risk stratification on a nurse-based heart failure out-patient clinic. Previous studies demonstrated that improving self-care may lead to fewer readmissions for HF.
Purpose: To validate the predictive value of the ELAN-HF score on readmission and/or mortality, and to assess the effect of self-care behaviour on readmission and mortality inpatients after admission with ADHF in our hospital.
Methods: In a prospective, single centre cohort study, 88 patients (all-comers) hospitalized for ADHF were included. N-terminal pro–B-type natriuretic peptide (NT-proBNP) levelswere measured directly at admission as well as at discharge, and were used along with other clinical and laboratory parameters to calculate the ELAN-HF Score. Patients were divided in four groups (low, intermediate, high, very high) according tot their risk score. The scaling response of the European Heart Failure Self-care Behaviour Scale (EHFScBS-9) was analysed (a score of > 0.5 is regarded as optimal). Cox regression analysis was used to demonstrate the



KM

association between both scores and re-admission for heart failure and all-cause mortality within 90 days, in order to validate and assess their respective prognostic predictive values within the study population.Kaplan-Meier survival analysis was used to assess survival among the risk groups.

Results: The median age of the study population was 75 years (IQR 69-83), 43% woman. NYHA III/IV functional class was present at discharge in 68 patients (85%). A left ventricular ejection fraction below 40% was present in 27 patients (34%). Complete data and follow up was available in 80 patients, and the endpoint of mortality and rehospitalisation was reached in 46 % of patients. The median NT-pro BNP level at discharge was 3505 pg./ml. (IQR 1912 - 7861). There was a significant association between the ELAN-HF score and re-admission and/or mortality <90 days (HR = 1.25, 95% CI 1.08 - 1.45,P = 0.003). The median EHFScBS-9 score was 68.1(IQR 58.3 - 77.8) with 19% patients having a low value of < 50. There was a non-significant association between the EHFScBS-9 score and re-admission and/or mortality <90 days (HR = 1.02,95% CI 1.00 - 1.04, P = 0.111).

Conclusions: This study reinforces the potential of the ELAN-HF score to triage patients with ADHF after discharge, possibly adding in optimizing the nurse-based follow-up treatment in order to prevent readmission or death. Self-care behaviour was non-significantly associated with readmission and/or mortality in our study population.

Young Investigator Award - Basic Science and Translational Science

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GRK2 regulates the endothelial responsiveness to bradykinin: role in human angioedema

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Background: Bradykinin (BK) regulates vascular homeostasis through the endothelial Gq protein coupled receptors (B1-B2), using Ca2+ as second messenger. Several kinases are involved in the regulation of BK signaling, such as CamKII; also GRK2 could be involved as it is able to phosphorylate BK receptors but with unknown biological effects. Purpose: to verify the role of GRK2 in regulation of BK signaling in physiological and pathological conditions. Methods: We used Bovine Aortic Endothelial cells (BAEC) for in vitro study where we determined GRK2 modulation by western blot and ubiquitination test, Ca2+ release and Nitric Oxide (NO) production using probes based techniques, and cell permeability through a vascular permeability assay. In mice with endothelial GRK2 Knock out (Tie2-CRE/GRK2fl+/fl-) we performed a Miles assay to test vascular permeability. In PBMCs from patients with ACE-inhibitor-related Angioedema (ACEi-A) and C1- deficit related Angioedema (C1-inh-HA) we evaluated GRK2 levels by western blot analysis. Results: At 5min, BAEC stimulation with BK(100nM) induced an increase of GRK2, which reverberates in all cellular compartments returning to baseline levels at 15min. BK induced-GRK2 accumulation is proteasome dependent, since GRK2 ubiquitination was significantly reduced post BK stimulation and the interaction between GRK2 and E3 ligase mdm2, decreased. We hypothesized that CamKII activated upon BK stimulation, can regulate GRK2 accumulation. Indeed, GRK2 and CamKII interaction increased in response to BK and the accumulation of GRK2 does not occur after CamKII inhibition (C17) supporting the involvement of the Kinase in GRK2 recruitment. Ca2+cytosolic accumulation induced by BK was sensitive to GRK2 activity, as it was enhanced by inhibition of the kinase with KRXC7. Accordingly, permeabilization and NO induced vasodilation, typically endothelial responses to BK, were enhanced when GRK2 was inhibited. To test in vivo the involvement of GRK2 in the regulation of BK-dependent endothelial responses we evaluated BK-induced vascular permeability in Tie2-CRE/GRK2fl+/fl- mice. Interestingly, these mice showed an increased vascular permeability already in basal condition and an increased response to BK respect to wt mice. Since GRK2 regulates the sensitivity of endothelium to BK, we speculated that GRK2 could have a role in BK- mediated Human Angioedema. We evaluated GRK2 levels in ACEi-A and C1inh-HA patients. Interestingly, we evidenced that in both populations, patients with reduced GRK2 levels showed a more severe phenotype of Angioedema.
Conclusions: Through CamKII, BK is able to activate GRK2 which in turn inhibits BK signalling; indeed, in vitro end in vivo results evidenced GRK2 as endogenous inhibitor of BK signalling. Consistently, patients with severe Angioedema have reduced levels of GRK2, suggesting that GRK2 can contribute to BK-dependent pathological response of endothelium during Angioedema

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Empaglifozin has cardioprotective and anti-inflammatory effects in mice during doxorubicin treatment

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Funding Acknowledgements: This work was funded by the "Ricerca Corrente" grant from the Italian Ministry of Health.

Background: Empagliflozin (EMPA), a selective inhibitor of the sodium glucose co-transporter 2 (SGLT2), reduces the risk of hospitalization for heart failure or cardiovascular death in type 2 diabetic patients.

Purpose: We hypothesize that EMPA could have cardioprotective and anti-inflammatory effects in Doxorubicin-Induced cardiotoxicity.
Methods: For this purpose, we tested the effects of EMPA (at 100 or 500 nM) alone or in combination with DOXO (20 μM) in HL-1 adult cardiomyocytes evaluating: mitochondrial viability (at 24h of incubation), lipid peroxidation (quantifying cellular Malondialdehyde [MDA] and 4-hydroxynonenal [4-HNA]), Leukotriene-B4 expression, p65-NF-κB activation and Interleukin 1β, 8 and 6 secretion. To evaluate cardiac function in vivo, Global Longitudinal Strain (GLS) were measured using 2D speckle tracking echocardiography in C57BL6 mice, 24 months old , pretreated with EMPA (dose: 10 mg/kg/day) orally for 3 days. EMPA was then administered for additional 7 days, alone and in combination with DOXO (2,25 mg/kg/day ip), according to our well established protocol; cardiac lysates were processed for analysis of pro-inflammatory Interleukins.
Results: We demonstrated that EMPA, co-incubated with DOXO, is able to increase cardiomyocyte viability of 33,6 and 82,3 % at 100 and 500 nM, respectively (compared to only DOXO treated cells). EMPA is able to inhibit lipid peroxidation by decreasing MDA and 4-HNA production of around 23,6 and 28,7 %, at 100 nM and of 47,8 and 52,1 % at 500 nM , respectively, compared to untreated cells ($p<0,01$ for all). Moreover, EMPA has anti-inflammatory activity in a concentration dependent manner with a reduction of Leukotriene B4 expression and p65-NFkb activation of 37,4 % and 31,6 % at 100 nM and of 58,4 and 64,3 % at 500 nM , respectively (all compared to only DOXO treated cells). EMPA also decreased the expression of Interleukin 1β (of 28,5 and 68,8 %), Interleukin-8 (of 21,2 and 57,3 %) and Interleukin-6 (of 28,1 and 49,8 %) at 100 and 500 nM, respectively, compared to only DOXO exposed cells ($p<0,05$ for all). In our in vivo studies, after 7 days with DOXO, GLS decreased. Interestingly, in mice treated with EMPA+DOXO, EMPA prevents the GLS's reduction : GLS was 19.24 ± 1.5 ($p < 0,01$) vs DOXO alone. In DOXO-EMPA groups heart IL-1β, IL-6 and IL-8 tissue extract were reduced of 48, 54,4 and 58,2 % compared to only DOXO group ($p<0,001$ for all).
Conclusion: EMPA has strong anti-inflammatory and cardioprotective effects in Doxorubicin-Induced cardiotoxicity and these effects are mainly mediated by a reduction of the lipid peroxidation, Leukotriene-B4 and NF-κB activation bringing to a strong inhibition of the Interleukin 1β, 8 and 6 production in cardiomyocytes. Preclinical studies demonstrate that EMPA has cardioprotective and anti-inflammatory effects during DOXO treatments, proposing as possible cardioprotective drug in cancer patients.

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Sterol metabolism is differentially regulated in human induced pluripotent stem cell-derived cardiomyocytes of peripartum cardiomyopathy patients

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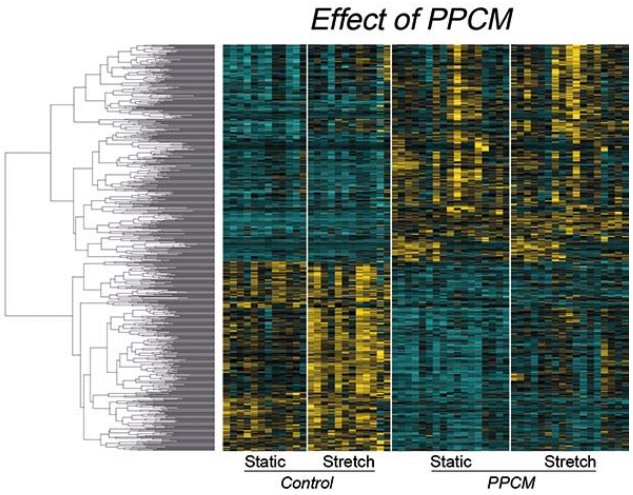
Funding Acknowledgements: This research was supported by the Dutch Heart Foundation, ZonMW Clinical Fellow and by the European Research Council.

Background: Peripartum cardiomyopathy (PPCM) is a rare form of heart failure that occurs at the end of the pregnancy or in the first months after delivery. PPCM diagnosis is based on exclusion and is therefore difficult to diagnose and characterize.
Objective: This study aims to determine which pathways are differentially regulated in PPCM patients compared to familial controls.
Methods: Cardiomyocytes were generated from three PPCM patient-derived induced pluripotent stem cell (iPSC) clones, and from two iPSC clones derived from her healthy sister. Pregnancy-associated wall stress was simulated by the application of equiaxial mechanical stretch for 48 hours on these cardiomyocytes. RNA sequencing was performed on cardiomyocytes derived from a PPCM patient and a healthy sister after mechanical stretch compared to static conditions. Sequencing results have been replicated in stem cell-derived cardiomyocytes from a second patient and a familial control using real time qPCR. Pathway and transcription factor enrichment analyses have been performed to identify affected pathways.

Results: Pathway analysis of differentially expressed genes in patient-derived cardiomyocytes widely indicated that major sterol and lipid metabolic pathways were reduced in PPCM, regardless of mechanical stretch. Additionally, pathways related to adaptive immune response, regulation of multicellular organismal process, and cofactor metabolism were significantly affected in PPCM. Further analysis revealed that SP1 and NF-Y were central transcription factors involved in nearly all identified pathways related to lipid metabolism. Moreover, PPCM-specific cardiomyocytes released significantly more troponin T than control cardiomyocytes. Strikingly, these results could be reproduced in iPSC-derived cardiomyocytes from a second patient, as well as in an established mouse model harboring a cardiac specific deletion of the STAT3 gene.
Conclusions: The present study mainly identified pathways related to sterol and lipid metabolism to be aberrantly regulated in PPCM. These data provide new insights into cell autonomous mechanisms and are indicative for novel pathways associated with PPCM.



Differentially expressed genes in PPCM

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Gut microbiota composition and interactions with diet: dysbiosis in heart failure is partly related to lower fiber intake

26/05/2019 15:00C Mayerhofer[1]; M Kummen[2]; K Holm[2]; K Broch[1]; A Awoyemi[3]; B Vestad[2]; C Storm-Larsen[2]; I Seljeflot[3]; T Ueland[2]; P Bohov[4]; RK Berge[4]; A Svardal[4]; L Gullestad[1]; JR Hov[2]; M Troseid[5]
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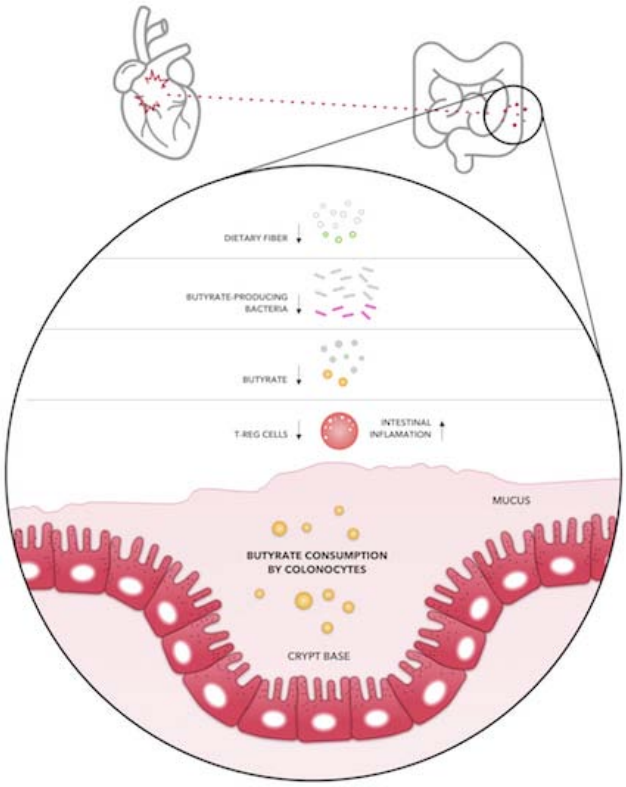
Funding Acknowledgements: This work was supported by the Norwegian Health Association [6782 to CCKM]

Objectives: To explore differences in the gut microbiota between patients with heart failure (HF) and healthy controls with a particular focus on associations with diet, etiology and disease severity.
Background: Recent reports have suggested alterations in the gut microbiota of patients with HF. Associations with diet remain largely uninvestigated.
Methods: The microbiota composition of two independent, cross-sectional cohorts (discovery, n=40 and validation, n=44) of patients with systolic HF and healthy controls (n=266) were characterized by sequencing of the bacterial 16S rRNA gene. Dietary and metabolite data were available for the validation cohort and follow-up data were available for the discovery cohort.
Results: The overall microbial community (beta diversity) differed between patients with HF and healthy controls in both cohorts (P<0.05). Patients with HF had a lower Firmicutes/Bacteroidetes (F/B)-ratio than controls (P=0.005), with a decreasing trend going from healthy controls via ischemic HF to non-ischemic HF (p for trend <0.05). Patients reaching a clinical endpoint (heart transplant or death) showed lower alpha diversity and lower F/B-ratio compared to healthy controls (P<0.01). Meat intake was associated with levels of trimethylamine-N-oxide (P=0.016). Finally, bacterial richness and abundance of several genera in the Firmicutes phylum were positively associated with fiber intake.
Conclusions: The gut microbiota composition in chronic HF was characterized by a decreased F/B ratio, which was associated with etiology and clinical outcome. The dysbiosis in patients with HF was related to low fiber intake, thus dietary patterns should be included in future studies, both as covariates and potential treatment targets.



Diet and butyrate-producing bacteria

791

Diastolic function modulation via protein kinase G-dependent Ca2(+)/calmodulin-dependent protein kinase-II phosphorylation and oxidation

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Background: Myocardial diastolic stiffness is dependent, in part, on signaling pathways and phosphorylation. Ca(2+)/calmodulin-dependent protein kinase-II (CaMKII) δ and protein kinase G (PKG) are known to target titin, but it is unknown so far if PKG phosphorylates CaMKIIδ.
Purpose: Our purpose was to reveal PKG and CaMKIIδ interaction and the functional effect of this interaction on cardiomyocyte and cardiac function in heart failure with preserved ejection fraction (HFpEF)
Methods: Left ventricular (LV) endomyocardial biopsies were procured in 15 HFpEF patients and 13 controls. Quantitative mass spectrometry (MS), recombinant human CaMKIIδ for in vitro studies, and biochemical analyses were performed to confirm CaMKIIδ-dependent PKG phosphorylation. Acute sGC stimulation was studied on HFpEF (with diastolic dysfunction) and control rats.
Results: All HFpEF patients had high diastolic stiffness, increased fibrosis and cardiomyocytes passive stiffness. They showed unchanged CaMKIIδ expression and increased phosphorylation and oxidation compared to controls. The in vitro CaMKIIδ phosphorylation by PKG and MS analysis revealed several phosphosites on CaMKIIδ. The most highly phosphorylated sites were located in the regulatory domain and the linker region of CaMKII. The luminescense signal was decreased

in HEK293 cells after acute sGC treatment, indicating association and dissociation of PKG from CaMKII. CNP resulted in a significant change in FCFP/FYFP of CaMKII compared to baseline. PKG inhibitor inhibits completely CaMKII activity. Significant correlations between PKG loss of each individual (patient) and increased CaMKII activity and oxidative stress were observed. Acute sGC stimulation, significantly improved LV diastolic dysfunction in HFpEF rats evident from improved ratio of peak velocity blood flow from gravity in early diastole to peak velocity flow in late diastole caused by atrial contraction, isovolumic relaxation time and time constant of isovolumetric pressure decline, in addition to improved LV end-diastolic pressure and stiffness in HFpEF rats. sGC stimulation improved cGMP-PKG pathway via increased cGMP level and PKG activity. Also, we found reduced CaMKIIδ auto-phosphorylation and oxidation, reduced oxidative stress and inflammation via reducing the pro-inflammatory cytokines. Cellular sGC stimulation caused a significant increase in Ca2+ transient amplitude in wild type (WT) mice but not in CaMKIIδc knock-out mice suggesting that the effects of sGC on calcium transient amplitude might be CaMKII dependent. In addition, sGC treatment in WT cardiomyocytes showed significant higher calcium transient amplitude compared to sGC treated cells from CaMKIIδc, suggesting the important role of PKG mediated-CaMKII phosphorylation in regulating calcium handling.

Conclusion: Our study shows that PKG plays a central role in regulating and maintaining the balance of CaMKIIδ activity and oxidative stress and thereby improving diastolic function.

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Doxorubicin-induced cardiomyopathy: gene variant TRPC6 as therapeutic target

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Funding Acknowledgements: Mayo Clinic Team Science Award

Background: Doxorubicin is an anthracycline used as a chemotherapeutic drug for the treatment of a wide range of adult and pediatric cancers. Doxorubicin use is limited do to its association with an increased risk of cardiomyopathy and heart failure. It is estimated that up to 10% of patients treated with doxorubicin will develop cardiac complications. The cardiotoxic effect of doxorubicin is dose-dependent with an increased percentage of patients developing heart failure at cumulative doses higher than 300-400mg/m2. A GWAS conducted of 1,191 patients from the N9831 clinical trial identified that cardiac gene expression and genetic variants of TRPC6 were associated with a decline in left ventricular ejection fraction (LVEF) (p=0.005 and p=1.62x10-6 respectively). TRPC6 is a non-selective cation channel expressed in heart and vascular tissue. TRPC6 participates in the pathogenesis of cardiac hypertrophy as a pathological response to chronic mechanical stress. Chronic activation has been found to promote cardiac fibrosis leading to heart failure. Overall these data suggest that TRPC6 variants could be associated with increased risk of doxorubicin-induced cardiotoxicity.

Purpose: Tests to determine which patients may progress to cardiomyopathy and heart failure are currently lacking and there are no targeted treatments to prevent cardiomyopathy in these patients.

Methods: In preliminary in vivo data, B6.129 wild-type mice (10 females, 10 males) were treated with either 6x intraperitoneal saline or 4mg/kg doxorubicin injections (cumulative dose of 24mg/kg).

Results: Our in vitro preliminary data show that inhibition of TRPC6 using the TRPC6 inhibitor GsMTx-4 in human iPSC-derived cardiomyocytes significantly reduced doxorubicin-induced apoptosis ($p<0.0001$). In vivo we found doxorubicin decreased HW/BW (p=0.008) and HW/TL (p=0.0004) ratios and increased cardiac vacuolation (p=<0.001) in male mice treated with doxorubicin compared to controls. Higher HW/BW ratio were also observed in TRPC6 knock out mice treated with doxorubicin compared to wild-type mice (p=0.005). Additionally, we found that doxorubicin-induced injury was significantly reduced in TRPC6 knock-out mice compared to wild-type mice based on reduced vacuolation (p=0.0004 males, p=0.03 females). Furthermore, a significant decrease in stroke volume (p=0.007), diastolic volume (p=0.01) and cardiac output (p=0.004) were found at day 21 post treatment in wild-type male mice treated with doxorubicin in comparison to control and TRPC6 knock-out mice.

Conclusions: Our results suggest that TRPC6 could be a novel therapeutic target in the prevention of chemotherapy-induced cardiomyopathy and heart failure. Genetic mapping of TRCP6 functional variants may provide a new screening tool to determine which cancer patients are at increased risk of developing heart failure and may benefit from increased cardiac monitoring and TRPC6-specific therapies.

Clinical Case Corner 3 - The many faces of valve disease

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An interesting case of right middle and lower zone pneumonia vs infective endocarditis secondary to aortic root abscess presenting as unresolving fever

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54 years old gentleman was admitted with complaints of fever and cough with expectoration for the past 3 weeks. His CXR showed right middle and lower zone homogenous opacity and ECHO showed dilated left atrium and ventricle, global hypokinesia of left ventricle, moderate left ventricular systolic dysfunction, adequate right ventricular systolic function, thickened aortic valve and RCC prolapse, dilated aortic root (40 mm), AML tip prolapse, type II diastolic dysfunction, severe eccentric AR, moderate MR, grade II TR, severe PAH (RVSP 75), HYPERECHOIC MASS (8 X 13) seen attached to RCC protruding into the LVOT. TEE confirmed HYPERECHOIC MASS (OLD HEALED VEGETATION) seen attached to RCC of aortic valve protruding into the LVOT with RCC prolapse with severe AR and also showed small aortic abscess (10 x 15) posterior to LCC of aortic valve towards LA. Whole body PET-CT revealed areas of consolidation in the right lung showing increased metabolic activity. No focal mass is seen. Enlarged metabolically active right hilar and mediastinal lymph nodes.

DISCUSSION Eventhough ECHO showed a vegetation, PET SCAN proved it metabolically inactive and thus the source of infection in this patient was right lung pneumonic consolidation which was treated with appropriate IV antibiotics and patient improved symptomatically.

TAKE HOME MESSAGE

Thus for a patient with unresolving fever of long duration even though echocardiogram showed a vegetation attached to aortic valve and trans esophageal ECHO confirmed the mass on RCC with a small aortic abscess inferior to LCC and severe eccentric AR, the WHOLE BODY PET SCAN was the need of the hour to pick up the metabolically active lesion which was the right lung pneumonic consolidation in this patient. The appropriate antibiotic for the correct duration can alone save the patient's life. Hence the right diagnosis / the source of infection was found with the help of PET SCAN.

821

Acute papillary muscle rupture: multi-specialty team approach ensuring good clinical outcome

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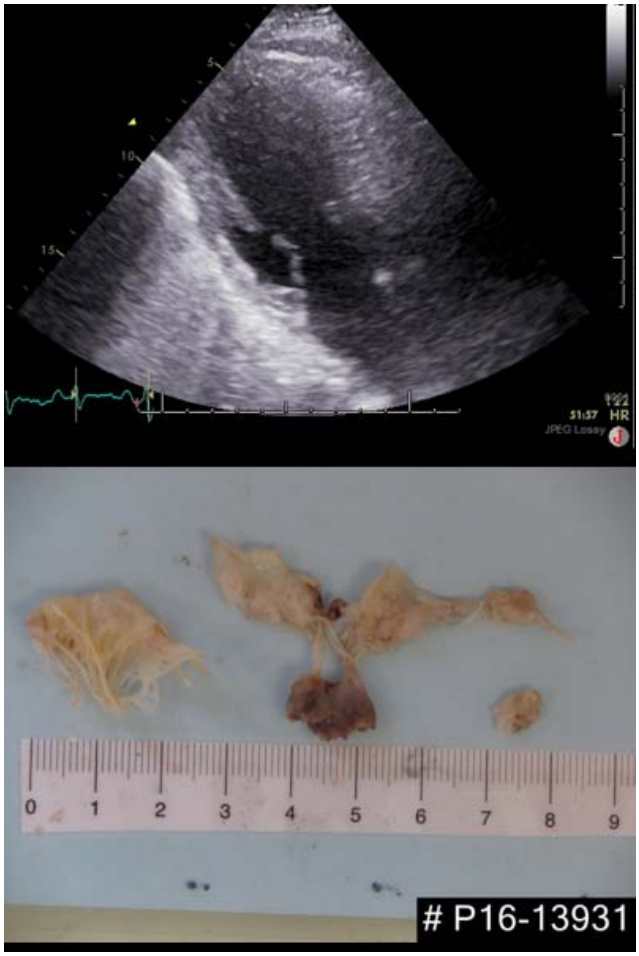
A 48 year old male presented to a district general hospital with acute shortness of breath, with chest pain in the preceding 12 hours. Physical examination revealed a pan-systolic murmer at the apex with bilateral lung crepetations. Initial ECG appeared relatively unremarkable and pulmonary oedema was demonstrated on chest radiograph. Within 2 hours his condition deteriorated with type II respiratory failure and academia. Transthoracic echocardiogram confirmed suspicion of acute posterior papillary muscle rupture with severe mitral regurgitation. Left atrial size appeared normal and hyperdynamic left ventricular systolic function.

The patient was transferred to the nearest cardiac centre with catheterization laboratory. The cardiothoracic surgery team and cardiac anaesthetics responded immediately and the patient was intubated and ventilated. Simultaneously, interventional cardiology performed emergency cardiac catheterization revealing an occluded RCA, severe proximal LAD and left circumflex disease and an intra-aortic balloon pump was placed. There was marked haemodynamic instability with significant adrenaline requirements and a short cycle of CPR. There was no facility for VA ECMO in this centre. Repeat arterial blood gas sampling was consistent with cardiogenic shock. pH 7.08, lactate 5.6, PCO2 10.9, PO2 34.7. A multi-specialty decision was made to proceed to emergency surgery despite high mortality likelihood. pH was recorded at 6.9 at the beginning of the case.

Emergency mitral valve replacement was performed with concomitant coronary artery bypass grafting to the left anterior descending, right and obtuse marginal coronary arteries. There was haemodynamic instability in the immediate post operative period and recovery thereafter was complicated by renal failure and academia. Total ICU stay was 22 days before discharge at day 33 to make an excellent recovery with persevered left ventricular systolic function with a normally functioning prosthetic mitral valve.

This case is particularly poignant due to the patients' excellent clinic outcome despite severe acidaemia (pH 6.9). Internal audit on emergency cases performed in this regional centre demonstrated no survival in patients with pH less than 7.1. Problem Acute papillary muscle rupture often results in marked and rapid clinical deterioration. Without emergency surgery, there is 90% mortality within one week and therefore early involvement of the cardiac surgical team is paramount to survival. Discussion In instances of acute heart failure secondary to mechanical complication there is a narrow time window in which prompt diagnosis, percutaneous intervention and surgery are crucial. This was achieved in this case by an effective multi-specialty team approach. Trauma centers are perhaps the original example of this, finding a mortality reduction of 15% in trauma cases by utilizing this method. As a result of this case, formation of a 'cardiac shock' team should be considered.



Mitral Valve & Ruptured papillary muscle

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The importance of Heart Team in acute heart failure

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Introduction: Acute heart failure is a life-threatening medical condition that could result from many cardiac ad extracardiac conditions. Concerning to severe aortic stenosis (AS), TAVI widened the spectrum of patients susceptible of treatment, although its utilization in context of cardiogenic shock is exceptional.
Clinical case: 83-years old male patient with previous history of arterial hypertension, diabetes, dyslipidaemia and ferropenic anaemia. The patient was admitted at emergency room due to acute pulmonary oedema (APO) refractory to medical therapy, with necessity of intubation and invasive mechanical ventilation (IMV). Electrocardiogram at admission revealed complete left bundle branch block. It was hypothesized to be an acute coronary syndrome so a coronarography was performed, with no angiographically relevant lesions. Maximum hs troponin was 13 pg/ml. The patient was hospitalized at cardiac intensive care unit due to a clinical scenario of de novo acute heart failure, of unknown aetiology, with presentation on B profile and progression to C. Transthoracic echocardiogram (TTE) revealed a left ventricle with hypertrophied walls, severe global systolic dysfunction with an estimated ejection fraction (EF) of 25%, diffuse hypokinesis and akinesis of medio and apical segments of anterior wall and anterior septum; aortic valve with extensive calcification, not being possible to define tricuspidia and conditioning restriction of its opening (medium gradient 31mmHg, maximum gradient 61mmHg, maximum velocity 3.5m/s). During hospitalization, the patient evolved with cardiogenic shock with multiorgan failure, persistent necessity of vasopressor support with noradrenalin, two failed attempts of extubation due to recurrent APO with respiratory exhaustion and reintubation necessity. Considering the AS the principal determinant of the clinical scenario, a proposal for percutaneous aortic valvuloplasty and TAVI implantation was made, performed with success. Posterior favourable clinical evolution allowing extubation two days after the procedure and clinical discharge at NYHA class I. TTE at revealing EF 43%, biologic valvular prothesis in aortic position with normal function and with slight transprothesic regurgitation.
Conclusion: In selected cases where AS seems to be the defiant and perpetuator factor of patient condition and his principal limitation to leave IMV, the discussion in heart team for TAVI implantation or balloon valvuloplasty with TAVI in backup seems to be a good solution.

823

A life-threatening cause of acute heart failure at a young age

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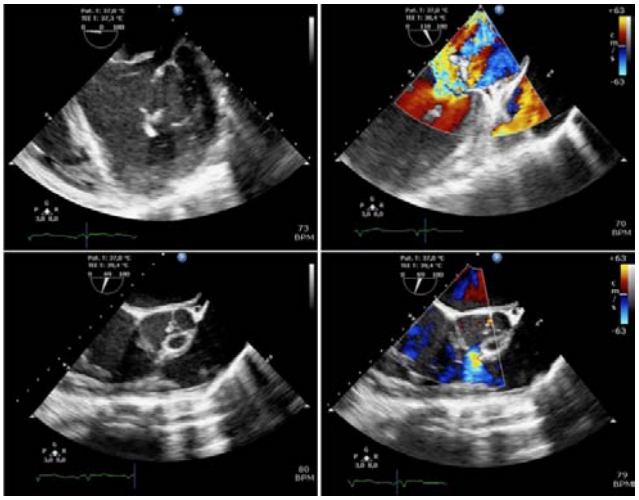
We present a case of a 33-year-old man, with clinical history of a non-specified cardiac murmur since childhood. He was admitted to our Emergency Department with complaints of progressive worsening exertional dyspnea (occurring in rest at admission), orthopnea, paroxysmal nocturnal dyspnea and lower limb oedema with 2 weeks of evolution. He also reported symptoms of consumption in the last month. At hospital admission, his medical examination revealed hypotension, tachycardia, polypnea and signs of decreased peripheral perfusion. A grade IV/VI, systolic heart murmur with axillary radiation was heard at cardiac auscultation.
A 12-lead electrocardiogram showed sinus tachycardia. Additional work-up revealed mixed acidemia, elevated systemic inflammatory parameters and microcytic, hypochromic anemia. Bedside transthoracic echocardiogram showed a mitral valve with thickened leaflets and severe, posterolateral directed mitral valve regurgitation caused by the prolapse of the anterior leaflet; preserved biventricular function and a dilated inferior vena cava without respiratory size variation.
The diagnosis of cardiac and septic shock was assumed, and the patient had to be transferred to the Intensive Care Unit in need of invasive mechanical ventilation.
To better clarify the clinical case, a transesophageal echocardiogram was performed revealing: 1) hyperechogenic thickening of the ventricular face of non-coronary and right coronary cusps of aortic valve, suggesting small vegetations and a diastolic flow, suggesting perforation of the non-coronary cusp; 2) severe, posterolateral directed mitral valve regurgitation caused by the prolapse of the anterior leaflet and destruction of the posterior leaflet with pulmonary venous flow reversal; 3) a serpiginous image of erratic movement attached to the head of the postero-medial papillary muscle, suggesting vegetation or part of the destructed posterior leaflet. A restrictive perimembranous ventricular septal defect (VSD) and a patent foramen ovale were also observed.
The diagnosis of native mitral and aortic valve infective endocarditis (IE) resulting in mitral valve destruction with acute major regurgitation and acute heart failure (HF) was established. Blood cultures were collected, empirical antibiotic therapy was initiated, and the patient was emergently transferred for a cardiac surgical center. He was submitted to mitral valve replacement with mechanical prostheses, aortic valve plasty and SVD closure. Blood cultures isolated a penicillin-sensitive Streptococcus viridans. After 6 weeks of guided therapy, the patient was hospital discharged. Currently, he is asymptomatic.
Acute HF is rare at a young age. IE is among the most common causes of this clinical syndrome in youth, especially in those patients with previous structural heart disease. The present case report is an illustrative example of this aetiology, whose urgent recognition and treatment were crucial for patient's survival.



Transesophageal Echocardiogram

824

A long history of recurrent prosthetic mitral valve thrombosis due to hypereosinophilic syndrome

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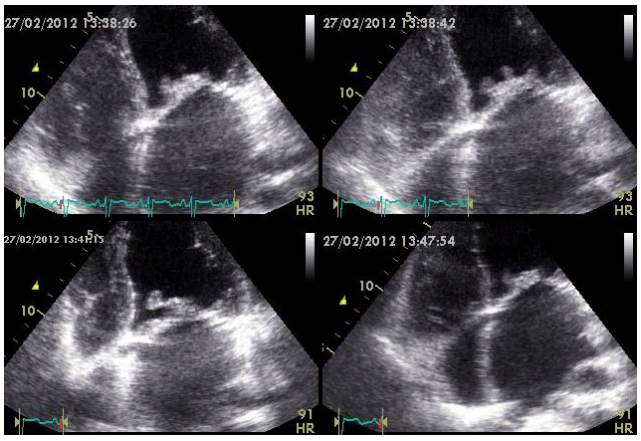
Background: Hypereosinophilic syndrome (HES) is a rare disorder defined as a persistent, unexplained peripheral marked eosinophilia. Although the exact mechanism of eosinophil-related tissue damage is not well known, endocardial fibrosis and thrombus formation are common occurrences. Cardio embolism is acknowledged as the most common etiology for stroke and transient ischemic attack (TIA).
Case report: We report the case of a 42-year-old woman suffering from idiopathic HES with recurrent stroke and TIA, due to native mitral valve thrombosis followed by mechanical prosthetic mitral valve thrombosis one month postoperatively, concomitant with severe eosinophilia and despite adequate anticoagulation. A bioprosthetic mitral valve replacement was performed and oral anticoagulation was



TTE: native mitral valve thrombosis

maintained associated with 100mg of aspirin. Four years postoperatively, the patient presented with dyspnea and recently diagnosed atrial fibrillation. Transesophageal echocardiography (TEE) was performed prior to cardioversion, showed leaflet thrombosis in the bioprosthetic mitral valve concomitant with severe eosinophilia despite corticosteroid therapy and adequate anticoagulation. Patient was putted on heparin therapy and high dose of corticosteroid. TEE performed at 04 weeks follow up showed the disappearance of thrombi. Electric cardioversion was successfully done. Oral anticoagulation associated with aspirin was maintained and no recurrent thromboembolic event was recorded at 03 months clinical follow-up.
Conclusion: Other than cardiac emboli and direct eosinophil toxicity, there is a hypercoagulable state in eosinophilia which can contribute to strokes. Our patient had recurrent heart embolism and strokes due to native, mechanical prosthetic and bioprosthetic mitral valve thrombosis induced by eosinophilia. Reduction of eosinophils with corticosteroid therapy and simultaneous anticoagulation had contributed in the resolution of thrombus and complete clinical recovery of the patient in our case.

825

The prevention of heart failure in case of severe mitral regurgitation. The clinical case of the patient with mitral valve dysplasia.

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Background. The mitral valve dysplasia is most common cause of the severe non-ischemic mitral regurgitation. Medical treatment of these patients is not effective. Only surgery of mitral valve dysplasia is the method that prevents development of heart failure in patients with severe mitral insufficiency (MR). This is achieved by performing different kind of mitral surgery, such as mitral valve repair, mitral valve replacement (by biological or mechanical prosthesis).
The goal of the study. To assess the results of surgical treatment of patients with severe mitral regurgitation in case of mitral valve dysplasia.
Materials and methods. We analyzed case studies of 250 pts with mitral valve dysplasia, who were operated in the period 2009-2016.
The mean age of patients was 53,8 ± 8.7 years. The studies population included 130 males (52 %) and 120 females (48%). Pts had preserved LV EF (59 ± 5%), NYHA III, IV (148 pts, 61%), atrial fibrillation (88 pts, 35%), anterior leaflet prolapse (54 pts, 19 %), posterior leaflet prolapse (124 pts, 52%), dual leaflet prolapse (75 pts, 29%). Performed surgical treatment consisted of mitral repair (78 %), mitral valve replacement (22 %), and 44 % of them had got a biological prosthesis, tricuspid interventions 26%, RFA 7%.
Results. The restoration of mitral valve function, regress of heart failure and improving of life quality indiscriminate after mitral surgery in case of mitral valve dysplasia. At discharge from hospital 98 % males and 93 % females had mitral regurgitation 0-1, most of them are freedom from anticoagulants in the three months after surgery.
Conclusions. The surgery of mitral valve in case of mitral valve dysplasia with severe MR is effective prevention of heart failure. Obviously the priority of mitral valve repair has good restoration of mitral valve function.

826

The crucial role of the heart valve team in the management of a complex case of multivalvular disease and heart failure.

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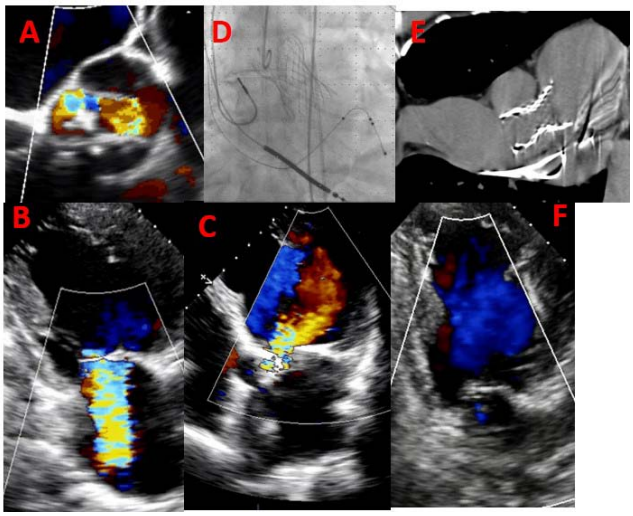
Multivalvular disease is a common condition with a complex pathophysiology and management. The Heart Valve Team (HVT) has a crucial role in defining the most appropriate timing and type of treatment.
A 60-y-old woman, with a history of bicuspid aortic valve in regular echocardiographic follow-up, referred to our heart failure unit due to worsening functional capacity (NYHA class III) in the previous 6 months. She had undergone a surgical suture of patent ductus arteriosus at the age of 18 and had a history of CKD and asthma.The EKG revealed a sinus rhythm with a complete LBBB (QRS 168 ms).The TTE showed a severely stenotic aortic bicuspid valve (type 1, NC - RC) with a concomitant moderate aortic regurgitation, a severe functional mitral regurgitation (MR), a severely dilated left ventricle (VTD 210 ml) with a severely depressed systolic function (EF 27%)(Fig.A-B-C).The dobutamine stress echo established the diagnosis of low-flow low-gradient aortic stenosis while the coronary angiography excluded the presence of CAD.A chest CT revealed an ascending aorta aneurysm (50 mm).
The case was evaluated by the local HVT which excluded the surgical solution (SAVR + MV repair + ascending aorta replacement) due to the high operative and in-hospital mortality (STS score for isolated SAVR 4% and a severely depressed EF) and chose a trans-catheter treatment. TAVR is a winning therapy for low-flow low-gradient aortic stenosis, provided that there is not any residual regurgitation.New-generation devices are associated with low rates of paravalvular leak post-TAVR in bicuspid valves.Moreover, the likeliness of MR improvement after TAVR was high in this patient due to many imaging and baseline predictors (anatomy of mitral valve, functional MR, no AF, low EF, severely dilated left ventricle).However, the LBBB represented a limiting factor of MR response to TAVR.
Thus, the patient underwent a CRT-D implantation and then a TAVR procedure with a CoreValve Evolut R 34 mm device (Fig.D). The LBBB and the associated systolic asynchrony were solved, the aortic device was correctly positioned without residual paravalvular leaks and the MR was immediately reduced to mild degree(Fig.F).The hospital course was uneventful and the patient was discharged with an optimized medical therapy. 3 months later, the patient referred an improvement of functional capacity (NYHA class II). The TTE showed an almost totally recovered EF (51%), no residual paravalvular leaks, low trans-aortic gradients, mild MR. The chest computed tomography excluded the ascending aorta size increase(Fig.E)so an elective ascending aorta replacement surgery was planned.
The evaluation and treatment of patients with multivalvular disease and heart failure is complex and requires the expertise of a multidisciplinary HVT, of which this case is a brilliant example. In these complex patients, transcatheter therapies are appealing options, when used according to evidences and with correct indications.



Figures

827

A case of an acute mitral regurgitation: differential echocardiographic diagnosis with the chronic form.

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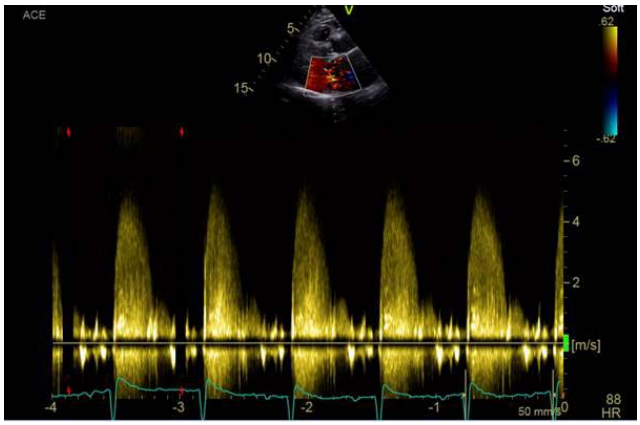
A 63 years old man came to Emergency Department because of breathlessness after fifteen days of worsening dyspnea. At medical visit, he had cardiac systolic heart murmur (IV/VI), rales at left inferior thoracic field and tachycardia. The arterial blood gas analysis demonstrated an initial compensated respiratory acidosis, while the chest x-Ray showed interstitial pulmonary congestion and lower left pleural effusion. An echocardiogram showed severe mitral regurgitation (MR) due to chordal rupture with P2 flail causing an eccentric jet directed towards the interatrial septum. The flow was easily detectable with continuous Doppler and graded as severe by quantitative methods. Interestingly the echocardiography findings were suggestive for acute MR. Indeed at continuous wave Doppler we founded an early peak and low-velocity triangle shaped MR , due to low left ventricular-atrium gradient and reduced atrial compliance. Moreover a very high (78%) left ventricle (LV) ejection fraction and hyperdynamic ventricle was visualized associated with tachycardia and hypotension In accordance with severe increase of LV diastolic pressures a restrictive pattern of the diastolic mitral flow and low cardiac output were also recorded.
The patients was then treated with non invasive ventilation, diuretics. After stabilization a coronary angiography and an early surgical intervention were performed with triangular resection of P2, annuloplasty (Physio Ring n.30) and aorto-coronary bypass (LIMA-LAD) because of significant stenosis of left anterior descending artery. The result was a trivial mitral regurgitation with a mild reduction of left ventricle systolic function.
This case shows an unusual presentation of acute MR with severe decompensation, hypotension and severe pulmonary hypertension. These findings were clinical

findings were associated with severe MR due to P2 flail with very small LV, high LV filling pressures and very low LV- left atrium gradient. This atypical clinical and Echo-Doppler presentation of MR with acute chordal rupture differs from the well-known Echo-Doppler patterns of chronic condition characterized by LV and LA adaptation to volume overload.



Eccentric acute MR flow

Moderated Poster Session - Devices for structural heart disease

828

Six-month outcomes from the multicenter, prospective study with the novel pascal transcatheter valve repair system for patients with mitral regurgitation in the CLASP study

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On behalf of: CLASP Investigators

Background: Severe mitral regurgitation may lead to an impaired prognosis if left untreated. Transcatheter treatment options have emerged as an alternative to surgery and an adjunct to medical therapy. We report the six-month results of the PASCAL transcatheter valve repair system in treating patients with mitral regurgitation enrolled in the multicenter, prospective, single arm CLASP study.
Methods: The PASCAL implant is comprised of two broad and curved paddles, two clasps capable of independent leaflet capture, and a Nitinol woven spacer which enable optimized leaflet capture, intended to reduce mitral regurgitation while minimizing concentrated stress on the leaflets. Eligible patients had clinically significant MR despite optimal medical therapy and were deemed candidates for transcatheter mitral repair by the local Heart Team. Safety, performance, and clinical outcomes were prospectively assessed at baseline, discharge, 30 days, and 6 months post-procedure. All major adverse events (MAE) were adjudicated by an independent clinical events committee and echocardiographic images were assessed by a core lab. The MAE rate was the primary safety endpoint, defined as the composite of cardiovascular mortality, stroke, MI, new need for renal replacement therapy, severe bleeding, and re-intervention for study device-related complications.
Results: Between June 2017 and September 2018, 62 patients were enrolled at 14 sites worldwide for transcatheter mitral valve reconstruction using the PASCAL system. The mean age was 76.5 years (62.9% male). All patients had MR grade ≥3+, with 59% functional, 34% degenerative, and 7% mixed etiology. The average STS Score for MV repair was 4.4%, EuroSCORE II was 5.2%, and 51.6% of patients were in NYHA Class III/IV. Successful implantation of the PASCAL device was achieved in 95% of patients. At discharge, 95% of patients had MR grade ≤2+ with 81% grade ≤1+. The MAE rate was 4.8%. At 30-day follow-up, paired analyses shows that 98% of patients had MR grade ≤2+ with 81% grade ≤1+ and 88% were in NYHA Class I/II ($p<0.0001$). The 6MWD improved by 38.9 m ($p=0.0015$) and was accompanied by average improvements in KCCQ and EQ5D scores by 14.1 points ($p<0.0001$) and 8.3 points ($p=0.0028$), respectively. The six-month data will be available for presentation.
Conclusions: In this early device experience, the Edwards PASCAL transcatheter valve repair system showed an acceptable safety profile and performed as intended in treating patients with mitral regurgitation. The PASCAL device resulted in significant MR grade reduction, which was associated with clinically and statistically significant improvements in functional status, exercise capacity, and quality of life. Continued follow-up is warranted to validate these initial promising results.

829

One-year outcomes of the TRI-REPAIR study assessing cardioband tricuspid valve reconstruction system for patients with severe tricuspid regurgitation

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On behalf of: The TRI-REPAIR Investigators
Funding Acknowledgements: Edwards Lifesciences

Background: Severe tricuspid regurgitation (TR) is associated with high morbidity and mortality rates with limited treatment options.
Objectives: We report the one-year outcomes of the Cardioband™ Tricuspid Valve Reconstruction System in the treatment of severe functional TR in 30 patients enrolled in the TRI-REPAIR study.
Methods: Between October 2016 and July 2017, 30 patients were enrolled in this single-arm, multicenter, prospective study. Patients were diagnosed with severe, symptomatic TR in the absence of untreated left-heart disease and deemed inoperable because of unacceptable risk for open-heart surgery by the local heart team. Clinical, functional, and echocardiographic data were prospectively collected before and up to one year post-procedure. An independent core lab assessed all echocardiographic data and an independent clinical event committee adjudicated the safety events.
Results: Mean patient age was 75 years, 73% were females, 23% had ischemic heart disease, and 93% had atrial fibrillation. At baseline, 83% were in NYHA Class III-IV, 63% had edema, and LVEF was 58%. Technical success was 100%. Through one year, one patient had a reintervention and exited the study. Five patients died of which one was device-related. Between baseline and one year (paired analyses), echocardiography showed average reductions of annular septolateral diameter of 16% (44mm vs. 37mm; $p<0.01$), PISA EROA of 49% (0.73cm2 vs. 0.37cm2, $p<0.01$), and mean vena contracta of 30% (1.2cm vs. 0.9cm, $p<0.01$). Clinical assessment showed that at one year 78% of patients were in NYHA Class I-II ($p<0.01$). Six minute walk distance improved by 42m ($p<0.01$). Kansas City Cardiomyopathy Questionnaire score improved by 19 points ($p<0.01$). Edema was absent in 70% of the patients.
Conclusions: These results show that the Cardioband tricuspid system performs as intended and appears to be safe in patients with symptomatic and severe functional TR. At one year significant reduction of TR through a sustained decrease of annular dimensions, improvements in heart failure symptoms, quality of life, and exercise capacity were observed. Further studies are warranted to validate these initial promising results.

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Clinical scenarios predict procedural outcomes and indices of right heart function in transcatheter repair of valvular right heart failure

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Background: Transcatheter tricuspid valve repair (TTVR) is an emerging technique to treat tricuspid valve regurgitation (TR). Predictors of adverse events are scarce, and stratification by TR etiologies is lacking.
Methods: We report the procedural outcomes of 164 patients undergoing TTVR for TR from a bi-center registry classified into four etiology-based clinical scenarios (CS; lone atrial fibrillation TR (Afib-TR), pulmonary hypertension TR (PHT-TR), mitral regurgitation TR (MR-TR), and TR in dialysis (Dialysis-TR)). TR procedural success was defined as a TR reduction by ≥ one grade. Clinical characteristics, procedural outcomes and the co-primary endpoints mortality and a combined endpoint (mortality, re-hospitalization and tricuspid valve (TV) re-intervention) at mid-term follow-up at one year were evaluated.
Results: In total, 164 patients were assessed. Fourtyfour (26.8%) patients were categorized as AfibTR; 30 (18.3%) as PHT-TR; 74 (45.1%) as MR-TR; and 11 (6.7%) as Dialysis-TR. We applied a stepwise categorization approach that classified patients on chronic hemodialysis into Dialysis-TR; patients not undergoing dialysis with MR ≥ grade 3 into MR-TR; patients not meeting the inclusion into Dialysis-TR or MR-TR with an invasively-determined systolic pulmonary artery pressure >50mmHg into PHT-TR; and the remaining patients into Afib-TR in case a history of atrial

fibrillation/flutter existed. Five patients (3.0%) did not meet pre-specified inclusion criteria and were excluded from the analysis. Procedural success was > 80% in all CS and did not differ between groups (p=0.38). The Dialysis-TR CS had the highest STS-scores (14.60 [12.93; 30.03]; p<0.01), largest coaptation gap (6mm [3.61; 7.17]; p=0.03), and rate of NYHA class ≥ 3 (n=11/11 (100%); p<0.01). Patients categorized into the Afib-TR CS had the lowest STS-scores (3.09 [2.99; 4.28]; p<0.01), lowest rate of NYHA class ≥ 3 (n=35/44 (79.5%); p<0.01), and highest functional capacity (6MWT; 316m [264; 341]; p<0.01). Concomitant MR clipping was highest in MR-TR CS (69/74 (93%); p<0.01). Within the group of patients that had procedural success, CS predicted the combined primary endpoint (Afib-TR CS (n=5/37 (13.5%), PHT-TR CS (n=15/26 (57.7%)), MR-TR CS (n=25/69 (36.2%), and Dialysis-TR CS (n=4/9 (44.4)); p<0.01). One-year mortality was highest in the PHT-TR CS when compared to the other CSs (p=0.03). One-year heart failure hospitalization was highest in the PHT-TR CS (12/26 (46.2%); p=0.02)). The rate of re-intervention was not significantly different among CSs.

Conclusions: Stratification of TTVR into etiology-based clinical scenarios may add value to the risk prediction in the heterogeneous patient population of TR patients, overcoming some of the limitations of regression-based risk prediction models and may better guide decision-making in the TTVR patient population.

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Impact of pulmonary hypertension on procedural and clinical outcomes in patients with right heart failure and tricuspid tegurgitation undergoing transcatheter edge-to-edge repair

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Aims: Transcatheter tricuspid valve leaflet edge-to-edge repair is a novel treatment option for symptomatic tricuspid regurgitation (TR) in patients with right heart failure. The aim of the present study was to investigate the prognostic significance of baseline pulmonary hypertension and its impact on procedural outcomes.

Methods and results: The analysis was carried out in 164 consecutive patients at increased risk for surgery (median age 78 (IQR 74-82) years) and symptomatic TR treated by interventional tricuspid valve edge-to-edge repair at two centers in Germany.

Seventy patients (43%) were found to exhibit a systolic PAP (sPAP) ≥ 50mmHg and were classified as PHT+ group and compared to the remainder of patients (PHT- group).

When compared to PHT- patients, the PHT+ group demonstrated a higher pre-opprative risk (EuroSCORE II 8 vs. 5%, p<0.01), more frequent prior heart failure hospitalizations (86 vs. 70%, p=0.02), more severe symptoms (NYHA class IV in 43 vs. 19%, p=0.01; 6-minute walking distance 197 vs. 261m, p<0.01) and higher NT-pro-BNP levels (p<0.01).

PHT+ patients had more impaired left and right ventricular function (LVEF 46 vs. 51%,p=0.03; TAPSE 17 vs. 15mm,p=0.02) and higher estimated sPAP (56±17 vs. 45±12, p<0.01) with comparable quantitative and semi-quantitative measures of mitral and tricuspid regurgitation severities on baseline echocardiography.

Procedural success (defined as successful clip implantation and residual TR ≤2) was achieved in 86% vs. 82% in PHT+ and PHT- patients respectively (p=0.52). None of the invasive PHT measures was predictive of procedural success on logistic regression analysis.

After a median follow-up of 245 days, 69 patients (39%) reached the combined endpoint of death (22% of patients,), rehospitalization for heart failure (29% of patients) or reintervention (4% of patients).

Both invasive and echocardiographic assessment of systolic PAP ≥ 50mmHg predicted the combined endpoint on univariate analyses. However, this criterion conveyed risk when assessed invasively (HR 1.73 (1.06 - 2.83), p=0.03), while it paradoxically conveyed protection when assessed non-invasively (HR 0.61 (0.36-0.98), p=0.04). This discrepancy was elicited by patients with a false negative echocardiographic assessment of PH (invasive systolic PAP ≥50mmHg, Echo systolic PAP < 50mmHg, n=28). In fact, this group demonstrated the worst right ventricular function (TAPSE 14±4mm), the most severe tricuspid regurgitation (TR grade IV in 57%) and the worst clinical outcomes (combined endpoint in 64% of patients).

Conclusions: Among patients with symptomatic TR undergoing transcatheter tricuspid valve leaflet edge-to-edge repair, invasively measured PH is associated with worse clinical status and advanced HF, but is not associated with procedural failure. Importantly, Echocardiographic estimation of pulmonary artery pressure seems to be unreliable.

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Echocardiographic L-Wave as a prognostic indicator in TAVI patients

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Introduction: The L wave represents mid-diastolic trans-mitral flow. Its clinical and prognostic value is not completely understood. It is assumed that this wave represents decreased relaxation of the left ventricle and thus diastolic dysfunction. Patients with severe aortic stenosis are prone to left ventricular hypertrophy and diastolic dysfunction. It has been previously shown in this group of patients that Trans-catheter aortic valve replacement (TAVR) induces reverse remodeling and improves diastolic function and prognosis. Our aim was to examine the change in L wave after TAVR and its clinical importance.

Methods: We examined the clinical and echocardiographic data of 535 patients (mean age 82.58±5.9) undergoing TAVR. The presence and velocity of L-Wave was recorded at baseline and 1 and 6 months post procedure. The impact of the procedure on L-Wave and clinical outcomes were analyzed.

Results: Patients with L-wave on baseline echocardiography (n=64, 12%) had a smaller stroke volume index by 5.7±2.3ml/m2 (p=0.01) and a lower systolic blood pressure by 17.2±6.6mmHg (p=0.01) compared to patients without L wave at baseline echocardiography. In patients with L-wave at baseline, in 31% the L-wave disappeared at 1 month and in 70% at 6 months follow up. In addition, baseline L wave velocity was 34.8±11.5 (cm/s) and decreased significantly at follow up. Patients with L-wave at baseline had higher 3 year mortality post procedure (HR 1.93, 95% CI 1.46-2.54, p<0.001). This was also true for patients with L-wave after 1 month (HR 5.03, CI 3.12-8.08, p<0.001). Multivariate analysis of survival was also statistically significant (p<0.001).

Conclusion: Post TAVR velocity of L wave decreases significantly and often disappears completely. The presence of L wave before TAVR is an independent risk factor for mortality.

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Long term outcomes in asymptomatic patients with severe aortic stenosis

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Objective: Patients with asymptomatic, severe aortic stenosis (AS) are presumed to have a benign prognosis. Current guidelines therefore do not recommend aortic valve replacement (AVR) for isolated, asymptomatic, severe AS. The aim of this study was to explore the natural history of patients with severe AS advised against surgery due to lack of symptoms.

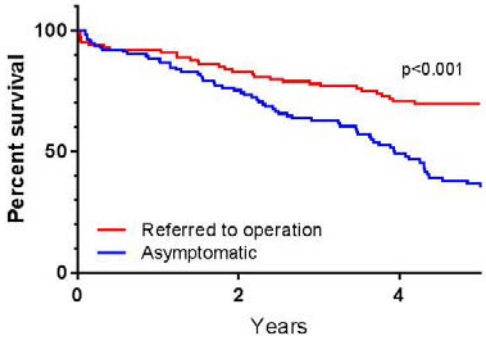
Methods: Patients who were referred for diagnostic evaluation for severe AS were identified through a search in the hospital database. We reviewed the medical records of every patient with the ICD-10-code for AS (I35) between Dec 1st, 2002 and Dec 31st, 2016. Clinical data, biochemistry and imaging data were procured for the patients categorised as asymptomatic and 100 age- and gender matched patients referred to AVR. By March 2017, mortality data were obtained from the national Norwegian Cause of Death Registry. This study was approved by the Regional Ethical Committee, which waived the need for patient consent because of the retrospective nature of the study.

Results: Among the 3454 patients with the code for AS, 2341 patients were evaluated by the heart team for possible AVR due to severe AS during the period in question. 1953 patients were referred to AVR. 388 patients received conservative treatment due to either a lack of symptoms (n=114), patient refusal (n=49) or a high risk-benefit ratio or because they had comorbidities presumed to reduce life expectancy significantly (n=225). The asymptomatic patients had a median age of 83.4 (IQR: 76.5-87.0). 42 % were male. The peak aortic jet velocity was 4.4±0.8 m/s, and the aortic valve opening area was 0.68±0.16 cm2. During a mean duration of follow up of 4.0±2.5 years (median 4.1 years, IQR: 2.10-5.4), 72 of the 114 patients died (63%). Survival at 1, 2 and 3 years for the asymptomatic patients was 88%, 75% and 63% respectively, compared with 91%, 82% and 77% in those who were referred to AVR (p<0.001) (Figure 1). 28 patients received AVR at a median 1.6 (IQR:1,1,-2.8) years after they were initially advised against surgery. When censoring the asymptomatic patients at the time of AVR, 1, 2 and 3 years survival was 88%, 72% and 57%. Cox regression analysis identified Troponin T as an independent predictor of mortality in patients with asymptomatic severe AS, p= 0.029. Age, valvular disease severity, NT-ProBNP, diabetes and coronary artery disease were not predictors of mortality.

Conclusions: Patients with severe AS who were advised against surgery due to lack of symptoms, had significantly higher mortality than patients referred for AVR.

Troponin T was an independent predictor of mortality. Our results suggest that in patients with severe AS, AVR should be considered even in "asymptomatic" patients, particularly if Troponin T is elevated.

Figure 1. Survival analysis. Kaplan-Meier curve reflecting survival in asymptomatic patients with severe aortic stenosis compared to 100 age- and gender matched patients referred to operation.



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Utilization of machine learning to identify gender-specific patterns in short- and long-term mortality after Cardiac Resynchronization Therapy

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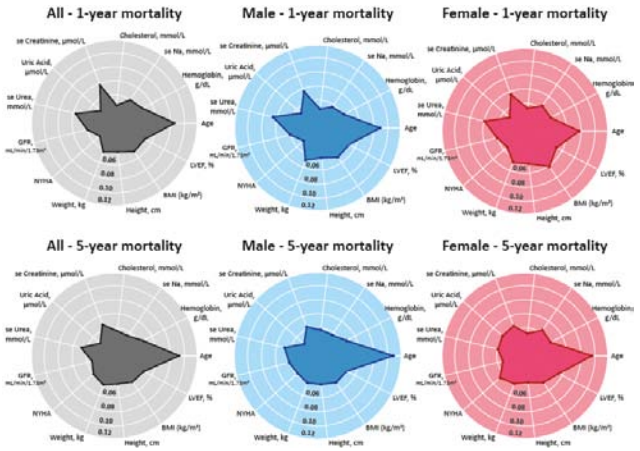
Background: Cardiac Resynchronization Therapy (CRT) is a standard treatment for chronic heart failure with decreased ejection fraction and wide QRS complex. However, not every patient benefits from the treatment, moreover, some studies reported difference in the outcomes between male and female patients.
Purpose: In the current study we utilized machine learning (ML) to explore gender-specific patterns among the predictors of 1- and 5-year mortality in patients undergoing CRT implantation.
Methods: We created six separate random forest models to predict 1- and 5-year all-cause mortality (3 for both follow-up duration: entire cohort, males and females). A registry of 2269 patients (66±10 years, 1700 [75%] males) was used as the training set for the 1-year mortality prediction models, whereas 5-year mortality prediction models were trained on the subset of patients who completed 5 year follow-up (n=1650, 66±10 years, 1258 [76%] males). 47 pre-implant parameters including cardiovascular risk factors and clinical variables were utilized to train our models. For each clinical parameter, we calculated the mean decrease in Gini impurity. Based on the extent of decline, the 10 most important features were selected, we took the union of these features and plotted the results on radar charts.
Results: There were 267 (12%) deaths during the 1-year and 879 (53%) deaths during the 5-year follow-up period. For the entire population the most important predictor of 1-year mortality was age followed by serum creatinine and urea levels (mean decrease in Gini impurity [dG]: 0.086, 0.058 and 0.057, respectively). To predict 5-year mortality, age, serum urea and left ventricular ejection fraction (LVEF) were of paramount importance (dG: 0.093, 0.049 and 0.048 respectively). We observed several gender-specific differences, the most important predictors of 1-year mortality were age, serum urea and creatinine for males (dG: 0.089, 0.066 and 0.055, respectively); age, body mass index (BMI) and serum urea for females (dG: 0.077, 0.062 and 0.059 respectively). In males the strongest predictors of 5-year mortality were age, serum urea and LVEF (dG: 0.108, 0.048 and 0.0.47, respectively), whereas in females these were age, LVEF and NYHA class (dG: 0.096, 0.055 and 0.047, respectively).
Conclusions: As explored by ML, there are marked differences between males and females regarding the predictors of mortality following CRT implantation. The most relevant predictors are age, renal function parameters, LVEF, BMI and NYHA class, however, their importance changes over time, which should be taken into consideration.



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Papillary muscle dyssynchrony-mediated functional mitral regurgitation: mechanistic insights and modulation by cardiac resynchronization

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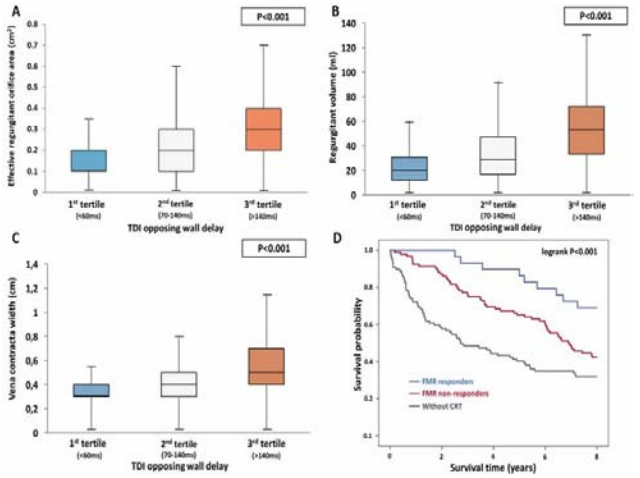
Background: Mechanistic features of functional mitral regurgitation (FMR) include papillary muscle displacement due to left ventricular remodeling. Intraventricular conduction delay might further augment this condition by introducing interpapillary muscle dyssynchrony.



Dyssynchrony-FMR

Objectives: To define this mechanism as a major contributing factor in FMR and prove the reversibility of FMR by interpapillary muscle resynchronization.
Methods: We enrolled 269 chronic HFrEF patients with conduction delay and comprehensively assessed dyssynchrony by complementary echocardiographic techniques. Opposing wall delay, calculated by speckle tracking, was determined as the time difference between peak longitudinal strain of the mid-anterior and inferior wall from a 2-chamber view. Furthermore, opposing wall delay was assessed as the time difference between peak strain values from tissue Doppler velocity-coded data of the mid-inferior septal and mid-lateral wall segments.
Results: Patients with severe FMR had markedly increased interpapillary longitudinal dyssynchrony (160ms[IQR120-200]) compared to those with moderate (70ms[IQR40-110]), no, or mild FMR (60ms[IQR30-100]; P<0.001). Increased interpapillary muscle dyssynchrony was correlated with effective regurgitant orifice area (P<0.001; Figure A), regurgitant volume (P<0.001, Figure B) and vena contracta

width (P<0.001, Figure C). Restoration of longitudinal papillary muscle synchronicity by cardiac resynchronization therapy (CRT) was correlated with FMR regression, as reflected by the reduction in regurgitant volume (P<0.001) and vena contracta width (P<0.001). Conversely, the improvement of FMR was associated with improved interpapillary radial (P=0.006) and longitudinal (P<0.001) dyssynchrony. The improvement of dyssynchrony-mediated FMR signified a better prognosis compared to no improvement in FMR during the 8-year follow-up period even after comprehensive adjustment by a bootstrap-selected confounder model (adj. HR of 0.41; 95% CI 0.18-0.91; P=0.028; Figure D). The results remained virtually unchanged after adjustment for left bundle branch block.

Conclusion: Intraventricular dyssynchrony introduces unequal contraction by papillary muscle bearing walls, which has an adverse effect on FMR. CRT can effectively restore interpapillary balance and thus create a less tented leaflet configuration, resulting in a clinically meaningful reduction of FMR. The restoration of papillary muscle synchronicity in dyssynchrony-mediated FMR translates into a significantly better prognosis.

Clinical Case - Advanced interventions from Alpha to Omega

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Venovenous ECMO as a rescue tool in acute respiratory failure during LVAD implantation in a patient with Cardiogenic Shock

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We report a case of a 48 year-old gentleman with past history of non-ischemic severely dilated CMP, persistent AF, S/P CRT-D and both alcohol and tobacco abuser who was transferred to us for possible advanced heart failure therapy after being admitted with acute decompensated heart failure and rapidly progressed to cardiogenic shock with multi-organs dysfunction including renal failure, hepatic failure and cerebral hypo-perfusion. Upon arrival, he was started on dialysis and placed on VA ECMO to provide full hemodynamic support as a bridge to decision. . His RV function was mildly to moderately impaired. LVAD was inserted one week after admission due to failure to wean VA ECMO despite significant inotropic support. During surgery for LVAD, VA ECMO was shifted to VV ECMO; as a rescue procedure for intraoperative pulmonary edema and severe resistant hypoxia. Intraoperative TEE showed no worsening RV systolic dysfunction but worsening of pulmonary HTN. Insertion of the VV ECMO occurred via the left femoral vein (LFV) cannula and right internal jug IJ cannula under TEE. Over the next 4 days, there were many challenges which were total atelectasis of left lung twice (resolved through bronchoscopic lavage with clot removal) and transient renal shutdown required continuous renal replacement therapy. Bedside echo was frequently the corner stone to evaluate the pulmonary artery pressure and RV dimensions and systolic function especially after resolution of lung issue to decide removal of VV ECMO. VV ECMO has been successfully removed successfully in the 5th day.There is no prior reported case of using VV ECMO for acute respiratory failure during VAD surgery. In our patient: VV ECMO was helpful to pass the acute respiratory failure phase but unfortunately because of Left lung's atelectasis caused by blood clot, its removal was postponed until day 4 postoperatively otherwise it should be removed as soon as possible to avoid vascular complications and infection.
Learning objectives: (1) VV ECMO could be a rescue procedure in case of acute respiratory failure during VAD surgery, (2) Right side invasive monitoring and bedside echo evaluation are helpful tool to decide removal of the VV ECMO, (3) LVAD can be used as a bridge to decision

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The combined use of left ventricular assist device and extracorporeal membrane oxygenation in a patient with severe heart failure due to myocardial infarction after stent thrombosis

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A 56-year-old male patient was transferred to our hospital with severe heart failure due to acute myocardial infarction after stent thrombosis of the left anterior descending artery. He progressed to multi-organ failure requiring intubation and maximal doses of multiple inotropic agents. Invasive cardiac output monitoring was implemented using the Swan Ganz pulmonalis catheter system. Circulatory support was first provided by an extracorporeal membrane oxygenator (ECMO) due to low-output related right ventricular (RV) failure with enhanced pulmonary artery pressures (pulmonary mean pressure 50 mmHg and pulmonary wedge pressure 40 mmHg) demonstrating poor LV unloading. The hemodynamic worsening was also triggered by concomitant development of pneumonia yielding septic shock caused by an Acinetobacter baumannii infection. Five days after ECMO implantation the patient was partially weaned from the ventilator, being completely awake and speaking with the help of a tracheostomy tube.
The first weaning attempt from the ECMO system, one week after implantation, failed. Cardiac index parameters, determined by the Fick principle, were very low between a rate of 1.4 to 1.6 L/min/m2. Echocardiographic findings revealed a severely reduced systolic cardiac function with a LV ejection fraction of 15%. Besides, the patient developed heparin induced thrombocytopenia with several hemoglobin relevant bleedings from the ECMO puncture sites. Thus heparin was replaced by argatroban with no longer major bleeding events at follow-up. At day 8, the patient developed pulmonary edema due to fluid overload yielding RV decompensation and subsequent LV compression after required enhancement of the ECMO flow. Facing this massive LV failure on ECMO, we decided to perform LV decompression with a percutaneous cardiac assist device. Immediately after Impella positioning, right-sided pressures, left-sided volumes, and pulmonary edema rapidly decreased (Impella outflow 2,0 L/min, pulmonary mean pressure 20 mmHg, and pulmonary wedge pressure 14 mmHg), paralleled by an average systemic arterial mean pressure of 70 mmHg under low-dose dobutamin and an ECMO flow of 2l/min. However, the second ECMO weaning attempt under Impella support also failed, indicating the poor cardiac function, verified by echocardiographic parameters. Therefore we decided a biventricular unloading until admission to a heart center, where a Levitronix CentriMag system was implanted. Unfortunately the patient died 5 days after implantation due to diffuse haemorrhage related to hyperfibrinolysis.
To conclude the implantation of ventricular assist devices is a logistical and ethical challenge and needs to be evaluated very carefully with a clearly defined 'exit strategy' for the patient.

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Oversizing amplatzer device for aortic valve closure in patient with L-VAD, aortic regurgitation and dilated aortic annulus

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Objective: Development of aortic regurgitation (AR) is a significant complication in patients with long-term LVAD support, leading to recurrent clinical heart failure symptoms and significantly increased mortality. Recently, percutaneous interventions, such as transcatheter aortic valve replacement (TAVR) and percutaneous occluder devices, have emerged. TAVR is a challenging procedure in these patients, because of the subsequent difficulty in anchoring the prosthesis in a non-calcified aortic annulus, especially in the presence of a dilated aortic annulus. Pre-stenting strategy with an uncovered stent to prepare an easy landing-zone for TAVR has been described; anyway it's not always feasible in very dilated aortic annulus. We report the case of a percutaneous transcatheter aortic valve closure with oversizing of the prosthesis, in order to treat AR in a dilated aortic annulus.
Methods: A 68-year old man was admitted to our Hospital with rapidly progressive symptoms of fatigue and shortness of breath 3 years after continuous-flow L-VAD implantation. Severe AR and severe pulmonary hypertension were detected at echocardiography, while a CT-scan showed a virtual basal ring perimeter of 9,3 cm. Because of high surgical risk and contraindication to heart valve transplantation for severe comorbidities, the patient underwent right transfemoral positioning of an Amplatzer PFO MF 30 mm Device. At the end of the procedure, a severe paravalvular leak was observed. In order to prevent device migration and hemolysis, an oversizing Amplatzer MF 35 mm was implanted.
Results. Cardiac hemodynamic improved with RPM reduction from 11.400 to 10.600, the post-procedural wedge of 6 mmHg, reduction in Pulsatility Index (PI) from 6 to 3 and a MAP of 70 mmHg. the Absence of paravalvular leaks was detected at TE-echocardiography.
Conclusions: We consider this technique a useful novel approach to treat AR in patients with aortic annulus dilatation and L-VAD that are poor candidates for repeat operation. Further data are needed to assess long-term results.

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Fulminant lymphocytic myocarditis with cardiogenic shock and multiorgan failure with complete recovery after percutaneous mechanical support and immunosuppression.

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Fulminant myocarditis is rare but serious myocardial inflammatory disease that presents with acute heart failure, cardiogenic shock and/or life-threatening arrhythmias. The management often requires intensive care, inotropes and mechanical circulatory support. Immunosuppressive therapy may result in a complete recovery. We report a case of previously healthy 19- year-old female that presented to regional hospital after two days of gastrointestinal symptoms with 3rd degree AV block, left ventricular (LV) systolic dysfunction (LVEF 40 %), significantly elevated cardiac biomarkers (hsTnT 13850 ng/l, NTproBNP 19686 ng/l) and cardiogenic shock requiring inotropes, temporary pacing and endotracheal intubation. Coronary angiography showed patent coronary arteries. Within next 24 hours, her status deteriorated with development of severe biventricular dysfunction (without wall thinning), widening of QRS complex and multiple organ failure. She was transferred to our center for further management and peripheral VA-ECMO was introduced. However, LVEF dropped to less than 10% with further QRS widening. An endomyocardial biopsy (EMB) revealed diffuse lymphocytic myocarditis (LM), resembling severe cellular allograft rejection with diffuse interstitial edema, but relatively sparse myocyte necrosis. FACS analysis of EMB showed CD4/CD8 ratio shifts to 1/3, normal ratio is 3/1. Both CD4 and CD8 Tcells were activated, rather than in a naïve status. Activated cells were predominantly Th1 cells. There was a significant expansion of CD14+CD16low cells (inflammatory, classical monocytes). PCR for panel of possible viral pathogens in the EMB specimen was negative. Therefore, immunosuppression with 1g/day (in 3 days) of methylprednisolone and intravenous IgG (0,5 g/kg, once) was instituted. Because of development of long runs of incessant VT (rate 220/min.) and LV dilatation, Impella 2.5 was introduced to achieve LV venting and to improve myocardial edema drainage. Immediately after addition of Impella to VA-ECMO, VTs ceased and QRS complex narrowed. Due to continuing LV dysfunction, Impella 2.5 was exchanged for Impella 5.0. On the day 10, echocardiogram showed significant recovery of LVEF. Therefore, VA-ECMO was discontinued on the day 11 and Impella was explanted on the day 13. Further recovery was uneventful and the patient was discharged after 44 days. Clinical status was stabilized with normal cardiac function by echocardiography and normal BNP and troponin levels. She is currently being tapered off of low dose of prednisone 2,5mg/day.

Conclusions: Our case illustrates that if acute viral infection is ruled out, immunosuppressive protocol can be successfully used in management of fulminant LM together with temporary mechanical circulatory support consisting of VA-ECMO + Impella. Rapid resolution of QRS prolongation and LV dysfunction with LV unloading by Impella suggest possible role of myocardial edema in development of severe mechanical ventricular dysfunction.

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A case of cardiac sarcoidosis diagnosed after heart transplantation

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A 53-year old female Caucasian was admitted to our hospital due to presyncope and shocks delivered from her defibrillator. She had been diagnosed with non-ischemic cardiomyopathy two years ago in a tertiary hospital, where she was admitted because of worsening exertional dyspnea. In that hospitalization, reduced left ventricular ejection fraction (LVEF) and new onset conduction abnormalities [1st degree atrioventricular block (AVB) -left bundle branch block with intermittent complete AVB] were documented. A Magnetic Resonance Imaging (MRI)-scan had revealed LVEF 26%, akinetic interventricular septum (IVS) and hypokinetic anterior (AW) and inferior (IW) walls and diffuse late gadolinium enhancement mainly located at the IVS and AW and to a lesser extent to IW and anterolateral wall (with transmural /midwall distribution), a pattern indicative of old myocarditis or atypical non-ischemic cardiomyopathy. The patient had been implanted CRT-D 18 months before, but this was the first time it delivered shocks. In our hospital, she received intravenously amiodarone and esmolol and ventricular tachycardia was successfully terminated. However, the patient rapidly deteriorated. Dobutamine was initiated and the patient was transferred to the Cardiac Care Unit where an intra-aortic balloon pump (IABP) was placed. Under IABP and intravenous inotropes the patient's haemodynamic status improved and no further arrhythmias occurred. However, the patient was unable to wean off IABP and intravenous inotropes. As a result, the patient became candidate for heart transplantation and an extensive pre-transplant evaluation, including total body Computerized Tomography (CT) was performed. Chest CT revealed few sub-pleural nodules mainly in upper lobes compatible with small granulomas. Successful heart transplantation was performed after three months. Post-transplantation histology of the patient's native heart revealed diffuse inflammatory reaction with noncaseating granulomas and few giant cells, findings consistent with cardiac sarcoidosis.

This case highlights the need for high clinical suspicion of rare, potentially reversible causes of heart failure, especially in patients with clinical/paraclinical findings suggestive of specific causes (conduction abnormalities and MRI findings in our patient). Diagnosis of cardiac sarcoidosis in the absence of previously documented systemic sarcoidosis remains intriguing and requires high clinical suspicion. Endomyocardial biopsy, a procedure that might be diagnostic, especially if guided, was not performed in our patient, due to the relatively insidious onset of heart failure symptoms and her end-stage heart failure status. Conclusively, endomyocardial biopsy, although invasive, potentially dangerous and not always conclusive, may be considered in selected, relatively young patients with unexplained dilated cardiomyopathy and clinical features suggestive of infiltrative disease.

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Successful transplantation of heart from a donor with Takotsubo syndrome

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One reason for the shortage of donor hearts is the fact that current guidelines recommend against the use of donor hearts with regional wall motion abnormalities or left ventricular ejection fraction <40%. Fully reversible acute stress-induced cardiac dysfunction (Takotsubo syndrome) can occur in the setting of severe somatic stress and catecholamine excess. Here we present a donor heart with left ventricular dysfunction due to Takotsubo syndrome that was successfully transplanted.

The donor was a previously healthy, 59-years old female, with rapid onset of headache and neurological deterioration. In the ambulance, she became suddenly unconscious with seizures, respiratory arrest and hypoxia. She was successfully resuscitated after a brief period of CPR. Upon arrival to the hospital, her Glasgow Coma Scale was 3 and CT-scan showed a massive subarachnoid hemorrhage originating from a basilar aneurysm. The neurosurgeon was consulted but further measures were considered futile. She was transferred to the ICU where brain dead was diagnosed a couple of hours later. Echocardiography twelve hours after onset of symptoms revealed a left ventricle with apical akinesia in the apical and EF 35%. Troponin levels were modestly increased at 888 ng/l. Coronary angiography was performed 24 hours after onset of symptoms and showed normal coronary arteries. Ventriculography confirmed apical akinesia and basal hypercontractility typical for Takotsubo syndrome. End-diastolic pressure was 10 mmHg.

The recipient was a 57-year-old man on waiting list for heart transplantation for three months due to dilated cardiomyopathy diagnosed 12 years earlier. He was on guideline-recommended therapy, including synchronized biventricular pacing. Despite optimal therapy, cardiac function had deteriorated substantially during the last months. At the time he was accepted for heart transplantation he had biventricular heart failure with a dilated left ventricle and EF <20%, a moderate mitral insufficiency and a right ventricular systolic pressure of 70 mmHg. The peri-operative period was uneventful and the heart was successfully transplanted. Peri-operative transesophageal echocardiography showed good bi-ventricular function after ECC. Post-operatively, he had severe vasoplegia and required vasopressor support the first postoperative days. He had pulmonary hypertension that was treated with inhaled vasoprost and later per-oral sildenafil. He also developed acute renal failure with need of renal replacement therapy. However, left ventricular function was good with a hyperdynamic left ventricle and an ejection fraction >65% two days postoperatively (Video 3). Right ventricular function was initially compromised but was normalized within two weeks. He was discharged from the ICU after 14 days.

Poster Session 2

Ventricular Arrhythmias and SCD

P874

The electrocardiographic markers of sudden cardiac death (SCD) and left ventricular global longitudinal strain in recovery peripartum cardiomyopathy patients : do they really recover?

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Background: The risk of arrhythmia and sudden cardiac death was prevalently high in Peripartum Cardiomyopathy (PPCM) patients, regardless of complete left ventricular ejection fraction (LVEF) recovery. The previous study has shown that residual myocardial injury might be a potential risk of arrhythmia in recovered PPCM patients. Global longitudinal strain (GLS) with speckle tracking analysis is more sensitive than LVEF to identify subclinical LV dysfunction in cardiomyopathies. This study was conducted to assess the association between ECG markers of SCD and LV GLS in recovery PPCM patients. To date, study related to ECG markers of SCD and their association with LV GLS in this population has not been reported.
Methods: Data were obtained from registry of PPCM in our Hospital, Faculty of Medicine, Indonesia. The data comprised of 12-lead ECGs and 2-D Echocardiography from recovered PPCM patients (n=35 women). The QRS duration, QTc interval using Bazett's formula, T peak to T end interval, and spatial QRS-T angle were measured from the 12-lead ECG prior to and unrelated to the SCD event. LV GLS was measured from the apical 2-, 3-, and 4-chamber views using speckle-tracking analysis. The bivariate analysis was analyzed using Pearson correlation and the linear regression multivariate analysis was analyzed using alternative models.
Result: Thirty-five recovery PPCM patients (mean age 31 ± 6 years) were enrolled in this study. Bivariate analysis showed there was a significant strong negative correlation between QTc and GLS (r=-0.645 ; p-value <0.001). A significant negative correlation was found between T peak to T end interval and GLS (r=-0.430; p-value=0.005) and between spatial QRS-T angle and GLS (r=-0.345; p-value=0.021). There were no correlation between QRS duration with GLS (p-value >0.05). Statistical analysis results showed that among studied markers, the strongest association for single marker was found between QTc and GLS value (R2=0.451). Further analyses utilizing alternative model also resulted a strong association between GLS value with combination of QTc and other ECG markers. Among all combinations of ECG markers, however, combination between QTC and T peak to T end interval with GLS value (R2=0.500) produced even stronger association.
Conclusions: From 12-lead ECG markers for SCD, QTc alone had demonstrated the strongest association with low GLS compared to QRS duration, T peak to T end interval, and spatial QRS-T angle. Utilizing a combination of ECG markers, QTc and T peak to T end interval gave a better association with GLS value compared to other markers.

P875

The characteristics of electrocardiographic markers of sudden cardiac death (SCD) in recovery peripartum cardiomyopathy patients : a novel study

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Objective: This study was conducted to asses the characteristics of electrocardiographic markers of sudden cardiac death (SCD) from the 12-lead electrocardiogram (ECG) in recovery peripartum cardiomyopathy (PPCM) patients.
Background: A Patient with PPCM has a risk of ventricular arrhytmia or sudden cardiac death (SCD). The risk of SCD persist even after complete recovery of left ventricular function. This study was conducted to asses known ECG markers for SCD in recovery PPCM patients. The study of ECG markers of SCD in this population has not been reported.
Methods: Data was obtained from registry of PPCM in our Faculty of Medicine, Indonesia, 12-lead ECGs were taken from recovery PPCM patients (29 women) compared to post labor women without PPCM in control group (29 patients). The QRS duration, QTc, T Peak to T end, spatial QRS-T angle, delayed QRS transition zone, and electrocardiographic LVH were measured from the 12-lead ECG prior to and unrelated to the SCD event in both groups. The QRS duration, QTc, T Peak to T end, QRS-T angle, delayed QRS transition zone, and electrocardiographic LVH were analyzed using Mann-Whitney test, Independent Samples T-Test, and Chi-Square test. Continuous variable were expressed as mean ± standard deviations if normally distributed and as median (minimum-maximum) if abnormally distributed.
Result: Twenty-nine PPCM patients in PPCM group (mean age 31 ± 6.2 years) and 29 healthy post labor women without PPCM in control group (mean age 31 ± 4.6 years) were enrolled in this study. The QRS duration were significantly higher in PPCM group compared to the QRS duration in control group (median 100 (80-110) ms vs 80 (74-96) ms; p-value <0.001). The QTc were significantly higher in PPCM group compared to the control group (median 443 (359-491) ms vs 410 (353-468) ms; p-value <0.001). The T peak to T end were significantly higher in PPCM group compared to the control group (mean 85.8 ± 17 ms vs 70 ± 9.6 ms; p-value <0.001). The spatial QRS-T angle (median 28 (2-170) ms vs median 21 (6-113) ms ; p-value = 0.312) and delayed QRS transition zone (27.6% (n=8) vs 17.2% (n=5) ; p-value = 0.345) were not statistically significant difference between two groups.
Conclusions: The characteristics of electrocardiographic markers of sudden cardiac death (SCD) from the 12-lead electrocardiogram were significantly higher in the PPCM patients compared to the control group, particularly the QRS duration, QTc, and T peak to T end. Their potential clinical significances for predicting SCD is needed to be investigated in larger sample and prospective studies.

P876

Impact of sustained cardiac tachyarrhythmias recorded in coronary intensive care unit (cicu) on short and long-term mortality and duration of cicu hospitalization.

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Introduction: Several studies conducted in Coronary Intensive Care Units (CICU) have demonstrated that ventricular arrhythmias (VAs) are associated with increased short and long-term mortality after acute coronary syndromes. However, the data for arrhythmias occurred in CICUs due to other cardiac disorders is limited. PurposeWe aimed to show the impact of VAs and supraventricular tachycardias (SVTs) recorded in CICU hospitalized patients on short and long-term mortality and duration of CICU hospitalization.
Methods: We conducted a prospective single-center observational study, which included consecutive patients (>18 years old) who was admitted to the CICU of the Cardiology department of our University Hospital for any cardiac disorder, from 1st January 2014 until 31st May 2017.ResultsNine hundred forty-three (943) consecutive CICU patients [age 66.35±15.52; 667 male (70.7%)] were included in our analysis (Table 1). The most common causes of CICU admissions were acute coronary syndromes (68.7%), followed by acute heart failure (17%). Patients who presented an arrhythmia had a higher all-cause mortality (12.9% vs 6.1%; p=0.003); a higher in-CICU mortality (8.1% vs 4%; p=0.002) and higher mortality after

Table 1.

	All*v*=943 (100%)	No arrhythmia *v*=757 (100%)	Arrhythmia 186 (100%)	Supraventricular tachyarrhythmia *v*=63 (100%)	Ventricular tachyarrhythmia *v*=123 (100%)
Death	70 (7.4%)	46 (6.1%)	24 (12.9%)	4 (6.4%)	20 (16.2%)
In-CICU death	45 (4.8%)	30 (4%)	15 (8.1%)	2 (3.2%)	13 (10.6%)
Death during 6-month follow-up period	25 (2.6%)	16 (2.1%)	9 (4.8%)	2 (3.2%)	7 (5.7%)

Arrhythmias occurrence, in-CICU mortality and 6-month outcomes.

discharge (4.8% vs 2.1%; p= 0.006). The occurrence of VA was associated with higher all-cause mortality compared to no arrhythmia (16.2% vs 6.1%; p= 0.003) and to SVT (16.2% vs 6.4%; P=0.003). In-CICU mortality was greater in patients with VAs than in patients with no arrhythmia (10.6% vs 4%; p= 0.02) or with SVT (10.6% vs 3.2%; p=0.02). VAs were also associated with greater 6-month all-cause mortality than SVTs (5.7% vs 3.2%; p<0.05) or no arrhythmia (5.7% vs 2.1%; p<0.05). No significant correlation between the occurrence of SVTs and all-cause mortality was observed. The mean duration of CICU hospitalization for the patients who presented arrhythmias was 3.90±4.91 days, while for the patients who did not present was 2.79±3.31 days (p=0.004).ConclusionsThe occurrence of arrhythmias prolonged the CICU hospitalization in our patients, while patients suffered from VA had a significantly higher short (in-CICU) and long-term (6-month follow-up) mortality. Our results confirm the poor prognosis of VA not only in ACS patients but also in all CICU hospitalized patients and show that early onset VA is associated with prolongation of CICU stay and poor outcome.

P877

Survival of patients with ischemic cardiomyopathy and ventricular tachyarrhythmias: Effect of catheter treatment

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Background: Ventricular arrhythmias contribute to significant increase of mortality rate in patients with ischemic cardiomyopathy (ICM). Risk of sudden cardiac death (SCD) could be reduced after implantation of a cardioverter-defibrillator (ICD), yet at the same time more frequent shock episodes are associated with poor life quality and higher hospitalization rate. Radiofrequency (RF) ablation of triggering ventricular premature beats or substrate-based catheter treatment are considered to be effective in patients with ICM but prognosis remains controversial.
The purpose of the study was to evaluate role of catheter treatment of ventricular tachyarrhythmias (VTA) and its effect on survival in patients with ischemic cardiomyopathy.
Materials and methods: We enrolled 72 consecutive patients (mean age 64±13 years, 63 male) with prior myocardial infarction (more than 40 days ago) and documented ventricular tachycardia (VT) episodes, including 12 patients which underwent emergency electrical storm ablation. Considering number of VT recurrence episodes after catheter treatment all patients were divided into two groups. First group consisted of 27 patients (37%) with recurrent sustained VT (mean age 62 ± 10 years) while second group included 45 patients (63 %) without VT recurrence (mean age 63± 12 years). During follow up most of VT episodes were registered in 13±9 years after acute myocardial infarction. Catheter treatment included mapping during hemodynamically tolerated clinically relevant VT and then ablation of VT triggers with subsequent homogenization of the scar. Patients with "fast" VT underwent primary scar homogenization.
Results: Effectiveness of RFA in patients with ICM and clinically relevant VT was 63%. During follow-up period all patients were alive and remained relatively stable. Long-term effectiveness of ES elimination was 100% while freedom from clinically significant VTA was up to 79% due to repeated ablation procedures. We also observed improvement of NYHA functional class in 80% of patients.
Conclusion: Catheter ablation of VTA may be effective treatment both in acute period and long term follow up. It also may be effective in improvement of heart failure NYHA functional class in some patients and contributes to better survival in patients with ICM.

Chronic Heart Failure - Pathophysiology and Mechanisms

P878

Right ventricle function as a predictor of worse prognosis in patients with advanced heart failure with reduced ejection fraction

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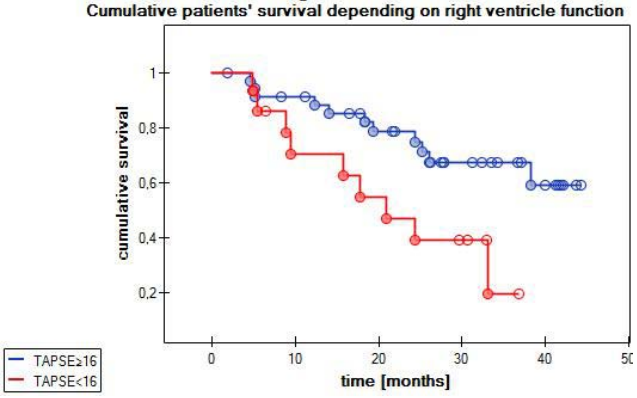
Background: Left heart failure may contribute to occurrence and progression of a secondary right ventricle dysfunction. It was previously demonstrated that parameters defining right ventricle function, like a tricuspid annular plane systolic excursion (TAPSE), correlate with indicators of exercise capacity.
Purpose: The aim of the present study was to evaluate whether right ventricle function can predict prognosis in patients with reduced left ventricle ejection fraction.
Material and Methods: Fifty one patients (aged 55.6±7.5 years) – 43 men (84%) and 8 women (16%) with advanced heart failure (LVEF≤35%, mean 21.7±5.4) were referred to a transplant center to be assessed for their suitability for heart transplantation. Patient demographics and clinical characteristics, including results of cardiopulmonary exercise test, echocardiographic examination and right heart catheterization, were recorded. The following parameters were used to evaluate right ventricle size (RVOT, RVIT) and function (TAPSE, S', FAC, global longitudinal strain and free wall strain). Patients were followed up for up to 3.7 years (1.96±1.05 years on average). The composite endpoint defined as death of any cause, urgent heart transplantation or urgent LVAD implantation occurred in 20 patients (39%).
Results: TAPSE positively correlated with peak VO2 (R=0.35, p=0.01). There was no relationship between TAPSE and age, sex, heart failure etiology, NYHA class, NT-pro-BNP, co-morbidities, left ventricle function or size, pulmonary systolic or pulmonary capillary wedge pressure. Cox proportional hazards regression analysis showed TAPSE<16mm as a significant predictor of composite endpoint (HR 2.86, 95% CI: 1.16-7.08, p=0.02), which was consistent with logrank test result (Chi2=5.7, p=0.02; Figure 1 shows Kaplan Meier curves). The remaining parameters measuring right ventricle function and size were not related to patient prognosis.
Conclusion: Right ventricle dysfunction assessed with TAPSE may predict worse physical capacity and poorer prognosis in patients with left heart failure.

Figure 1.
Cumulative patients' survival depending on right ventricle function



P880

Cardiodepression and subepicardial obesity: is there a connection?

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Introduction . The left ventricular ejection fraction (LVEF) is an integral indicator of systolic function, and the most frequent cause of a decrease in the ejection fraction is coronary heart disease, especially its acute forms. The pathogenetic significance of subepicardial obesity (SEO) in the pathogenesis of cardiac pathology is not fully understood, and the data in the literature are contradictory.
Purpose. To study the severity of subepicardial obesity and its relationship with LVEF in patients with primary stenting for AMI.
Methods. 22 patients were examined, the average age was 56.2 ± 9.6 years (6 women, 16 men), 6 weeks after AMI with stenting of coronary arteries ad hoc. The control group - 20 healthy volunteers, average age 51.4 ± 11.4 years (10 women, 10 men). LVEF was estimated by the Simpson method. Epicardial fat was defined as the echo-negative space between the myocardial wall and the pericardial visceral leaf, visualized behind the free wall of the right ventricle in B-mode using the parasternal position along the long axis of the left ventricle at the end of systole. The significance and strength of the correlation relationship were determined using the non-parametric Spearman test.
Results. The study established the average thickness of epicardial fat in patients - 4.24 ± 1.34 mm, in healthy volunteers - 3.62 ± 1.40 mm (the differences are not statistically significant). The mean value of LVEF in patients was 54.1 ± 5.15% and 65.1 ± 3.6% in healthy individuals (p <0.0001). As a result of the study, a negative significant correlation relationship r = −0.51 (p <0.05) was found between LVEF and thickness of subepicardial fat in patients. The control group did not find a significant relationship between the systolic function of the left ventricle and the thickness of epicardial fat (r = -0.17, p> 0.05).
Conclusion. The presence of an inverse relationship between LVEF and thickness of epicardial fat only in patients with primary stenting for AMI indicates the significance of SEO in the pathogenesis of heart failure, the mechanism of which requires further study.

P881

Markers of cardiac adverse events in patients with reactive fixed pulmonary hypertension secondary to systolic heart failure treated with sildenafil

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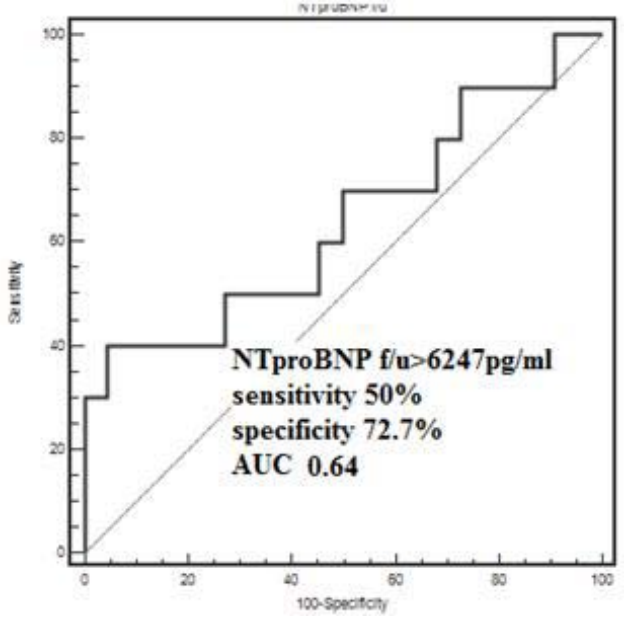
Objective: Reactive fixed pulmonary hypertension (RFPH) in patients with advanced systolic heart failure (HF) is a contraindication do heart transplantation (HTx) and is associated with increased morbidity and mortality. Oral sildenafil has been used in selected heart failure patients to reduce pulmonary hypertension and to restore heart transplant candidacy. We sought to determine predictors of cardiac adverse events (CAE) such as death or HF decompensation in patients with systolic HF and RFPH treated with sildenafil.
Methods and results: Between 2007 and 2018, 1136 patients were evaluated at our department as candidates for HTx. 35 of them, who presented with systolic HF and were ineligible for HTx due to RFPH [pulmonary vascular resistance (PVR)>2,5 Wood units (WU), transpulmonary gradient (TPG)>12 mmHg or ≤2,5 WU with systolic arterial pressure ≤85 mmHg during vasoreactivity test] were included in the study [31 men aged 55.1±7.4 years]. In all patients sildenafil was introduced and up-titrated to a maximal tolerated dose in addition to optimal medical therapy. Patients were reassessed at 3-6 months intervals. 22 (63%) had restored HTx candidacy following sildenafil therapy within median 5 [IQR 4-6] months. In the whole cohort, during oral sildenafil therapy we observed improvement of NYHA class [from 2.9±0.2 to 2.7±0.5, p=0.05]. 19 patients (54%) reported reduction of HF symptoms. Pulmonary hemodynamic parameters had reduced as follows: pulmonary artery systolic pressure [67±14 to 54±15 mmHg, p<0.001], mean pulmonary artery pressure [42±8 to 34±11 mmHg, p<0.001], TPG [19±6 to 14±7 mmHg, p<0.001] and PVR [5.0±1.7 to 3.4±1.7, p<0.001]. In 10 (29%) patients CAE such as death (5 pts) and heart failure decompensation (5 pts) were noted during median 16 months [IQR 9-30].
Baseline GGTP [OR 1.01; 95% CI (1.0-1.03) p=0.04], and follow-up (f/u): GGTP [OR 1.0; 95% CI (1.0-1.01) p=0.05], NTproBNP [OR 1.0002; 95% CI (1.0000- 1.0004 p=0.002], left ventricular (LV) end-diastolic volume [OR 1.02; 95% CI (1.00-1.04) p=0.03], LV ejection fraction [OR 0.57; 95% CI (0.33-0.97) p=0.03] were defined as markers of CAE in patients with systolic HF and RFPH treated with sildenafil. f/u NTproBNP was identified as an independent but moderate predictor of CAE at level of more than 6247 pg/ml, with sensitivity 50%, specificity 72.7% (AUC 0.64, p=0.03).
Conclusion: Higher follow-up NTproBNP levels are associated with cardiac adverse events in patients with reactive fixed pulmonary hypertension secondary to systolic heart failure treated with sildenafil.



NTproBNP as predictor of adverse events

P882

Incidence and predictors of pacemaker induced cardiomyopathy: a single-center experience

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Background: Pacemaker induced Cardiomyopathy (PICM) is an important cause of heart failure with reduced ejection fraction in patients exposed to frequent right ventricular (RV) pacing. Data regarding this complication are sparse. Therefore, the aim of this study was to identify the incidence and predictors of PICM.
Methods: Between 2011 and 2017, 857 consecutive patients undergoing pacemaker (PM) implantation, were reviewed, and according to our inclusion criteria 173 individuals were enrolled in this retrospective single center study. All patients included had normal left ventricular ejection fraction (LVEF) before implantation and underwent single-chamber ventricular or dual-chamber PM implantation. Frequent RV pacing was present (≥ 20%), and repeated echocardiogram was available ≥1 year after implantation. PICM was defined as deterioration LVEF ≥10%, resulting in LVEF <50%, which cannot be explained by other cardiac causes.
Results: During a mean follow-up of 39.9 ± 21.0 months, PICM occurred in 26 patients (16%) with post-Implantation LVEF being 38.6± 2.5% in patients with PICM vs 55.4 ± 7.4% in patients without PICM (p <0.001). RV pacing percentage did not differ significantly between the both groups (76.5 vs 76.2 %, p= 0.65). The PICM group patients were likely to be men (23/26 vs 82/147, p=0.002) and had a lower rate of arterial hypertension (HTN) (16/26 vs 121/147, p=0.016). Multivariable analysis revealed male gender (HR 8.4, 95% CI 2.16-32.58, p =0.002), lower prevalence of HTN (HR 4.9, 95% CI 1.71-14.09, p =0.003) and wider paced QRS complex (HR 1.04, 95% CI 1.02-1.07, p <0.001) as predictors of PICM.
Conclusions In patients with frequent RV pacing, the prevalence of PICM is not uncommon. Male sex and wider paced QRS complex are independent predictors of PICM and these patients may require closer follow-up.

P883

Logistic regression model to predict left ventricular ejection fraction recovery in a heart failure unit

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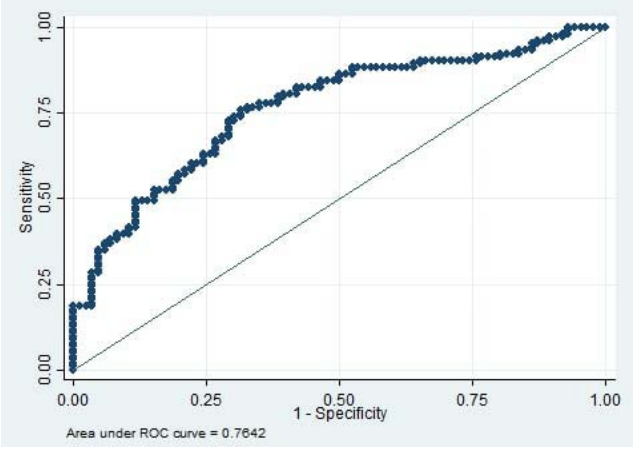
Background/Introduction: Heart failure with improved ejection fraction is a novel phenotype defined as improvement in left ventricular ejection fraction (LVEF) to>40% in patients with previous reduced ejection fraction (HFrEF).
Purpose To assess predictors of LVEF recovery in patients with HFrEF.
Methods We randomly selected a sample of 216 HFrEF patients from a heart failure unit diagnosed between January 1st of 2000 and September 23th of 2018. Univariate and multivariate logistic regression analysis were undertaken to select appropriate variables to predict LVEF recovery.
Results 56% patients showed improvement of LVEF. Female gender, antecedents of alcoholism, left bundle branch block and the etiology were significant predictors of LVEF recovery in the univariate analysis. Multivariate logistic analysis selected four parameters: female gender (coefficient - 0.99, CI:-1.83,-0.15, p=0.021), alcoholism (coefficient: 1.31, CI 0.23,2.38, p=0.017), idiopathic etiology (coefficient: 0.98, CI: 0.2, 1.76 p= 0.014), and tachycardiomyopathy (coefficient: 2.27, CI: 0.08,4.45, p=0.042). This model showed a good fit with a Homer-Lemeshow value of 0.41. The area under the ROC curve was 0.76, indicating a good discrimination power.
Conclusion: This multivariate model may be used in day-to-day practice to estimate patient-specific potential of LVEF recovery.

	Recovered LVEFN=121 (56%)	Non recovered LVEFN=95 (44%)	p
Sex (men)	82 (67.7%)	81 (85.26%)	0.003
Body mass index	28.75	30.25	0.32
HTA	70 (57.25%)	51 (53.28%)	0.38
Dyslipidemia	58 (47.93%)	55 (57.89%)	0.15
Diabetes mellitus	45 (37.19%)	39 (41.49%)	0.52
SmokersEx smokersNo smokers	49 (40.83)23 (19.17%)48 (40%)	37 (39.78%)16 (17.2%)40 (43.01%)	
Alcoholism	30 (25%)	9 (9.57%)	0.009
COPD	12 (9.92%)	15 (15.79%)	0.195
Peripheral artery disease	8 (6.61%)	8 (8.42%)	0.614
Stroke	10 (8.26%)	7 (7.37%)	0.81
Obstructive sleep apnea syndrome	16 (13.22%)	11 (11.58)	0.72
Etiology IdiopaticIschemic Hypertensive Tachycardiomyopathy Enolic Chemotherapy Valvular CongenitalFamiliar	46(38.33%)29 (24.17%)7 (5.83%9 (7.5%)11 (9.17%)5 (4.17%)4 (3.33%)2 (1.67%)7 (5.83%)	26 (27.18%)51 (54.26%)01 (1.06%)1 (1.06%)2 (2.13%)6 (6.38%)07 (7.45%)	<0.001
Initial LVEF (%)	28.65%	29.1	0.64
LVEDD (mm)	63.76	64.14	0.75
Control LVEF (%)	51.33	29.66	<0.001

Baseline and echocardiographic measurements



ROC curve

P884

Dynamics of left ventricular ejection fraction in patients with stable coronary artery disease after coronary artery bypass grafting

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Purpose: to study clinical characteristics of patients with stable coronary artery disease (CAD) in groups with different dynamics of left ventricular (LV) ejection fraction (EF) after coronary artery bypass grafting (CABG); to assess LV EF dynamics after CABG in groups with different baseline value (grade) of LV EF.

Methods: We conducted a prospective single-center study and enrolled 384 patients with stable CAD, selected for CABG (328 (85,4%) males and 56 (14,6%) females, age 39-92; average age (61±8) years. We analyzed demographic, clinical, laboratory, echocardiographic, coronary angiographic, intra- and postoperative data. The changes of LV EF were evaluated at period 1 (between 6 and 12 months after CABG) and period 2 (24 months after CABG). The total sample of enrolled patients were subdivided retrospectively into three groups according to the LV EF change: 1) 1st – LV EF relative change of ≥10% towards its improvement (n=110 [28,7%]); 2) 2nd – "without change" (LV EF relative change up to 10% in both directions; n=207 (53,9%); 3) 3rd – LV EF relative change of ≥10% towards its decline (n=67 [17,4%]). LV EF at both follow-up periods was assessed in 128 (33,3%) patients. The sample of 128 patients was used for LV EF change evaluation depending on baseline LV EF grade: LV EF ≥50% (n=35; 27,3%); LV EF 40-49% (n=27; 21,1%) and LV EF <40% (n=66; 51,6%). Numeric data were presented as median with interquartile range.

Results: Group 3, compared to the pooled group 1 and 2, was characterized by the higher frequency of patients with HF stage C2 (modified AHA/ACC classification, 2007): 20/67 (18,2%) vs. 10/274 (3,6%), respectively (0,001). The baseline LV EF in group 1 was significantly lower compared to that in groups 2 and 3: 37% (32-47%), 55% (45-62%) and 52% (38-59%), respectively (0,001 for both comparisons). The frequency of patients with preserved LV EF (≥50%) was lower in group 2, as opposed to groups 2 and 3. Group 3, in contrast to groups 1 and 2, was characterized by the higher value of end-systolic LV volume (and its index), as well as the higher frequency of patients with mitral and tricuspidal regurgitation. At period 1, the structure of the sample of 128 patients by LV EF grades was as follows: LV EF ≥50%, 40-49% and <40%, respectively, 54 (42,2%) patients, 38 (29,7%) and 36 (28,1%). At period 2 we observed the shift towards increased frequency of patients with LV EF <40% (55 (43,0%) patients).

Conclusions: The LV EF improvement at different follow-up periods was associated with worse baseline LV EF and more prevalent HF stage C2 cases. The LV EF dynamics in patients with baseline LV EF <50% was "biphasic": the initial LV EF improvement or recovery was subsequently shifted to its decline in part of the patients. The determination of predictors of different LV EF dynamics patterns is crucially important for individualized management of post-CABG patients.

P885

Predictors of left ventricular systolic recovery may depend on patients' age

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Background: The prognostic impact of left ventricular functional recovery(LVF-Rec)is unclear and its predictors are still understudied.PURPOSE:to evaluate predictors of LVF-Rec in a cohort of ambulatory Heart Failure(HF)patients and to study the influence of age on those predictors.

Methods: We analyzed patients followed in our HF clinic from 2002 to 2015 who had at least 2 echocardiograms performed during the follow-up period.A total of 304 patients with left ventricular ejection fraction(LVEF)<50% and an echocardiographic re-evaluation with no intervention(revascularization or surgical valve correction)between images were included.Systolic dysfunction was categorized:severe(LVEF <30%),moderate(LVEF 30-39%),mild(LVEF 40-49%).Recovery(HF-rec)was considered when systolic dysfunction improved at least one category even when no full recovery(LVEF >49%)was attained.HF-rec and non-recovered patients were compared.Multivariate logistic regression models were built to determine independent predictors of recovery.The analysis was then stratified according to patient's age(cut-off 70 years).

Results: Most patients were male(71.1%),mean age 66(±14),71.7% had severe systolic dysfunction at first evaluation.Between echocardiogram re-evaluation(median time:34 months),150 patients(49.3%)showed no LVEF recovery or even worsening and 154(50.7%) recovered.HF-rec patients were less often male(61.7%vs80.7%, p<0.001),more often had history of arterial hypertension(61.7%vs50.0%, p=0.04)and less often had ischemic aetiology(25.3%vs46.0%, p<0.001).HF-rec patients had smaller end-diastolic left ventricular diameter(EDLVD) (59±8vs65±9mm, p<0.001),lower serum creatinine(median 1.00vs1.13mg/dL, p=0.003)and lower loop diuretic dose(median 60vs80mg/day, p=0.04).Independent predictors of LVF-Rec(model 1 included:gender,ischemic aetiology,EDLVD≥60mm,age,arterial hypertension history,severe initial systolic dysfunction,serum creatinine ≥1.5mg/dL and B-type natriuretic peptide)were female gender(OR: 2.17, 95% CI 1.11-4.35, p=0.02),non-ischemic aetiology(OR: 2.78, 95% CI 1.35-5.56, p=0.005),and EDLVD<60mm (OR: 3.12, 95% CI 1.56-6.25, p=0.001).If prognostic modifying therapy and diuretic dose were included in the model(model 2)results would be similar.When the analysis was stratified according to patients' age(cut-off 70):in the younger group of patients,gender,ischemic aetiology and EDLVD were still independently associated with recovery;however in patients ≥70 years only a smaller EDLVD remained an independent predictor of LVF-Rec.

Conclusions: Females,patients with non-ischemic HF and those with EDLVD<60mm have higher probability of LVF-Rec.Age appears to influence

the predictors of recovery.In elder patients only a smaller EDLVD predicts recovery while gender and aetiology appear to be less important.Our results highlight the relevance of ventricular remodeling in systolic function recovery-patients with less severe remodeling have more 3-fold higher probability of functional recovery.

P886

Mitral annular plane systolic excursion and peak systolic shift are simple echocardiographic parameters to detect left ventricle systolic dysfunction in heart failure

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The most important method for left ventricular state determination in patients with coronary heart disease is regional contractility assessment. However, evaluation of local contractile capacity by echocardiography is rather subjective method. Strain Rate imaging gives more possibilities because consists of multiple analysis for each segment of myocardium.
Materials and methods. We have learnt the regional contractility of 145 patients with ischemic heart disease. Tissue doppler imaging, strain rate imaging and angioventriculography were performed for all people. For strain rate imaging wall motion tracking (WMT) with 4Ch Tracking option was used.
Results. Graphes of longitudinal (Sl) and transmural (St) shift for each segment were obtained. The correlation coefficient (Pearson) r between mitral annulus excursion (MAE) and ejection fraction (EF) of left ventricle was 0,88. The linear regression model is presented as EF=5,0145*MAE+0,8946.
The results of sensitivity, specificity, positive and negative prognostic value for peak systolic shift, mitral annulus excursion and ejection fraction in predicting left ventricle contractility in compare with angioventriculography data are presented in the table. The highest diagnostic level was established for longitudinal peak systolic shift in basal segments (Sl) for the value 6,9 mm with sensitivity 83,7%, specificity 96,8%, diagnostic value 85,4%, and mitral annulus excursion for the value 11 mm with sensitivity of 74,4%, specificity of 100%, diagnostic accuracy of 81,2%.
Conclusion: the parameters of peak systolic shift in basal segments and mitral annulus excursion have high sensitivity, specificity and diagnostic value for assessment of left ventricle contractility at patients with coronary heart disease.

Diagnostic value				
	Sl	St	Mitral annulus excursion	EF
Prognostic value	7,0 mm	6,9 mm	11 mm	**55%**
Sensitivity, %	**83,7**	**54**	**74,4**	**66,3**
Specificity, %	**96,8**	**90**	**100**	**100**
Positive prognostic value	**98,6**	**91,9**	**100**	**100**
Negative prognostic value	**65,2**	**48,3**	**58,5**	**51,7**
Diagnostic value, %	**85,4**	**65,6**	**81,2**	**75,2**

P887

Left ventricular myocardial non-compaction associated with hypertrophic cardiomyopathy: mutation range, life-threatening complications and outcomes

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Purpose: to assess the range of mutations, life-threatening complications and outcomes in patients with phenotype of hypertrophic cardiomyopathy (HCM) associated with left ventricular myocardial non-compaction (LVNC).
Methods: the research included 280 patients with HCM (184 men and 96 women, median age 44.6±16.0 years). Eleven (3.9%) of them underwent echocardiography and cardiovascular magnetic resonance (CMR) presented with phenotype of HCM/LVNC associated (6 men and 5 women, median age 43±11 years). Mutation search was carried out by the next generation sequencing (NGS) in 8 patients.
Results: presence of LVNC in patients with HCM was followed by the heavier clinical manifestations: functional class (FC) of heart failure (HF) NYHA 2.8±0.01 against 2.2±0.02, p<0.05, lower LV EF of 43.5±2.4% against 67.5±5.6%, p<0.001, higher frequency of ventricular arrhythmias (80% against 45.8%, p<0.001). For the observation period (median of observation - 6.7 years) implantable cardioverter defibrillator (ICD) was implanted in 4 patients with unstable ventricular tachycardia (UVT), in two of them were noted numerous operations of ICD. Life-threatening arrhythmias were registered in 2 patients against the background of the manifesting WPW syndrome; radiofrequency ablation (RFA) of additional connection was executed. Within a period of observation adverse patient outcomes were registered in 3 cases: 1 patient was diagnosed with sudden cardiac death (SCD) against the background of operation of ICD, lethal outcome occurred due to HF progression to III FC NYHA and development of thromboembolic events in 2 patients.
All the patients with phenotype of HCM/LVNC associated underwent genetic analyses. There was revealed pathogenic mutation p.Gln1233 * and options with the uncertain clinical importance of p.Arg346His, p.Ala1255Thr in MYBPC3 gene; pathogenic mutations of p.Arg663His and Glu930del in MYH7 gene and also a combination of two mutations: p.Arg502Gln in a gene of MYBPC3 and p.Arg1712Trp in MYH7 gene. It should be noted that the registered options in sarcomere genes are associated with development of HCM, at the same time mutations of p.Arg663His and Gln1233 * in a gene of MYBPC3 were detected by us earlier in patients with HCM and without signs of LVNC. Also the mutation with the uncertain clinical importance c.298+1G> C (rs780476936), leading to the disturbance of splicing, in NEXN gene coding nexilin F-actin binding protein was revealed. There were no mutations in analyzed genes in 1 (12.5%) out of 8 patients.
Conclusion: phenotype of HCM/LVNC associated is characterized by the high risk of life-threatening arrhythmias development, SCD and HF progression. The mutations identified in patients with such phenotype are associated with HCM. However, these mutations are not unique markers of the combined genotype because they were detected in patients with HCM and without LVNC.

P888

Left ventricular diastolic dysfunction in patients with paroxysmal atrial fibrillation

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Background: Heart failure (HF) and atrial fibrillation (AF) are very common clinical conditions linked by similar risk factors and pathogenic mechanisms preferably structural cardiac remodeling and rate-related left ventricular function impairment. The strict diagnosis of HF with preserved ejection fraction (HF-PEF) in pts with concomitant AF still remains a clinical challenge due to symptoms similarity and raised natriuretic peptide levels in both conditions. Evaluation of HF on the basis of diastolic dysfunction in AF is crucial in term to prevent HF deterioration and to improve outcome.
The purpose of our clinical study was to evaluate LV diastolic dysfunction in pts with paroxysmal AF (PAF) presenting or not with LVHF.
Methods: 196 patients, 111 women and 85 men aged from 47 to 75 years with PAF were enrolled in the study. Patients were divided into two demographically comparable groups, depending on the presence or absence of typical HF symptoms and signs in the setting of AF and when PAF was stopped. There were 120 pts in the 1st group: 70 women and 60 men aged from 48 to 71 years. The 2ndgroup included 76 pts: 41 female and 25 male, aged from 47 to 75 years. All subjects underwent echocardiographic examination after PAF stopping. The diagnosis of LVHF and its severity was proved on the basis of respiratory rate (RR), clinical and radiologic signs of the pulmonary congestion, and the brain natriuretic peptide (BNP) levels. The DD was diagnosed according to the recommendations of the American Society of Echocardiography in conjunction with the European Association for Cardiovascular Imaging (2016).
Results: In the 1st group LVHF manifested as pulmonary edema in 5 pts (4.16%), in 18 pts (15%) there were clinical and radiologic signs of pulmonary bed congestion. The mean levels of BNP was 74.84±6.28 pg/ml in the 1stgroup and 56.27±7.19 pg/ml (p>0.05) in the 2nd group. All patients from the 1st group were diagnosed having DD of different degrees 7.5% of pts had grade 3, 57.88% had grade 2 and 41.66% had grade 1 DD. In the 2nd group 13.16% of pts had not evidence of LVDD, 1-2 degree LVDD was found in 72.37% and 14.47% of cases respectively. The frequency of 2-3 degree DD recording in two groups differed significantly by the χ^2-test. Significant differences in the mean DD values between groups were obtained: the mean maximal tricuspid regurgitation velocity was 4.42±0.76m/s vs 2.73±0.64m/s, the mean E/e' ratio was 19.5±1.89 vs 10.29±2.01 (p<0.05), the mean PAP accounted for 62.38±3.55 mm Hg vs 41.86±3.94 (p<0.05).
Conclusion: PAF even in the absence of clinical futures of HF is associated with LVDD. The degree of LVDD reflects the manifestation and severity of LVHF in observed cohort.

P889

Left ventricle diastolic dysfunction in ambulatory patients with atrial hypertension

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Three or four from four criterias (septal e' < 7 cm/sec, lateral e' < 10 cm/sec), average E/e' ratio > 14, left atrial volume index (LAVI) > 34 mL/m2, and peak TR velocity > 2.8 m/sec) need for diagnosis diastolic dysfunction in the presence of normal left ventricle ejection fraction.

Purpose: Investigating the frequency of diastolic dysfunction in the presence of normal left ventricle ejection fraction in ambulatory patients with arterial hypertension.

Materials and methods. The study included 129 ambulatory patients with arterial hypertension aged 66,92±0,97. The control group included 55 people without cardiovascular disease (aged 37.1±1.3). The left ventricular diastolic dysfunction patterns was detected by E/A and e'/a' ratios. The left ventricular diastolic dusfunction was assessed using septal and lateral e', average E/e' ratio, LAVI and systolic pressure of pulmonary artery (SPAP).

Results: The studied patients had a pattern of left ventricular diastolic dysfunction type 1 in 102 cases (E/A-0.72±0.01; e'/a' septal - 0.61±0.01; e'/a' lateral - 0.63±0.02), a pattern of diastolic dysfunction type 2-in 27 cases (E/A-1.26±0.04; e'/a' septal -0.75±0.05; e'/a' lateral-0.77±0.07) compared with the control (E/A – 1.69±0.05; e'/a' septal – 1.54±0.05; e'/a' lateral – 1.84±0.08). Diastolic dysfunction was diagnosed in 23 patients (18%): 6 of them had four criteria (E/e' – 22,97±2,38; e' septal – 4,7±0,41; e' lateral – of 7.02±0,59; LAVI -81,67±5,64; SPAP 43,83±3,24); 17 patients had three criteria (E/e' – 9.23±0.78; e' septal – 5.71±0.30; e' lateral – 8.16±0.42; LAVI - 81.9±6.87; SPAP 32.92±1.96). 83 patients (64%) had two criteria of four: (E/e' – 10,25±0,46; e' septal – 6,69±0,21; e' lateral – 8,82±0,23; LAVI - 38,97±0,68; SPAP 20,48±0,60), that is diastolic dysfunction indeterminated. The remaining 23 patients (18%) had one or no signs (E/e' – 8,7±0,49; e' septal – 7,64±0,28; e' lateral – 9,82±0,3; LAVI -22,73±0,21; SPAP 19,25±1,33), that is, had normal diastolic function.

Conclusions. Thus, in only 18% of cases ambulatory patients with arterial hypertension with left ventricular diastolic dysfunction patterns have criteria of diastolic dysfunction; in 64% of cases diastolic dysfunction indeterminated.

P890

Tissue doppler E/E ratio, a predictor of in-hospital complications in acute myocardial infarction

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Introduction: Diastolic dysfunction is an early finding in patients presenting with acute myocardial infarction (AMI), often heralded by an increase in E/E' ratio. The purpose of this study was to assess the relationship between the E/E' ratio and in-hospital complications (IHC) in AMI.

Methods: A retrospective analysis of 250 patients admitted to a Cardiology ward diagnosed with AMI was performed. The primary endpoint was defined as the composite of re-infarction, stroke, mechanical complications (MC), heart failure (HF), acute kidney injury (AKI) and/or arrythmia. Mann-Whitney U test was used for mean comparison between variables. Two different multivariable logistic regression (MRlog) models were applied, one evaluating the effect of other echocardiographic variables besides E/E' ratio (left ventricular ejection fraction – LVEF, pulmonary artery systolic pressure – PASP, telediastolic diameter of left ventricle and left atria diameter) and the other one evaluating the effect of clinical variables (age, obesity, history of hypertension and diabetes mellitus) on IHC. A Pearson analysis was performed to evaluate correlation between variables.

Results: IHC occurred in 158 patients (63%). 73% of patients in the population were male, and the mean age was 69 (±13) years. HF occurred in 51% of patients, arrythmias in 22%, AKI in 11% and MC in 1%. No re-infarction/stroke was noticed. Mann-Whitney U test revealed a statistically significant association between E/E' ratio and IHC (p<0.001). The MRlog using the echocardiographic variables above mentioned demonstrated a statistically significant result for E/E' ratio (p=0.016 – Exp(B): 0.847) and for PASP (p=0.009 – Exp(B): 0.906). The MRlog model that included clinical variables demonstrated that E/E' ratio retained predictive value for IHC (p=0.022 – Exp(B): 0.922). For each unit increase in E/E' ratio, the probability of not having an IHC decreases by 8-15%, according to the model used. The effect of E/E' ratio on IHC was mainly driven by the risk of developing HF (p=0.03, Exp(B):0.88). Pearson correlation test between variables did not achieve statistical significance, therefore an independent variation between them was admitted.

Conclusion: The increase in E/E' ratio is associated with a higher risk of IHC. E/E' ratio has predictive value in IHC risk, particularly HF, which is independent from the effect of other clinical and echocardiographic variables.

P891

Lack of consensus on the non-invasive diagnosis of diastolic dysfunction in individuals referred for cardiovascular screening

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On behalf of: University Medical Center Utrecht, Utrecht University
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Introduction: Left ventricular diastolic dysfunction (LVDD) is common and can progress to heart failure, notably with preserved ejection fraction (HFpEF). International consensus on diagnostic criteria for LVDD is crucial, however, multiple different criteria and cut-points exist.

Purpose: To assess the impact of three recent diagnostic recommendations on the prevalence and classification of LVDD.

Methods: The study population comprised 574 consecutive participants of an ongoing case-cohort study (HELPFul) enrolling patients (>45 years) referred to a cardiology clinic for cardiac evaluation. We evaluated the criteria in the 2018 Heart Failure Association (HFA) recommendations with the 2016 guidelines of the European Society of Cardiology (ESC) and the 2016 American Society of Echocardiography (ASE)/European Association of Cardiovascular Imaging (EACVI) guidelines. Patients with history of cardiac disease were excluded. Cardiac evaluation included natriuretic peptides and echocardiography.

Results: All LVDD criteria could be applied to 432 subjects, mean age 62.6 years (SD=9.3), 67% women. The prevalence of LVDD was 6.0% with 'HFA 2018', 24.3% with 'ESC 2016', and 2.1% with 'ASE/EACVI 2016'. Concordance of 'HFA 2018' with 'ESC 2016' and 'ASE/EACVI 2016' was 21.5%, and 28.2%, respectively. Upward classification with 'HFA 2018' occurred in 254 (58.8%) compared with 'ESC 2016' and in 305 (70.6%) compared with 'ASE/EACVI 2016'. Downward classification with 'HFA 2018' occurred in 85 (19.7%) compared with 'ESC 2016' and in 5 (1.2%) when compared to 'ASE/EACVI 2016'. The 'HFA 2018' classified 330 (76.3%) in an intermediate group. There were no substantial sex differences.

Conclusions: The prevalence of LVDD in our cohort varied considerably with prevailing international recommendations, making the impact of LVDD and HFpEF difficult to quantify. This hampers comparisons between different studies and in meta-analyses. Moreover, the 'HFA 2018' recommendations result in a large intermediate group requiring additional (invasive) imaging.

P892

Molecular and genetic markers a renin-angiotensin-aldosteron systems as predictors of development of a diastolic heart failure in patients with an obesity

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Research objective: Searching of the molecular and genetic markers which are presumably involved in a pathogenesis of a secondary diastolic heart failure (DHF) at patients with an obesity.

Materials and methods: PCR-diagnostics of biomaterials (whole blood) of 104 patients with an obesity which were divided into 2 groups, depending on existence or lack of a diastolic heart failure was carried out. The following candidate genes were analyzed: gene of an angiotensinogen AGT (C521T and T704C), gene of an angiotensin II first type receptor AGTR1 (A1166C), gene of an angiotensin II second type receptor AGTR2 (G1675A), aldosteronsintaza gene CYP11B2 (C (-344)T). The maintenance of aldosteronum, renin, angiotensin II in patients' blood plasma was estimated.

Results: It is shown that development of secondary DHF in persons with an obesity of both sexes is associated with CYP11B2 aldosteronsintaza gene mutation, namely with replacement allele of C in the provision-344 on an allele of T and existence of a genotype of T/T. The relative risk of development of a disease at a genotype of T/T is increased by 5,93 times at men (=0,008) and by 4,57 times at women (=0,014).

For men AGT angiotensinogen gene mutation, namely replacement allele C in the provision 521 on T allele matters. At the same time, the relative risk of development of DHF at a genotype of T/T is increased by 4,26 times (=0,039). Mutations of genes of a angiotensin II first type receptor AGTR1 (A1166C) and angiotensin II second type receptor of an AGTR2 (G1675A) are not associated with development of DHF in patients with an obesity. It is established that patients with an obesity of the III degree and DSN, are characterized by authentically more high average level of plasma Aldosteronum (for 25,9%, <0,05) in comparison with patients without DHF; what is followed by the normal maintenance of a renin and angiotensin of II.
Conclusion: The submitted data can be used at stratification of risk of development of a secondary heart failure in persons with an obesity.

P893

Role of endothelin-1 in HFpEF-related ventricular and atrial remodeling

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Introduction: Atrial remodeling is common in patients with heart failure and associated comorbidities (e.g. diabetes, metabolic syndrome) and has been shown to independently increase mortality. Endothelin-1 is a pro-fibrotic cytokine which is thought to be involved in the progression of cardiac remodeling. In contrast, ET-1 has also been shown to be a potent inotropic agent. We investigated the interplay between tissue ET-1 concentrations and cardiac function in patients with and without diabetes/obesity.
Methods: Right atrial appendages were collected from 9 patients undergoing cardiac surgery. Right atrial and ventricular contractile function were assessed using transthoracic echocardiography. Myocardial ET-1 of atrial appendages was quantified with an ELISA.
Results: Mean age of patients included was 63.3 ± 1.6 years. 44 % of patients were female and 78 % of patients were on ß-blockers and/or ACE inhibitors. The study cohort presented with a mean LVEF of 51.7 ± 0.8 % and a mean LAVI of 35.6 ± 1.8 %. In addition, mean right atrial and ventricular function were preserved (mean RVFAC 44 ± 1 %, RAEF 34.5 ± 1.6 %). Tissue ET-1 concentration was not significant different between control and diabetic patients (8.5 ± 1 vs. 9.8 ± 2.7 pg/ml; n.s.). Moreover, ET-1 was not related to body mass index, left atrial volume index or left ventricular function ($R^2 < 0.03$; $p < 0.05$). However, even though myocardial right atrial ET-1 was not related to right atrial ejection fraction ($R^2 = 0.2258$; n.s.), high concentrations of myocardial ET-1 significantly correlated with reduced right ventricular function (i.e. right ventricular fractional area change ($R^2 = 0.8692$; $p < 0.05$)). This indicates an important link between ventricular function and atrial hormonal activity.
Summary: Myocardial ET-1 was associated with ventricular contractile function. Atrial neurohumoral activation might represent the culprit for the vicious circle of ventricular dysfunction and atrial myocardial ET-1 release.

P894

Renal function in patients with different types of left ventricular remodeling after acute myocardial infarction

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Purpose: to study the functional capacity of the kidneys in patients with rapidly progressive remodeling of the left ventricle after acute myocardial infarction with ST segment elevation (STEMI).
Methods: The study included 86 patients with STEMI. Inclusion criteria was the presence of significant stenosis of only one coronary artery according to the coronary angiography results. The treatment in the framework of the study was carried out without a washout period with preservation of the prescribed pharmacotherapy for STEMI. The follow-up period was 48 weeks. At baseline and after 24, 48 weeks of follow-up, the creatinine level was determined on the analyzer Olympus AU400, the GFR was calculated using the CKD-EPI formula. In addition, patients underwent echocardiography with MyLab scanner (Esaote, Italy) with the determination of the end diastolic volume index (EDVi). Then the patients were divided into two groups. The first group included 51 people without echocardiographic signs of LV remodeling: the dynamics of EDVi after STEMI was <20%. Group 2 consisted of 35 patients with rapidly progressive LV remodeling (increase in EDVi by > 20%). The compared groups were matched by age, sex, anthropometric data, and treatment.
Results: In group 1, creatinine initially amounted to 91 [95% CI 86.9; 95.2], after 24 weeks - 90.5 [95% CI, 86.9; 94.1] (p = 0.83), 48 weeks - 93.6 [95% CI 88.3; 98.9] μmol / l (p = 0.25). GFR in this group was 82.3 [95% CI 78; 86.6], 82.9 [95% CI 98.8; 87] (p = 0.76), 80.2 [95% CI 75.7; 84.7] ml / min (p = 0.34). In group 2, the following creatinine values were identified: baseline - 86.2 [95% CI 79.7; 92.7], after 24 weeks - 90.1 [95% CI 84.8; 95.5] (p = 0.2), after 48 weeks - 93.9 [95% CI 87.7; 100.1] μmol / l (p = 0.02). GFR at hospital admission was 91.6 [95% CI 83.1; 100], after 24 weeks - 85.1 [95% CI 79.4; 90.8] (p = 0.08), 48 weeks - 83 [95% CI 77.5; 88.5] ml / min (p = 0.04).
Conclusions: a deterioration in renal function, manifested by an increase in creatinine and a decrease in GFR level has been revealed in STEMI patients with rapidly progressive left ventricular remodeling.

P895

Biomarkers of hemodynamics stress and development of adverse left ventricular remodeling in patients with acute primary myocardial infarction with ST segment elevation

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On behalf of: MASTARD

Background: To evaluate changes in serum levels of soluble ST2 (sST2) and N-terminal- probrain natriuretic peptide (NT-proBNP) and their association with the development of adverse left ventricular remodeling (LVR) during the six months after primary ST-segment elevation myocardial infarction (STEMI). Methods: Subjects were 31 patients with STEMI (median age, 59 yr), who underwent percutaneous coronary intervention (PCI) during the first 24 h of the onset of myocardial infarction (MI). Blood samples and parameters of echocardiography were assessed at days 1, 3, 7, and 14, and six months after STEMI. Results: Serum levels of sST2 decreased by 48% from admission to day 7. Serum levels of NT-proBNP decreased by 40% from day 7 to six months after STEMI. High sST2 serum levels were associated with the development of early LVR at timepoints T1-T3 (r=0.8; r=0.6, r=0.9, p<0.05, respectively) in the group with development of adverse LVR by six months after STEMI. The absence of decrease in NT-proBNP serum levels to 125 pg/mL by day 7 (r=0.69, p=0.04) was associated with the development of the adverse LVR by six months after STEMI.
Conclusions: Serum levels of sST2 and NT-proBNP decreased in the six months after STEMI. Significant decrease of the serum levels of sST2 occurred in the first 7 days; serum levels of NT-proBNP decreased after day 7. Elevated levels of both these markers on day 7 were associated with development of adverse LVR by 6 months after STEMI.

P897

Features emotional status at patient with ischemic heart disease and chronic heart failure and different types of left ventricle remodeling

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Purpose: to study emotional status at patients with ischemic heart disease (IHD) and chronic heart failure (CHF) and different types of left ventricle remodeling (LVR). Materials and methods: 91 men with IHD and CHF (II - IV function class on NYHA, and left ventricular ejection fraction < 45%) in the age from 42 till 65 years (average age 56.5+0.5 years) were examined. 51 patients with disadaptive left ventricle remodeling (DLVR) (end diastolic size index > 3.3 and relative wall thickness of LV < 30) were included in the first group. 40 patients with adaptive left ventricle remodeling (ALVR) (end diastolic size index > 3.3 and relative wall thickness of LV < 45, but > 30) were included in the second group. A level of anxiety and the depression were examined by the Hospital Anxiety and Depression Scale (HADS), personality characteristics - by the MMPI questionnaire. Results: The groups did not differ on age, duration IHD, function class of heart failure (NYHA). The patients with CHF and DLVR had 4.8±0.7 and 8.5±0.9 scores of anxiety and depression level accordingly. The patients with CHF with ALVR had accordingly 4.7±0.4 (p > 0.05) scores of anxiety level and 5.2±0,5 (p < 0.05) scores of depression level. The patients with CHF and DLVR had the such MMPI test parameters accordingly: on scale of Hypochondriasis – 62.3±2.1 scores; on scale of Depression – 51.4±3.9 scores; on scale of Hysteria – 54.7±2.8 scores; on scale of Psychopathic Deviate – 46.7±3.6 scores; on scale of Paranoia – 46.4±1.9 scores; on scale of Psychasthenia – 53.3±1.7 scores; on scale of Schizophrenia – 47.1±1.9 scores; on scale of Hypomania – 43.8±3.3 scores. The patients with CHF with ALVR had the such MMPI test parameters accordingly: on scale of Hypochondriasis – 55.7±1,4 scores (p < 0.05); on scale of Depression – 51.1±1.4 scores (p > 0.05); on scale of Hysterias – 49.9±1.1 scores (p > 0.05); on scale of Psychopathia Deviate – 44.5±0.9 scores (p > 0.05); on scale of Paranoia – 50.6±1.4 scores (p > 0.05); on scale of Psychasthenia – 46.8±1.6 scores (p < 0.05); on scale of Schizophrenia – 45.9±1.0 scores (p > 0.05); on scale of Hypomania – 42.1±1.4 scores (p > 0.05). Conclusion: the patients with ischemic heart with disease and chronic heart failure and disadaptive left ventricle remodeling had more high expressed accentuated personality characteristics and level of depression, in comparison with the patients

with a chronic heart failure with adaptive left ventricle remodeling, these data may negatively affect the prognosis of these patients and also these data must be considered when prescribing treatment.

P899

Interrelation of the clinical-functional state and parameters of myocardial remodeling with the functional state of the kidneys in patients with chronic heart failure

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Purpose: To study the relationship between the clinical-functional condition and parameters of the myocardial remodelation and functional state of the kidneys in patients with chronic heart failure (CHF).
Methods: A total of 223 patients with I-III functional class (FC) of CHF were examined (patients were randomized to FC functional group CHF according to the six-minute walking test (SMWT) and the scale of assessing the clinical state of patients (SACS)). The mean age of patients was 62,3±5,6 years. Patients were divided into 2 groups depending on the estimated calculated the rate of glomerular filtration (cGFR) according to the formula MDRD: cGFR≤60 ml/min/1.73m2 - 67 patients and cGFR≥60 ml/min/1.73m2 - 156 patients. All patients, along with general clinical methods of evaluation, were evaluated: SACS, SMWT, quality of life (QOL), echocardiography (EchoCG) with determination of structural and geometric parameters, systolic and diastolic LV function, serum creatinine (Cr).
Results: In patients with CHF, as the disease progresses, there is a significant impairment of the functional state of the kidneys, characterized by a decrease in cGFR≤60 ml/min/1,73m2, which are early biochemical predictors of dysfunction of the kidneys (DK) in patients with CHF. There was a decrease in cGFR≤60ml/min/1,73m2 in 30% of patients with CHF. Patients with CHF with progression of the disease have worsened kidney function, clinical course of the disease, accompanied by a decrease in exercise tolerance for SMWT and deterioration in the QOL, which was most pronounced in patients with DK. The inverse high correlation dependence of SMWT with the SACS indexes (r=-0,91) and the total index (TI) of the QL (r=-0,86) was revealed; there was an average positive correlation between the rates of cGFR and SMWT in patients with cGFR≤60 and cGFR≥60 ml/min/1,73 m2 (r=0,41, r=0,48); in patients with cGFR≤60 ml/min/1,73 m2, the SMWT values were reliably lower by 14,1% (p<0,005), and the SACS was 16% higher (p<0,005) compared to those in patients with cGFR≥60 ml/min/1,73 m2. The relationship between diastolic and systolic function and cGFR parameters was established: the early filling rate of the LV - E in patients with cGFR≤60 ml/min/1,73m2 by 6,7% (p<0,05), LVEF by 8,3% (p<0,05) is lower, and the final systolic volume is 9,8% (p<0,05) higher in comparison with these parameters in patients with cGFR≥60 ml/min/1,73m2. The mean positive correlation between cGFR and the rate E (r=0,38, r=0,46) and between cGFR and LVEF (r=0,40, r=0,38) was noted in the groups of patients with cGFR≤60 and cGFR≥60 ml/min/1,73 m2.
Conclusions: In patients with CHF Interrelation of the clinical-functional state and parameters of myocardial remodeling with the functional state of the kidneys was established.

P900

LV global longitudinal strain as a predictor for LV reverse remodeling in dilated cardiomyopathy

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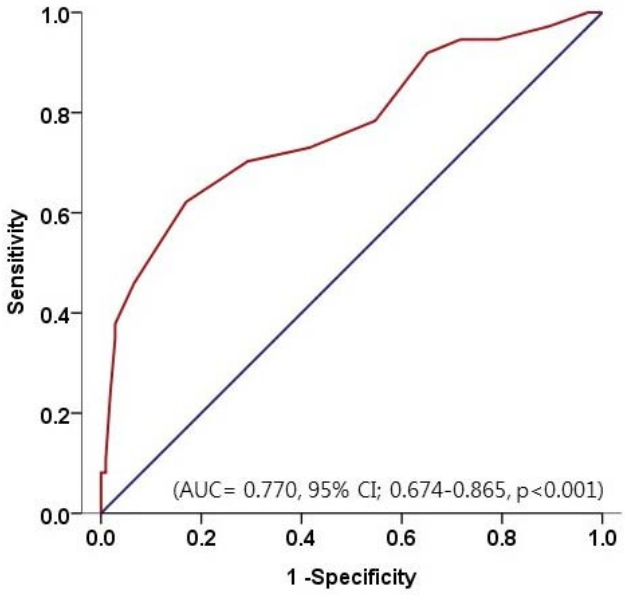
Background The prognosis of dilated cardiomyopathy (DCM) has significantly improved in the past few years, mostly as the result of successful therapy-induced reverse remodeling. The aim of this study is to investigate the predictors of left ventricular reverse remodeling (LVRR) in DCM patients with normal sinus rhythm.
Method We reviewed medical records and analyzed echocardiographic data of 143 DCM patients who had been first diagnosed, evaluated, and followed at our institute between Mar. 2013 and Aub. 2017. We defined LVRR as improvement of LVEF ≥10% point and decrease in LVEDV ≥10% as suggested in previous studies.
Results The mean age was 64.6 years. During the median follow-up period of 40.0 months, LVRR developed in 37 patients (25.9%). Mean LVEF was 27.4 ± 7.6% at entry and 35.2 ± 12.5% at last follow up (mean increase 7.8 ± 13.6%, p<0.001). By multivariate regression analysis, only LVGLS independently predicted the LVRR (hazard ratio= 1.340, 95% CI; 1.060-1.693, p=0.014). Receiver-operating characteristic curve analysis showed that the optimal LVGLS cut-off value to identify the patients with LVRR was -11.5% (AUC=0.770, 95% CI; 0.674-0.865, p<0.001)
Conclusion GLS was an independent predictive factor for LVRR in DCM patients with sinus rhythm.

Cox regression analysis

Variables	Univariate analysis		Multivariate analysis		
HR	95% CI	p-value	HR	95% CI	p-value
Age	0.989	0.985-1.013	0.345	1.021	0.977-1.067	0.358
Sex	1.962	0.842-4.576	0.119	1.031	0.265-4.019	0.965
LVEDVi	1.010	1.003-1.016	0.003	0.980	0.922-1.040	0.499
LVESVi	1.015	1.007-1.023	<0.001	1.034	0.954-1.120	0.414
LVEF	0.880	0.824-0.940	<0.001	0.862	0.732-1.014	0.074
LA volume index	0.896	0.849-0.945	<0.001	0.945	0.869-1.029	0.194
E/A	0.297	0.106-0.830	0.021			
S' velocity	1.561	1.174-2.076	0.002	1.275	0.713-2.279	0.412
E/e' ratio	0.882	0.816-0.954	0.002	1.005	0.881-1.147	0.936
LVGLS	1.408	1.215-1.633	<0.001	1.340	1.060-1.693	0.014
TAPSE	0.512	0.173-1.520	0.228			
RVFAC	1.012	0.972-1.052	0.572			
RV s'	0.969	0.825-1.138	0.700			
RV GLS	1.149	1.056-1.251	0.001	0.818	0.389-1.762	0.625
RV FWLS	1.070	1.008-1.137	0.026	1.087	0.738-1.599	0.674



P901

Evolution of LV remodeling geometry and insulin resistance indices under conventional active medication on RAS: ramipril and eprosartan

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In hypertensive patients, LVH and insulin resistance (IR) often coexist, amplifying development of TOD and HF. Therapeutic strategies should aim BP values, LVH , IR and RAS inhibitors would be "drug of choice" for such combinations.
Objective: To compare the effects of an ARB-based regimen with eprosartan and ACEI ramipril on LVH and IR in hypertensives with preserved EF.
Methods: 101 hypertensives (48,51% of men; 51,1±0,71 yrs) with LVH and IR were randomly assigned to ramipril (R-gr; n=56, mean dose=15,3mg±1,2 mg/d) or eprosartan (E-gr; n=45, mean dose=850±12,4 mg/d). ABPM, TTE, and HOMAIR were performed (baseline, 6, 12- months). LVMI> 95 g/m2 in women and >115 g/m2 in men identified LVH. Relative wall thickness (RWT >0.42) categorize geometry of

Evolution of LV remodeling and HOMA IR

Variables	Baseline	6 months	12 months	Group
RWT				
	0.44±0.06 0.45±0.06	0.43±0.04* 0.42±0.03*	0.41±0.03* 0.40±0.02*	R-grE-gr
p>0.05	p<0,05	p<0,05		
LVMI (g/m^2)				
	146.42±15.54 148,76±10.93	142,64±29,85* 139,91±28,18*	117,09±25,75* 97,38±22,43*	R-grE-gr
p>0.05	p<0,001	p<0,001		
LV remodeling pattern				
Concentric remodeling	1 (1,79%)1 (2,22%)	1 (1,79%)1 (2,22%)	4 (7,14%)5 (11,11%)	R-grE-gr
Concentric hypertrophy	52 (92,85%)42 (93,33%)	44 (78,57%)34 (75,56%)	32 (57,14%) 13(28,89%)	R-grE-gr
Eccentric hypertrophy	3 (5,36%)2 (4,45%)	5 (8,93%)4 (8,89%)	1 (1,79%)-	R-grE-gr
Normal LV geometry	--	6 (10,71%)6 (13,33%)	19 (33,93%) 27(60.00%)	R-grE-gr
HOMA-IR values				
	3.34±0.09 3.38±0.08	3.20±0.02* 3.05±0.09*	2.45±0.07* 2.21±0.08*	R-grE-gr
p>0.05	p<0.01	p<0.001		

Note: * p<0.001 from baseline

Variables	*Ramipril gr (56 pts)*	*Eprosartan gr (45 pts)*	*p*
Age (yrs)	50.11±0.79	52.04±0.63	*p>0.05*
History of HT (months)	13.00±1.95	13.41±2.01	
Gender (M)	29 (51.79%)	20 (44.44%)	
SBP (mmHg)	201.31±7.41	203.61±7.84	
DBP (mmHg)	106.25±5.54	107.17±6.02	
HR (bpm)	74.5±5.39	74.33±5.34	
BMI (kg/m^2)	29.35±0.31	29.41±0.21	
HOMA-IR	3.34±0.09	3.38±0.08	
LV remodelling LVMI (g/m^2) RWT	140.42±15.54 0.44±0.06	148,76±10.93 0.45±0.06	

Fig.1 Baseline characteristics of groups

LV remodeling. To define IR was used HOMAIR levels > 2.5. Results: LV remodeling indices have a beneficial evolution in both study groups, but more significant (p<0.05) in the E-gr. After 12 months, number of patients in E-gr, who expressed normal pattern of LV geometry, appears to be almost twice higher compared to R-gr. Both therapeutic regimens have gradually improved HOMAIR values (p<0.001), but with greater reduction in Egr (p<0.001) (Tab.1)

Conclusion: Both drug-regiment progressively improve hypertensive LV geometry and IR indices, but with greater efficiency in the Eprosartan-medicated arm, probably due to additional sympatholytic effect of its moiety

P902

Impact of sacubitril/valsartan on reverse cardiac remodeling in Taiwan population

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Background: Sacubitril/valsartan is an angiotensin receptor and neprilysin inhibitor (ARNI), which benefits the patients with heart failure and reduced ejection fraction (HFrEF). The literature of ARNI impact on cardiac remodelling for Asian is sparse.

Purpose: The objective of this study is to use echocardiography to evaluate the effect of ARNI on the cardiac remodelling of the HFrEF patients using echocardiography in Taiwan population.

Methods: We performed a retrospective study of 136 HFrEF patients using ARNI during the period from 1 November 2016 to 30 November 2017. Data including clinical characteristic, comorbidity, medications, renal function, NT-pro B-type Natriuretic Peptide (NT-BNP) and New York Heart Association (NYHA) functional class of the patients were collected. Besides, we analysed the relevant echocardiography parameters of left ventricle (LV) and right ventricle (RV), which indicating cardiac remodelling before and six months after using ARNI.

Results: A total of 136 patients with HFrEF were analysed in the given period. The study population mean age was 69.6 ± 11.6 years and men made up 82% of them. NYHA class II, III and IV constituted 21.3%, 67.6%, and 11.1%, respectively.LV ejection fraction (LVEF) significantly increased (34.7% vs 41.8%, p<0.001) and LV mass index (LVMI) reduced obviously (100.7g/m2vs 74.3g/m2, p<0.001) after six months of ARNI therapy. Parameters indicated the systolic function of LV also showed noticeable improvement, including LV internal diameter end-systole (LVIDs, 5.37cm vs 4.99cm, p<0.001), LV end-systolic diameter (LVESD, 5.31cm vs 4.98cm, p<0.001), LV end-systolic volume (LVESV, 157.7ml vs 122.7ml, p=0.011). The size of left atrium was also found to have reduced (4.43cm vs 4.23cm, p=0.014). However, LV end-diastolic volume (LVEDV), LV end-diastolic diameter (LVEDD), E/A ratio and RV S' have no statistical difference after six months. Conclusions: TheHFrEF population treated with ARNI have statistically significant improvement in LA size, LVEF, LVMI, LVIDS, LVESD, and LVESV after six months. This result emphasised the effectiveness of ARNI on LV reverse remodelling process in the Asian population. However, larger cohort studies are needed to confirm the results and to ensure the role of ARNI in the management of patients with heart failure.

P903

Right ventricular outflow tract hypertrophy assessment as a diagnostic stratification tool in patients with pulmonary hypertension

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Introduction: The right ventricle (RV) is a complex structure whose geometry changes in the presence of pulmonary hypertension (PH). The impact of chronic RV pressure overload on its remodeling process and the relationship with the hemodynamic phenotype and clinical group of PH is not stablished.

Purpose: To evaluate the relationship between the RV outflow tract (RVOT) thickness and the hemodynamic phenotype and clinical characteristics of PH patients.

Methods: Longitudinal observational study of consecutive patients with diagnosis of PH, based on hemodynamic criteria, and submitted to a high-resolution CT pulmonary angiography. PH was defined as pre-capillary [pulmonary arterial wedge pressure (PAWP) of 15 mmHg or lower], isolated pos-capillary [PAWP higher than 15 mmHg and diastolic pressure gradient (DPG) less than 7 mmHg] or combined pos-capillary (PAWP higher than 15 mmHg and DPG of 7 or more). The thickness, in millimeters, of the RVOT was measured in sagittal planes. The values obtained were compared with patient's hemodynamic profile, clinical classification (Nice 2013), WHO functional class and the presence of signs of heart failure (HF) at presentation.

Results: 78 patients were included, 69.2% females, with mean age 67 years old (IQR:26). 76% had pre-capillary PH, 21% combined post-capillary PH and 4% isolated post-capillary PH. Based on the clinical classification, 50% of the patients belonged to group 4, 28% to group 1, 11% to group 3 and 6% to group 2. The RVOT thickness did not differ significantly according to the WHO functional class, presence of right-sided HF signs at presentation or with hemodynamic classification. However, considering the clinical classification, the RVOT thickness varied significantly between groups (group 1: 6,1±1,7mm; group 4: 5,6±1,2mm; group 3: 5,2±1,2mm; group 2: 3,5±0,3mm, p=0,002). By analysis of variance, it was verified that this variation was due to the lower thickness of the RVOT in group 2 when compared with the other groups (versus group 1, 3 and 4; respectively p<0,001, p=0,004 and p<0,001).

Conclusion: The thickness of RVOT varies between clinical groups of PH, being significantly lower in patients from the group 2 patients. Based on this result we concluded that this parameter is useful in the diagnostic and etiological evaluation of patients with PH.

P904

The blood levels of apelin and angiotensin-(1-7) and their interrelations with parameters of left ventricular remodeling in patients with hypertension and type 2 diabetes

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Introduction: The left ventricular (LV) remodeling and LV hypertrophy (LVH) are the initial stages of the development of the heart failure in patients with hypertension. The apelin and angiotensin-(1-7) are the functional antagonists of renin-angiotensin-aldosterone system and the important protective cardiovascular peptides, but their role in the development of LV remodeling in such comorbidities pathology as hypertension and type 2 diabetes (T2D) is not clear enough.
Purpose. The aim of the study was to determine the blood levels of apelin and angiotensin-(1-7) in patients with hypertension and T2D and to investigate their interrelations with parameters of LV remodeling.
Methods: The study involved 76 patients with hypertension of 2-3 degrees with concomitant T2D (37 men and 39 women) aged 40 to 70 years. The investigation complex included general clinical examination methods, the echocardiography with determination of the LV internal dimension at end diastole (LVIDed), septal wall thickness at end diastole, posterior wall thickness at end-diastole and calculation of the relative wall thickness, the LV mass (LVM) and LVM index. The LVH we determined according 2018 ESH/ESC Guidelines. Control group consisted of 21 healthy volunteers. The blood levels of the apelin and angiotensin-(1-7) determined using ELISA.
Results: Both the apelin and angiotensin-(1-7) levels in patients with hypertension and T2D were significantly lower than in control group (0,874(0,840;0,926) ng/ml versus 1,097(0,963;1,179) ng/ml, p<0,001 and 105,51(89,13;121,17) ng/l versus 132,75(125,06;142,87) ng/l, p<0,05, respectively). In patients with LVH the levels of apelin and angiotensin-(1-7) were significantly lower than in patients without LVH (0,866(0,788;0,924) ng/ml versus 0,917(0,892;0,984) ng/ml, p<0,05 and 129,3(117,5;136,8) ng/l versus 101,9(88,2;117,7) ng/l, p<0,01, respectively). The correlation analysis revealed significant negative relationships of the apelin levels with SWTd (r=-0,50, p<0,001), PWTd (r=-0,46, p<0,001), RWT (r=-0,29, p<0,05), LVM (r=-0,39, p<0,01) and LVM index (r=-0,42, p<0,001) and significant negative relationships of the angiotensin-(1-7) levels with LVIDed (r=-0,37, p<0,01), LVM (r=-0,40, p<0,001) and LVM index (r=-0,41, p<0,001).
Conclusion. The study showed, that in patients with hypertension and T2D observed decreasing of the blood levels of apelin and angiotensin-(1-7), particularly in the presents of LVH and their negative correlations with main parameters of LV remodeling, that indicating the patogenetic role of these peptides in progression of heart lesion.

P905

Bone morphogenetic protein and adverse left ventricular remodeling in patients with acute primary STEMI

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On behalf of: MASTARD

Purpose: to study the dynamics of serum levels of bone morphogenetic proteins (BMP)-2 and BMP-4 and its association with a development of adverse left ventricular remodeling (LVR) in patients with acute primary anterior myocardial infarction with ST segment elevation (STEMI).
Methods: 21 patients with STEMI (mean age 60.4±7.4) were enrolled. All patients underwent percutaneous coronary intervention during 24 hours from onset, in 34% of patients it was during the first 3 hours. Blood samples and echocardiography data were performed on the days 1 (T1), 3 (T2), 7 (T3), 14 (T4) and through 6 months after STEMI (T5). The serum levels of BMP-2 and BMP-4 were determined by the immunoassay. In addition we assessed levels of troponin I, creatine phosphokinase-MB (CPK-MB), matrix metalloproteinases (MMP)-2, 9, high-sensitivity C-reactive protein (hCRP), soluble suppression of tumorigenicity-2 (sST2), N-terminal pro brain natriuretic peptide (NTproBNP) in the same terms. End-diastolic (EDV) and end-systolic (ESV) volume, ejection fraction (EF) of LV were determined by a Simpson method. Adverse LVR was established when values of EDV or/and ESV LV increased in 20% from admission to 6 months period.
Results: Serum levels of BMP-2 decreased on 50% from hospital period to 6 months after MI (p<0.05): 38 (T1)→28 (T2)→32 (T3)→36 (T4)→11 pg/ml (T5). The dynamics of BMP-2 in hospital period was not revealed. Level of BMP-2 in the group without adverse LVR decreased from the first 7 days after MI to 6 months period: from 41 to 21 pg/ml (p<0.05).
High level of BMP-2 in this group at 14th day was associated with a large values of EDV LV (r=0.7, p<0.05). The level of BMP-2 at the admission was associated with reperfusion time (r=-0.8, p<0.05), with levels of MMP-9 and hCRP at time-point T3 (r=0.5, p<0.05). Serum levels of BMP-4 increased from 325 (T2) to 395 pg/ml (T3) (p<0.05), however to the 6 months after MI its level decreased to 298 pg/ml (T5) (p<0.05). The level of BMP-4 was associated with MMP-9 and hCRP (T2) and sST2 (T4) in negative power (r=-0.6, p<0.05), but with MMP-2 (T4) (r=0.6, p<0.05).However in group without adverse LVR the level of BMP-4 decreased from 360 (T2) to 528 pg/ml (T4) (p<0.05).
Conclusion: Serum levels of BMP-2 and BMP-4 decreased to 6 months after MI. In hospital period only serum levels of BMP-4 increased, but the level of BMP-2 was without dynamics. High levels of hCRP, MMP-9 were associated with high levels of BMP-2 in hospital period. Reverse association was revealed for BMP-4 with sST2 and hCRP. Adverse LVR was associated with the absence of BMP-4 increase to time point T4 and BMP-2 decrease to time-point T5.

P906

Heart rate variability and left ventricle volumetric indices in patients after the acute Q-wave myocardial infarction

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Purpose: to estimate interrelations between heart rate variability (HRV) and left ventricle volumetric indices in patients after the acute Q-wave myocardial infarction (Q-AMI).
Materials and methods: 213 male patients in the average age of 52.0±9.1 y.o. survived after the primary Q-AMI were included into the study. All patients underwent Holter ECG monitoring (HMECG) with the estimation of HRV and transthoracic echocardiography. HMECG in all cases were performed in normal conditions, on standard therapy without any specific restrictions on 10-14 day of the Q-AMI. Standard therapy included antiplatelet agents, beta-blockers, ACE inhibitors or ARB, statins in individually matched doses, nitrates (if necessary) and amiodarone (if necessary). Interpretation of HRV parameters was made in accordance with the recommendations of the ESC working group and the NASPE (1996) with estimation of SDNN, SDANN, RMSSD and pNN50. As a decrease in the total HRV, a reduction of SDNN≤100 ms was assumed. Statistical analysis was performed using nonparametric Spearman R correlation test. Differences were considered significant for p<0.05.
Results: Analysis of the features of the baseline level of HRV and its correlation with left ventricle volumetric indices was carried out. It was revealed negative correlation between level of SDNN and LVEDD (R=-0.197; p=0.005); LVESD (R=-0.244; 0.001); LVEDV (R=-0.172; p=0.014); LVESV (R=-0.280; p=0.001); level of SDANN and LVEDD (R= -0.236; p=0.001); LVESD (R=-0.251; 0.001); LVEDV (R=-0.211; p=0.003); LVESV (R=-0.299; p=0.001); level of RMSSD and LVESD (R=-0.251; 0.001); and level of pNN50 and LVEDD (R=-0.167; p=0,018); LVESD (R=-0.239; 0.001); LVESV (R=-0.207; p=0.003). All four analyzed HRV parameters also show the positive correlation with LVEF: SDNN (R=0.287; p=0.001); SDANN (R=0.283 p=0.001); RMSSD (R=0.161; p=0.022) and pNN50 (R=0.229; p=0.001).
Conclusions: Obtained results show the unity of pathologic processes of myocardial remodeling in patients after Q-AMI and presence of interrelation between the increases in the size of left ventricle and decreasing of its contractility and parameters of heart rate variability.

HRV parameters and LV volumetric indices

Parameter	Mean±St.Dev.	Parameter	Mean±St.Dev.
LVEDD, cm	5.73±0.70	SDNN, ms	101.41±35.83
LVESD, cm	3.92±0.82	SDANN, ms	87.99±31.69
LVEDV, ml	156.06±51.73	RMSSD, ms	27.19±21.17
LVESV, ml	82.15±40.84	pNN50, %	6.11±9.85
LVEF, %	48.67±11.54		

P907

The PARTHENON study: PAtient RegisTry assessing effectiveness and safety of HEart failure treatmeNt with Sac/Val acrOss CaNada

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Background: Sacubitril/valsartan (sac/val) was introduced into clinical practice in Canada in 2015 for patients with Heart Failure with a reduced Ejection Fraction (HFrEF). The PARTHENON registry was initiated simultaneously to evaluate the effectiveness and safety of sac/val followed in routine clinical practice for up to 3 years. We present the interim results of PARTHENON at a median follow-up time of 6.6 months.
Methods: This observational, multicenter Canadian registry enrolled patients who initiated sac/val as per guideline recommendations within a prior 3 month period. Patients were actively recruited at 32 community and academic centers between May/2016 and October/2017. The primary endpoint is the association between

baseline natriuretic peptide levels and the composite endpoint of all-cause hospitalization or all-cause mortality. Safety endpoints included physician- reported clinically relevant symptomatic hypotension (Systolic Blood Pressure <100 mmHg), hyperkalemia (Serum Potassium > 5.5 mmol/L) and renal impairment (Decrease in eGFR>=40 % Compared to Baseline). All treatment decisions were made as per the treating physician.

Results: This interim analysis included 998 patients (80% male), with a mean age of 67 years, with predominantly NYHA Class II (83%) symptoms. The mean baseline BP was 119/70 mmHg, LV ejection fraction was 29.5± 7.6% and the median NT-proBNP and BNP levels were 992 pg/mL and 226 pg/mL respectively. Following sac/val initiation, 137 patients (13.7%) had a hospitalization, and 33 patients (3.3%) died. Clinically relevant symptomatic hypotension occurred in 126 patients (12.6%) and hyperkalemia and renal impairment were reported in 26 (2.6%) and72 (7.2%) patients, respectively. Eighty-two patients (8.2%) discontinued sac/val, either due to adverse events (n=35, 43%), investigator decision (n=27, 33%) or other reasons (n=20, 24%).

Conclusion: The PARTHENON registry describes the HFrEF patient population receiving Sac/Val in Canadian practice which is characterized by a high proportion of HFrEF patients with NYHA class II, normal BP and a low rate of adverse events when compared to the Canadian product monograph.

P908

Prediction of pharmacological reverse remodeling in non-ischemic dilated cardiomyopathy with wide QRS-complex.

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Background: No data is yet available to help decide introduction of device treatment, such as cardiac resynchronization therapy, in heart failure patients with a wide QRS-complex. Therefore, we attempted to identify the clinical indicators of left ventricular reverse remodeling (LVRR) after pharmacotherapy in non-ischemic dilated cardiomyopathy (NIDCM) patients with a wide QRS-complex.

Methods and Results: We evaluated 38 patients diagnosed with NIDCM and a wide QRS-complex (≥120 ms) who were treated by medical treatment including beta-blockers. Of the total patients evaluated, 19 (50%), 6 (16%), and 13 (34%) patients had left bundle branch block (LBBB), right bundle branch block (RBBB), and nonspecific intraventricular conduction delay (NICD), respectively. Electrocardiograms and echocardiograms taken at baseline (BSL) and at 6 (6M) and 12 months (12M) after initiation of the standard medical treatments were analyzed. LVRR (ΔLV ejection fraction [EF] ≥ +10% and ΔLV end-diastolic diameter ≤ −10% at 12M) was detected in 19 (50%) patients. Although BSL-LVEF was not significantly different between patients with LVRR and those without it (29 [IQR: 22.37]% vs. 31 [20.42]%, p = 0.74), 12M-LVEF was higher in patients with LVRR than in those without it (52 [47.60]% vs. 42 [24.50]%, p = 0.0019). Among the BSL-parameters, only the presence of LBBB was strongly associated with the prediction of LVRR. In the LBBB group, the presence of severe mitral valve regurgitation at 6M and higher systolic blood pressure at 6M were predictors of LVRR. No significant predictor of LVRR was noted in the RBBB group. In the NICD group, New York Heart Association class ≤ II at 6M, longer PQ interval at 6M, longer QT interval at 6M, and normal QRS-complex duration at 6M were found to be predictors of LVRR.

Conclusions: Combined assessment using BSL- and 6M-parameters provided supportive data that helps in the decision regarding the introduction of device treatment in patients with NIDCM with a wide QRS-complex. The predictors of LVRR may differ according to different morphology types of the QRS-complex.

P909

Neurohormonal antagonist therapies, renal function and kalaemia: a trade-off to consider when treating heart failure patients

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Introduction: The heart failure (HF) with reduced ejection fraction (rEF) therapeutic algorithm encompasses three pharmacological classes that interact with homeostatic renal mechanisms and with potassium (K) excretion. The known effects of sacubitril/valsartan (S/V) on renal function and K levels accrue form the PARADIGM-HF Trial results but there is a lack of every-day clinical practice derived evidence.

Objectives: To evaluate the impact of S/V initiation therapy on renal function, serum K levels and concomitant K-retaining drugs in patients (pts) with HFrEF.

Methods: Single-centre, prospective study of pts medicated with S/V. Estimated glomerular filtration rate (eGFR) calculated by the CKD-EPI formula, serum creatinine (sCr) and K were recorded before S/V initiation and after the up-titration (to maximal individualized tolerated doses) period. Concomitant therapy with mineralocorticoid receptor antagonists (MRAs) and their respective doses was recorded. The effect of S/V introduction on laboratorial data and changes in MRA doses were evaluated by Wilcoxon test.

Results: S/V was prescribed to 102 pts. The mean sCr value was 1.24±0.5 mg/dL, corresponding to an average eGFR of 67.5±23.4 ml/min/1.73. There was no significant change in mean sCr (1.26±0.46, P=NS) or eGFR (62.6±22.5 ml/min/1.73; P=NS) after S/V initiation. Eleven pts (10.8%) had an increase of sCr >0.3mg/dL, which, however, did not led to the interruption or reduction of S/V dose. In 8 pts (7.8%) the drug was started off-label in pts with eGFR < 30ml/min/1.73 but >20ml/ min/1.73: in 7 of these pts, a sCr reduction was observed after S/V initiation (this reduction was >0.3 mg/dL in 3 pts).The mean baseline K value was 4.5±0.6 mmol/L and there was seen a statistically but not clinically significant increase (4.66±0.5mmol/L; P= 0.034) after S/V introduction. Hyperkalaemia with K >5.5mmol/L was observed in 6 pts (5.9%).

In 18 pts (17.6%) S/V was started in the presence of K between 5 and 5.5mmol/L. In this sub-population, 10 pts (9.8%) had K reduction after starting the drug, 1 pt maintained the exact same level of K, and 4 pts (3.9%) had a rise of 0.1 to 0.2mmol/L. Only 1 pt required S/V dose reduction (basal K: 5.5mmol/L, maximum K: 6.2mmol/L). There was a need for MRA dose reduction in 5 pts (4.9%), and even interruption in 3 pts (2.9%) in order to reduce K levels. It is also worth noting that in 35 pts (34%) S/V was started without prior MRA prescription.

Conclusion: In this study population the initiation of S/V did not affect negatively renal function and its introduction in pts with eGFR between 20 and 30ml/min/1.73 was found to be safe. Hyperkalaemia was a frequent problem, but did not led to S/V discontinuation. It was observed that sometimes physicians choose to reduce MRA dose in order to maintain S/V therapy and consequently take the possible clinical benefit from both drugs.

P910

Does PSV in ICA independently predict plasma levels of NT-proBNP in patients with HFrEF diabetic cardiomyopathy and ipsilateral carotid artery disease?

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Background/Introduction: Diabetes Mellitus is a systemic disease that clinically is presented with various forms of cardiovascular abnormalities. MACE and Cardiovascular Death among diabetics is mostly common. Carotid artery disease and Diabetic Cardiomyopathy is one of many common comorbidities in DM patients.

Purpose: The aim of this study was to evaluate the possible clinical correlation of ipsilateral Carotid Artery Disease in patients with HFrEF Diabetic Cardiomyopathy. Can PSVs of stenotic ICAs ipsilaterally, independently predict plasma levels of NT-proBNP in patients with HFrEF diabetic cardiomyopathy?

Material/Methods: 422 patients (234 male, 188 female) Diabetics betweeen 46 to 77 years of age with HFrEF DCMP and ipsilateral CAD were recruited for this study. All patients had an EF ≥25-40≤ % and ipsilateral carotid artery disease, diagnosed with U/S Echo. Internal Carotid Artery stenosis was considered to be significant when PSV≥230 cm/sec. NT-proBNP plasma levels were evaluated for Diabetic Cardiomyopathy assessment and considered to be significant when ≥400pg/ml. All data were analyzed using ANOVA and logistic regression and ICA PSV as an independent variable. Data are presented as mean ± standard deviation and level of significance was accepted when p<0. 05.

Results: Date were analyzed in 422 Diabetics (234 male, 188 female) betweeen 46 to 77 years of age with HFrEF DCMP and ipsilateral CarotidArteryDisease. 104 (24.6%) patients had ICA PSV 217 ± 34 cm/sec and NT-proBNP of 709 ± 124 pg/ml. 99 (23.4%) patients had ICA PSV 241 ± 41 cm/sec and NT-proBNP of 886 ± 96 pg/ml. 121 (28.7%) patients had ICA PSV 256 ± 38 cm/sec and NT-proBNP of 913 ± 119 pg/ml. 98 (23.3%) patients had ICA PSV 294 ± 37 cm/sec and NT-proBNP of 1136 ± 121 pg/ml. Ipsilateral ICA PSVs are markedly increased (p=0.019) and can independently predict augmented circulating NT-proBNP palsma levels (p<0.0001).

Conclusion: Increased ICA PSVs is an independent predictor of markedly NT-proBNP levels in DM patients with ipsialteral carotid artery disease and HFrEF DCMP.

P911

Ten-year differences in indications for cardiac resynchronization therapy in international guidelines - insights from the Heart Failure Pilot and Long-Term Registries of the ESC

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Background: Cardiac resynchronization therapy (CRT) applied to properly selected patients (pts) with heart failure (HF) improves quality of life and symptoms, as well as reduces HF rehospitalizations and mortality. In recent years, both the eligibility criteria (severity of symptoms in New York Heart Association (NYHA) class, left ventricle ejection fraction (LVEF), QRS complexes duration, presence of left bundle branch block (LBBB) or presence of atrial fibrillation (AF)), as well as the strength of scientific evidence attributed to them have been regularly changed.Purpose This study aimed to investigate the changes in eligibility of real-life HF pts for CRT according to differences in the last ten-years international guidelines.
Methods: We reviewed 7 international guidelines (5 European (2007, 2010, 2013, 2015, 2016), 1 North American (2012) and 1 Canadian (2017)) published from 2007 to 2017. Out of 2019 Polish HF ptsrecruited into the HF Pilot (years 2009-2010) and Long-Term (years 2012-2013) Registries of the ESC, 1456pts were included into the final analysis (563 pts with lacking data on CRT eligibility criteria, with paced rhythm or died during index hospitalization were excluded from the study). Patients with AF were assessed separately. Patients were clinically stable.Results Class I (indicated/recommended) of CRT implantation recommendations received from 44 pts (3%) in 2012 to 134 pts (9.2%) in 2010 (p-value for differences between groups <0.0001). There were 25 pts (1.7%) who would be eligible in the class I of recommendations across all of the guidelines (the common criteria in those pts were: sinus rhythm, LVEF ≤35%, LBBB, QRS ≥ 150 ms, NYHA class III or ambulatory class IV). Class IIa (should be considered) of recommendations received from 15 (1%) to 75 pts (5.2%) in 2015 and 2012 (p-value for differences between groups <0.0001), respectively. Class IIb (may be considered) of recommendations received from 28 (1.9%) to 80 pts (5.5%) in 2015 and 2013 (p-value for differences between groups <0.0001), respectively. Within pts with AF indication for CRT had from 16 (1.1%) to 53 pts (3.6%) in 2015 and 2012 (p-value for differences between groups <0.0001), respectively. In overall (including all classes of recommendations and patients with AF and sinus rhythm), the most patients would have been qualified for CRT in 2013 (261 pts, 17.9%), while the least in 2015 (111 pts, 7.6%; p-value for differences between groups <0.0001).
Conclusions: The results of our study suggest that there is an accumulation of recommendations for CRT implantation which may cause some confusion among clinicians. A high variability of the percentage of patients meeting the CRT eligibility criteria was observed. Across the ten years, the criteria overlappedonly in a small percentage of cases.

P912

Hypertrophic cardiomyopathy unmasked after treatment of heart failure

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Introduction: We report a case of heart failure with reduced ejection fraction (HFrEF) in whom hypertrophic cardiomyopathy (HCM) was unmasked following recovery of LV systolic function.
Clinical Case: A 61-year-old man presented with a six-month history of progressively worsening dyspnea and orthopnea. Physical examination revealed features of biventricular failure. Electrocardiogram revealed normal sinus rhythm and left ventricular hypertrophy (LVH). Chest X-ray revealed cardiomegaly and bilateral pleural effusions. He was treated for acute decompensated heart failure. Transthoracic echocardiography (TTE) demonstrated left ventricular dilation (LVIDd 6.0 cm) and moderate concentric LVH with septal and posterior wall thickness of 15 mm each. Left ventricular ejection fraction (LVEF) was 25-30% with akinesis of the mid septum and apex (Figure 1 a, b). He was started on perindopril and bisoprolol with outpatient titration. His repeat echocardiogram after three months on optimal medical therapy revealed a reduction in LVEF to 20%. His perindopril was switched to sacubitril-valsartan, titrated to the maximum dose. Coronary angiography demonstrated a chronically occluded left anterior descending artery not requiring intervention.
Repeat TTE performed three months later for primary prevention implantable cardioverter defibrillator candidacy determination revealed significant reduction in LV size (LVIDd 4.8 cm) and dramatic improvement in LVEF to 50-55%. Notably, the pattern of hypertrophy had changed from concentric to asymmetric septal hypertrophy, with the interventricular septum measuring 22 mm, consistent with HCM (Figure 1 c, d). Cardiac magnetic resonance (CMR) imaging confirmed these findings, with concomitant delayed gadolinium enhancement (Figure 1e) suggestive of HCM.
Discussion: In 5% of patients with HCM, there is progression to end stage or "burned out" phase characterized by systolic impairment. This stage of disease is associated with adverse LV remodeling, cavity dilation, and wall thinning due to a process of extensive myocardial fibrosis. Further clinical deterioration is rapid, often necessitating consideration for cardiac transplantation. We did not find any previously reported case of "burned out" HCM with full recovery of LV systolic function on medical therapy in the literature. Angiotensin receptor-neprilysin inhibitor (ARNI) use has been associated with significant improvements in the mortality and morbidity of patients with HFrEF although the remodeling benefits are still unknown.
Conclusion: This case serves as a possible example of reversal of adverse remodeling from two possible pathologic entities with normalization of LV function only 3 months after use of an ARNI. Proper diagnosis of the cardiomyopathy occurred after LV remodeling occurred. Ongoing studies may provide more robust data on the effects of sacubitril-valsartan on left ventricular remodeling.

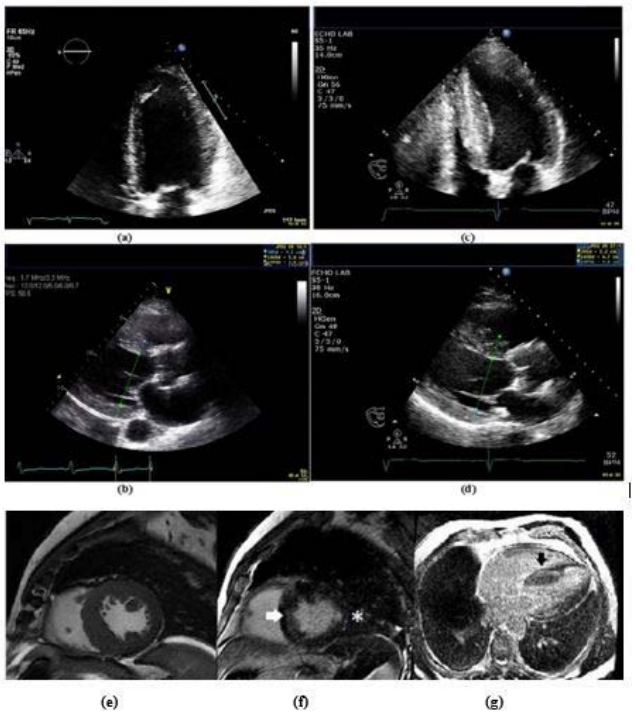

Figure 1.

P913

Left ventricular ejection fraction recovery in patients with heart failure with reduced ejection fraction treated with sacubitril/valsartan.

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Introduction: and objectives. A significant number of patients with heart failure (HF) and reduced left ventricular ejection fraction (LVEF) experience ventricular function recovery during follow-up. We studied the variables associated with LVEF recovery in patients treated with sacubitril/valsartan (SV) in clinical practice.
Methods: Prospective and multicenter registry including 427 outpatients with HF and reduced LVEF who started SV between October 2016 and March 2017. We selected patients with LVEF≤35% at the beginning and classified them into two groups according to LVEF at the end of follow-up (>35%, group R, or ≤35%, group NR).
Results: 249 patients (58.3%) had LVEF≤35%; after a mean follow-up of 7±0.1 months, 62 (24.8%) had LVEF>35%. They were older (71.3±10.8 vs. 67.5±12.1 years, p=0.025), and had more often hypertension (83.9% vs. 73.8%, p=0.096), higher blood pressure before and after SV (both, p<0.01). They took more often high doses of beta-blockers, with lower proportion of cardiac resynchronization and ICD (all, p<0.05), the latter being the only predictive variable of NR in multivariate analysis (OR 0.26, IC 95% [0.13–0.47], p<0.0001). At the end of follow-up they had a mean LVEF of 41.9±8.1% (vs. 26.3±4.7%, p<0.001), with a difference compared to the initial LVEF of 14.6±10.8% (vs. 0.8±4.5%, p<0.0001), Functional class improved in both groups, mainly in group R (p=0.035), with fewer consultations in the emergency department (p=0.07).
Conclusions. In patients with LVEF≤35% treated with SV, not being a carrier of ICD was independently associated with LVEF recovery, which was related to greater improvement in functional class.

P914
Real-world experience with angiotensin ii receptor blocker neprilysin inhibitor: reverse remodelling is the norm

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Backgroung: The randomized clinical trial PARADIGM-HF proved that compared with enalapril, Angiotensin II Receptor Blocker Neprilysin Inhibitor (ARNI), sacubitril-valsartan, reduced the risk of hospitalization for heart failure (HF) by 21%, decreased cardiovascular (CV) and all cause of death and reduced the symptoms and physical limitations of heart failure, in patients with reduced left ventricular ejection fraction (LVEF).
Purpose: In our country reality, this drug has only 1-year approval. We considered that analysing the application and performance of this drug in our population was fundamental, through a real-word study.
Methods: We conducted a retrospective, observational study of 200 patients with HF treated with sacubitril-valsartan, in a single-centre. Patients were selected whether they were at 97/103mg dose, twice a day (b.i.d) (n=100). Then primary co-endpoints were: improvement of LVEF, New YorK Heart Association functional class (NYHA) and N-terminal pro B-type natriuretic peptide (NT-proBNP) from baseline (start ARNI) until 3 months after initiating 97/103mg (b.i.d) dose. We also analysed events after tolerating the studied dose: CV Death, HF first hospitalization, emergency visits for Acute HF (AHF), de novo atrial fibrillation (AF) and appropriate defibrillator shocks. Baseline clinical and demographic characteristics were evaluated, as well as the time until maximum dose was reached.
Results: In our cohort, mean age was 59 ±12.6, and 86% were male. 51.5% of patients had HF of non-ischemic etiology. Median time between initiation of the drug and reaching the 97/103mg dose was 11 weeks. Regarding our primary endpoints: LVEF improved on average 3.7% ±8.9, with statistical significance (95% IC 1.641 to 5.924; p=0.001). This was verified in 46% (n=32) of the subpopulation studied and in 16.7% of these, LVEF increased to >35%. NT-proBNP had a mild mean decrease of 15.7pg/mL, but without statistical significance; NYHA functional class had a significant improvement (IC 95% 0.008-0.012; p=0.005), 47% of patients with baseline NYHA II changed to I; 81% III to II and 66% IV to II. After 3 months on the 97/103mg b.i.d dose, CV Death occurred in 1%, de novo AF in 1%, first HF hospitalization in 2%, appropriate ICD shock in 3% and emergency visits for AHF in 9%.
Conclusions: as we expect there was a significant improvement in LVEF and symptoms of HF with this drug. Similarly to previous studies, 16.7% improve LVEF above 35%, and no longer have guideline-derived indication for prophylactic implantable cardioverter defibrillator.

P915
Alteration of left ventricular structure and function after treatment with angiotensin receptor-neprilysin inhibitor in patients with heart failure with reduced ejection fraction (ALLEVIATE-HF)

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Background: There is robust evidence that Angiotensin receptor-neprilysin inhibitor (ARNI) can reduce death and heart failure hospitalization in patients with heart failure with reduced ejection fraction (HFrEF). However, the improvement of function and reverse remodeling of the left ventricle after ARNI have not been established.
Method: In this single-center retrospective cohort study of 47 patients with HFrEF, we reviewed the clinical and echocardiographic data collected prior to the initiation of ARNI treatment compared to the one collected after maximal tolerated ARNI dose. Paired sample T-test was used for normally distributed data, while Wilcoxon Signed Rank test for non-normally distributed data.
Results: The mean left ventricular ejection fraction (LVEF) significantly improved from 30.23% to 42.15% (mean difference 11.92 ± 1.84, p < 0.001), left ventricular end diastolic diameter decreased by 5.02 mm (p = 0.001), left ventricular end systolic diameter decreased by 8.23 mm (p < 0.001), and LV mass index decreased by 20.45 g/m2 (p = 0.01) The mean duration from maximal tolerated ARNI dose to echocardiographic follow up was 17.98 ± 14.04 weeks. There were 30 patients (64.83%) whose LVEF improved ≥ 5% from baseline. Although the prognostic factor of improved LVEF was not identified, there were positive trend in those who had been up-titrated the ARNI dose and negative trend in those with left ventricular end diastolic diameter at baseline of more than 60 mm.
Conclusion: There were significant improvement of LVEF and other parameters of reverse remodeling of the left ventricle after treatment with ARNI.

P918
Prognostic impacts of body mass index and statin therapy on long term mortality in patients with ischemic cardiomyopahty

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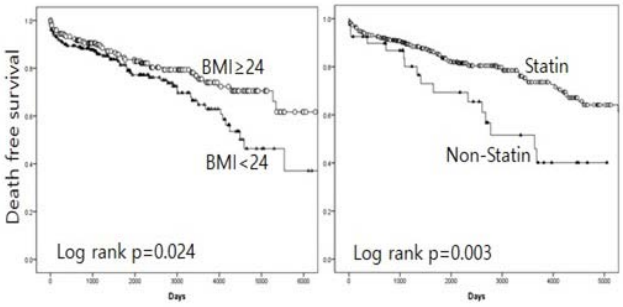
Background and objectives: Uncontrolled ischemia is a frequent cause of heart failure exacerbation after myocardial infarction in the case of progressive remodeled heart. We investigated the prognostic factors of long term outcome in patients with ischemic cardiomyopathy (ICMP).
Methods: A total of 1,214 patients were found to have left ventricular (LV) ejection fraction (EF) <45% and LV end diastolic dimension >55mm with regional wall motion abnormality. After exclusions including acute myocardial infarction and absent acceptable invasive coronary imaging, 475 patients (73±10 years, 274 female) were included for analysis.
Results: During 6.0±4.7 year follow up, 111 patients (23.4%) were died. There were no significant differences on long term mortality between sex. Old age, diabetes, hypertension and low body mass index were poor prognostic factors of mortality in ICMP. Echocardiographic measured low EF less than 35%, elevated left ventricular filling pressure (e/e'>15) and presence of pulmonary hypertension (right ventricular systolic pressure>35mmHg) were significant poor prognostic factors in ICMP. In coronary angiography, left circumferential artery and right coronary artery lesion showed bad outcome rather than left anterior descending artery. Repeated percutaneous coronary intervention was not related with long term outcome. Mortality was significantly lower in patients taken statin medication. In Kaplan Meier survival analysis, mortality was significantly higher in lower BMI rather than higher BMI group (log rank p=0.024). Long term outcome was better in statin treated group than non-statin treated group (log rank p=0.003) (Fig)
Conclusion: Besides conventional risk factors, higher body mass and statin therapy significantly attenuated long term mortality in patients with ICMP. Therefore, optimal nutritional support and medication was helpful to improved outcome in patients with remodeled heart due to ischemia.



P919

Impact of post-discharge statin withdrawal on long-term clinical outcome in patients with ischemic heart failure with reduced ejection fraction

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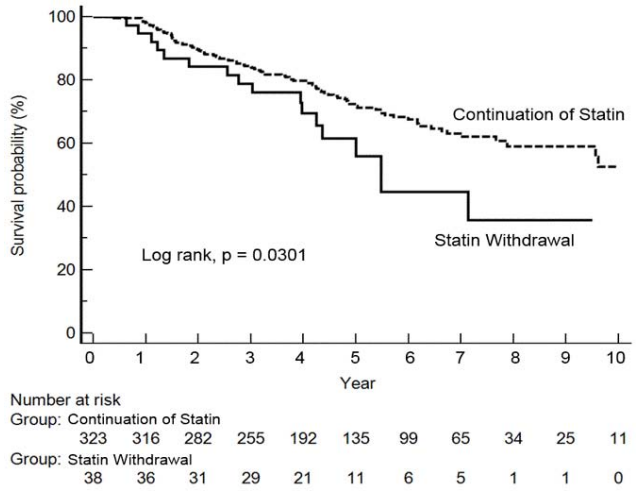
Background: Statin therapy is necessary for secondary prevention in patients with acute myocardial infarction (AMI). However, among patients with ischemic heart failure (HF) with reduced ejection fraction (EF) who suffered from AMI before 1 year, limited data are available describing the clinical impact of statin withdrawal within 1 year after AMI.
Methods: Patients in the Korean multi-center registry who survived for 1 year after AMI were consecutively enrolled. After excluded patients with preserved EF, patients with ischemic HF with reduced EF who prescribed statin at discharge were divided into 2 groups on the basis of statin withdrawal history. A total of 449 patients were compared in all-cause mortality within a follow-up period.
Results: Median follow-up duration was 52 months (interquartile range 31 to 78 months). Age, sex, presence of diabetes, hypertension, and dyslipidemia, as well as status of smoking were not different between the groups. Patients with statin withdrawal history had greater all-cause mortality (31.3% vs. 47.5%). Withdrawal of statin within 1 year after AMI was an independent predictor of all-cause mortality after adjusting confounding risk factors (hazard ratio: 2.096, confidence interval: 1.238-3.548, p=0.006).
Conclusion: In patients with ischemic HF with reduced EF, post-discharge withdrawal of statin within 1 year after AMI is associated with increased risk of poor outcome independently of coexisting risk factors.



P920

Possibilities of clinical application of the new biomarker ST2 in heart failure patients: an exercise test

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Objective: The objective of this study was to evaluate prognostic value of sST2 biomarker at rest and after exercises in the development of adverse cardiac events in heart failure (HF) patients during the 12-month follow-up period. Methods. A total of 35 patients (91.4% men, median age of 62 [57; 67] years) with stable coronary artery disease and baseline LVEF of 44% [35; 52]% were enrolled in the study. At baseline evaluation, heart failure patients were of New York Heart Association (NYHA) class I-III. Serum levels of sST2 and NT-proBNP were measured using an enzyme immunoassay. Serum sST2 levels were measured prior to (at rest) and immediately after the 6-minute walk test (6MWT). Results. Depending on the course of HF, the patients were divided into 2 groups: group 1 comprised patients (n=15) with adverse cardiac events; group 2 comprised patients (n = 20) without it. The median values of baseline sST2 were 39.68 [32.28; 52.32] ng/mL in group 1 and 29.29 [26.34; 33.78] ng/mL (p=0.007) in group 2. The cut-off values predicting adverse cardiac events in ischemic heart failure patients were determined based on receiver operating characteristic curve analysis. Baseline sST2 concentration at rest of 33.14 ng/mL was identified as a cut-off value with the sensitivity of 73.3%, specificity of 75.0%, and AUC of 0.77 (95% CI 0.59-0.89, p=0.002). After 6MWT in patients with the unfavorable course of HF, there was a tendency (p = 0.211) to increase in sST2 level by 9.3% from 39.68 [32.28; 33.78] ng/mL to 43.75 [36.85; 54.80] ng/mL. In patients without adverse cardiac events, the level of sST2 did not change (29.29 [26.34; 33.78] ng/mL at rest and 29.43 [23.79; 34.79] ng/ml after 6MWT, respectively). Baseline sST2 concentration after 6MWT of 34.58 ng/mL was identified as a cut-off value with higher levels of specificity and sensitivity of 86.7 and 85.0%, respectively (AU - 0 86, p <0.0001) for prediction of adverse cardiac events during the 12-month follow-up period. Conclusion. Our data suggest that ST2 may be considered a non-invasive biomarker for prediction of adverse cardiac events during the 12-month follow-up period in ischemic heart failure patients. Baseline sST2 concentration after 6MWT demonstrated higher diagnostic sensitivity and specificity for prediction of adverse outcomes.

P921

Cerebral oximetry and haemodynamic parameters during controlled orthostatic challenge in heart failure and normal subjects

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On behalf of: HARVEST

Background: Changes in cerebral oxygenation and hemodynamic parameters during orthostatic stress are poorly investigated in patients with congestive heart failure (CHF).Introduction / purpose
We aimed to investigate whether the presence of CHF affects cerebral tissue oxygenation relative to changes in haemodynamic parameters during controlled orthostatic stress.
Methods: Near infrared spectroscopy (NIRS) was applied to measure absolute frontal cerebral tissue oxygen saturation (SctO2) during 700head-up tilt (HUT) in 61 patients with CHF (mean-age: 71±11 years, 82% male,NYHA class I–III), in stable condition and in 60 non-CHF control individuals (mean age: 60±12 years, 42% male). Synchronized non-invasive beat-to-beat hemodynamic monitoring, cerebral oximetry and ECG were applied during rest and head-up-tilt test (HUT). Group differences in continuous variables between CHF- positive and -negative individuals were compared using Student's t-test.The associations between CHF and SctO2 levels in supine position and after 10 minutes of HUT were studied using multivariable-adjusted linear regression models including age, gender, systolic blood pressure (SBP) in supine position and after 10 min of HUT, heart rate (HR) in supine position and after 10 min of HUT.
Result: In patients with CHF, the SctO2 decreased from 67±5% in supine to 64±5% after 10 minutes in standing position while both systolic (SBP), diastolic blood pressure (DBP) and heart rate (HR) increased upon HUT (SBP from 123±27mmHg to 125±24mmHg, DBP from 67±13mmHg to 69±14mmHg; HR from 70±13bpm to 73±14bpm). In controls, SctO2 decreased from 71±3% (p<0.001 compared to HF patients) in supine to 69±3% (p<0.001 compared to HF patients), whereas SBP, DBP and HR increased (SBP from 142±19mmHg to 142±20mmHg, DBP from 79±12mmHg to 85±14mmHg; HR 71±12bpm to 78±13bpm). A diagnosis of CHF (beta = -3.3 %; p<0.001) and higher resting HR (beta = -0.09 % per bpm; p = 0.008) was associated with lower supine SctO2 levels. Lower SctO2 after 10 min HUT was independently associated with CHF (beta -2.9 %; p =0.001), age (beta -0.1 % per year; p = 0.001), resting HR (beta -0.073 % per bpm; p=0.010) and 10 min HUT SBP (beta 0.053 % per mmHg; p = 0.001). Ejection fraction (EF%) showed no significant correlation with SctO2 and its changes during HUT.
Conclusion: Patients with CHF in stable condition experience reduced levels of cerebral oxygenation in rest and in standing position as compared to controls without CHF. Age and higher resting heart rate are associated with reduced cerebral oxygenation whereas increased orthostatic systolic blood pressure is associated with increased cerebral oxygenation during orthostasis. These findings might indicate subclinical impaired posture-dependent cerebral perfusion oxygenation in heart failure.

P922

Diastolic heart failure in patients with chronic obstructive pulmonary disease in combination with hypertension

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Purpose: to evaluate left ventricular (LV) and right ventricular (RV) diastolic function in patients with chronic obstructive pulmonary disease (COPD) in combination with hypertension (HT)

Methods: In total, 100 COPD patients (GOLD 2, group B) in remission (79 males and 21 females) 54,42±6,23 years old were monitored. The COPD group in combination with HT stage II included 69 patients, the isolated COPD group - 31 patients. All patients underwent 6-min walk test (6MWT), pulse oximetry, spirometry, electrocardiography, echocardiography (ultrasound device RADMIR Ultima) and chest x-ray.
Results: The 6MWT distance was significantly lower in comorbid group compared to isolated COPD group (383,41±14,85 m vs. 395,68±18,99 m, p < 0,05). Desaturation during the 6MWT was significantly higher (4,14±1,44 % vs. 3,39±1,31 %, respectively, p<0,05). LV mass index was significantly higher (130,77±23,12 g/m2 vs. 96,53±13,72 g/m2, respectively, p<0,05). RV wall thickness was higher (5,42±0,61 mm vs. 5,11±0,80 mm, respectively =0,0545). Analysis of the distribution of patients according to type of LV diastolic dysfunction showed probable (χ2=34,13, <0,0001) differences. According to type of RV diastolic dysfunction between the groups also revealed probable (χ2=12,83, =0,0016) differences.
Conclusions: Reduced exercise tolerance, exercise-induced desaturation, signs of heart remodeling and more pronounced diastolic dysfunction both ventricles are revealed in patients with COPD combined with HT.

P923
Laboratory and clinical indicators of chronic heart failure in patients with rapidly progressive left ventricular remodeling

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Purpose: to study the dynamics of laboratory and clinical parameters of chronic heart failure in patients with different types of left ventricular remodeling after acute myocardial infarction with ST segment elevation (STEMI) at 48-week of follow-up.
Methods: the study included 86 patients with STEMI. Inclusion criteria was the presence of significant stenosis of only one coronary artery according to the coronary angiography. The treatment in the framework of the study was carried out at the background of prescribed pharmacotherapy for STEMI. Initially at 7-9th days and after 24, 48 weeks of follow-up, the brain natriuretic peptide (BNP) was determined using immunochemical analysis, the patient's clinical condition scale (CCS) was analyzed. A 6-minute walk test was performed after 12 and 48 weeks. In addition, all patients underwent echocardiography using the device MyLab ("Esaote", Italy) with the evaluation of the end diastolic volume index (EDVi). Then the patients were divided into two groups. The first group included 51 people without echocardiographic signs of LV remodeling: the dynamics of EDVi after STEMI was <20%. Group 2 included 35 patients with rapidly progressive LV remodeling (increase in EDVi index was >20%). The compared groups were matched by age, sex, anthropometric data, and treatment.
Results: initially compared individuals did not differ in the BNP level: in group 1 - 117.2 [95% CI 80.6; 153.8] pg/ml, in group 2 - 146.2 [95% CI 79.5; 213] pg/ml (p=0.34). After 24 weeks, patients with no pathological increase in the EDVi index showed a decrease in BNP to 64.9 [95% CI 37.3; 92.6] pg/ml (p=0.009), after 48 weeks - 71.9 [95% CI 31.9; 111.9] pg/ml (p=0.01). In patients with rapidly progressive LV remodeling, the BNP values did not change significantly: after 24 weeks - 102.9 [95% CI 23.5; 182.2] pg/ml (p=0.11), after 48 weeks - 91.4 [95% CI 43.1; 139.7] pg/ml (p=0.11). According to the 6-minute walk test in group 1 after 12 weeks of follow-up, the average distance traveled was 487.9 [95% CI 459.3; 516.5] m, after 24 weeks - 506.8 [95% CI 481.6; 531.9] m (p=0.15), after 48 weeks - 520.6 [95% CI 496.5; 544.8] m (p=0.04). In group 2 the average distance after 12 weeks of follow-up was 499 [95% CI 460.3; 537.7] m, after 24 weeks - 515.6 [95% CI 463.7; 567.6] m (p=0.57), 48 weeks - 500.9 [95% CI 455.7; 546.3] m (p=0.91). According to CCS, group 1 had no dynamics: baseline - 1.1 [95% CI 0.9; 1.3] after 24 weeks - 1 [95% CI 0.8; 1.1], 48 weeks - 0.8 [95% CI 0.7; 1] points. In group 2, the initial CCS value was 1 [95% CI 0.7; 1.4], after 24 weeks, 0.8 [95% CI 0.4; 1.2] (p=0.01), 48 weeks — 1.09 [95% CI 0.8; 1.4] points (p=0.001).
Conclusions: in STEMI patients without pathological myocardial remodeling, a favorable decrease in the BNP level and an improvement in exercise tolerance were found. While in the group with rapidly progressive left ventricular remodeling, there was a worsening of clinical condition and without normalization of BNP.

P924
RecovHF - predictive markers of one year recovery

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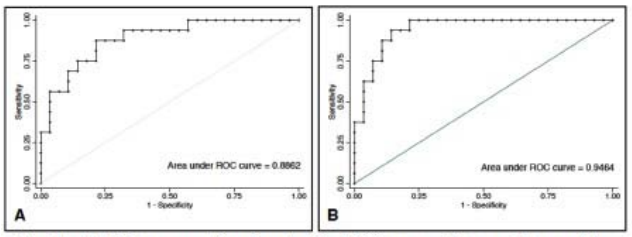
Introduction: Left ventricular ejection fraction (LVEF) recovery in Heart Failure (HF) is associated with better overall prognosis, with different characteristics when compared to the other subgroups ofHF patients. Few data exists about its predictors in de novo HF, and its knowledge would be of great importance to better stratify, follow and treat this specific type of patients.
Methods: A single centered retrospective open cohort study. Data from the advanced HF consult database, including all newly diagnosed HF patients with LVEF<40%. LVEF recovery was defined as LVEF≥50% or an absolute increase of 15%. Clinical, biochemical, electrocardiographic and echocardiographic data were collected. Using logistic regression, predictors of LVEF recovery during follow-up and at 1year, were determined.
Results: 90 patients were analysed during a follow-up of 281.1py, with a significant improvement of LVEF (mean diff 14.4%, p<0.001) and an incidence rate of 1.6 cases/10py. 35.6% of those who recovered, did it in the 1st year. Hypertension (OR 0.40, p=0.048), diabetes (OR 0.36, p=0.028), previous treatment with neurohormonal antagonists drugs (OR 0.36, p=0.030), ischemic aetiology (OR 0.24, p=0.003), iron deficiency (OR 0.14, p=0.025) were significantly associated with no LVEF recovery during follow-up. Only QRS duration (OR 0.96, p=0.004), LBBB (OR 0.15, p=0.011) and eGFR (1.04, p=0.021) were significantly associated to LVEF recovery at the 1st year. A model including these data, age and gender performed highly predictive of LVEF in 1 year (AUC 0.95).
Conclusion: Different characteristics at HF diagnosis are associated with LVEF recovery within one year or later on, allowing to better identify, stratify an follow those patients. More studies are needed to corroborate these results.

Table 3. Variables significantly associated with LVEF recovery with the first year of follow-up.

Characteristic	OR	*p-value*
QRS duration	0.96	**0.004**
QRS ≥ 130ms	0.16	**0.015**
Left bundle branch block	0.15	**0.011**
Biochemical parameters		
eGFR [a]	1.04	0.021

[a] Assessed by CKD-EPI formula
eGFR - Estimate of glomerular filtration rate; LVEDV – Left ventricular end-diastolic diameter; LVEF – Left ventricular ejection fraction



Graphic 2. Reciever operating characteristic (ROC) curves of two models, predicting LVEF recovery within 1 year of follw-up. A) Including quadratic age, male gender, QRS duration, QRS≥130ms, the presence of LBBB and eGFR (using CKD-EPI formula) with an AUC of 0.09. B) Same as A, but including the variable LVEF and ischemic etiology.
AUC – area under the curve.

Predictive model for LVEF recovery at 1y

Chronic Heart Failure - Epidemiology, Prognosis, Outcome

P925
Prognostic value of NT-proBNP added to clinical parameters to predict two-year prognosis of chronic heart failure patients with mid-range and reduced ejection fraction, a report from FAR NHL registry

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On behalf of: FAR NHL

Background: The guidelines recommend to determine natriuretic peptides, the NYHA classification and comorbidities in order to predict the patient's prognosis. The aim our work was to develop a prognostic score in chronic heart failure patients that would take account of patients' comorbidities, NYHA and NT-proBNP.
Methods and Results: Consecutive 1088 patients with chronic heart failure with reduced ejection fraction (HFrEF) (LVEF<40%) and mid-range EF (HFmrEF) (LVEF 40-49%) were enrolled. Two-year all-cause mortality, heart transplantation and/or LVAD implantation were defined as the primary endpoint (EP). The occurrence

of EP was 14.9% and grew with higher NYHA, namely 4.9% (NYHA I), 11.4% (NYHA II) and 27.8% (NYHA III-IV) (p<0.001). The occurrence of EP was 3%, about 10% and 15–37% in patients with NT-proBNP levels ≤125pg/ml, 126-1000pg/ml and >1000pg/ml respectively. Discrimination abilities of NYHA and NT-proBNP were (AUC 0.670; p<0.001 and AUC 0.722; p<0.001). The predictive value of the developed clinical model, which took account of older age, advanced heart failure (NYHA III+IV), anaemia, hyponatraemia, hyperuricaemia and taking a higher dose of furosemide (>40 mg daily) (AUC 0.773; p0.001) was increased by adding the NT-proBNP level (AUC 0.790). Conclusion: The use of prediction models in patients with chronic heart failure, namely those taking account of natriuretic peptides, should become a standard in routine clinical practice. It might contribute to a better identification of a high-risk group of patients in which more intense treatment needs to be considered, such as heart transplantation or LVAD implantation.

P926

Prospective observational study on heart failure: one-year follow-up results of NATURE-HF (NAtional Tunisian REgistry of Heart Failure) outcome registry

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Background: The First clinical observational studies on heart failure (HF) in Tunisia.
Objective: NATURE-HF (NAtional Tunisian REgistry of Heart Failure) outcome registry.
Methods: This is a nationwide, multicenter, prospective observational trial on a population of 2040 patients followed up for 1 year..
Results: 268 patients were hospitalized for Heart Failure. 1772 were outpatients. The mean age was 63.6 ans ± 12.6. 70.9% were male. Hypertension and diabetes were noted in 42% and 38% respectively. Coronary artery disease was the most common etiology. 52% of patients was pauci-symptomatic (NYHA II). % 57.7 % of the patient presented HFrEF. 33.4% had LVEF ≤35 %. The cumulative total mortality rate at 12 months was 13 %. 7% of patient were hospitalized at 12 months. Average length of stay in hospital for hospitalized patients was around 1.9 (59.0% with 1 previous hospitalization; 32.9% with 2 to 3 previous hospitalizations and 8.1% with 4 or more previous hospitalizations).
Average length of hospital stay (public or private) was about for 8.7 days (64.0% were hospitalized for 1 week, 25.2% for
2 weeks and 10.8% for more than 2 weeks). 22% of patients were under optimized treatment.
Conclusions: Our results are concordant with the literature. but there are deficiencies concerning the therapeutic management and especially the optimization of the treatment.

P927

Sex-related differences in inflammation-associated biomarkers and their predictive utility for new-onset heart failure

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Background: There are known sex-differences in heart failure (HF) pathophysiology, and chronic inflammation has been suggested to be more prominent in males. We evaluated whether baseline levels of inflammation-associated biomarkers differ among men and women from the general population, and investigated whether these differences translate to a sex-specific predictive utility for new-onset HF.
Methodology: We included 8569 HF-free participants (50% women) from the Prevention of Renal and Vascular End-stage Disease (PREVEND) cohort. Associations of sex with plasma concentrations of inflammatory biomarkers – copeptin (CP), procalcitonin (PCT), plasminogen activator inhibitor-1 (PAI-1), galectin (Gal)-3 and C-reactive protein (CRP) were evaluated using linear regression models. In longitudinal analyses, primary endpoint was new-onset HF. Sex-specific predictive value of these biomarkers for both endpoints was determined by Cox regression analysis and evaluated along with the gold standard HF biomarker – N-terminal pro-B-type natriuretic peptide (NT-proBNP).
Results: Males displayed significantly higher levels of PAI-1, CP, PCT (reflecting thrombosis and endothelial activation), whereas females demonstrated higher levels of Gal-3 and CRP (reflecting macrophage and T-cell activation); Pdifference-for-all<0.001. However, none of the inflammation-associated biomarkers displayed a sex-specific predictive utility for HF; Pmen vs women=ns. NT-proBNP levels were higher in women than in men (P<0.001) and strongly predicted incident HF (P<0.001), but did not display a sex-specific predictive utility; Pmen vs women=ns. Nevertheless, for HFrEF, and not HFpEF, but not HFpEF,, a doubling in NT-proBNP was associated with a greater risk of new-onset HFrEF (men vs women: 1.54 (1.35 – 1.76); p<0.001 vs 1.86 (1.49 – 2.32); p<0.001).
Conclusions: Sex-differences in plasma levels of inflammation-associated biomarkers need not translate to a differential predictive utility for new-onset HF in men and women. Sex should be considered as an independent factor in HF pathophysiology rather than a confounding factor.

P928

The patient journey of heart failure patients in Belgian hospitals

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Introduction: Regional discrepancies in heart failure (HF) care are common. A better understanding of diagnosis, treatment and follow up (FUP) of HF patients, as well as of the organizational structure of medical centers, could lead to a better care trajectory for HF patients in Belgium.
Purpose: This project aims to map the in- and out-patient flow of HF care in Belgian hospitals to gain insights in HF management allowing the development of recommendations to optimize Belgian HF care specifically.
Methods: A survey of 44 multiple-choice questions related to HF disease management is currently carried out during face-to-face interviews with one cardiologist responsible for HF in all Belgian hospitals. The current interim analysis is based on interviews held between September and November 2018 and covers a representative sample in terms of regional center distribution and center size.
Results: Currently, 41 hospitals have completed the survey of which 22%, 27% and 51% were large (>600 beds), medium (400-600 beds) and small hospitals (<400 beds) respectively. Of these hospitals, 71% have a dedicated HF specialist and 66% a HF nurse. 85% of the respondents indicate to use NT-pro-BNP over BNP or pro-BNP mainly because of the hospital laboratory preferences and data from the literature. These markers are used by 71% of the hospitals in an emergency setting, by 61% for diagnosis and 51% for patient FUP. ACEi/ARB, BB and MRA are seen as standard of care (SoC) for HFrEF by 100% of the respondents, whereas ARNI, diuretics, devices and rehabilitation are only regarded as SoC by 78%, 73%, 61% and 56% of the respondents, respectively. Importantly, dedicated HF specialists more often regarded diuretics, devices and rehabilitation as SoC as compared to non-dedicated HF specialists, with no difference for ARNI. In line, dedicated HF specialists indicate that a much higher percentage of HFrEF patients reach the target dose of ACEi/ARB, BB, MRA and ARNI versus non-dedicated HF cardiologists. The most important causes why target doses cannot be reached are mainly related to hypotension and worsening of renal function for ACEi/ARB (68% and 63% respectively), brady/tachycardia for BB (80%), hyperkalemia for MRA (83%) and hypotension for ARNI (83%). Regarding the role of a HF nurse, hospitals indicate patient information at discharge and patient education during FUP as the most important tasks, followed by the point of contact for patients and FUP of the patient when hospitalized.
Conclusion: Despite well-defined guidelines for HF treatment, these interim results demonstrate an underuse and underdosing of guidelines-directed treatment. As the presence of a dedicated HF specialist and HF nurse might be associated with improved HF care, more attention should be directed towards the creation of well-established HF clinics. Additionally, reimbursement of NT-pro-BNP to screen and diagnose HF patients in an early stage, even at the GP's office seems desirable.

P929

Frequency of cardiac and non cardiac monocomorbidity in heart failure outpatients stratified by ejection fraction phenotype: a single tertiary university center experience

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Purpose: To assess the prevalence of major cardiac and noncardiac single comorbidity (mono-comorbidity) in a contemporary, unselected chronic heart failure (HF) population visiting the HF Clinic of a tertiary University Hospital, and its association with LVEF.
Methods: This is a prospective, observational study collecting epidemiological information in ambulatory HF patients from January 2016 to December 2018. Patients were classified according to baseline LVEF into HF with reduced EF [EF <40% (HFrEF)], mid-range EF [EF 40-50% (HFmrEF)] and preserved EF [EF >50% (HFpEF)]. Major cardiac and non cardiac comorbidities were recorded at baseline.
Results: Overall, 1064 patients (mean age 73.4 years, 57.7% men, mean LVEF=43.6%, 38.9% ischemic etiology) were recruited in this study [n = 361 (33.9%) HFrEF, n = 247 (23.2%) HFmrEF, and n = 456 (42.9%) HFpEF]. The frequency of mono-comorbidities in the total population as well as stratified by LVEF phenotype is presented in Table 1. In comparison with HFmrEF and HFpEF subjects, patients with HFrEF were more like to have a prior myocardial infarction (25.0% vs. 21.4% vs. 0%), atrial fibrillation (25.0% vs. 28.6% vs. 9.1%), diabetes (6.3% vs. 0% vs. 0%), and chronic kidney disease (12.5% vs. 0% vs. 0%), but less likely to have hypertension (12.5% vs. 35.7% vs. 81.8%) or obesity (0% vs. 14.3% vs. 4.5%).
Conclusion: The findings of the present study verify the theory that the presence of myocardial infarction favours the development of HFrEF whereas the presence of hypertension favours the development of HFpEF, with HFmrEF most probably representing a transition stage.

Table 1. Frequency of single comorbidity (monocomorbidity) by EF phenotype

Comorbidity	Total n=52/1064 (4.9%)	HFpEF n=22/456 (4.8%)	HFmrEF n=14/247 (5.7%)	HFrEF n=16/361 (4.4%)
Obesity, n (%)	3 (5.8)	1 (4.5)	2 (14.3)	0 (0)
Hypertension, n (%)	25 (48.1)	18 (81.8)	5 (35.7)	2 (12.5)
Myocardial infarction, n (%)	7 (13.5)	0 (0)	3 (21.4)	4 (25.0)
COPD, n (%)	0 (0)	0 (0)	0 (0)	0 (0)
Diabetes mellitus, n (%)	1 (1.9)	0 (0)	0 (0)	1 (6.3)
Atrial fibrillation, n (%)	10 (19.2)	2 (9.1)	4 (28.6)	4 (25.0)
Dyslipidaemia, n (%)	0 (0)	0 (0)	0 (0)	0 (0)
Smoking, n (%)	4 (7.7)	1 (4.5)	0 (0)	3 (18.8)
Anaemia, n (%)	0 (0)	0 (0)	0 (0)	0 (0)
Chronic kidney disease, n (%)	2 (3.8)	0 (0)	0 (0)	2 (12.5)

COPD, chronic obstructive pulmonary disease; EF, ejection fraction; HFmrEF, heart failure with mid-region ejection fraction; HFpEF, heart failure with preserved ejection fraction; HFrEF, heart failure with reduced ejection fraction

P931
Which results of the cardiopulmonary exercise test deserve greatest attention to establish the prognosis in heart failure?

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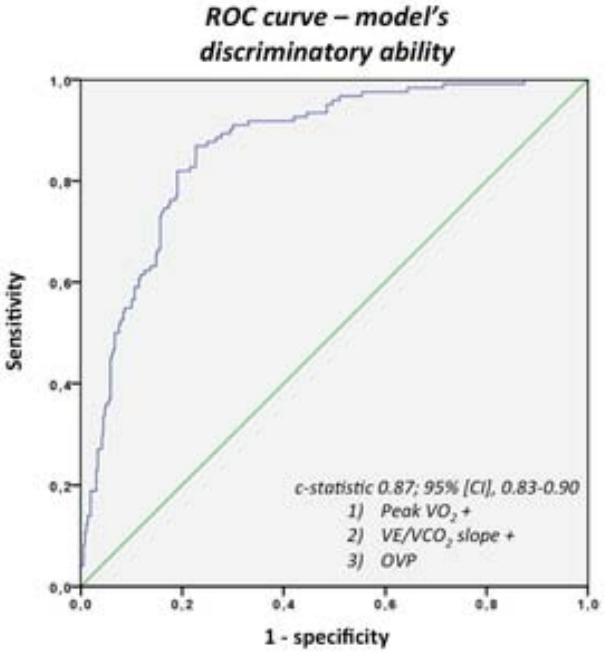
Background and aim: Limitation of exercise tolerance is one of the cardinal manifestations of heart failure (HF). Cardiopulmonary exercise testing (CPET) provides a thorough assessment of exercise integrative physiology involving the pulmonary, muscular, and oxidative cellular systems. We aimed to identify which data collected during a CPET shows the best prognostic performance with respect to predicting mortality or the need for heart transplantation (HT).
Methods: Single-centre retrospective cohort study of consecutive HF patients performing a CPET for functional and prognostic HF evaluation from October 1996 till May 2018. Left ventricular ejection fraction was not an exclusion criterion. A Cox model was fit with time to death or heart transplantation (whichever recorded first within 5 years) as the dependent variable and CPET parameters as the independent variables. Both unadjusted and adjusted covariate Cox regressions were performed. ROC curve analysis was used to determine whether the significant variables, as a model, could reliably predict the study endpoint.
Results: The study population consisted of 513 patients, median age 58 (IQ 16) years, and 74.9% male. The majority had reduced ejection fraction (75.4%), and the most common HF aetiology was ischemic heart disease (55.8%). During the 5-years follow up, 126 patients died and 60 underwent heart transplantation. In unadjusted Cox regression, nearly all CPET variables were significantly associated with the study endpoint. After covariate adjustment, with prior exclusion of redundant variables, three measures remained associated with the study endpoint: peak VO2 consumption (hazard ratio [HR] 0.85; 95% confidence interval [CI], 0.81-0.90); VE/VCO2 slope (HR 1.02; 95% CI, 1.00-1.02); presence of oscillatory ventilatory pattern (HR 3.73; 95% CI, 2.43-5.72). As a model, these 3 variables showed a strong discriminatory ability (c-statistic 0.87; 95% CI, 0.83-0.90) (see figure) for the study endpoint.
Conclusion: When using the CPET for prognostic stratification of HF patients, the presence of an oscillatory ventilatory pattern, the peak VO2 and the VE/VCO2 slope are the most important tools on which clinicians should focus.



Figure

P932
The long-term prognosis of patients with different types of heart failure admitted with decompensation in Russia

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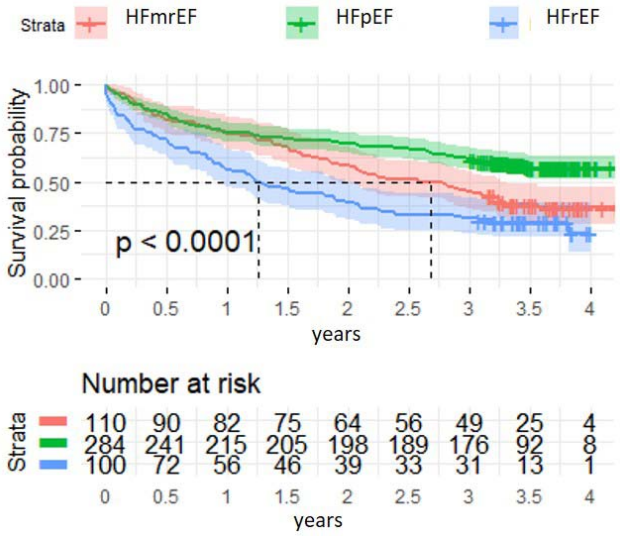
Background: There is a lack of data about the long-term prognosis of patients with HFpEF and HFmrEF. Moreover, there is a debate about whether the diagnosis of these conditions is always correct in stable patients in countries where BNP/NT-proBNP is not checked routinely like Russia.
Purpose: To investigate the prognosis of patients who were admitted to a Russian hospital with proven decompensation of heart failure.
Methods: We investigate medical data of patients who were admitted to one hospital and whose LVEF were known. We investigated patients baseline characteristics and reviewed their prognosis for three years. We divided the patients into three subgroups regarding their LVEF.
Results: 494 patients were enrolled in the study: 100 HFrEF, 110 HFmrEF and 284 HFpEF. The median age of patients was 75 years, and there was no difference between groups regarding age. The highest rate of infarction and cardiomyopathy were in HFrEF (58% and 34%), followed HFmrEF (38% and 18%) and then HFpEF (25% and 9%). The percent of women was 42% in HFrEF, 50% in HFmrEF and 70% in HFpEF. At the admission, systolic blood pressure in HFrEF and HFmrEF were lower than in HFpEF (130 vs 145 mm Hg). Heart rate was the highest in HFrEF following HFmrEF and HFpEF (97 vs 91 vs 86 bpm). The one-year

mortality where 28%, 25.5% and 24.3% in HFrEF, HFmrEF and HFpEF respectively. (graph 1)

Conclusion: All three groups of patients had a bad prognosis. The mortality rate of these severely ill patients is similar to results from other studies with the same population which showed that mortality of patients with confirmed heart failure in Russia is not lower than in other countries opposite the results of subanalysis of patients from Russia in TOPCAT study.



P933

Gender differences in plasma levels and prognostic value of NT-proBNP in chronic heart failure

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Background: Natriuretic peptides are established biomarkers of heart failure (HF). The existence of gender-related differences in circulating levels and prognostic value are still controversial.

Methods: Individual patient data from studies assessing cardiac biomarkers (N-terminal fraction of pro-B-type natriuretic peptide - NT-proBNP - and high-sensitivity troponin T) for risk prediction in stable chronic HF were analysed.

Results: Women (n=1964, 23%) had higher median [interquartile interval] NT-proBNP concentrations than men (1678 [659-4215] vs. 1294 [522-2973] ng/L, p<0.001). Female gender predicted higher NT-proBNP independently from age, body mass index, glomerular filtration rate, left ventricular ejection fraction (LVEF), and atrial fibrillation.

Over a 2.4-year follow-up (1.6-3.2), 2351 patients (27%) died, and cardiovascular death occurred in 1558/8271 (19%). HF hospitalization was recorded in 2088/7944 (26%) over 2.0 years (1.3-2.6). Women and men had similar areas under the curve for the 3 endpoints, with higher cut-offs among women: all-cause death, 2328 ng/L vs. 1319 ng/L; cardiovascular death, 2328 ng/L vs. 1413 ng/L; HF hospitalization, 1265 ng/L vs. 907 ng/L. In the prognostic model above, the risk of the three endpoints increased by 32%, 35%, and 17%, respectively, per doubling of NT-proBNP in women, and by 41%, 45%, and 30% in men.

Conclusions: Women with chronic HF display higher NT-proBNP levels than men in the whole population as well as across many patient subgroups. This difference is not entirely explained by heterogeneity in age, BMI, or renal function. NT-proBNP holds independent prognostic significance in both genders, although alternative prognostic cut-offs might be considered for women.

P934

RDW is an important marker in a one-year prediction of survival with stable systolic heart failure

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Prediction of patient survival for one year is the stage of determining indications for high-tech methods of care. The forecasting process is hampered by a wide variety of markers of poor prognosis and variability in the course of the disease.

Purpose: Evaluate the contribution of the width of the distribution of red blood cells by volume (RDW) to the prediction of heart failure in a stabilized patient with systolic heart failure.

Materials and methods: A prospective study of 212 patients with "non-valvular etiology" of HF with an LV ejection fraction (Simpson) ≤ 35% at the age of 18-70 years. Of these, 176 men (83%) and 36 women (17%). Design work: hospitalization of patients in the treatment of heart failure; selection of therapy and stabilization of patients; assessment of status, performance of laboratory and instrumental studies; observation, telephone contacts, correction of therapy and hospitalization during decompensation; filling the database of 200 indicators. After 12 months, the endpoints were recorded. Results: Within 12 months, 64% of patients (135 people) survived, 2% (5 people) had an implant system EXCOR, 10% (21 people) had cardiac transplantation, 24% of cases (51 people) were lethal. The end points reached 77 people. In patients who reached the end point, the RDW level was significantly higher: Me 17.5% (min-max 12.3 - 28%). In patients who did not reach the end point, the RDW level was lower: 14.1% (min-max 11.0-13.0%). After a multifactor regression analysis procedure, RDW entered the method for predicting heart failure for 1 year. This method is as follows. The patient in the stable phase of the disease on the background of optimal drug therapy is determined by the frequency of respiratory movements, the level of systolic blood pressure measured at 3-5 minutes of orthostasis, the content of lymphocytes and RDW in the serum and the age of the patient in which the clinic of heart failure debuted. Calculate Z using the original formula. With Z> -1.7, survival is predicted to be less than 1 year, with Z≤-1.7 - more than 1 year.

Discussions: The increase in % RDW reflects the main pathological processes leading to the progression of HF — inflammatory stress and an iron metabolism disorder. In heart failure, a so-called "reticuloendothelial block" develops, mediated by overexpression of hepcidin, a peptide-hormone that is secreted in the liver and is a regulator of iron metabolism. Hepsidin is activated during hypoxia and inflammation, reduces the absorption of iron from the intestine and the reticuloendothelial depot. In addition, inflammatory cytokines can directly inhibit erythropoietin-induced maturation of erythrocytes, which is reflected in an increase in RDW.

P935

The Charlson comorbidity index: A significant predictor of increased mortality and cardiac related hospitalizations in patients with heart failure

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Background: Comorbidities are highly prevalent in patients with heart failure (HF) and are suggested to have an impact on clinical outcome. The Charlson comorbidity index is a validated score to estimate mortality in patients with multiple comorbidities.

Purpose: To evaluated the predictive value of the Charlson comorbidity score on clinical outcome in patients with HF.

Methods: All patients with a diagnosis of chronic HF and the Charlson comorbidity index at a health maintenance organization were evaluated. Patients were followed for cardiac related hospitalizations and death.

Results: The cohort included 6,404 HF patients. Mean follow-up was 576 days; the median Charlson score was 6 (interquartile range 5-7); age-adjusted Charlson score was 9 (8-10). The Charlson score and the age-adjusted Charlson score were discriminative and significant predictors of survival as well predictive of the combined end point of death and cardiovascular hospitalization (Figure 1). After adjustment for other significant predictors, increasing Charlson score and age-adjusted Charlson score were independently predictive of survival and the combined end point of death and cardiovascular hospitalization by Cox regression analysis. Area under the curve (AUC) by receiver operating curve (ROC) demonstrated that the AUC for the Charlson, age-adjusted Charlson and the HF adjusted model were 0.62; 0.65 and 0.715 respectively (P<0.0001 for all models).

Conclusions: Comorbidities as evident by the Charlson comorbidity index have a significant impact on outcome in HF patients.

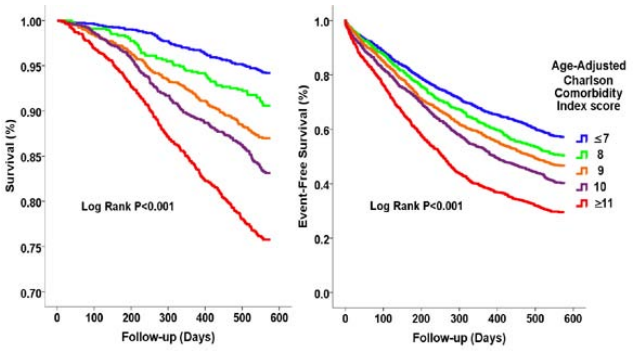

Figure 1. KM Survival Analysis

P936

Prognostic role of right ventricular global longitudinal strain in dilated cardiomyopathy

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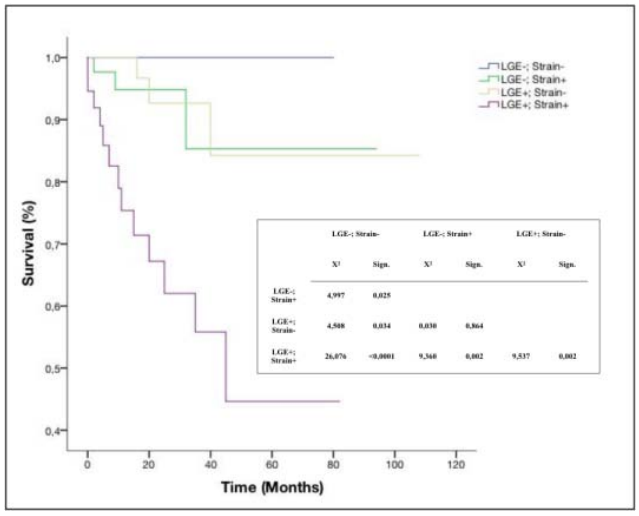
Introduction: The prognostic stratification in dilated cardiomyopathy (DCM) remains a demanding issue in clinical practice. In addition to left ventricular (LV) function evaluation, the presence of fibrosis and right ventricular (RV) dysfunction are considered among the most promising prognostic tools in DCM. In this field, cardiac magnetic resonance (CMR) has emerged as the gold standard technique for both ventricle dysfunction and tissue characterization (i.e. late gadolinium enhancement (LGE) distribution) assessment. Recently, speckle tracking echocardiography (STE) has emerged as a method to study the intrinsic performance of the myocardial wall, making it possible to identify subtle RV dysfunction in DCM patients. Other recent studies successfully demonstrated that LV feature tracking analysis (FTA) is able to give additional prognostic power when combined with the above-mentioned classical parameters.
Purpose: Evaluation of left ventricular strain at FTA has shown an incremental prognostic value compared to classical parameters, but nothing is known about the possible prognostic role of Right Ventricular (RV) strain. The aim of the study was to evaluate the prognostic impact of FTA focusing on Right Ventricular Global Longitudinal Strain (RV-GLS) in a large population of DCM.
Methods: 183 DCM patients were examined with a comprehensive morpho-functional CMR study including FTA. The study endpoint was defined as a composite of (i) cardiovascular death, (ii) cardiac transplant (iii) implantable cardiac defibrillator appropriate intervention.RESULTS During a median follow-up period of 23 months, 20 patients (11%) experienced the study endpoint. At the univariate analysis, LGE and RV-GLS were the most powerful predictors of events and they remained independent even at multivariate level (LGE Hazard Ratio [HR]: 4.86; p=0.006; RV-GLS HR: 1.17 per %; p=0.001). By Receiver Operating Characteristics (ROC) analysis, -19% emerged as the most accurate RV-GLS cut-off able to identify the risk of presenting the end-point. By Kaplan-Meier analysis, patients with a RV-GLS value >-19% showed a reduced survival (log-rank p<0.0001) even if the right ventricle ejection fraction (RVEF) was preserved (log-rank p=0.016). RV-GLS >-19% and LGE presence equally impacted on the end-point development and their compresence showed an additive effect (see Picture).
Conclusions: RV-GLS is an independent short-term predictor of major cardiovascular events in DCM and showed an incremental value, better than parameters such as LV and RV ejection fraction.



Picture

P937

Impact of nutritional scores in patients with stable heart failure with reduced ejection fraction

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Background: Malnutrition is a common condition associated with worse outcome in patients with heart failure with reduced ejection fraction (HFrEF). Inflammation is closely linked to nutritional depletion and advanced HF. We aimed to investigate the relationship of well-established nutritional indices with inflammation and the impact of on survival of stable patients with stable HFrEF.
Methods: Patients with stable HFrEF undergoing routine ambulatory care between January 2011 and November 2017 have been identified from a prospective registry. Comorbidities and laboratory data at baseline were assessed. All-cause mortality was defined as the primary study endpoint. The Nutritional Risk Index (NRI) [(1.519 × serum albumin, g/dL) + (41.7 × present weight (kg)/ideal body weight(kg))] and the Prognostic Nutritional Index (PNI) [(=albumin (g l−1) × total lymphocyte count × 109 l−1)] as well as the Neutrophil-to-Lymphocyte ratio (NLR), the Monocyte-to-Lymphocyte ratio (MLR) and the Platelet-to-Lymphocyte ratio (PLR) were calculated. The association of the scores with heart failure severity and impact on overall survival were determined.
Results: Data was complete and analyzed for a total of 443 patients. The median age of the study population was 64 years (IQR 53-72) and 73% of the patients were male. The median body mass index (BMI) was 26.6kg/m2 (IQR 23.8-30.2). Median NT-proBNP levels were 2053pg/ml (IQR 842-4345) with most patients presenting in the NYHA classes II (178, 40%) and III (173, 39%). The nutritional scores correlated well with heart failure severity reflected by NT-proBNP [r=-0.32, p<0.001 for NRI and r=-0.48, p<0.001 for PNI] and NYHA class [p<0.001 for NRI and PNI] as well as with progressing inflammation reflected by the inflammatory scores [NRI: r=-0.11, p=0.032 for NLR, r=-0.18, p<0.001 for PLR and r=-0.08, p=0.101 for MLR and PNI: r=-0.76, p<0.001 for NLR, r=-0.075, p<0.001 for PLR and r=-0.71, p<0.001 for MLR] and C-reactive protein [r=-0.25, p<0.001 for NRI and r=-0.24, p<0.001 for PNI]. Both nutritional scores were associated with all-cause mortality in the univariate analysis, and after adjustment for age, gender and kidney function [adj. HR 0.60 (0.41-0.89), p=0.011 for NRI and 0.48 (0.31-7.34), p<0.001 for PNI]. The ROC was 0.597 for NRI and 0.674 for PNI. The PNI, but not NRI, remained significantly associated with mortality when NT-proBNP was included in the multivariate model [adj. HR 0.62 (95%CI 0.40-0.96), p=0.032]. Kaplan Meier analysis confirmed the discriminatory power of PNI (Figure 1).
Conclusions: Nutritional depletion and enhanced inflammation is more common in advanced disease. The nutritional score PNI is associated with survival in HFrEF patients independently of NT-proBNP highlighting the importance of nutritional state on prognosis.The easily available score may help clinicians to identify HFrEF patients with worse prognosis with urgent need for intensified therapy and/or alternate treatment options.

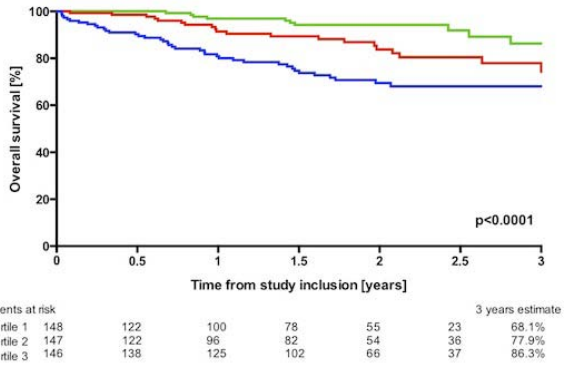

Figure 1.

P938

Relationship of genetic determination of peripartum cardiomyopathy to its clinical outcome

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Funding Acknowledgements: Supported by the research grants [MZ 15-27682A] and No 00023001 (IKEM, Prague, Czech Republic).

Background: Peripartum cardiomyopathy (PPCM) is an idiopathic form of cardiomyopathy characterized by manifestation of heart failure within the last month before or 5 months after the labour. PPCM reflects genetic predisposition and/or can be triggered by pathologic processes associated with pregnancy, such as preeclampsia or by oxidative stress due to prolactin hypersecretion.
We aimed to assess the genetic background of PPCM and to correlate it with the clinical outcome.
Methods: We performed whole-exome sequencing in 15 females with PPCM and analysed the data using bioinformatics. We evaluated the family history of dilated cardiomyopathy (DCM), clinical characteristics and results of echocardiographic follow-up, mainly of left ventricular ejection fraction (LVEF). Left ventricular reverse remodelling was defined by an increase of LVEF more than 10 % and a decrease of end-diastolic diameter (LVEDD) more than 10 % at 1 year of follow-up. Mean age of disease manifestation was 30.5±6.4 years, mean baseline LVEDD was 64±7 mm and mean baseline LVEF was 23±5 %.
Results: Family history of DCM was found in 7 patients (47 %). Suspected pathogenic mutation of one of the cardiomyopathic genes (TTN, DMD, MYH7, FLNC, TMEM43, OBSCN) was found in 9 patients (60 %). Early implantation of a mechanical assist device followed by heart transplantation was necessary in 1 case. Left ventricular reverse remodelling at 1 year of follow-up occurred in 6 patients (40 %). The mean LVEF at the last follow-up was 40 % (median of follow-up 5 years). At the last follow-up, genotype-positive patients were less likely to have LVEF >40 % than genotype-negative patients (33 % vs 100 %, p=0.010). The value of LVEF at the end of follow-up was not associated with family history of DCM (p=0.205).
Conclusion: A substantial proportion of patients with PPCM had a positive genetic background (family history of DCM or pathogenic mutation of cardiomyopathic genes). The genotype-positive patients with PPCM were more likely to have systolic dysfunction during the follow-up than genotype-negative patients.

P939

A TNM-like staging system for risk stratification in heart failure patients: comparison with others nosologies

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Background: To better classify patients with heart failure (HF), we proposed a new staging system named HLM, analogous to TNM classification used in oncology, which refers to heart damage (H), lung involvement (L), and malfunction (M) of peripheral organs (JACC 2014;20;63(19):1959-60). The aim of this study was a comparison between HLM and NYHA, ACC/AHA, ESC and MAGGIC score to assess the most accurate prognosis of HF patients in terms of rehospitalization for major adverse cardiac and cerebrovascular events (MACCE) and cardiac death.
Methods: We performed an observational registry of 1380 consecutive HF patients. All parameters for heart, lungs and peripheral organs function were examined. Each patient was classified according to HLM, NYHA, ACC/AHA, ESC and MAGGIC score at the entrance and at the discharge. Rehospitalization for MACCE and cardiac death were checked at 12 months follow up.
Results: Among 1380 patients: 68.5% males, 31.3% females, mean age 70.18 ± 7.48 years. Overall survival curves regarding rehospitalization for MACCE and cardiac death at 12 months, show that HLM classification is as valid as the others (p<0.001). In particular, the area under the ROC curve (AUC) is greater for HLM than NYHA, ACC/AHA, ESC and MAGGIC score in terms of MACCE (HLM=0.691; NYHA=0.625; ACC/AHA=0.593; ESC= 0.547; MAGGIC=0.624) and cardiac death (HLM=0.792; NYHA=0.711; ACC/AHA=0.637; ESC=0.562; MAGGIC=0.729). All the variables of each nosology are significantly correlated with rehospitalization for MACCE and cardiac death (p<0.001), except NYHA II, HFmrEF and all the ACC/AHA stages (p>0.05).
Conclusions: According to these results, HLM classification has greater prognostic power compared to the other nosologies in terms of MACCE and cardiac death in HF patients, thanks to the evaluation of heart, lung and peripheral organs involvement. A wider and systemic approach should be used in HF patients, in order to improve clinical management and costs.

P940

Vegetative nervous system imbalance as the factor of development and progression of chronic kidney disease in patients with heart failure associated with metabolic syndrome

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Introduction: Metabolic Syndrome (MS) is a very common condition among patients with heart failure (HF).MS is associated with subclinical defeat of vitals and has a great contribution for the development of HF, which can be complicated with Chronic Kidney Disease (CKD). CKD quite often defines quality of life,the forecast in patients with HF.Early identification of markers of CKD at patients with HF and MS can prevent CKD progression.
Objective: To estimate presence of an imbalance of the vegetative nervous system (VNS) patients with HF and MS and its influence on development of CKD.
Methods: Retrospective analysis of clinical records of 350 patients corresponding to the diagnosis of HF (according HFA recomendatios,2016) and MS (according to criteria of consensus of the International federation of diabetes) being on hospitalization in one of the hospitals of Almaty,Kazakhstan from 2015 to 2018 was carried out. In all patients was calculated the standardized glomerular filtration rate (GFR),ml/min./ 1,732, and the analysis of urine on a microalbuminuria (MAU) was made.Twenty- four hours monitoring of an electrocardiogram by Holter was carried out to all patients.
Results: 78% of patients had HF with preserved ejection fraction (EF), other 22% had HF with mildly reduced EF. All of them had elevated levels of proBNP. According kidneys function, all patients were divided into 4 groups: 1) patients with norm filtration (NF) without MAU (average GFR 90)- 79 patients entered 2) patients with NF with MAU (average GFR 84) and MAU (average value 47,5)-75 patients entered 3) patients with hyperfiltration (HRF) -115 patients (average GFR - 120) 4) patients with a hypofiltration (HPF) (average GFR 57) - 81 patients. The analysis of a condition of VNS in these groups according to twenty-hours long monitoring of an electrocardiogram by Holter has been carried out. The following indicators were analyzed: the circadian index (CI);SDNN, milliseconds(ms)(a standard deviation of all normal R-R of intervals); SDANN, ms (the standard deviation of average NN calculated for short (5 minutes) periods). Data of the temporary analysis of VSR in group with HRF are characterized by the prevalence of sympathetic activity (SA) of VNS over parasympathetic (PA). In group with NF the tendention to decrease in SA with some increase in PA was noted. In group with a hypofiltration -hyper activation of SA with strengthening of PA. The group with HRF and HPF, in the analysis of a daily rhythm variability (DRV) was characterized by his expressed decrease, in group without markers of CKD DRV is close to norm.
Conclusions: We showed the presence of VNS imbalance among the patients with HF and MS and impaired kidneys function. The degree of VNS imbalance correlate with the stage of CKD. For the prevention of CKD development greater attention for the blocking of sympathetic nervous system must be paid.

P941

Value of lung ultrasound in chronic stable ambulatory heart failure patients

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Background: The role of lung ultrasound (LUS) in diagnosis and response to diuretic treatment of patients with acute HF has been widely studied, but less is known about its value in chronic HF.
Purpose: To assess the prognostic value of LUS in a cohort of chronic HF stable ambulatory patients and to explore the relationship of LUS findings with clinical data, such as NYHA functional class, left ventricular ejection fraction (LVEF) and NTproBNP.
Methods: Consecutive stable ambulatory patients who attended a scheduled follow-up visit in a HF clinic were included. LUS were performed with a pocket device and examined 4 chest areas per side (two anterior and two lateral). Scans were analysed offline by two investigators blinded to clinical data, who evaluated the number of B-lines of each area. The addition number of B-lines of each area and the quartiles of such addition were used for the analyses. The primary outcome end-point was the composite of all-cause death or hospitalization due to HF at one year. Linear regression and Cox regression analyses were performed.
Results: Five-hundred seventy-seven patients were included between July 2016 and July 2017 (age 69 ± 12 years, 72% men). The main HF aetiology was ischemic heart disease (43%) followed by dilated cardiomyopathy (20%). Median HF duration was 79 months (Q1-Q3 38-144). Mean LVEF was 45%±13 (mean LVEF when admitted at the Unit 34%±13). Most patients were in NYHA functional class II (70%), 13% were in class I and 17% in class III. Median NTproBNP was 722 ng/L (Q1-Q3 262-1760). Mean number of B-lines was 5 ± 6 (Q1, 0; Q2, 1-3; Q3, 4-7; Q4, ≥8). The number of B-lines was associated with age (beta-coefficient 0.11, p<0.001), NYHA functional class (beta-coefficient 1.75, p<0.001), and logNTproBNP (beta-coefficient 1.40, p<0.001). Mean number of B-lines according to NYHA functional class was: class I, 3.5 ± 6; class II, 4.9 ± 6; and class III, 7.1 ± 7. During the one year follow-up 47 patients suffered the primary end-point. In total there were 24 HF related hospitalizations and 26 deaths. In Cox regression analysis, Q4 of B-lines showed a double risk of suffering the primary end-point (HR 2.13 [95%CI 1.18-3.84], p=0.01). However, statistically significance was not maintained for LUS results in the multivariable analysis when age, NYHA functional class and logNTproBNP were included in the model, although a 38% increase in the risk of suffering the primary end-point for Q4 was observed (HR 1.38 [95%CI 0.75-2.54], p=0.31).
Conclusion: In outpatients with stable chronic HF, the number of B-lines detected in LUS was associated with age, NYHA functional class and NTproBNP. Patients having ≥8 B-lines had a significant double risk of HF related hospitalization or all-cause death at one year. However, when strongly powerful prognostic variables such as NYHA class and NTproBNP were included in the model LUS did not retain an independent prognostic role.

P942
A registry-based algorithm to predict ejection fraction in electronic health records

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Background: Electronic health records (EHRs) provide abundant routine clinical care data to support research, but often lack phenotypic information needed to discern relevant subphenotypes. Left ventricular ejection fraction (EF) is required to discriminate the different heart failure (HF) phenotypes [i.e. HF with preserved (HFpEF), mid-range (HFmrEF) and reduced (HFrEF) EF], but is not collected in EHRs. This may represent a major limitation when using EHRs in HF research. Aim of this analysis was to create an algorithm that identifies HF EF phenotypes in routine care data using available patient's characteristics.
Methods: We included 42,061 HF patients from the Swedish Heart Failure Registry that collects data on EF and biomarkers. For the primary analysis we performed two logistic regression models to predict 1) HFrEF and HFmrEF vs. HFpEF; and 2) HFrEF vs. HFmrEF and HFpEF. In the secondary analysis we performed a multivariable multinomial logistic regression to create a prediction model for all 3 separate HF phenotypes: HFrEF vs. HFmrEF vs. HFpEF. The models included 22 predictors: age, sex, NT-proBNP, NYHA class, mean arterial pressure, heart rate, Body Mass Index (BMI), estimated Glomerular Filtration Rate (eGFR), history of ischaemic heart disease, atrial fibrillation, Chronic Obstructive Pulmonary Disease (COPD), diabetes, hypertension, anemia, cancer in previous 3 years, valvular disease, device therapy, RAS inhibitors, beta-blockers, diuretics, MRA, digoxin.
Results (Figure 1): The C-statistic, that measures the discriminative ability of a predictive model, was 0.774 (95% confidence interval 0.769 - 0.780) for HFrEF and HFmrEF vs. HFpEF, 0.756 (95% CI 0.752 – 0.761) for HFrEF vs. HFmrEF and HFpEF, 0.683 (95% CI 0.677 - 0.688) for HFpEF vs. HFmrEF vs. HFrEF. Strongest predictors for the HFpEF phenotype were older age, female sex, presence of hypertension, atrial fibrillation and anemia, while those for HFrEF were presence of a cardiac device (implantable cardioverter defibrillator or cardiac resynchronization therapy), increased levels of NT-proBNP, use of RAS-inhibitors and beta-blockers.
Conclusion: Baseline patient characteristics from EHR could be used to identify different EF phenotypes in HF. Both logistic models categorizing HFmrEF with either HFrEF or HFpEF performed better than the multinomial model. This may be explained by different phenotypes coexisting within HFmrEF and part of HFmrEF patients having transitioning EF.

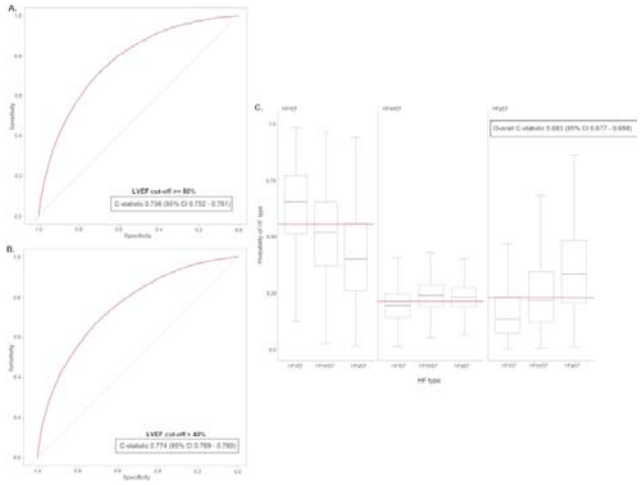

Figure 1 Discrimination plots

P943
Heart failure with mid-range ejection fraction (HFmrEF): a transition phenotype?

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Background: Heart failure with mid-range ejection fraction (HFmrEF) is a poorly defined entity, where evidences for optimal treatment are lacking. We describe the temporal trend of EF in HFmrEF and long-term outcome, as observed.
Methods: Patients enrolled in IN-CHF Registry were grouped, according to baseline EF, in preserved (HFpEF, >50%), mid-range (HFmrEF, 40-49%) and reduced EF (HFrEF, <40%). We reported clinical characteristics, long-term mortality and, when available, EF trend.
Results: Out of 7559 pts (72% males, age 69±13 yrs, EF 37±11%), 4338 had HFrEF (57%), 1792 HFmrEF (24%) and 1429 HFpEF (19%). Mortality at 21±23 months was lower in HFmrEF (8.4%, p .001) compared with HFrEF (11.2%), but not with HFpEF (9.7%).
In the subgroup with a second echocardiography (Table), mortality at 36±28 months was 4.5%, 7% and 7.3% (for HFmrEF, HFrEF and HFpEF respectively, p ns) when patients were phenotyped according to baseline EF, and 3.7%, 8.1% and 6.4% when grouped according to follow-up EF (p .01).
Conclusions: In IN-CHF Registry, HFmrEF patients were more similar to HFrEF, rather than to HFpEF patients. HFmrEF shows greater variability than other groups: only 60% of patients with HFmrEF at enrollment stayed in the same group at follow-up (vs 71% of HFrEF and 82% of HFpEF). These data suggest that clinical studies on HFmrEF should consider its peculiar temporal trend.

	HFrEF	HFmrEF	HFpEF	p
N°	859	335	220	
Age	65±12	63±15	69±16	.001
Female %	24	27	47	.001
Ischemic etiol %	43	36	19	.001
HF history <6 mos %	26	22	17	.012
AFib %	14	17	30	.001
NYHA III-IV %	22	12	21	.001
Previous year HF Hosp %	40	29	30	.001
RAS-inh (target dose) %	86 (58)	87 (61)	86 (56)	ns
β-block (target dose) %	85 (60)	86 (63)	88 (58)	ns
MRA %	53	55	56	ns
Transitioned at follow-up				.001
-to HFrEF %	71	18	4	
-to HFmrEF %	21	60	14	
-to HFpEF %	8	22	82	

P945

The impact of prior ejection fraction on clinical outcomes in patients with heart failure with mid-range ejection fraction

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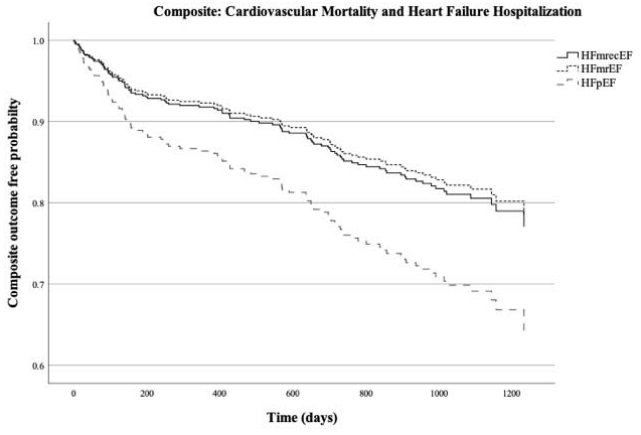
Background: Heart failure (HF) patients are classified according to ejection fraction (EF). Although HF with mid-range EF (HFmrEF) is recognized in guidelines, neither the clinical characteristics nor the natural history of this cohort of HF patients are fully defined. The heterogeneity of the HFmrEF population, which includes some patients whose EF had previously been preserved (HFpEF) and others with reduced EF that had partially recovered (HFmrecEF), contributes to this uncertainty.
Purpose: To compare the clinical characteristics and outcomes of patients with HFmrEF according to whether they previously had preserved EF that had fallen over time or reduced EF that had partially recovered.
Methods: All patients at our institution in 2015 with a diagnosis of HF who had an echocardiogram with an EF measured between 40-50% and had at least one prior echocardiogram three months or more prior were included. Patients were classified into groups according to whether their EF either: improved from a prior EF of <40% (HFmrecEF), was consistently between 40-50% on all past echocardiograms (HFmrEF) or had been greater than 50% on all past echocardiograms before falling into mid-range (HFpEF). Data was collected through retrospective review of the electronic medical record. Multivariable Cox regression analyses for outcomes were adjusted for age, gender, CKD, CAD and atrial fibrillation.



Results: Of the 915 patients with EF 40-50%, 467 patients who did not have a prior echocardiogram for comparison were excluded. Among the remaining 448 patients, 157 (35%) had HFmrecEF, 67 (15%) had stable HFmrEF, and 224 (50%) previously had HFpEF. Patients with HFmrecEF were younger and were more likely to have a history of symptomatic HF and CKD. Patients with HFpEF were more likely to be female. Most other variables were similar in the 3 patient groups. Over a median follow-up time of 2.2 years, prior HFpEF when compared to HFmrecEF patients exhibited a trends towards higher all-cause mortality (adjusted HR 1.52, confidence interval [CI] 0.96-2.41, p=0.074), higher likelihood of all-cause hospitalization (adjusted HR 1.38, CI 1.01-1.09, p=04), and higher likelihood of the composites of all-cause mortality and HF hospitalization (adjusted HR 1.6, CI 1.02-2.21, p<0.02) and cardiovascular mortality and HF hospitalization (adjusted HR 1.71, CI 1.09-2.69, p=0.02). No significant differences in outcomes between HFmrecEF and HFmrEF were seen.
Conclusion: These findings demonstrate the diversity of the HFmrEF population. They suggest that the natural history of patients identified by an EF in the 40-50% range differs depending on their prior EF. Notably, HFpEF patients whose EF had reduced into the 40-50% range were at higher risk for events than patients in the other sub-groups.

P946

Factors influencing the hospital re-admission rates of heart failure patients: insights from the North-West of England.

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Introduction: Heart failure (HF) affects 2% of Europe's population; prevalence increases with age and approximately one in every five people aged 70 and above suffers from HF. Nearly 5% of all UK hospital admissions are related to the heart failure. It is a costly condition, with most of its expenditure related to hospital care of patients with heart failure.Objectives/ Purpose
Although HF patients have low in-patient mortality, their re-admission rates are significantly high; UK data shows that 10-20% require re-hospitalisation within 1 month and 50- 75% within 1 year of hospital discharge. We explore the factors influencing the hospital readmission in this patient cohort.
Methods: Hospital episode statistics (HES) data for north west of England hospitals for HF related hospital admissions, length of stay (LOS) and 28 day readmission rates for the year 2017/18 were reviewed. This was triangulated with the Clinical Commission Groups (CCG) records on readmissions and the adherence with guideline directed therapy and demographic data related to ageing and household income and finally, data on configuration of heart failure services from community and hospital based HF teams by using a survey .
Results: From June 2017 -June 2018; HF related non-elective hospital admission rates varied (210-530/ 100,000 population) in five hospitals in the Northwest of England. Unplanned 28 days readmission rates were even more markedly variable with the lowest being 51 and highest 93 (per 100,000) population. Lower readmission rates were seen in the institutions where patients were stabilised after intravenous to oral diuretic switch and where the HF services were led by a HF specialist cardiologist (p0.02). Lower length of stay was associated with higher readmission rates (p0.001).
Clinical commissioning groups (CCG) data also supported this trend; lower adherence to first line HF therapy associated with higher readmission rates. Increased proportion of local elderly population (4-23% >65 yrs) and lower weekly household income (<£250/ week) was also associated with higher readmissions (CI 95%, P<0.05). This was most likely due to a higher disease and comorbidity burden resulting high hospital admission rates.
Conclusion HF related hospital readmissions continue to be a significant issue for the UK health economy. Population demographics, socio-economic status, configuration and leadership of local HF services, adherence to guideline directed therapy and a push to reduce in-patient length of stay; all seem to play a part in determining the rehospitalisation rates. Multi-faceted strategies tailored to the local needs are required to tackle this important issue.

P947

Prognostic impact of transition of left ventricular ejection fraction in patients at risk for heart failure: Insights from the CHART-2 Study

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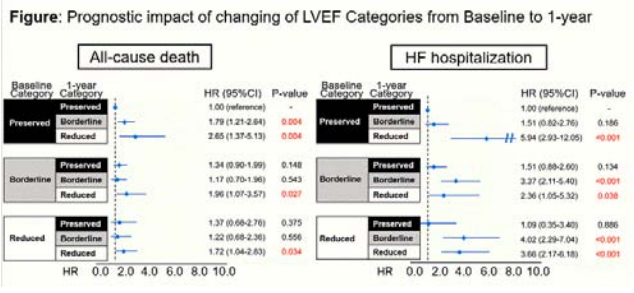
On behalf of: The CHART-2 Study

P947: Factors related to LVEF changes

Preserved			Borderline			Reduced		
Variable	coefficient	P-value	Variable	coefficient	P-value	Variable	coefficient	P-value
Diastolic BP, /10mmHg	0.67	<0.001	Stroke	4.54	0.020	Cancer	-5.34	0.070
LVMI, g/m^2	-0.01	0.020	CCB	3.37	0.020	LVDd, /10 mm	-6.50	<0.001
IHD	-0.66	0.040	BNP, /100pg/mL	0.71	0.020			
Diuretics	-0.97	0.040	β-blocker	-2.13	0.014			
			IHD	-3.39	0.020			
			LVDd, /10 mm	-5.00	<0.001			

BNP, brain natriuretic peptide; BP, blood pressure; CCB, calcium antagonist;IHD,ischemic heart disease; LVDd, left ventricular end-diastolic diameter; LVMI, left ventricular mass index.

Background: Transition of left ventricular ejection fraction (LVEF) and its prognostic impact is not well established in patients without heart failure (HF).
Purpose: To examine the relationship between temporal changes in LVEF and their clinical impacts in patients at risk of HF.
Methods: We enrolled 3,935 consecutive asymptomatic patients at risk of HF in the CHART-2 Study, and divided them into 3 groups by baseline LVEF (Preserved, ≥50%, N=3,478; Borderline, 41-49%, N=291; Reduced, ≤40%, N=166). We examined the transitions among the 3 groups from baseline to 1-year for all-cause death and HF hospitalization.
Results: Borderline and Reduced at registration transiently changed to other groups at 1-year, whereas Preserved did not; at 1-year, Borderline transitioned to Preserved and Reduced by 50.0% and 14.4%, and Reduced transitioned to Preserved and Borderline by 25.3% and 31.3%, respectively, whereas Preserved transitioned to Borderline and Reduced only by 3.6% and 0.8%, respectively. Transitions from Preserved to Borderline, Preserved to Reduced, and Borderline to Reduced, and Reduced to Reduced were significantly associated with increased 5-year mortality. Transitions from Preserved to Reduced, and Borderline to Borderline, Reduced, and Reduced to Reduced were significantly associated with increased 5-year incidence of HF hospitalization, whereas transitions from Borderline or Reduced to Preserved were not (Figure). The linear regression analysis showed that Preserved, Borderline and Reduced patients had different sets of factors related to LVEF changes, but LV dilatation was commonly associated with LVEF decrease in Borderline and Reduced groups (Table).
Conclusions: Temporal decrease in LVEF was significantly associated with worse outcomes among asymptomatic patients at risk of HF, suggesting the importance to improve or maintain LVEF for ameliorating the long-term prognosis in those patients.



Prognostic impact of LVEF categories

P948

The 6-min walk test in assessment for mortality in patients with heart failure

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Background: Exercise testing is recommended in patients with heart failure (HF) to obtain an objective evaluation of functional capacity and to guide exercise prescription according to current ESC guidelines (IIA – evidence C). While peak oxygen consumption is a strong predictor of cardiovascular events and death, the value of the 6 min walk test (6MWT), which is easier to perform, is less clear.Purpose The aim of the present study was to examine the 6MWT in relation to mortality in our HF registry.Method All the patients were assessed at the first visit to the specialized outpatient HF clinics (N=5924) where a 6MWT is included in the protocol. Patients were divided into tertiles of distance walked (category 1-3 where 1 walked longest). Patients who did not perform the test was assigned category 4 (N=1990). Cox regression analysis of time to death using available demographic and measured variables was examined.
Results: 6MWT (mean meter ± SD) were 549±60, 415±33, 237±91 for tertile 1-3, respectively. Patients in category 3 and in those that did not perform the test, category 4, were older, had poorer renal function, lower systolic blood pressure, used more diuretics, had more anemia and stroke and had a higher proportion of women than categories 1 and 2. The figure shows the Kaplan Meier plot of the differences in mortality for the categories and these were highly significant (p<0.001). In Cox regression analysis of time to death, the categories of the 6MWT were highly significant independent predictors for mortality adjusted for age, NYHA functional class, s-sodium, eGFR, systolic blood pressure, gender and daily dose of diuretic (p<0.001). The 6MWT was also a highly significant independent predictor for mortality when used as a continuous variable (p=0.001).Conclusions The 6MWT is easy to perform and is a powerful tool in assessing the risk for mortality in outpatients with HF. This suggests that it should be used on a regular basis in the work up of these patients.

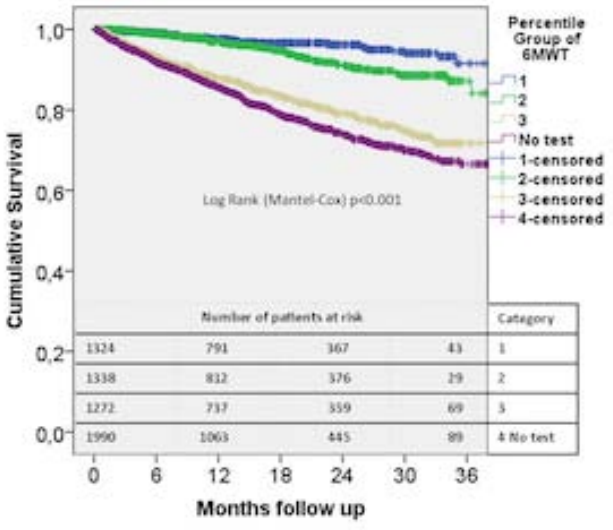

Figure 6MWT

P949

Comparison of of inflammation based prognostic scores in patients with stable heart failure with reduced ejection fraction

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[1]*Medical University of Vienna, Vienna, Austria*

Background. Elevated inflammatory markers are characteristic for heart failure with reduced ejection fraction (HFrEF) correlating with disease severity and prognosis. Evidence emerges that heart failure is triggered by inflammation directly, meaning that the progression of HF is a function of individual inflammatory host response.We aimed to investigate and compare the impact of well-established inflammation based scores on survival of stable patients with stable HFrEF.
Methods: Patients with stable HFrEF undergoing routine ambulatory care between January 2011 and November 2017 have been identified from a prospective registry. Comorbidities and laboratory data at baseline were assessed. All-cause mortality was defined as the primary study endpoint. The modified Glasgow Prognostic Score (mGPS) as well as the Neutrophil-to-Lymphocyte ratio (NLR), the Monocyte-to-Lymphocyte ratio (MLR) and the Platelet-to-Lymphocyte ratio (PLR) were calculated. The association of the scores with heart failure severity and impact on overall survival were determined.
Results: Data was complete and analyzed for a total of 443 patients. The median age of the study population was 64 years (IQR 53-72) and 73% of the patients were male. The median body mass index (BMI) was 26.6kg/m2 (IQR 23.8-30.2). Median NT-proBNP levels were 2053pg/ml (IQR 842-4345) with most patients presenting in the NYHA classes II (178, 40%) and III (173, 39%). Patients received well titrated dosages of guideline recommended heart failure therapy. The mGPS was 0 for 352 (80%), 1 for 76 (17%) and 2 for 14 (3%) patients, respectively. All scores correlated with heart failure severity reflected by NT-proBNP [p<0.001 for mGPS] and NYHA class [p<0.001 for mGPS]. All scores were associated with all-cause mortality in the univariate analysis, however after adjustment for age, gender and kidney function only the mGPS and PLR remained significantly associated with outcome [adj. HR 2.87 (2.00-4.11), p<0.001 for mGPS and 1.25 (1.02-1.54), p=0.030 for PLR]. The ROC was highest for mGPS and MLR [0.652 and 0.656 respectively]. Solely mGPS remained significantly associated with mortality when NT-proBNP was included in the multivariate model [adj. HR 1.87 (95%CI 1.20-2.91), p=0.006 for mGPS]. Kaplan Meier analysis confirmed the discriminatory power of mGPS (Figure 1).
Conclusions: Enhanced inflammation is more common in advanced heart failure. Among established inflammation scores merely mGPS is associated with survival in HFrEF patients independently of NT-proBNP. This relationship emphasizes the significance of the individual proinflammatory response on prognosis.This easily available score may help clinicians to identify HFrEF patients with worse prognosis with urgent need for intensified therapy and/or alternate treatment options.

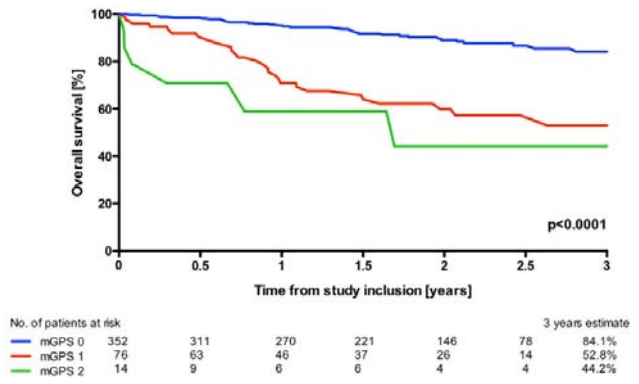

Figure 1

P950

The effect of ejection fraction change during follow-up on outcomes in patients with heart failure with mid-range ejection fraction

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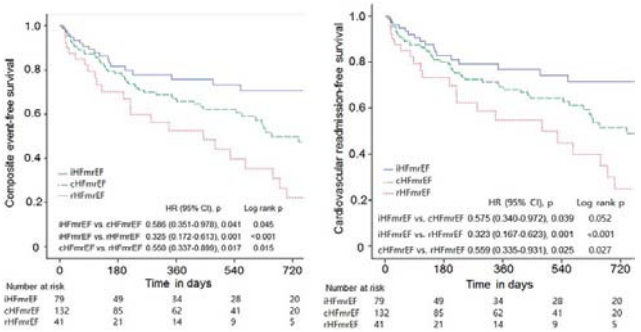
Background: Limited data are available on the role of ejection fraction (EF) change in heart failure with mid-range EF (HFmrEF).
Purpose: We investigated the effect of EF change on outcomes in HFmrEF patients.
Methods: Among 252 consecutive patients with primary diagnosis of HFmrEF (baseline EF 40-49%) and baseline and follow-up echocardiogram in an urban tertiary referral center (October 2013 to March 2017), 79 (31.3%) were in HFmrEF with improved EF (EF≥50% at follow-up echocardiogram) (iHFmrEF), 132 (52.4%) were in HFmrEF with consistent EF (EF 40-49% at follow-up echocardiogram) (cHFmrEF), and 41 (16.3%) were in HFmrEF with reduced EF (EF<40% at follow-up echocardiogram) (rHFmrEF) groups. The clinical characteristics and composite events (cardiovascular death and cardiovascular readmission) were compared.
Results: The iHFmrEF group had higher rates of female and coronary artery disease (CAD) with revascularization than rHFmrEF or cHFmrEF groups. There were comparable in other characteristics among 3 groups. Significantly lower values of left ventricular (LV) end diastolic diameter and LV end systolic diameter and higher levels of EF were observed in the iHFmrEF group than the rHFmrEF or cHFmrEF groups. There were equivalent in other echocardiographic parameter among 3 groups. Composite event occurred in 100 patients (39.7%), with significantly lower rates in the iHFmrEF group. After risk adjustment, iHFmrEF was associated with decreased risk of composite event than cHFmrEF (hazard ratio [HR] 0.586, 95% confidence interval [CI] 0.351-0.978, p=0.041) and rHFmrEF (HR 0.325, 95% CI 0.172-0.613, p=0.001). Additionally, female (odds ratio [OR] 0.404, 95% CI 0.233-0.699, p=0.001), CAD with revascularization (OR 0.361, 95% CI 0.208-0.630, p<0.001), and spironolactone use (OR 0.434, 95% CI 0.234-0.805, p=0.008) were predictive for increased EF.
Conclusions: In HFmrEF patients, improved EF at follow-up echocardiogram was observed in approximately one-third of patients. Moreover, it was predictive for better clinical outcomes and affected by sex, CAD with revascularization, and spironolactone use.

	iHFmrEF vs.cHFmrEF	iHFmrEF vs.rHFmrEF	cHFmrEF vs.rHFmrEF
Adjusted HR (95% CI), p	Adjusted HR (95% CI), p	Adjusted HR (95% CI), p	
All-cause death	0.721 (0.216-2.406), 0.595	0.189 (0.050-0.715), 0.014	0.322 (0.118-0.879), 0.027
CVdeath	0.802 (0.083-7.760), 0.849	0.378 (0.034-4.246), 0.430	0.466 (0.078-2.798), 0.404
CV readmission	0.575 (0.340-0.972), 0.039	0.323 (0.167-0.623), 0.001	0.559 (0.335-0.931), 0.025
CV death andCV readmission	0.586 (0.351-0.978), 0.041	0.325 (0.172-0.613), 0.001	0.550 (0.337-0.899), 0.017
All-cause death andCV readmission	0.606 (0.374-0.982), 0.042	0.327 (0.180-0.592), <0.001	0.734 (0.582-0.927), 0.009



Kaplan-Meier estimation

P951

Hospitalisation for heart failure: short term cost savings associated with outcomes reported from the DECLARE-TIMI 58 trial

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On behalf of: DECLARE-TIMI 58 Investigators
Funding Acknowledgements: This study was funded by AstraZeneca

Background: Type 2 diabetes mellitus (T2DM) and heart failure (HF) represent a considerable burden to patients, healthcare systems and society globally. The Dapagliflozin Effect on Cardiovascular Events (DECLARE)-TIMI 58 trial evaluated the effects of dapagliflozin on cardiovascular (CV) and renal outcomes in patients with T2DM and either established CV disease or multiple risk factors (MRF) for CV disease. The trial demonstrated that treatment with dapagliflozin was associated with a lower rate in the composite of CV death or hospitalisation for heart failure (HHF) compared to placebo (hazard ratio: 0.83; 95% confidence interval: 0.73 to 0.95); a finding driven by a lower rate of HHF in dapagliflozin-treated patients (hazard ratio: 0.73; 95% confidence interval: 0.61 to 0.88).
Purpose: To estimate the direct healthcare costs associated with HHF event rates reported from DECLARE-TIMI 58, from a US payer perspective.
Methods: DECLARE-TIMI 58 event rates were used to predict HHF incidence in a hypothetical cohort of 1,000 people with T2DM, over a 4-year time horizon. A range of published HHF event costs ($26,893–$37,076, 2017 $) were applied to predicted HHF events. Long-term costs associated with managing HF were not considered. Future costs were discounted at 3% per annum. Sensitivity analyses were conducted for pre-defined DECLARE-TIMI 58 subgroups.
Results: Over a 4-year modelled time horizon, 24 HHF events were predicted per 1,000 patients treated with dapagliflozin versus 33 HHF events for placebo (difference: –9 events). When modelled by prior HF status, more events were avoided in those with prior HF due to higher underlying event risk in this subgroup (difference: –33 events per 1,000 patients). Total estimated costs associated with HHF were $630,237–$868,875 per 1,000 patients treated with dapagliflozin versus $860,164–$1,185,864 per 1,000 patients treated with placebo (difference: $229,927–$316,989). For the overall population, a 27% reduction in HHF costs was estimated over 4 years, compared to 21% and 35% reductions estimated in the established CV disease and MRF subgroups, respectively.
Conclusions: The reduction in HHF events demonstrated for dapagliflozin versus placebo in the DECLARE-TIMI 58 trial will translate to savings within healthcare systems in clinical practice. Further to hospitalisation costs estimated in this study, additional savings associated with HF management may be attained in those without prior disease. These short-term cost savings complement other previously shown benefits of dapagliflozin related to improved glycaemic control and weight loss.

P952

Sex difference of mortality and mode of deaths in elderly patients with chronic heart failure - A report from the CHART-2 Study-

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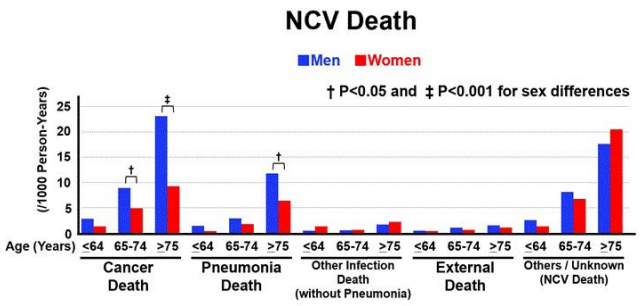
Funding Acknowledgements: The Japanese Ministry of Health, Labour, and Welfare; The Japanese Ministry of Education, Culture, Sports, Science, and Technology; Japan AMED

Background: Limited data exist on the sex difference of mortality and mode of deaths in elderly patients with chronic heart failure (CHF).
Purpose: To examine the sex difference in mortality and mode of death comparing older versus younger CHF patients.
Methods: We compared the mortality and mode of deaths of older and younger Stage C/D CHF patients in the Chronic Heart Failure Analysis and Registry in the Tohoku District (CHART)-2 (N=4876, mean 69 years, women, 32%) by age; G1, <64 years, N=1521 (54.3±8.8 years, women, 22.8%,); G2, 65-74 years, N=1510 (69.9±2.9 years, 30.7%); and G3, >75 years, N=1845 (80.3±4.4 years, 40.2%).
Results: From G1 to G3, the prevalence of women, left ventricular ejection fraction (LVEF) and plasma levels of B-type natriuretic peptide (BNP) increased (all P<0.001). Although NYHA functional class -, chronic kidney disease, cancer, LVEF, and BNP had significant impacts on all-cause mortality in all groups, their impacts were less evident in G3 as compared with G1. In both sexes, 5-year mortality increased (9.9, 17.3 to 39.9%, P<0.001) along with a decrease in the proportion of cardiovascular mortality and an increase in non-cardiovascular mortality. Between the sexes, all-cause and cardiovascular mortality were comparable whereas women had a significantly lower incidence of non-cardiovascular mortality than men in G2 (9.1% vs. 13.3%, P=0.024) and G3 (18.9% vs. 26.1%, P<0.001), which was attributable to the higher incidence of cancer death and pneumonia death in men than in women (Figure).
Conclusions: Compared with younger CHF patients, the elderly were characterized by more severe clinical background, the increased proportion of non-cardiovascular death and worse prognosis with different impacts of prognostic factors. Sex differences exist in non-cardiovascular mortality in the elderly. These results indicate that HF management in the elderly should include a multidisciplinary approach to improve mortality.



Mode of deaths by sex and age categories

P953

The long term surivival rate of patients without CV desease and with HF in Russia. The epidimiologic study EPOCHA

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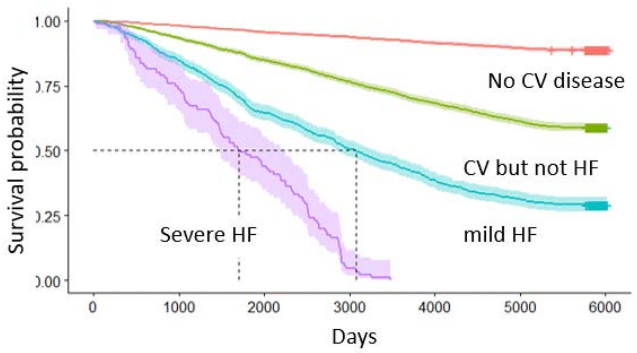
On behalf of: EPOCHA study group

Background: usually survival rate in heart failure (HF) are evaluated in patients who admitted to hospital or come to clinical visit. However, there are lack of data of survival rate in population regarding the fact that some patients would not sick for medical health
Purpose: to find out how the survival rate of heart failure patients over 17 years of follow-up in a representative sample of the population.
Methods: medical data of the representative sample in the six regions of Russia were analysed to find out the prevalence of heart failure.
Results: 16000 patients were enrolled in the study in 2002 years. The long term prognosis was known for 9349 of them. The mortality one-year mortality was 0.69%, 2.56%, 4.42%, 6.25% in patients without CV diseases, with CV deasese but without HF, with mild and severe HF respectively. During 5 and 10 years of follow-up, 50% and 100% with severe HF died respectively. At the end of follow-up, 70% with mild HF died.
Conclusion: This analysis showed a quite poor prognosis of patients with both CV diseases and HF in Russia. The implementation of new treatments and prevention measures are required to improve the prognosis of these patients.
Limitations: As this was epidemiologic study BNP levels were no measured and echocardiography were not evaluated. There is a possibility that some patients in the mild HF group didn't have HF.



P954

Burden of heart failure rehospitalizations in heart failure with preserved versus reduced ejection fraction from Asia

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Funding Acknowledgements: The Singapore Heart Failure Outcomes and Phenotypes study had been funded by the National Medical Research Council of Singapore.

Background: Data on the burden of rehospitalizations for heart failure (HF) in Asia are scarce.
Purpose: To determine the frequency, clinical correlates and prognostic significance of HF rehospitalizations in patients with preserved ejection fraction (HFpEF; EF≥50%) and reduced EF (HFrEF; EF<50%) in a multi-ethnic population-based cohort in Asia.
Methods: Patients from the prospective population-based Singapore Heart Failure Outcomes and Phenotypes (SHOP) study were included. Stabilized HF patients underwent detailed clinical assessment at baseline and were followed up over 2 years for death or hospitalization. Analyses accounted for death as a competing event.
Results: Of 1099 patients (age 62 ± 12 years, 24% women, 22% HFpEF) followed over a median of 1.53 (interquartile range [IQR] 0.54–1.95) years, 171 (15%) died and 2310 readmissions were recorded in 662 patients. Of these rehospitalizations, 1233 (42%) were due to cardiovascular causes, and 876 (30%) were due specifically to HF as a primary cause. The median number of all-cause rehospitalizations was 3, median length of stay (LOS) was 4 (IQR 2-7) days and cumulative LOS was 12 (IQR 5-31) days.
Patients with HFrEF were readmitted as frequently as patients with HFpEF (31% vs 27% and 30% vs 32% with 1-2 and 3 or more rehospitalization records respectively, p=0.416) and had similar cumulative LOS. Compared to patients with HFrEF, patients with HFpEF were more frequently readmitted for non-cardiovascular causes (38% vs 47%, p=0.005) but as frequently readmitted for HF (36% vs 30%, p=0.166). Patients who were more frequently readmitted to the hospital tended to be older, were enrolled as an inpatient, have lower heart rate, New York Heart Association class III/IV, a history of coronary artery disease, atrial fibrillation/flutter, hypertension or diabetes but less likely to be on ACE-inhibitor/ARB and beta blockers at baseline, regardless of HF type (all p for interaction >0.05).
Having 3 or more rehospitalizations (vs none) was associated with higher odds of all-cause mortality (odds ratio [OR] 1.86, 95% CI 1.14-3.05; p=0.013) in HFrEF, but not in HFpEF (OR 0.48, 95% CI 0.15-1.54; p=0.219) (p for interaction 0.008).
Conclusion(s) : Asian patients with HF have a high burden of rehospitalizations, regardless of HF type. While total and HF hospitalization burden is similar in HFpEF and HFrEF, non-cardiovascular causes are more prominent in HFpEF. Recurrent hospitalizations in HFrEF portend higher short-term mortality.

P955

Prediction of heart failure decompensations using artificial intelligence techniques

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Introduction - The creation of large databases and advances in ICT (information and communication technologies) have allowed the development of artificial intelligence or machine learning techniques.
- These methods are capable of creating algorithms based on the data supplied with the aim of helping in the usual clinical practice.
Objectives and methods
- The objective is to determine which parameters measured by telemonitoring (blood pressure, heart rate, O2 saturation, weight and questionnaire) are the best predictors of heart failure (HF) decompensations in our group.
- Data were collected from telemonitored patients in the HF Unit of our hospital from May 2014 to February 2018, with the following variables: baseline characteristics and HF decompensations (decompensations include, in addition to hospitalizations, administration of iv diuretic at home, emergency room or day hospital and adjustment of oral diuretics).
Results
- The study contains 242 patients (138 men and 104 women), with an average age of 78 years (SD 10.9). The most prevalent heart disease is ischemic (33%), followed by idiopathic (18%). The mean LVEF is 42.4 (SD 15.21). 138 patients (57.4%) were in atrial fibrillation. The mean time of evolution of HF is 5.8 (SD 7.08).
- During the 46 months of follow-up, a total of 562 heart failure decompensations were detected. Of these, 379 were managed at home (286 with oral diuretic adjustment, 80 with intravenous treatment and 16 with subcutaneous furosemide pumps). There were 151 hospital admissions and 32 emergency visits that did not require hospital admission (resolution of the decompensation with the intravenous treatment administered in this department).
- Figure 1 specifies monitored parameters, established alerts, sensitivity (Se) and false alert rate per patient and year (FA/pt-y).
- Weight variations (1 kg increase in 3 days or 3 kg in 5 days) and desaturation below 90% in pulse oximetry are good predictors of HF decompensation according to Se and FA/pt-y values. Regarding to the questionnaire, "worse" answers in questions 1 and 2 are very good predictors of decompensation. Questions 3 and 4 also have good predictive values, but less than questions 1 and 2.
Conclusions - Significant weight increases, desaturation below 90%, perception of clinical worsening, including development of edema, worsening of functional class and orthopnea are good predictors of heart failure decompensation.

Parameter to study	Threshold number	Type of alert	Se	FA/pt-y
SBP	<95 or <150	Yellow	0.28	11.4
	<85 or >150	Red	0.08	1.4
DPB	<60 or >110	Yellow	0.23	9.1
	<50 or >100	Red	0.04	0.9
HR	<55 or >90	Yellow	0.30	11.2
	<50 or >90	Red	0.08	1.4
O2Sat	<94	Yellow	0.15	3
	<90	Red	0.39	13.5
Weight variations	1 kg increase in 3 days or 3 kg in 5 days	Red	0.52	9.55
n	**Questionnaire**	**Answer**	**Se**	**FA/pt-y**
1	Well-being	Worse	0.37	2.7
2	Ankle	Worse	0.35	2.9
3	Walks	No	0.37	18
4	Shortness of breath	Yes	0.41	19.93

Parameters and their values

P956

Prevalence of heart failure in cardiac intensive care unit

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Background: Cardiac care unit (CCU) is increasingly becoming a very vital part of management of critically ill patients. There is limited information about the prevalence of heart failure (HF) and their outcome in this critical population.
Objectives: This registry represents data fromour hospital, as representative to tertiary academic centre, and provide an epidemiological snapshot of the HF patients, their risk profile and their short term outcome during hospital stay.
Methods: This is a local single center cross sectional observational registry of patients admitted to CCU one year from July 2015 to July 2016. Data were collected through special software programme. This registry includes the data of 1006 patients admitted to the CCU. Patients with clinical and laboratory evidence of HF were systematically studied.
Results: Our registry showed that the prevalence of HF was 29.4% of the total CCU admissions. 72.7% were HFrEF and 27.3% were HFpEF. Male patients were the most prevalent(60.1%) with mean age (60.4±10). Hypertension and smoking (59.5%, 45.6%) were the commonest CV risk factors in HF patients followed by obesity (41.2%). Diabetes was prevalent in 40.2% and dyslipidemia in 35.8% of patients. Cardiogenic shock was existing in 22.3%(n=66) of HF patients followed by atrial fib/flutter (16.8%, n=50). Acute coronary syndrome (ACS) patients was the underlying etiology of HF in 26.7%(n=79). 13.2% of HF patients had prior PCI, 7.8% had CABG, 3.7% had prior valve surgery. History of prior admission to the hospital was existing in 87.4%. LBBB was the commonest ECG findings in 24.6%, followed by AF (22.3%). Ischemic ECG changes were more prevalent in HFrEF type (21%), while voltage criteria were most prevalent in HFpEF type (12.5%). On ECHO examinations, HFrEF showed higher prevalence of severe mitral and tricuspid regurge and higher prevalence of RWMA. Duration of hospital stay was much higher in HF group, specially in HFrEF type with mean value of 8.91±7. During in-hospital course, HF mortality was 25.7% of the total CCU mortality. Moreover, HFrEF

mortality represented 94.4% of HF mortality. Using multivariate regression analysis, the presence of hypertension doubles (2.1; IC at 95%: 1.16-3.76) probability to develop HF, compared to its absence. LBBB and AF increase the likelihood to develop HF by 7 times, each mm decrease in LA size reduces the odds of heart failure by 6% (Odds ratio 0.94; IC at 95% 0.9-0.98), each one time decrease in incidence in ACS reduce the probability of HF incidence by 15%.
Conclusion: HF is the primary reasons for admission into the CCU in 30 % of cases. Acute coronary syndrome is the commonest etiology of HF. Mortality among CCU patient was comparable to reports elsewhere. Hypertension, AF and LBBB are independent predictors of HF in such populations.

Chronic Heart Failure - Diagnostic Methods

P957
The ratio of fibroblast growth factor 23 to phosphorus as a predictor of cardiovascular death in heart failure patients with reduced ejection fraction.

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Background: high-concentration of phosphorus has been associated to an increased risk of cardiovascular events. Fibroblast growth factor 23 (FGF-23) is an important regulator of the phosphorus homeostasis, displays multiple direct effects on cardiac function and seems also to participate to adverse cardiac remodeling. Recently, several reports demonstrated that FGF-23 is a strong and independent predictor of adverse events in patients with heart failure (HF).
Purpose: To examine the utility of the FGF-23 to phosphorus ratio as a predictor of cardiovascular events in HF patients with reduced ejection fraction (HFrEF).
Methods: Our evaluation included seventy six HF patients (women n=14; men n=62; NYHA II-IV; mean age: 67 years; mean EF: 22 %). A two-site enzyme immunoassay was used to measure levels of C-terminal FGF-23 (C-term FGF-23). The primary outcome was cardiovascular death.
Results: The FGF-23 to phosphorus ratio ranges from 7 to 5769 (RU/mL/mM) and was higher in HF patients with NYHA III-IV (156.4) than in patients with NYHA II (28.9). Ratios were not significantly different between dilated and ischemic cardiomyopathies (82.2 vs. 87.7). The FGF-23 to phosphorus ratio correlated with left ventricular ejection fraction ($r = -0.26$; $P = 0.02$), estimated glomerular filtration rate (eGFR; $r = -0.29$; $P = 0.01$), BNP ($r = 0.44$; $P < 0.001$) and Nt-proBNP ($r = 0.55$; $P < 0.001$). After 8 years of follow-up, 57 patients reached the primary endpoint. Concentration of the FGF-23 to phosphorus ratio was significantly higher in HF patients who died in comparison to survivors (105.6 vs 46).
Conclusion: The FGF-23 to phosphorus ratio may be useful to identify patients with HFrEF with a higher risk of developing adverse cardiovascular events.

P958
Soluble ST2/LVMI correlates with native T1 mapping value in 3T cardiac magnetic resonance in patients with dilated cardiomyopathy

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Background: Native T1 mapping and extracellular volume fraction (ECV) of cardiac magnetic resonance imaging (CMRI) are known to detect not only interstitial fibrosis but also, pre-fibrotic phase of cardiomyopathy. Soluble ST2 (sST2), a member of the interleukin-1 receptor family, assumed to play a significant role in inflammatory response of fibroblast. Several reports have already shown no significant correlation between sST2 and late gadolinium enhancement (LGE), which indicates myocardial fibrosis. The aims of the study was to assess the relationship of serum sST2 level and ECV or native T1 mapping value in patients with dilated cardiomyopathy (DCM).
Method: This study included 19 DCM patients, who underwent 3-Tesla CMRI including precontrast and postcontrast T1 mapping (modified look-locker inversion recovery [MOLLI] sequence) and LGE imaging from August 2017 to May 2018. Each sST2 concentration obtained within 7 days pre/post CMRI, was indexed by being divided with left ventricular (LV) mass obtained from CMRI cine images. Mean native T1 value was calculated by averaging 4 cuts of precontrast T1 mapping images. ECV values were obtained according to the formula including patient's hematocrit. Correlation analysis was evaluated with Pearson coefficient.
Result: The average age was 49.5±11.3 yrs and male patient were 12 out of 17 (63.2%). The LV ejection fraction was 29.5±7.2% and serum brain natriuretic peptide (BNP) was 1270.2±1352.7pg/mL. The sST2/mass index showed a moderate linear correlation with Native T1 value ($p = 0.012$, $R2 = 0.382$) (Figure 1). However, there were no significant correlation between sST2/mass index and ECV and LGE.
Conclusion: sST2/LMVI showed linear correlation with Native T1 mapping value which might imply pre-fibrotic inflammatory phase of DCM, i.e. early phase of DCM. Further studies are needed to assess the clinical implication of sST2 as a marker of active inflammation in the early phase of DCM.

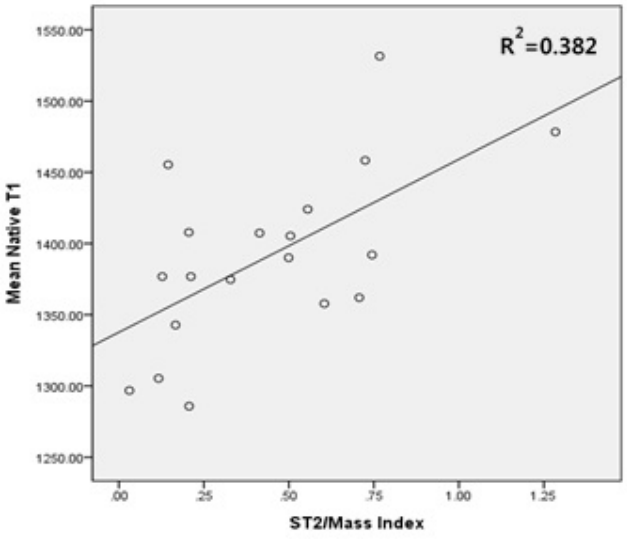

Figure 1

P959
Dynamics of the stimulating growth factor sST2 and interleukin 33 in acute myocardial infarction

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Introduction: Interleukin (IL)-33 and stimulating growth factor sST2 are molecules with an opposite pathophysiologic implications in the myocardial response after acute myocardial infarction (AMI). The kinetics of IL-33 and sST2 level and their correlation with left ventricular (LV) function remains poorly defined, both may be a target for the purpose of monitoring of the disease.
Objective: To study the dynamics of stimulating growth factor sST2 and Interleukin 33 in acute myocardial infarction with left ventricular dysfunction and left ventricular preserved function.
Materials and methods: The study included 30 patients with AMI. LV dysfunction was estimated in the 1st day of AMI, the criterion of which was an increased NTproBNP concentration of more than 300 pg/ml or a decrease in LV ejection fraction (EF) less than 50%. Two groups were formed for studying: 1st group - 16 patients with LV dysfunction, an average age was 49 [46; 51] years; the 2nd group - 14 patients without LV dysfunction, an age was 56 [51; 59] years, p=0,15. The blood serum concentration of interleukin 33 (IL 33, the pg/ml) and the stimulating growth factor sST2 (ng/ml) was defined on the 1st day and on the 14th day and in 6 months.
Results: The troponin level in the groups did not differ: 3.53 [2.3; 6.0] ng/ml and 2.38 [1.46; 3.3] ng/ml, $p = 0.54$. There were significant differences on the 1st day of AMI on the LV EF value: 1st group - 47.0 [45; 55]%, 2nd group - 56.0 [55; 62]%, $p = 0.04$; and differences on the NTproBNP oncentration: 1st group - 859.11 [309, 98; 1370] pg/ml, 2nd group - 44.5 [22.15; 129.2] pg/ml, $p = 0.003$.
In the 1st group, the serum sST2 concentration was significantly higher on the 1st day of AMI than on the 14th day: 31.87 [27.40, 38.76] and 25.63 [22.8; 28.93] ng/ml, $p = 0.01$. After 6 months the sST2 value was 31.30 [21.06, 36.49] ng/ml, $p = 0.42$. Values of IL33 in the 1st group did not have significant dynamics for the entire follow-up period: on the 1st day - 4.08 [3.76; 5.15] pg/ml, on the 14th day - 4.38 [3.95; 5,15] pg/ml, after 6 months - 5,39 [4,91; 5.49] pg/ml, $p>0.05$.
In the 2nd group significant differences in serum sST2 concentration were not detected during the whole follow-up period: on the 1st day - 29.71 [29.36; 33.51] ng/ml, on the 14th day - 25.99 [18.49; 38.78] ng/ml, after 6 months - 25.1 [9.62; 33.93] ng/ml, $p>0.05$. The values of IL33 in the serum on 1st day were 3,76 [3.65; 4.53] pg/ml, on 14th day - 4.33 [4.33; 4.43] pg/ml, $p> 0.05$. After 6 months, IL33 concentration was significantly increased - 4.82 [4.72, 5.2] pg/ml, $p = 0.04$.
Conclusions: The increase in serum sST2 concentration in the acute period of myocardial infarction is associated with left ventricular systolic dysfunction and

heart failure. Increasing the concentration of IL33 in the late post-infarction period is associated with preserved left ventricular ejection fraction and can be used to identify favorable outcome of the myocardial infarction.

P960

BNP as the biomarker of diagnosis and prognosis in long-term mortality in a cohort with HFpEF and HFrEF in the south of Brazil

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Background: The elderly population with Heart Failure with preserved Ejection Fraction (HFpEF) and Heart Failure with reduced Ejection Fraction (HFrEF) display different etiologies, profiles and comorbidity rates, with a consequent variable impact in prognosis. PURPOSE: To evaluate and to compare the risk of mortality and the Hazard Ratio (HR) of the BNP and other prognostic clinical variables as the causes of long-term mortality registered in death certificates (CID10) in an elderly cohort with the gold standard for HFpEF and HFeEF. METHODS: Six hundred thirty-four patients, who presented at the emergency room, from March 2006 through September 2012, with dyspnea and suspicion of HF, took part of this study. The accuracy of BNP to identify patients with heart failure and the search from the association with the level of BNP (POCT Biosite) and with the long-term prognosis were evaluated. The Hazard Ratio (HR) of mortality risk factors in bivariate and multivariate analysis was measured. The cause of death was identified through the search of death certificates in registries, informed by the Brazilian MIS - Mortality Information Service. RESULTS: A sample with 634 patients included, the majority of patients were white (93%) and women (63%), average age 77,3 sd +- 8,6 years and 40,5% > 80 years. The BNP presented AUC 0.93 (CI 95%, 0.88 to 0.97). The best cutoff of BNP was 180 pg/ml with S 0.83 (CI 95%, 66.7 to 80.4) and Sp 0.90 (CI 95%, 76.7 to 95.4). LR + 6.7 (95 %, 3.1 to 14.3), accuracy of 77.7. Survival analysis throughout the 78 months of the study was carried out by the Kaplan-Meier curve. The death certificates analysis, total deaths and Hazard ratios follow in Table 1.
Conclusions: The level of BNP has showed the strongest mortality risk factor of prognostic biomarker of long-term mortality in a cohort of patients with HFpEF and HFrEF.

Table 1-Comparison of risk of mortality

Causes of DeathTotal deaths n=340/634	HFrEFn=124	HFpEF n=216	p	AdjustedHR (CI 95%)
Age (years)	72 (±9.7)	79.6 (±6.8)	0.018	≥80 years HR 1.54 (CI 0.9 - 2.5)
BNP	800 pg/ml	380 pg/ml	0.002	≥180pg/ml HR 3.4 (CI 1.2 - 9.6)
BMI ≤22kg/m^2 (%)	33 (27)	67 (31)	0.18	HR 1.2 (1.05 - 3.15)
Cardiomegaly (%)	115 (93)	173(80)	0.09	HR 1.71 (CI 0.9 - 3.9)
Pneumony (%)	43 (35)56 (45)	78 (36)	<0.001	HR 1.63 (CI 0.9 - 2.7)
Renal Disease-ESRD (%)	91 (42)	<0.001	HR 2.14 (CI 1.05 - 4.4)	

*Estimated by proportional risk regressions by Cox Bivariate and Multivariate.HR (Hazard Ratio), BNP (B-type Natriuretic Peptide), BMI (Body Mass Index, ESRD (End-Stage Renal Disease).

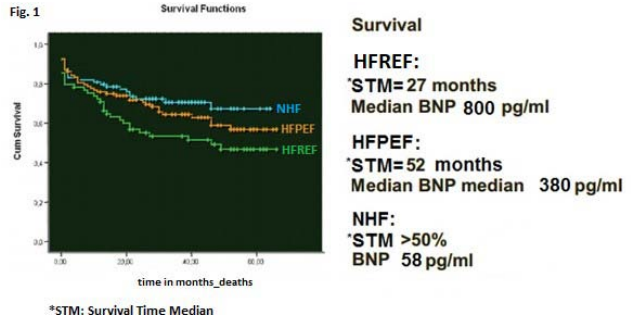

Figure 1

P961

Association between severity of heart failure and chemerin level

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Chemerin is suggested to be associated with cardiovascular function. Recent data showed that chemerin is associated with the coronary artery disease, and severity of coronary atherosclerosis, arterial stiffness, augmented risk of cardiovascular events, at the same time, it is not known about chemerin and risk of heart failure (HF). The aim was to investigate association between circulating chemerin concentrations and severity of HF in hypertensive patients.
Methods: 64 hypertensive patients were enrolled into the study with I and II functional classes of heart failure in accordance to New-York Heart Association classification. The average age was 57.32±7.78, males 29 (44.6%). Chemerin was measured by ELISA. Exercise tolerance was assessed with help of 6-minute walking test (6MWT).
Results. Chemerin values at admission exceeded the control values and averaged 289.76 ± 78.48 ng/ml. A direct correlation was established between the severity of CHF and the average levels of chemerin (p<0.001, r=0,59), which at FC I - 185.43 ± 57.81 ng / ml, at FC II - 343.87 ± 86.38 ng/ml. After 6 months, all patients showed a tendency to a decrease chemerin's level, the differences between the mean values at admission and after 6 months were reliable (p=0.048). In the most severe patients, despite ongoing therapy, the level of chemerin remained high or tended to increase, which coincided with an increase in the clinical manifestations of heart failure and exercise tolerance indices. The average level of triglycerides in patients with HF at admission to the hospital was 3.17 ± 1.68 mmol/l, total cholesterol - 5.67 ± 1.52 mmol/l. The average triglycerides at II FC HF exceeded those at FC I (3.59 ± 1.63 mmol/l and 2.65 ± 1.83 mmol/l, respectively), but the differences were not significant. Significant direct correlations between triglyceride levels and chemerin (r=0.355, p<0.05) and C-reactive protein (r=0.39, p <0.05) were found. Relative ratio analyses demonstrated that RR:2.306, CI:1.372-3.877, RD: 0.511, Sensitivity: 0.804, Specificity: 0.778.
Conclusion: The serum chemerin level is a highly informative marker of severity and prognosis of HF. The connection between chemerin and the activity of inflammation, exercise tolerance and the severity of HF was established.

P962

The effect of CPAP and oral appliances treatment on biomarkers in patients with heart failure and OSA

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Introduction: Untreated obstructive sleep apnea (OSA) is associated with an increased risk of heart failure. Circulating biomarkers represent as a safe, convenient, and inexpensive possibility for cardiovascular risk assessment and stratification. Nevertheless, no studies have examined the treatment effect of continuous positive airway pressure (CPAP) and oral appliances (OA) in patients with OSA and heart failure (HF) on galectin-3 and soluble ST-2. Results about changes of NT-pro-BNP level after OSA treatment are controversial.
Purpose of the study was to evaluate the effect of CPAP and oral appliances treatment on serum NT-proBNP, Galectin-3 and soluble ST-2 level in patients with HF and OSA at 3 months after treatment.
Methods: We conducted a prospective study in 152 patients with heart failure and moderate or severe OSA divided into groups with heart failure with reduced (HFrEF) (74 patients) and with heart failure with preserved ejection fraction (HFpEF) (78 patients). All patients were randomized to OA and CPAP groups. Serum NT-pro-BNP, galectin-3, and soluble ST-2 were measured prior to and after 3 months of therapy. Patients who have prior CPAP treatment were excluded from the study.
Results: As compared with baseline, NT-proBNP significantly decreased after 3 months in patients with HFrEF in CPAP and OA groups (CPAP: 737±292 vs. 441±165 pg/ml, p<0.001; OA: 893±179 vs. 488±182 pg/ml, p<0.001) and in patients with HFpEF in CPAP group (CPAP: 425±167 vs. 193±65 pg/ml, p<0.001). A statistically significant difference of level of NT-proBNP was not observed in patients with HFpEF and OA. No significant differences were showed in Galectin-3 at 3 months in patients with HFrEF (CPAP: 20,31±9,22 vs. 18,64±8,51 pg/ml, p=0,624; OA: 21,42±7,96 vs. 17,89±9,24 pg/ml, p=0,872) and HFpEF groups (CPAP: 19,46±10,04 vs. 17,72±9,51 pg/ml, p=0,388; OA: 18,51±8,67 vs. 17,89±9,16 pg/ml, p=0,755). Significant changes of ST-2 were found in patients with HFrEF and from CPAP group (CPAP: 72,16±39,18 vs. 43,05±19,88 ng/ml, p<0.001; OA: 78,46±28,17 vs. 67,15±29,33 ng/ml, p=0,069).
Conclusions: There were statistically significant changes in NT-proBNP level in patients with HFrEF in the CPAP and oral appliances groups, and in patients with HFpEF in the CPAP group at 3 months of treatment. No significant differences were showed in Galectin-3 in all groups at 3 months. Significant changes of ST-2 were found in patients with HFrEF from CPAP group.

P963

Changes in plasma neprilysin levels after left ventricular assist device implantation and association of outcomes during 1-year follow-up

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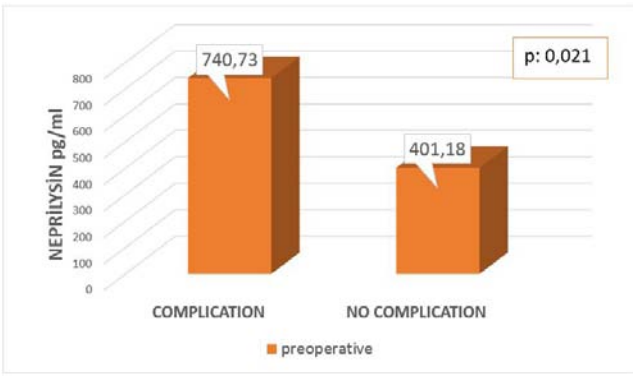
Introduction: Plasma Neprilysin levels increase with neurohormonal system activation seen in heart failure and inducing degradation of natriuretic peptides which increases fibrosis and decreases diuresis. After left ventricular assist device (LVAD) implantation neurohormonal system activation mostly decreased, but it is not known whether it returns to normal physiologic set levels. There is also a lack of data on association with pre-LVAD elevated Neprilysin levels and the adverse outcomes over first year.
Purpose: We aimed to evaluate the changes in neprilysin plasma levels between preoperative period and at the 3rd month after LVAD implantation, and association of the first year adverse outcome.
Methods: Patients who had LVAD implantation procedure between January 2017 and October 2017 were included in the study, prospectively. Plasma Neprilysin levels measured before and 3 months after operation. The patients were followed for mortality and adverse events including stroke, pump thrombosis, gastrointestinal bleeding and right ventricular failure during 1 year follow-up period.
Results: 47 patients with a mean age of 54±11 years were included in the study. Female to male ratio and the average BMI of the patients were 40/7 and 25,7±3,89 kg/m2, respectively. Plasma Neprilysin levels significantly decreased from 175,28pg/ml to 75,3 pg/ml after the 3 months of LVAD implantation (p:0,007). Totaly 13 patients died after LVAD implantation during the one year follow-up period and preoperative plasma neprilysin levels detected high in this 13 patients (1116,55 ± 1007,68pg/ml, 566,74 ± 795,68pg/ml, p:0,002).
33 patients had LVAD adverse complications in the first year. Patients with LVAD complications seen in the first year were found to be statistically significantly higher in patients with preoperative plasma neprilysin levels than those without complications (740,73±1158,55 pg/ml; 401,18±400,79 pg/ml; p:0,021). 12 patients developed right heart failure. In patients with right heart failure preoperative plasma neprilysin levels were detected high compared to without complication 35 patients (950,16 pg/ml; 558,57pg/ml; p:0,013).
Conclusion: Although neurohormonal system activation after LVAD implantation has decreased, it does not completely return to normal. The high level of preoperative neprilysin in the patients who died within 1 year after the LVAD implantation showed that increased preoperative neurohormonal activity may be related to death.In particular, preoperative neprilysin level may be predictive of right heart failure and other adverse events in the first year after LVAD implantation



P964

MR-proANP effectively risk stratifies patients with type 2 diabetes regardless of presence of heart failure

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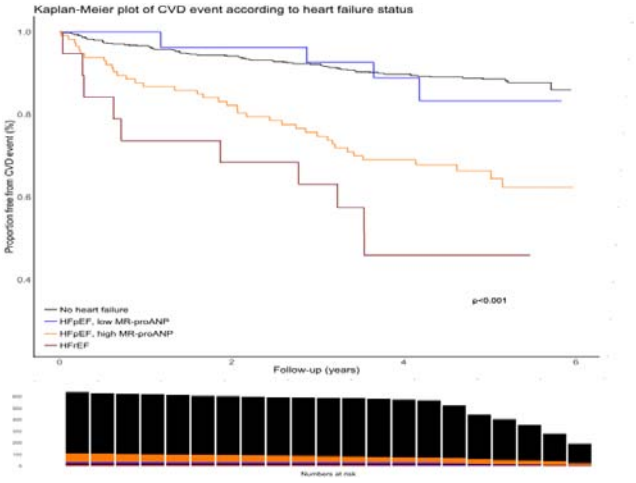
Background/Introduction: We have previously reported that, in patients with type 2 diabetes (T2D), a cut-off of 60 pmol/l for the cardiac biomarker mid-regional pro-atrial natriuretic peptide (MR-proANP) effectively ruled out heart failure (HF) with reduced ejection fraction (HFrEF) but had limited diagnostic value regarding HF with preserved ejection fraction (HFpEF). Whether this cut-off carries relevant prognostic information is unknown.
Purpose: To investigate whether MR-proANP can improve risk stratification in T2D patient with and without HF.
Methods: In this prospective cohort study, T2D patients (n=806) from two specialized diabetes clinics were characterized with clinical variables, echocardiography and MR-proANP. HF was predefined as follows: A left ventricular ejection fraction (LVEF) ≤40% defined HFrEF. Patients with dyspnea and at least one of the following defined HFpEF: LVEF >40% and ≤50%, E/e´septal ≥15, LV hypertrophy (LV mass >95 g/m2 for women; >115 g/m2 for men) or left atrial enlargement (>34 ml/m2). Information on incident cardiovascular disease (CVD) events were retrieved through national registries. A CVD event was defined as the composite of admission with CVD (including HF, coronary revascularization, myocardial infarction, cardiac arrest, cerebrovascular disease and peripheral artery disease) and CVD death.
Results: During a median follow up of 4.8 years, 126 CVD events occurred. Overall, an MR-proANP level ≥60 pmol/l was associated with an increased risk for CVD events (univariate; hazard ratio (HR) 2.09 [95% confidence interval 1.7;2.52], p<0.05, multivariable model including age, gender, known duration of T2D, body mass index, systolic blood pressure, known CVD and albuminuria; HR 1.75 [1.4;2.23], p<0.05). Compared to patients without HF, patients with HFrEF had the highest risk for CVD events (univariate; HR 6.25 [3.23;12.11], p<0.05, multivariable model; HR 3.35 [1.65;6.80], p<0.05) followed by patients with HFpEF and an MR-proANP level ≥60 pmol/l (univariate; HR 3.47 [2.34;5.13], p<0.05, multivariable model; HR 2.55 [1.64;3.97], p<0.05). Conversely, HFpEF patients with an MR-proANP level <60 pmol/l did not have a significantly higher risk compared to patients without HF (p>0.05). Adding MR-proANP to the multivariable model, showed a net reclassification improvement (NRI) of 27.1% [7.6;46.6], p<0.05, and adding HF status showed an NRI of 32.8% [13.5-52.0], p<0.05.
Conclusions: A cut-off for MR-proANP of 60 pmol/l effectively identified patients with T2D who had an increased risk of CVD events and values below were associated with a favourable prognosis even in the presence of HFpEF. These findings support the use of MR-proANP as a diagnostic rule out tool in patients with T2D.



CVD event according to HF status

P965

Growth Differentiation Factor-15. A new, long-term prognostic biomarker in chronic heart failure with preserved or mid-range ejection fraction

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Antecedents. Chronic heart failure (HF) with mid-range or preserved ejection fraction (HFmrEF, HFpEF) are HF phenotypes requiring better prognostic stratification; the prognostic role of biomarkers in those patients is not well-known.

Aim. To assess the prognostic value of Growth Differentiation Factor-15 (GDF-15) in patients with HFpEF or HFmrEF.
Methods. HFpEF and HFmrEF patients were sampled during their first visit to a HF Unit, and GDF-15 and amino-terminal proBNP (NT-proBNP) were analyzed by automated immunoassays. All-cause mortality was the endpoint analyzed.
Results. 311 patients with CHF, 29% HFmrEF, 32% women, mean age 68±13 years were included. No differences existed in the GDF-15 or NT-proBNP concentrations between both HF phenotypes. During a follow-up lasting up to 88-months (interquartile range 9-30 months), 98 patients (31.5%) died, most (71%) by cardiovascular causes. Death patients have higher median concentrations of GDF-15 (4,085 vs. 2,270 ng/L, p<0.0001) and NT-proBNP (1,984 vs. 1,095 ng/L, p<0.0001). Multivariable analyses identified New York Heart Association functional class (NYHA-FC) III or higher, systolic blood pressure, left atrial size and age>65 years as independent predictors (p between 0.04 and 0.0001) of all-cause mortality. When GDF-15 and NT-proBNP concentrations were added to these clinical variables, only GDF-15 added value to prediction of all-cause mortality (p=0.01).
Using the clinical predictors obtained for global mortality, a score was constructed that could predict the risk of cardiovascular mortality for a given patient during follow-up. We assign a scale of 34 points based on the coefficient β of each variable. This score allowed estimating the risk of cardiovascular mortality. The cumulative incidence function curves distinguished two groups: a low risk group (<21 points) and a high risk group (≥ 21 points).
Tertiles of GDF-15 (<1625, 1625-4330 and >4330 ng/L) were related to the 5-years survival; 78% of patients in the lowest tertile survived compared with only a 16% survival for the highest GDF-15 tertile.
Conclusions. GDF-15 appears as a strong, independent biomarker to identify HFmrEF or HFpEF patients with worse prognosis.

MORTALITY SCORE					
	β	Adjustment factor (x10)	Risk groups	Num of patients	Incidence of survival (%)
NYHA3	0,361	4	<21 points	139	72%
SBP<120 mmHg	0,366	4	≥21 points	159	21%
LA >50 mm	0,539	5			
Age >70 years	0,916	9			
GDF15 >1860 pg/ml	1,223	12			
TOTAL		34 points			

P966

Serum surfactant B concentration increases during physical exercise but does not predict patient survival

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Background: Serum surfactant B is a recognized marker of alveolar-capillary barrier damage. Surfactant B may also be a predictor of worse survival in patients with heart failure.
Purpose: To assess whether physical exertion results in augmentation of alveolar-capillary barrier damage as measured by increase in serum surfactant B concentrations and whether it impacts patient survival.
Material and Methods: Fifty one patients – 43 men and 8 women (aged 55.6±7.5 years) with advanced heart failure (NYHA II-III/IV, EF≤35%, mean 21.7±5.4) underwent complex cardiologic assessment, including cardiopulmonary exercise test (CPX). CPX was performed on a bicycle ergometer according to RAMP protocol with increments of 10 Watt/min. Venous blood samples were collected before and immediately after CPX. Serum surfactant B was determined by enzyme-linked immunosorbent assay. All patients were followed up for mean of 23.5±12.6 months. Cumulative endpoint was were defined as: any death, urgent heart transplantation or urgent LVAD implantation.
Results: Serum surfactant B concentration increased significantly after CPX (median [IQR]: 77.5 [60.5-106.5] vs 87.2 [63.5-111.9] ng/ml, p<0.001). Moreover, surfactant B levels both at rest and post-CPX were positively correlated with NT-pro-BNP (R=0.32, p=0.02 and R=0.41, p=0.003, respectively). Patients with more advanced symptoms of heart failure showed greater increase in surfactant concentration after physical exertion when adjusted for basal value (NYHA class II-II/III: median 1,64 [IQR:-3.0-8.6%] vs NYHA class III-III/IV: median 8.7 [IQR: 2.4-16.8%], p=0.02). Among indicators of physical capacity analysed during the CPX VE/VCO2 slope and anaerobic threshold showed correlation with increase of surfactant concentration during exercise (R=0.29, p=0.04 and R=-0.44, p=0.002, respectively). Neither surfactant levels (rest, post-CPX) nor post-CPX change in surfactant level were predictive of patient prognosis.
Conclusions: Increased leakage of surfactant B into the systemic circulation reflects exacerbation of alveolar-capillary barrier damage as a consequence of hemodynamic changes in pulmonary vascular bed taking place during exertion in patients with advanced heart failure. However, it does not seem to significantly affect patient prognosis.

P967

Novel urinary peptidomic classifiers predict mortality in heart failure patients: (HOMAGE)

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On behalf of: on behalf of the Heart 'Omics' in AGEing (HOMAGE) investigators

Background. Heart Failure (HF) is associated with a high death rate. Biomarkers predicting a patient's risk will help identify those patients in need of more intensive monitoring and therapy. However, whether urinary peptidomic classifiers predict the risk of death in HF patients remains unknown.
Methods. We analyzed data of 355 patients (women, 27.6 %, mean age, 70±10) from the Hull cohort, which is included in HOMAGE database. HF patients were identified, and their clinical data extracted. Each patient's blood and urine samples were collected at baseline. The multidimensional HF1 and HF2 peptidomic classifiers were measured on baseline urine samples. Using the Cox regression, we modeled the association between survival time and HF1 and HF2, while adjusting for risk factors, including sex, age, haemoglobin, creatinine, and sodium. Additionally, we ran analyses stratified, using same models, on left ventricular ejection fraction (EF<50%, >50%).
Results. During a median follow-up of 19 months (5-95% range: 1-82 months), 125 (35.2%) patients died. In the fully adjusted model, HF1 was not associated with an increased risk of death (hazard ratio [HR], 1.16; 95% confidence interval [CI]: 0.92–1.46], but HF2 was (HR 1.48; CI, 1.04–2.11]. After stratification for EF (>50%), the HF2 classifier predicted a two-fold increased risk of death in HFpEF subjects (HR, 1.95; CI, 1.00–3.85).
Conclusions. Novel peptidomic biomarkers may provide new insights into HF pathophysiology, improve risk stratification and patient management.

P968

Influence of galectin-3 and soluble ST-2 on risk of death and heart failure hospitalization in patients after ST-elevation myocardial infarction treated with primary percutaneous coronary intervention

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Funding Acknowledgements: Grant from Medical University of Warsaw

Background: Despite modern reperfusion strategies, myocardial infarction leads to deleterious processes resulting in left ventricular remodelling (LVR) and heart failure (HF). Galectin-3 (Gal-3) and soluble ST-2 (sST-2) are involved in LVR as a result of inflammation and fibrosis. There is an evidence of a high prognostic value of both biomarkers in predicting outcomes in HF patients. However, studies evaluating the role of Gal-3 and sST-2 in patients after ST-segment elevation myocardial infarction (STEMI) treated with primary percutaneous coronary intervention (PCI)are insufficient.
Purpose: The study group (SG) was followed-up forthe primary endpoint combined of cardiovascular (CV) death or HF hospitalization at one-year. Additionally, we compared Gal-3 and sST-2 concentrations to the control group (CG).
Methods: The analysis was based on data collected in a prospective BIOSTRAT (Biomarkers for Risk Stratification After STEMI; NCT03735719) study.From October 2014 to April 2017, 117 consecutive patients (without HF history) with first-time STEMI treated with PCI were recruited. The CG consisted of 41 patients with risk factors for CV diseases, but without history of coronary artery disease or HF. Blood for Gal-3 and sST-2 measurements were sampled 72-96 hours after admission.
Results: Median age was 61 and 60 years (p=0.21), while 70% and 53% (p=0.33) were men (in the SG and CG, respectively). Median left ventricular ejection fraction in the SG was 48%, and 60% in the CG (p<0.001). Median Gal-3 and sST-2 concentrations in the SG were 7.1 ng/mL (5.6-8.8) and 23.4 ng/mL (18.0-32.0), while in the control group – 6.3 ng/mL (4.6-7.8; p=0.03) and 17.9

ng/mL (15.7-23.3; p=0.001), respectively. Data on the primary endpoint was available for 104 patients (89%). During the one-year observation, 9 patients (8.65%) reached the primary endpoint. In the univariate analysis higher Gal-3 and sST-2 concentrations, among other variables, were predictors of the primary endpoint (Gal-3 hazard ratio [HR]: 1.34, 95% confidence interval [CI]: 1.17-1.54, p<0.001; sST-2 HR 1.05, 95% CI: 1.02-1.08, p=0.001). Gal-3 ≥9.57 ng/mL and sST-2 ≥45.99 ng/mL had sensitivity of 78% and 44%, and specificity of 85% and 97%, respectively, for prediction of the primary endpoint during follow-up.Both, Gal-3 and sST-2 correlated positively with length of stay in intensive cardiac care unit, C-reactive protein, N-terminal pro-B-type natriuretic peptide and negatively with glomerular filtration rate. Gal-3 correlated positively with age, Killip and New York Heart Association class. There was no significant correlation between sST-2 and age.

Conclusion: In patients after first-time STEMI, Gal-3 and sST-2 are predictors of mortality and HF hospitalization and their assessment after STEMI may play a useful role in the CV risk stratification.

P970

N-terminal pro-B-type natriuretic peptide in chronic heart failure: The impact of sex across the ejection fraction spectrum

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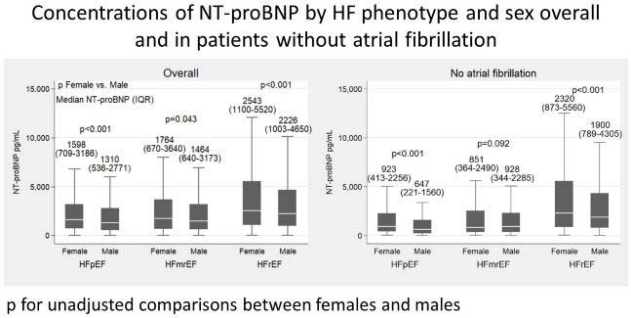
Objective: The aim was to assess sex-specific differences in N-terminal B-type natriuretic peptide (NT-proBNP) regarding concentrations, associations with patient characteristics, and prognostic role, in a large and unselected population with chronic heart failure (HF) with preserved (HFpEF), mid-range (HFmrEF), and reduced ejection fraction (HFrEF).
Methods and results: In 9847 outpatients with HFpEF, HFmrEF, and HFrEF (49 vs. 35 vs. 25% females) from the Swedish HF Registry, median concentrations of NT-proBNP were 1598 pg/mL in females vs. 1310 pg/mL in males (p<0.001) in HFpEF, 1764 vs. 1464 pg/mL (p=0.043) in HFmrEF, and 2543 vs. 2226 pg/mL (p<0.001) in HFrEF. The differences persisted after adjustment HF severity, age, body mass index, presence of atrial fibrillation, kidney function, and anemia, p<0.001 for HFpEF and HFrEF, vs. p=0.006 in HFmrEF. In patients with HFpEF in sinus rhythm, median NT-proBNP was 43% higher in females, 923 vs.647 pg/mL.
Associations between patient characteristics and high NT-proBNP (defined as above the median in females and males in the three HF phenotypes) were largely similar in both sexes. High NT-proBNP was associated with the composite of all-cause death or first HF hospitalization in both sexes and across the EF phenotypes; adjusted hazard ratios (95% confidence intervals; CI) 2.10 (1.63-2.70) vs. 1.76 (1.38-2.23) in HFpEF females vs. males, 1.86 (1.43-2.43) vs. 1.84 (1.50-2.27) in HFmrEF, and 1.46 (1.23-1.73) vs. 1.51 (1.37-1.67) in HFrEF (no significant interaction NT-proBNP*sex across the EF spectrum).
Conclusion: Concentrations of NT-proBNP were higher in females across the EF spectrum, with large relative differences in HFpEF. Associations with patient characteristics and outcomes were nonetheless similar in both sexes. The findings support the use of NT-proBNP for prognostic purposes in chronic HF, regardless of sex, but the sex-differences, in HFpEF in particular, merit further investigation and might have implications for optimizing trial eligibility.



p for unadjusted comparisons between females and males

P971

Significance of etiological diagnosis of hypertrophic cardiomyopathy phenocopies

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Introduction: Clarification of the etiology of phenocopies of hypertrophic cardiomyopathy (HCM) is of great importance due to the growing numbers of widely available therapeutic options.
Purpose: The aim of our study was to determine the diseases responsible for HCM phenocopies in the patient group managed at our Heart Failure Outpatient Clinic.
Methods: We examined 58 heart failure patients with HCM phenotype (left ventricular wall thickness ≥ 15mm) at our Heart Failure Outpatient Clinic between 1 January 2016 and 31 July 2018. After an echocardiography was performed, every patient underwent cardiac magnetic resonance imaging (CMR) test as well.
Results: The final diagnosis after the CMR test was HCM in half of the patient group (29 patients), hypertension-related left ventricular hypertrophy (LVH) in 18 patients, cardiac amyloidosis in 8 patients, and respectively 1-1 case of Löffler endocarditis, non-compaction cardiomyopathy and Fabry disease. From the 8 patients, that the CMR suggested cardiac amyloidosis (CA), 3 proved to be transthyretin (ATTR) amyloidosis, and 2 AL amyloidosis. In one case, after the negative medical examinations (serum electrophoresis, free light chain measurement, 99mTcHDP scintigraphy, gingival biopsy), a myocardial biopsy has been performed, confirming a previously sufferred myocarditis. In the last 2 cases, due to one patient's non-compliance, and the other patient's death, no further testing could be carried out. Currently, 1 of the 3 ATTR patients is already receiving tafamidis treatment, in the other two cases, treatment initiation is in progress. The 2 AAL patients are being treated in co-operation with haematologists. The patient suffering from Fabry's disease is receiving enzyme replacement therapy and the patient with Löffler endocarditis is treated with steroid therapy.
Conclusions: The etiological diagnosis of HCM phenocopies suspected by echocardiography is of great importance, because this could allow an effective and often prognosis improving treatment in a large number of patients.

P972

Diverse effects of neprilysin inhibition by sacubitril/valsartan on different forms of natriuretic peptides in patients with HFrEF.

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Background: Sacubitril/valsartan (SV) is a novel heart failure (HF) medicine. The drug combines angiotensin II receptor blocker and inhibitor of neprilysin (NEP), a protease responsible for a breakdown of natriuretic peptides (NPs) of A- and B-type. The effect of NEP inhibition on the levels of different NPs forms still remains unclear. In this study we explored effects of SV on both clinical status of HF patients with reduced ejection fraction (HFrEF) and levels of different NPs forms.
Methods: 22 HFrEF patients, age 27-87 (median 66, IQR 57.25-76), 86.4% male, presenting baseline LVEF 15-40% (median 27.5%, IQR 25-34.75%), NYHA class II (27.3%), III (50%) and IV (22.7%) received SV for 30 weeks. We examined changes in LVEF, NYHA class and biomarkers in EDTA-plasma samples at baseline and at 30 weeks after SV initiation. NT-proBNP was measured by Pathfast™ assay and in-house immunoassay based on monoclonal antibodies (MAbs) targeting nonglycosylated regions of NT-proBNP. In-house intact proBNP assay (N- and C-terminal epitopes) and total BNP assay (C-terminal epitope and epitope comprising the site of NEP cleavage) were used. All MAbs were from HyTest Ltd. ANP was measured by in-house immunoassay utilizing anti-ANP MAb 23/1 (Biorad) and rabbit polyclonal anti-ANP antibody.
Results: We observed more than 30% NT-proBNP level decrease in 13 patients (65%) and considered them as responding group; in 7 patients (35%) NT-proBNP level increased or did not change (non-responding group). There was no difference in NYHA functional class dynamics in responding and non-responding groups: 84.6% and 85.7% of patients exhibited NYHA class improvement correspondingly (P=1.000). However, LVEF improvement (more than 20% increase) between responding and non-responding groups differed significantly (P=0.0023): only 15.4% of patients from responding group demonstrated decreasing or unchanging LVEF, while no LVEF increase was observed in non-responding group.
NT-proBNP dynamics analyzed by Pathfast™ and our glycosylation-independent assay in responding group differed in 4 cases (30.8%). Both proBNP and total BNP levels had moderate correlation with NT-proBNP measured by in-house assay (r=0.731 and 0.788 correspondingly), and no correlation with NT-proBNP measured by Pathfast™ (r=0.336 and 0.394 correspondingly).
ANP level (available for 9 out of 22 patients) changes showed no association with NT-proBNP dynamics: 3 patients in responding group showed a dramatic increase

in ANP level, 2 patients demonstrated ANP decrease to undetectable level at 30 weeks and 2 patients had no change in ANP concentration.
Conclusions: Diverse effects of SV therapy on different forms of NPs in both responding and non-responding patients suggest differential impact of NEP inhibition on metabolism of NPs in individuals. One can speculate that monitoring different forms of NPs provides useful insights regarding beneficial effects of SV therapy in HF.

P973
Timing of echocardiographic evaluation of patients with advanced heart failure. Is it time consuming?

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Echocardiography constitutes the cornerstone in diagnosis and management of patients (pts) with heart failure (HF). Technological developments thoroughly improves the estimation of these pts but also may increase significantly the duration of the examination offering data not always necessary for the specific clinical condition. The aim of the study was to test the hypothesis that although focus echo was used the duration of the examination was prolonged.
Methods: We studied 20 consecutive pts with advanced HF in an EACVI (European Association of Cardiovascular Imaging) accredited echo lab as everyday routine examinations. The studies were performed by a highly experienced echocardiographer, EACVI accredited using an updated echo machine. All pts underwent a full conventional echo study and according to each case additional methods were used (3D, strain analysis, dyssynchrony analysis, contrast and RV function advanced analysis). All measurements and calculations were performed off line and the reporting time was also estimated. Patients with atrial fibrillation and poor image quality were excluded.
Results: The pts' (65% men) mean age was 57.4±13.8 years and the underlying pathophysiology was ischemic cardiomyopathy (55%), dilated cardiomyopathy (30%) and other (15%, lupus erythematosus, peripartum cardiomyopathy and hypertension). Mean EF was 23±5% and concomitant at least moderate MR was present in 65%. 3D measurements were performed in 90% of pts, LVGLS was calculated in 35%, dyssynchrony in 25%, RV function measurements in 25% and contrast was used in 10%. Time for images acquisition was 26.25±7.6min, time for conventional measurements was 9.6±0.9min and time for calculations (2D and 3D EF, MR quantification) was 7.2±0.8min. Need for contrast administration added 1min, dyssynchrony estimation 1.35min, LVGLS analysis 2min and further RV function 3min. Reporting time with printed report was completed in 14.2±0.8min. Mean total time from beginning of study till the report was written was 57.8±8.9min.
Conclusion: Echocardiographic evaluation of patients with advanced HF is time consuming even if the study is focused and a protocol is used and exceeds the time that is needed even for complex valvular disease estimation.

P974
Short-term echocardiographic evaluation by global longitudinal strain in patients with HFrEF treated with sacubitril / valsartan

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Introduction: Sacubitril/Valsartan combination therapy (ARNI) in the PARADIGM HF study showed important results in reducing mortality, re-hospitalization and improving quality of life in patients with heart failure and reduced left ventricular function (HFrEF). However, at present, few data have been presented that have analyzed hemodynamic and functional effects of this drug.
Objective: The aim of the present study was to assess the main echocardiographic parameters, including Global Longiudinal Strain (GLS), in patients with chronic SC who were treated with ARNI. Ventricular strain may be considered the gold standard for the analysis of variations in left ventricular function.
Methods and Results 30 outpatients were enrolled (22 males, mean age 64+10 years) with the following baseline characteristics: LVEF 28+9, NYHA II-III, idiopathic etiology 46% ischemic 48%, valvular 6%. In all patients ARNI was titrated according to the ESC guidelines, with a starting dose of 100mg die and a progressive increase to the maximum tolerated dose. In 12 pts it was not possible to reach the maximum dose because of severe hypotension (n=10) and of significant worsening of renal function (n=2). Eighteen pts (60%) were treated with the maximum dose of 200 bid. Assessment of echocardiographic data was obtained in all patients at baseline and at 3-6 months of follow-up. In addition to the main echocardiographic parameters (FE, LVEDV, LVESV, E/A, decT, VolAsx, TAPSE, mitral regurgitation) the GLS (total, epicardial and endocardial) was also evaluated. Main echo data are shown in the table.
Conclusions: Treatment with ARNI in patients with HFrEF significantly increases LVEF at mid term, but more precociously, it affects global longitudinal strain which improves already at 3 months. This study confirms the favorable action of ARNI on the left ventricular function, and underlines how the strain method represents today the reference tool for detecting even minimal short-term changes in ventricular function.

	baseline	3 months	6 months
LVEF (%)	28±8	28±9	34±12 ° *
TAPSE (mm)	17±4	17±5	17±7
LA vol (ml)	84.3±42	83±47	85±48
GLS	-6.9±4.3	-7.9±4.2 ^	-8.8±4.4 ^
GLS epi	-6,15±3.8	-6.43±3.9	-7.88±4.1 °
GLS endo	-8.2±4.8	-9.0±4.8 ^	-10.1±5.1

° p <0.001 vs baseline ^ p <0.05 vs baseline * p <0.05 vs 3 months

P975
Cardiac output and cardiac index by echocardiography modalities versus thermodilution: a comparative study

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Introduction: Accurate measurement of cardiac output (CO) and cardiac index (CI) is crucial in making decision on therapeutic management of patients under various cardiac pathology. Despite the invasive nature, thermodilution method (TD) using pulmonary artery catheter placement is accepted as a reference standard for CO measurement method. Various transthoracic echocardiography (TTE) modalities can be utilised to calculate CO and CI, though the agreement with TD is not established firmly based on past studies. This present study aims to identify by statistically significant value of CO and CI measured by TTE modalities in comparison with TD, and to evaluate the level of agreement between these two methods.
Methods: Sixty-one patients admitted for elective TD procedure through Swanz-Ganz pulmonary artery catheter were included. Measurements of CO and CI by TD were obtained. TTE modalities which are Teicholz, modified Simpson and doppler-based techniques were utilised to calculate CO and CI through product of stroke volume with heart rate. The relationship between CO and CI by TTE measurements with TD was studied using Pearson's correlation, then their strength and direction of linear association was evaluated by performing regression analysis. Finally, Bland-Altman analysis was used to assess the level of agreement between these two methods of CO and CI measurement.
Results: The normality of the data distribution was checked using Kolmogorov-Smirnov test and skewness of the data was between -2 to 2. By Pearson correlation and linear regression, the TTE modalities of systemic and pulmonary Doppler were significantly correlated in terms of CO and CI. The r value of CO for systemic and pulmonary Doppler were r= 0.435 and 0.365; p<0.05 while in terms of CI, r= 0.367 and 0.322; p < 0.05 respectively. According to the Cohen (1988), the r values obtained indicate medium strength of relationship between TD with systemic and pulmonary Doppler. Based on Bland-Altman analysis, there were also agreements between TD with systemic and pulmonary Doppler as the differences in data were scatter plotted within the limit of agreement (LOA). Systemic Doppler CO and CI showed the least data differences with TD CO and CI. For CO, the mean of bias was -0.12 l/min with the 95% LOA of -3.94 l/min and 3.69 l/min, whereas for CI, the mean of bias was 0.018 l/min with the 95% LOA of -1.71 and 1.74 l/min. The proportional bias was determined by the regression of mean differences data when B value nearest to zero and t value <0.05 to reject null hypothesis.
Conclusion: This study shows that Doppler-based techniques are novel echocardiography modalities in assessing CO and CI as there is reasonable agreement with the reference method. With sufficient study in the future, clinical decision can be made with high level of assurance based on these non-invasive TTE modalities alone when current gold standard invasive TD is not feasible.

P976
Prognostic value of myocardial fibrosis amount and localization assessed by cardiac magnetic resonance in patients with non ischemic dilated cardiomyopathy with left ventricular systolic dysfunction

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Background: Myocardial fibrosis detected with cardiac magnetic resonance (CMR) has emerged in recent years as an important prognostic value in patients (pts) with heart failure (HF).
Purpose: to evaluate the prognostic role of myocardial fibrosis amount and localization in pts with non ischemic dilated cardiomyopathy (DCM) and left ventricular systolic dysfunction.
Methods: We enrolled retrospectively pts suffering from DCM with left ventricular ejection fraction (LVEF) ≤45% underwent CMR with administration of paramagnetic contrast agent followed at our HF Department from January 2012 to December 2016. We evaluated demographic, laboratory, therapeutic and imaging parameters (left and right ventricular ejection fraction, myocardial mass, presence of late gadolinium enhancement (LGE), LGE localization, number of LGE segments). The composite endpoint was death from any cause and hospitalization for cardiovascular (CV) causes or HF.
Results: We enrolled 184 pts (69% male, mean age 56 ± 12 years). 90 pts (49%) showed left ventricular LGE. Table 1 shows the parameters that were predictive of events at univariate analysis. At multivariate analysis, only the presence of LGE confirmed its prognostic value (HR 8,009; IC 95% 2,504–25,621; p=0,0001). With the increase in the number of LGE segments there was a significant trend of worsening of the prognosis (p=0.03). In particular, the presence of more than 3 LGE segments was associated with a worse outcome (HR 1.3, IC 95% 1.16-2.02, p=0.008). The localization at basal septum was associated with an increased risk of events, especially arrhythmias, compared to the other localizations.
Conclusions: the amount and localization of myocardial fibrosis are independent predictors of death and CV and HF hospitalization in pts affected by DCM and may allow early detection of pts at high risk of poor prognosis, needing more aggressive treatment and closer follow-up visits.

	Total(184)	Events (85, 46%)	No events (99, 54%)	p value
Age, years	55±15	57±14	53±16	0.05
Diabetes, n (%)	41(23)	28(33)	14(14)	0.03
Chronic Kideny Disease, n (%)	23(13)	18(21)	6(6)	0.02
Atrial Fibrillation, n (%)	48(27)	30(36)	19(19)	0.05
Left Ventricular Ejection Fraction, %	35±10	32±9	39±10	0.0008
Right Ventricular Ejection Fraction, %	44±11	41±12	46±10	0.005
Myocardial Mass, g	146±47	164±52	133±39	0.001
LGE, n (%)	87(49)	49(58)	40(40)	<0.0001

P977
Global longitudinal strain for prediction of ejection fraction change in heart failure

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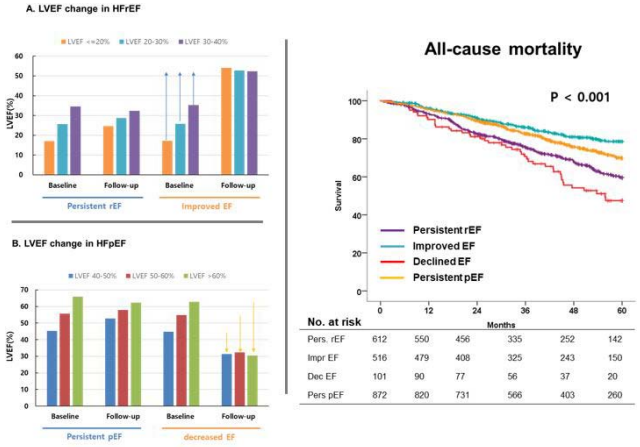
Background: In patients with heart failure (HF) the left ventricular ejection fraction (LVEF) changes during follow-up. Myocardial strain is a marker for LV contractility and a good prognostic factor.
Purpose: We sought to evaluate whether global longitudinal strain (GLS) can predict changes in LVEF in HF patients.
Methods Of 4312 patients hospitalized for acute HF 2,105 underwent echocardiography at baseline and follow-up (median interval: 406 days). GLS was measured at the index admission. HF phenotypes were defined as persistent HF with reduced EF (persistent HFrEF, LVEF ≤ 40% at baseline and follow-up), HF with improved EF (HFiEF, LVEF ≤ 40% at baseline and improved to >40% at follow-up), HF with declined EF (HFdEF, LVEF>40% at baseline and declined to ≤40% at follow up) and persistent HF with preserved EF (persistent HFpEF, LVEF ≥40% at baseline and follow-up).
Results 1130 patients had HFrEF at baseline: during follow-up 54% and 45.8% had persistent HFrEF and HFiEF, respectively. When stratifying the patients according to LVEF, HFiEF patients archive LVEF > 50% regardless of baseline LVEF, whereas patients with persistent HFrEF did not show significant EF change. Among 975 patients with HFpEF at baseline, 10.5% and 89.5% had HFdEF and persistent HFpEF at follow-up, respectively. Similarly, patients with HFdEF experienced a decline in LVEF to ca. 30% regardless of baseline LVEF. Regarding the clinical outcomes, HFiEF had the best and HFdEF the worst prognosis (figure).
The median GLS was 10%, 7.7% and 13.7% in all, HFrEF and HFpEF, respectively. Patients with HFiEF had higher GLS than persistent HFrEF (7.9±3.2% vs. 8.7±3.45%, P<0.001), whereas HFdEF had lower GLS than persistent HFpEF (14.1±4.6% vs. 11.8±4.5%, P<0.001). In multivariable analysis, each 1% increase in GLS was associated with a 10% increased risk for HFiEF (P<0.001) and 7% reduced risk for HFdEF among patients with baseline HFrEF and HFpEF, respectively.
Conclusions In patients with HF, the changes in LVEF during follow-up are associated with different outcomes. GLS can be used to predict the LVEF changes in both HFrEF and HFpEF patients.



EF change and outcomes

P978
Left atrial function in HFpEF and HFmrEF patients; relation to pulmonary artery systolic pressure

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Background: Heart failure with preserved ejection fraction (HFpEF) and with mid-range ejection fraction (HFmrEF) are conditions sharing similar diagnostic criteria and symptoms. Left ventricular diastolic dysfunction has often been considered central to the pathophysiology of both, as determined by current conventional echocardiographic measures of elevated filling pressure and/or an increased in left atrial (LA) volume. While studies have shown that LA function and pulmonary artery systolic pressure (PASP) are an important determinant and an indicator of LV filling pressures, the relationship between LA mechanical function and PASP in such patients is unclear.
Methods: A total of 108 consecutive outpatients diagnosed with HFpEF (n=70) with an Ejection Fraction (EF) ≥ 50%, or HFmrEF (n=38) with an EF of 40-49% were prospectively enrolled. Pulmonary artery systolic pressure was estimated using tricuspid regurgitation gradient and right atrial pressure. The following conventional parameters were also obtained on a resting echocardiogram: mitral E/A, E/e', left atrial volume indexed (LAVi) and LV EF. Left atrial phasic function was analysed using 2D-Specle Tracking. Peak-atrial longitudinal strain (PALS) and peak-atrial contraction strain (PACS) were measured, reflecting LA reservoir and pump function respectively. We looked at the relationship of LAVi, traditional parameters of systolic and diastolic function and LA strain, with PASP in this cohort.
Results: There were 20 (29%) HFpEF patients with elevated PASP (≥40mmHg), and 12 (32%) in the HFmrEF group. At univariate analysis, there were significant correlations between PASP and the following echocardiographic measurements in the HFpEF and HFmrEF groups respectively: E/e' (r=0.47 p<0.001, r=0.37 p<0.05), mitral E/A (r=0.48 p<0.001, r=0.46 p<0.01), LAVi (r=0.45 p<0.001, r=0.17 p=NS), PALS (r=-0.48 p<0.001, r=-0.57 p<0.001) and PACS (r=-0.44 p<0.001, r=-0.50 p<0.01). Peak-atrial longitudinal strain had the highest correlation coefficient with PASP in both groups. There was no significant correlation between LV EF and PASP in either group. Stepwise multiple linear regression analysis of LAVi, parameters of LV diastolic dysfunction and LA strain showed that PALS was the best independent predictor of PASP in the HFmrEF group (standardised Beta coefficient =-0.51, p<0.001), and had the greatest area under the curve to predict the presence of high PASP at Receiver Operating Characteristics analysis (area under the curve = 0.82, p<0.01).

Conclusion: This study shows that a reduced LA reservoir function is associated with an increased PASP in patients with HFpEF and HFmrEF, reflecting perhaps that the large blood volume which is directly aspirated from pulmonary bed into LV, leads to the rise in pulmonary artery pressures. Reduced LA reservoir function has excellent predictive value in both heart failure groups, and emerged as an independent predictor of high PASP in patients with HFmrEF.

Chronic Heart Failure - Treatment

P980

Small tolerated enalapril doses before ARNI administration predicts adverse events during ARNI up-titration

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Background/Introduction: The maximum recommended dose (200 mg BID) of sabutipril-valsartan (ARNI) is associated with better prognosis in patients with heart failure and reduced ejection fraction (HFrEF). Theoretically, small tolerated enalapril doses might associate with lower ARNI tolerated doses
Purpose: To investigate the possible association of small tolerated enalapril doses before ARNI with adverse events after ARNI switch.
Methods: Patients with HFrEF (EF£35%), NYHA class II and III at maximum tolerated dose of β-blocker, enalapril and spironolactone were considered eligible for the study. All patients were switched from enalapril to ARNI which it was progressively up-titrated every week from 50mg BID to 100mg BID and eventually 200mgX2. Enalapril dosage £5 mg BID prior to ARNI was considered as "low dose" (LD), while a dose> 5 mg / BID was considered as a "high dose" (HD).
Results: A total of 33 patients with a mean age of 59.5 years (84.8% with ischemic myocardiopathy) were prospectively included. 82% of patients were receiving LD of enalapril before ARNI and 18% HD. Overall, 70% of the patients were titrated to the maximum dose of ARNI. Fewer LD patients were up-titrated to the maximum target ARNI dose as compared with the HD group patients (66.6% vs. 83.3%, p=0.01). Only patients in the LD group experienced adverse events during ARNI up-titration (1 patient asymptomatic hypotension, 2 patients symptomatic hypotension and 2 patients hyperkalaemia).
Conclusions: Low tolerated enalapril doses before ARNI administration are associated with a lower probability of ARNI up-titration at the maximum recommend dose and more adverse effects during ARNI administration.

P981

Prescription of sacubitril/valsartan in a real-world population

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On behalf of: RICA-HFTeam

Introduction: Sacubitril/valsartan (S/V) introduction in the heart failure (HF) with a reduce ejection fraction (rEF) therapeutic algorithm was the biggest advance in this syndrome treatment in recent years. Given the small amount of time elapsed since S/V introduction, there are no comparative data between real-life populations and the PARADIGM-HF Trial population.
Objective: To characterize a population followed in the HF Clinic of a Tertiary Hospital medicated with S/V and to compare it with the PARADIGM-HF Trial population.
Methods: Prospective data recording study of pts with HFrEF treated with S/V. Clinical and demographic characteristics, S/V doses, adverse effects and concomitant therapy data were recorded. Comparisons with the PARADIGM-HF S/V treated population were established by Student's T-test and ANOVA.
Results: One hundred and two pts were included. Median follow-up time since S/V first dose was 6 (4-10) months. The present study population presents statistically higher mean age, NTproBNP and serum creatinine levels (Cr) when compared to the PARADIGM-HF population. There was a greater number of pts in NYHA functional class I and II and ischemic etiology was less frequent. There were no significant differences regarding gender, systolic blood pressure or baseline ejection fraction (Table 1).
This real World population had a higher rate of β-blocker and mineralocorticoid receptor antagonist prescription (Table 1). In this population, 59 pts (57.8%) started on S/V at the dose of 24+26mg and 43 pts (42.2%) at the intermediate dose. The average maximum tolerated dose was significantly lower than that reported in PARADIGM-HF (175±84 vs 375±71 mg/day, <0.001): low dose in 28 pts (27.5%), intermediate dose in 54 pts (52.9%) and high dose in 20 pts (19.6%). The mean dose of ACEi/ARB before S/V initiation was lower than that reported in PARADIGM-HF (dose equivalent to enalapril 14.75±11.75 mg/day vs 18.9±3.4, P =0.01) and 4 pts (3.9%) were medicated with ACEi/ARB previously. The rate of ICD and/or CRT was much higher in the real world population (table 1).
S/V was discontinued in 7 pts (6.9 vs 2.3%, P = NS): in 4 pts due to hypotension (3.9 vs 0.9%, P =0.011), in 1 due to cough (1 vs 0%, P =NS), in 1 due to angioedema (1 vs 0.4%, p =0.003) and in 1 due to HF decompensation (1 vs 0%, P =NS).
The mortality rate in this study population was 3.9% (4 pts).
Conclusions: When comparing the PARADIGM-HF Trial population with a real World population it is evident that the latter is composed of older patients with higher levels of NTproBNP and Cr. In this every-day HFrEF population maximal S/V tolerated doses were lower than those reported in PARADIGM-HF. The rate S/V discontinuation due to adverse events was similar, attesting the safety of the drug.

Variables	PARADIGM-HF Population	Real World Population	P
Age (years)	63.8 ± 11.5	67.8 ± 10.3	<0.001
Female sex - Nº of patients (%)	879 (21)	21 (21)	0.92
Systolic blood pressure (mmHg)	122 ± 15	120.2 ± 18,8	0.37
Ejection fraction (%)	29.6 ± 6.1	29.5 ± 7,6	0.936
NTproBNP (pg/mL)	1631	3107	0.002
Serum Creatinine (mg/dL)	1.13 ± 0.3	1.24 ± 0.5	0.021
Potassium (mmol/L)		4.5	
Etiology			
Dilated Cardiomyopathy – Nº of patients (%)		35 (34.3)	
Ischemic Cardiomyopathy - Nº of patients (%)	2506 (59.9)	57 (55.9)	<0.001
Other		10 (9.8)	
NHYA Functional Class			**0.006**
I – Nº of patients (%)	180 (4.3)	10 (9.8)	<0.001
II – Nº of patients (%)	2998 (71.6)	76 (74.5)	<0.001
III – Nº of patients (%)	969 (23.1)	16 (15.7)	<0.001
IV – Nº of patients (%)	33 (0.8)	0 (0)	<0.001
Pharmacological Therapy			
Previous ACEi - Nº of patients (%)	3266 (78)	74 (72.5)	0.46
Previous ARB – Nº of patients (%)	929 (22,2)	22 (21.6)	0.96
B-blocker – Nº of patients (%)	3899 (93.1)	101 (99)	<0.001
MRA – Nº of patients (%)	2271 (54.2)	67 (66)	0.01
Diuretics - Nº of patients (%)	3363 (80.3)	76 (76.5)	0.6
Digitalis – Nº of patients (%)	1223 (29.2)	11 (11)	<0.001
Ivabradine – Nº of patients (%)		16 (16)	
Maximum tolerate Sacubitril/Valsartan dose (mg/day)	375 ± 71	175 ± 84	<0.001
Previous ACEi/ARB doses (Enalapril equivalent - mg/day)	18.9 ± 3.4	14.75 ± 11.75	0.001
Devices			
ICD – Nº of patients (%)	623 (14.9)	50 (49)	<0.001
CRT – Nº of patients (%)	292 (7)	27 (26)	<0.001

P982

Use of sacubitril-valsartan in heart failure with reduced ejection fraction: real world experience

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Introduction: Sacubitril/Valsartan (Sac/Val) significantly reduces hospitalizations and mortality of heart failure patients (pts) with reduced ejection fraction (HFrEF). Considering that real world evidence is still scarce, it's important to report our experience regarding safety and efficacy of this drug, after approximately one year of its introduction in Portugal. Methods: From November 2017 to January 2019, 74 patients (pts) were switched from Angiotensin-Converting Enzyme Inhibitor/Angiotensin Receptor Blocker (ACEI-ARB) to Sac/Val. Data of 66 pts (80% men), with ischemic etiology (61%) and left ventricular ejection fraction (LVEF) of 28,9 +/-6,8% were retrospectively analyzed. Mean age was 71,4 +/-12,0 years old. At the start of therapy with Sac/Val, 50% of pts were in NYHA class II, 39,3% in NYHA class III and 6% in NYHA class IV. Mean NTproBNP before the switch of therapy was 5888,6 +/- 5846,1 pg/ml. Considering ESC guideline Class I Recommendation for HF therapy, 92% of pts were using betablockers, 91% ACEI/ARB, 61% mineralocorticoid/aldosterone receptor antagonist, 74% loop diuretics and 15% ivabradine.

Seventeen percent had CRT and 21% ICD. In 31 pts (46,9%), initial Sac/Val dose of 24/25mg bid was not augmented. In 36,3% of pts was possible to achieve an intermediary dose of 49/51mg bid and in 15,1% the maximum dose was achieved. Clinical efficacy (HF hospitalization, death, NYHA class improvement), safety (arterial pressure, serum potassium, creatinine), NTproBNP and echocardiographic (LVEF) parameters were analyzed. Results: There was an improvement of NYHA class, with only 2 (3%) pts remaining in NYHA class IV. Two (3%) pts had worsened NYHA class. Among the remaining pts, 34 (51,5%) improved NYHA class. There were 4 (6%) unplanned hospitalizations for HF after switch of therapy and there were 2 deaths of refractory HF. About safety concerns, sac/val had been discontinued in 1 pt because of hypotension, and in another one because of worsening renal function. In 62 pts there were no major events associated with therapy switch: mean arterial pressure was 125,9+/-18,7 mmHg, serum potassium (4,5+/-0,4 mmol/L) and renal function (Cr 1,2+/-0,4mg/dl) remained stable. There wasn´t any report of angioedema. LVEF after switch therapy improved from 28,9+/-6,8 to 37,5+/-9,0%. Conclusion: Therapy with Sac/Val, when associated to other ESC guideline Class I Recommendation HF therapies, was effective in improving NYHA class and reducing hospitalizations being associated to low risk of complications.

P983

The dangers of non-heart failure hospitalisation for heart failure patients: frequent medication changes without follow up

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Introduction: Pharmacotherapy in heart failure (HF) has become increasingly complex with each patient's prescription the product of weeks or months of careful titration. The admission to hospital of HF patients for non-cardiac issues may lead to medication changes (MC) for reasons that may be either indicated or potentially inappropriate. Failure to communicate MC to the HF or cardiology team during admission or to arrange follow up with HF services may leave the patient exposed to potentially adverse outcomes.
Purpose: This study set out to examine the frequency with which HF MC occurred when patients who attend the heart failure unit (HFU) are admitted to hospital for non-cardiovascular reasons. Additionally we determined whether a rationale was documented and if patients were informed of the changes. Where changes were identified, appropriate follow up in HFU was arranged.
Methods: In an ongoing prospective single-centre observational study, we reviewed a daily list of admissions via the Emergency Department for patients that attend the HFU. Discharge notes were screened to assess if MC were made, and if so, whether there was a documented rationale for the change. Following this a phone call was made to the patient in order to assess their understanding of the change in HF therapy.
Results: To date, from a total of 584 non-HF admissions we randomly selected 73 patient charts. Fifty percent of patients carried a diagnosis of HFrEF (Heart Failure with Reduced Ejection Fraction) and 50% of patients were diagnosed with HFpEF (Heart Failure with Preserved Ejection Fraction). Patients studied had an average age of 74.6 years and an average length of stay of 10 days. Dominant cause for admission was respiratory infection. We noted a MC in 52% (n=38) of patients. Diuretics were the agents most frequently changed in 42% of cases (n=16). Changes were noted also in beta blockade (n=10), ACE inhibitors/ARBs (n=10), MRAs (n=1) and nitrates (n=1). There was no contact with the cardiology service in regard to any of these changes. A documented rationale was noted in 65% of cases (n=25). To date phone calls have been made to 27 patients who had MC. Of these, 44% (n=12) stated that their admitting teams knew of their attendance at HFU. Fifty one percent of patients (n=14) were aware that MC occurred, while 25% (n=7) had these changes explained to them. No patients were advised to follow up with the HFU.
Conclusion: The incidence of MC is high in this vulnerable patient cohort when they are admitted to hospital for non-cardiovascular reasons. While there is a stated rationale in many cases, these alterations were not discussed with cardiology service, and follow up with the HFU was not requested. This sequence of events may leave patients susceptible to adverse HF events following discharge from hospital. In an effort to guard against such events we recommend closer links are established between services both in hospital and at outpatient level.

P985

Clinical, echocardiographic and cost improvement after the onset with sacubitril-valsartan in mexican patients with heart failure.

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On behalf of: Gómez Leiva, Veronica V

INTRODUCTION. In Mexico, heart failure (HF) has a prevalence of 1.6 million persons and annual incidence of 600,000 new cases.Sacubitril/Valsartan (S/V) has proved to be superior than conventional therapy decreasing the number of readmissions in the emergency room, days in the intensive care unit, total hospitalizations days, improve in quality of life and survival, echocardiography has shown improvement in the left ventricular ejection fraction (LVEF) and reverse remodeling achieved.PURPOSE. Compare the echocardiographic parameters, quality of life, institutional costs, tolerance and side effects in patients with heart failure with reduced ejection fraction before and after 3 months therapy with S/V.METHODS. Patients diagnosed with HF, LVEF ≤35%, persistence of symptoms and treated with conventional therapy were recruited to initiate S/V therapy. After written consent was obtain, echocardiographic parameters (LVEF, diastolic diameter, systolic diameter, diastolic function and pulmonary artery systolic pressure), quality of life: 6-minute walk test (6-MWT) and Kansas City cardiomyopathy questionnaire (KCCQ) and institutional cost were measured; follow-up was made at three months, with the same parameters.Data analysis was made with SPSS statistical program (v 24.0). Data is presented as means and standard deviations, frequencies and percentages. The distribution of variables was determined with the Shapiro-Wilk test; Wilcoxon and Friedman test were used. Statistically significant was taken at p <0.05.RESULTS. 25 patients were enrolled. Baseline characteristics: mean age 54 years (± 13.7), women 32%, non-ischemic 52%, 52% without pacemaker, 12% with implantable cardioverter defibrillator (ICD), 12% with cardiac resynchronization therapy (CRT) and 24% with ICD-CRT. 68% were non responders (59% ischemic), 20% responders (60% non-ischemic) and 12% super responders (all non-ischemic).Echocardiographic parameters exhibited the reverse remodeling achieved, improvement in the LVEF (26.1% ± 7.3 to 29.9 ± 8.5, p 0.02), diastolic diameter (61.2±9.5 to 60.4±7.2, p 0.57), systolic diameter LV (50.8±11.8 to 50.3±10.8, p 0.80), pulmonary artery systolic pressure (32.4±15.4 to 32.6±17.1, p 0.64), diastolic function (grade II to grade I or absence, p 0.23). Improvement in the 6-MWT (430.6±152.6 to 472.3±91, p 0.16), KCCQ (41.7±14.2 to 56.7±7 p 0.005).Hospitalized (4.7±10.2 to 0.2±1, p 0.02) and disabilities (8.8±22.9 to 0.1±0.8 p 0.08) days decreased, dose tolerance (100mg bid) was 80% with a decrease in side effects. Institutional cost for three months with triple therapy was US $54,547.74 and for S/V was US $ 9,659.45.CONCLUSION. The therapy with S/V for the treatment of patients with HF and LVEF ≤35% with persistence of symptoms shows an improvement in the quality of life by KQ, reverse left ventricular remodeling, further institutional saving was US $ 44,888.29 this could be related with a decrease in hospitalizations days.

P987

The efficacy of nicorandil for patients with ischemic chronic heart failure

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BACKGRAUND Nicorandil, combination of nitrate component and sarcolemmal adenosine triphosphate-sensitive potassium channel opener, is a potent vasodilator of coronary and peripheral vessels and has been used as an antianginal agent, but its effect in heart failure (HF) patients has not been fully established. Therefore, we examined impacts of nicorandil in ischemic HF patients in a small cohort.
PURPOSE To assess the efficacy of therapy with nicorandil in hospitalized with ischemic chronic heart failure.
METODS 12 HF patients with ischemic etiology were prospectively registered and divided into 2 groups based on oral administration of nicorandil during hospitalization : nicorandil group (n = 6) and non-nicorandil group (n=6). Patients were randomly assigned to be treated with or without oral nicorandil. BNP levels were measured at admission and at 5th day. Echocardiography was performed and the patients undergo cardiopulmonary exercise test.

Comparisons of clinical features

	nicorandil group	non-nicorandil group	p
age	63.8±4.19	69.7±5.6	0.26
male	66.6%	66.6%	
LVEF (%)	39.33	39.83	0.95
E/e	6.62±2.2	8.13±0.7	0.17
MAPSE	11.2±2.5	12.8±5.1	0.71
ΔBNP	221	14	0.038

LVEF left ventricular ejection fraction, BNP B-type natriuretic peptide, MAPSE mitral annular plane systolic excursion

RESULTS 66,6% of the patients were men, mean age was 67 years and mean length of inpatient stay was 7.8 days. We found a positive correlation between initial BNP and the number of hospitalized days in nicorandil group (r=0.64) and a negative correlation between initial BNP and the number of hospitalized days in non-nicorandil group (r=-0.73). The difference between levels of BNP after 5 days of treatment and initial BNP in the two groups is statistically significant (p=0.038). Ventilatory efficiency (VE/Vco2) is significantly different between the two groups (p=0.022).
Conclusion: The patients in the nicorandil group had higher decrease of BNP levels without shortening the length of hospitalization. Further studies with larger cohorts are needed.

P988

Sequential nephron blockade with diuretics improves diastolic dysfunction in patients with resistant hypertension

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Introduction: Hypertension is one of the major contributors to cardiac diastolic dysfunction.
Different therapeutics strategies have been proposed to control blood pressure (BP) but their independent impact on cardiac function remain undetermined. In patient referred to our center for uncontrolled hypertension, we compared changes in cardiac parameters between two strategies consisting of sequential nephron blockade with intensive diuretics (NBD) or sequential renin angiotensin blockade (RAB).
Purpose: To determine evolution of BNP (brain natriuretic peptides) levels and echocardiographic (TTE) parameters of diastolic dysfunction according to strategies to control BP.
Results: BNP levels were not significantly different in the two groups at baseline (mean±SD 30.1±37pg/mL in NBD versus 22.6±22.3pg/mL in RAB, p=0.147) but significantly decreased in NBD at week 12 : 20.1±22.7pg/mL versus 55.2±60.4pg/mL in RAB, p<0.0001. At week 12, only 9 (12%) patients in NBD presented BNP levels > 35pg/mL vs. 37 (55%) in RAB (p<0.001). Concordantly, echographic parameters such as left ventricular end-diastolic diameter (mean mean±SD, 49±4mm in NDB and in 52±5mm in RAB, p=0.004) and left atrial area (16.9±3.6cm^2 in NBD and 19.1±3.7cm^2 in RAB, p=0.003) improved significantly in NBD group. According to ESC guidelines for evaluation of LV diastolic dysfunction by TTE, the proportions of patients presenting ≥2 criteria in NBD and RAB group respectively were 31.2% and 19.3% at baseline vs. 3.1% and 32.2% after 12 weeks (p=0.001). In a multivariate analysis, NBD treatment was significantly associated with a decline in BNP levels (p<0.01) even after adjustment on daytime systolic BP lowering, heart rate, renal function, age and gender.
Conclusion: In patients with uncontrolled hypertension, intensive nephron blockade with sequential addition of diuretics improves markers of diastolic dysfunction independently of BP lowering.

P989

Optimising heart failure treatment following cardiac resynchronisation therapy

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BACKGROUND: Device therapy in addition to medical treatment improves prognosis in a subset of patients with heart failure and reduced ejection fraction. However, some patients remain symptomatic or their heart failure even progresses despite cardiac resynchronization therapy (CRT). The aim of the study was to evaluate the proportion of patients who could benefit from optimization of medical therapy by using sacubitril/valsartan, ivabradine or both following CRT implantation.
METHODS: Post-hoc analysis of a single-center, double blind, controlled trial, in which, patients scheduled for CRT were randomized to empiric (n=93) or imaging-guided left ventricular lead placement (n=89). All patients underwent clinical evaluation and blood sampling at baseline and 6 months following CRT implantation. The proportion of patients meeting the indication for sacubitril/valsartan (irrespective of angiotensin-converting enzyme inhibitor or angiotensin 2 receptor blocker dosage) and/or ivabradine in current guidelines was evaluated at baseline and after 6 months.
RESULTS: Of 182 patients with an indication for CRT, 146 (80%) also had an indication for optimization of medical therapy at baseline by adding sacubitril/valsartan, ivabradine or both. Of the 179 survivors at 6 months, 136 (76%) were still symptomatic after device implantation; of these, 51 (38%) patients had an indication for optimization of medical therapy: sacubitril/valsartanin 37 (27%), ivabradine in 7 (5%), and both drugs in 7 (5%) patients. Seven (18%) patients without indication at baseline developed an indication for medical optimization 6 months after CRT implantation.
CONCLUSION: In the present study, 38%of those who remained symptomatic 6 months after CRT implantation were eligible for optimization of medical therapy with sacubitril/valsartan, ivabradine or both. Patients with CRT may benefit from systematic follow-up including evaluation of medical treatment.

P990

Trimetazidine management: an extraordinary clinical response in patients with heart failure (TRIMEX-Study)

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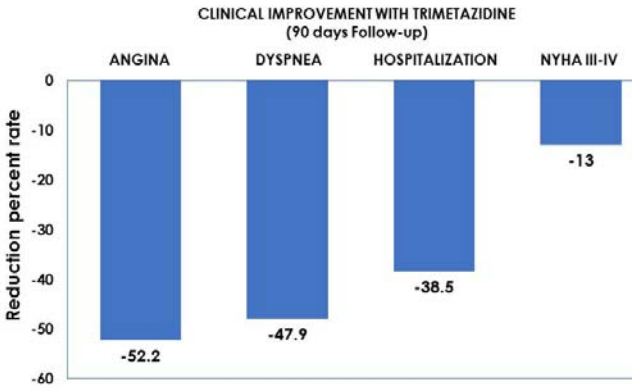
Ischemic heart disease (IHD) is the main cause associated with heart failure (HF), generating high mortality and hospitalization rates. Our purpose was to evaluate clinical prognosis, mortality and functional capacity of Trimetazidine (TRI) in patients with HF associated with IHD.
Material and method: Consecutively both genders patients, over 18 years old with HF and IHD diagnosis according to ESC clinical guidelines were included. They receive standardized treatment. We excluded patients with acute myocardial infarction, cerebrovascular disease/transient ischemic attack or clinical decompensation in the last 6 months. Oral 35 mg of TRI was added every 12 hours. In follow-up mortality, clinical deterioration and hospitalization was evaluated.
Results: Basal: We included 31 patients, only one woman. History of: Diabetes 39.1%, Hypertension 52.2%, Myocardial infarction 73.9%, Angioplasty 26.1%, CABG 13% and smoking 52.2% . 78.3% were in I-II NYHA class. Angina in 56.5%, Exertional Dyspnea 87%, Dyspnea at rest 47.8%. BMI 28.1± 4.5 Kg/m2. (34.8% were obese) Systolic BP 124.0±22.9 mmHg, LVEF: 33.2±10.3 (HFrEF:69.6 %). Sinus rhythm in 82.6%, Resynchronization therapy (CRT) in 13%%. Labs: Creatinine 1.4±1.0 mg/dL, Sodium 136.9±2.4 mEq/L, NT-pro-BNP:5285.2±284.7 pg/ml. Basal clinical index risk scores: GRACE 106.2 (52-148), MAGGIC 18.7±6.5 (7-31), EMPHASIS 4.7±6.5(2-10). Treatment: ACE-I 87%, betablockers 78.3%, spironolactone 74%, aspirin 73.9%. Preceding TRI Global Readmission rate (GRR) were 52.2%.
Follow-up (90 days). 87% were in NYHA class I-I. Exertional Dyspnea 39.1% (47.9% reduction, p<0.001), Dyspnea at rest 21.7% (26.1% reduction, p<0.001), Angina 4.3%1 (52.2% reduction, p<0.001). NT-pro-BNP 1994.5±221.5 pg/ml (p<0.05). No statistics differences in LVEF and serum creatinine. Treatment: ACE-I 95.7%, (increase 8.7%). Readmission rates were: HF: 8.3%, Non-cardiac: 5.9% , and GRR: 13.7%;(-38.5% reduction p<0.001). No Ischemic hospitalization. No mortality observed.
Conclusions: With oral TRI addition to standard treatment, We observed a significant decrease in ischemia and HF clinical symptoms. Reduction in HF, ischemia and global hospitalization. No mortality was documented.



REDUCTION RATES IN CLINICAL PARAMETERS

P991

Careful volume assessment appears to be the critical factor in achieving clinical trial dose of sacubitril/valsartan in the community.

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Introduction: In the PARADIGM-HF trial, sacubitril/valsartan (S/V) has been shown to improve morbidity and life expectancy in HF-REF patients. Real world data, while limited, indicate a similar clinical response. However, achievement of clinical trial dose (CTD; 97/103 mg BD) of S/V appears to be a challenge with only one data set to date reporting CTD in >50% of their cohort. Early data indicate that CTD may be more effective in improving important metrics such as LVEF. Therefore, identifying methods of facilitating achievement of CTD would be of importance.
Methods: 322 HF-REF patients were switched from ACEi/ARB to S/V between May 2016 and August 2018. Patients still on the titration process (n=25) were excluded. Baseline and follow-up clinical characteristics were collected. Univariate and multivariate test were used to analyze predictors of achieving CTD.
Results: 12.4% patients have not tolerated S/V as a result of symptomatic hypotension (52.4%), impairment of renal function (23.6%), gastrointestinal symptoms (13.5%) and hyperkalaemia (10.5%). Of the 257 patients successfully started on this agent, CTD has been achieved in 75.5% patients, 11.4% patients have been maintained on 49/51mg BD and 8.1% patients on 24/26mg BD. Symptomatic hypotension (73.6%) has been the main impediment to achieve CTD, followed by renal deterioration (12.2%) and then hyperkalaemia and gastro-intestinal symptoms (5.3% each). Multivariate analysis of variables related to achieving CTD showed that down-titration of loop diuretic was the most important predictor (Table 1). Reduction in diuretic has been required in 37.2% of patients with a mean reduction in diuretic need of 10mg furosemide equivalent/patient.
In conclusion, achievement of CTD with S/V is achievable in the majority of community population. Hypotension being the major barrier to achieving maximum dose and the need to down titrate diuretic in a large percentage of the population strongly underline the need to pay close clinical attention to volume status during the titration process.

Table 1. Predictors of reaching CTD

	Univariate	Multivariable		
	OR (95%CI)	p value	OR(95%CI)	p value
Age	0.99 (0.97-1.01)	0.23	1.02 (0.99-1.05)	0.19
Male	1.04 (0.61-1.78)	0.87	0.78 (0.4-1.54)	0.48
Diuretic dose decrease	1.77 (1.05-2.97)	0.031	2.05 (1.14-3.68)	0.017
Baseline log-NTproBNP	0.81 (0.66-1.01)	0.056	0.82 (0.64-1.05)	0.12
Baseline eGFR	1.02 (1.01-1.03)	0.002	1.02 (1-1.04)	0.015
Baseline haemoglobin	1.21 (1.04-1.4)	0.015	1.15 (0.96-1.38)	0.14

P992

Cardiopulmonary exercise testing as a fundamental tool in the assessment of the functional class in treating sacubitril / valsartan. Results at 3 months

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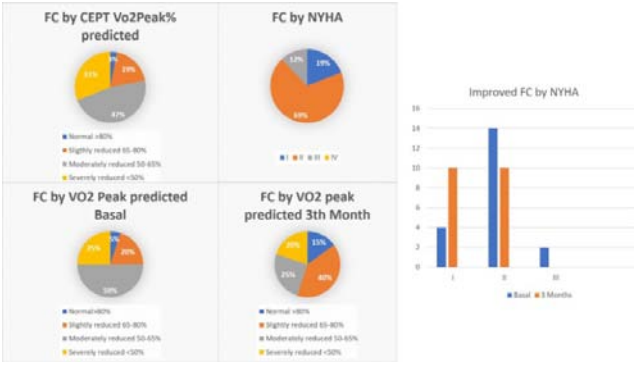
Introduction: Sacubitril-Valsartan (ARNI) has demonstrated to improve the functional class (FC) measured by NYHA in patients (pts) with heart failure (HF) and ventricular dysfunction. The most objective method of assessing FC in HF is the peak oxygen uptake (Vo2) in a cardiopulmonary exercise test (CPET). Our objective is to assess whether the use of ARNI in pts with HF also improves the FC measured by peakVo2.
Methods: We analyzed 20 pts with HF and left ventricular dysfunction, treated with ARNI according to ESC guideliness. FC was determined before ARNI (basal) and 3 months after treatment by NYHA and by CPET. According to the % peakVo2 reached, by the Wasseman predicted values, the FC estimated was: normal FC> 80% predicted, FC slightly reduced 60-79%, FC moderately reduced 59-50% and FC severely reduced <50%
Results: 85% males, 69 ± 9 years, LVEF 31 ± 4%, NTproBNP 2039 ± 2020, 45% ischemic C., 50% C idiopathic C. 100% use of beta-blockers
The correlation between baseline FC estimated by NYHA and estimated with peak VO2 was poor (Fig 1 A). In both groups there was a tendency to improve FC by both NYHA and by CPET. (Fig 1 B, D). According to our series, pts with the greatest improvement in FC by CEPT had worse baseline peakVO2 consumption (912 vs 1170 ml / min, p = 0.03), lower weight (74 ± 8 vs 95 ± 18 kg, p = 0, 02) and were older (74 ± 5 years vs 61 ± 10 years, p = 0.19)
Conclusions: There is a poor correlation between FC assessed by NYHA and measured by CEPT in pts with ventricular dysfunction. Pts have worse FC by CEPT than by NYHA. Treatment with ARNI tends to improve the FC estimated by both methods after 3 months. It is especially in older pts, without overweight conditions and with worse basal situation that improve better in our series. This data points to a functional objective improvement with ARNI.



FC by NYHA and CEPT after 3 months

P993

Safety profile of sacubitril-valsartan in heart failure with reduced ejection fraction with chronic kidney disease, a real life study

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Background/Introduction: Sacubitril/valsartan (S/V) has shown to decrease the risk of cardiovascular mortality in heart failure with reduced ejection fraction (HFrEF) patients and might be a promising therapeutic approach in patients with renal dysfunction. However, its effects in patients with associatedchronic kidney disease(CKD) is unknown, as there is no evidence to support any recommendation.
Purpose: Weaimed to evaluate the tolerability and safety profile of S/V in advanced CKD patients with HFrEF.
Methods: This study was performed as a prospective, single-center descriptive study from January 2016-January 2018.By using baseline estimated glomerular filtration rate (GFR), patients were stratified in 2 groups, without and with CKD (<60 ml/min/1.73 m2). Patients were evaluated monthly during the first 3 months and in month 6 and 12 after initiated S/V. The safety pre-specified primary end-point was the composite of angioedema, symptomatic hypotension, renal impairment and hyperkaliemia.
Results: Of the 336 consecutive HFrEF patients included (69±11 years, female (87; 25.9%)in whom were initiated S/V,131 had CKD (stage 3, 112 patients, 33.3%; stage 4, 19 patients, 5.7%).More than half of the patients (54,8%) suffered from ischemic cardiomyopathy with a mean left ventricular ejection fraction of 30.5±6.8%. The majority, 51.8%, were on NYHA functional class II (NYHA III 37.3%; IV 4.5%).No significant differences were found in S/V dose achieved and remained between patients without and with CKD (low dose, 20.4 vs 26.4%; medium dose 28.2 vs 35.2% and highest dose 48.6 vs 34.1%, respectively). At 1 year follow up, the combined primary end-point was numerically higher in patients with CKD compared with those patients without, although did not reach significant difference (14.4 vs 21.8, p=0.1): angioedema (1 vs 0.8%, p=0.52), symptomatic hypotension (7.9 vs 14.3%, p=0.18), severe renal impairment (0 vs 4.5%, p=0.07) and potassium ≥5.5 mmol/L (8.4 vs 16.7%, p=0.06). In 9 patients was necessary discontinue S/V, 4 without CKD and 5 with.
In both subgroups of patients, no significant changes were found in mean GFR during follow up.
Conclusions: CKD could be an acceptable treatment to reduce cardiovascular risk in HFrEF patients with CKD, with a good tolerability and safety profile

P994

Early left ventricular reverse remodeling after sacubitril-valsartan treatment. Subanalysis of SAVE-RLife study

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On behalf of: SAVE-RLife Group

Introduction: Few data on echocardiographic parameters of reverse remodeling has been published after the use of sacubitril-valsartan (SV) treatment. Objective: To analyse the reverse remodeling response in terms of echocardiographic parameters after the use of SV and evaluate the predictors for a left ventricular reverse remodeling.

Methods: This is an observational, ambispective, multicentre study that included all patients with stable HFrEF who started SV between SEP2016 and DEC2018. Patients with an echocardiogram (TTE) after at least 6 months of treatment were included. Reverse ventricular remodeling was defined as an increase in LVEF≥5%.

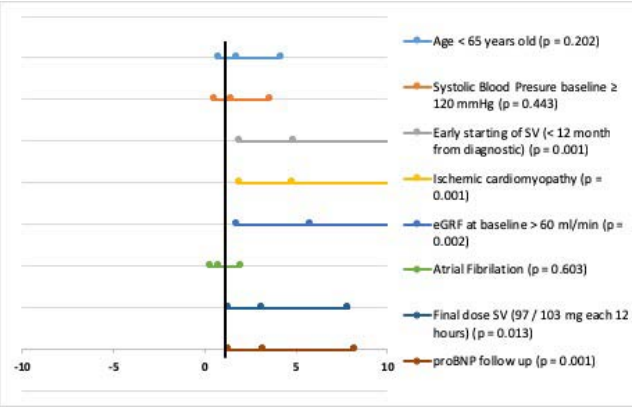
Results: A follow up TTE was perform in 84 out of 276 patients (30.4%). The mean age was 65 ± 10 y, 25% women. The main aetiologies of HFrEF were IHD (46.9%) and dilated cardiomyopathy (39.3%), and most frequent comorbidities were 69.3% hypertension, 44% DM, 50% Dyslipidemia, 31.3% AF and 27.4% CKD. TTE values are shown in Table 1. Patients with non-ischemic cardiomyopathy (non-IHD) had a greater improvement in LVEF (29.9±7.2 to 41.3±12.7 Vs non-IHD vs 30.4±6.9 to 32.7±9.8 in IHD patients). ; p<0.001) and a greater reduction of LVED (67.6±8 to 60.9±8.9 in non-IHD vs 62.53±7 to 60.50±8.1 in IHD, p<0.001). Other predictors of LV reverse remodeling are shown in Figure 1.

Conclusions: In our study, SV improves LVEF and reverse remodeling. Predictors of reverse remodeling were: non-IHD etiology, earlier initiation of SV since diagnosis of HF, estimated glomerular filtration rate at baseline >60 ml/min and achievement of the highest dose of SV.

Echocardiographic outcomes

N=84	Baseline value (mean±SD)	Follow - up value (mean±SD)	MEAN DIFFERENT	P value
LVEF (%) (n = 84)	30.44± 7.41	37.83± 12	7.39	< 0.001
LVED (mm) (n = 84)	63.17± 8.75	61.36± 9	- 1.81	< 0.001
LA (mm) (n = 60)	46.46±7.14	43.15± 6.37	- 3.31	< 0.001
PAPs (mmHg) (n = 48)	42.38± 12.7	37.54± 12.7	-4.84	0.001
MI (grade 1 - 4) (n = 65)	1.59± 0.89	1.40± 0.867	- 0.19	< 0.001
LVEDV (ml) median (Q_1 - Q_3) (n = 14)	173 (126 ; 223)	159 (115± 221)	- 14	0.530
E (mseg) (n= 15)	0.89± 0.21	0.72± 0.21	- 0.17	0.015
A (mseg) (n = 12)	0.57± 0.29	0.83± 0.275	0.26	0.010
E/A (n = 10)	1.79± 1.08	1.25± 1.10	- 0.54	0.139

Left ventricular ejection fraction (LVEF), Left ventricular end-diastolic diameter (LVED), left atrial diameter (LA), pulmonary artery pressure (PAPs), mitral insufficiency (MI), left ventricular end-diastolic volume (LVEDV), Pulmonary artery pressure (PAPs), Ischemic heart disease (IHD)



Predictors of LV reverse remodeling

P995

Impacts of mineralocorticoid receptor antagonists on mortality in heart failure patients with beta-blockers

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Introduction: Mineralocorticoid receptor antagonists (MRA) is an important drug for patients with heart failure with reduced ejection fraction (HFrEF). Although beneficial impacts of MRA on the patient's survival have been shown from landmark trials, Japanese registry data did not consistently support it. Beta-blockers have a key role for MRA to provide beneficial effects. In these Japanese studies β-blockers might not be used enough to make MRA work.

Purpose: To examine impacts of MRA on mortality of the Japanese HFrEF patients treated with β-blockers.

Methods: Of all consecutive patients who were hospitalized in the university hospital because of HF between 2002 and 2010, 144 patients with left ventricular EF (LVEF) ≤35% who were introduced β-blockers in the hospital were analysed (age 60.1±15.0 years, male 78%, LVEF 27.0±5.9 %). Follow-up period was 3-years. Primary and secondary end points were all-cause death and cardiac death respectively. Data were collected from medical records. In order to examine impacts of MRA, Kaplan-Meier survival curve analysis and Cox regression analysis were performed.

Results: A prescription rate of MRA among the HFrEF patients increased from 45% in 2002 to 78% in 2010. All of MRA at baseline were spironolactone and mean daily dosage was 28.5±13.2 mg. Mean daily dosage of β-blockers was 8.8±8.6 mg in the carvedilol equivalent dosage. Patients treated with MRA (n=86) were likely to have higher NYHA class III or IV (56% vs. 41%), lower LVEF (27% vs. 29%) and lower systolic blood pressure (114 vs. 120 mmHg) compared with patients without MRA (n=58). Dosage of loop diuretics in patients with MRA was higher than that in patients without MRA (31.2 mg vs. 19.8 mg in the furosemide equivalent dose, p<0.01) at baseline, but no significant differences were observed at the end of follow-up (32.5 mg vs. 24.4 mg). After the follow-up, all-cause mortality in patients without MRA was significantly higher than patients with MRA (13% vs. 2.7%, p=0.03 by log-rank test). In the Cox regression analysis after adjustment for NYHA class, systolic blood pressure and loop diuretics, the absence of MRA remained to predict higher all-cause mortality (hazard ratio=0.18, 95% confidence interval=0.04 to 0.94). Meanwhile, no significant difference was observed in cardiac death (p = 0.17) between the two groups.

Conclusions: One of the MRA, spironolactone, reduces all-cause mortality among Japanese HFrEF patients treated with β-blockers. Our finding emphasizes an importance of β-blockers under the MRA treatment in HFrEF patients.

P996

Response rate to sacubitril-valsartan in the community. Is there a clear phenotype?

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Introduction: Several clinical trials have now shown that the combination ARNI, sacubitril-valsartan (S-V) significantly improves mortality and morbidity among

HF-REF patients. Real world experience is less expansive and it is unknown if there is a particular clinical phenotype with HF-REF who are more likely to respond.
Methods: To assess patient responsiveness to S-V in a community from May 2016 to present. All patients have had defined stable HF-REF on maximal tolerated disease modifying therapy. Response to S-V definition: 30% reduction in NT-proBNP and/or a 5% increase in LVEF(LVEF taken ≥2 mths post last titration). Univariate and multivariable analyses were used.
Results: 322 HF-REF patients were commenced on S-V (median age 70 [61.9-76.2] years; male 75.1%). All patients were on ACEi/ARB prior to S-V. 90.7% were prescribed beta-blockade and 71.9% MRA. 12.4% did not tolerate S-V. 7.7% in titration were excluded. 46.3% met the NT-proBNP criteria for responder status while 49.3% had LVEF increase by >5%. 78.4% met either responder criteria components (table 1). Non-responder patients were older, hypertensive, and had more CKD, ischaemia and atrial fibrillation (all p≤0.5). Absence of ischaemia was the only independent predictor to response (p=0.018). Diuretics were decreased in 37.2% of patients. Mean reduction of 10±37mg.
Conclusion: Though majority of patients responded to sacubitril-valsartan, non-responders had increased disease burden. Responders were younger, had better renal function and required diuretic dose decrease.

RESPONDER CRITERIA AND PHENOTYPE

PATIENTS MEETING RESPONDER CRETERIA	n/N		
NTproBNP down >30% from T1 to follow up	99/214 (46.3%)		
LVEF up >5% from T1 to follow up	70/142 (49.3%)		
NTproBNP down >30% AND LVEF > 5%	35/185 (18.9%)		
NTproBNP down >30% OR LVEF > 5%	134/171 (78.4%)		
Diuretic decrease	93/250 (37.2%)		
PHENOTYPICAL DEFFERENCE			
Phenotypical features	Non-Responder	Responder	p-value
Age	71.4(62.7,77.6)	65.1(56.3,72.5)	0.001
eGFR	58(44,70)	71(55,81)	0.01
HTN	56/150 (37.3%)	6/35 (17.1%)	0.038
Ischaemic Cardiomyopathy	42/146 (28.8%)	1/34 (2.9%)	0.001
AF	74/150 (49.3%)	9/35 (25.7%)	0.019

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Treatment of patients with heart failure with reduced ejection fraction (HFrEF) in Germany: differences between cardiologists and primary care physicans

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Background: Simultaneosly two prospective non-interventional patient registries were conducted to assess the treatment of chronic heart failure with reduced ejection fraction (HFrEF) therapy: AURORA assessed HF therapy as provided by primary care physicians in Germany, whereas ARIADNE assessed HF therapy as provided by private practice based cardiologists / internal medicine specialists across Europe.
Purpose: Here, two real-world cohorts of HFrEF patients treated by primary care physicans vs. specialists are compared.
Methods: Consecutive patients with symptomatic chronic HF (NYHA II–IV) and reduced LVEF were eligible for both studies. Baseline demographics, medical history and heart failure medication data are presented here according to HFrEF Treatment (Sacubitril/Valsartan) SacVal or "conventional" standard of care HF therapy (SoC) as per index visit. AURORA enrolled 1260 HFrEF patients treated by 220 primary care physicians (PCP) throughout Germany. ARIADNE data represents a subgroup of 4768 patients enrolled in Germany by 340 specialists.
Results: The baseline characteristics and HF treatments are given in the table.
Conclusion: In Germany characteristics and treatment of patients with chronic HFrEF differ between primary care physicans and specialists, with a higher rate of guideline recommended therapy by specialists. For both PCP- and specialist-treated patients, a higher HF symptom burden (NYHA class/LVEF) at baseline resulted in a more common selection of Sac/Val therapy above conventional HF therapy.

	AURORA	ARIADNE		
	Sac/Val	SoC	Sac/Val	SoC
N	761	499	2409	2359
Age (yrs)	72.4	73.3	67.8	69.5
Diabetes	47.0	42.7	35.5	35.2
Coronary artery disease	63.6	61.5	59.1	63.1
LV-EF	38.3	34.9	32.7	36.3
NYHA class > II	67.4	47.7	60.2	33.4
HF-medication				
Beta Blocker	71.6	60.1	85.2	86.2
MRA	33.0	24.8	57.1	51.7
Loop diuretics	61.1	53.7	63.1	57.6
ACEi	17.7	34.5	4.2	56.7
ARB	10.8	19.6	3.6	31.2

P998

Effects of sacubitril/valsartan on cardiac performance and exercise capacity

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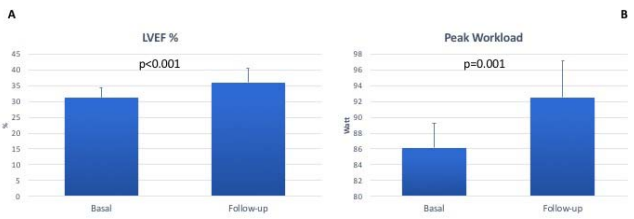
Background: Sacubitril/Valsartan has emerged as a novel therapy in the treatment of heart failure (HF) with reduced ejection fraction (HFrEF), showing lower rates cardiovascular mortality and HF hospitalization compared to standard therapy. Although the recent widespread use of sacubitril/valsartan in clinical practice, data on exercise capacity of HF patients on treatment are still lacking.
Methods: We enrolled patients with HFrEF in two Italian experienced HF centers, who started sacubitril/valsartan according to 2016 ESC Guidelines recommendations. Patients underwent clinical assessment, venous blood sample collection, transthoracic echocardiography and cardiopulmonary exercise test at baseline (before starting sacubitril/valsartan) and after reaching the maximum tolerated dose. Baseline and follow-up data were compared to assess the effects of sacubitril/valsartan on cardiac performance and exercise capacity.
Results: Thirty-two patients (87% males, mean age 65.8±9.5) were studied in the present preliminary analysis. In 3 patients the treatment was interrupted do to different reasons (2 hypotension, 1 renal dysfunction). The mean reached dose was 143±66 mg and 56% of patients reached the maximum dose (200 mg). Comparing baseline analysis with follow-up assessment (104±60 days) we observed a statistically significant, however not clinically relevant, decrease in systolic and diastolic blood pressure (respectively, 119±16 vs. 109±17 mmHg, p=0.01; 73±8 vs. 67±8 mmHg, p=0.01) and a stability of renal function (eGFR MDRD 71.2±20 vs. 70.8±20 ml/min/1.72m2; p=ns) and potassium levels (4.51±0.41 vs. 4.59±0.45 mmol/l). Regarding cardiac performance and exercise capacity, a significant increase in EF (31.2±3.1 vs. 36±4.6%; p<0.001) and in workload reached at peak exercise (86.2±37.5 vs. 92.5±39 watt; p=0.001) was observed at follow-up (Figure 1A and B). Peak VO2showed a trend toward increased values at follow-up, however at the moment not significant (14.2±4.4 vs. 14.7±4.1 ml/kg/min; p=ns), similarly ventilatory efficiency during exercise (VE/VCO2 slope) showed a slight, however not significant, improvement (31.2±6.2 vs. 30.1±5.8, p=ns) during follow-up assessment.
Conclusion: Medium-term treatment with sacubitril/valsartan is safe and leads to an increase in systolic function, assessed by EF, and in maximum workload reached at the peak of the exercise. A trend toward an improvement in peak oxygen uptake and ventilatory efficiency is reasonable, however longer follow-up is needed to clarify the specific effect of sacubitril/vasartan on exercise capacity.



P999

Self-motivation, self-regulation and self-care in patients with heart failure: a sequential mixed-method study

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Background: Though self-care improves patient outcomes and quality of life, it remains suboptimal in majority of heart failure. Interventions such as education programs have been shown to improve self-care but insufficiently due to patients' low motivation to change lifestyle habits. Better understanding of how behaviour change materialise in this population is needed.
Purpose: To understand the mechanism by which self-care is motivated and improved in patients with heart failure.
Method: Explanatory sequential mixed-method. Suitable heart failure patients were purposively sampled from a quantitative study conducted at one tertiary hospital. Thematic analysis with constant comparison was employed. Qualitative and quantitative data were integrated using the Temporal Self-regulation Theory used to guide the study.
Results: Seventeen participants were interviewed. Mean age was 56, mostly male (76.5%), Chinese ethnicity (82.4%), married (82.4%), earning less than $3 000(70.6%), secondary school educated (47.1%), working full-time (41.2%), Buddhist (35.3%), New York Heart Association functional (NYHA) class II (70.6%) and staying with their family (100%). Mean self-care maintenance score was suboptimal (44.5; cut-off score 70). Two motivators associated with emotional attachment were identified: to bargain for more time to (1) love family - by preventing worry and grief and providing support and (2) love self - by righting the wrongs an regain feeling of normalcy. Three barriers were identified: (1) difficulty adopting physical activity due to – time constraint and fear of overexertion; (2) difficulty deviating from sociocultural dietary norms and habits due to – convenience of eating out, difficulty making dietary requests, respecting cooks other diners and unhealthy food habits and (3) difficulty controlling the future due to – perceived short residual lifespan and perceived futility. Personalised strategies to overcome each barrier includes: integrating physical exercise into daily living and enjoyable activities, self-monitoring, making food adaptations, meal preparations, damage control, self-regulation (i.e. ignoring, distracting, substituting and cognitive reframing) and positive thinking.
Conclusion: Clinicians and case managers could motivate and empower self-care by eliciting each patients' motivators of change and facilitate the development of plans and strategies to improve lifestyle habits using the results of this study.

P1000

Benefits of full yogic breathing for patients with chronic heart failure

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Background: Chronic heart failure (HF) remains the leading cause of morbidity and mortality all over the world. Slow yogic breathing has been shown to improve cardiovascular and psychological parameters among healthy individuals, but its potential benefit for HF patients is unclear.
Purpose: To evaluate the effectiveness of full yogic breathing in patients with acute decompensated HF.
Methods: The study included 130 patients (mean age 65.2±5.7 years) hospitalized for acute decompensated HF with reduced left ventricular ejection fraction (<40 %). All patients were divided into two groups: 66 patients received only standard therapy of HF (angiotensin-converting enzyme inhibitor, β-blockers, aldosterone antagonists, digoxin, diuretics) and 64 ones additionally practiced the full yogic breathing during all hospitalization period. On-admission and discharge measurement included 6-minute walk test, evaluation of dyspnea by the Borg scale, transthoracic echocardiography, forced vital capacity (FVC), arterial oxygen saturation (SpO2) and quality of life (QoL) assessment by the Minnesota Living with Heart Failure Questionnaire. Length of hospitalization was assessed in all participants.
Results: The statistical analyses were significant for favorable changes in the breathing group, compared to the control, for 6-minute walk test distance (P = 0.016), severity of dyspnea (P = 0.024), FVC (P < 0.01), SpO2 (P = 0.036) and scores for the total QoL (P < 0.01). No difference was found in echocardiography parameters between groups. Average length of hospitalization was less in breathing group compared to the control (16.2±2.2 versus 19.8±2.9 days, P < 0.001). After adjustment for significant covariates in Cox regression models, full yogic breathing practice was an independent predictor of reduction of hospitalization length for acute decompensated HF (odds ratio (OR) 0.16, 95 % confidence interval (CI) 0.05-0.38) and improvement of NYHA class (OR 0.24, 95 % CI 0.18-0.56).
Conclusion: In acute decompensated HF patients full yogic breathing practice in addition to standard therapy is associated with a significant improvement of exercise intolerance, lung function, NYHA class and QoL and reduction of hospitalization length.

P1001

Analysis of the effectiveness of health education imparted by nursing in an heart failure unit

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Introduction: The education for health developed by nursing in the Heart Failure Unit(HFU) is decesive to promote self-care and improve the quality of life.
Aims: Analyze the impact of nurse education through how it is modified European Heart Failure Self-care Behaviour (EHFS) scale during the year of inclusion in the HFU and in which areas self-care has more impact.
Methods: Descriptive, prospective, longitudinal study that included 93 consecutive patients assessed in the HFU from 2014 to 2017. Self-care was analyzed through EHFS and how this scale varied throughout the year of inclusion. Several NOCS were analyzed: weight control, Blood pressure (BP) control, diet control, exercise, and quality of rest by liker scale and compared at 6 and 12 months. All patients received personalized education and also group this last in the first 6 months
Results: the average age of the patients was 67 ± 12 years, 70% males. The EHFS at the beginning of the program was 42.7 ± 1.8, at 6 months 22.7 ± 1.3 and at 12 months 23.5 ± 1.6, being statistically significant the difference found in the baseline and the 6 months. Basically, adequate weight control was performed by 14% of the patients, BP control by 17%, appropriate diet by 24%, physical exercise by 20%, and up to 75% communicated good quality rest. At 6 months up to 80% of patients performed adequate weight control, 86% adequately BP control, 52% fulfilled a low sodium diet, 57% performed moderate physical exercise and up to 84% showed adequate rest quality. After 12 months, 62% of the patients had adequate weight control, 73% had BP control, only 48% had an appropriate diet, 66% continued with moderate physical exercise and 89% showed good quality of rest.
Conclusion: The health education provided by nursing at the HFU is very effective in the first 6 months assessed through the EHFS. Although diet and physical exercise are the factors where it is more difficult to have a positive impact, it is more lasting in time when it is achieved. Weight control and BP control are easy habits to acquire but the patient, after the first 6 months, usually abandons them early. Group education can have a positive impact because of the "group effect".

P1002

Comparative analysis of the European Heart Failure Self-Care Behavior Scale and the Self-care of Heart Failure Index in hospitalized patients with heart failure.

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Background. Self-care is an important factor providing a successful management of patients with heart failure (HF). Several tools are using for the measurement of self-care in HF.
Purpose. The purpose of our study was to compare Russian versions of the European Heart Failure Self-Care Behavior Scale_9 (EHFScBS_9) and the Self-care of Heart Failure Index, version 6.2 (SCHFI) in the assessment of the self-care in hospitalized HF patients.
Methods. 50 hospitalized patients with HF (NYHA I-III), mean age 62.2 ± 9.6 years, 56% of them were male, mean left ventricular ejection fraction 52.1 ± 10.3% were included into the study. The management of patients with HF, including patient's education was performed according to the current ESC/HFA Guidelines 2016 and the Russian Guidelines 2017. The level of self-care was assessed on admission and before discharge from the hospital by using EHFScBS_9 and SCHFI.
Results. The coefficient α-Cronbach for EHFScBS_9 was 0.788 on admission and 0.798 at discharge from the hospital. Test-retest reliability of this scale was 0.892 (p<0.01). The coefficient α- Cronbach for SCHFI was 0.722 on admission and 0.785 at discharge from the hospital, test-retest reliability was 0.832 (p<0.01). Both scales demonstrated an improvement in the ability to self-care in hospitalized HF patients. Total score of the EHFScBS_9 was decreased from 22.0±8.6 on admission to 20.4±7.5 at discharge from the hospital (p<0.01). The total score of the SCHFI was increased from 129.7±38.9 on admission to 143.9±41.4 at discharge from the hospital (p <0.01). The greatest improvement of the EHFScBS_9 was noted in items: "if my shortness of breath increases I contact my doctor or nurse" from 2.3±1.5 initially to 2.0±1.3 at discharge from the hospital (p<0.01); "if my feet/legs become more swollen than usual I contact my doctor or nurse" from 2.5±1.6 to 2.2±1.5 (p<0.01). The greatest improvement of the SCHFI was observed in items: "check

your ankles for swelling" from 2.5 ± 1.0 to 2.8 ± 0.9 (p<0.01), "reduce your fluid intake" from 2.4 ± 1.0 to 2.8 ± 0.9 (p<0.01) and "take an extra water pill" from 2.3±1.4 to 2.7±1.1 (p<0.01), "do something that will relieve your symptoms" from 2.2 ± 0.9 to 2.5 ± 0.8 (p<0.01), respectively. Analysis of concurrent validity showed an average inverse correlation between the scales, both on admission (r= −0.309; p=0.029) and at discharge from the hospital (r= −0.434; p<0.01).Conclusion. Russian versions of the European Heart Failure Self-Care Behavior Scale and the Self-care of Heart Failure Index are effective tools for the assessment of self-care in patients with heart failure, and can be used both in clinical studies and in real clinical practice.

P1003

Utility of the implementation of a standardized evaluation program for therapeutic adherence in heart failure

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Introduction: The therapeutic adherence in patients with heart failure (HF) is important to avoid readmissions. The Morisky-green test (MG) is one of the most used but has limitations. We designed a health intervention consisting of a standardized assessment of adherence and knowledge of drugs complemented with individual education implemented by nursing in patients with HF. Aims: To assess whether the implementation of a standardized evaluation of therapeutic adherence is more effective than the application of the MG test. Assess whether the knowledge of the drugs and the intervention on it, by nursing, translates into greater therapeutic adherence compared with the conventional approach.
Methods: The standardized evaluation consists of a first area where compliance is assessed based on what the patient communicates and the verification of the correct intake of drugs and the second area assesses the knowledge of the action of these and the ability to respond to a decompensation through knowledge of the flexible diuretic regimen. With the first area, we identify the patient who complied or not and with the second, we identify the patients who need to reinforce health education due to little or no knowledge of the medication
Results: We included 100 consecutive patients, assessed in the HF Unit at the time of inclusion, included in the period of January 2014 and January 2018. The mean age was 70 ± 13 years, 61% were men, 72% were HFrEF, 18% HFmid-range EF and 10% HFpEF. All patients were first given the MG questionnaire and subsequently the standardized evaluation. According to the MG test, 3 non-compliant patients (3%) were identified. After standardized evaluation, 12 non-compliers (12%) were identified, this difference being significant (p <0.01). In addition, 92 patients (92%) were identified with little knowledge about the drugs and the ability to act in the face of decompensation.
Conclusions: The implementation of the standardized evaluation to asses therapeutic adherence en HF allowed to identify more accurately the non-compliant patients, compared with the MG test. It also presented as an added advantage, the identification of those patients with poor capacity to respond to a decompensation and act early to avoid readmissions

P1004

A propensity-matched study of moderate to severe obesity and mortality in heart failure

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Background: Obesity has been shown to be an independent risk factor for cardiovascular morbidity and developing heart failure. However, a plethora of evidence supports "obesity paradox" in heart failure patients. In the Taiwan Society of Cardiology-Heart Failure with Reduced Ejection Fraction (TSOC-HFrEF) registry, an inverse association between body mass index (BMI) levels and all-cause mortality has also been proven in Taiwanese heart failure population. The study divided heart failure patients by BMI into 4 groups, and obesity was defined as BMI≤27. We think there may exist controversy that patients with more than moderate obesity (body mass index ≥≤30 kg/m2) may not have the same survival advantage as their counterparts. Therefore, this study aimed to investigate the associations of moderate to severe obesity (defined as BMI≥30 kg/m2 in Taiwan) with heart failure patients' outcome.
Method: Patients who were admitted to our Hospital during Aug 2013 and Dec 2014 with the diagnosis of acute decompensated heart failure were enrolled retrospectively. Patients with BMI≥30 were selected as severe obesity group. Control group were selected from the other patients by 1:2 propensity score matching to balance the baseline condition and comorbidity. The primary outcome was the occurrence of all-cause death, and the secondary outcome was the occurrence of cardiac death during 3-year follow-up. All death was considered cardiac unless there was a clear noncardiac cause. We used Kaplan-Meier and Log Rank analyses to compare the all cause mortality and cardiac death between the 2 groups.
Result: 984 patients were enrolled in this study. Of these patients, 42 (4.2%) were BMI≥30. Only 32 patients passed the propensity matching test and other 64 patients with BMI<30 were selected as control. The mean BMI were 32.37 in the severe obesity group and 24.35 in the control group. Their baseline characteristics are shown in Table 1. There are significant differences in clinical characteristics between 2 groups, with a lower incidence of hypertension and lower level of B-type natriuretic peptide (BNP) in the obesity group. There is no significant difference in other clinical characters. During 1-year follow-up, 3 were lost follow up in the obesity group and 8 in the control group. The incidence of all-cause mortality (10% vs 9%, p=0.678) does not differ significantly between the 2 groups. After 3-year follow-up, another 6 were lost follow up in the obesity group and 5 in the control group. There is still no significant difference of all-cause mortality (26% vs 18%, p=0.118). But the obesity group has more incidence of cardiac death (26% vs 12%, p=0.004).
Conclusion: Heart failure patients with moderate to severe obesity may not share the same survival benefit as mild obesity patients. However, this study result is limited by the small number of populations.

P1005

The impact of self-control and self-help education on quality life of patients with chronic heart failure in Uzbekistan

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The aim. Study of the impact of self-control and self-help methods on the quality of life (QOL) in chronic heart failure (CHF).
Materials and methods. The study included 204 pts with CHF aged from 19 to 82 years (mean age - 58.7 ± 12.9). Patients were treated in a hospital with simultaneous training of self-control and self-help. Medical therapy was carried out according to ESC recommendations. All pts, initially and after 24, 52 weeks, were evaluated for quality of life using Minnesota questionnaire "Life with heart failure".
The results. When analyzing the results of the survey, it was found that the average value of QOL in pts with CHF initially averaged 68.3 ± 12.2 points. Gender differences in QOL of patients with CHF were determined: for men, the average value of QOL was 62.8 ± 10.1 points, for women, 71.4 ± 13.2 points (p <0.05). An increase in NYHA class is accompanied by a significant stepwise deterioration in the indicator of QOL, with each class corresponding to a certain level of QOL (II −53.1 ± 9.4 points; III - 67.2 ± 11.9 points; IV - 81.6 ± 13.8 points). Evaluation of QOL during the observation period revealed a tendency towards a positive trend compared with baseline data. The improvement in QOL by the 24th week was noted on 14.1% (58.7 ± 11.4 points), and by the 52nd week - on 28.1% (49.1 ± 9.5 points) compared with baseline (p <0.05).
Conclusion. Self-control and self-help education and dynamic control over the implementation of doctor's recommendations allows in clinical practice to improve the quality of life of patients.

P1006

The influence of socio-clinical variables on the level of self-care in heart failure patients

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Introduction: Heart failure (HF) is an increasingly important problem for public health. It is estimated that 1-2% of the world's population suffer from HF. The costs of hospitalization constitute a significant part of the total costs of treatment of HF patients. Therefore, there is a need to pay attention to the role of self-care in the therapeutic process of HF patients.
Objectives: The aim of the study was to evaluate the influence of socio-clinical variables on the self-care level in HF patients.
Methodology:The study included a sample of 100 patients diagnosed with HF (mean age: 73.78 years) hospitalized at the Department of Internal Medicine of the Health Care Centre in our city. The analysis of medical records and the own authorship questionnaire were used to collect basicsocio-clinical data. A standardized 9-item European Heart Failure Self-care Behavior Scale (EHFScB) questionnaire was used to assess the self-care level.
Results: Statistical analysis showed a significant difference in the level of self-care and such variables as marital status (p=0.001), taking Digoxin (p=0.002), taking diuretics (p=0.015), NYHA classification (p=0.001). Linear correlation showed that age was a negative predictor of the level of self-care

(B=-0.356, p<0.001). Multivariate analysis showed a negative impact of the NYHA functional class IV on the self-care level of the study group patients (B=-23.595, p=0.048).
Conclusions: The socio-clinical factors have a significant impact on the level of self-care in HF patients. It is necessary to take interventions improving the level of self-care in HF patients.

P1007
Effects of time perspective and executive function on self-care in patients with heart failure: a cross-sectional study

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Background: Time perspective refers to one's consideration about future consequences of current behaviours. Executive function refers to a set of cognitive processes mainly working memory, inhibition and mental flexibility that allows for higher order thinking. Both has been shown to change behavioural intentions and actual behaviours through self-regulation but has yet to be explored in the heart failure self-care context. Improving self-care such as sodium restriction and increasing exercise could improve clinical outcomes, decrease rehospitalisation and enhance quality of life.
Purpose: To examine the effects of time perspective and executive function on heart failure patient's self-care.
Methods: Cross-sectional study. 147 heart failure patients from a tertiary hospital completed questionnaire and cognitive measures of self-care, time perspective, intention and executive function. Multiple regressions, mediation and moderation analyses was conducted using the PROCESS macro for SPSS were conducted.
Results: Self-care level was suboptimal (87.1% below cut-off score). Non-adherence rates were high for medication adherence (10.8%), physical activity (general: 55.8%; at least 30 minutes: 68.7%), weight monitoring (76.2%) and sodium restriction (at home: 46.9%; outside: 71.4%). Self-care was associated with time perspective (r =.362), executive function (r=.174) and intention (r =.184). Time perspective mediated the self-care intention-behaviour relationship, explaining 62.0% of the total effect and was not moderated by executive function. The indirect effect of intention on self-care through time perspective was 1.205 with a bootstrapped 95% confidence interval (0.532 , 2.145). There were differences in time perspective (mean=4.538, standard deviation (SD)=.834; t=3.109, p=.002 CI:.158,.711) and executive function (mean=5.47, SD=1.60; t=3.012, p=.003; CI:.251,1.208) for patients below and above 61 years old. Majority of the patients were male (77.6%), Chinese (70.1%), married (65.3%), have at most secondary school education (41.5%), family income less than SG$ 3000 (65.3%), employed full-time (41.5%), stays with someone (87.1%) and most importantly, rely on themselves as caregiver (61.9%) (Table 1). The median left ventricular ejection fraction (LVEF) was 27%, majority were of New York Heart Association class II (55.1%) and has at least 3 comorbidities estimated using the Charlson comorbidity Index score.
Conclusion: Clinicians and counselors could motivate patients' self-care by enhancing future-oriented time perspective tailored according to age. As executive function may be difficult to improve in older patients, executive function demands could be outsourced to visual reminders or other personalized systems like planners. Further research could be done on health message framing and personality types to develop more effective interventions to improve self-care habits.

P1008
Real world usage and outcomes of all HFrEF patients treated with sacubitril/valsartan in Belgium

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Background: The angiotensin receptor neprilysin inhibitor sacubitril/valsartan (s/v) was granted reimbursed market access in Belgium on November 1, 2016 for the treatment of adult patients (≥18 years) with symptomatic heart failure with reduced ejection fraction (HFrEF; LVEF≤35% and optimally treated with an ACEi or ARB). In Belgium, s/v can only be initiated by cardiologists and internists. However, information on its real world use is scarce. Purpose: To provide data on real world clinical practice of all HFrEF patients treated with s/v in Belgium. Methods: A nationwide, retrospective cohort study was performed based on patient level linkage of integrated electronic healthcare datasets including administrative payer claims, national health registries, pharmacy claims and medical records. All HFrEF patients receiving reimbursement for s/v in Belgium between November 2016 and December 2018 will be included, regardless of prior history or length of follow-up. Results: An interim functional analysis was performed covering data from 2200 HFrEF patients treated with s/v, being 69.3% men. S/v was prescribed in 97.7% (n=2149) by cardiologists and 2.1% (n=46) by internists. 515 different physicians prescribed s/v and the average number of prescriptions per physician was 4.3. 48.3% were in NYHA II, 46.4% in NYHA III and the remaining in NYHA IV patients (5.2%). 28.7% of patients were between 60-70 years and 32.1% between 70-80 years. 16.8% of patients were over 80 years of age. The number of s/v packs delivered steadily increases over time for all dosages. Most patients were initiated s/v at the lowest dose of 24/26mg twice a day (BID), and only 24.1% achieved the target dose of 97/103mg BID after one year of treatment. Conclusion: The majority of the HFrEF patients treated with s/v in Belgium are male with NYHA II and ≥60 years. Almost all applications for s/v reimbursement came from physician specialists in cardiology. Real life data shows that most patients were initiated at the lowest dose of s/v. Final analysis is expected in March 2019 and will consist of a full real life profile of every single Belgian HFrEF patient treated with s/v providing the first insights on s/v utilization, outcomes and patient profiles in Belgium.

P1009
Sacubitril-valsartan and its effect on ventricular remodeling

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Introduction: Based on the PARADIGM HF trial, sacubitril-valsartan has been included in ESC guidelines for the treatment of chronic heart failure with reduced ejection fraction (HFrEF). Angiotensin receptor-neprilysin inhibitor has demonstrated to improve left ventricular ejection fraction (LVEF). Is LVEF the only parameter modified?
Methods: To answer this question, a series of patients with HFrEF attending the advanced heart failure unit who initiated sacubitril-valsartan was prospectively assessed. Aetiology and baseline characteristics were collected. LVEF and ventricular volumes were evaluated by transthoracic echocardiogram before and after 6 and 12-month treatment. T- test was conducted for the comparison of paired data.
Results: Eighty-four patients initiated sacubitril-valsartan. Patients with drug discontinuation or without echocardiogram before and 6-12months after therapy were excluded. Seventy patients were evaluated. Mean age was 73 years old; 58 (83%) patients were men and 54% had ischaemic aethiology. 53% had atrial fibrillation and 54% were diabetic. Mean LVEF was 31,1% and median estimated glomerular filtration rate was 65,4 ml/min. Regarding to optimal medical treatment: 97% were on angiotensin-converting-enzyme inhibitor, 91% beta-blocker and 77% were receiving a mineralocorticoid-receptor antagonist.
Left ventricular ejection fraction significantly improved after 6-month treatment (31,1±4,8 vs 40,7±10,2; p<0,001). Lower left ventricular end systolic (109,2±41,4 vs 83,0±47,2; p=0,006) and end diastolic volumes (163,2±57,9 vs 136,5±57,1; p=0,021) were described. There is a tendency to support these observations also after 12 months: LVEF remained lower (p= 0,003), as well as left ventricular end systolic volume (p=0,058).
Conclusions: Neprilysin inhibition has a beneficial effect on ventricular structure, improving not only ventricular volumes, but also ejection fraction. Longer follow-up periods need to be assess, as this improvement might change therapeutic approaches based on LVEF, for example, the indication of cardiac resynchronization therapy.

P1010
Short and medium-term safety and tolerability of Sacubitril-Valsartan and Empaglifozin joint intake

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Background: Sacubitril-Valsartan has improved the prognosis of patients with heart failure and reduced ejection fraction. Empaglifozin has reduced heart failure incidence in patients with type 2 diabetes. However, data regarding safety and tolerability of joint intake are scarce.
PURPOSE: The aim of our study is to describe clinical use of Sacubitril-Valsartan together with Empaglifozin coadministration in real world practice, with special focus on safety and tolerability.
Methods: We performed a single-centre, retrospective evaluation of Sacubitril-Valsartan and Empaglifozin joint prescription from the date of the first drug prescription until the 20th December 2018. Inclusion criteria was any sustained prescription of both drugs by Cardiology and/or General Practitioners. Patients were excluded if no data were available or prescription had an incorrect indication.

We collected baseline characteristics of the patients, data of tolerance and information regarding laboratory markers. Statistical analysis was performed using SPSS Software for MAC, 20.0 version. Changes in cuantitative values over time were analyzed using T-Test.

Results: From the 3rd of March 2016 to the 20th of December 2018, 41 patients were included in the study. Three patients were excluded from the final analysis (1 due to unavailable data, 2 because of incorrect prescription of Sacubitril-Valsartan with LVEF > 45%).

Thirty-eight patients remained, of which 62% were men. Mean age was 68 years old. All the patients were diabetic, 67% hypertensive and 80% received statins. Ischaemic heart disease was the main cause of heart failure (65%). At baseline, 60% of the patients reported NYHA functional class II symptoms.

Sacubitril-Valsartan was started first in 14 patients, Empaglifozin in 11 patients, and both drugs were started at the same time in 13 patients, usually after heart failure admission.

During a medium follow-up of 432 +/- 202 days, only 4 patients (10,53%) were admitted to the hospital due to acute heart failure. No cardiovascular nor renal deaths were registered.

Creatinine (Cr) levels remained stable during follow-up, with a non-significant decrease of Cr values from 1,043mg/dl (SD = 0,33) at baseline to 1,034 mg/dl (SD = 0,29) at the end of the study. Blood test at intermediate time-points showed similar results (Cr = 1,068; 0,987, and 0,997mg/dl at blood test 2, 3 and 4 respectively). Cr increase above 40% of baseline levels was detected only in 3 patients (7,89%) and reversible in all, without any case of severe acute kidney injury.

Glycated hemoglobin (HbA1c) showed a mild and also non-significant reduction during the study, from 6,834% (SD = 1,19) at baseline to 6,723% (SD = 0,99) in the last visit. Glycemic values improved shortly after initiating Sacubitril-Valsartan or Empaglifozin (HbA1c 6,410 at blood test 2, p = 0,065).

Conclusions: Combination of Sacubitril-Valsartan and Empaglifozin is frequent, safe, and well tolerated in real world clinical practice.

P1011

Angiotensin receptor-neprilysin inhibition improves peak oxygen consumption in reduced heart failure patients

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Background and Purpose: The addition of Angiotensin Receptor-Neprilysin Inhibitors (ARNI) to standard therapy of heart failure with reduced ejection fraction (HFrEF) has proved to improve outcomes. Cardiopulmonary exercise testing (CPET)-derived ergometric variables, as peak oxygen consumption (VO2), are used to determine heart transplant (HTx) eligibility. We aimed to analyse the impact of ARNI therapy in CPET variables.

Methods: We conducted a retrospective, observational cohort study, including 19 patients with symptomatic HFrEF with a left ventricular (LV) ejection fraction (LVEF) <35% and whose functional capacity was evaluated by CPET less than 6 months before initiating ARNI. We excluded patients who had implanted a cardiac resynchronization therapy device (CRT) or were submitted to heart surgery less than 6 months before the first CPET. A follow-up CPET was conducted 7±4 months after starting ARNI.

Results: Mean age was 55±12 years and 90% were male.Mean LVEF was 26±6% and before initiating ARNI, all patients were on optimal medical therapy, including angiotensin-converting enzyme inhibitors/angiotensin receptor blockers (100%), ß-blockers (94.7%) and mineralocorticoid receptor antagonists (89.5%). Moreover, 9 patients had an implantable cardioverter defibrillator (D) and 9 patients had a CRT-D.Regarding aetiology, 11 had ischemic heart disease, 6 had dilated cardiomyopathy, 1 had corrected transposition of great arteries and 1 had LV non-compaction. The majority of the patients (73.7%) were on maximal doses of ARNI (97/103mg bid); the remaining were on intermediate dose (49/51 bid). Following ARNI, peak VO2significantly increased from 15.4±5.2 to 17.0±4.0 mL.kg-1.min-1(mean absolute increase of +1.5 mL.kg-1.min-1, p=0.03). Among the 7 patients with peak VO2<14 mL.kg-1.min-1, 3 (43%) improved peak VO2to values >14 mL.kg-1.min-1, pulling the patients out of one of the classical HTx eligibility markers. Regarding other ergometric variables, a numerically increase was observed in mean total exercise duration (12:45 to 13:27 min), in respiratory exchange ratio (RER) (1.08±0.11 to 1.12±0.08) and in peak oxygen pulse (9.9±2.7 to 10.6±2.6 mL.beat-1). Conversely, the mean respiratory efficiency index (VE/VCO2) following ARNI remained similar.

Conclusion: In this cohortof HFrEF patients, ARNI significantly improved peak VO2, a major prognostic predictor. Importantly, 3 out of 7 patients with a peak VO2within the HTx threshold recovered to ineligibility values.

P1012

Sacubitril/Valsartan use in a real world experience: data from a large single-center population of heart failure patients with reduced ejection fraction

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Background: Sacubitril/Valsartan has emerged as a novel therapy in the treatment of heart failure (HF) with reduced ejection fraction (HFrEF), showing a lower cardiovascular mortality and HF hospitalization rates compared to standard therapy. Although the recent widespread use of Sacubitril/Valsartan, real life data are still lacking.

Methods: We performed a retrospective analysis of 201 monocentric patients with HFrEF, who started Sacubitril/Valsartan between September 2016 and December 2018 and followed at our HF ambulatory.We collected demographic data, clinical history with ongoing medications, baseline clinical characteristics and follow up (i.e. period of treatment until last contact with the hospital or by telephone call) about tolerated dose of Sacubitril/Valsartan, interruption of treatment, hospitalization for HF, deaths.

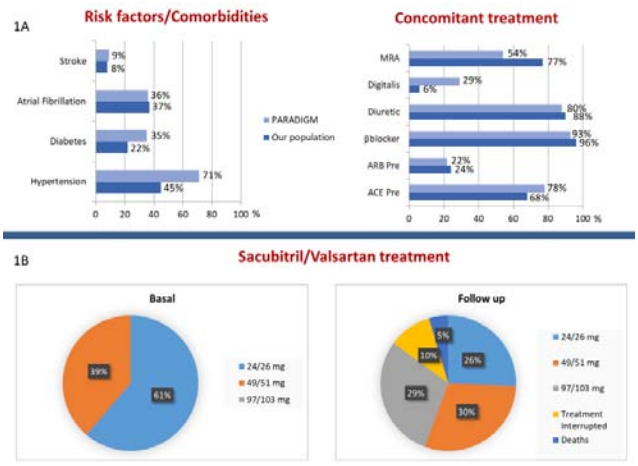
Results: Baseline characteristics of our population and of PARADIGM trial are presented in Tab. 1 and Fig.1A. One hundred and five patients also performed a cardiopulmonary exercise test before starting treatment, showing a mean peak VO2 of 14.9 ± 4.7 ml/min/kg (60 ± 17 % of predicted), with VE/VCO2 slope of 34.3±8.2, VO2/work of 9.4±1.5. During follow up (268 ±185 days) 36 patients had hospitalization for HF, while 20 patients interrupted treatment with Sacubitril/Valsartan (7 hypotension, 5 renal insufficiency, 1 angioedema, 7 not known/patient decision) and 9 deceased. Dose administered at baseline and at the end of follow-up is reported in Fig. 1B.

Conclusions: Compared to PARADIGM trial, our real-life population has similar characteristics and HF gravity. For clinical reasons during follow up only 31% reached the maximum dose. In future more studies are needed to analyze the prognostic impact of low vs. higher doses.

Table 1

	Meann(%)	PARADIGM trialMeann (%)				
Age (years)	67.2	±	10.8	63.8	±	11.5
Female sex	42 (21%)	879 (21%)				
White	198 (99%)	2781 (66%)				
BMI (kg/m^2)	26.1	±	4.1	28.1	±	5.5
SBP (mmHg)	116.8	±	11.8	122	±	15
NYHA II	130 (65%)	2998 (72%)				
NYHA III	71 (35%)	969 (23%)				
Ischemic Etiology	109 (54%)	2506 (60%)				
ICD	84 (42%)	623 (15%)				
CRT	57 (28%)	292 (7%)				

Baseline charachteristics compared to PARADIGM trial



P1013

Effects of Sacubitril/Valsartan in real-world HF and reduced ejection fraction (HFrEF) population.

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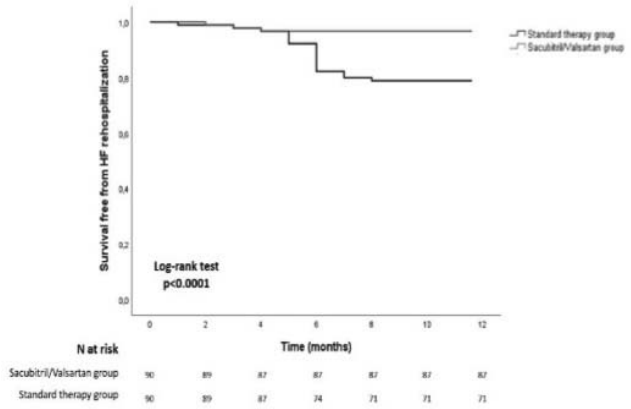
Background: The PARADIGM-HF has shown the superiority of Sacubitril/Valsartan (S/V) compared to Enalapril in HFrEF. However, its impact of in a clinical setting is yet to be elucidated. In this study, we aimed to evaluate the effects of S/V compared to standard HF therapy (ST) in our HFrEF population. Methods and results:180 patients with chronic HFrEF from our outpatient clinic were prospectively enrolled. Ninety patients were treated with ST, up-titrated to the maximum tolerated dose, maintained for at least 3 months, and ninety patients started the association with S/V as still symptomatic. The primary endpoint was rehospitalizations for worsening HF, cardiac death and the composite endpoint at 12 months of follow-up (FU). The secondary endpoint was the evaluation of the effects of S/V on the symptoms, on LV remodeling, on eGFR, compared to ST at 6-months FU. S/V group showed significantly lower HF rehospitalizations (3.3% vs 21.1%;p < 0.0001) and composite endpoint (6.7% vs 25.6%;p =0.001), whereas cardiac death was substantially not different between two groups. Moreover, in S/V group LVEF increased from 30 (27-38) to 35.5 (30-42) % (p= 0.001), LVESV decreased from to 119 (95-155) to 96 (83-130) mL (p=0.033) as well as sPAP from 30 (25-40) to 27 (25-36) mmHg (p=0.024) already at 6 months. Conversely, no statistically significant differences in term of parameters of LV and RV function were found in ST group. Finally, S/V group showed an improvement of eGFR (60 ± 22 mL/min vs 68 ± 23 mL/m2; p= 0.034), in comparison to ST group in which, despite a better baseline eGFR, even a worsening of eGFR (70 ± 21 mL/min vs 60 ± 19;p=0.021) was recorded at 6 months.
Conclusions: In our real-world HFrEF population, S/V reduces hospitalization and improves cardiac function in HFrEF. Furthermore, S/V preserves renal function in comparison to ST in HFrEF patients.



P1015

Use of sacubitril-valsartan in elderly patients. Subanalysis of the SAVE-RLife study

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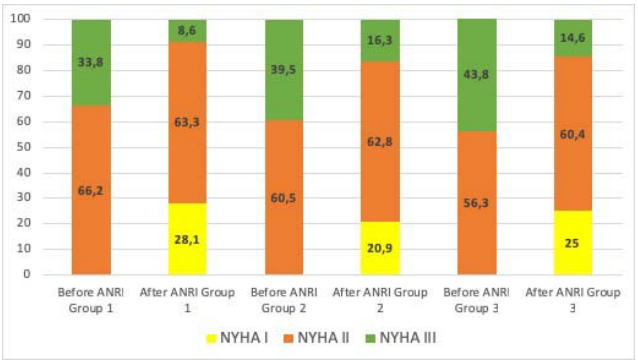
On behalf of: SAVE-RLife group

Introduction: The mean age of patients included in the PARADIGM-HF trial was 63.8±11.5 years. Objective: To analyse the use, safety and efficacy of sacubitril-valsartan (SV) in different age groups.
Methods: This is an observational, ambispective study that included all patients with stable HFrEF who started SV between SEP2016 and DEC2018. The cohort was divided into three age groups: patients <65 years (y); 65 - 74 y and >75 y.

Results: 276 patients were included, 68 patients women (24,6%), 44.6% were <65 y (n=123); 29.3% between 65 - 74 y (n = 81) and 26.1% were > 75 y. The basal treatment was similar in all groups, except for a greater use of aldosterone antagonists in patients <65 y vs >75 y (73% vs 56.9%, p=0.071). We observe in age group >75y a significant reduction in the estimated glomerular filtration rate (GFR) at baseline and after the use of SV (<65 y from 77.80 to 77.51 ml/min, 65 - 74 y from 66.39 to 60.72 ml/min >75 y from 61.28 to 56.74 ml/min, p<0.001), while the reduction of proBNP after using SV is independent of the age range (- 1316; - 1386; - 1492 pg/ml respectively; p=ns). A trend toward clinical improvement in NYHA class is present in all age groups (Figure 1). LV remodeling, defined as LVEF increase and LV end-diastolic diameter (LVED) decrease after the use of SV, was observed in the three age groups, without any significant differences (+ 7.93, + 4.52, + 5.51 of increase in LVEF, p=ns; and - 2.37, - 2.58, - 0.16 of decrease in LVED, p=ns). There are no differences in adverse events between the different age groups (Table 1).
Conclusions: These results add data about the SV use in elderly patients. We show that SV is a safe and effective drug in this subgroup of patients. Despite a higher prevalence of comorbidities, an improvement in functional class without increasing side effects is observed.

Baseline Characteristic & Adverse events

	N=276	Patients< 65 años N=123 (44.6%)	Patients 65 - 74 años N=81 (29.3%)	Patients ≥ 75 años N=72 (26.1%)	P value
Comorbidities	Ischemic cardiomyopathy, n (%)	61 (49.6%)	39 (48.1%)	43 (59.7%)	0.289
HBP n (%),DM n (%),AF n (%)	77 (62.6%), 49 (39.8%), 31 (25.2%)	64 (79%), 38 (46.9%), 35 (43.8%)	60 (83.3%), 38(52.8%), 33 (45.8%)	0.002, 0.203,0.003	
CRTn (%) / ICD n (%)	17 (13.8%) / 33 (26.8%)	11 (13.6%) / 11 (13.6%)	10 (13.9%) / 7 (9.7%)	0.660 /0.005	
Adverse events	Acute renal failure, n (%)	19 (15.4%)	14 (17.5%)	12 (16.7%)	0.925
Symptom. Hypotension, n (%)	12 (9.8%)	8 (10%)	4 (5.6%)	0.536	
Asympt. Hypotension, n (%)	12 (9.8%)	7 (8.8%)	8 (11.1%)	0.887	
Hyperkaliemia, n (%)	14 (11.4%)	18 (22.5%)	10 (13.9%)	0.092	
Hospital Admission/visit to the ER (mean± SD)	0.39± 1	0.38± 0.848	0.44± 0.963	0.893	
Exitus	10 (8.1%)	6 (7.5%)	7 (9.7%)	0.878	



NYHA evolution before and after SV

P1016

Allopurinol safety and efficacy in heart failure patients: a systematic review

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Introduction: Heart failure is a prevalent morbid disease with a high economic burden for the healthcare system. There has been data supporting that allopurinol, a xanthine oxidase inhibitor, can improve the endothelial dysfunction, cardiac function, and quality of life in these patients.
Purpose: Review allopurinol efficacy and safety in heart failure patients to shed light on improvement in different outcomes.
Methods: Electronic search in Medline, Scopus, Web of Science and Google Scholar was conducted for mesh terms of "allopurinol" and "heart failure" and updated on 11/1/2019 for the last time. Only articles in English or Persian language and only human interventional studies about allopurinol efficacy or safety in heart failure patients were eligible for inclusion. The title, abstract and full text of search results were screened after excluding duplicates, letters, congress abstracts, and reviews and then articles assessed for their risk of bias according to Quadas2. Included 17 articles were used to extract data about treatment outcomes. Screening, data extraction, and risk of bias evaluation were cross-checked with a second author, based on PRISMA guideline.
Results: Most of the included articles were randomised clinical trials. About half of the studies were mainly focused on cardiac function. The other main focus of the studies were endothelial dysfunction and cardiac biomarkers. Only one study focused on cardiac rhythm in heart failure patients. The majority of the included patients had left ventricle ejection fraction (LVEF) of less than 40%. The most administered allopurinol dose was 300 mg daily. There were many outcomes reported in the studies which were categorized into three groups (Imaging, laboratory data, and others). Flow-mediated vasodilation and LVEF, uric acid level and N terminal-pro B type natriuretic peptide (N terminal-pro BNP), New York heart association functional class and 6-minute walk test were the most frequently measured parameters in imaging, laboratory and other outcomes respectively. Out of the studies, most of them showed significant improvement in the above parameters. Two studies evaluated the quality of life from which one reported significant improvement. Only one study used strain imaging for evaluation of cardiac function which showed significant improvement. Two studies showed no significant improvement of N terminal-pro BNP and one of them which was also using imaging did not show improvement in LVEF. In a study evaluating two doses of Allopurinol, the higher 600 mg daily dose was significantly better in improving the outcomes. Allopurinol was well tolerated and the most reported adverse effect was skin rash.
Conclusion: Although there is evidence that allopurinol significantly improves endothelial dysfunction, cardiac biomarkers, and function, there is a need for more high quality randomised controlled trials to give insight about which patients benefit most from its use.

[Ref.]	Type of Study	Main Focus	Population (Total,ALLO)	Baseline UA level	Study Groups (mg/day or infusion rate) Duration	Outcomes	Safety of ALLO (N)
[1]	RCT	Endothelial Function and Cardiac Biomarker	ADHF ischemic HF (81,42)	7.43 ± 2.77 (mg/dl)	ALLO (300)/ standard treatment 10 ± 4 days	A: FMD** B: UA**, NT-proBNP**	NA
[2]	Prospective	Cardiac Function and Biomarker	HF, LVEF<35% (35,35)	3.9 (SD: 1.3) (mg/dl)	ALLO (600) 3 months	A: Strain Imaging** B: UA**, NT-proBNP**, ESR ** C: QoL-**, NYHA FC **, Orthopnea*, Fatigue*, Anorexia*, Muscle cramps*, 6 MWT**	Skin Rash (1)
[3]	RCT	Cardiac Function and Biomarker	Chronic HF (165,62)	321.4 ± 42.5 (µmol/L)	ALLO (300)/ standard treatment 6 months	A: FMD*, LVEF*, LVEDD*, LVESD* B: TNF-a*, BNP* C: NYHA*	Allergic Dermatitis (1)
[4]	RCT	Cardiac Function and Biomarker	HF (61,30)	9.3 ± 0.3 (mg/dl)	ALLO (100 to 300)/Febuxostat (10 to 40) 12 months	A: LVEF** B: UA**, Total cholesterol**, Triglycerides**, BNP*, hsCRP*, Cystatin-C#, MCP-1#, EPA/AA ratio# C: Systolic BP*, Heart rate#	No adverse effect
[5]	Prospective	Cardiac Function and Biomarker	Stable HF, LVEF < 40% (57,57)	7.9 ± 2.2 (mg/dl)	ALLO (600) Duration: 6 months	A: LVEF** B: NTproBNP**, UA#, GDF-15#	Allergodermia (3), Alopecia (1)
[6]	RCT	Cardiac Function	Symptomatic HF, LVEF<40% (253,128)	11.0 (mg/dl)	ALLO (600)/ placebo 24 weeks	A: No significant improvement in LV volume, mass or EF B: UA**, Cystatin C** C: No significant improvement in QoL and 6MWT	Skin Rash (13)
[7]	Prospective	Cardiac Function	Idiopathic Dilated Cardiomyopathy, LVEF<40%, (24,24)	7.2 (mg/dl)	ALLO (300) 3 months	A: S*, E*, coronary flow reserve#, mitral A velocity*, E/E'*, B: UA*	No adverse effect
[8]	RCT	Endothelial Function and Cardiac Biomarker	HF, LVEF<40% (60,21)	7.4±2.4 (mg/dl)	ALLO (300)/ Rosuvastatin (10)/ placebo 1 months	A: FMD* B:UA**, NT-proBNP*, VEGF#	NA
[9]	RCT	Endothelial Function	HF, LVEF<40% (74,38)	7.2±0.4 (mg/dl)	Atorvastatin (20)+ALLO (300)/ Atorvastatin (20)+placebo 8 weeks	A: Flow mediated endothelial dependent vasodilation* B: MDA*, UA*, ecSOD*, hsCRP*, TIMP-1*, MMP9*, total cholesterol*, LDL* C: 6MWT#	No adverse effect
[10]	RCT Cross over	Endothelial Function	HF, LVEF<40% (16,16)	562 ± 82 (µmol/l)	ALLO (300)/ placebo 2 weeks	A: Postischemic peak blood flow#, FMD# B: UA** ,Allantoin*, ADMA#	No adverse effect
[11]	RCT	Cardiac Function	HF, LVEF<40% (82,43)	6.5 ± 1.7 (mg/dl)	ALLO (300)/ placebo 36 weeks	A: LVEF**, LVEDD# B: UA** C: Systolic BP**, Diastolic BP*, NYHA**	NA
[12]	RCT Cross over	Endothelial Function	HF, (30,30)	7.12 ± 1.53 (mg/dl)	ALLO (300)/ ALLO(600)/ placebo 1 month	A: Endothelium Dependent Vasodilation**, FBF** (600 better than 300) B: UA**, no improvement in BNP	Skin Rash (1)
[13]	RCT	Cardiac Biomarker	HF (50,NA)	NA	ALLO (300)/ placebo 3 months	B: Cholesterol#, hemoglobin**, BNP#, UA**	Skin Rash (2)
[14]	RCT	Endothelial Function	Ischemic HF, LVEF<40% (11,NA)	7.5 (SD:1.1) (mg/dl)	ALLO (300)/ placebo 1 month	A: FBF* B: MDA#, UA**	NA
[15]	RCT	Endothelial Function	HF (14,8)	535±22 (µmol/l)	ALLO (300)/ placebo 2 weeks	A: Postischmic peak blood flow#, forearm follow dependent flow# B: UA**, Allantoin**	No adverse effect
[16]	Prospective	Cardiac Function	Idiopathic Dilated Cardiomyopathy, LVEF<40%, (9,9)	NA	ALLO (0.5, 1.0, and 1.5 mg/min infusion for 15 minutes each) Spontaneously	A: Q_{co}**, MV O2#, dP/dtmax/MV O2**, SW/MV O2*	NA
[17]	RCT Cross over	Cardiac Rhythm	HF (16,16)	0.524 0.08 (mmol l-1)	ALLO (100 or 300)/ placebo 16 weeks	B: UA**, C: No significant improvement in heart rate variability or dysrhythmia	NA

A: Imaging, B: Laboratory data, C: Other outcomes
**: P value <0.001, *: P value <0.01, #: P value <0.05
ALLO: allopurinol, UA: uric acid, N: number, RCT: randomized clinical trial, ADHF: acute decompensated heart failure, HF: heart failure, FMD: flow mediated vasodilation, NT-proBNP: N terminal-pro B type natriuretic peptide, NA: not available, LVEF: left ventricle ejection fraction, SD: standard deviation, ESR: erythrocyte sedimentation rate, QoL: quality of life, NYHA FC: New York heart association functional class, 6MWT: 6 minute walk test, LVEDD: left ventricle end diastolic diameter, LVESD: left ventricle end systolic diameter, TNF-a: tumor necrosis factor alpha, hs-CRP: high sensitivity C reactive protein, MCP: monocyte chemoattractant protein, EPA: eicosapentaenoic acid, AA: arachidonic acid, BP: blood pressure, GDF-15: growth differentiation factor 15, VEGF: vascular endothelial growth factor, MDA: malondialdehyde, ecSOD: extracellular superoxide dismutase, TIMP-1: tissue inhibitor of metalloproteinase-1, MMP9: matrix metalloproteinases 9, LDL: low density lipoprotein, ADMA: asymmetric dimethylarginine, FBF: forearm blood flow, Q_{cor}: left main coronary blood flow, MVo2: Myocardial oxygen consumption, dp/dtmax: peak rate of rise of left ventricular pressure, SW: stroke work,

Characteristics of the included studies

P1017

Initial experience of a nursing consultation in the uptitration of neurohumoral treatment in patientes with heart failure and reduced ejection fraction

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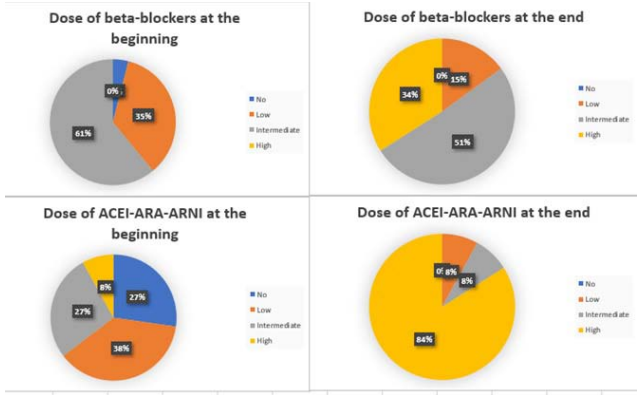
Introduction: - Nursing is a cornerstone for the follow-up of patients with HF, carrying out important educational work, follow-up (including telemedicine projects) and, more recently, in the up titration of drugs with prognostic impact.
- Recently the HF Unit of our hospital has incorporated HF nursing in the up titration of drugs.
Objectives and methods
- The objective is to describe the characteristics of the patients referred to the nurse's consultation, the treatment that the patients were prescribed at the first visit and the treatment achieved.
- We collected patient data from the implementation of the nursing consultation in November 2017 until September 2018.
- The up titration was carried out following a protocol drawn up by the unit's professionals, in which consultations are carried out every 2 weeks with ECG and blood analysis and a progressive increase in drug doses.
Results
- Twenty-six patients (21 men and 5 women) with an average age of 60.7 years (SD 13.1) were included. The most prevalent heart disease is ischemic (46.2%), followed by idiopathic (42.3%). The mean LVEF is 27.4 (SD 7.8). 15 patients are in sinus rhythm and 2 in atrial fibrillation.
- Figure 1 describes the characteristics of the pharmacological treatment of the patients in the first nurse's consultation and upon completion of titration. High dose of beta-blocker was reached in 54% of patients and high dose of ACEI-ARA-ARNI in 84%. The reason for not achieving higher doses of beta-blocker was sinus bradycardia. In patients who did not reach the maximum dose of ACEi-ARA, it was due to symptomatic hypotension.
- In patients in whom the titration has been completed, the time invested was 9.4 weeks (SD 5.2). During this phase there were no HF decompensations requiring emergency visits or hospital admissions.
Conclusions: - Drug titration is possible in patients with HF and reduced LVEF, and maximum doses can be safely reached in most cases.

	Beginning	End	p
SBP (mmHg)	124,5 (18,4)	117,2(18,0	0,043
DBP (mmHg)	78,6 (10,9)	75,9(9,2	0,039
HR (bpm)	70,2 (13,6)	62,9(8,5	0,004

Comparison of hemodynamic values before and after titration. *HR only in patients in sinus rhythm



Neurohumoral treatment dosage

P1018

The impact of the use of sacubitril/valsartan on clinical and echocardiographic parameters in heart failure patients

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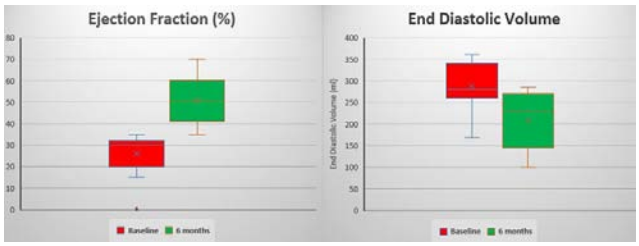
Background: Sacubitril/valsartan is a guideline-recommended alternative drug to Angiotensin-Converting enzyme inhibitors (ACEIs) or Angiotensin II Receptor Blockers (ARBs) to reduce morbidity and mortality in patients with chronic heart failure with reduced ejection fraction (HFrEF). Recent guideline update specifically advises switching symptomatic HFrEF patients to sacubitril/valsartan for further reduction of morbidity and mortality.
Purpose: The aim of the work was to demonstrate the clinical effects of the use of sacubitril/valsartan instead of the conventional ACEIs or ARBs in HFrEF patients.
Methods: A total number of 23 patients with miscellaneous causes of heart failure (14 patients had ischemic etiology, 8 patients had dilated cardiomyopathy and 1 patient had peripartum cardiomyopathy) presented in the setting of heart failure (NYHA III-IV) with normal creatinine clearance. Through clinical examination and baseline 2D transthoracic echocardiography (TTE) was done with an emphasis on left ventricular ejection fraction (LVEF) and end diastolic volume (EDV). All patients received sacubitril/valsartan instead of ACEs inhibitors or ARBs together with beta-blockers, diuretics and Mineralocorticoid antagonists when indicated. Follow-up after 6 months was done to assess patient clinical status as regards heart failure symptoms and follow up TTE as regards LVEF and EDV.
Results: The mean age of the patients was 46.89 ± 15.4 years, 14 patients (60.87 %) had a baseline NYHA III while 9 patients (39.13%) had NYHA IV. Mean baseline LVEF and EDV were 27.3% ± 8 and 277.11 ± 57.67 ml respectively. At 6 months follow-up, 21 patients (91.3%) had NYHA I while 2 patients had NYHA II (8.7 %), mean LVEF and EDV were 49.05% ± 10.27 and 202.79 ± 64.86 ml respectively. (P<0.001)
Conclusion: According to this small case series, the use of sacubitril/valsartan was not only associated with improvement of heart failure symptoms but also it was linked to evident improvement of TTE parameters in the form of improved LVEF and reduced EDV at 6-months follow-up.



Graphical representation

P1019

The efficacy of "Get With the Guidelines Heart Failure," a retrospective analysis

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Background: Heart failure (HF) represents an immense burden to our patients and, consequently, to healthcare expenditure. In an era of pay-for-performance initiatives, during which financial penalties are enforced for HF-related readmissions, reducing these occurrences has become of tantamount importance to hospital systems throughout the United States. In an effort to improve heart failure management as well as hospital readmission rates, the American Heart Association (AHA) created a collaborative quality improvement program entitled: Get With the Guidelines – Heart Failure (GWG-HF). It is the aim of this study to evaluate the efficacy of this initiative in reducing readmissions.
Methods: A university medical center in a major US city performed a retrospective chart review of randomly selected HF hospitalizations on a yearly basis for the GWG-HF initiative. This data was used to compare two years, 2012 and 2016; one in which the hospital's GWG-HF performance was sub-par (2012, N=416) and the other in which performance warranted a Gold-Standard award for adherence to guidelines (2016, N=301). GWG-HF "Achievement Measures" were selected as comparative variables between the two years.
Results: Of the GWG-HF "Achievement Measures," post-discharge appointments displayed the most significant difference between the comparison groups with 97.3% of patients having an appointment scheduled in 2016 and only 74.6% in 2012, a statistically significant difference of 22.7% (p<0.0001, 95% CI 17.1-28.1). Additionally, evidence-based beta Blocker use exhibited a statistically significant difference between the comparison years with 99.2% usage in 2016 and 91.8% in 2012, a 7.4% difference (p=0.0031, 95% CI 2.6-12.2). Measuring the LV function and ACEi/ARB/ARNi use were achievement measures with non-statistically significant differences in the two populations.
Conclusion: The GWG-HF "Achievement Measures" of scheduling post-discharge appointments and utilizing evidence-based beta Blockers were better enforced during a period with fewer 30-day readmissions. While this finding does not, in and of itself, imply a causal relationship it does lend support to the notion that compliance with GWG-HF ultimately reduces HF-related readmissions.

P1020

Echocardiographic assessment of treating patients with chronic heart failure with mid-range ejection fraction by external counterpulsation

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Introduction: The new 2016 European Society of Cardiology Heart Failure (HF) Guidelines propose a new HF classification includes a new HF category with mid-range EF (HFmrEF, LVEF 40-49%). The influence of the external counterpulsation on patients with HFmrEF is unclear.
Purpose: The aim of this study was to evaluate the echocardiographic parameters of patients with HFmrEF treated with external counterpulsation (ECP).
Methods: We studied 57 patients with stable CAD undergoing one course of external counterpulsation therapy. We categorize the patients into two groups: HFmrEF (EF 40-49%) and control group (EF>50%). Echocardiographic assessment included evaluation of the chamber size and ejection fraction by 2D and Doppler measurements.
Results: The mean age of the patients was 63.07 ± 7.44 years (43 (75.4%) men and 14 (24.6%) women). The mean age of the patients included in the HFmrEF group and control group was 64.13 ± 6.86 and 62.69 ± 7.67 years (p=0.45). There were 13 men and 2 women in the HFmrEF group and 30 men and 12 women in the control group (p=0.24). All patients treated with one course of the ECP therapy (33.87 ± 5.93 and 35.02 ± 4.57 sessions, p = 0.7714). The mean EF before treatment was 44.23 ± 3.21% and 62.18 ± 6.78% (p<0.0001). After the treatment by the ECP the mean EF in both group were 52.13 ± 7.01% and 65.73 ± 6.63% respectively (p<0.0001). When comparing the dynamics of the EF and stroke volume between two groups following data obtained: for EF: +7.90 ± 7.44 and +3.55 ± 4.27% (p=0.0487); for stroke volume: +6.35 ± 13.08 and +2.51 ± 8.03 ml (p=0.0176). After the end of treatment 9 out of 15 patients in the HFmrEF group (60%) had an EF more than 50%. When comparing the dynamics of changes in the echocardiographic parameters in the HFmrEF group and the control group, non-statistically changes observed in the following parameters: end-diastolic diameter of the LV (-0.06 ± 0.18 and -0.06 ± 0.31 sm, p=0.3504), end-diastolic volume of the LV (-0.69 ± 18.43 and -0.27 ± 12.07 ml, p=0.9783), left atrial volume (-3.73 ± 16.13 and -5.19 ± 14.79 ml, p=1.0), the ratio between early mitral inflow velocity and mitral annular early diastolic velocity (E/e', -0.65 ± 3.89 and -0.40 ± 2.74, p=0.9566).
Conclusion: ECP treatment was associated with an increase in EF and stroke volume in patients with HFmrEF.

P1021

Early effects of Sacubitril/valsartan on exercise tolerance in patients with heart failure with reduced ejection fraction.

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Introduction. Sacubitril/valsartan in patients with heart failure (HF) with reduced ejection fraction (HFrEF) was shown to be superior to enalapril in reducing the risk of death and hospitalization for HF.
Purpose. Our aim was to evaluate the cardiopulmonary effect of sacubitril/valsartan HFrEF patients.
Methods. In this observational study 94 patients with HFrEF underwent serial cardiopulmonary tests (CPET) after initiation of sacubitril/valsartan in addition to recommended therapy.
Results. At baseline, 38% of patients had New York Heart Association (NYHA) class III HF, mean left ventricular ejection fraction (LVEF) was 27 ± 6%. After a mean follow-up of 7.4 ± 3.6 months systolic blood pressure decreased from 117±14 mm Hg to 101±12 mm Hg (p < .0001); Peak oxygen consumption (VO2) improved from 14.7±3.3 mL/kg/min at baseline (% of predicted = 54.2±14) to 17.3±4.7 mL/kg/min after follow-up (% of predicted = 65.3±17.6) (p < .001), oxygen pulse increased from 11.6±2.9 at baseline to 13.7±4.2 mL/kg/min at follow-up (p < .001). VE/VCO2 Slope decreased from 34±6.3 to 31.9±6 (p= .024).

Conclusion. In ambulatory patients with HFrEF, administration of sacubitril/valsartan improved exercise tolerance, peak oxygen consumption and ventilatory efficiency at 7.4 ± 3.6 months follow-up. Further studies are necessary to better clarify underlying mechanisms of this functional improvement.

P1022

In-hospital management of disease modifying drugs in heart failure with reduced ejection fraction - an opportunity to improve?

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Introduction: Heart failure (HF) is a syndrome with high morbimortality and its prevalence continues to grow. New therapeutic options are an opportunity to change the natural history of the disease. Guidelines recommend in-hospital maintenance or initiation of all disease-modifying drugs (DMD), with titration as much as possible before discharge.
Objective: To analyse in-hospital management of DMD in HF with reduced ejection fraction (HFrEF) patients admitted in an Acute Heart Failure Unit (AHFU).
Methods: Retrospective study of consecutive hospitalizations due to acutely decompensated HF, over a year, examining hospital databases. HFrEF patients discharged from the AHFU were selected to evaluate medication at admission, in-hospital and at discharge.
Results: From the 181 AHFU admitted patients, 76 HFrEF were included. At admission 68.4% were on renin-angiotensine-aldosterone inhibitor (RASi) - 50.0% ACEi, 9.2% ARB, 9.2% ARNI; 72.4% on beta blocker (BB) and 65.8% on aldosterone antagonists (ARM). At discharge 77.6% were on RASi - 57.9% ACEi; 9.2% ARB; 10.5% ARNI; 85.5% BB and 77.6% ARM; 57.9% were on triple DMD therapy and 10.5% on Ivabradine. Regarding ACEi: 34.1% started, 18.2% increased and 27.3% maintained ambulatory dose; Regarding ARB: 14.3% started, 14.3% increased, 42.9% maintained ambulatory dose. Regarding ARNI: 25% started, 23.5% increased 50% maintained ambulatory dose. Although during hospitalization all DMD were titrated to patients maximum tolerated dose, at discharge most patients on RASi (83.1%) and BB (80.0%) were not on maximum recommended doses according to guidelines, while on ARM only few patients (27.1%) didn't reach maximum doses. Very few patients needed to reduce or suspend DMD medication at discharge - 5.8% reduced and 21.2% suspended RASi, mainly due to low blood pressure (50.0%) and renal disease (30.0%); 12.7% reduced and 10.9% suspended BB mainly due to low blood pressure (38.9%) and bradycardia (22.2%); 6% both reduced and suspended ARM mainly due to renal disease (60.0%).
Conclusion: While being a predictor of bad prognosis, hospitalization was an opportunity to optimize HFrEF treatment. At discharge patients' DMDs maximum tolerated doses were frequently inferior to guideline's recommended maximum dosages. Although in line with other real-life registries and even trials, titration should always be re-challenged in an early post-discharge assessment.

P1023

Adherence to therapy in patients with chronic heart failure

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Adherence to therapy depends on many factors, including the cost of the drugs, tolerance and effectiveness, which are not easy to assess. Antiplatelet drugs have low cost, good tolerability and public awareness. Moreover antiplatelet therapy is an essential component of the treatment in majority of cardiology patients. The aim of this study was to investigate adherence to therapy patients with chronic heart failure (CHF) and comorbidity on the model of antiplatelet drugs.
Methods. 203 patients with CHF (130 males and 73 females aged 61.8±9.6 years) were studied. CHF was defined according to ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure, 2016. The main causes of CHF were coronary artery disease with arterial hypertension in 154 (75.9%) patients. Age-adjusted Charlson Comorbidity Index (ACCI) was estimated. Comorbidity was regarded as high at index ≥ 6 scores. Quality of life, personal characteristics were evaluated. Adherence to antiplatelet therapy of comorbid patients was assessment with Four-Item Morisky Green Levine Medication Adherence Scale.
Results. Age-adjusted Charlson Comorbidity Index was 5.0±2.1 scores. The total number of drugs was taken by patients with CHF was 4.6±1.7. Patients with CHF with high comorbidity took more drugs than patients with CHF low comorbidity (4.9 ± 1.8 and 4.2 ± 1.7 respectively, p = 0.03). Antiplatelet therapy was recommended in 190 (97.6%) examined patients with CHF, of which acetylsalicylic acid (ASA) was obtained in 186 (97.9%) patients with CHF, clopidogrel - 4 (2.1%) patients. The dose of ASA was 75–100 mg. The majority of patients (163; 85.8%) had CHF of ischemic genesis. Only 99 (52%) patients had high adherence to antiplatelet therapy. Main cause of nonadherence was irregular forgetfulness (28;31% patients), side effects from the gastrointestinal tract (12;13.1%) and a large number of recommended drugs (20;21.1%). There was an inverse relationship between adherence to antiplatelet therapy and the number of drugs (r= -0.49; p <0.0001), between level of adherence to antiplatelet therapy and a violation memory of patients with CHF (r= −0.31, p=0.032). Patients with poor adherence were characterized with disadaptive obsessive-phobic type of attitude to their disease (χ2=6.22; =0.01) and the 'projection' psychic defense mechanism (=0.02). The emotive type of character accentuation prevailed (<0.001) among patients with high adherence to antiplatelet treatment.
Conclusion. Comorbidity leads to the destination antiplatelet therapy in patients with chronic heart failure. Low adherence to antiplatelet treatment is associated with personality features of chronic heart failure patients and polypharmacy due to high comorbidity.

P1024

Hemodynamic and clinical effects of ARNI therapy in patients with advanced heart failure undergoing repeated Levosimendan infusions

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Background: repetead Levosimendan infusions (rp-Levo) improve hemodynamics and symptoms in patients (pts) with advanced heart failure (aHF). Sacubitril/Valsartan, which benefit are known in pts with moderate HF, could be attempted.
Methods: from Jan 2016 to Dec 2018, 30 aHF outpatients had rp-Levo 12,5 mg (0.05-0.1 mcg/Kg/min) every 3-4 weeks awaiting heart transplantation (HTx). Seven pts (5 M, 2 F, age 53+/-10y, 3 ischemic etiology) could be weaned from rp-Levo after starting ARNI. Data at baseline (T0), at rp-Levo withdrawal (T1, median time on rp-Levo 11mo), and after 6 months (T2, median time on ARNI 8mo) were compared.
Results: Sacubitril/Valsartan median dosage was 132 + 139 mg. Changes over time are presented in the Table. An improvement in hemodynamics and RV function was observed on rp-Levo, reaching statistical significance on ARNI.Inferences: ARNI therapy could be attempted in stable pts with aHF, even if on rp-Levo, and may give a significant improvement of the hemodynamic profile despite end-stage LV dysfunction. The role of ARNI in aHF pts, including HTx candidates, deserves to be explored.

Comparison among all groups

	T0	T1	T2	p 0vs1	p 1vs2	p 0vs2
LVEF (%)	23	20	24	0,3	0,3	0,4
LVEDV (ml)	273	315	257	0,4	0,5	0,4
TAPSE (mm)	14	21	20	0,2	0,05	0,04
NTproBNP (ng/L)	3360	1584	1271	0,02	0,5	0,02
RAP (mmHg)	7	4	4	0,3	0,2	0,009
SPAP (mmHg)	48	33	26	0,3	0,2	0,01
DPAP (mmHg)	20	17	10	0,5	0,03	0,001
MPAP (mmHg)	32	22	16	0,02	0,05	0,3
WP (mmHg)	21	15	11	0,3	0,5	0,001
CI (L/min/mq)	1,8	1,8	2	0,5	0,4	0,004
VPR-I (WU/mq)	5,3	3,8	2,5	0,6	0,03	0,08
CREA (mg/dL)	1,1	1,4	1,1	0,8	0,03	0,1
BUN (mg/dL)	59	62	39	0,2	0,04	0,7

p:p-value; LVEF:left ventricular ejection fraction; LVEDV:left ventricular end-diastolic volume; TAPSE:tricuspid annular plane systolic excursion ; NT-pro-BNP:terminal fragment of brain natriuretic peptide; RAP:right atrial pressure; SPAP:systolic pulmonary arterial pressure; DPAP:diastolic pulmonary arterial pressure; MPAP:mean pulmonary arterial pressure; WP:wedge pressure; CI:cardiac index; VPR-I:indexed vascular pulmonary resistances; CREA:creatinine; BUN: blood urea nitrogen

P1025

Efficacy of bromocriptine on 2-year prognosis of life in patients with peripartum dilated cardiomyopathy

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The aim: assessment of the life expectancy of patients with peripartum cardiomyopathy at 2 years of follow-up, depending on bromocriptine prescription.
Material and methods: 50 pts with PCMP were examined, aged from 20 to 41 years old (average 28.2 ± 0.8 years). The complex of examinations included: ECG, HMECG, Echo-KG, 6-minute walk test (6MWT) with determination of the NYHA classes. Repeated contact with patients or relatives was held annually. It was studied 2 year life prognosis.
The results. All patients, depending on the destination bromocriptine, were divided into 2 grs. I group of 15 pts with PCMP, who, in addition to the standard therapy of HF, were prescribed bromocriptine at an average dose of 3.85 ± 1.25 mg. The II gr of 20 pts received optimal therapy according to ESC recommendations.
The study of the dynamics of the disease revealed that in the bromocriptine gr, complete restoration of LV function (increase in LVEF more than 55%) was observed in 7 (47%) cases, while in the standard therapy gr, LV recovery was observed only in 35% of cases (7). While no deaths were recorded in I gr, mortality in II gr was 15% (n = 3), (1 death due to progression of HF, 2 cases due to the development of SCD). During the second year of observation, another 1 patient died due to the progression of HF in II gr. As a result, cumulative mortality was 20% (n = 4).
Conclusion. Thus, the analysis of the dynamics of mortality in patients with the peripartum form of DCM showed that, against the background of optimal therapy, the additional administration of bromocriptine has a positive effect on the prognosis of life with the possibility of complete restoration of LV function.

P1026

Quality of heart failure treatment treated by residential cardiologists -The HeartFailureBavaria Project

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Background & Purpose: The quality of heart failure (HF) therapy in the hospital setting is fairly well known through clinical trials and registries, but largely undescribed in the setting of primary care and residential cardiology. HeartFailureBavaria was initiated as a network project aiming to describe characteristics and quality of care in patients with HF treated by resident cardiologists in the German healthcare setting.
Methods: 106 resident cardiologists across Bavaria agreed to characterize their consecutive HF patients on a structured case report form focussing on HF type and severity, comorbidities, diagnostic assessment, and interventional and medical treatment. Periodic benchmark reports were issued to the project group.
Results: Between 5/2014 and 12/2016, 70 cardiologists contributed information on 5497 patients with a cardiologically confirmed diagnosis of HF for the present analysis: median age 72 years; 66% male; NYHA II/III/IV in 50/36/5%; LVEF <40% (i.e., HFrEF)/40-49% (i.e., HFmrEF)/≥50% (i.e., HFpEF) in 29/29/42% of patients, respectively; sinus rhythm 60%; atrial fibrillation 29%; median heart rate 71 bpm; median QRS interval 118 ms. Frequent comorbidities were: hypertension 74%, coronary heart disease (CHD) 51%, hyperlipidemia 50%, valvular heart disease 32%, diabetes 28%, renal insufficiency 25%, COPD 12%.
Pharmacotherapy in groups of LVEF (<40/40-49/≥50%) was ACEi 69/65/57%, ARB 23/29/30%, betablocker 90/87/80%, MRA 64/48/27%, diuretics 88/75/71%, glycoside 14/10/13%, ivabradine 6/4/2% (all p<0.005, respectively). Patients aged <72 years vs. older patients received more often MRA (52% vs. 39%), triple therapy with ACEi/ARB, betablocker and MRA (46% vs. 32%), and antiplatelet therapy (54% vs. 44%); by contrast, older patients more often received diuretics (83% vs. 68%), and anticoagulation (56% vs. 33%; all p<0.001, respectively). Men and women with HFrEF were treated similarly, except for men in NYHA class III receiving betablockers more often than women: 92% m vs. 84% w, p=0.004. However, when considering all patients of all types of HF, men received individual substance classes and their combination more often (about 4-10% more often) than women, with the exception of diuretics (both sexes treated similarly) and glycosides (6% more often in women). Device therapy and interventions were: ICD 14%, CRT-D 9%, CRT-P 1%, PCI 29%, CABG 16%. The ratio of implanted to indicated devices was 0.54 for ICD (indication criteria: NYHA II/III, CHD, LVEF≤35%), and 0.32 to 0.42 for CRT (depending on the applied indication criteria).
Conclusion: HF patients cared for by residential cardiologists exhibited a good level of adherence to pharmacotherapy guidelines, without major gender-specific differences. There remains potential for improving cardiac device therapy. Despite lacking evidence how to optimally treat patients with HFpEF (and HFmrEF), utilization of respective substance classes was very similar to HFrEF patients.

P1027

To evaluate the safety and tolerability of ARNI initiation in inpatient versus outpatient setting in an Asian population: a real world study

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Introduction: TRANSITION and PIONEER HF trials showed that entresto, an angiotensin receptor neprilysin inhibitor (ARNI), can be initiated early and safely in patients with heart failure reduced ejection fraction (HFrEF) shortly after an acute heart failure episode during hospitalization. However, it is unclear whether the results can be translated to the Asian population.Purpose: To compare the tolerability of ARNI initiation and continuation rate in both inpatient and outpatient settings.
Methods: A retrospective review of all patients who were prescribed ARNI from 1 November 2015 to 30 September 2018 in a tertiary institution in Singapore was performed. Data on the incidence of adverse drug reactions (ADRs), continuation rate of ARNI and reasons for ARNI discontinuation were collected from electronic clinical documents. 1022 patients were identified. 287 of 339 patients in the Inpatient Group and 549 of 683 patients in the Outpatient Group were included. Exclusion criteria include missing data, defaulted medication and initiation of ARNI in another institution.
Results: In the Inpatient Group, 89 patients (30%) experienced ADRs, 26 (30%) experiencing ADRs whilst inpatient and discontinuation rate is 48 (55%). In the Outpatient Group, 93 patients (17%) experienced ADRs and discontinuation rate is 47 (51%). Reasons for discontinuation of ARNI in both groups were similar - common reasons include worsening kidney function and hypotension.
Conclusion: Although inpatient ARNI initiation may be associated with higher rates of ADRs, tolerability and continuation of ARNI are similar in both groups. This may provide further evidence that ARNI can be safely initiated inpatient and allows optimisation of treatment for patients with HFrEF.

	Inpatient Group	Outpatient Group	Total
Total patients included	287 (34.3%)	549 (65.7%)	836
Male	209 (72.8%)	426 (77.5%)	
Mean age ± SD	64 ± 12.1	62 ± 12.3	
Mean EF before initiation of ARNI ± SD (%)	24 ± 7.2	26 ± 12.3	
Mean SBP before initiation of ARNI ± SD (mmHg)	116 ± 17.8	121 ± 20.2	
Total ADRs	87 (30%)	93 (17%)	180
Worsening kidney function	28 (32%)	11 (12%)	39
Asymptomatic hypotension	27 (31%)	20 (22%)	47
Symptomatic hypotension	21 (24%)	12 (13%)	33
Total discontinuation	48 (55%)	47 (51%)	95

P1028

The optimize-heart failure care program in our heart institute in Vietnam

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Our heart institute in Vietnam taken part in the Optimize Heart Failure (OHF) program since October 2016. The aims of this program are to improve patients outcomes by improving heart failure (HF) patients' awareness of their condition, and by optimizing HF treatment according to a locally-agreed guidelines (based on the ESC guidelines)

with checklists to improve guideline adherence in hospital and at subsequent clinic review.
All HF patients with left ventricular ejection fraction < 50% hospitalized in our Institute have been included in the program since October 2016. The patients received education about diet, exercise, weight control and the detection of worsening HF symptoms at home, and HF treatments. All patients were reviewed at 2 months (M2) and 6 months (M6) for clinical signs, treatments and outcomes (readmission and death at 30 days, 60 days and 6 months after discharge). We also performed a telephone survey at 6 months after discharge to check their knowledge and their self-management on the four education topics. The start-up step (basic program) enrolled 401 patients (October 2016 and November 2017) and the full program has enrolled 211 patients to date (Jun 2018-November 2018). All patients were treated according to the same protocol but the full program also included reinforcement of patient education and practitioner guideline adherence.
Data will be presented to show our real word evidence: an improvement of knowledge and practice of HF patients in all of the 4 education themes and an improvement in pharmaceutical prescription rate (including renin-angiotensin-aldosterone system inhibitors, beta-blockers, mineralocorticoid receptor antagonist, and ivabradine for HF patients with NYHA II-IV and sinus rhythm). The rate of readmission and the mortality at 30 days and at 60 days after discharge were also improved with the full program compared with the basic program.
Conclusion: Pharmaceutical guideline adherence has been improved in Vietnam by using simple checklists and regular hospital educational meetings for healthcare professionals. Educational reinforcement helps patients retain information and to follow lifestyle and medical advice. The OHF Care Program is simple, inexpensive, and easy to implement in our country, and may well be easy to implement in other developing countries.

P1029

The effect of inhibitors of angiotensin receptors and neprilysin on the clinical and functional status of patients with dilated cardiomyopathy

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The aim. Evaluation of clinical efficacy in patients with CHF of non-coronary etiology at the stage of inpatient and outpatient treatment.
Materials and methods. The study included 64 pts with CHF III-IV FC on NYHA, non-coronary etiology hospitalized for developing decompensated HF, which were divided into 2 groups: Group I comprised 32 people who were prescribed sacubitril / valsartan in an average dose of 28.45 ± 15 , 5 mg / day. Patients in group II (n = 32) took ACE inhibitors in recommended doses.
Results. Tolerability was rated as satisfactory in both groups. 2 patients noted a more significant hypotension in the group of ARNI when initiating therapy, with the stabilization of SBP and DBP by the end of the hospitalization, and therefore, the drug was continued to be administered. After 1 month of observation, when assessing the clinical and functional status of patients with DC, there was a significant decrease in the total weight in both grs on 11% and 9%, HR - on 11% and 12%, respectively, in grs I and II. There was a significant effect on central hemodynamic parameters, and the increase in SBP and DBP in I gr was 13% and 9%, while in II gr, the increase in SBP and DBP was only 5% and 7%, respectively. There was a significant decrease of HR on 21% and 12% more significant in I gr ($p < 0.01$). Objective improvement in functional status was observed in both grs. Thus, in I gr, 6MWT indicators improved from 84.00 ± 36.30 to 280.00 ± 83.21m, while in II gr it was, from 82.00 ± 46.32 to 240.00 ± 76.35m (all $p < 0.01$). When analyzing the quality of life using the Minnesota questionnaire, it was noted that the total score was significantly reduced in both intra- and intergroup comparison (from 86.25 ± 20.12 to 18.20 ± 12.14 in I gr and from 88,25 ± 26.78 to 28.12 ± 15.13 in II gr).
Conclusion. The use of standard HF therapy in the inpatient and outpatient stages is accompanied by an improvement in the indicators of quality of life and clinical and functional status. At the same time, when ARNI was prescribed, a greater positive effect on the initial parameters was noted.

P1030

Indicators of echocardiographic examination with the use of sacubitril/valsartan in patients with CHF caused by dilated cardiomyopathy

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The aim: Evaluation of the effect of RAAS inhibitors and neprilisine inhibitors (Sakubitril / Valsartan) on echo indicators in patients with dilated cardiomyopathy (DC)

Materials and methods: The study included 64 patients with chronic heart failure of III-IV NYHA classes, caused by DC, divided into: Gr I - 32 who were prescribed sacubitril / valsartan at an average dose of 28.45 ± 15.5 mg/day. Pts in gr II (n = 32) took ACE inhibitors in recommended doses. Echocardiography - the survey was carried out according to the standard technique.
Results. A significant positive effect was noted, accompanied by an increase in LV EF from 30.93 ± 6.43% to 34.71 ± 4.24% (10%) in I gr and from 28.28 ± 7.5% to 30.01 ± 6,33% (6%) in II gr, with a decrease in the cardiac meassures: LA-6% and 5%, EDD-8% and 4%, ESD-10% and 5%, respectively to I and II grs, with no significant differences between them. At the same time, it was noted that the indicators of the MPAP in I gr had a greater decrease compared with II gr (initially 57.67 ± 14.08 and 56.67 ± 9.08 42.17 ± 8.48 mm Hg, in dynamics - 42.17 ± 8.4 and 48.67 ± 12.08 mm Hg (by 27% and 15% respectively), in parallel with the decrease of RV – on 9% and 5%
Conclusion. The use of standard therapy for heart failure leads to a positive effect on echocardiographic parameters, while the appointment of ARNI has a greater positive effect compared with ACE inhibitors.

P1031

Inpatient versus outpatient introduction of angiotensin receptor neprilysin inhibitor in chronic heart failure patients

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Background: According to current guidelines, angiotensin receptor neprilysin inhibitors (ARNIs) are indicated in ambulatory patients with chronic heart failure (HF) and reduced ejection fraction (EF).
Purpose: To assess the safety and effects of ARNI introduction in HFrEF inpatients compared to outpatients in a retrospective single-center registry.
Methods: In an observational retrospective and mono-centric registry at our institution we included all HFrEF patients who received a Sacubitril/Valsartan prescription from July 2015 to November 2016 . All patient data was recorded in their medical files at baseline at follow-up at 6 months for safety, and efficacy. Patients were retrospectively classified into 2 groups according to ARNI introduction mode: inpatient or outpatient.
Results: 89 patients were included in our registry: 49 were outpatients and 40 inpatients. Mean systolic blood pressure at ARNI start was similar between outpatients and inpatients (117±15 versus 110±16 mmHg, respectively; p=0.06) as was glomerular filtration rate (GFR) (67.8±26.1 versus 64.0±25.2 ml/min, respectively; p=0.49). At 6 months follow-up, ARNIs had been continued in 90% of the outpatients versus 92% of the inpatients (p=0.79). There was a trend toward more symptomatic hypotension episodes in the inpatient group compared to the outpatient group (30,7% versus 18.6%, respectively; p=0.2) but GFR remained similar between groups (66.8±29 vs 59.5±25 ml/min; p=0.23) and the was no difference in hyperkalemia incidence between the outpatient and inpatient groups (4.7 versus 7.8%, respectively; p=0.56). In both groups, there was a significant improvement in NYHA class and LVEF at 6 months compared to baseline status.
Conclusions: In a monocentric observational registry, there was no significant difference in safety and efficacy in ARNI prescription between inpatients and outpatients with chronic HFrEF.

P1032

Management of patients with advanced heart failure and type 2 pulmonary hypertension.

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Introduction: Pulmonary hypertension (PH) is a common sequel of chronic heart failure, often with precapillary component. High pulmonary arteriolar resistance (PAR) is a negative prognostic sign and can complicate heart transplantation (HTx). The aim of this analysis was to present the approach to the patients (pts) with precapillary PH who were listed for Htx in our institution.
Patients and methods: Consecutive patients (pts) evaluated for HTx during period 1/2010 – 12/2017 were analysed, with a view to subgroup with precapillary PH. Hemodynamic investigations were performed using Swan-Ganz thermodilution catether. Precapillary PH unacceptable for HTx was defined as PAR > 4 Wood units and/or transpulmonary gradient (TPG) > 15 mm Hg, measured under euvolaemic conditions. Reversibility of PH was stated when PAR and TPG declined to values acceptable for HTx after testing by prostaglandin E1 or sildenafil.

Results: The criteria for unacceptable PH fulfilled 85 pts (69 men, 21-73 yrs). Reversibility of PH was achieved in 69 % of them.

Subsequently, all the pts were closely monitored in order to achieve optimal therapy. Fifty pts were treated with PDE5 inhibitor sildenafil (Revatio fi. Pfizer 60-120 mg/d). Duration of therapy was 9-91, median 10 months. Thirty nine (78%) pts were responders, only one did not tolerate the treatment.
Left ventricular mechanical circulatory support Heart Mate II fi.Thoratec (MCS) was implanted in 39 pts, in 15 of them solely for PH. Decrease of PAR was achieved in 27/28 measured pts.
All the pts were listed, HTx was subsequently performed in 65 (77 %), 9 (11 %) died on waiting list (WL), one pt. was left on MCS, 2 were excluded for comorbities, others are still on WL.
HTx was performed in 39 pts on special protocol ("ovesized donor heart", postoperative NO inhalation) and in 26 pts on MCS. In the early postoperative period 10 (15 %) of pts developed transient right ventricular failure, none died due to graft failure.
Conclusions: Precapillary PH in pts with advanced HF require special management. With contribution of sildenafil and MCS majority of pts can proceed to successful HTx.

P1033

Neuroendocrine inhibition in patients with heart failure and severe aortic stenosis undergoing TAVI

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Background: Neuroendocrine inhibition with beta-blockers (BBs) and renin-angiotensin system inhibitor (RAS-i) has been postulated to decrease morbidity and mortality in patients with heart failure and reduced ejection fraction. However, there is inconclusive data about the role of BBs and RAS-I in patients with severe aortic stenosis (AS) undergoing transcatheter aortic valve implantation (TAVI).
Purpose: We aim to demonstrate that BBs and RAS-i will decrease morbidity and mortality in patients with severe AS after the left ventricular outflow obstruction has been resolved with TAVI.
Methods This is a retrospective cohort study of patients with severe AS that underwent TAVI between April 2012 and March 2016 in a tertiary cardiovascular center. The presence of neuroendocrine inhibition with BBs, RAS-i or both (BBs +RAS-i) was assessed. Evaluated outcomes included 30-day and 1-year mortality, length of stay, acute kidney injury (AKI), stroke and heart failure readmission (one month).
Results Out of the 372 patients that underwent TAVI in our institution, 158 (42%) were female with a mean age of 84.9 ± 6.7 years and mean STS score of 6.93 ± 4.01. A total of 127 (34%) patients had heart failure with reduced ejection fraction, 291(78%) had hypertension, and 79(21%) had diabetes mellitus. Their mean creatinine was 1.13-±0.58 mg/dl, mean AV-area was 0.65 ± 0.17 cm2 and mean AV-gradient was 49.4 ± 13.2 mmHg. A transfemoral approach was performed in 261 (70%) of the patients. Neuroendocrine inhibition was present in 324 (87%) patients, of these, 284 (76.3%) were on BBs, 151 (41%) were on RAS-i, and 111 (30%) were on BBs + RAS-i. See Table 1 for clinically relevant outcomes.
Conclusions This study suggests that neuroendocrine inhibition with RAS-i is associated with lower hospital stay and 30-day mortality in patients with severe AS and heart failure undergoing TAVI. The rate of post-TAVI AKI was not affected by the presence of RAS-i. Beta-blockers failed to demonstrate any significant outcome.

P1034

The effect of lisinopril on the functional state of the kidneys in patients with renal dysfunction

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Purpose. To study the effect of lisinopril on the indicators of the functional state of the kidneys of patients with I-III functional class (FC) of chronic heart failure (CHF) depending on the degree of renal dysfunction (RD).
Methods. A total of 118 patients with ischemic heart disease from I-III FC CHF, who were examined at baseline and after 6 months of standard therapy with - lisinopril. All patients were divided into 2 groups depending on the estimated glomerular filtration rate (eGFR): 30≤60 ml/min/1.73m2 – 89 patients. The average age of patients was 60.3 ± 6.6 years. To determine the functional state of the kidneys, the level of serum creatinine (Cr) and eGFR were determined by formula CKD-EPI.
Results. Analysis of eGFR showed that among 29 patients with eGFR<60 ml/min/1.73 m2: in 12 patients 30≤60 ml/min/1.73m2 in the first group Kp and eGFR were 83.7±14.7 μmol/l and 79.6±14.8 ml/min/1.73m2 respectively.
In the group of patients with eGFR>60 ml/min/1.73m2, against the background of a 6-month therapy with lisinopril, a significant decrease in Kp and an increase in eGFR by 8% ($p<0.005$) and 9.6% ($p<0.005$), respectively;. in the group of patients with eGFR= 59–45 ml/min/1.73m2 (CKD 3A stage), with a 6-month therapy of lisinopril, there was a significant increase in eGFR by 8% ($p<0.05$), respectively. In the group of patients with eGFR=44–30 ml/min/1.73m2 (CKD 3B stage), with a 6-month therapy of lisinopril, there was only a tendency to improve these indicators.
Conclusion. In patients with CHF with intact eGFR>60 ml/min/1.73m2 and moderate RD with eGFR=59-45 ml/min/1.73m2, the use of lisinopril in standard therapy showed significant nephroprotection. In patients with chronic heart failure with RD with 30>eGFR<45 ml/min/1.73m2 with a 6-month therapy of lisinopril, there was only a tendency to improve indicators of RD.

P1035

Levosemindan using in pediatric patients with end-stage heart failure: single center experience.

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Background: in adult patients with end-stage heart failure repetitive levosimendan infusions are widely used. In this population multiple infusions of levosimendan leads to improvement of hemodynamics and relief of symptoms, and also decrease rehospitalization rates. But data's about repeated levosimendan infusions effects in children and infants with decompensated heart failure are limited.
Purpose: to evaluate effectiveness and safety of multiple levosimendan infusions in pediatric patients with end stage heart failure.
Methods: from January 2015 up to December 2018 65 children's with end-stage heart failure were under observation in our center. Median age – 5,4 years (range 2 month – 15 years). Boys 28 (43%), girls – 37 (57%). For all patients standard clinical investigations, ECHO, pro-BNP levels, 6-MWT (in patients older 6 year) were performed at baseline before first administration of levosemindan and 3 days after, and then in the same schedule during next hospitalisations. We have done 2-3 levosimendan administrations during one hospitalization with 7-10 days interval. Median period between rehospitalisations was 3 month. Total number of infusions

P1033: Table 1.

	Beta-blockers	RAS-inhibitors	RAS-i plus beta-blockers						
	Yes(284)	NO(88)	p-value	Yes(151)	NO(221)	p-value	Yes(111)	No(261)	p-value
30-day mortality	12 (4.23)	6 (6.82)	0.391	3 (1.99)	15 (6.7)	*0.046	2 (1.8)	16 (6.13)	0.110
1-year mortality	52(18.3)	16(18.2)	1.000	25 (16.5)	43 (19.5)	0.498	19 (17.1)	49 (18.7)	0.770
Length of stay	7.5± 4.2	7.8±4.9	0.730	7.2±3.8	7.8±4.7	0.163	6.9± 2.5	7.8± 5.0	*0.013
Acute Kidney Injury	63 (22.3)	20 (22.7)	1.000	29 (19.3)	54 (24.4)	0.256	23 (21.0)	60 (23.0)	0.685
Stroke	3 (3.4)	13 (4.5)	0.770	3 (1.99)	13 (5.88)	0.074	3 (2.7)	13 (5.0)	0.411
30-day readmission (HF)	3 (3.37)	12 (4.23)	1.000	3 (2)	12 (5.4)	0.111	3 (2.7)	12 (4.6)	0.567

HF (Heart Failure)

was – 358. The continuous infusion of levosimendan was uptitrated to a maximum dose of 0.2 mg/kg/min in all patients, first 24 hours – we have administrate drug in dose 0,1 mg/ kg/min, next 24 hours – 0,2 mg/kg/day.
Results: Total number of infusions for 65 patients during 3 year composed 358. In 16 patients (24%) with hypotension we have used combination of levosimendan and dobutamin. ECHO data's: mean left ventricle ejection fraction (LVEF) before and after first levosimendan administration was not significantly changed – 18 ± 5% vs 20 ± 6,3% respectively. However, during follow-up period after 5-6 infusions mean LVEF significantly increased 25 ± 3,8 % ($p<0.005$). Baseline mean pro-BNP level was – 22000 ± 7567 pg/ml, after the first two infusions it was significantly decrease – 15000 ± 5500 pg/ml ($p<0.005$). During follow-up period continued decreasing of pro-BNP level has been noted. Mean pro-BNP level after 6 infusions was 7500 ± 1853 pg/ml, significantly lower in comparison with baseline ($p\leq 0.03$). There were no serious adverse events in the study population.
Conclusions: our data shows that multiple levosimendan infusions in children with end-stage heart failure demonstrate positive clinical and hemodynamic effects, well tolerated without severe adverse events. Further evaluation is required for determine optimal levosimendan administration regimen, frequency and combination with other inotropic drugs in children's with severe heart failure..

P1036

Availability and accessibility to heart failure treatment in latin america

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Introduction: Economic deprivation is considered an independent risk factor for Heart Failure (HF), beside this, there are other specific risk factors with greater incidence in Latin America (LA), such as hypertension, rheumatic fever and chagas disease. Prevalence of HF in LA is estimated in 1.0-2.0%. Decreased hospitalization and mortality are related to adherence to guideline-directed medical therapy (GDMT) and cardiac devices.
Purpose: Inadequate access to HF therapies deteriorates quality of life, increases hospitalization and mortality. This paperwork aims to reveal data about treatment access in LA; this information will help to generate new health policies and fulfill the specific needs for each country.
Methods: A descriptive observational study was conducted in 19 countries of LA. A structured questionnaire was sent to each national coordinator of the Council of Heart Failure and Pulmonary Hypertension of the Interamerican Society of Cardiology. This questionnaire evaluated "availability" (available: yes, no) and "accessibility" (type of access: public, private, patient, donation or research) to 21 pharmacological agents , cardioverter defibrillator (ICD) and cardiac resynchronization therapy (CRT). Data was collected since January 2017 until June 2018.
Results: All countries had "Availability" to cardiac devices (Table 1)and to, at least, one of the GDMT options. Public access (ideal coverage) to at least 50% of all therapies was found in 52.6% of countries (Figure 1) and patient access to at least 50% of all available therapies was found in 15.8% of countries.
Conclusion: LA has availability to, at least, one option for each of the GDMT therapies in HF patients. Public access is high for dobutamine (84.2%), moderate for devices (63% and 57.9% for CRT and ICD), and low for new GDMT options (21.1% for Ivabradine and ARNi: Sacubitril/Valsartan). Donation and research are still needed to access some treatments in some countries. Results will help health authorities and cardiovascular institutions to overcome economic deprivation effects and reach higher accessibility to GDMT and devices in each country.

Table 1.Access to cardiac devices

Type of access	ICD n(%)	CRT n(%)
Public	12(63,2)	11(57,9)
Private	4(21)	5(26,3)
Patient	2(10,5)	2(10,5)
Research	-	-
Donation	1(5,3)	1(5,3)
Not available	-	-

Figure 1.Public health systems coverage

P1037

Decongestion therapy: does it differ from discharge to usual life conditions and among heart failure patients?

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Introduction: Most decompensations of heart failure (HF) are due to congestion. At discharge from hospitalization patients are supposed to be in their dry weight, as congestive signs at this time are a predictor of rehospitalizations and mortality. Although most times euvolemic state is obtained during hospitalization, ambulatory habits and lifestyle diverge from hospital conditions, and medication might need to be adjusted.
Objective: To evaluate the adequacy of the prescribed diuretic dose at discharge on ambulatory conditions at reassessment after 2 weeks (average), and if there are differences on the diuretic dose among ejection fraction groups.
Methods: Retrospective study of consecutive hospitalizations due to decompensated HF in an Acute Heart Failure Unit (AHFU) over one year, between November 2017 and October 2018, examining hospital databases. Patients who were reassessed in a period of 30 days in Day Hospital (DH) were selected, and diuretic therapy changes were assessed.
Results: Of 162 patients discharged directly from the AHFU, 142 (87.7%) were referred to DH revaluation; of these, 29 didn't attend to the booked appointment, with a final population of 113 patients. The mean time to reassessment was 12 days, with 37 (32.7%) patients needing to increase diuretic dose at this time due to congestion (average of 3.6 kg weight increase) – 81.0% needed to increase loop diuretic dose, 45.9% thiazidic-like and 8.1% mineralocorticoid receptor antagonists (MRA). 70.2% of them were with sequential nephron blockage. 51.4% patients needed endovenous diuretic administration in the first evaluation and 3 were rehospitalized before 30 days after discharge due to decompensated HF. Out of 76 patients that didn't need diuretic adjustment in their visit, only 2 were readmitted in 30 days due to decompensated HF. 31.0% of non-reduced ejection fraction (non-HFrEF) needed diuretic adjustment and 34.5% of reduced ejection fraction (HFrEF)needed it as well.
Conclusion: Nearly a third of patients revaluated at DH needed diuretic adjustment at the first visit, with no difference between HFrEF and non-HFrEF. This supports the importance of early revaluation after discharge for therapy readjustment, preventing future readmissions. In our experience, revaluation at 12 days allowed not only adjustment of oral diuretic dose but also administration of IV diuretic, preventing 84.2% rehospitalizations. Diuretic doses at discharge might be appropriate for in-hospital setting, but commonly not enough at ambulatory environment. Future studies should be directed to the increase of diuretic dosage at discharge in order to prevent early readmissions and mortality.

P1038

The European Heart Failure self-care behaviour scale: psychometric testing of the Hebrew version

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Background: Regular assessment of self-care behaviour is important to tailor patient's care and to evaluate effectiveness of interventions such as educational programs or heart failure (HF) disease management programs. The European Heart Failure Self-care Behaviour Scale (EHFScBS) is a validated instrument used worldwide.
Aim: To develop and evaluate validity and reliability of the Hebrew version of the 9 item EHFScBS in Israel HF patients.
Methods: In order to develop the Hebrew version of the EHFScBS, forward and back translation was performed according the standard translation process of the scale. Content validity of the scale was assessed by Israeli HF experts including HF nurses and HF cardiologists and usability was assessed by HF patients. For the psychometric evaluation, 102 HF patients (mean age 61±12 years, male 75%, NYHA II and III 42% and 51% respectively) from 2 studies performed in 2007 and 2015-2017 in a tertiary teaching hospital in Israel, were analysed. As for validity, content validity, construct validity and known-groups validity were assessed. Reliability was evaluated with internal consistency. This 9-item scale ranges from 0-100, with higher scores indicating better self-care behaviour.
Results: Experts reported that items concerning general self-care to reduce weight and smoking cessation were missing. Patients found the scale easy to complete after a short explanation and took no more than 10-15 minutes to complete it. An explore factor analysis using a principal component analysis with varimax rotation extracted two factors. Factor 1 consisted of 5 items regarding health maintenance behaviour such as "take a low-salt diet" (items 1, 5, 7, 8 and 9) and factor 2 included 4 items about consulting behaviour such as "if short of breath increases I contact my doctor or nurse" (items 2, 3, 4 and 6). Known-groups validity testing revealed a significant difference before and after an educational intervention in the total score (n=40, 41.6 ± 23.8 vs. 67.6 ± 21.8, p < .01). Values of Cronbach's alpha in total score, factor 1 and 2 were 0.78, 0.68 and 0.76, suggesting that internal consistency of this scale was acceptable.
Conclusions: Our study provides support for usability, validity and reliability of the 9-item Hebrew version of the EHFScBS. The scale in the current format is ready to use for assessing self-care behavior in Israeli HF patients.

Chronic Heart Failure - Clinical

P1039

Formation of cardio-renal syndrome in patients with chronic heart failure and type 2 diabetes, depending on the choice of glucose-lowering therapy

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Objective: To evaluate the contribution of various glucose-lowering drugs and their combinations to the formation of cardio-renal syndrome in patients with chronic heart failure (CHF) and chronic kidney disease (CKD).
Materials and methods: 223 patients with CHF were examined, among whom 98 patients had a history of type 2 diabetes mellitus. In 67 subjects, CKD was identified. The diagnosis of CHF was confirmed by the presence of myocardial dysfunction according to echocardiography and an increase in the concentration of N-terminal fragment of the brain natriuretic peptide (NT-proBNP) in the blood of more than 125 pg / ml by ELISA. The diagnosis of CKD was confirmed by lowering the estimated glomerular filtration rate using the formula CKD-EPI (eGFR) <60 ml / min / 1.73 m2 for at least 3 months.
The filtration function of the kidneys was also determined by the level of cystatin C in the blood and Cystatin-based eGFR (CKD-EPI). Depending on the received sugar-lowering therapy, patients with CHF and CKD were divided into four groups: the first group included 21 patients (31.3%) taking metformin, the second group included 12 (17.9%) patients receiving insulin therapy, the third - 15 (22.4%) surveyed taking sulfonylurea drugs, in the fourth group - 29 (43.3%) people who used a combination of metformin and sulfonylurea drugs.
Results: the groups did not differ by gender, age, comorbidity or concomitant therapy, as well as in type of CHF depending on LV EF (for rLVEF pmg=0,124; for mrLVEF pmg =0,459; and for pLVEF pmg =0,691). The average LV EF was, respectively, 52,3±7,8%, 56,0±9,2%, 51,8±6,0%, 58,5±9,1% (pmg =0,731).
NT-proBNP was significantly different between the groups: the maximum in the second group was 687.5±129.4 pg/ml, the minimum in the first group was 209.4±96.5 pg/ml, the intermediate value in the third and fourth group, respectively: 348.6±87.7 pg / ml and 367.9±99.7 pg / ml (pmg =0,002).
Parameters of the LV diastolic function were significantly different between groups: septal e', lateral e', E/e' in the second group were higher than in the first, third and fourth group (pmg <0.001 for all parameters). Groups did not statistically significantly differ in Creatinine-based eGFR (pmg = 0.216). Cystatin C and Cystatin-based eGFR did not depend on the choice of glucose-lowering therapy but correlated with NT-proBNP (r = 0.685, p <0.05 and r = -0.804, p <0.05, respectively). Conclusion: in patients with type 2 diabetes and CKD, the type of CHF does not depend on the choice of glucose-lowering therapy. In patients who take insulin therapy, more severe CHF is formed, assessed by NT-proBNP, and while taking metformin is less pronounced. The use of Cystatin-based eGFR (but not Creatinine-based eGFR) to assess the dynamics of CKD showed that the decrease in filtration function of the kidneys is not associated with the choice of glucose-lowering drugs, but depends on the CHF severity.

P1040

Iron parameters and erythropoietin level in patients with chronic heart failure.

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Introduction: chronic heart failure (HF) is a global health problem. One of the most common co-morbidities in HF is presence of iron deficiency (ID) and anemia. Anemia and ID is an independent predictor of high risk of cardiovascular complications in patients with HF. In the 2016 ESC guidelines for the diagnosis and treatment of HF, systematic measurement of iron parameters: serum ferritin and transferrin saturation (TSAT) is recommended in all patients with HF. The causes of anemia and ID in HF are different, such as insufficient intake of iron from food, increased levels of pro-inflammatory cytokines, hemodilution, chronic kidney disease and others. The role of erythropoietin (EP) in the development of anemia in patients with CHF and saved glomerular filtration has not been established.
Methods: Serum concentrations of iron, ferritin, TSAT, soluble transferrin receptors (STR), EP, 6-minute walk test were measured in 80 patients with chronic systolic HF [age: 70.82±7.66 years, men: 30, New York Heart Association (NYHA) class: 0/19/45/16] at a therapeutically department. The control group consisted of 10 patients without HF [age: 67.40±4.69 years, men: 3]. All standard echocardiography and tissue Doppler echocardiography (TDE) were performed with GE Vivid 7 Medical System. Conventional measurements include left ventricle (LV) cavity dimensions, wall thickness, fraction ejection and transmitral flow velocities, evaluation of diastolic parameters.
Results: comparison of iron metabolism in groups of patients with HF of different functional classes with the control group revealed a significant decrease in iron and ferritin levels and an increase in the concentration of STR in all groups of patients with HF (p<0,05). The level of STR in the serum of patients with NYHA 3-4 was significantly higher (p<0,05). In 62.5 % patients with HF were diagnosed with ID with low ferritin. Anemia, according to WHO criterias was detected in 30% patients, the level of hemoglobin corresponded to a mild degree. In all patients glomerular filtration rate corresponded to mild or moderate decrease. An increase in the concentration of EP was found in all patients with HF compared to the control group.
In patients with HF and ID, LV cavities were increased and ejection fraction was reduced with increasing NYHA classes. Patients with NYHA of 3-4 were observed decrease of contractile ability of myocardium of the left ventricle and the violation of diastolic function (p<0.05).
Conclusions: the frequency of anemia and iron deficiency increases about the progression of HF. In most patients with NYHA 3-4 there are signs of iron deficiency. In patients with HF with saved glomerular function, the EP content significantly increases with the increase of severity of HF. Iron deficiency in patients with HF is associated with decrease systolic and diastolic function of myocardium of the LV. Therefore detection and treatment of ID needed in addition to conventional therapy for HF.

P1041

Ambulatory heart failure patients: temporal pattern of vitamin D

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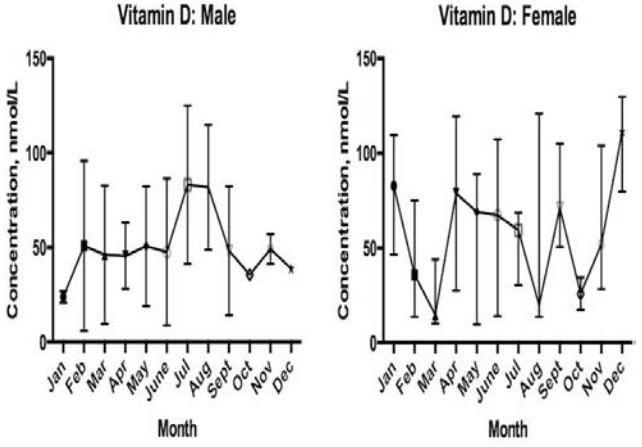
Introduction: Vitamin D insufficiency is common within the Irish population and heart failure (HF) patients are particularly at risk. Moreover, elderly HF patients are at risk of reduced sun exposure leading to reduction in vitamin D level. Various studies had investigated the role of vitamin D in improving outcome in heart failure and low vitamin D correlates to poor prognosis in patients with left ventricular assist device. Routine vitamin D blood measurement is not part of HF follow-up as per ESC

guidelines, yet it is vital in general well-being of patients. The aim of this study is to examine temporal vitamin D pattern in all heart failure subtypes patients attending the Heart Support Unit (HSU) of our Hospital.
Method: 343 consecutive patients attending HSU from period January to December 2017 were included. Vitamin D, ntProBNP, eGFR, creatinine, calcium, phosphate, and albumin levels was extracted. Descriptive statistical analysis was calculated. Range was described as median with inter-quartile range.
Result: Data was available in 294 of the 343 heart failure patients, 170 male (77 [65:83] years, 57.8%) and 124 female (81 [74:85] years, 42.2%) patients. Only 91 (30.9%) patients (48 were female) had vitamin D level checked at least once within the year. Female patients display bimodal dipping of vitamin D concentration reaching the level of insufficiency (<50umol/L) during winter and autumn (Figure 1). In the female cohort, vitamin D level was deficient at 15 [10:14] nmol/L mid-winter



Vitamin D distribution

versus 67 [14:107] nmol/L in mid-summer. 276 (93.9%) patients had ntProBNP level in 2017 with eGFR of 47.6 [33.4:64.7] (mL/min/1.73 m^2). Creatinine was marginally lower in male (122 [102:152] umol/L) compared to female (144 [80:152] umol/L). Calcium and Phosphate levels were normal, 2.3 [2.2:2.4] umol/L (both), and 1.0 [0.86:1.2] umol/L in male and 1.1 [0.98:1.3] umol/L in female. Albumin level was normal (37 [32:40] umol/L vs 37 [34:39] umol/L) respectively.
Conclusions: Vitamin D levels are not routinely check in HF patients especially in those who have impaired renal function which impacts on vitamin D metabolism but without obvious perturbations in calcium or phosphate homeostasis in this cohort. The temporal vitamin D pattern in female cohort dipped in winter and autumn, that may reflect the seasonal exposure to sun. Interestingly, no bimodal pattern observed in level of vitamin D in male heart failure cohort, possibly due to more engagement in physical activity outdoors. These finding suggest the need for routine vitamin D measurement and treatment in heart failure patients.

P1042

Angiotensin-converting enzyme inhibitors in female patients with diabetes mellitus in reduced ejection fraction heart failure

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Back ground: Although sex-specific differences in cardiovascular medicine are well known, the exact influences of sex on the effect of cardiovascular drugs remain unclear. Furthermore, women are also less often treated with evidence-based drugs therapy. Angiotensin-converting enzyme inhibitors (ACE-I) should be prescribed to all patients with left ventricular systolic dysfunction. Patients may also have multiple comorbidities at the same time. Clinical guidelines for the management of type 2 diabetes (DM II) recommend individual therapy. If treatment is individualized for every patients the prognosis could be better in patients with multiple comorbidities. This study aims to evaluate the effects of ACE-I on all-cause mortality in reduced ejection fraction heart failure (HFrEF) according to patients' genders and the presence or the absence of DM II.
Method and Results: 399 male patients and 231 female patients with HFreF were recruited to the study. The EF of males was lower. More male patients were on the ACE-I than female patients. Almost 40% of the males and females had DM (Table 1). 105 patients (70%) with DM were on the ACE-I in the male group, 66 patients (67%) with DM were on the ACE-I in the female group, p=Not significant (NS). 207 male patients (52 %) and 106 female patients (46%) of the cohort died during a median follow-up duration of 54 months, p=NS. Although 26 of female patients (39%) with DM who were on the ACE-I treatment died, 20 of female patients (61%) with DM who weren't on the ACE-I treatment died (p=0.046) during follow-up. There was no significant statistical difference for all-cause mortality between the females with the ACE-I treatment (50%) who died and the females without the ACE-I treatment (35%) who died in the patients without DM (p=NS). It wasn't determine any difference for all-cause mortality among in the males with or without DM who were on ACE-I or were not on ACE-I in the patients with HFreF.
Conclusion: It was determined that more female patients with DM who were not on the ACE-I treatment died compared to the female patients with DM who were on the ACE-I treatment during the follow-up in the study. There wasn't similar difference in the male group.

General Characteristics of Patients

	Male (n=399)	Female (n=231)	p
Age (years)	66± 11	66± 13	NS
Ejection fraction (%)	24 ± 9	27± 10	0.001
Diabetes	151 (38%)	99 (43%)	NS
ACE-I	302 (76%)	158 (68%)	0.047
All-cause mortality	207 (52%)	106 (46%)	NS

P1043

Association of serum galectin-3 with depression in heart failure with reduced ejection fraction

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Background / Introduction: Immunoinflammatory activation has been recognized as an integral feature of heart failure (HF) pathophysiology. Galectin-3, a β-galactoside-binding lectin, has been implicated in myocardial inflammation and fibrosis.
Purpose: We sought to examine the association of galectin-3 with indices of depression in patients with heart failure and reduced ejection fraction (Left Ventricular Ejection Fraction<40%) (HFREF).
Methods: We enrolled 87 consecutive patients with HFREF (age: 65.01±9.58years, 56% ischemic HF) regularly visiting our outpatient clinic. Galectin-3 concentrations in serum were determined by an automated quantitative test using the ELFA technique. Screening for depressive symptoms was performed using the Zung self-rating depression scale (SDS) and the Beck Depression Inventory (BDI). Statistical analysis was performed using SPSS 19.
Results: Serum galectin-3 levels were 21.77±13.12ng/ml. Galectin-3 concentrations showed a positive association with indices of depression, including SR raw score Zung (r= -0.397, p=0.011), and total score BDI (r= -0.348, p=0.035). In multiple linear regression analysis, galectin-3 independently positively predicted SR raw score Zung (B:0.351, 95%CI for B: 0.066 – 0.636, p=0.018), after adjusting for age, gender, NYHA, LVEF, logNT-proBNP, urea and Na. In ROC curve analyses, the optimal cutoff point for galectin-3 as a predictor for SR raw score Zung >40 (cut-off for depression) was 24.15ng/ml, associated with a 54.20% sensitivity and 81.20% specificity (AUC:0.694, 95%CI: 0.524 – 0.864, p=0.040). In multiple linear regression analysis, galectin-3 showed a trend to independently positively predict total score BDI (B:0.260, 95%CI for B: -0.024 to 0.543, p=0.071), after adjusting for age, gender, NYHA, LVEF.
Conclusion: Serum galectin-3 independently predicts symptoms of depression in HFREF

P1044

Evaluation of ventilation response during physical testing in patients with chronic heart failure and chronic obstructive pulmonary disease

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Background: The determination of the exercise tolerance of patients with CHF and COPD is of great diagnostic and prognostic significance. For an objective assessment of the level of physical performance, it is recommended to use the test

with a 6-minute walk test (6MWT). The use of devices that allow monitoring the indicators ETCO2 and Sp2 during the whole study with the function of memory of results significantly increases the diagnostic value of the test.

Purpose: to determine the diagnostic possibilities of applying dynamic monitoring of CO2 and Sp2 indicators during 6MWT.

Methods: We studied 160 patients of both sexes. Patients with COPD II-IV, stable course (n = 68, age 64.9 ± 4.82 years), patients with CHF II-IV in New York Heart Association (NYHA) (n = 52, age 58.4 ± 3.24 years) . The control group consisted of patients without COPD and CHF (n = 40, age 55.35 ± 6.51 years). Conducted 6MWD in accordance with the recommendations of the European Society of Cardiology and the American Thoracic Society . The patient was instructed that his task was to walk as fast as possible for 6 minutes, while he himself determined the intensity of his load. Shortness of breath was assessed on the Borg scale, VAS, the dynamics of the patient's complaints, objective data (BP, pulse, NPV), a dynamic capnogram was recorded using a LifeSense LS1-9R (MedAir AB), a dynamic Sp2 was recorded using a Spiropalm 6MWT (Cosmed).

Results: The study found that the reaction of respiration and gas exchange at rest and during 6MWT in patients with COPD and CHF is different. PETCO2 alone patients with CHF in NYHA class II was 38.2 ± 2.13 mm Hg, in NYHA class III the PETCO2 was 34.4 ± 2.22 mm Hg., in NYHA class IV - 32.4 ± 1.14 mm Hg. The value of PETCO2 in patients with COPD II was 36.2 ± 2.43 mm Hg, in patients with COPD III - 34.1 ± 1.22 mm Hg., in patients with COPD IV was 32.2 ± 1.13 mm Hg. All patients completed 6MWT. The 6MWT distance in patients with CH in NYHA class II was 384.9 ± 10.56 m, in NYHA class III - 298.4 ± 10.24 m, in NYHA class IV - 162 ± 6.51 m. The 6MWT distance in patients with COPD II was 432.4 ± 8.9 m, with COPD III — 354.7 ± 9.9 m, and with COPD IV — 262 ± 9.5 m. 69.2% of patients reported shortness of breath as the main reason for stopping during 6MWD, and significantly more often in the group of patients with COPD ($p < 0.05$). A significant decrease in the rate of PETCO2 was observed in all patients with CHF during 6MWD. In the group of patients with COPD, a relative increase in the rate of PETCO2 was observed during the execution of 6MWD. When analyzing the trend of PETCO2, these patients showed signs of periodic respiration, in contrast to the control group. When analyzing the SpO2 index during 6MWD, a decrease in this indicator was found in both groups.

Conclusion: the dynamic monitoring of PETCO2 and SpO2 significantly expand the diagnostic value of the standard 6MWD.

P1045

Chronic obstructive pulmonary disease as comorbidity of the patient with heart failure: clinical profile and follow-up

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Introduction: chronic obstructive pulmonary disease (COPD) is a prevalent comorbidity in the patient with heart failure (HF). The decompensation of one entity is frequently in relation to the other, with the
consequent higher rate of readmissions and a worse impact on life quality and prognosis.

Purpose: the aim of this study was to compare patients with HF and COPD and those without COPD in terms of clinical profile and prognosis.

Methods: patients admitted to the Cardiology ward of a tertiary hospital with the diagnosis of HF were prospectively and consecutively collected for 12 months and subdivided into two groups (with and without a previous diagnosis of COPD). Both groups were compared in terms of clinical, analytical and imaging characteristics as well as follow-up.

Results: 336 patients were included with a median follow-up after discharge of 403 days. 44 (13.1%) presented COPD upon admission. Regarding baseline characteristics, significant differences were found in terms of sex (male predominance, 79.5 vs 48.3%, p <0.001), current smoking (20.5% vs 8.2%, p 0.01), former smoking (54.5% vs 29.5%, p 0.001) and home oxygen therapy (13.6% vs 2.7%, p 0.001). No significant differences were observed about the prevalence of other cardiovascular risk factors, clinical presentation, proportion of left or right ventricular dysfunction, medical treatment at admission or discharge. In terms of follow-up, readmissions for HF, as well as mortality from all causes and from HF were higher in patients with COPD, without reaching statistical significance. Mortality from other causes different from HF is significantly higher (19% vs 7%, p 0.01, figure 1).

Conclusions: COPD is a comorbidity common in patients with HF, without important differences in terms of clinical presentation or therapeutical approach, but with a negative impact in terms of mortality.

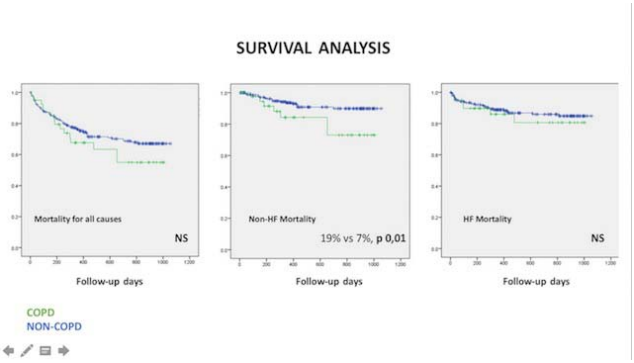

Figure 1. Survival analysis.

P1046

Chronic heart failure confers a higher risk of non-cardiovascular death in a patients with atrial fibrillation

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Background: The coexistence of chronic heart failure (HF) and atrial fibrillation (AF) is common and associated with higher risks of stroke and cardiovascular (CV) mortality. The association between chronic HF and the risk of death from cancer and other non-CV disorders is not well established in patients with AF.

Methods: In a cohort of AF patients from a tertiary cardiology centre, we assessed the association between chronic HF (vs. no HF) and cause-specific non-CV death during the prospective 5-year follow-up. We also compared non-CV mortality rates between patients with HF and reduced ejection fraction (HFrEF) and patients with HF and preserved/mid-range ejection fraction (HFpEF/HFmrEF).

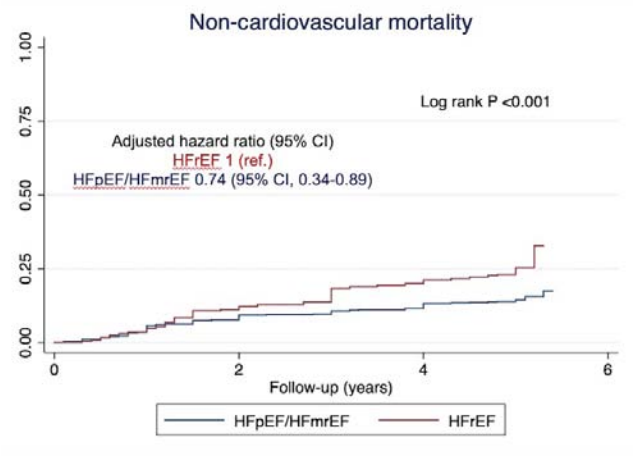
Results: The study included 1,803 AF patients (mean age, 71±12 years, 63% male). A documented history of chronic HF was present in 29%. Among AF patients with chronic HF, 41% had HFrEF and 59% had HFpEF/HFmrEF. At 5-year follow-up, there were 298 cases of non-CV death (rate, 3.7; 95% confidence interval, 3.3-4.1 per 100 patient-years). Following adjustment for age, sex, body mass index, smoking status, relevant comorbidities and medical treatment, AF patients with chronic HF compared with those without HF had significantly higher risk of non-CV death, including death due to specific causes: infection, cancer, and a composite of COPD, renal/hepatic dysfunction or bleeding (Table). Compared with AF patients with HFrEF, patients with HFpEF/HFmrEF had lower risk of non-CV mortality (Figure).

Conclusions: In patients with AF, chronic HF is an independent predictor of a higher risk of non-CV mortality, including a greater risk of dying from cancer, infection or worsening pulmonary, renal or hepatic disorders or bleeding. Non-CV death rate is lower in patients with HFpEF/HFmrEF compared to patient with HFrEF.

Adjusted non-CV mortality risk

	No of deaths (%)	Adjusted HR (95% CI) chronic HF vs. no HF	P-value
All non-CV deaths	298	2.6 (1.8-3.2)	<0.001
Infection	105 (35%)	2.1 (1.3-4.1)	0.009
Cancer	83 (28%)	3.1 (1.4-5.3)	<0.001
Composite: CODP, renal/hepatic dysfunction, bleeding	110 (37%)	2.4 (1.6-3.7)	0.003

HR - hazard ratio; CI - confidence interval; HF- heart failure; COPD - chronic obstructive pulmonary disease



P1047

Adherence to guidelines for diabetic patients with heart failure with reduced ejection fraction

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Introduction: Heart failure (HF) and diabetes mellitus (DM) are two major global chronic diseases which often coexist. Despite a large number of published clinical guidelines, the adherence to treatment guidelines in real world practice were seldom reported. This study aimed to investigate the adherence to diabetes treatment guidelines in patients with HF and reduced ejection fraction (HFrEF).
Methods: Between 2015 and 2017, 345 diabetic patients with HFrEF in a HF referral center were recruited. Baseline characteristics, the prescription rates of diabetic medications and death from cardiovascular causes or unplanned hospitalization for HF in 2016, 2017 and 2018 were analyzed.
Results: Among these diabetic patients with HFrEF (age 65.2±12.6 y/o, 71.6% male, mean LVEF 27.5±6.9%, mean BMI 26.2±4.6 kg/m2), the prescription rates of sodium-glucose co-transporter 2 (SGLT2) inhibitor increased from 10.8% in 2016 to 18.8% in 2017 and 26.3% in 2018 (p<0.001), whereas the prescription rates of metformin, dipeptidyl peptidase 4 inhibitor, sulfonylurea, alpha-glucosidase inhibitor and insulin did not change significantly over time. The prescription rates of metformin and SGLT2 inhibitor were significantly higher in patients treated by cardiologists than in those treated by endocrinologists and other specialists (65.5% vs. 40.4% and 40.4%, p<0.001; 32.6% vs. 10.7% and 1.5%, p<0.001, respectively). Compared to those who received metformin with or without SGLT2 inhibitor treatment, patients who were not treated with guideline-recommended anti-diabetic medications had higher annual event rate of death from cardiovascular causes or unplanned hospitalization for HF (10.1% vs. 30.7%, p<0.001). After multivariate analysis, prescription of guideline-recommended anti-diabetic medications was associated with favorable outcomes (Odds ratio 0.39; 95% CI 0.25 to 0.59; p<0.001).
Conclusion: Adherence to treatment guidelines for diabetic patients with HFrEF is suboptimal and diverse among different specialists. Moreover, prescription of guideline-recommended anti-diabetic drugs was associated with better clinical outcomes. Our finding emphasizes the importance of training and collaboration in the management of these patients.

P1048

Measuring frailty in hospitalized heart failure patients using common lab parameters

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Background: Frailty is characterized by physiological decline and marked vulnerability to adverse health outcomes. It carries an increased risk of poor health outcomes including procedural complications, falls, institutionalization, disability, and death. Several indices have been used for evaluation of frailty historically. The criteria considered by Fried et al. includes 5 phenotypical variables and Rockwood et al. proposed a 7-point scale entirely based on clinical judgment. Recently, frailty indices based on routine laboratory parameters (FI-Lab) using blood, urine testing and standard physical measures have been introduced. Unlike clinical frailty indices which were evaluated only in community-dwelling individuals, these FI-Lab indices have also been validated in hospitalized patients. Even though frailty is a well-known predictor of mortality in cardiovascular patients, no studies have been done to find the relationship between frailty and heart failure (HF) using this easy to use, validated and time-saving FI-Lab.
Purpose: To find the relationship between Frailty and Heart failure in hospitalized patients using common lab parameters.
Methods: This is a retrospective cross-sectional study. Data were extracted from a corporate database, for the month of September 2017. FI-Lab has 23 variables; each available variable was scored 1 if the value fell outside of normal range (deficits). Sum of these deficits was divided by the total number of available variables. The result was then multiplied by 23. FI-Lab was used as a continuous variable, higher values are assumed to have a higher risk of frailty. Multiple linear regression and t-test were used to analyze the data using IBM SPSS statistics 24.
Results: The study population (n=4,681) had a mean age of 59±21 years and 50% were male. Documented HF diagnosis was found in 762 (16%) patients. Comparing patients with and without HF, statistically significant differences were found in age (72±15 years vs 56±20 years), diabetes mellitus (50% vs 26%), history of stroke (14% vs 7%), myocardial infarction (20% vs 5%), hypertension (8% vs 41%), and FI-Lab score (8.04±3.74 vs 5.84±3.89). HF was strongly associated with frailty status independent of age, gender, hypertension, diabetes, stroke, acute myocardial infarction and AFib in multiple linear regression analysis (B 1.1, p <0.001, CI [0.76, 1.44]).
Conclusion: Though the relationship between Frailty and HF has been studied previously using other frailty indices, the process lacked objective data or was time-consuming. Our study uses FI-Lab to evaluate frailty risk in HF patients, which can help providers in establishing a prognosis, determining procedural risks, and guiding treatments more effectively in a busy clinical environment.

P1049

Predictors of cognitive impairment in patients with chronic heart failure and reduced left ventricular ejection fraction

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Background. Cognitive impairment (CI) is independent prognostic marker of adverse outcomes in patients (pts) with chronic heart failure (CHF). However, in routine clinical practice cognitive function in pts with CHF usually is not evaluated and clinical predictors of CI in CHF are studied insufficiently.
Objective. to establish predictors of CI in patients with CHF and reduced left ventricular ejection fraction of (rLVEF).
Methods. 124 stable CHF pts with rLVEF aged 18 to 75 years, NYHA II-IV were examined. Cognitive function was evaluated by using Mini-Mental State Examination (MMSE) scale. Cognitive dysfunction was defined as MMSE≤ 26 points. Besides routine examination, additional biochemical (determination of ceruloplasmin, citrulline, myeloperoxidase) and immunoenzymometric (determination of interleukin 6, NTproBNP, insulin) methods were used.
Results and discussion. CI was observed in 68.5% of pts. According to univariate regression analysis, CI was associated with age (OR 1.07, 95% CI: 1.03-1.11), duration of CHF symptoms (OR 1.02, 95% CI: 1.001-1.03), presence and duration of hypertension and coronary heart disease (CHD) (OR 3.46, 95% CI: 1.44-8.30 and OR 2.60, 95% CI: 1.14-5.90, respectively). Higher risk of CI have pts NYHA III-IV (OR 2.68, 95% CI: 1.22-5.87), with worse quality of life (OR 1.02, 95% CI: 1.002-1.04) and higher ceruloplasmin level (OR 1.02, 95% CI: 1.01-1.03). Lower risk of CI have pts with better functional status - the 6-minute walk test, Duke Activity Status Index (DASI) (OR 0.996, 95% CI: 0.99-0.999 and OR 0.96, 95% CI: 0.94-0.99, respectively), better adherence to therapy (OR 0.77, 95% CI: 0.60-0.98) and better endothelium-mediated vasodilatory response (OR 0.9, 95% CI: 0.83-0.98). In multivariate analysis, the independent predictors of CI in CHF were age, duration of hypertension, lower adherence to therapy and higher ceruloplasmin level.
Conclusion. CI is observed in the majority of pts with CHF, it associates with age, duration of CHF symptoms, presence and duration of hypertension and CHD. Higher risk of CI have pts with NYHA III-IV, worse quality of life and higher ceruloplasmin level. At the same time, lower risk of CI have pts with better functional status, better adherence to treatment and better endothelium-mediated vasodilatory response. The independent predictors of CI in CHF with rLVEF in multivariate logistic regression model are age, duration of hypertension, lower adherence to treatment and higher ceruloplasmin level.

P1050

Improving recognition and management of hyperkalemia in patients with HF: an online educational intervention

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Background: Patients with heart failure (HF) who are receiving RAAS inhibitor therapy are at increased risk for developing hyperkalemia. However, guideline-recommended monitoring of serum potassium after initiation of RAAS inhibitors is lacking in real-world practice, and many patients who develop hyperkalemia are not optimally managed.
Purpose: To determine if an online continuing professional development (CPD) intervention could improve knowledge/competence and confidence of cardiologists and nephrologists related to assessment and management of hyperkalemia in the setting of HF.
Methods: Cardiologists and nephrologists electively participated in a video-based, 4-faculty educational discussion on diagnosing and treating hyperkalemia. The effects of education were assessed using a repeated pairs, pre-assessment/post-assessment study design. For all questions combined, a chi-square test assessed differences from pre- to post-assessment. P values <.05 are statistically significant. Cramer's V was used to assess educational effect. The activity launched on June 26, 2018 and data were collected through August 27, 2018.
Results: Overall significant improvements were seen after education for both cardiologists (N=333; P < .001; considerable educational effect, V=.205) and nephrologists (N=155; P < .001; considerable educational effect, V=.174). Pre-assessment, the average correct response rate was 37% for cardiologists and 50% for nephrologists, while post-assessment average correct response rates were 57% and 67%, respectively. Significant improvements were observed in cardiologists' and nephrologists' competence related to management of hyperkalemia (Table).
As a result of the education, 22% of cardiologists and 10% of nephrologists reported higher confidence in ability to maintain maximal doses of RAAS inhibitor therapy while managing concomitant hyperkalemia in their patients with HF.
Conclusion: The statistically significant improvements observed in this intervention demonstrate the benefits of using education to increase knowledge, competence and confidence of cardiologists and nephrologists, and suggest that this type of intervention has the potential to positively impact recognition and treatment of hyperkalemia in patients with HF.

Improvements in knowledge/competence

Topic	Cardiologists (N=333)Relative % improvement (post-assessment vs pre-assessment; P value)	Nephrologists (N=155)Relative % improvement (post-assessment vs pre-assessment; P value)
Managing risk for hyperkalemia in patients on RAAS inhibitor therapy	115% (30% vs 64%; P<.001)	61% (46% vs 75%; P<.001)
Appropriate use of potassium binders to treat hyperkalemia	68% (35% vs 59%; P<.001)	32% (50% vs 66%; P=.004)

P1051

Features of the arterial wall functional state in patients with chronic heart failure with a moderately reduced left ventricular ejection fraction and a persistent form of atrial fibrillation

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Objective: To evaluate the functional state of the arterial wall in patients with chronic heart failure (CHF) with a moderately reduced left ventricular ejection fraction (mrLVEF) and a persistent form of atrial fibrillation (AF).
Materials and methods: The study included 48 patients with a moderately reduced left ventricular ejection fraction (mrLVEF), which were divided into 2 groups depending on a heart rhythm disorder. The first group included 28 patients with persistent AF, the second one - 20 patients with sinus rhythm. The diagnosis of CHF with a moderately reduced LV EF was confirmed by the presence of LV EF in the range of 40–49%. Diastolic dysfunction was diagnosed according to tissue visualization of diastolic velocity of the mitral valve fibrous ring and an increase in the concentration of the N-terminal fragment of brain natriuretic peptide (NT-proBNP) in the blood using ELISA.
The functional state of the arterial bed was determined according to arteriography using the device "Arteriograph 24 Tensiomed" (Hungary).
Results: there were no statistically significant differences between groups by sex, age, comorbidity, therapy (except for anticoagulants and antiarrhythmic drugs). LV FV statistically significantly did not differ between groups: 46.5 [44.5; 47.0]% in the first group, 45.0 [42.0; 47.0]% in the second group (p = 0.605). The level of NT-proBNP in the 1st group was 289.7 [192.2; 421.0] pg / ml, in the 2nd — 127.7 [19.4; 373.6] pg / ml (p = 0.143).
Indicators of diastolic LV function differed statistically significantly between groups: in the first group, septal e '(p = 0.007), lateral e' (p <0.001), E / e '(p = 0.001) were higher than in the second group.
There were revealed statistically significant differences between groups in arteriography parameters.
Central blood pressure in aorta (CBPao), augmentation index (AIXao), aortic pulse wave velocity (PWVao) were higher in the first group than in the second: 147.0 [96.0; 152.5] mmHg versus 96.0 [90.0; 124.5] mmHg, (p <0.001); 30.2 [9.3; 44.5]% versus 13.4 [5.3; 29.4]%, (p <0.001); 9.7 [7.9; 12.1] m/sec vs. 6.6 [6.5;7.4] m/sec (p <0.001), respectively. Correlation analysis showed a direct strong interconnection between CBPao and E/E'(r = 0.750; p <0.05), and AIXao and E/E' (r = 0.707; p <0.05).
Conclusion: for CHF patients with moderately reduced LV EF and persistent form of AF, a statistically significant increase in central BP in aorta and arterial stiffness is more characteristic due to more pronounced LV diastolic dysfunction compared with CHF patients who have sinus rhythm.

P1052

Clinical predictors of the long-term progression of renal dysfunction in heart failure patients with reduced ejection fraction

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Renal dysfunction is a frequently encountered co-morbidity in heart failure patients with reduced ejection fraction (HFrEF) and deteriorates the prognosis of the patients significantly. The aim of this study is to evaluate the clinical determinants of the progression of renal dysfunction (PRD) in HFrEF patients in long-term follow-up.
Methods: A total of 414 patients with the diagnosis of HFrEF (left ventricular ejection fraction ≤40%) and with a clinical follow-up duration longer than one year were enrolled into the study. PRD was defined as a ≥25% decline in estimated glomerular filtration rate (eGFR) and a change in eGFR category, or a sustained decrease in eGFR ≥15 ml/min/1.73 m2 within 12 months during the follow-up period.
Results: Median baseline eGFR was 59 (42–79) mL/min/1.73 m^2 and 52% of the patients had moderate-severe renal dysfunction. During a median 39 (23–71) months follow-up, the mean decline in eGFR was -6,49 ± 11.05 mL/min/year. PRD was detected in 157 (38%) patients. In univariate analysis, significant clinical associates of the PRD were presence of right sided heart failure, inability to use an ACE inhibitor or an angiotensin receptor blocker, not using spironolactone and statins. Decline of eGFR was significantly correlated with the echocardigraphic variables (i.e. left atrial size, right ventricular diameter, pulmonary arterial systolic pressure), increased NT-proBNP, AST, ALT and decreased sodium, albumin and total cholesterol levels.
By linear regression analysis adjusted for clinical, therapeutic, echocardiographic and laboratory variables, abnormal liver function tests including increased ALT and low albumin levels showed highest associations with the yearly decrease in eGFR. In Cox regression analysis, low albumin level, followed by left atrial size, low hematocrit ratio, age and NT-proBNP level were significant determinants of PRD.
Conclusion: In long-term follow-up of HFrEF patients, biochemical variables indicating liver dysfunction and congestion (i.e. increased ALT, low albumin, low hematocrit and increased NT-proBNP levels) are the main predictors for PRD.

P1053

Features of the clinical picture and remodeling of the left heart in patients with heart failure on the background of ischemic heart disease and thyrotoxicosis

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Background: Comorbidity affects the clinical aspects of heart failure (HF) and cardiac remodeling in comorbid patients. With the development of thyrotoxicosis

in patients with coronary heart disease (CHD) the risk of atrial fibrillation increases 4.5 times, and CH decompensation - 3.3 times.
Purpose: To study the clinical aspects of chronic heart failure (CHF) and the features of structural and functional remodeling of the left ventricle (LV) in patients with coronary artery disease and thyrotoxicosis.
Methods: 131 patients were enrolled into the study: the main group consisted of 30 patients with coronary artery disease (CAD), CHF and thyrotoxicosis; 1st comparison group - 35 patients with CHD and CHF, without thyroid pathology; 2nd comparison group - 35 patients with thyrotoxicosis without cardiovascular diseases (CVD); 3rd group - 31 patients with CHD and thyrotoxicosis with no signs of CHF. A rating scale of clinical state (RSCS) was used, a 6-minute walk distance (6MWD), an echocardiographic study (EchoCG) was performed, and the functional state of the thyroid gland was also determined.
Results: The evaluation of the clinical symptoms of CHF by RSCS did not reveal significant differences when comparing the indices between the main and 1st comparison groups, however, exercise tolerance in patients with CHF with CHD and thyrotoxicosis was significantly lower by 15.4% (p = 0, 01). There were revealed significantly lower values of indexed linear (EDD) and volume indices (EDV, ESV) of the LV in patients of the main group compared with the corresponding results in the group with IHD and CHF without thyrotoxicosis, which is due to increased cardiac output on the background of hyperactivity of the sympathetic nervous system during thyrotoxicosis . In patients with CHD, CHF and thyrotoxicosis, LV concentric hypertrophy (LVHL) was determined significantly more often - in 84% of cases than in patients with CHD and CHF without thyrotoxicosis - in 70% (p = 0.03). In both groups, the values of the LV ejection fraction corresponded to the intermediate type of HF (HFmrEF), and no significant differences were found between the indicators - 48.1 (41,0; 52,0) and 47,0 (40,0; 48,0) (p = 0.1). Transmitral blood flow indices indicate more pronounced signs of diastolic dysfunction (LVDD) in patients of the main group: V/V are lower by 12.5% (p = 0.01), isovolumetric relaxation time (IVRT) is by 11.11% (p = 0.02) compared with the results in patients of the 1st comparison group.
Conclusions: The peculiarities of structural and functional remodeling of the left heart in patients with CHF of ischemic genesis and thyrotoxicosis were revealed: significantly more frequent incidences of LVHL (84% of cases), lower values of EDD, EDV, ESV, expressed by LVDD, which is probably caused by significant activation of renin-angiotensin-aldosterone (RAAS) and, especially, sympatho-adrenal (SS) systems in conditions of attendant thyrotoxicosis.

P1054
Heart failure after kidney transplantation

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Introduction: Cardiovascular diseases are the greatest cause of morbidity and mortality in patients after kidney transplantation. The incidence of congestive heart failure (CHF) in patients with a transplanted kidney is 2 to 5 times higher than the incidence in the general population. The incidence of CHF in patients with a transplanted kidney was 10.2% 12 months and 18.3% 36 months after transplantation. Diastolic left ventricular dysfunction is present in 45% of patients with a transplanted kidney. Heart failure (HF) is highly prevalent in patients treated with haemodialysis. Hypertension, renal anemia, and comorbid conditions such as coronary artery disease are important risk factors for HF.Aim: To determine the frequency of risk factors for occurrence and frequency of HF in kidney transplant patients and patients on chronic hemodialysis.
Patients ande methods: We conducted a prospective study that included 90 patients. All patients had their history data taken, ECG, complete physical examination and echocardiography. The difference in frequency of the observed parameters was tested by chi-sqyare test.
Results: Patients were divided into two groups: kidney transplant patients (60) and patients treated with hemodialysis (30). In the group with kidney transplant patients was 42 (70%) men and 18 (30%) women. In the group with patients treated with hemodialysis was 15 (50%) men and 15 (50%) women. The average age in kidney transplant patients was 42.22 ± 1.71 years, in the group with patients treated with hemodialysis was 52.97 ± 2.98 years. The mean duration of dialisys before kidney transplant in the group with kidney transplant patients was 43.00 ± 9.19 months. The average kidney graft survival was 9,1±9,68 years. The mean duration of dialisys in the group of patients treated with hemodialysis was 87.00 ± 15.6. CHF had 3,33% kidney transplant patients and 16,67% patients treated with hemodialysis. HF was significantly higher in patients treated with hemodialysis than in kidney transplant patients (p <0.05). Diastolic dysfunction had 36,67% patients treated with hemodialysis and 45% patients with transplanted kidney. Hypertension had 30% kidney transplant patients and 66,67% patients treated with hemodialysis. Left ventricular hypertrophy had 50% kidney transplant patients and 76,67% patients treated with hemodialysis. CHD had 13,33% kidney transplant patients and 36,67% patients treated with hemodialysis. Atrial fibrilation had 10% kidney transplant patients and 26,67% patients treated with hemodialysis. Mitral regurgation had 33,33% kidney transplant patients and 56,67% patients treated with hemodialysis.Aortic regurgitation had 15% kidney transplant patients and 33,33% patients treated with hemodialysis.Conclusion: We find statistically significant differences in the frequency of HF between kidney transplant patients and patients treated with hemodialysis.

P1055
Predictors of short form-36 psychosocial variables in heart failure with reduced ejection fraction

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Background-aim. Quality of life reflects the multidimensional impact of a clinical condition and its treatment on patients' daily lives. It is markedly impaired in heart failure and adversely affects prognosis. Short Form -36 (SF-36) is a generic quality of life measure containing eight dimensions. We aimed to investigate SF-36 psychosocial variables (vitality, social function, emotional role and mental health) in patients with heart failure and reduced ejection fraction (left ventricular ejection fraction<40%) (HFREF).
Methods. Clinical, echocardiographic and laboratory parameters were determined in 87 patients with HFREF (age: 64.81±12.05, 90% male, Ischemic: 84%) visiting our outpatient clinic. Furthermore, assessment of functional activity, quality of life and screening for depressive symptoms was performed using the Duke index, the Kansas City Cardiomyopathy Questionnaire (KCCQ), the Minnesota Living With Heart Failure Questionnaire (MLHFQ), the Beck Depression Inventory (BDI), and the Zung self-rating depression scale (SDS). Statistical analysis was performed using SPSS 19.
Results. Median vitality was 35.00(20.00, 50.00), median social function was 56.00(56.00, 67.00), median emotional role was 0.0(0.0,33.00) and median mental health was 52.00(36.00, 64.00). Vitality correlated positively with Na (r=0.236, p=0.049) and correlated negatively with NYHA (r= -0.270, p=0.025). Emotional role is positively associated with Hgb (r= 0.264, p=0.032) and Na (r= 0.322, p=0.007), whereas it is negatively associated with RV diameter (r= -0.287, p=0.046). Mental health correlated positively with age (r= 0.234, p=0.038), LVmass (r= 0.292, p=0.024) and Na (r=0.294, p=0.014). Vitality, social function and emotional role correlated positively with Duke index (r= 0.386, p<0.001), (r= 0.235, p=0.030), (r= 0.370, p<0.001) respectively. Vitality, emotional role and mental health showed a positive association with KCCQ overall summary (r= 0.513, p<0.001), (r= 0.298, p=0.006) (r= 0.305, p=0.005) respectively and a negative association with total score MLHFQ (r= -0.578, p<0.001), (r= -0.422, p<0.001), (r= -0.467, p<0.001) respectively. Vitality, emotional role and mental health correlated negatively with Self-rated raw score Zung (r= -0.527, p<0.001) (r= -0.321, p=0.004) (r= -0.544, p<0.001) respectively. Social function did not correlate with Self-rated raw score Zung (p=0.845).
Conclusion. Clinical, echocardiographic and laboratory parameters are significantly associated with SF-36 psychosocial variables. SF-36 psychosocial variables correlate positively with Duke index and KCCQ and negatively with MLHFQ and Self-rated raw score Zung.

P1056
Heart failure patients with previous anterior myocardial infarction have a lower cerebral blood flow

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Purpose: Heart and brain interaction is a well-known entity in heart failure (HF) and a reduced ejection fraction (EF) is an independent risk factor for stroke. HF patients with a history of myocardial infarction (MI) has more prone to have thromboembolic stroke. However, less is known about cerebral blood flow in HF patients with reduced EF, particularly who have a previous MI. We aimed to evaluate the transcranial Doppler (TCD) flow rates in HF patients with reduced EF who have previous anterior MI as compared with the patients who have non-anterior MI or healthy population.
Methods: We retrospectively evaluated 94 patients who underwent to TCD monitoring. 10 patients with an EF >40% and 12 patients with suboptimal signals of middle cerebral artery flow in TCD examination were excluded from the study. Of those with EF ≤ 40% (n=46), 24 HF patients (52.2%) had previous anterior MI and 22 patients (47.8%) had non-anterior MI (previous inferior, posterior, lateral or non ST elevation MI). A control group has been made of 26 healthy subjects who underwent TCD. Minimum, maximum and mean flow velocities of the both right middle cerebral artery (RMCA) and left middle cerebral artery (LMCA) determined by TCD were analyzed.
Results: The average maximum, mean and minimum velocities of RMCA were 87.8, 56.41 and 36.53 cm/s respectively in control group and 68.69, 44.41 and 30.29 cm/s, respectively, in HF patients with previous anterior MI (p<0.001, 0.001 and 0.017,

respectively). The average maximum, mean and minimum velocities of LMCA were 88.73, 57.15 and 36.34 cm/s, respectively, in control group and 69.75, 44.58 and 31.08 cm/s, respectively, in HF patients with previous anterior MI (p =0.001, 0.002 and 0.081 respectively). In HF patients with non-anterior MI; the average maximum, mean and minimum velocities of RMCA were 84.1, 52.94 and 37.0 cm/s respectively (p=0.027, 0.078 and 0.031 as compared to HF patients with anterior MI) and the average maximum, mean and minimum velocities of LMCA were 80.93, 50.84 and 34.81 cm/s, (p=0.09, 0.156 and 0.19 as compared to HF patients with anterior MI).
Conclusions: The results of this study showed that HF patients with previous anterior MI are more likely to have lower cerebral flow velocities as compared to those with previous non-anterior MI or healthy controls, suggesting more close heart and brain interaction in this group of patients.

P1057
Iron deficiency predictors in patients with CHF and rLVEF

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The aim is to study iron deficiency (ID) predictors in patients with chronic heart failure (CHF) and reduced left ventricular ejection fraction (rLVEF).
Methods. 134 stable compensated patients (pts) with CHF (113 men, 21 women), 18-75 years old, NYHA class II-IV, LVEF<40% were examined. Beside routine clinical and laboratory examination, iron panel test, 6 min walk test (6MWT), standardized endurance leg extensor test were performed. Quality of life was assessed by the Minnesota living with heart failure questionnaire (MLHFQ). Statistical data handling was made using logistic regression.
Results. ID was found in 83 (62%) of 134 patients with CHF and rLVEF. ID patients were comparable with those without ID by age, gender, heart rate, LVEF, as well as with the proportion of patients taking ACEi, beta-blockers and mineralocorticoid receptors antagonists. There was no statistically significant association between hemodynamic and major echocardiographic indices and the risk of ID in our patients (SBP, HR, left atrium, LVEF, LV MMi, EDVi). The presence of anemia (OR 3.64, p=0.004), III-IV NYHA functional class (OR 2.98, p=0.004) and the worse quality of life (OR 1.02, p=0.01) were found to be ID predictors. In patients with NYHA class II (OR 0.34, p=0.004) there was a lower risk of developing ID. The better thigh quadriceps endurance (OR 0.98, p=0.04), the lower risk of developing ID. Probability of ID decreases with higher levels of hemoglobin (OR 0.95, p=<0.001), MCV (OR 0.82, p<0.001), MCH (OR 0.8, p=0.01) and GFR (OR 0.98, p=0.04). At the same time, higher levels of citrulline (OR 1.01, p=0.02) and NTproBNP (OR 1.002, p=0.01) are reliably associated with increased risk of ID occurrence. According to the results of multivariable regression model, independent ID predictors were found to be decreased erythrocyte's MCV (OR 0.83, p=0.002) and elevated NTproBNP level (OR 1.002, p=0.01).
Conclusions. ID was found in 62% patients with CHF and rLVEF and was dependent on concomitant anemia. Risk of ID is higher in patients with NYHA class III-IV, in patients with poorer quality of life, with elevated citrulline and NTproBNP levels. Hemoglobin, MCV, MCH, GFR and better thigh quadriceps endurance were directly associated with the presence of ID. Independent predictors of ID were MCV and NTproBNP levels.

P1058
Comorbidities and financial difficulties of hospitalized heart failure patients amidst the Greek economic crisis

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Background/Introduction: Heart failure (HF) is a global pandemic affecting more than 26 million patients. As the world population ages, and survival from cardiovascular disease improves, the overall burden of HF is expected to increase over time. Patients with HF often have multiple comorbidities that complicate management and may adversely affect outcomes.
Purpose: The purpose of the study was to record the characteristics and comorbidities of hospitalized patients with HF. Data on medical insurance and ability of HF patients to afford their medications were also collected.
Methods: The study sample consisted of 152 HF patients who were hospitalized in the Cardiology Department of a tertiary hospital in Greece within a period of one year. Inclusion criteria were diagnosis of HF, age ≥18 years, and sufficient understanding of the Greek language. We collected data regarding socio-demographic and clinical characteristics of the HF patients and measured a multitude of laboratory and diagnostic parameters. We estimated the prevalence of depression by using the Patient Health Questionnaire-9 (PHQ-9). Sleep quality of the patients was measured using the Pittsburgh Sleep Quality Index (PSQI).
Results: Of the 152 HF patients, 94 (61.8%) were males and 58 (38.2%) females with an average age of 70.9±13.7 years. When the ejection fraction (EF) was considered, the proportion of patients with reduced, mid-range, and preserved EF were 54.6%, 20.4%, and 25.0%, respectively. 78.3% of the patients had arterial hypertension, 48.0% coronary artery disease, 46.1% dyslipidemia, and 46.1% atrial fibrillation. Diabetes mellitus was present in 38.2% of patients, while anemia and chronic kidney disease were particularly common in 32.9% and 31.6% of the patients, respectively. The majority (67.8%) of patients were overweight and obese. Poor sleep quality (global PSQI score ≥5) was recorded in 82.9% of HF patients. 67.8% of the patients reported the presence of depressive symptoms (PHQ-9 score ≥5), whereas the prevalence of major depressive symptomatology was 34.2% (PHQ-9 score ≥10). Lastly, although just 6.6% of the patients had no medical insurance, 36.8% of the total participants reported that they face financial difficulties to afford their medications.
Conclusion(s): The medical community must take measures to identify, evaluate and manage comorbidities in HF patients. Our attention should not only be focused on cardiovascular comorbidities. HF patients often suffer from anemia, chronic kidney disease, are obese, depressed, and have disturbed sleeping patterns. The Greek financial crisis might have exerted a negative effect on the patients' non-adherence to medical treatment, in the background of financial problems. As the austerity period is far from ending, the Greek HF community must strive to create the necessary structures were HF patients could be securely followed-up and treated.

P1059
Chronic kidney disease in patients with acute decompensated heart failure: prevalence and prognostic value

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Objective: chronic kidney disease (CKD) is a frequent comorbidity in patients with heart failure (HF) which was shown to cause negative influence on prognosis in this population.
The purpose: to evaluate the incidence and prognostic value of CKD in patients with acute decompensated heart failure (ADHF).
Methods: 278 patients with ADHF were examined^ mean age was 69.7±10.2 years (M±SD), 55% were male, 47.8% current smokers, 30.6% alcohol abusers. Comorbidities: 90.3% had arterial hypertension, previous myocardial infarction 47.1%, atrial fibrillation 46%, stable angina 43.5%, anemia 40.6%, chronic obstructive pulmonary disease 34.9%, and diabetes mellitus (DM) 33.1%; 70% had anamnesis of symptomatic heart failure with frequent hospitalizations during the last year.
CKD and acute kidney injury (AKI) were diagnosed according to KDIGO 2012 Guidelines, glomerular filtration ratr (GFR) was calculated using CKD-EPI equation.
Results: Incidence of CKD in ADHF was 45% (n=125), and in 57.5% of patients CKD was diagnosed only at admission. Patients with ADHF with vs without CKD were older (70.8±10 vs 68.7±10.2, p<0.05), had higher rate of symptomatic HF with frequent hospitalizations during the last year (80% vs 61.2%, p<0.05), stable angina (80% vs 44.4%, p<0.01), DM (45.6% vs 22.9%, p<0.001), obesity (62.4% vs 50.3%, p<0.05), and anemia (56.8% vs 27.5%, p<0.001).
There were more pronounced signs of renal dysfunction in patients with CKD on admission to the hospital: serum creatinine 157±89 vs 98±31 μmol/l (p <0.001), GFRCKD-EPI 50±89 vs 66±18 ml/min/1.73 m2 (p <0.001), urea 12.6±8.3 vs 9.7±6.1 mmol/l (p <0.001). They also had lower levels of hemoglobin (11.9±1.9 vs 13.2±2.3 g/l, p <0.001), serum cholesterol (4.4±1.3 vs 5.2±1.2 mmol/l, p <0.001), and sodium (141.6±3.3 vs 143.2±3 mmol/l, p <0.01).
Left ventricular hypertrophy (detected with ultrasound) was more common in ADHF patients with vs without CKD (69.6 vs 43.1%, p <0.001) and was more pronounced (left ventricular mass index 194.9±77.4 vs. 166.2±82.3 g/m2, p <0.001).
Presence of CKD in patients with ADHF was associated with higher frequency of rehospitalizations due to decompensation of HF within 6 months after discharge (52% vs 30.7%, p<0.001). No associations of existing CKD with AKI development (46.4 and 41.2%, p >0.05) or in-hospital mortality (6.4 and 8.5%, p >0.05) were detected.
Conclusions: CKD is common (45%) but underdiagnosed comorbidity in patients with ADHF and is associated with more frequent episodes of HF decompensation. We did not reveal any negative effect of CKD on the incidence of AKI development and in-hospital mortality.

P1060
Iron deficiency prevalence in decompensated heart failure in elderly patients a prospective survey in an emergency hospital

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Introduction: In patients with heart failure (HF), iron deficiency (ID) correlates with decreased exercise capacity and poor health-related quality of life, and predicts

worse outcomes. However, it is still underdiagnosed and by that, untreated. Since symptoms related to ID are not specific, only assessment of biological iron parameters allows its diagnosis. Both absolute (depleted iron stores) and functional (where iron is unavailable for dedicated tissues) ID can be easily evaluated in patients with HF using standard laboratory tests . ID prevalence in HF varies according to the clinical characteristics of the studied cohort and the applied definition of ID (it ranges from 33 to 74%, with higher rates in anaemics versus non-anaemics and decompensated versus stable HF). Even if presence of ID is well known in patients with HF with reduced ejection fraction (REfHF) and treatment recommendations are included in clinical guidelines, it is not the same situation in patient with HF and preserved ejection fraction (PEfHF).

Method: We prospectively enrolled 91 patients with decompensated chronic HF hospitalised in The our Emergency Hospital during a period of 6 month. Iron parameters were prospectively assessed during the 72 h after hospital admission. Anaemia was defined as Hb<13g/dl in men and <12g/dl in women. Iron deficiency in HF was defined according to the 2012 European Society of Cardiology Guidelines and patients were classified either as PEfHR or REfHF. We did not included patient with chronic Kidney disease with eGFR< 40 ml/min/1.73mp, nor patients with other condition possible to be associated with anemia (cancer, chronic inflammatory disease, different haematological conditions).

Results: The mean age of patients at inclusion was 78, sex distribution was 53% female and 47% male and all patients was NYHA III or IV at inclusion. Of 91 patients, 24,29% had REfHF and 75,71% had PEfHF . Prevalence of ID was higher in PEfHF than REfHF (38% vs 27,9%, p=0.107). Also prevalence of anaemia and ID was higher in PEfHF than REfHF (30% versus 22.5%, p=0.1996). Absolute ID was also higher in PEfHF than RefHF (24% versus 12,5%, p<0.02). We did not find any correlation between antiplatelet or anticoagulant treatment and the prevalence of ID.

Conclusion: ID and anaemia are highly prevalent among elderly patients with PEfHF. In our survey ID prevalence in patients with PEfHF (associated or not with anemia) was higher than in patient with REfHF (the overall ID difference did not reach statistic significance but the absolute ID did). Importantly, in particular absolute ID was common even in the absence of anaemia in both groups. Treatment of ID improves morbidity in patients with REfH. Taking into account that there are not at this time any strong treatment recommendation for patients with PEfHF we consider it could be useful to evaluate the impact of iron therapy in this particular group of patients.

P1062

Malnutrition risk in heart failure with reduced ejection fraction patients - single centerpilot study

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Background: Malnutrition results from loss of appetite, poor diet, digestive problems or chewing and swallowing difficulties. It is frequent in patients with intercurrent chronic illnesses such as e.g. heart failure. Mostly, the first warning symptom of malnutrition is a weight loss without using special diets, probably caused by malabsorption. Due to that, the treatment of heart failure patients wouldn't be as effective as it could be. Because of that, it is vital to find some biomarkers of malnutrition in order to identify malnourished patients earlier and change their therapy faster.

Purpose: To assess nutritional status of heart failure with reduced ejection fraction (HFrEF) patients and check the correlation between nutritional status and clinical, echocardiographic and biochemical parameters in those population.

Methods: This study included 100 consecutive patients hospitalized due to HFrEF in Ist Cardiology Department, Poznan University of Medical Sciences. The assessment of nutritional status was taken at admission based on polish version MNA form (Mini Nutritional Assessment). The clinical condition was evaluated according to NYHA class and the occurrence of HF decompensation. Furthermore, we analyzed chosen echocardiographic and biochemical parameters (especially: lipid panel, fasting glucose, thyroid function).

Results: Among all patients 40% had a normal nutritional status (group 1), 52% were at risk of malnutrition (group 2) and 7% were malnourished (group 3). In patients with coexisting diabetes mellitus malnutrition appeared more often (43% of patients in group 3 and only 15% in group 1). In group of malnourished patients we observed significantly lower fasting glucose level (group 1 – 6,09±1,0mmol/L, group 3 – 5,56±2,2mmol/L; p=0,0396) as well as LDL-C (p=0,0385) and total cholesterol levels (p=0,0396), however there is also higher bilirubin level (group 1 - 21±13umol/L, group 3 - 62±42umol/L; p=0,0284). There were no significant changes in thyroid hormones status as well as in natriuretic peptides level between analyzed groups. Furthermore, malnourished patients are more frequently hospitalized due to decompensated HF (p=0,0016).

Conclusions: Malnutrition in HFrEF patients is associated with abnormal lipids profile (decreased LDL-C and total cholesterol levels) and glucose level (low fasting glucose). It also affects higher risk of exacerbation of HF. Diabetes mellitus seems to be associated with a higher risk of malnutrition in patients with heart failure. More research is needed to confirm our findings.

P1063

The incidence of chronic heart failure in patients with type 2 diabetes mellitus

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Introduction: Chronic heart failure (CHF) in patients with type 2 diabetes mellitus (T2DM) is one of the most common cardiovascular complications. However, currently there are few data on the incidence of CHF in T2DM, as well as hypo- and overdiagnosis of CHF.

Purpose: To assess the incidence of CHF in patients with T2DM.

Methods: The registry included patients ≥40 years with confirmed T2DM (HbA1c levels, glycemic profile) admitted to the city hospital from 01/08/2018 to 01/11/2018 (n=477). The first step was to assess the presence of a diagnosis of CHF in the patient's history. The second step was to assess the diagnosis of CHF according to the 2016 HF Guidelines (ESC) and compare results. All patients had results of NT-proBNP and echocardiography which were evaluated within 1-3 days after admission. NT-proBNP levels ≥125 pg/ml was considered as abnormal, echocardiography parameters were assessed according to the 2016 HF Guidelines (ESC). Statistical analysis was performed with STATISTICA 10.0 software package.

Results: In the whole group mean age was 69.7±11.4, 60.3% women. Among concomitant diseases met: hypertension 93.6 %, coronary heart disease 64.5%, atrial fibrillation 33.3%, previous myocardial infarction 32.9%, previous stroke 20.1%. The median NT-proBNP was 730 [110; 1877] pg/ml, mean ejection fraction (EF) was 49.6±11.2%. After general analysis patients were divided into 2 groups: group 1 (G1) – patients with a diagnosis of CHF at admission (78%, n=372) and group 2 (G2) – without CHF at admission (22%, n=105). In the G1 the median NT-proBNP was 820 [150; 2167] pg/ml, mean EF was 48.8±11.4%, in the G2 – 100 [50; 1160] pg/ml and 55.6±7% respectively. In G1 the diagnosis of CHF was confirmed in 291 patients (78%), with median NT-proBNP 1270 [532; 2638] pg/ml, mean EF 47±11.5%. In G1 the diagnosis CHF was excluded in 81 (22%). In G2 the diagnosis of CHF was first established in 51 patients (49%), the median NT-proBNP 1160 [550; 1800] pg/ml, mean EF 55.3±7.9%. The absence of CHF was confirmed in 54 (51%).

The distribution of patients by EF in confirmed CHF was the following: 52.1%, 39.4%, 8.5% with preserved, mid-range and reduced EF in G1, in G2 – 61.5%, 38.5%, 0% respectively.

Conclusions: The incidence of CHF was 71.7% in patients with T2DM admitted to the city hospital within 3 months. Among all patients, the presence of CHF was overestimated in 17% (n=81) and underestimated in 10.7% (n=51). It should be noted that the diagnosis of HF with reduced EF was correctly established prior to the hospitalization. Our results show that the diagnosis of CHF should be made after receiving all data (including NT-proBNP, echo) which will help to avoid underestimation or overestimation cases of CHF.

P1064

Comparison of serum selenium and thyroid hormones in patients with acute myocardial infarction, chronic heart failure and healthy volunteers.

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Background/Introduction: Selenium (Se) is incorporated in many selenoproteins i.e.: glutathione peroxidase (GPX) and iodothyronine deiodinases. Oxidative stress is increased in acute coronary syndromes (ACS) and heart failure (HF). In case of Se deficiency both GPX activity and thyroid hormones conversion may be decreased and have negative influence on cardiovascular system.

Purpose: We sought to evaluate Se levels in Polish patients with myocardial infarction (MI), heart failure (HF) and healthy volunteers in relation to thyroid hormones levels.

Methods: The study group: We studied 143 persons: 54 consecutive patients with acute MI (group MI), 59 consecutive patients with decompensated HFrEF, (group HF) and 30 healthy volunteers (group C).

Exclusion criteria: thyroid dysfunction, severe systemic disease, treatment with amiodarone, steroids or propranolol.

Laboratory tests: TSH, fT3, fT4, Se levels were analysed.

Table 1.Comparison of MI, HF and C group

Characteristics	Group MI n= 54	Group HF n= 59	Group C n= 30	p-value
Age, years	61.00 (53.75; 67.25)	65.00 (59.00; 74.00)	61.50 (57.50; 68.75)	0.0837
Male sex, n (%)	47 (87.04%)	48 (81.36%)	25 (83.33%)	0.7104
Smoking, n (%)	33 (61.11%)	21 (35.59%)	8 (27.59%)	0.0035 a,b
BMI, kg/m^2	26.18 (24.76; 30.79)	28.41 (25.50; 32.28)	30.11 (27.36; 34.76)	0.0127 b
Selenium, µg/l	65.91 (55.15; 76.10)	59.74 (47.73; 70.66)	93.18 (84.20; 99.10)	<0.0001 b,c
Selenium deficiency,n (%)	38 (70.37%)	44 (74.58%)	3 (10.00%)	<0.0001 b,c
TSH, µIU/ml	2.23 (1.20; 3.11)	1.60 (1.16; 2.03)	1.08 (0.68; 1.80)	0.0002 b,c
fT3, pmol/l	4.21(±0.69)	4.16(±0.94)	4.99(±0.66)	<0.0001 b,c
fT4, pmol/l	15.96(±2.27)	17.95(±2.98)	15.31(±1.91)	<0.0001 a,c
fT3/fT4 ratio	0.27(±0.04)	0.24(±0.06)	0.33(±0.05)	<0.0001a,b,c

Table legend: a - p<0.05 between group MI and HF, b - p<0.05 between group MI and C, c- p<0.05 between group HF and C.

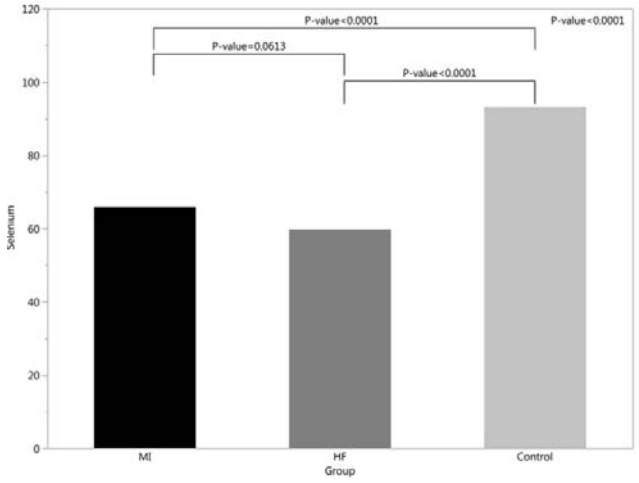

Figure 1. Serum selenium levels.

Results: Se levels were lowered in both MI and HF patients in comparison to healthy controls (Table 1, Figure 1). Patients with MI and HF presented higher levels of TSH and lower levels of fT3 and fT3/fT4 ratio in comparison to controls (Table 1).
There was a moderate correlation between Se and: fT3 (r=0.390, p<0.0001) and fT3/fT4 ratio (r=0.4294, p<0.0001).
Conclusions: Se deficiency is frequent, unrecognized finding in both patients with acute MI and chronic HF in comparison to healthy volunteers. Further studies are needed to investigate if Se deficiency may play a negative role in patients with MI, and HF.

P1065

Anger, anxiety, depression and quality of life in patients with right heart failure associated with COPD, according to their functional capacity

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Introduction . COPD has several comorbidities, including heart failure (HF), decreasing the functional capacity of patients due to their common symptomatology. This condition can be related to psychological comorbidities such as anger, anxiety and depression, emotions that negatively affect the quality of life and the prognosis of the patients.
Purpose. To investigate the levels of anger, anxiety, depression and quality of life in patients with HF related to COPD, depending on the level of functional capacity.
Method. A descriptive cross-sectional study was carried out that included 75 patients, who were classified according to the level of functional capacity by NYHA in I (N = 10), II (N = 33), III (N = 29) and IV (N = 3). We used the Hospital Anxiety and Depression Scale (HADS), the State-Trait Anger Expression Inventory (STAXI-2) and the SF-12 to assess health-related quality of life. An analysis of variance was performed, using SPSS v25.
Results. The sociodemographic characteristics by group were I: 55.4 ± 16.06 years, 55.6% women; II: 66.21 ± 11.77 years, 54.5% men; III: 69.26 ± 13.01 years, 64.5% women; IV: 83.00 ± 5.29 years, 75% women. There were statistically significant differences between the groups (I / II / III / IV) in the means of depression [F (3,74) =, p <0.05] (4.60 ± 3.62 / 4.48 ± 3.30 / 8: 34 ± 3.93 / 7.00 ± 3.00), internal anger-expression [F (3.74) =, p <0.05] (11.00 ± 4.92 / 11.85 ± 4.33 / 14.76 ± 4.08 / 14.33 ± 6.11) and quality of life [F (3.74) = , p <0.05] (71.59 ± 20.01 / 59.21 ± 23.37 / 38.79 ± 19.69 / 26.67).
Conclusion. Patients with lower functional capacity have greater depressive symptomatology, internalization of anger and lower quality of life, factors that in turn can affect their prognosis. Evaluating psychological aspects such as anger, anxiety and depression is fundamental for the treatment, since they can be factors related to future exacerbations and / or complications, worse prognosis and lower quality of life of the patient. Making the implementation of interdisciplinary teams necessary for the evaluation and treatment of patients.

P1066

The prevalence of chronic kidney disease and change in renal function during treatment optimization in patients with heart failure with reduced ejection fraction

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Introduction: Optimal neurohormonal therapy of chronic heart failure (CHF) is often complicated by the presence of chronic kidney disease (CKD), which is an important prognostic factor of CHF.
Purpose: We investigated the prevalence of different CKD stages and changes in renal function in the effect of treatment optimization (TO) in patients (pts) with heart failure with reduced ejection fraction (HFrEF) followed at our heart failure outpatient clinic (HFOC).
Methods: The prevalence of different CKD stages were assessed in 469 pts with HFrEF managed at our HFOC (male:77.19%, age:62.58±12.6 years, NYHA:3.12±0.78%, LVEF:26.88±6.51%, eGFR: 51.45±19.25ml/min/1.73m2). The change in eGFR before and after TO was also determined in the whole patient group and in pts with different CKD stages.
Results: In 29.63% of pts eGFR was above 60 ml/min/1.73m2 (CKD1-2), in 59.70% was 30-60 ml/min/1.73m2 (CKD3a-3b) and in 10.66% was under 30 ml/min/1.73m2 (CKD4-5) at baseline. After TO 19.40% of pts was at CKD1-2, 63.75% at CKD3a-3b and 16.84% at CKD4-5 stage. After TO significant eGFR decrease was detected in the whole population (51.45±19.25 → 46.03±17.09 ml/min/1.73m2; p<0.001), at baseline CKD1-2 (74.06±14.84 → 58.81±17.29 ml/min/1.73m2; p<0.001) and baseline CKD3a-3b (45-18±8-67 → 43-57±15-06 ml/min/1.73m2; p<0.001) pts compared to eGFR parameters before TO. Pts with CKD4-5 at baseline showed significant eGFR improvement (23.73±6,15 → 29.78±11,37 ml/min/1.73m2; p<0.005.) Neurohormonal antagonist usage did not show significant difference after TO in pts with CKD1-2 (BB: 89.01%, ACEi/ARB: 98.90%, MRA: 57.14%), CKD3a-3b (BB: 94.31%, ACEi/ARB: 97.99%, MRA: 66.22%) and CKD4-5 (BB: 93.67%, ACEi/ARB: 94.94%, MRA: 58.23%).
Conclusions: The prevalence of CKD in HFrEF population is very high. Based on our study results renal function worsening was detected after TO in mild and moderate CKD pts, however, renal function improvement was proved in the most severe CKD4-5 pts. Our data suggests that we should strive to achieve optimal neurohormonal antagonist therapy in CKD4-5 pts too, partly because, based on previous data, the severe CKD patient group is one of the pts who benefit most from this treatment and partly because, based on our study results it seems safe treatment option in this group of patients.

Acute Heart Failure

P1067

Prognostic significance of an early echocardiographic evaluation of right ventricular dimension and function in acute heart failure.

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Background: Sparse and contradictory data are available on the prognostic role of an early echocardiographic examination in patients with acute decompensated heart failure (ADHF). We planned a prospective study to elucidate which echocardiographic parameter is better related to prognosis in such patients.
Methods and Results: In a consecutive series of ADHF patients with either reduced (HFrEF) or preserved (HFpEF), a complete echocardiographic examination was performed within 12 hours from admission. End-point of the study was death or re-hospitalization at 6 months from hospital discharge.
Among the 381 patients enrolled, 209 had HFrEF and 172 had HFpEF. After 6 months from discharge, 73 died and 96 were re-hospitalized for cardiovascular causes. At multivariable analysis a large right ventricular diameter (RVEDD >40 mm, p=0.02), a reduced TAPSE (<18 mm, p=0.004) and inferior vena cava diameter >22 mm (p=0.02) were associated with 6-months events. Left ventricular ejection fraction (LVEF) and diastolic function analysis were not predictive of events. Pulmonary artery systolic pressure (PASP) >45 mmHg and TAPSE/PASP <0.425 were associated with prognosis at univariate but not at multivariable analysis. Conversely, the TAPSE/RVEDD ratio (dichotomized at its median value of 0.461) was a significant predictor of outcome at multivariable analysis (p<0.001).
Conclusions: in patients hospitalized for ADHF, early echocardiographic identification of right ventricular dilatation and dysfunction predict a poor outcome better than left ventricular systolic and diastolic dysfunction.

P1068

Seismocardiography can track right heart catheterization parameters in patients with heart failure: a pilot study

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Background: Right heart catheterization (RHC) is an important diagnostic tool in patients (pts) with heart failure (HF). Intravenous (IV) pharmacological agents can be administered during RHC to assess the cardiac response. In our previous studies, we have shown that wearable chest patch based seismocardiogram (SCG) signals – the local body vibrations of the chest wall in response to cardiac ejection – can assess cardiopulmonary stress test parameters and can accurately quantify cardiac contractility changes [pre-ejection period (PEP)], which can be used to differentiate between compensated and decompensated patients with HF following a six-minute walk test.
Purpose: We compared RHC variables with features from simultaneously recorded SCG to evaluate the utility of the wearable sensor as an alternative to invasive measurements.
Methods: We enrolled 4 pts with HF with a mean age 52 ±11, 100% men, ejection fraction 0.26 ±0.21 and performed RHC at baseline and with infusion of IV vasodilator (nitroprusside or nitroglycerin). SCG and ECG signals were simultaneously recorded using our custom-built wearable chest patch (Fig. 1a). We segmented the RHC pressure signals and SCG signals into heartbeats and averaged the beats over 15 second windows for each intracardiac pressure, and extracted features (amplitude, frequency and time domain) from the SCG. We compared the changes in SCG features from baseline to those in response to the drug infusion and compared them with the changes in RHC pressures. We also combined the SCG features using dimension reduction techniques and calculated the distance between the two distributions (baseline and peak drug infusion), and compared them with the changes in RHC pressures.
Results: Cardiac contractility decreased (PEP increased) with vasodilator infusion, whereas pulmonary artery mean pressure (PAM) decreased (Fig. 1b). The distance between the two SCG distributions (corresponding to the two physiological states – baseline and peak drug infusion) showed good correlation (R2=0.87) with the changes in PAM (Fig. 1c).
Conclusions: Using simultaneous SCG and ECG we can track the changes in corresponding RHC pressures for patients with HF. This wearable device can potentially provide non-invasive monitoring of the hemodynamics related to medication changes in pts with HF.

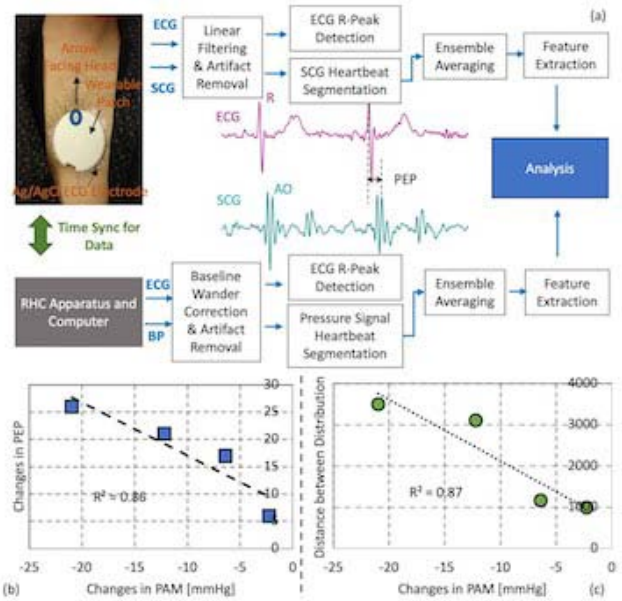

Figure 1: (a) Image showing the wearable patch for measuring ECG and SCG signals from the chest, corresponding wearable signals and data processing block diagram for wearable and RHC signals. (b) Changes in PEP from baseline to peak drug infusion is showing strong correlation with changes in PAM from RHC. (c) Distance between combined SCG features at baseline and peak drug infusion is showing strong correlation with changes in PAM.

Figure 1

P1069

Morphological characteristics of myocardial inflammation and long-term outcomes in patients with acute decompensation of ischemic chronic heart failure

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Aim: To determine the morphological characteristics of myocardial inflammation and to assess the dynamics of serum biomarkers and long-term outcomes in patients with cute decompensation of ischemic chronic heart failure (ADHF).
Methods: This open-label, nonrandomized, single-center, prospective trial was registered at clinicaltrials.gov (#NCT02649517). This trial included 18 patients (78% men; age of 60.12±9.30 years; LVEF of 29.92±18.22%) with ADHF and ischemic systolic dysfunction. Inclusion criterion was ADHF not earlier than six months after optimal surgery (PCI or/and CABG) and with optimal drug treatment for ADHF. All patients underwent invasive angiography and endomyocardial biopsy with immunohistochemistry. Patients were divided into five groups according to the results of immunohistochemistry and immune fluorescence assay: group 1 (viral antigens +/myocardial inflammation+ and serum antibodies to cardiomyocytes), group 2 (viral antigens+/myocardial inflammation+), group 3 (viral antigens+/myocardial inflammation - and serum antibodies to cardiomyocytes), group 4 (viral antigens+/myocardial inflammation -), group 5 (myocardial inflammation-/ serum antibodies to cardiomyocytes). On admission and at one-year follow up, serum levels of IL-1β, IL-6, IL-10, hsCRP, TNF-α), troponin I, IFN-γ, BNP and NT-proBNP were measured using multiplex immunoassays. Serum anti-fibrillary, anti-sarcolemmal and anti-nuclear antibodies to cardiomyocytes were determined using indirect immunofluorescence (IMMCO Diagnostics).
Results: We identified morphological criteria for myocardial inflammation in 56% (n = 10) in group 1 and 2 in equal parts. We did not find morphological criteria for myocardial inflammation in 44% (n = 8) in group 3 - 22% (n = 4) and group 4 – 17% (n = 3). On admission, in group 1 increasing of troponin I and hsCRP was observed in 11% (n = 2), and 5.5% (n = 1) after one year. On admission, in group 2 increasing of troponin I was find - 11% (n = 2) and hsCRP - 5.5% (n = 1), and after a year only troponin I was increased in 5.5% (n = 1). On admission, in group 3 we observed an increase in troponin I, hsCRP - 5.5% (n = 1) and after a year only troponin I was increased in 11% (n = 2). There was no increasing troponin I, hsCRP in group 4 and group 5 on admission and after a year. The mortality rate in group 2 within one

year was 11% (ADHF-5.5%, sudden cardiac death-5.5%), and in group 3 – 5.5% of ADHF.
Conclusion: Patients with CHD and ADHF are a heterogeneous group. Half of patients had myocarditis. Viral and viral-autoimmune myocarditis were detected in equal parts. Among cases without myocarditis we detected virus-positive patients in 88%. Antibodies to cardiomyocytes were found in 57% of them. The only patient had antibodies to cardiomyocytes without myocarditis. The most common antigens to enterovirus and human herpesvirus type 6. The presented data can be find new criteria for the phenotyping of ADHF to medical treatment.

P1070

Heart failure patients with residual congestion and worsening renal function was associated with increased 1-year cardiovascular event

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Background: There are a few studies about the relationship between serum B-type natriuretic peptide (BNP) for the maker of residual congestion at discharge, the development of worsening renal function (WRF), and cardiovascular event in patients with heart failure (HF).
Purpose: Our purpose was to evaluate the association between serum BNP level at discharge or WRF during hospitalization for HF, and cardiovascular mortality in patients with HF.
Methods: We divided the patients with acute decompensated HF into four groups by the median value (284.3 pg/mL) of serum BNP level at discharge and by the occurrence of WRF. We evaluated the association between serum BNP/WRF and 1-year cardiovascular/all-cause mortality/HF readmission. The four groups were 1) less than the median BNP level and no occurrence of WRF (C-W-), 2) less than the median BNP level and occurrence of WRF (C-W+), 3) equal or greater than the median BNP level and no occurrence of WRF (C+W-), and 4) equal or greater than the median BNP level and occurrence of WRF (C+W+).
Results: Among 311 patients enrolled, WRF developed in 102 patients (32.8%). Patients in C-W- group was significantly younger than patients in the others (P=0.007). Systolic blood pressure was significantly different among the groups (P=0.02). The risk of cardiovascular death and HF admission was significantly different between the four groups (P =0.0001). In Cox proportional hazard models, patients in W+C+ had the highest risk of composite endpoint (Hazard ratio (HR), 5.12; 95% confident interval (95% CI), 2.01-14.38; P=0.0005). Patients with W+C- and those with W-C+ had a higher risk than patients with W-C- (HR, 3.70; 95% CI, 1.28-11.17; P=0.02; HR, 3.67; 95% CI, 1.47-10.14; P=0.005, respectively).
Conclusions: Heart failure patients with the development of WRF combined with elevated BNP at discharge had the highest risk of 1-year cardiovascular event of cardiovascular death and HF readmission.

P1071

Cardiac acoustic biomarkers reflect disease status and cardiac functions in patients with acute decompensate heart failure: the ACTOR-HF trial

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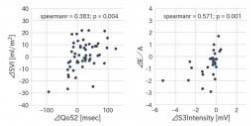
Introduction: Biomarkers reflecting rapid changes in disease status and cardiac function are important for patient care of heart failure (HF), whereas only a few biomarkers are available and most of them have limitations for daily use. Cardiac acoustic biomarkers (CABs), which are acoustic and temporal metrics incorporating heart sounds and electrocardiographic signals, can be recorded noninvasively and easily, and can be assessed on daily basis using an ambulatory acoustic cardiography device on the chest. The aim of this study is to assess temporal changes of CABs and their association with disease status and cardiac functions in patients hospitalized for acute decompensated HF (ADHF).
Methods: We prospectively enrolled 60 patients hospitalized for ADHF. Echocardiographic parameters and CABs were evaluated at admission, pre-discharge and the first clinic visit following discharge. The following CABs were recorded by an ambulatory acoustic cardiography device for 5 minutes at rest: electromechanical activation time (EMAT, time-interval from Q wave onset to S1) and total electromechanical systolic interval (QoS2, time-interval from Q wave onset to S2), both of which are generally regarded as an indicator of left ventricular systolic performance; and S3 Intensity (peak-to-peak amplitude of S3).
Results: A total of 60 patients with ADHF enrolled from April, 2017, to December, 2018 in this trial. The mean age was 70±13 years, and 76.7% were men. One third of them have HFpEF (defined as ejection fraction > 50%). The mean hospitalization period was 20±11 days. The prolonged EMAT (i.e. EMAT≥120msec) was detected in 17 patients (28%) and the increased S3 Intensity (i.e. S3 Intensity≥2.0) was observed in 15 patients (25%) at admission. From admission to the pre-discharge and to the first clinic visit, S3 Intensity significantly decreasedP<0.001 and P<0.001, respectivelyand QoS2 significantly increasedP=0.002 and P<0.001, respectively-while EMAT was not changed. Correlations between changes in CABs and echocardiographic parameters revealed significant direct correlation between changes in QoS2 and changes in stroke volume index (r=0.383, P=0.004) (Figure) and between changes in S3 Intensity and changes in trans mitral flow E/A (r=0.571, P=0.001) (Figure).Conclusion: Temporal changes of CABs reflect alterations of disease status and cardiac functions in patients hospitalized for ADHF.



Scatter plot in subjects

P1072

Admission copeptin activity closely associated with left ventricular filling pressure in patients with acute decompensated heart failure

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Purpose: to evaluate association novel biomarkers activity with left ventricular filling pressure in patients (pts) with acute decompensated heart failure (ADHF).
Methods. In the prospective single-center trial were included 159 hospitalized pts with ADHF III-IV FC NYHA and LV systolic dysfunction due to coronary artery disease, arterial hypertension and dilated cardiomyopathy. Echocardiography and determination of the biomarkers concentrations (soluble ST2 (sST2), copeptin, galectin-3, hsTnT and NGAL) compared with NT-proBNP were performed at admission and discharge. Left ventricular filling pressure was assessed by E/E'.
Results. Admission biomarkers concentrations were 3615,5 (1578,0; 6289,3) pg/ml, 60,49 (41,9; 92,9) ng/ml, 40,61 (29,1; 48,9) pmol/l, 14,2± 3,8 ng/ml, 29,95 (21,8; 49,6) pg/ml and 62,35 (43,0; 87,5) ng/ml (NT-proBNP, soluble ST2, copeptin, galectin-3, hsTnT and NGAL, respectively). Mean E/E' was 22,29±8,02. E/E' correlated with the concentrations of NT-proBNP, copeptin, NGAL and sST2 (relatively r=0,708 (p<0,01), r=0,767 (p<0,01), r=0,365 (p<0,05), r=0,405 (p<0,05)). After treatment, the concentrations of all biomarkers, except NGAL, decreased significantly (Δ%= -37,56%, -29,9% , -25,9%, -12,97%, -10,61% (p<0,0001 for all) for NT-proBNP, sST2, copeptin, galectin-3, hsTnT, respectively). E/E' also decreased to 17,78±6,48 (p<0,0001). At the discharge, only concentrations of NT-proBNP and copeptin continued to correlate with E/E', but weaker than at the admission (respectively r=0,613 and r=0,578, p,0,01 for all). Further ROC analysis showed that the predictive value of the admission and discharge opeptin levels for shot, long- and medium-term prognosis is not inferior to that of NT-proBNP (discharge concentrations for shot, long- and medium-term prognosis respectively: AUC= 0,714 (95%CI 0.550, 0.877), p=0,021 vs AUC= 0,704 (95%CI 0.565, 0.843), p=0,01; AUC = 0.735(95% CI 0.640- 0.830), p <0.0001 vs 0.727(95% CI 0.639-0.816), p <0.0001; AUC=0,739 (95%CI 0,640;0,838), p<0,0001 vs 0,732 (95%CI 0,637-0,826), p<0.0001). Probably this is due to the revealed close association of copeptin concentration and filling pressure in pts with ADHF.
Conclusion. Among novel biomarkers admission copeptin activity most closely and better than NT-proBNP associated with left ventricular filling pressure in patients with ADHF.

P1073

Comparison of chromogranin A to proven biomarkers of natriuretic peptide, and ST2 as a prognostic marker in patients with acute heart failure

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Background: Chromogranin A (CgA) level have been reported to predict mortality in patients with heart failure. However not much information in available regarding predictive power, clinical availability to date. We compared predictive power of chromogranin A to previously proven biomarkers of natriuretic peptide, and ST2 in patients with acute heart failure.Method: Between Jun. 2017 and Jun. 2018, patients who had CgA test in acute stage of heart failure hospitalization were retrospectively enrolled. A total of 264 patients were enrolled and median follow-up duration was 166 days. Relationship between four biomarkers and prognosis (in-hospital mortality, composite outcome of all-cause mortality and hospitalization for heart failure) of the patients were investigated.
Results: In-hospital mortality of the study population was 7.3% (n=19). During the follow-up, composite event of mortality and hospitalization for heart failure was observed in 12.6% (n=33). In receiver-operating curve analysis to predict in-hospital mortality, area under curves (AUC) were 0.715, 0.740 and 0.778 for NT-proBNP, CgA, and ST2, respectively. Cutoff value for predicting in-hospital morality for CgA was 158 pmol/L. During the follow-up, patients with high CgA (>158pmol/L) was associated with worse outcome (52.3% vs. 19.9%, p<0.001). Level of CgA was related to NYHA class, age, history of hypertension and diabetes, serum levels of NT-proBNP and ST2.
Conclusion: CgA presented comparable prognostic power to that of proven biomarkers of NT-proBNP and ST2 in patients with acute heart failure. CgA showed additive prognostic implication on NT-proBNP level in patients with acute heart failure.

Baseline characteristics of the patients

	Survivors(N=231)	90 days Events(N=33)	p value
Age	67.6±15.9	76.9±8.4	<0.001
HTN	114(49.4%)	17(51.5%)	0.963
DM	71(30.7%)	12(36.4%)	0.652
de novo	181(78.4%)	17(51.5%)	0.002
NYHA class			0.002
II	132(57.1%)	11(33.3%)	
III	56(24.2%)	7(21.2%)	
IV	43(18.6%)	15(45.5%)	
Chromoganin A	256.1±382.1	426.4±399.5	0.018
NT-proBNP	9390.0±26197.9	19120.6±25324.2	0.046
ST2	49.4±43.2	89.4±49.2	<0.001

P1074

Blood urea nitrogen and biomarker trajectories in acute heart failure

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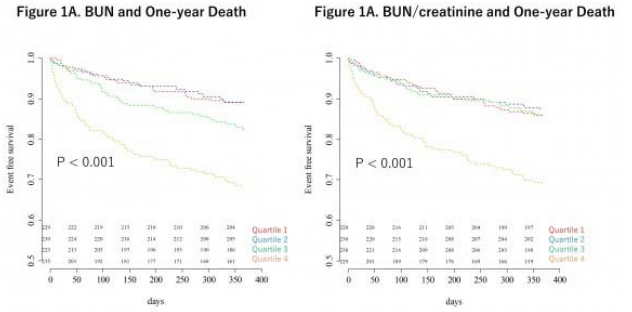
Background: Blood urea nitrogen (BUN) is considered a biomarker of neurohormonal activation in heart failure (HF) and higher levels are associated with worse outcomes.
Purpose: To investigate whether BUN and/or BUN/creatinine (BUN/Cr) is associated with biomarkers of organ dysfunction or injury and predicts outcomes independent of these biomarkers in patients with acute HF (AHF).
Methods: The Acute Kidney Injury Neutrophil gelatinase-associated lipocalin (NGAL) Evaluation of Symptomatic heart fallure Study was a multicenter, prospective cohort study of AHF patients. We retrospectively analyzed 918 patients for the relationship between BUN and BUN/Cr to other biomarkers including brain natriuretic peptide (BNP), high sensitivity cardiac troponin I (hs-cTnI), urine and serum NGAL (uNGAL and sNGAL), and galectin 3. These biomarkers were measured at admission, 4-hours, day 1, 2, 3 and discharge. Clinical outcome was death at 1 year.
Results: Higher quartiles of BUN and BUN/Cr were significantly associated with higher biomarkers levels during hospitalization. The highest quartile of BUN and BUN/Cr were significantly associated with death at 1 year (Figure 1). However, in multivariate Cox analysis, a U-shaped relationship between BUN and BUN/Cr and death at 1 year was observed with the second quartile of BUN and the third quartile of BUN/Cr showed the lowest risk (Figure 2).
Conclusions: BUN and BUN/Cr were associated with biomarkers of organ dysfunction and injury in AHF. A U-shaped relationship was observed between BUN and BUN/Cr and death at 1 year.



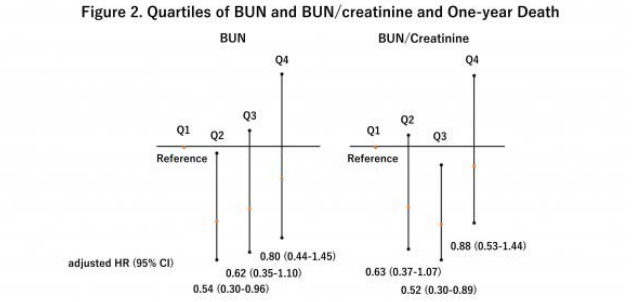


Figure 1 and 2

P1075

Menage a trois - Laboratory markers of myocardial injury, systemic inflammation, and thrombosis in patients with acute heart failure syndromes: insights from the CATSTAT-HF study

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Funding Acknowledgements: Nothing to declare.

Background: Previous studies have shown that several pathophysiological mechanisms including myocardial injury and activation of thrombotic and inflammation pathways might impact on outcomes among patients with acute heart failure (AHF) syndromes.
Purpose: Primary goal of the study was to determine the prevalence of laboratory marker abnormalities with respect to myocardial injury, systemic inflammation, and thrombosis. Secondly, we aimed to examine the association of these laboratory indices with N-terminal prohormone of brain natriuretic peptide (NT-proBNP), New York Heart Association (NYHA) class, left-ventricular ejection fraction (LVEF), estimated glomerular filtration rate (eGFR) and glycated hemoglobin (HbA1c) values.
Methods: A total of eighty patients with documented AHF according to ESC 2016 HF criteria were consecutively enrolled in the study during 2018. All patients underwent a physical examination, transthoracic echocardiography and blood withdrawal for laboratory analyses. Laboratory markers of principal interest were high-sensitivity cardiac troponin I (hs-cTnI), C-reactive protein (CRP) and D-dimers. Abnormal cut-offs were set according to assay specifications as follows: hs-cTnI ≥15.6 ng/L for women and ≥34.2 ng/L for men, CRP ≥5.0 mg/L, and D-dimers ≥0.5 mg/L. Finally, NT-proBNP, NYHA class, LVEF, eGFR, and HbA1c values were obtained in all patients.
Results: Mean age of the cohort was 69.6±10 years, 47.5% were women and a vast majority (88.3%) were in NYHA III class or higher. Median NT-proBNP value was 3333 pg/mL (IQR 1219, 6990) with mean LVEF of 42%, mean eGFR of 57 mL/min/1.73 m2 , and mean HbA1c of 6.6%. Median values of examined

laboratory markers were 20.3 ng/L (IQR 11.1, 36.5), 10.5 mg/L (IQR 5.9, 23.3) and 1.1 mg/L (IQR 0.7, 2.2) for hs-cTnI, CRP and D-dimer, respectively. Abnormalities of these markers were common in the observed cohort with 73.7%, 69.8%, and 47.9% of patients having abnormal CRP, D-dimer and hs-cTnI levels, respectively (Figure 1). One fifth (20.8%) of the cohort did not have an abnormality in any of the aforementioned markers. A total number of laboratory abnormalities positively correlated with NYHA class (r=0.448, p=0.002). hs-cTnI values correlated positively with NYHA class (r=0.374, p=0.021), HbA1c (r=0.312, p=0.014) and negatively with LVEF (r=-0.344, p=0.041). CRP correlated negatively with estimated glomerular filtration rate (r=-0.345, p=0.002) and positively with HbA1c (r=0.316, p=0.010). D-dimer values positively correlated to CRP (r=0.495, p=0.016) and NT-proBNP (r=0.330, p<0.05).

Conclusions: Abnormalities of laboratory markers that reflect myocardial injury, systemic inflammation and thrombosis are highly prevalent among patients with AHF syndromes. These markers generally appear to be associated with worse cardiovascular, renal and glycemic parameters.

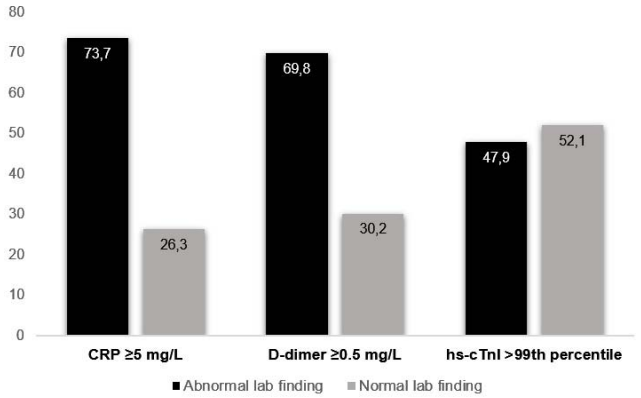

Figure 1. Lab abnormalities in AHF

P1076

Uptake of heart failure guidelines in the management of acute heart failure admissions with a focus on NT-proBNP: a UK tertiary centre experience.

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Introduction Brain natriuretic peptides (BNP) are peptides released mainly from the cardiac ventricles and have diuretic, natriuretic as well as hypotensive effects. NT-proBNP, derived from proBNP, and is increased in heart failure (HF) patients. In the acute phase, NT-proBNP measurement can improve the diagnostic accuracy of HF in patients presenting with dyspnoea. Furthermore, NT-proBNP levels also correlate with prognosis in acute HF admissions. The use of NT-proBNP has also been shown to be cost effective with reduction in hospitalisations. UK NICE guidelines from 2018 as well as ESC guidelines on HF have recommended that all patients admitted with suspected HF should have NT-proBNP measured.

Purpose We investigated the proportion of patients presenting with acute HF to our hospital who had an NT-proBNP measured on admission. Our target was that 100% of patients should have this measured.

Methods A standardised pro-forma for data collection was used to collect data about our acute heart failure admissions from 4th January 2018 until 27th November 2018. Basic demographics, NT-proBNP levels, echo data and discharge diagnoses were recorded. Our IT coding data was filtered to include patients who had "heart failure" as their primary discharge diagnosis.

Results 113 patients were found to have a primary diagnosis of HF on their discharge summary. The majority of patients were males (66%) with a mean age of 62 years old. Our cohort was an "all-comer" population and included patients with ischaemic heart disease (39%), hypertension (32%), diabetes (35%) and AF (32%). 23% of our patients had a diagnosis of CKD.

35 patients (31%) did not have an NT proBNP level measured despite "heart failure" being the primary discharge diagnosis. 7 patients without NT-proBNP measurement did not have a prior diagnosis of HF before admission.

It is therefore possible that there is a lack of knowledge about the up to date guidelines on the management of HF and also, more specifically, about lack of knowledge about prognostic value of NT-proBNP in patients already known to have HF.As a result of this study, we will implement teaching programmes on updates about HF management for our non-cardiologist colleagues. Our HF specialist nurses will also play a vital role in education on the wards. We will also be collaborating with our IT department to design an alert which prompts the clinician about the guidelines about NT-proBNP measurement as well as alerting our HF team directly if there are patients with very high NT-proBNP levels in the hospital.

Conclusion There is suboptimal adherence to national and international HF guidelines, with one third of our acute HF patients not having their NT-proBNP measured on admission. This issue has major clinical and cost-effectiveness implications for our patients and we will be implementing enhanced education measures and IT collaborations to improve adherence to the HF guidelines in our hospital.

P1077

Pregnancy-associated plasma proteins in patients with Infarction acute phase STEMI

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Introduction . Worldwide deaths from cardio - vascular disease ranks first among all causes of overall mortality. To improve risk stratification and diagnosis of acute coronary syndrome are open and actively exploring new protein growth factors and damage associated with pregnancy plasma protein-A.

The purpose of the comparative analysis of PAPP-A levels in the blood plasma of patients with acute coronary syndrome.

Material and methods: In the study 71 patients were enrolled with acute coronary pathology, the average age was 57 ± 8.5 years of age. In the blood plasma of patients was measured PAPP-A. Blood sampling was carried out at the time of patient's admission to the verification of the final diagnosis. The concentration of PAPP-A was measured by immunofluorescence. The control group consisted of 20 healthy individuals. The comparison group consisted of 40 patients with hypertension and coronary heart disease with stable forms of angina. The statistical processing of the material held by a "Statistics 8.0" package.

Results: PAPP-A in 37 patients with Infarction acute phase STEMI were the highest 27,64 ± 11,60 and close to the cases of mortality 27,7 ± 7,1. In 34 patients with Infarction acute non phase STEMI PAPP-A concentrations were slightly lower segment 11,02 ± 7,18, but fairly significantly (p <0.05) higher than that of patients with a diagnosis of unstable angina, 8.22 ± 3.16. All patients with myocardial infarction at admission were decorated complications of acute period. 38 patients had a higher risk for Killip 2,5-4. 9 patients had a higher risk of fatality on a scale of Grace in hospital = 40-50%. Absolute mortality from heart attack was 9 cases, which fully complies with Grace in hospital. Analysis of PAPP-A was statistically significant (p <0.05) due to weak negative outlook mortality on a scale of Grace in 6 months p = 0,001, r = -0,25.

Conclusion: PAPP-A levels are significantly higher in patients with acute coronary artery disease compared to healthy people and patients with arterial hypertension and coronary heart disease (stable form). In patients with Infarction acute phase STEMI PAPP-A is greater than the value in unstable angina in 3,4 times, and in patients with Infarction acute phase STEMI in 2,5 times. In case of death PAPP-A is 3.3 times higher than that in unstable angina. PAPP-A - factor protein damage, and can be used as the analyzer is unstable atherosclerotic plaques in acute coronary events.

P1078

Soluble CD163 is associated with LV ejection fraction in patients with STEMI

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Background: CD163 molecule belongs to important parts of the scavenger system, which helps to eliminate hemoglobin-haptoglobin complex and has a potential to suppress reactive oxygen radicals production in patients with acute coronary syndromes. The increase of sCD163 was also observed in patients with heart failure. Purpose: The aim of the study was to analyze clinical significance of increased sCD163 in left ventricular functional changes in patients with acute myocardial infarction (STEMI).

Methods: In the group of 29 patients (64.5±7.5 years, 4 females) with acute STEMI, we assessed concentrations of plasma sCD163 (at the time of admission, 24h and 96h later) and analyzed its association with left ventricular systolic function (LVEF).

Results: The plasma sCD163 level was increasing during the time of observation when compared to normal levels [0h: 1770.5 μg/L (IQR: 1451-2096.2 μg/L) vs.

1178 μg/L (1078-1265 μg/L), p<0.001; 24h: 2063 μg/L (1589-2453 μg/L) vs. 1178 μg/L (1078-1265 μg/L), p<0.001; 96h: 2116 μg/L (1924-2458 μg/L) vs. 1178 μg/L (1078-1265 μg/L), p<0.001]. In patients with LVEF ≤40%, plasma sCD163 concentration was significantly increased when compared to pts with LVEF >40% [0h: 1996 μg/L (1756-2145 μg/L), vs. 1456 μg/L (1280.5-2006.5 μg/L), p 0.022; 24h: 2435 μg/L (2145-2753 μg/L) vs. 1689 μg/L (1421.5-2131 μg/L), p 0.003; 96h: 2458 μg/L (2036-2783 μg/L) vs. 2032 μg/L (1761.5-2143.5 μg/L), p 0.004]. Concentration of sCD163 was negatively associated with left ventricular ejection fraction (24h: r -0.39, 95% CI: -0.57- -0.03, p 0.04).
Conclusion: Plasma sCD163 concentration is increased in patients with acute myocardial infarction (STEMI) and is associated with left ventricle ejection fraction and could serve as a potential tool for risk stratification of these patients.

P1079

Splenic volume index using computed tomography is associated with heart failure readmission in patients with acute decompensated heart failure

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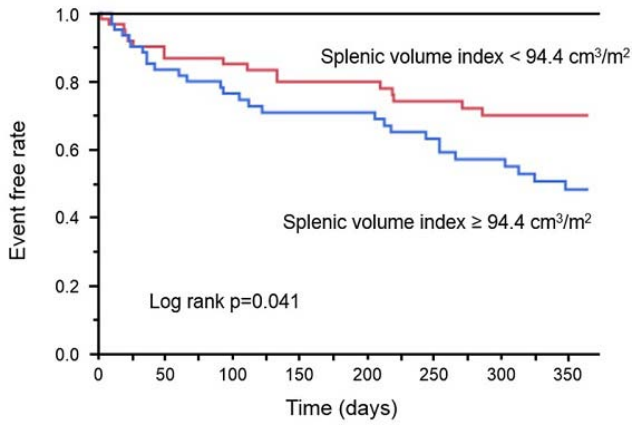
Background: The spleen is the organ which related to inflammation, and the splenic size is affected by hemodynamic congestion and sympathetic stimulation. However, the association between the splenic size and prognosis in patients with heart failure has been unknown.
Methods: Between January 2015 and March 2017, we analyzed 125 acute decompensated heart failure patients who performed computed tomography on admission day. Splenic size was measured by three-dimensional computed tomography. Patients were divided into two groups according to median of splenic volume index (SpVi: splenic volume / body surface area), and compared their baseline characteristics and the rate of heart failure readmission at one year.
Results: The median of SpVi was 94.4 cm3/m2 (IQR: 65.3 to 139.4 cm3/m2). There was no difference in age between two groups. Patients with large SpVi had significantly enlarged left atrium and left ventricle. In multiple regression analysis, posterior wall thickness and left ventricular end-diastolic diameter had significant positive correlations with SpVi. Kaplan-Meier analysis revealed large SpVi group had lower event free rate (log rank p = 0.041) than small SpVi group. After adjusting for age, sex, systolic blood pressure, creatinine, hemoglobin and log B-type natriuretic peptide, SpVi was independently related to heart failure readmission (Hazard ratio 2.64 [95% CI: 1.34 to 5.35], p = 0.005).
Conclusions: Increased splenic volume is independently associated with heart failure readmission in patients with acute decompensated heart failure.



Kaplan-Meier curve of heart failure r

P1080

It is the real deal: right ventricular dysfunction is a common finding across different ejection fraction phenotypes in acutely decompensated heart failure patients

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Funding Acknowledgements: Nothing to declare.

Background: Dysfunction of the right ventricle (RV) can often be underestimated during the work-up of a congested patient with acutely decompensated heart failure (ADHF).
Purpose: To determine the prevalence of RV dysfunction in ADHF patients and to characterize parameters of RV dysfunction when stratified by sex and the left ventricular ejection fraction (LVEF).
Methods: Twenty-six patients with LVEF <50% and 26 with LVEF ≥50%, that fulfilled ESC 2016 HF criteria for ADHF were consecutively enrolled in the study. Parameters of RV function including tricuspid annular plane systolic excursion (TAPSE), tricuspid lateral annular systolic velocity (S'), fractional area change (FAC), RV 2D free wall strain (FWS) and pulmonary artery systolic pressure (PASP) were measured by transthoracic echocardiography with abnormal cut-offs defined by ASE/EACVI criteria.
Results: Mean age of patients was 69.6 ± 10.6 years with equal sex distribution. Reduced FWS was the most common (71.9%) RV abnormality among ADHF cohort while decreased S' was least frequently (49%) encountered (Figure 1). Women had significantly higher RV FAC and RV 2D FW strain values than men (35.9 ± 9.1 vs. 29.1 ± 9.8 % and -19.2 ± 6.2 vs. -14.7 ± 4.9 %, respectively). Distribution of reduced TAPSE and RV S' was significantly higher among patients with LVEF <50% compared to those with LVEF ≥50% (p=0.031 and p=0.023, respectively; Mann-Whitney U test) (Table 1).
Conclusions: RV dysfunction is a common finding among ADHF patients and seems to affect men more than women. Prevalence of RV dysfunction is substantial in both LVEF phenotypes, although those with LVEF <50% are generally more affected and dominantly present with reduced RV FW strain while elevated pulmonary pressures seem to predominate among patients with preserved LVEF.

Table 1. RV dysfunction and LVEF

VARIABLE	LVEF <50%	LVEF ≥50%
TAPSE, mm	15.5 ± 5.6	18.8 ± 4.8
TAPSE <17 mm, %	67.5%	33.3%
RV S', cm/s	9.6 ± 3.1	11.8 ± 3.3
RV S' <9.5 cm/s, %	58.8%	29.4%
RV FAC, %	31.6 ± 10.6	35.2 ± 7.9
RV FAC <35%, %	63.6%	50.0%
RV 2D FW strain, %	-16.0 ± 5.5	-19.7 ± 6.7
RV 2D FW strain <20%, %	76.0%	57.1%
PASP, mmHg	37.8 ± 13.3	45.7 ± 23.5
PASP >35 mmHg, %	54.5%	62.5%

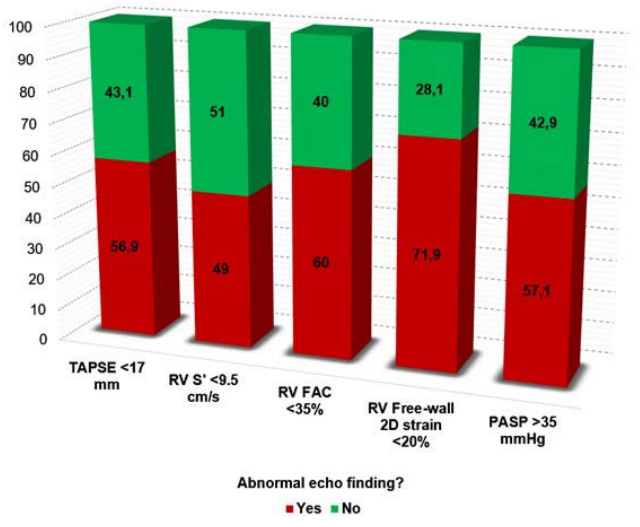

Figure 1. RV dysfunction in ADHF cohort

P1081

Concomitant pericardial effusion predicts adverse outcomes in patients with acute myocarditis

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Background: Acute myocarditis is still one of the most serious cardiovascular diseases with difficulty in both diagnosis and treatment. The disease is often accompanied by pericardial effusion because this category of the disease usually presents in the form of myopericarditis. However, there is lack of data that explain the prognostic implication of pericardial effusion in acute myocarditis. The aim of this study was to investigate the impact of pericardial effusion on adverse clinical outcomes in patients with acute myocarditis.
Methods: A total of 116 patients (39.5±20.1 years, 76 males) with acute myocarditis consecutively admitted to a tertiary hospital between 2011 and 2016. All patients were diagnosed with acute myocarditis by clinical symptom and signs, abnormal findings in cardiac imaging such as echocardiography or magnetic resonance image, and elevated cardiac troponin-i. They were divided into two groups according to the presence of pericardial effusion; the pericardial effusion (PE) group (n=56, 43.4±18.3 years, 29 males) vs. the non-pericardial effusion group (non-PE) group (n=54, 36.6±21.1 years, 43 males). Baseline characteristics, echocardiographic findings, laboratory findings, and clinical outcomes were compared between the two groups. The primary endpoint was in-hospital death or ECMO therapy.
Results: PE was noted in 56 out of 110 patients (50.9%) with acute myocarditis. Patients with PE tended to be older (43.4±18.3 vs. 36.6±21.1 years, p=0.071) and was more likely to be female (48.2% vs. 20.4%, p=0.002). Hypotension (systolic blood pressure < 90mmHg) was more frequent in PE group (25.0% vs. 5.6%, p=0.005). NYHA functional class was higher in PE group (1.9±1.5 vs. 1.2±1.4, p=0.021). High serum lactate level was noted in PE group (4.2±4.1 vs. 1.8±1.3, p=0.008).
Multivariate analysis using binary logistic regression showed that cardiac troponin > 10 ng/ml (OR 9.02, 95%CI 2.10-38.74, p=0.003) and the presence of pericardial effusion (OR 17.9, 95%CI 2.10-152.58, p=0.008) were the only independent predictors for the primary endpoint.
Conclusion: In patients with acute myocarditis, the presence of pericardial effusion indicates more adverse disease course. Early intensive immunosuppressive therapy or preparing for mechanical circulatory support would be warranted.

P1083

The effect of prehospital diuretic administration on clinical outcomes in patients with acute heart failure.

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On behalf of: SLOVASeZ II, III Investigators

Background: Most patients with AHF present with congestion. Early decongestion with diuretic agents could improve their clinical outcomes.
Aim: The aim was to analyse the impact of prehospital diuretic administration on clinical outcomes in patients with acute heart failure (AHF)
Methods: SLOVASeZ II, III registries enrolled 1239 consecutive patients hospitalised due to AHF. Patients were divided into two groups: with prehospital intravenous diuretic administration (D+, n=602) and without (D-, n= 607) diuretic agents within 24 hours before hospitalisation. The primary outcomes were: length of hospital stay and in-hospital death.
Results: A total of 1239 patients were divided into two groups (with and without prehospital diuretic administration). The average age was 71±11,8 years with gender distribution 634/605 (men/women). HFrEF/HFmrEF/HFpEF was in 417/190/349 patients. In 304 (24,5%) patients there was newly diagnosed AHF, the sudden worsening of AHF in 289 (23,3%) and progressive worsening of AHF in 646 (52,1%) patients. The baseline characteristics were similar between groups. The length of hospital stay did not differ between groups (the average for D+ 9,4 vs. 9,1 days for D-, p=0,83). The rate of in-hospital death did not differ between the groups (8,8 vs. 6,4%, p=0,11).
Conclusions: The prehospital intravenous diuretic administration within 24 hours before admission was not associated with clinical outcomes in a large prospective cohort of patients with AHF.

P1084

Characteristics and outcomes of diabetic patients with reduced left ventricular ejection fraction post acute myocardial infarction.

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Introduction: Diabetes is associated with higher morbidity and mortality in patients with heart failure and coronary artery disease. Recent studies have shown a reduction in cardiovascular endpoints including all-cause mortality and myocardial infarction in patients treated with sodium-glucose transporter 2 (SGLT-2) inhibitors. Data regarding the effect of SGLT-2 inhibitors in type 2 diabetics with ischaemic cardiomyopathy is limited. Our aim was to assess the clinical features, outcomes, and treatment strategy of diabetic and non-diabetic patients at our institution with left ejection fraction (LVEF) ≤40% following myocardial infarction (MI). Particular focus was directed to use of SGLT-2 inhibitors .
Methods: Retrospective study of consecutive patients undergoing inpatient coronary angiography at a tertiary hospital over a 9-month period (01/01/17 - 30/09/2017). 1,635 patients were identified. 92 patients satisfied inclusion criteria; 60% STEMI, 40% NSTEMI. 85% had new diagnosis of heart failure. 34/92 (37.0%) were diabetic, 8/34 (23.5%) newly diagnosed. Mean HbA1c in the diabetics was 8.32. 38.2% of the diabetics were eligible for SGLT-2 inhibitor initiation.
Results: There was no significant difference between diabetics and non-diabetics with respect to sex, age, peak troponin, length of admission, history of ischaemic heart disease, prior left ventricular dysfunction and heart failure therapies on admission or discharge. Diabetics had higher rates of hypertension (75% vs 34%, p<0.001), higher triglyceride levels (1.94mmol/L vs 1.46mmol/L, p=0.025) and were more likely to be on lipid lowering therapy at admission (62% vs 25%, p=0.006) but not at discharge than non-diabetics. There was an increase in use of SGLT-2 inhibitors from 2.9% diabetics on admission to 20.1% on discharge. One-year survival post-discharge was higher in diabetics (100%) vs non-diabetics (90.6%), (p=0.045).
Conclusion: This analysis offers hypothesis-generating data supporting the potential protective effect of SGLT-2 inhibitors on survival in diabetics with left ventricular dysfunction post-MI. Ongoing efforts should be directed at identifying diabetic patients eligible for SGLT-2 inhibitors in high-risk cohorts.

P1085

The EuroDEM- study: does arrival mode affect ED management and outcome of acute heart failure patient?

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Funding Acknowledgements: Helsinki University Hospital, Department of emergency medicine and services

Background: Acute heart failure (AHF) is often encountered in emergency departments (ED). From 11% to 53% of AHF patients arrive to the ED by ambulance.
Purpose: The aim of our study was to show potential effects of arrival mode on the ED management and short-term prognosis of AHF patients.
Methods: The EuroDEM study was a European multinational multicentre study. Data on patients presenting with shortness of breath were collected from 66 EDs. Patients with discharge diagnosis of AHF were categorized into two groups based on their arrival mode to the ED: those arriving by ambulance (emergency medical services (EMS) patients) and those self-presenting (non-EMS patients). ED management and prognosis were compared between the two groups.
Results: The study included 507 AHF patients. The majority (60.9%) arrived at the ED by ambulance. EMS patients tended to be older (mean age 80 years vs. 75 years) and more often females (56% vs. 42%) compared to non-EMS patients. On admission to the ED, EMS patients had higher heart rate (90/min vs 85/min, p=0.019) and respiratory rate (24/min vs 21/min, p=0.026). Diuretics were administrated to 67% of all AHF patients, nitrate-infusion to 12 % and intravenous morphine to 8%. Seventy-nine percentage received supplementary oxygen, and 9.5% non-invasive ventilation (NIV). No significant difference was seen in the ED management between the patient groups apart from the use of supplementary oxygen (EMS 85% vs non-EMS 69%, p< 0.0001) and NIV (EMS 13% vs non-EMS 4%, p=0.0017). Thirty-two percentage of non-EMS patients and 16 % of EMS patients were discharged home from ED (p<0.0001). The mean length of hospital stay was 7 days in both groups. In-hospital mortality was 5.0 % for non-EMS and 10.9 % for EMS patients (p= 0.06).
Conclusion: Majority of AHF patients arrive to the ED by ambulance. The arrival mode does not seem to affect the ED management apart from the use of ventilatorysupport. Non-EMS patients are more often discharged home from the ED, whereas the in-hospital mortality is higher among EMS patients.

P1086

Multicenter randomized clinical trial of the efficacy and safety of intravenous Quercetin in patients with acute decompensated heart failure

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Objectives: To evaluate the efficacy and safety of early treatment with intravenous high water-soluble Quercetin (Q) in acute decompensated heart failure (ADHF) patients with reduced left ventricular ejection fraction (EF).
Design and Methods: In open-label multicenter (8 centers involved) clinical trial (II phase) 91 patients admitted for ADHF were randomized either to Q1 scheme (n=28) or to Q2 scheme (n=34) or to control group (n=29). Inclusion criteria: chronic HF of ischemic etiology > 1 year, EF ≤ 40%, sinus rhythm. Intravenous Q was used during 5 days with Q1 800 mg and Q2 450 mg total dose. All patients received recommended standard HF therapy. Primary surrogate endpoint: EF increase ≥ 5%, EDV decrease ≥ 5% and decrease ≥ 6 points by HF severity scoring system compared the baseline values and those on day 10. HF severity score included: dyspnea, arrhythmia, orthopnoe, jugular-venous distension, crackles, gallop rhythm, hepatomegaly, edema, systolic blood pressure, respiratory and heart rate. The results of the difference in EF, EDV and HF severity score between baseline and 10th day were translated into points (high efficacy - 3 points, moderate - 2 points, poor -1 point, no effect - 0 points) and summarized in each group. Secondary endpoint was evaluated by cardiovascular death and re-hospitalization for HF within 180 days. All adverse events were used to assess the safety of Q.
Results: The study groups did not differ in terms of demographic characteristics and main clinical data. EF increase ≥ 5% was observed: Q1 group – in 67.9%, Q2 – in 79.4% and in 55.6% patients of the control group. EDV decreased ≥ 5%: Q1 – in 69.2%, Q2 – in 58.8% and in 51.8% of controls respectively. HF severity score (decrease ≥ 6 points) was significantly higher in Q1 and Q2 in compare to control group (82.1, 82.4 and 62.1%, both p<0.05 respectively). The primary endpoint was 2.14 point in Q1, 2.12 - in Q2 and 1.62 - in the control group (both p<0.05). There was no significant difference in secondary endpoint between groups: 17.2% in Q1, 14.3 in Q2 and 24.1% in the control group respectively. Treatment by Q was safe without any serious adverse events.
Conclusion: Our results show that intravenous Q contributes to the improvement of left ventricle contraction and remodeling, and reduces clinical severity of HF in ADHF patients. According to our data, Q2 regime with the low dose of the study drug is preferred. Study results give the background for further larger phase 3 trials of Q use in ADHF patients.

P1087

Optimal intravenous anesthesia in patients with acutely decompensated heart failure undergoing transcatheter aortic valve implantation

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Background Patients with severe aortic stenosis (AS) and concomitant acutely decompensated heart failure (ADHF) undergoing transcatheter aortic valve implantation (TAVI) represent a specially challenging population. Optimal anesthetic therapy in this population is unknown.
Purpose To evaluate the optimal anesthetic therapy selection and relevant clinical outcomes in patients with severe AS and ADHF undergoing TAVI
Methods This is a retrospective cohort study of patients that underwent TAVI in our institution between 04/2012 and 12/2016. Optimal use of anesthetics was defined as ≤3 anesthetic agents (not including ketamine). End-points included: 30-day mortality, heart failure readmission, acute kidney injury (AKI), and length of stay (LOS).
Results: Out of 570 patients that underwent TAVI in our institution, 92(16%) had ADHF (see Table 1 for baseline characteristics). The average amount of anesthetics administered was 3.3 and, 50/92 (56%) of patients with ADHF had optimal anesthesia use. The 30-day mortality was 2(4%) for patients with optimal anesthetic use vs. 3/42(7.5%) for the non-optimal group (p=0.65).
A regression model demonstrated that LOS increased 1.1days for every anesthetic agent used (p=0.047). For the optimal group, heart failure associated readmission was 2/50 (4%) vs. 10/42 (25%) for the non-optimal group (p=0.004). Post TAVI AKI was similar in both groups (p=0.36).
Conclusion: This study suggests that optimal anesthesia use in patients with ADHF undergoing TAVI decreases LOS and heart failure readmission at 30-days with no impact in post-TAVI AKI and 30-day mortality.

Table 1

	ADHF n=92	No-ADHF=478	p-value
Age, years	83.4± 8.7	84.5± 6.5	0.2139
Female, sex	40 (43)	214 (44)	0.8193
Ejection fraction (%)	48.5± 14	55.2± 12	<0.0001
STS score	7.6± 4.4	6.0± 3.5	0.0013
NT-proBNP	10.088± 13	4122± 8.1	0.0010
Propofol	21 (23)	142 (30)	0.2534
Dexmedetomidine	54 (59)	289 (61)	0.8153
Midazolam	64 (72)	332 (70)	0.8008
Lidocaine/ Bupivacaine	76 (84)	370 (78)	0.2040
Fentanyl	82 (91)	437 (92)	0.8331
Ketamine	1 (1.1)	5 (1.1)	1.0000
Optimal Anesthesia, N (%)	50 (55.6)	257 (54.1)	0.8185

STS: The Society of Thoracic Surgery Risk Score.

P1088

Angiotensin-converting enzyme inhibitors in acute coronary syndrome with mid-range ejection fraction

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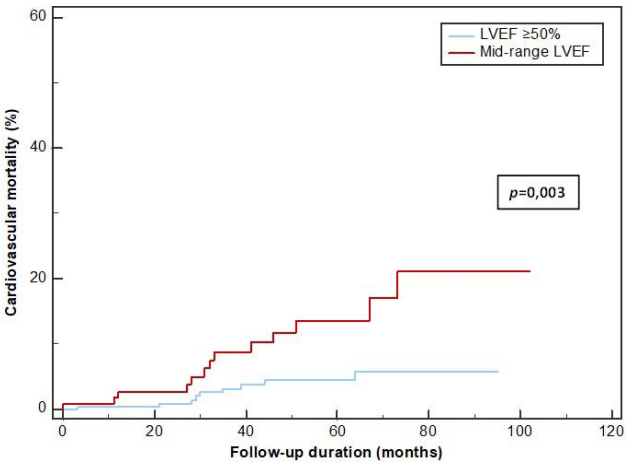
Introduction: Classically included in the group of patients with 'preserved' left ventricular systolic function (LVEF), heart failure (HF) with mid-range ejection fraction (40-49%) is a group of patients with more recent individualization, whom approach and treatment in the context of ischemic heart disease are not yet fully established. The aim of this study was to evaluate the impact of angiotensin-converting enzyme inhibitors (ACEI) on acute coronary syndrome (ACS) with mid-range LVEF (MREF) and its comparison with patients with LVEF ≥50%.
Methods: This was a retrospective study of patients with nonfatal ACS, periodically included in our center registry between October/2010 and November/2017, who were evaluated for LVEF during the index event. Patients were subdivided into 2 groups - group 1 with MREF and group 2 with LVEF ≥50%. The primary endpoints evaluated were cardiovascular mortality (CV) and MACE (myocardial infarction, coronary revascularization and CV death), at a median follow-up of 42 months (IQR 27-59).
Results: A total of 394 patients were identified, 28,9% belonging to group 1 and 71,1% to group 2. The prescription of ACEI at discharge was 90,4% in group 1 and 90% in group 2.
Cardiovascular mortality was significantly higher in group 1 (11,4% vs. 3,6%, p<0,05). In addition, there was a trend for more MACE in this group (17,5% vs. 11,4%, p=0,104).
In a multivariate analysis adjusted for age and ACS type, the use of ACEI in group 1 was associated with lower CV death (HR 0,2, 95% CI 0,1-0,8). There was also less MACE, but this difference did not reach statistical significance (HR 0,5, 95%



ACEI CV Mortality Kaplan Meier Curves

CI 0,2-1,5). In group 2, no significant differences were found either for CV death (HR 0,9, 95% CI 0,2-4,5) or for MACE (HR 0,8, 95% CI 0,3-2,1), despite a tendency for fewer events.
Conclusions: In ACS, MREF appears to be associated with worse prognosis when compared with LVEF ≥50%. The prescription of ACEI was associated with a decrease in cardiovascular events in the MREF group, which did not occur significantly in the LVEF ≥50% group.

P1089
Haemodynamic effects of heart rate lowering in patients admitted for acute heart failure: to save energy by improving effectiveness

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Background: Heart rate (HR) is a parameter with prognostic value for patients presenting with heart failure (HF) and sinus rhythm in both acute and chronic setting. In patients admitted for acute decompensation, HR could be a compensatory mechanism but also contribute to worsening HF, and indication to drugs which improve HR control is unclear. We analyzed the hemodynamic effect of early administration of ivabradine combined with usual care, 48-72hrs after hospital admission for HF in patients with sinus rhythm and HR >75 bpm.
Methods and results: Non-invasive hemodynamic parameter (stroke volume, SV, cardiac output, CO, Systemic Vascular Resistance, SVI) were obtained by the Niccomo Device (Medis, Germany) through a bioimpedence technique. Measurements with this device have been shown to be accurate, highly reproducible and sensitivity to normal hemodynamic changes. In this ongoing study, the first 16 acute HF patients enrolled had the following clinical characteristics: mean age 69±16, 31% females, ischemic aetiology 31%, hypertensive 25%, idiopathic 44%, LVEF 39±20%, BNP 1348±1198 pg/mL. Despite clinical stabilization of the patient, after 48-72 hrs from admission, HR was persistently elevated (79,5± 8,5 bpm) and Ivabradine 5 mg bid was started on-top of standard care (beta blockers 62,5 %, diuretics 81,25%, ACE i 62,5%, ARB 12,5%, MRA 56,25%). Measurement were made at the baseline (48-72hrs from admission), after 24-48-72 hrs from starting Ivabradine and at the time of discharge. Treatment with ivabradine was well tolerated in all patients. HR was progressively reduced from 79,5 ± 8,4bpm to 64,2 ±10,1 bpm at hospital discharge, p<0.01. We observed a significant hemodynamic improvement by HR control with an increase of stroke volume (baseline 74,4±9,4 ml vs 85,49±16,4 ml at discharge, p 0,017), and only a minimal reduction of cardiac output (baseline 6,6 ±0,7 L/min vs 5,32 ±1 L/min at discharge, P=ns). All other measures of heart work were also significantly affected by reducing HR.
In conclusion: The strategy of the early administration of ivabradine, during a decompensated episode of HF to control HR on top of usual care including beta-blockers, is feasible and safe. The effect of lowering HR may save energy without affecting cardiac output as confirmed by the significant increase of stroke.

P1090
Predictors of response to levosimendan in patients with decompensated heart failure

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Background: Levosimendan is an inodilator with potential efficacy and safety benefit over catecholaminergic inotropes used in decompensated heart failure (DHF) patients (pts). We sought to determine predictors of response to levosimendan infusion in pts admitted for decompensated advanced heart failure.
Patients and methods: From January 2015 to December 2018, levosimendan was administered in 101 pts (90 men) hospitalised with DHF at a single centre. Mean age was 51.5 ± 10.1 years, main diagnosis was dilated cardiomyopathy in 48 % pts, coronary artery disease in 33 % of pts. Mean baseline systolic blood pressure was 103.8 ± 12.8 mm Hg, heart rate 78.7 ± 15.8 beats per minute, median NT-proBNP was 6571 ng/L. Patients discharged without subsequent additional intravenous inotropic therapy were defined as responders (R). Other pts (intravenous inotropes added and/or ventricular assist device implanted and/or heart transplant and/or death during hospitalisation), were non-responders (NR). Twenty one simply available clinical and laboratory parameters were included in multivariate logistic regresion analysis to determine independent predictors of reponse to levosimendan.
Results: There were 75% R and 25% NR. The hospital mortality rate was 4 %. During the hospitalisation 13 % and 2 % of pts, respectively, underwent ventricular assist device implantation or heart transplant. Significant differences were observed between R and NR patients in baseline bilirubin and beta-blocker use (28 ± 18 vs 47 ± 29 umol/L, p=0.003; 63 vs 30 %, p=0.001, respectively). Beta-blocker use was identified as the only independent predictor of response to levosimendan.
Conclusions: Three quarters of patients responded to levosimendan. Patients who tolerate beta-blocker benefit most from levosimendan therapy. Responders had lower baseline bilirubin.

P1091
Levosimendan for primary graft failure treatment after orthotopic heart transplantation

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Introduction: Primary graft failure (PGF) is a life-threatening complication, and a leading cause of early mortality after orthotopic heart transplantation (OHT). PGF is defined as severely impaired systolic function accompanied by hypotension, low cardiac output, and high filling pressures occurring in the first 72 hours in the absence of hyperacute rejection and cardiac tamponade. The treatment strategies include supportive care, inotropes (catecholamines, phosphodiesterase inhibitors) and mechanical circulatory support (MCS). It is known that most inotropic agents can be associated with an increase in morbidity and mortality. Levosimendan (LS) increases cardiac contractility without increasing myocardial oxygen consumption or causing pro-arrhythmogenic effects. There is limited data of its use in after OHT.
Purpose: The aim of the study is to evaluate the role of LS in patients with PGF requiring MCS after OHT.
Method: We retrospectively analysed 153 consecutive OHT patients in our hospital from 2013 to 2018. We assessed the incidence of PGF requiring ECMO and evaluated subgroups based on LS treatment as shown in (Fig1).
Results: There were 40 (26.5%) cases of PGF requiring ECMO support, of whom 12 patients received LS (LS group) and 28 did not (non-LS group). The mean age at the time of OHT was similar in both groups (44 vs 44.1; p=0.985. Apart from a higher incidence of female sex in the LS group (67% vs 25% in the non-LS group; p=0.012) there were no significant differences in baseline characteristics. Fewer patients in the LS group had ECMO implanted before leaving theatre (4/12 vs 20/28 in the non-LS group; p=0.024), however over 90% of patients in each group received ECMO within the first 24 hours after OHT. Median time to the onset of LS infusion was 120 hours, (Q1-Q3: 60-230hours) from ITU admission. Successful weaning from ECMO was comparable between the groups (8/12 vs 23/28 cases in the non-LS group; p=0.283), however the duration of MCS in the LS group was significantly longer with median time of 8.18 days (Q1-Q3: 5.9-11.4) as opposed to to 4.7 days (Q1-Q3:2.7-6.1) in the non-LS group (p=0.005). Although thirty-day mortality was not statistically different between the groups (6/12 vs 6/28 in the non-LS group; p=0.071), 90-day mortality was significantly higher in the LS group (10/12 vs 11/28 in the non-LS group; p=0.011).

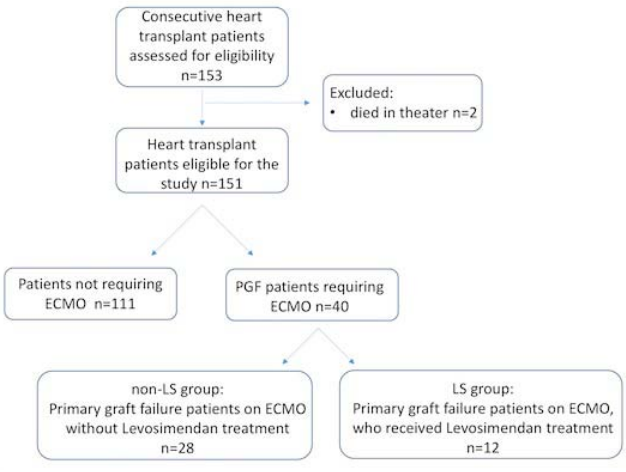

Fig 1. Study flow chart

Conclusions: Previously reported outcomes of LS use in the PGF post-OHT vary. We have retrospectively described our experience which shows no apparent benefits of the drug. The reasons for this may be related to 1) more severe circulatory failure compared to previously reported cases (all our patients required MCS) 2) later time to initiate MCS in the LS group 4) more severe circulatory failure in the LS group as the patients needed longer time on MCS 3) relatively late LS use in the course of circulatory failure. Further insight into the impact of LS on inotropic support and time of MCS weaning is pending.

P1092

Lack of prognostic effect of N-terminal pro-brain natriuretic peptide levels in acute heart failure and functional severe tricuspid regurgitation

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Background: In patients with acute heart failure (AHF), plasma levels of N-terminal pro-brain natriuretic peptide (NT-proBNP) have generally shown to be associated with higher risk of adverse clinical outcomes. However, its prognostic value in patients with predominant facts of right ventricular failure remains unclear. Functional tricuspid regurgitation (TR) has emerged as a powerful prognosticator and a potential therapeutic target in heart failure setting.
Purpose: In this work, we aimed to evaluate the association between NT-proBNP and long-term mortality across TR status in an unselected cohort of patients admitted with AHF.
Methods: We prospectively included a cohort of 2961 patients admitted with the diagnosis of AHF. TR severity was assessed during hospitalization using a multiparametric integrative approach, and classified as none, mild, moderate, and severe. We used multivariable Cox regression analysis to identify the association between severe TR grade and long-term all-cause mortality.
Results: At a mean follow-up of 3.35±3.20 years, 1821 (61.5%) patients died. The mean (SD) age was 73.9±11.1 years, 49% were women, 51.8% displayed left ventricular ejection fraction>50%, and the median (IQR) of NT-proBNP was 4823 pg/ml (2086-9183). The proportion of patients with severe TR was 10.1%. In the whole sample, NT-proBNP (per increase in 2000 pg/ml) was independent and significantly associated with higher risk of mortality (HR=1.06, 95% CI: 10.5-1.08, p<0.001). However, a differential prognostic effect was found across severe TR status (p-value for interaction=0.008). In those with no severe TR, NT-proBNP remained significantly associated with higher risk (HR=1.07, 95% CI:1.05-1.08, p<0.001). On the contrary, when severe TR was present, NT-proBNP was not longer associated with mortality (HR=1.02, CI 95%:0.98-1.05, p=0.284).
Conclusion: In patients with AHF and severe TR, NT-proBNP did not show to be related with the risk of mortality.

P1094

In-hospital results of application of extracorporeal membrane oxygenation in cardiosurgery

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Background: Extracorporeal membrane oxygenation (ECMO) is the only method that temporarily replaces the pumping function of the heart and / or pulmonary gas exchange function in the acute period of the disease. ECMO is resorted to in the case of postcardiotomy syndrome of small cardiac output, refractory cardiogenic shock, cardiac graft dysfunction, decompensation of chronic heart failure (as a bridge to heart and / or lung transplantation) or acute respiratory failure. Despite of certain risks the frequency of application increases annually. The main tasks of the doctor: 1) a thorough and timely assessment of the general status of the patient, indications and contraindications to ECMO; 2) round-the-clock system monitoring of the patient's condition, physiological and mechanical circuit of ECMO; 3) prevention of development and / or treatment of possible complications.
Purpose: To analyze in-hospital results of using ECMO in cardiac surgery patients.
Methods: A retrospective single-center review of 112 patients aged 56,2 ± 13,5 years (80,4% of men, 19,6% of women) who were treated with ECMO in 2010-2018. Connection options: veno-venous (n = 6), veno-arterial (n = 106, 15,1% - central access, 84,9% - peripheral). Indications: postcardiotomy syndrome of small cardiac output (58%), cardiac graft dysfunction (17%) and isolated respiratory failure (5,4%). This method was also used in case of refractory cardiogenic shock (19,6%) in patients with decompensated chronic heart failure, acute myocardial infarction and life-threatening heart rhythm disorders. Used invasive methods of LV unloading to prevent or treat pulmonary edema, maintain and improve the residual pumping function of LV during veno-arterial ECMO: intraaortic balloon pump (n = 43), atrioseptostomy (n = 7), active drainage of LV / LP (n = 13), single drainage of pulmonary artery. Renal replacement therapy was performed in 32 cases (28,6%). The system of selective antegrade distal perfusion of the lower extremities was used to prevent ischemia in 37 patients.
Results: The mean time of mechanical support was 184,1 ± 124,05 h (3 hours-25 days). Stabilization of systemic hemodynamics, normalization of pulmonary gas exchange and successful weaning from ECMO in 57,5%. Stay in ICU was 16,4 ± 10,4 days, in hospital – 41,9 ± 18 days. Hospital survival rate – 49,1%. The main causes of deaths: progressive heart failure with the development of irreversible multi-organ changes, infectious complications and sepsis, strokes and bleedings.
Conclusions: Extracorporeal membrane oxygenation is an effective method of maintaining the hemodynamic and / or respiratory status of patients with acutely developed and potentially reversible respiratory, cardiac or cardiorespiratory failure, resistant to standard therapy. ECMO increases the hospital survival rate of initially severe patients and for certain groups is the only possible method of treatment.

Acute Heart Failure - Epidemiology, Prognosis, Outcome

P1095

Obesity Paradox in Acute Heart Failure from Single Center Observational Study

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Background: The study sought to investigate the impact of baseline body mass index (BMI) on adverse clinical outcomes in patients presented with acute heart failure requiring hospitalization.
Methods: We retrospectively reviewed 641 consecutive patients who presented with acutely decompensated heart failure requiring hospitalization in 2015. BMI was assessed at the time of hospital admission in 631 patients (98.4%). The patients were divided into 3 groups according to BMI: <18.5 (low BMI group, N=83, 13.2%), ≥18.5 and <25.0 (normal BMI group, N=374, 59.4%), ≥25 (high BMI group, N=173, 27.5%). The primary endpoint was a composite of all-cause mortality and recurrent heart failure requiring hospitalization.
Results: The median follow-up period was 2.0 years. The cumulative incidence of primary endpoint was markedly higher in patients in the low BMI group (57.8%) than in those in the normal BMI group (49.5%) and high BMI group (45.7%, logrank P=0.0097, 0.0026, respectively). In the multivariable analysis, the excess adjusted risk of low BMI relative to normal BMI and low BMI to high BMI was significant in terms of primary endpoint (adjusted HR: 1.57, 95%CI: 1.13-2.15, P=0.009, adjusted HR: 1.52, 95%CI: 1.03-2.23, P=0.04).
Conclusion: Patients with low BMI had markedly higher risk for all-cause mortality and recurrent heart failure requiring hospitalization than those with normal or high BMI after the index heart failure hospitalization.

P1096

Regional differences in the incidence and prognosis of the takotsubo syndrome

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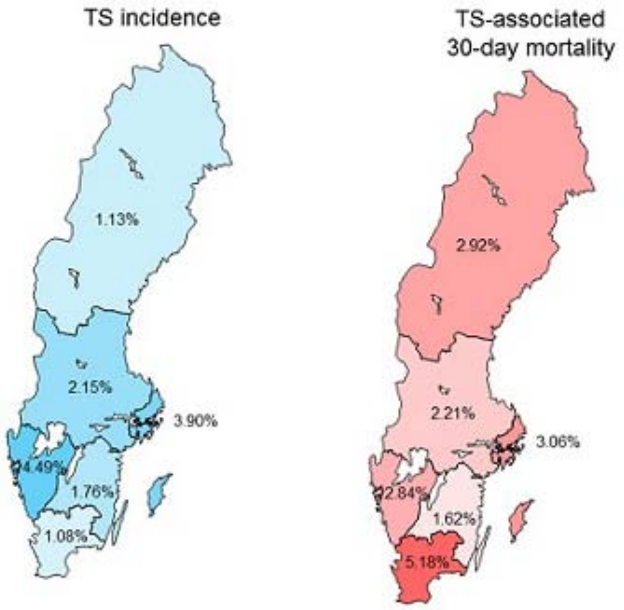
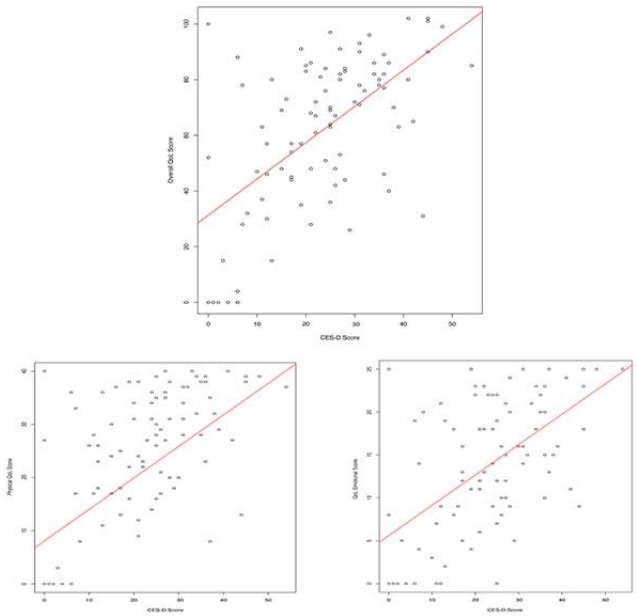
Background: Takotsubo syndrome (TS) is an acute cardiac syndrome with a clinical presentation that is very similar to acute myocardial infarction (AMI). Similar to AMI, TS carries a considerable risk of severe complications and death.
Purpose: Whereas regional differences exist in the care and outcome for patients with AMI, it is unknown whether regional differences exist in the care and outcome of patients with TS.
Methods: Using the nationwide Swedish Angiography and Angioplasty Registry (SCAAR) we identified 2,898 patients with TS in Sweden between January 2009 and February 2018. We compared the six health care regions in Sweden in regards to both the incidence of TS among patients with suspected acute coronary syndrome, and the prognosis for patients with TS.
Results: The reported incidence of TS was highest in the Western health care region (Västra Götaland) whereas unadjusted and adjusted mortality for patients with TS was highest in the Southern health care region (Figure). With the Western health care region as the reference region, the adjusted 5-year mortality risk increased

from North to South (hazard ratio [HR] 0.62, 95% confidence interval [CI] 0.31 – 1.23 for the Northern versus Western region; and HR 1.30, 95% CI 0.88 – 1.90 for the Southern versus Western region, ptrend=0.031).
Conclusions: The incidence and prognosis of TS differed between different health care regions within Sweden. The extent to which these observed differences relate to socioeconomic factors, rural-urban differences, climate and other geographical factors, and regional health care policies remains to be established.



correlated with the presence of depressive symptoms, both in the physical (r=0.56, p<0.01), emotional (r=0.56, p<0.01) and overall score (r=0.59, p<0.01) (fig 1).
Conclusion: The prevalence of impaired QoL is high in HF patients. Even when the toll of the disease on the physical components is similar in women and men, in the emotional construct women with HF diagnosis exhibited worse QoL than their male counterparts. As we expected, impaired QoL is associated with a higher prevalence of depressive symptoms in this population.



Depressive symptoms and QOL

P1097
Gender-related differences in quality of life and depressive symptoms in chilean heart failure patients

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Introduction: Heart Failure (HF) is one of the leading causes of morbidity and rehospitalization in older people. HF deteriorates the quality of life (QoL) and increases the rates of depression in elderly subjects, but gender-related differences are often unacknowledged.
Aim: To evaluate gender differences in QoL and prevalence of depressive symptoms in patients hospitalized with the diagnosis of decompensated heart failure.
Methods: Cross-sectional study. We included patients admitted due to ADHF in a Chilean University Hospital between 2015-2017. QoL was evaluated by the Minnesota Living With Heart Failure Questionnaire. We analyzed the physical construct (questions 2,3,5,6,7,12, and 13) and the emotional construct (questions 17-21). The prevalence of depressive symptoms was evaluated using the CES-D scale, with a cut-off of 16 points or more suggesting clinical depression. Differences between QoL and depression in HF patients were analyzed through Chi-square and Student´s T scores as corresponding. Correlation between variables was evaluated by Pearson´s correlation. Mortality data were obtained from the Chilean National Registry database. All statistical analyses were carried out in R v.3.5.1.
Results: We included 92 individuals, 48.4% female, mean age 71.2±14.6. In both genders the prevalence of depressive symptoms was high (68. 1% male vs. 77,2% female p=0.45), and the QoL was poor (MLWHF mean score 68.5±14.5). Even when the patients with poorer QoL were often women, it did not reach statistical significance (38.6% female vs. 23.4% male p= 0,17). There were no differences in the prevalence of poor QoL according to age (71.7 vs. 69.6, p= 0,53), educational level (28.1% less than eight years. 29.6% more than eight years), or health insurance (19.4% private insurance vs. 34.5% public insurance p=0.21). We did not observe differences between gender and QoL both in total score or in the physical component; however, women reported impaired QoL in the emotional components when compared with men (score 15.9 vs. 12.2, p=0.02). A worse QoL was strongly

P1098
Early urinary sodium as an early marker of diuretic resistance

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Background and purpose: Impaired natriuresis has been associated to worse long-term outcomes in heart failure (HF) patients.
The value of urine sodium as an early prognostic marker during acute decompensated HF (ADHF) admission is unknown.
The aim of this study was to evaluate if urinary sodium early after admittance can predict worsening HF (WHF) during HF admission.
Methods: Charts of all consecutive patients admitted with decompensated HF at our center from January to December 2018 were retrospectively reviewed.
Patients were eligible if they were admitted with an ADHF diagnosis and needed intravenous diuretic for congestion relief. The dose of diuretic administered was at the discretion of the clinician, based on the patient's situation at the time of admission.Worsening HF was defined as clinically persistent congestive signs associated with poor diuretic efficacy measured by weight, after 48 hours of diuretic treatment.According to a prespecified protocol, patients with WHF were upgraded to continuous furosemide perfusion and a thiazide was added.Blood tests and a spot urinary sample were collected in the first 6 hours after diuretic administration.
Results: Among 89 patients [60% males, median age 77 (IQR= 68-83), 17% with HFrEF] who were evaluated in this study, 28 (31,4%) patients fulfilled the definition of WHF. Patients who developed WHF were more likely to have lower urinary sodium at admittance (73.1 vs 92.7 mEq; p=0.014) than patients without WHF. Urinary sodium was better predictor than fractional excretion of sodium or urinary Na/K.
In the cohort, 66 % of patients with early urinary sodium < 50 mEq developed WHF vs 26% of patients with urinary sodium ≥ 50 mEq [HR=2.53 (1.46;4.4), p=0.03).

Conclusions: Low urinary sodium early during ADHF admission is a good predictor of WHF occurrence. This measure could be a marker to identify patients who would benefit from more intensive diuretic strategies.

P1099

Diuretic dose and worsening renal failure in acute heart failure. DOSE-AHF in real life

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Background and aim: Diuretics are the main treatment in acute heart failure (AHF). Evidence about optimal dose is scarce. On the other hand, worsening renal function (WRF) is common in AHF patients. The aim of this study is to evaluate if high diuretic doses are effective and safe in ADHF.
Methods: Consecutive patients with AHF from 2013 to 2018 were retrospectively reviewed.According to DOSE-HF protocol they were divided in two groups depending on initial diuretic dose in the first 48 hours: low dose (LD) (<2.5 patient basal dose) vs high dose (HD) (≥ 2.5 patient basal dose).
Results: Among 202 patients evaluated, 38 (18.8%) patients received high diuretic dose. WRF developed in 12% of patients and was independent of administered diuretic dose (table). HD group presented a trend in greater weight loss at discharge and in lower hospitalization rate at 90 days (table).
Conclusions: In a real life HF sample, HD in AHF tended to produce greater congestion relief and a decrease in HF hospitalizations. WRF was independent to the diuretic dose administered.

Diuretic dose the first 48 hours	High dose (19%)	Low dose (81%)	p value
Age (years)*	78 ± 9,4	75 ± 10,5	0,12
Male (%)	65,7	60,4	0,7
Arterial Hypertension (%)	94,3	83,5	0,11
Diabetes Mellitus 2 (%)	51,4	46,3	0,7
Ejection fraction (%)	48,5 ± 16,4	47,2 ± 16,7	0,6
NT-proBNP (pg/ml)*	9196,9 ± 10918	9966,6 ± 13891	0,7
Basal Furosemide (mg)*	21,29 ± 9,8	47,65 ± 32,1	<0,01
Furosemide at 48 hours (mg) *	261,14 ± 162,5	118,10 ±113,4	<0,01
Furosemide at discharge (mg) *	49,58 ± 20,4	62,6 ± 32,7	0,03
Serum potassium at discharge (mmol/L) *	4,2 ±0,4	3,9 ± 0,5	<0,01
Basal Creatinine (mg/dl) *	1,5 ± 0,8	1,5 ± 0,7	0,9
WRF at 72h (%)	19	16	0,7
WRF at discharge (%)	16,1	11,3	0,54
48 hours diuresis (ml)*	3320 ± 1116	3712 ± 1592	0,9
Weight loss at 72 hours (Kg) *	-1,06 ± 1,9	-0,75 ± 1,8	0,5
Weight loss at discharge (Kg) *	-6,7 ± 8,4	-4,5 ± 5,4	0,06
HF rehospitalization at 90 days (%)	10,3 %	22,7 %	0,08
All cause mortality at 90 days (%)	5,1%	13%	0,1

*mean and standard desviation

P1100

Is diabetes a predictor of worse outcome in decompensated heart failure?

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There is general agreement that diabetes (DBT) worsens outcome of chronic heart failure. Nevertheless its significance in decompensated heart failure (DHF) pts is not uniformly accepted.
Purpose: To compare clinical characteristics and inhospital and one-year outcomes between diabetic and non diabetic pts admitted for DHF.
Methods: Retrospective analysis of a database of 1004 consecutive pts with DHF admitted to 2 CCUs between 2010 and 2017 and followed up for one year. The diagnosis of DHF was made by clinical evaluation of the attending physician and BNP or NTproBNP levels. DBT was defined according to previous clinical history. One-year follow up was obtained by clinical visits or by phone. Reduced ejection fraction was defined when <0.45.
Results: Baseline characteristics are shown in table. There were no significant differences between diabetics and non diabetics in inhospital mortality (6.1% vs 6.3% p:NS) and in one-year mortality (34.3% vs 40.2% p:NS). Stratified by age, DBT did not influence mortality. Also in an unconditional logistic regression analysis DBT was not an independent predictor of inhospital and one-year mortality.
Conclusions. Diabetic patients were younger, predominantly men, showed a higher prevalence of reduced ejection fraction and of coronary etiology. In our population of elderly patients with DHF diabetes did no predict a worse outcome wether inhospital or at one-year.
Advanced age and acute decompensation play a major role in outcome thus neutralizing the relative impact of DBT

Baseline Characteristics

	Global(%) n 1004	Diabetes(%) n:257(25.6)	Non Diabetes(%) n:747(74.5)	p
Age. Median (IQR)	81(73-87)	77(69-83)	83(75-88)	<0.001
Male	53	63.4	49.4	<0.001
Hypertension	79	86.8	76.4	<0.001
Chronic Renal Failure	24	26.8	23	NS
Cancer	10.3	9.3	10.7	NS
Stroke	8.9	7.8	9.2	NS
Coronary Etiology	33.4	46.7	28.8	>0.001
Valvular Etiology	21	13.6	23.5	<0.001
Heart Failure History	58	61	56.9	NS
Atrial Fibrillation	32.4	27.6	34	0.03
Reduced Ejection Fraction	49.9	58.2	47	0.001
Admission SBP mmHg. Median (IQR)	140(120-170)	143(130-180)	140(120-170)	0.02
Admission Heart Rate. Median (IQR)	90(75-103)	90(80-100)	90(75-105)	NS

P1101

The relationship between transient and persistent worsening renal function and 1-year cardiovascular event in patients with acute decompensated heart failure

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Background: Worsening renal function (WRF) is major complication in patients with heart failure (HF). There are few studies to investigate the difference between transient and persistent WRF in prognosis.
Purpose: Our purpose was to investigate the association between transient and persistent WRF and mid-term prognosis in HF patients.
Methods: We studied 404 patients with acute HF who admitted to our hospital. WRF was defined as a relative increase in serum creatinine of at least 25% or an absolute increase in serum creatinine ≥0.3 mg/dL from the baseline. We evaluated the association between transient and persistent WRF and 1-year composite endpoint of cardiovascular mortality and HF readmission in HF patients.
Results: WRF was occurred in 106 patients (26.2%). Patients with transient WRF had a higher systolic blood pressure than those with persistent WRF and without WRF (152.49±40.08 mmHg vs. 144.64±38.04 mmHg vs. 138.54±30.10 mmHg, P =0.01). Patients with persistent WRF had the highest serum creatinine (1.66±1.04 mg/dL, 1.31±0.73 mg/dL in patents with transient WRF, 1.04 0.53 mg/dL in patients without WRF; P<0.0001) and had the highest serum BNP (1251.4±1206.2 pg/mL, 755.9±457.8 pg/mL, 858±830.2 pg/mL, P=0.02, respectively). In Cox proportional hazard models, persistent WRF was only associated with increased risk of composite endpoint (hazard ratio, 3.9; 95% confident interval, 1.92 to 7.65; P <0.0001). However, transient WRF was not associated with increased risk of composite endpoint (P=0.34).

Conclusion: Whereas transient WRF was not associated with increased risk of cardiovascular death and HF readmission, persistent WRF was associated with increased risk of cardiovascular death and HF readmission in patients with HF.

P1102

The obesity paradox in practice: cardiovascular versus non-cardiovascular mortality in heart failure

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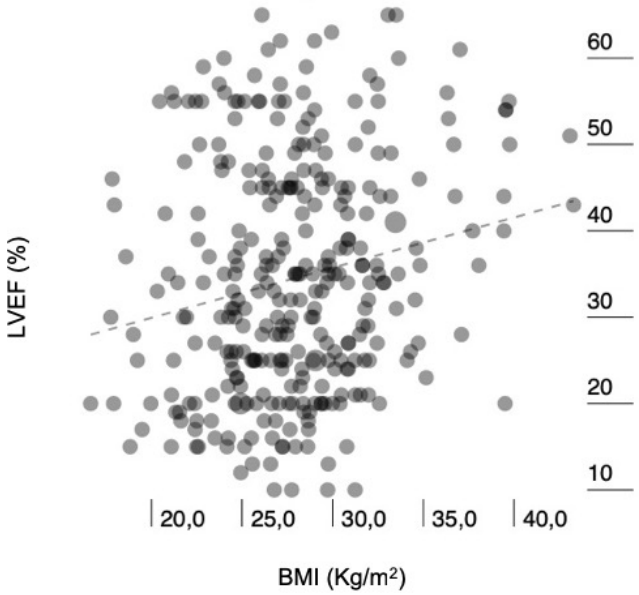
Introduction: Obesity (body mass index (BMI) ≥30kg/m2) significantly increases the risk for the development of new-onset heart failure (HF). Nevertheless, in patients (pts) with already-established chronic HF, obesity is paradoxically associated with higher survival rates compared with normal-weight pts – the 'obesity paradox'.
Purpose: Assess the relation between BMI and cardiovascular and non-cardiovascular mortality rates in pts with chronic HF and reduced ejection fraction (HFrEF).
Methods: Unicentric, retrospective analysis of pts followed in a HF Clinic (HFC) since 3/2011. Included pts with reduced ejection fraction (EF) (<50%) and previous diagnosis for at least 6 months. Pts were divided into 3 groups: BMI <25 kg/m2(G1), BMI ≥25 and <30 kg/m2(G2) and BMI ≥30 kg/m2(G3). Pts without confirmed biometric data were excluded. Clinical, demographic, analytical, electrical, echocardiographic characteristics and major cardiac events - HF hospitalization (HFhosp) and mortality (from cardiovascular cause (CVm) and non-cardiovascular cause (nCVm)) – were appraised.
Results: Included 331 pts with mean age of 60.6 ± 13.2 years, mean BMI (mBMI) of 27.8± 4.5kg/m2 and male predominance (77%). G1 consisting in 90 pts with mBMI 22.6 kg/m2, G2 with 150 pts (mBMI 27.6kg/m2) and G3 with 91 pts (mBMI 33.3kg/m2). Age and BMI were inversely correlated (p=0.023), without gender differences between groups. G3 had more hypertension (p=0.04) and diabetes (p=0.05), but lower smoking (p=0.01) and renal chronic disease (p=0.034); there were no significant differences in atrial fibrillation prevalence, alcohol consumption or underlying HF etiology. During follow-up (FU), after optimized medical therapy (OMT), left ventricle ejection fraction (LVEF) was positively correlated with mBMI (p<0.001). There was a reduced BNP value in G2 and G3, although not statistically significant. Regarding clinical events G1 had higher mortality rate, especially when compared to pts with mBMI ≥25kg/m2(G2 and G3; 38% vs 18%, p<0.001). G1 had higher nCVm (p<0.001). There were no differences in CVm neither HFhosp among groups.
Conclusion: In this cohort, BMI <25kg/m2was associated with higher mortality, particularly due to non-cardiovascular causes but no differences were seen between groups regarding in cardiovascular mortality or HF hospitalization.



P1103

Acute decompensated heart failure in the emergency department: lower 30-day readmission rates in 1000 patients

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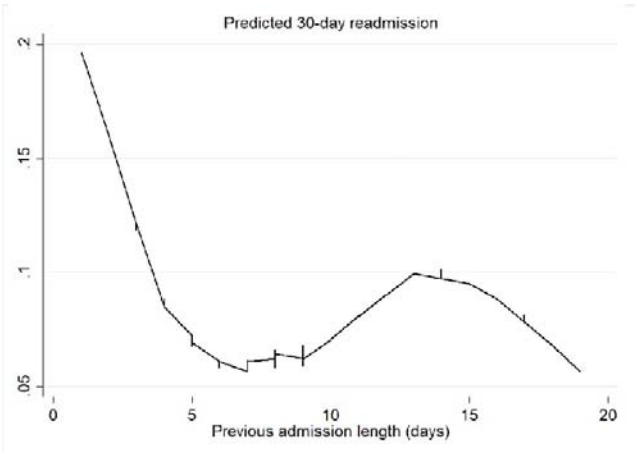
Background: Acute decompensated heart failure (ADHF) is the first cause of hospitalization among elderly patients. We aimed to characterize the characteristics and outcomes of a large contemporaneous cohort of ADHF patients admitted to our emergency department (ED).
Methods: We conducted a retrospective, observational study of all 1057 patients admitted to our ED with a discharge diagnosis of ADHF from November 2016 to December 2017. Baseline clinical data and outcomes (in-hospital, 30-day and follow-up (median period of 5 [IQR 3-11] months) all-cause mortality and readmissions) were determined.
Results: Mean age was 78±10 years and 53% were male; of the 1057 patients, half (53%) were hospitalized. The median admission length was 9 [IQR 5-15] days and in-hospital mortality was 12.7%. Median BNP values were 739 [IQR 381-1486] pg/mL and mean creatinine 1.43±0.8 mg/dL. After discharge, all-cause readmission at 30 days was 8% and related to previous admission length. 30-day readmission was higher with previous admission length less than 5 days, lower with 5-10 days and again higher with length above 10 days (Figure 1). All-cause mortality at 30 days was 15%, with age [HR 1.4 (95%CI 1.1-1.9), p=0.04] and creatinine [HR 2.3 (95%CI 1.3-5.3), p=0.04] as positive predictors. Follow-up (median 5 month) readmission rate for previously hospitalized patients was 30% and its only predictor was left ventricular ejection fraction (LVEF) [HR 0.93 (95%CI 0.91–0.96), p=0.05]. Follow-up all-cause mortality was 28% and was predicted by age [HR 1.4 (95%CI 1.2-1.7), p<0.01] and creatinine [HR 1.5 (95%CI 1.1 – 1.9), p<0.01]. Of the 47% patients that were directly discharged from the ED, 14% were readmitted at 30 days. Predictors for 30-day readmission were BNP [OR 1.5 (95%CI 1.1-1.8), p=0.02] and C-reactive protein (CRP) [HR 1.9 (95%CI 1.2-1.8), p=0.01]. In this group, 30-day mortality was 4.6% and only predicted by creatinine [HR 2.5 (95%CI 1.1-4.8), p=0.04]. Follow-up all-cause readmission was 32% and predicted by LVEF [HR 0.91 (95%CI 0.90–0.93), p<0.01]; all-cause mortality was 15% and was predicted by CRP [HR 1.15 (95%CI 1.0–1.3), p<0.01] and BNP [HR 1.3 (95%CI 1.1–1.5), p<0.01]. Comparing the characteristics of admitted vs discharged ADHF patients, patients with a prior hospitalization had a lower 30-day readmission rate (8% vs 14%, p=0.01), same overall readmission rate (30% vs 32%), but a higher 30-day mortality (13% vs 5%, p<0.01) and overall mortality (28% vs 15%, p<0.01).
CONCLUSIONS: Half of patients admitted to the ED were hospitalized. Of these, only 8% are readmitted within 30 days. In-hospital mortality is high. Among discharged patients directly from the ED, 1 in 7 were readmitted at 30-days.



P1104

Diuretic efficacy as a prognostic marker in patients admitted for heart failure

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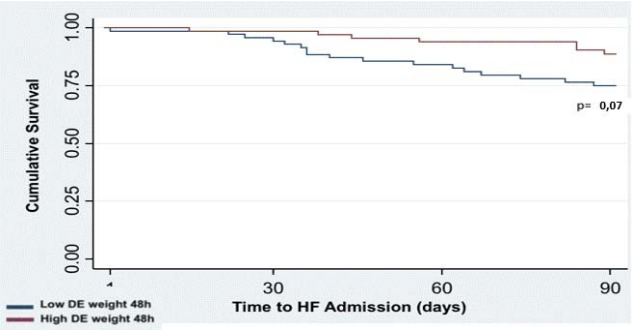
Background and purpose: Diuretic metrics objectively quantify the diuretic response in heart failure (HF) patients. Although diuretic efficacy (DE) parameters by weight and fluid output have been proposed, it is unknown if one parameter is superior to the other.
We sought to determine which DE parameters are associated to adverse events during the follow-up in patients admitted with HF.

Methods and results: Charts of all consecutive patients admitted with decompensated HF at our center from 2013 to 2018 were retrospectively reviewed.
DE measurements by weight and fluid output at 48, 72 and 96 hours after admission were collected retrospectively for 103 patients (71 % males, median age 73.4 (IQR= 66-82), 37% with HFrEF).
We analyzed their association with adverse events at 90 and 365 days after discharge.
Only DE by weight (adjusted weight loss per unit of furosemide) at 48 hours was found to be a predictor of events at 90 days. Patients with a poor diuretic response [defined as DE by weight at 48 hours below the median (-0.21 kg/40 mg furosemide)] had a greater risk of rehospitalization due to HF [HR 3.27 (0.95;11.1), p=0.041].
Conclusions: Poor DE by weight at 48 hours after admittance is associated with HF rehospitalization at 90 days. This finding could lead to the early identification of patients resistant to diuretic treatments in whom intensification of treatment could prevent HF rehospitalizations.



P1105

Demographics, management, and in-hospital outcomes of patients with hospitalized acute heart failure syndromes in the contemporary real clinical practice

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On behalf of: KCHF investigators

Background: There is a scarcity of reports on the clinical characteristics and management practice in the contemporary all-comer patients with acute decompensated heart failure (ADHF).
Purpose: This study aimed to evaluate the clinical characteristics of and practice for the treatment of contemporary all-comer patients with ADHF in Japan.
Methods and Results: The Kyoto Congestive Heart Failure (KCHF) registry is a prospective observational cohort study enrolling 4056 consecutive patients who had hospital admission due to ADHF without any exclusion criteria between October 2014 and March 2016 in the 19 participating hospitals in Japan. Baseline characteristics, clinical presentations, management, and in-hospital outcomes were compared among heart failure (HF) with reduced left ventricular ejection fraction (LVEF) (HFrEF: LVEF<40%), HF with mid-range LVEF (HFmrEF: 40%≤ LVEF <50%), and HF with preserved LVEF (HFpEF: LVEF ≥50%). Among 4041 patients with documented LVEF, 1744 (43%) had HFpEF, 746 (19%) HFmrEF, and 1551 (38%) HFrEF. The median age was 80 (IQR, 72–86) years in the entire population, and was higher with increasing LVEF (p<0.001). The in-hospital mortality rate was higher in the HFrEF population than in the HFmrEF and HFpEF populations (9.2%, 4.8%, and 5.1%, P<0.001).
Conclusions: This registry elucidated the clinical features and clinically relevant in-hospital outcomes in contemporary consecutive patients with ADHF in the real-world clinical practice in Japan, demonstrating changes in the characteristics of patients with ADHF. When classified by LVEF, significant differences in characteristics and in-hospital outcomes existed among patients with HFrEF, HFmrEF, and HFpEF.

P1106

Incidence and prognosis of the takotsubo syndrome compared to acute myocardial infarction

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Background: Takotsubo syndrome (TS) is a potentially life-threatening acute cardiac syndrome with a clinical presentation very similar to myocardial infarction (MI) and for which the natural history, management and outcome remain incompletely understood.
Purpose: The aims of this study were to assess the relative short- and long-term mortality risk of TS , ST-elevation MI (STEMI) and non STEMI (NSTEMI) and to identify predictors of in-hospital complications and poor prognosis in patients with TS.
Methods: Using the nationwide Swedish Angiography and Angioplasty Registry (SCAAR) we identified almost all (n=117,720) patients who underwent coronary angiography due to TS (N=2,898 [2.5%]), STEMI (N=48,493 [41.2%]) or NSTEMI (N=66,329 [56.3%]) in Sweden between January 2009 and February 2018.
Results: Patients with TS were more often women as compared with patients with STEMI or NSTEMI. TS was associated with unadjusted and adjusted 30-day mortality risks lower than STEMI (adjusted hazard ratio [adjHR] 0.60, 95% confidence interval [CI]0.48-0.76, p<0.001), but higher than NSTEMI (adjHR 2.70, 95% CI 2.14-3.41, p<0.001). Compared to STEMI, TS was associated with similar risk of acute heart failure (adjHR 1.26, 95% CI 0.91–1.76, p=0.16) but lower risk of cardiogenic shock (adjHR 0.55, 95% CI 0.34–0.89, p=0.02). The relative 30-day mortality risk for TS versus STEMI and NSTEMI was higher for smokers than non-smokers (adjusted pinteractionSTEMI=0.01 and pinteractionNSTEMI=0.01).
Conclusion: Thirty-day mortality in TS was higher than in NSTEMI but lower than STEMI, despite a similar risk of acute heart failure in TS and STEMI. Among patients with TS, smoking was an independent predictor of mortality.

P1107

Immediate and Long-term survival outcomes of Patients Admitted with Decompensated Heart Failure with underlying Valvular Heart Disease

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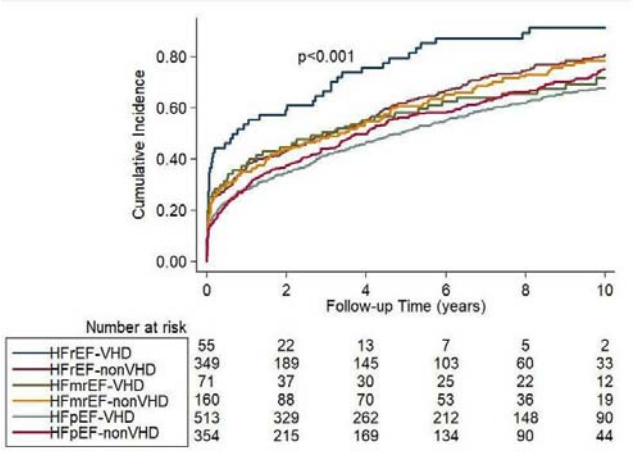
On behalf of: Chitra Heart Failure Study

Introduction: Valvular heart disease (VHD), especially rheumatic heart disease(RHD) is a common cause of heart failure in India . The data on long-term outcomes of these patients is scarce.
Objective: Was to collect data regarding clinical characteristics, in-hospital of patients with VHD in a tertiary care center admitted over a period of 10 years (2001-2010) and assess the long-term follow-up.
METHODS: Patients aged 18 years and above with valvular heart disease were selected from the hospital database of patients admitted in our centre with acute decompensated heart failure(ADHF) during the study period. Patients who had concurrent ischemic heart disease were excluded. Demographic data, risk factors, comorbidities, in-hospital outcomes and long-term survival were captured. The patients were grouped on the basis of left ventricular ejection fraction into Heart failure with preserved ejection fraction (HFpEF; EF > 50%), HF with mid-range EF (HFmrEF; EF 40-49%) and HF with reduced EF (HFrEF; EF <40%). Subjects who were admitted with HF due to other causes were included as a comparator for survival analysis (non-VHD)
Results: Of the 1502 patients who were admitted with ADHF during this period, 639 had VHD(42.5%). Of patients with VHD,51.5% were females. Majority of the VHD patients had RHD (515 patients, 80.6%). Mean age of the population was 44.9 years (SD = 12.8 years). Patients with RHD were significantly younger than others (RHD =43.3 years SD 12.5 years, non-RHD 51.5 years; SD 12.3 years, p<0.001). More than four-fifths had HF with preserved ejection fraction (HFpEF = 80.3%). Atrial fibrillation or flutter was present in 59.2% of patients. Anemia (Hb<10 g/dL), renal dysfunction during hospitalisation and active infective endocarditis were present in 6.1%, 29.6% and 6.7 % of patients respectively.
The median duration of hospitalization was 6 days (interquartile range 3-10) and during hospitalization, 113 patients (17.7%) died. The total time at risk was 3370 person-years (p-y) and 461 patients died during the study period with a median survival time of 4 years. The survival of patients with VHD and others (non-VHD) grouped on the basis of EF is provided in figure 1. Patients with VHD with reduced

ejection fraction (valvular cardiomyopathy) had the worse prognosis among the groups. (p<0.001)



VHD and HF Types based on EF - Survival

P1108

Body mass index and long-term survivals in admitted patients with acute heart failure according to their heart failure phenotype

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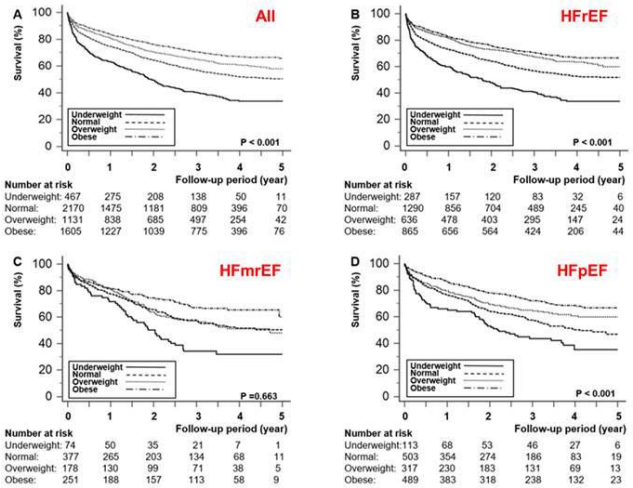
On behalf of: KorAHF investigators
Funding Acknowledgements: This work was supported by Research of Korea Centers for Disease Control and Prevention.

Backgrounds: Obesity is a major risk factor for incident heart failure (HF). Paradoxically, a high body mass index (BMI) appears to be beneficial even in patients with HF (obesity paradox). We investigated the presence of debatable 'obesity paradox' in admitted patients with acute HF according to HF phenotype.
Methods: We evaluated the admitted patients hospitalized for acute HF in 10 regionally-representative tertiary university hospitals who registered in the Korean Acute Heart Failure (KorAHF) Registry from March 2011 to February 2014. The primary outcome was 5-year total mortality according to BMI categories by WHO criteria for Asian.
Results: Among the 5,625 patients who were registered at KorAHF Registry, we excluded 209 patients without information about left ventricular ejection fraction (LVEF) and 42 without BMI. A total of 5374 (53.3% males, mean age: 68±14years) were analyzed. The mean BMI was 23.3±3.9Kg/m2. The patients were categorized to underweight (BMI<18.5Kg/m2, 467 patients, 8.7%), normal (18.5≤BMI<23Kg/m2, 2171 patients, 40.3%), overweight (23≤BMI<25Kg/m2, 1131 patients, 21.0%) and obese (BMI≥25Kg/m2, 1605 patients, 29.8%). In patients with higher BMI, younger people, men, hypertension and diabetes were more frequent. Mean follow up duration was 855±591days. In the follow-up duration, 38.2% died. Obese patients had the best survival whereas underweight patients had the worst survival. After multivariate analysis, obese patients were associated with the best and underweight patients with the worst survival regardless of HF type.
Conclusions: Obesity was associated with favorable long-term survival in admitted patients with acute HF regardless of their HF phenotype.



Survival curves according to BMI.

P1109

Incidence and outcome of takotsubo syndrome compared to acute myocardial infarction, in men versus women

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Background: Takotsubo syndrome (TS) is an acute cardiac syndrome with a clinical presentation very similar to acute myocardial infarction (AMI). One striking feature that distinguishes TS from AMI is that approximately 90% of TS patients are women. However, even though women are more often affected by TS, men that develop TS have been reported to have worse outcomes than women with TS. We sought to compare men and women with TS, and contrast the observed sex differences in TS and AMI.
Methods: Using the nationwide Swedish Angiography and Angioplasty Registry (SCAAR) we identified almost all (n=117,720) patients who underwent coronary angiography due to TS (N=2,898 [2.5%]), STEMI (N=48,493 [41.2%]) or NSTEMI (N=66,329 [56.3%]) in Sweden between January 2009 and February 2018. We compared the association between sex and adverse clinical outcomes for patients with TS versus AMI.
Results: Patients with TS were more often women (73.0%) as compared with patients with STEMI (27.3%) or NSTEMI (30.0%), p<0.0001. A statistical interaction was present between TS and sex such that men with TS had an unadjusted risk of dying within 30 days that was similar to that of men with STEMI, whereas women with TS had a better unadjusted 30-day prognosis than did women with STEMI (Table). However, after multivariable adjustment, the statistical interaction with regards to mortality risk between sex and TS versus AMI did not persist (Table).
Conclusion: As compared to sex-related differences in prognosis after AMI, men with TS have disproportionally worse prognosis than women with TS. Some of the TS-specific sex-related risk may be related to other cardiovascular risk factors and comorbidities.

	Hazard Ratio (95% Confidence Interval)		
All-cause death	Women	Men	$P_{interaction}$
30 Day Prognosis			
Unadjusted			
TS vs. STEMI	0.27 (0.21 - 0.36)	0.62 (0.43 - 0.90)	0.0004
TS vs. NSTEMI	1.32 (0.99 - 1.76)	2.17 (1.49 - 3.14)	0.039
MV adjustment*			
TS vs. STEMI	0.56 (0.42 - 0.74)	0.68 (0.47 - 0.98)	0.40
TS vs. NSTEMI	2.76 (2.05 - 3.72)	2.85 (1.96 - 4.15)	0.89

P1110

Hazardous effects of widespread inotrope use in acute heart failure patients

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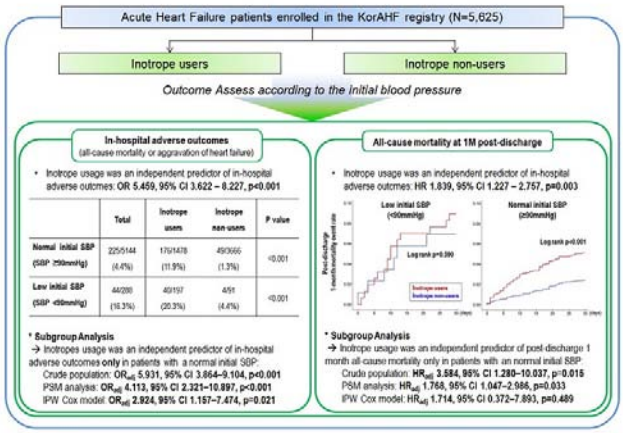
On behalf of: Korean Acute Heart Failure (KorAHF) registry

Background: The majority of acute heart failure (HF) patients are treated with diuretics to optimize volume status and vasodilators for symptom resolution and congestion relief. Inotropes can be administered in patients with hypotension or signs and symptoms of peripheral hypo-perfusion. Current guidelines recommend

that inotropes should not be used in patients with normal systolic blood pressure. However, inotropes are widely applied in the real world.
Purpose: We aimed to evaluate the effect of inotropes in acute HF patients from a nationwide Korean Acute Heart Failure (KorAHF) registry.
Methods and Results: A total of 5625 patients were analyzed. Those with isolated right HF (154 patients, 2.7%) were excluded, leaving 1703 (31.1%) patients who received inotropes during admission and 3768 (68.6%) patients who did not receive inotropes. The majority of inotrope users was normal SBP (≥90 mmHg, 1478 patients, 86% of users) at the initial point. The primary outcomes were in-hospital adverse events and post-discharge 1-month mortality. Inotrope users had a higher event rate than non-users (in-hospital adverse events: 13.3% vs 1.4%, p<0.001; 1-month mortality: 5.5% vs 2.5%, p<0.001), while inotrope use was an independent predictor for clinical outcomes (in-hospital adverse events: ORadjusted 5.459, 95% CI 3.622–8.227, p<0.001; 1-month mortality: HRadjusted 1.839, 95% CI 1.227–2.757, p=0.003). Subgroup analysis showed that inotrope use was an independent predictor for detrimental outcomes in patients with normal initial SBP (in-hospital adverse events: ORadjusted 5.931, 95% CI 3.864–9.104, p<0.001; 1-month mortality: HRadjusted 3.584, 95% CI 1.280–10.037, p=0.015). For patients with a low initial SBP, inotrope use was not a risk factor for adverse outcomes (in-hospital adverse clinical outcome: ORadjusted 0.575, 95% CI 0.013–25.167, p=0.730; post-discharge 1-month mortality: HRadjusted 1.714, 95% CI 0.372–7.893, p=0.489). Because of the distinct baseline characteristics among inotrope users and non-users, we performed two different methods to compensate for the differences; the propensity score matching (PSM) method and the IPW Cox proportional hazards regression model. The matched populations showed consistent results.
Conclusion: Inotropes are still widely used, even in acute HF patients presenting with a normal blood pressure. We have demonstrated the hazardous effects of inotrope use in acute HF patients. The infusion of inotropes is strongly associated with in-hospital adverse outcomes and 1-month follow-up mortalities. Clinicians should be cautious with the usage of inotropes in acute heart failure patients, especially in those with a normal blood pressure.

Central Illustration



Central illustration

P1111

Clinical usefulness of cystatin C in patients with acute heart failure: implications for sarcopenia and cachexia

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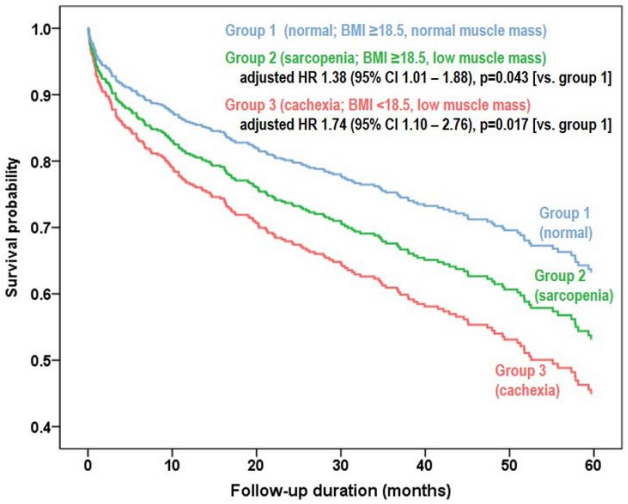
Background: Sarcopenia and cachexia are frequent in patients with chronic heart failure (HF), and contribute to excess mortality. Cystatin C can be utilized to estimate muscle mass and to assess the presence of sarcopenia or cachexia. However, the clinical usefulness of cystatin C is not fully investigated in patients with acute HF.
Purpose: We aimed to investigate whether the estimates of muscle mass using cystatin C can provide additional prognostic information in patients who admitted for acute HF.
Methods: We retrospectively identified 586 patients with acute HF in whom the muscle mass was estimated using body weight, serum creatinine, and serum cystatin C measured during index hospitalization. Study population was categorized into three groups: patients with BMI ≥18.5 kg/m^2 and muscle mass ≥45.0kg in men or ≥30.9kg in women (group 1 [normal]; n=264), patients with BMI ≥18.5kg/m^2 but reduced muscle mass (group 2 [sarcopenia], n=263), and those with BMI <18.5kg/m^2 (group 3 [cachexia]; n=52). The risk of all-cause mortality was compared between these 3 groups.
Results: During a median 34 months of follow-up (interquartile range, 16–54), 213 patients (37%) died. There was no J-curve phenomenon between BMI, cystatin C, and estimated muscle mass with the risk of mortality. The annualized mortality rates were 10.4% in group 1 (normal), 14.7% in group 2 (sarcopenia), and 20.3% in group 3 (cachexia). Compared with group 1 patients, the risk of mortality was significantly higher in group 3 patients (adjusted HR 1.74; 95% CI 1.10–2.76; p=0.017) as well as in group 2 patients (adjusted HR 1.38; 95% CI 1.01–1.88; p=0.043), even after adjusting for clinical risk factors and echocardiographic parameters.
Conclusions: Cystatin C is a useful biomarker for estimation of muscle mass and for assessment of sarcopenia or cachexia, which provide independent prognostic value in patients with acute HF.



Survival curve

P1112

Prognostic value of bioimpedance vector analysis-assessed cachexia in patients with decompensated heart failure

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Objective: Decompensated heart failure (DHF) is one of the leading causes of hospitalization worldwide. Cachexia is a serious complication in chronic heart failure patients. Bioimpedance vector analysis (BIVA) is a non-invasive, accurate technique, which could be helpful in identification of cachexia and muscle wasting in patients with DHF. The aim of the study was to determine cachexia in DHF patients by BIVA and to evaluate the association with heart failure rehospitalization rate during 6 months.
Methods: in 183 patients admitted with DHF (125 male, 68.9±9.4 years (M±SD), BMI 30.5±6.9 kg/m2, 86.9% arterial hypertension, 55.7% ischemic heart disease, 53% myocardial infarction, 51.4% atrial fibrillation, 36.1% diabetes mellitus, known chronic kidney disease (CKD) 39.9%, ejection fraction (EF) 44.3±14.9%) BIVA was performed. BIVA results were expressed using resistance (R/h) and reactance (Xc/h). Cachexia by BIVA was defined in patients, who dropped outside right lower quadrant of reference curve of 95% R/Xc graph. Mann-Whitney and Spearman tests were performed. P <0.05 was considered statistically significant.
Results: cachexia by BIVA was identified in 31% DHF patients. DHF patients with BIVA detected cachexia compared with DHF patients without cachexia were older (73.7±8.4 vs 67.2±8.6 years, p<0.05) and mostly female (86% vs 62%, p<0.01), had higher resistance R/h (285.5±49.9 vs 211.3±44.3 Om/m, p<0.05) and reactance Xc/h (22.8±4.6 vs 18.2± 6.5 Om/m, p<0.05), lower fat-free mass (57.1±8.3 vs 68.2±12.5 kg, p<0.001), lower musculoskeletal mass (27.3±5.5 vs 36.0±8.4 kg, p<0.001). There were no differences in prevalence of main comorbidities between groups, but there was tendency to higher rate of preexisting CKD (63% vs 53%, p>0.05), chronic obstructive pulmonary disease (29% vs 23%, p>0.05) and higher proportion of patients with reduced EF (43% vs 37%, p>0.05) in DHF with BIVA detected cachexia patients. Patients without cachexia demonstrated higher volume overload compared with cachexia DHF patients (total body water 49.9±9.1 vs

41.8±6.1 kg, p<0.01; extracellular body water 21.9±3.5 vs 16.6±2.5 kg, p<0.01) and had more marked clinically presentation of systemic congestion (bilateral crackles (82 vs 71%, p<0.05), Rg-hydrothorax (63 vs 36%, p<0.001), orthopnea (86 vs 50%, p<0.01), oedema (100 vs 86%, p<0.05)). Patients without cachexia compared with BIVA detected cachexia patients demonstrated better outcomes: lower readmission rate due to heart failure decompensation during 6 months (35% vs 57%, p<0.05).
Conclusions: In 31% of patients hospitalized with DHF cachexia by BIVA was detected. Patients with BIVA detected cachexia had worse prognosis compared with patients without cachexia. Evaluating cachexia by BIVA added useful information to standard clinical parameters and could help to determine the patient population with higher risk of rehospitalization rate and apply adequate preventive strategy.

P1113
Healthcare Expenditure of Patients with Heart Failure in a Developing Country

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On behalf of: Manipal Heart Failure Registry [MHFR]

Objectives: Analysis of healthcare expenditure of patients with heart failure for 12 months from the time of index admission.
Methods: Manipal Heart Failure Registry (MHFR), established in 2015 in a tertiary care hospital in Southern India, is a prospective observational cohort of patients diagnosed with heart failure.
From this registry, we analysed the total expense incurred during index hospitalization from in-patient bills which included the consultation charges, expenses for ICU/ward stay, investigations, interventional procedures and medications. Similarly, the expenses incurred for medications, scheduled or unscheduled hospital visits and re-hospitalization(s) during the 12 months follow up period were calculated.
Results: A total of 610 patients with mean age of 65.0 ± 13.6 years were included among which 59.8% were males and 38.9% had ischemic heart failure. Average duration of index hospitalization was 5.3 days with an average expenditure of INR 59492 (€710). This included the charges for hospitalization and consumables [INR 9210.9 (€110)], investigations [INR 6465.0 (€65)], medicines, devices and procedural charges [INR 38940.1 (€461)], consultation/professional charges [INR 2158.2 (€26)] and expenditure incurred by caregivers [INR 2717.8 (€40)]. Follow up data were available for 98.1% of the patients. Re-hospitalization rate was 10.8% and 34.1% patients had unscheduled visits to the hospital due to worsening symptoms. Average expenses during the 12 months follow-up period was INR 22680 (€268) which included re-hospitalizations, scheduled/unscheduled visits, and medications. Patients who were non-compliant to medicines or were re-hospitalized during the follow-up period spent considerably more than those who were not [INR 32876 (€387) vs INR 20899 (€247), p= 0.042; INR 35255 (€416) vs INR 20213 (€237), p= 0.002, respectively].
Conclusions: Healthcare expenditure of patients with heart failure in India is much lower than their western counterparts. Hospitalizations and interventional procedures account for bulk of the expenses incurred. Drug non-compliance is an important and easily avoidable cause for increased healthcare expenditure.

P1114
Are predictor factors of mortality different depending on the etiology of acute heart failure?

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Introduction: Acute heart failure (AHF) is a life-threatening medical condition requiring urgent treatment and associated with high morbimortality.
Objective: Evaluation of predictor factors (PF) of in-hospital (IH), 6-months (6m) and 1-year (1y) mortality (M) concerning the etiology of AHF that motivate P hospitalization.
Material and methods: Single center retrospective analysis of P data admitted with AHF between 2001-2017. P were divided in 2 groups concerning the etiology of cardiomyopathy: ischemic (G1, n=214) versus non-ischemic (G2, n=251). Data was collected regarding clinical, laboratorial and echocardiographic parameters in both groups to determine PF of stablished endpoints.
Results: 465 P were reviewed, age 67.9±12.2 years, 69.9% males. 64% had hypertension, 39.4% diabetes and 34.4% dyslipidaemia. 57.3% had a de novo diagnosis. In G2P the most prevalent etiologies were idiopathic dilated (53%) and valvular (35.5%). There were no differences between groups regarding age, gender, laboratorial tests (BNP, haemoglobin (Hb), creatinine (Cr), urea (U)) and ejection fraction. Total IH M was 6.7%, 51.6% in G2. At univariate analysis in G1P, PF of IH M were inotropic use (odds ratio (OR) 12.522, p 0.001, confidence interval (CI) 2.75-57.10), profile at admission (OR 4.842, p 0.004, CI 1.65-14.17), U (OR 1.014, p 0.005, CI 1.00-1.02), age (OR 1.090, p 0.007, CI 1.02-1.16), systolic blood pressure (SBP) (OR 0.977, p 0.009, CI 0.96-0.99) and Hb (OR 0.722, p 0.025, CI 0.54-0.96). At multivariate analysis, independent PF of IH M were inotropic (p <0.001), profile (p 0.001), U (p 0.002), SBP (p 0.007) and Hb (p 0.022). These also were independent FP of 6m and 1y M except Hb (p 0.970 and 0.168). In G2, PF of IH M were inotropic use (OR 8.722, p 0.001, CI 2.41-31.51), profile at admission (OR 12.853, p <0.001, CI 3.54-46.67), SBP (OR 0.973, p 0.012, CI 0.95-0.95), U (OR 1.011, p 0.012, CI 1.00-1.02) and Cr (OR 1.019, p 0.045, CI 1.01-1.04). At multivariate analysis, independent PF of IH M were inotropic (p <0.001), profile (p <0.001), Cr (p 0.001), SBP (p 0.009) and U (p 0.002). The only independent PF of 6m M was U (p 0.011) and1y M Cr (p <0.001) and profile (p 0.008).
Conclusion: In our center using real life data, the hemodynamic profile and use of inotropes were important factors of prognosis regardless of the etiology of HF. These results are in accordance with larger studies.

P1115
Predictor factors of rehospitalization and mortality in acute heart failure

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Introduction: Acute heart failure (AHF) is a life-threatening condition requiring immediate diagnosis and initiation of treatment. The first months after an AHF episode are characterised by high readmission and mortality rates.
Objective: Evaluation of predictor factors (PF) of in-hospital (IH) mortality (M), and 6-months (6m) and 1-year (1y) rehospitalization (RH) and M in patients admitted with AHF.
Material and methods: Single center retrospective analysis of P data admitted with AHF between 2001-2017. Data was collected regarding clinical, laboratorial and echocardiographic parameters to determine PF of stablished endpoints.
Results: 465 P were reviewed, age 67.9±12.2 years, 69.9% males. 64% had hypertension, 39.4% diabetes and 34.4% dyslipidaemia. 57.3% had a de novo diagnosis. Total IH M was 6.7%. At univariate analysis, PF of IH M were inotropic use (odds ratio (OR) 10.258, p <0.001, confidence interval (CI) 3.859-27.265), clinical profile at admission (OR 7.274, p <0.001, CI 3.314-15.967), systolic blood pressure (SBP) (OR 0.975, p <0.001, CI 0.962-0.989), urea (OR 1.102, p <0.001, CI 1.006-1.019), age (OR 1.067, p 0.001, CI 1.026-1.110), brain natriuretic peptide (BNP) dosage (OR 1, p 0.002, CI 1.003-1.009), haemoglobin (OR 0.810, p 0.029, CI 0.671-0.978) and creatinine level (OR 1.019, p 0.047, CI 1.002-1.038). At multivariate analysis, independent PF of IH M were profile at admission (p<0.001), creatinine (p<0.001), BNP (p<0.001), inotropic (p 0.002) and urea (p0 0.021). Concerning to 6m M, at univariate analysis, the PF were urea (OR 1.010, p 0.001, CI 1.004-1.016) and age (OR 1.036, p 0.008, CI 1.010-1.069). At multivariate analysis, they both showed to be independent PF of 6m M (urea p <0.001 and age p 0.007). Concerning to 1y M, the only PF was urea (OR 1.009, p 0.039, CI 1.002-10.18). This was also the only PF of 6m RH (OR 1.008, p 0.006, CI 1.002-1.013). The only PF for 1y RH was ejection fraction (OR 0.971, p 0.018, CI 0.947-0.995).
Conclusion: In this study, and accordingly with larger studies, hemodynamic and analytical profile at admission were important factors of prognosis.

Coronary Artery Disease

P1116
Long-term biological variation of high-sensitivity cardiac troponin t using minimal important differences and reference change values in stable outpatients with cardiovascular disease

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Objective: To evaluate the long term biological variation of high-sensitivity cardiac troponin T (hs-cTnT) in stable outpatients with cardiovascular disease (CVD) .
Methods: After applying 8 exclusion criteria to 965 patients, hs-cTnT was measured at index visit and at a 12-month interval in 169 stable outpatients presenting for routine follow-up visits for any CVD. Stability was defined as absence of any endpoint within the follow-up period. Reference change values (RCVs) and minimal important differences (MIDs) were determined to assess biological variation of hs-cTnT.
Results: MID and RCV for the 12 months interval in patients were 3.8 ng/L or 44.2%, respectively. MID and transformed MID values were lower than the corresponding RCV with a value of 5.1 ng/L for the transformed RCV and 28.1% for the transformed

MID. Similar patterns were shown in different subgroups as sex, age, and renal function. We observed a baseline hs-cTnT value dependent change of MID and RCV with increasing values for MID and decreasing values for RCV which converge to stable values between a baseline hs-cTNT value of 11 to 25 ng/l.
Conclusions: Biological variation of hs-cTnT over 12 months in stable outpatients depends on the concentration at index visit, and is consistent among important prespecified subgroups. MID shows a low biovariability over 12 months.

	RCVabs (ng/ml hs-cTnT)	MID (ng/ml hs-cTnT)	RCV (%)	MIDrel (%)
Total	5.1	3.8	44.2%	28.1%
< 14	3.8	2.3	37.0%	26.4%
>= 14	5.5	3.3	28.7%	15.9%
male	5.6	3.9	44.2%	27.3%
female	3.8	3.2	45.0%	30.1%
eGFR >= 60ml/min	4.3	3.4	41.6%	27.9%
eGFR < 60ml/min	7.5	4.4	47.0%	27.7%
age >= 70	6.3	4.1	45.0%	28.5%
age < 70	4.2	3.4	43.1%	27.3%

MID and RCV values and as transformed values including the different subgroups

P1117
The impact of coronary sinus reducer on left ventricular function in patients with refractory angina; new horizons in ischemic cardiomyopathy?

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Background: Coronary sinus (CS) Reducer System is a balloon-expandable, stainless steel mesh, implanted percutaneously in the CS to create a controlled narrowing of the lumen and establish pressure gradient across it. CS Reducer implantation has been shown to improve angina and quality of life in patients with coronary artery disease having angina refractory to medical therapy and not amenable to any further revascularization.
Purpose: To evaluate the impact of CS Reducer implantation upon left ventricular (LV) function as assessed by cardiac magnetic resonance (CMR) in patients with refractory angina and coronary artery disease not amenable to further revascularization.
Methods: Prior to device implantation and at 4-months, all patients underwent clinical assessment with evaluation of: CCS class, six-minute walk test (6-MWT) and resting ventricular volumes and function, measured using CMR.
Results: Nineteen patients (18 males/1 female, 66±10 years), underwent successful Reducer implantation. Sixteen patients improved by ≥ 1 CCS class. Eight patients experienced 1 CCS class reduction, 7 patients 2 CCS class reduction, 1 patient 3 CCS class reduction and 3 patients did not experience any benefit in angina class. The 6MWT was also improved 4 months after Reducer implantation (from 319±77 meters to 418±107 meters, p=0.002).
Four months after Reducer implantation, we noticed a significant improvement in LV ejection fraction (LVEF) (61 [IQR 47-71] to 66 [IQR 57-72] %; p=0.009), a reduction in LV end-diastolic volume (LVEDV)/Body surface area (BSA) (65.7 [IQR 57.4-89.6] to 64.7 [IQR 53.7-74.1] ml/m2; p=0.036, respectively) and a reduction in LV end-systolic volume (LVESV)/BSA (28.7 [IQR 18.6-38.8] to 20.0 [IQR 15.0-31.4] ml/m2; p=0.007, respectively). Patients with reduced EF (EF<50%, n=6) presented a greater increase of EF at follow up compared to patients with preserved EF (11.3 [IQR 6.5-54.5] vs 3.8 [IQR 0.6-9.1] %; p=0.029). The observed decrease in LVESV/BSA was greater in patients with reduced EF (23.6 [IQR 11.6-33.8] vs 4.2 [IQR -2.0-8.4] ml; p=0.005).
Conclusions: CS Reducer implantation improved angina symptoms, functional capacity and left ventricular function in patients with refractory angina. The improvement was pronounced in the subgroup of patients with reduced ejection fraction. The hypothesis generating results indicate a new approach to be tested in ischemic cardiomyopathy.

P1118
Interventricular septal dysfunction due to myocardial infraction can result in right ventricular failure in long term follow up

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Background: Diastolic functional parameters and interventricular septal thickness are related to right ventricular dysfunction after anterior myocardial infarction. This finding suggest that interventricular septal function can affect right ventricular function in myocardial infarction patients. We measured right ventricular free wall strain using dedicated software whether the ischemic insult on interventricular septum can affect the long-term right ventricular function, which is important parameter for the development of heart failure.
Methods: The patients diagnosed as acute myocardial infarction due to left anterior descending artery disease who underwent successful revascularization were enrolled. Echocardiographic exams were performed 2 times, within 72 hours and 1 year after the revascularization. Strain values of interventricular septum and right ventricular free wall were derived from the Dicom images. The analysis was performed using the dedicated software for the measurement of right ventricular strain.
Results: Total 53 patients were enrolled. The values of global left ventricular strain were increased after the follow up. There were no changes in global longitudinal strain of the right ventricle. But longitudinal stain values acquired from right ventricular free walls were decreased even the improved left ventricular strain values.
Conclusion: Interventricular septal dysfunction due to ischemic injury resulted from anterior myocardial infarction can affect long term right ventricular dysfunction. This finding suggests the interventricular dependence between cardiac chambers and can provide the development of heart failure in myocardial infarction patient after the successful revascularization.

Left and right ventricular strain			
	Initial (n=53)	Follow up (n=53)	P value
Left ventricle			
Global longitudinal strain (%)	-13.25±4.50	-16.25±4.21	<0.001
Longitudinal strain, septum (%)	-11.26±5.74	-14.88±5.18	<0.001
Right ventricle			
Global longitudinal strain (%)	-19.90±4.60	-20.08±5.07	0.839
Longitudinal strain, septum (%)	-15.20±4.52	-16.04±5.27	0.367
Longitudinal strain, free wall (%)	-20.58±5.27	-18.82±5.70	0.049

P1119
New biomarkers of cardiovascular endpoints and heart failure progression analysis after myocardial infarction

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Background: Myocardial infarction (MI) is one of the main factors in chronic heart failure (HF) onset or progression. Creatine phosphate kinase (CPK), troponins (Tr) and NTproBNP seems to have prediction potential in HF and primary cardiovascular endpoints prediction in the remote period, and recently the new and more sensitive biomarkers such as soluble ST2 and Pentraxin-3 (Ptx-3) are intensively investigated. For Ptx-3 the normal range is not yet defined.
Objective: was to study predictive power of ST2, Ptx-3 and NTproBNP biomarkers on cardiovascular endpoints in 12 months after MI and systolic left ventricular ejection fraction (LVEF) failure progression and cut-off point for mortality for ST2.
Materials: NTproBNP, Ptx-3 and ST2 were estimated 3 days after MI (both STEMI and nonSTEMI) in 180 patients. In 12 months (369.2±11.9) the primary endpoints (MI, stroke, death, and hospitalization) were analyzed. Patients were divided into 1st groups with serum ST2 below normal threshold (n=108, 60.0±2.3 years, ST2=27.9±8.9 ng/ml) and 2nd – with ST2 above the threshold (n=72, 63.9±1.9, ST2=97.7±21.9 ng/ml). The survival binary logistic regression and RandomForest educational models was constructed based on patient investigation parameters during hospitalization and primary endpoints in 1 year to estimate impact of biomarkers. Additionally, in 58 patients (36 from the 1st and 22 from the 2nd groups) the LVEF was investigated by means of echocardiography to find biomarkers of systolic function decline progression.
Results: In 1-year the mortality ratio (6.9% vs 4.6%), strokes (4.2 vs. 1.9) and hospitalizations (11.1 vs 4.6) were higher in the 2nd group but of MI – in the 1st (12.5 vs 16.7). NTproBNP was significantly higher in the 1st group (883.1±76.4,

vs 1820.8±144.1 pg/ml, p<0.012), Ptx-3 differed in less extent between the group compared to ST2 (144.5±25.1 vs. 203.1±32.7 ng/ml, p<0.041). By binary regression analysis high ST2 increased probability of stroke on 1.4% but decreased of MI on 1.3% (p<0.05). High NTproBNP (marginal impact on mortality + 1.52 %, p<0.01) and Ptx-3 (marginal impact +1.18%, p<0.05) both were risk factors of mortal endpoints. Random Forest education analysis increased predictive power of biomarkers in 2-3 times: mortality was predicted mostly by age, MI in the past and NTproBNP (last on 5.64 %) and Ptx-3 (on 3.48) and MI and stroke – ST2 (3.15 and 2.95 respectively). PTX-3 > 43.9 ng / ml was shown to be mortality risk factor with sensitivity 70.0% and specificity 52.9%. In 1-year in the groups with high and low ST2 the biomarker failed to predict the LVEF decline (p=0.4).

Conclusions: NTproBNP, ST2 and Ptx-3 biomarkers showed predictive power in cardiovascular endpoints in 1-year FU analysis after MI but failed to predict systolic left ventricular function decline.

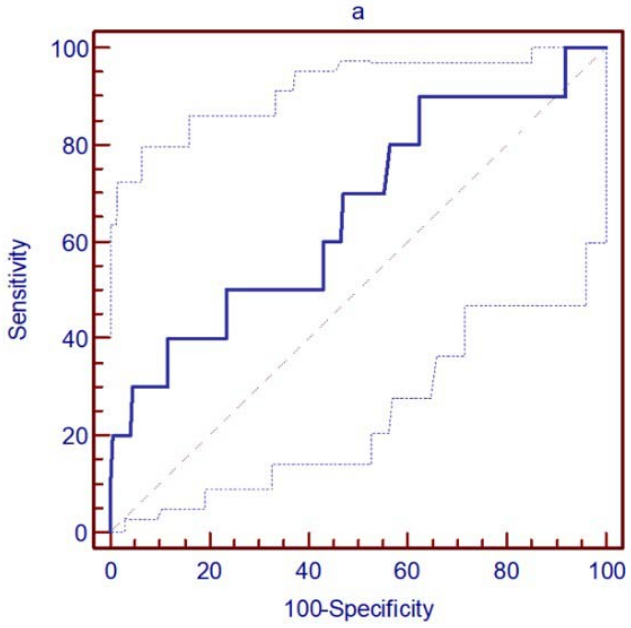

Fig. 1. Cut-off value on Ptx-3 in 1-year

P1120

Selective beta blockers are beneficial for chronic obstructive pulmonary disease patients with acute myocardial infarction: a nationwide study of 186,326 patients

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β-blockers are important for acute myocardial infarction (AMI) patients due to their better outcomes, both short-time and long-term. Nevertheless, β-blockers are under-prescribed in chronic obstructive pulmonary disease (COPD) patients with AMI for fear of the bronchospasm. The aim of this study was to investigate the association between the usage of selective β-blockers and the risk of mortality in COPD patients after first AMI via a nationwide, population-based cohort study. In this retrospective study, 186,326 AMI patients have been identified between January 2000 to December 2012 from National Health Insurance Research Database. Among those patients, 23,116 had COPD and only 7,609 patients (32.92%) were prescribed β-blockers, while 15,507 were not. We stratified those patients into cardio-selective and non-selective β-blockers groups. Multivariate Cox proportional hazards models were used to estimate adjusted hazard ratios (HR) with 95% confidence intervals (95% CI). Those who had taken cardio-selective β-blocker showed a reduced risk of mortality (HR: 0.93; 95% CI: 0.89-0.98; p<.01). Hence the study concludes that cardio-selective β-blockers improve overall survival among COPD patients after first AMI.

P1121

Identifying acute coronary syndrome in patients presenting to the emergency department with chest pain. Development of the CHEST PAIN-ALERT algorithm

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Background: Coronary artery disease is the most common precipitating cause of heart failure (HF) worldwide. Early identification of acute coronary syndrome (ACS) in patients presenting to the emergency department (ED) with chest pain (CP) can result in timely treatment, which can prevent left ventricular remodeling and reduce the occurrence of HF.

Purpose: This investigator-initiated, single-center, observational, prospective cohort study aimed at developing the best possible clinical algorithm to identify the presence of ACS in patients presenting to the ED with CP.

Methods: 224 all-comer patients enrolled prospectively in the CHEST PAIN-ALERT trial were grouped into derivation and validation sets in a ratio of 1:1. Data concerning 1. patient demography, 2. risk factors, 3, current therapy, 4, ECG at presentation and 5. pain characteristics were collected. Patients with CP that had stopped before presentation were excluded, as well as the non-cooperative patients, patients who participated in another trial, or have other medical condition which in the investigator's opinion may interfere with the patient's optimal participation in the study. The primary end point was confirmation of the diagnosis of ACS. ACS was defined as the presence of unstable angina, acute myocardial infarction (AMI) or sudden coronary death. The decision on the presence of ACS was made using highly sensitive cardiac troponin, echocardiographic recording and coronary angiography, as well as data from a 15-day follow-up, in accordance with the actual ESC guidelines and the universal definition of acute myocardial infarction. Telephone interviews included data about performed diagnostic procedures (stress test, echocardiography, ECG-holter monitoring, angiography), medical therapy for ACS, revascularization (percutaneous, surgical), and adverse events (recurrence of ischemia, heart failure, stroke, bleeding, hospitalization).

Results: The diagnosis of ACS was confirmed in 51/224 (22.8%) patients. The CHEST PAIN-ALERT algorithm's AUC (figure 1), sensitivity, specificity, positive and negative predictive value were: 0.945, 95.0%, 85.5%, 0.613 and 0.986, respectively. Positive and negative likelihood ratios were: 6.55 and 17.1, respectively. One of 112 patients (0.89%) was false negative and 12/112 patients (10.7%) were false positive. Conclusions: CHEST PAIN-ALERT algorithm showed an excellent predictive value to identify the presence or absence of ACS among CP patients presented to the ED. Early identification of ACS is a cornerstone for timely treatment, which might reduce the incidence of subsequent HF in these patients.

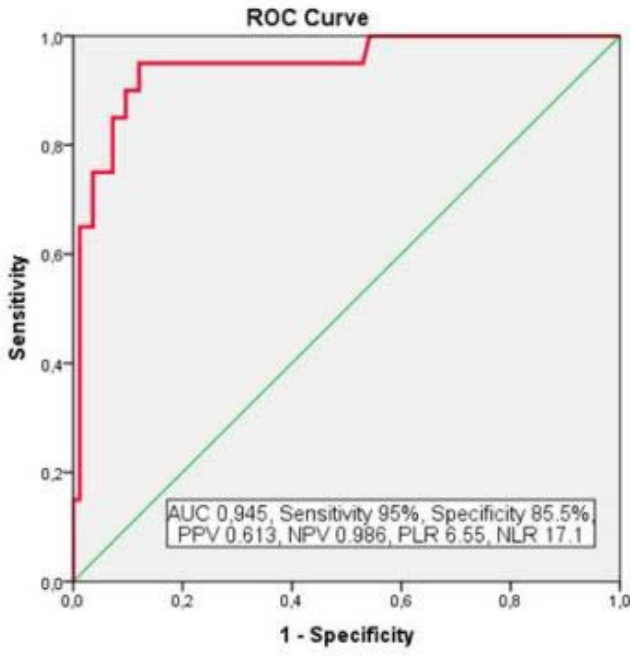

Figure 1

P1122

Clinical characteristics, management and in-hospital mortality of patients with non-st-segment elevation vs. st-segment elevation myocardial infarction in kosovo

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Background: Myocardial infarction (MI) is a major cause of mortality for all regions of the world. Based on the presenting electrocardiogram, acute MI is categorized generally as non-ST-segment elevation MI (NSTEMI) and ST-segment elevation MI (STEMI). The clinical presentation, treatment and outcome of patients differ between these two types of MI.
Aim: The objective of this study was to assess clinical characteristics, management and its impact on in-hospital mortality in patients with MI.
Methods: This retrospective study included all patients hospitalized for ACS from January 1st, 2014 to December 31st, 2018, at the Clinic of Cardiology of the University Clinical Center of Kosova, in Prishtina, Kosovo. All clinical, biochemical, ECG, echocardiograms and the results of the invasive diagnostic and interventional results were registered, both in NSTEMI and STEMI patients.
Results: Among 4667 admitted patients with ACS (mean age 63 ± 12 years, 30% female), according to the final discharged diagnosis, 2982 (64%) patients were identified with STEMI, 1546 (33%) with NSTEMI, and 113 (3%) unstable angina. NSTEMI patients were older than STEMI patients (p=0.025), with more female presented (p=0.002), were less smokers (p=0.012), and more hypertensive (p<0.001), compared to STEMI patients. The primary percutaneous intervention (PPCI) was performed equally in NSTEMI and STEMI patients (33.4% vs. 34.4%, p=0.343), whereas NSTEMI patients were less likely to be transferred to 24 hours PPCI center (15% vs. 29%, p < 0.001) compared to STEMI patients.
In-hospital mortality in the whole group of patients that were not transferred to the 24 hours PPCI center did not differ between NSTEMI and STEMI patients (8.3% vs. 9.2%, p = 0.388). The mortality was higher in patients that did not underwent reperfusion by PPCI both in NSTEMI (10.1% vs. 2.1%, p<0.001) and STEMI (10.8% vs. 4.7%, p<0.001), compared to those that underwent PPCI. The mortality rate of patients with MI did not differ between NSTEMI and STEMI patients that were treated medically (14% vs. 11.4%, p = 0.107) or by PPCI (3.0% vs. 4.7%, p=0.299).
Conclusion: During last five years majority of patients with acute MI were not treated with PPCI in Kosovo, in whom the mortality rate remain very high. NSTEMI patients are less likely to be transferred to a 24 hours PPCI center than STEMI patients, despite the same in-hospital mortality rate of these two groups of patients. These findings highlight the need for the implementation of the strategy of early and urgent invasive treatment of NSTEMI patients in Kosovo.

P1123

Manifestations of frailty in elderly patients with acute coronary syndrome

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Background. Detecting frailty in elderly patients with acute coronary syndrome (ACS) is important to predict the occurrence of adverse outcomes, but because of its complexity, frailty screening is not commonly performed. The quality of life of older people is determined not only by the presence of chronic diseases, but also geriatric syndromes. The most common geriatric syndromes are sensory deficits (decreased vision and hearing), cognitive impairment and depression, incontinence urine, falls, decreased mobility and malnutrition. The aim of the study was to assess patient distribution depending on positive responses to screening questions.
Methods: In 130 patients ≥75 years (83±5 years, arterial hypertension (AH) 92%, previous myocardial infarction (MI) 32%, atrial fibrillation 32%, diabetes 27%, chronic heart failure (HF) 77%, acute heart failure (ACF) (Killip I - 60%, II- 29,2%, III - 10%,IV- 0,8%), admitted with MI (75%) or unstable angina (25%), frailty (national validated questionnaire), nutritional status (Mini Nutrition Assessment), cognitive function (Mini Mental State Examination) were assessed. National validated questionnaire includes 7 questions. Frailty was diagnosed with ≥3 points, pre-frail 1-2 points and non-frail – 0 points.
Results: Mean score on a national validated questionnaire was 2,9±1,4 points. Only 8.5% of patients responded negatively to all questionnaire questions. None of the patients had 7 points. 6,2, 19,2, 32,3, 23,8, 6,9 and 3,1% patients had 1, 2, 3, 4, 5 and 6 points. Most often patients noted decreased vision and hearing (56.9%). 48,5 and 48,5% of patients had reduction of mood and the episodes of urinary incontinence. 44,6% patients gave positive answers about memory impairment, understanding, orientation, or ability to plan. 37,7% patients had injuries associated with a fall during the last year, 34,6% - weight loss. 20% patients had difficulties in walking.
Patients with weight loss had more pronounced score on MNA score (22,3±2,7 vs 23,7±2,8 points, p<0,01). Patients with positive answers about memory impairment, understanding, orientation, or ability to plan had more cognitive dysfunction (25,8±4,9 vs 28,3±4,1 points, p<0,01).
8,5 % of the patients were non-frail, 25,4 % pre-frail and 66,1 % frail. Patients with frailty were more likely women (72 vs 59%; p<0,05), had higher incidence of AH (94 vs 86%; p<0,01), MI in this hospitalization (86 vs 55%; p<0,05), GFR <60 ml/min/1,73 m2 (71 vs 48%; p<0,05).
Conclusion: Frailty occured in 66,1% of elderly patients with ACS, was associated with increased prevalence of cardiovascular diseases. Most often, patients had decreased vision and hearing, reduction mood and the presence of episodes of urinary incontinence.

P1124

SCAD (Spontaneous coronary artery dissection) UK data an observation study of PSCAD vs. Non PSCAD

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Spontaneous coronary artery dissection (SCAD) is a devastating condition, which affects predominantly young females. It has been associated with Pregnancy and post partum. It is a non-inflammatory, non-atherosclerotic cause of acute myocardial infarction. It can result in significant morbidities such as ventricular arrhythmias, sudden cardiac death and left ventricular systolic dysfunction (LVSD).
The purpose of this study was to compare PSCAD vs. non-PSCAD cohorts to see if there were any substantial differences. UK (United Kingdom) data for SCAD was reviewed from 01/01/2007 to 01/10/2017. Pregnancy and post partum associated SCADs were analysed. Post Partum was defined to be up to 1 year after pregnancy. 24 PSCAD were identified which were randomly matched by age in a 2:1 Ratio. In total 72 SCAD's were selected. 2 patients were withdrawn after the angiograms were reviewed (24 PSCAD and 46 non PSCAD). Data was reviewed using the national registry and SCAD experts reviewed angiograms for all patients.
Mean age for the entire cohort was 35.35. In the PSCAD cohort 62.50% presented as a STEMI (ST elevation Myocardial infarction) with 45.83% having ECG changes in the anterior leads. Compared to non-PSCAD cohort 58.70% presented as a STEMI with 41.30% having ECG changes in the anterior leads. In the PSCAD cohort 33.33% affected the LMS (Left main stem), 20.83% affected the RCA (Right coronary artery), 70.83% affected the LAD (left anterior descending), 29.17% affected LCX (left circumflex artery) and 41.67% affected more than one vessel affected. In 29.17% of cases percutaneous coronary intervention (PCI) was undertaken and 8.33% cases required a coronary artery bypass graft (CABG). In the non-PSCAD group 10.86% affected the LMS, 10.86% affected the RCA, 76.09% affected the LAD, 13.04 % affected LCX and 4.35% affected more than one vessel. 28.26% underwent PCI with 10.87% cases requiring CABG.
Heart failure was reviewed in both cohorts with Echocardiogram or Magnetic resonance imaging (MRI) reviewed at least 3 months after the event. In the PSCAD group 50 % had normal LVSF (Left ventricular systolic function), 20.83% with mild LVSD, 16.67 with moderate LVSD, 4.17 % with severe LVSD and in 8.33% data was not available. In non-PSCAD group 54.35% had normal LVSF, 19.57% had mild LVSD, 10.87% had moderate, 0 % had severe LVSD and in 15.22% data was not available.
In both sub groups the commonest vessel affected was the LAD. However, the PSCAD group had a higher number of LMS and multi vessel cases of SCAD's. This highlights that this cohort has a more severe form of SCAD. From a heart failure perspective in both subgroups at least half the patients regained normal LV function.

P1125

Effect of intravenous ferric carboxymaltose on left ventricular systolic function after acute myocardial infarction

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Introduction: Treatment with intravenous ferric carboxymaltose (FCM) showed to improve symptoms, functional capacity, and quality of life in patients with heart failure and iron deficiency. No data are currently available in the setting of acute coronary syndromes. The aim of our study was to investigate the role of iron supplementation on left ventricular (LV) function and shape in acute myocardial infarction (AMI).Material and methods: A total of 11 consecutive patients (age 64 ±

12 years) hospitalized for ST elevation myocardial infarction (STEMI) in the anterior wall underwent physical examination, echocardiography and blood samplings with the assessment of high sensitivity troponin (hsTr), ferritin, transferrin and transferrin saturation (TSAT) within 24h from admission. Echocardiographic examination, ferritin and transferrin saturation (TSAT) were re-assessed after 3 months from FCM administration. The determination of the initial iron need was calculated based on body weight and haemoglobin levels. A single dose of intravenous FCM (500 mg) was administered in patients with a TSAT ≤20% as an undiluted slow bolus injection within 24h from hospital admission and irrespective of anaemia status. If needed, a second dose was administered one week later.
Results: All patients showed a ferritin concentration <100 ugr/ml. Five patients had a TSAT ≤20% (group A) and 6 patients a TSAT >20% (group B). The two groups were similar in terms of door-to-balloon time, LV systolic function and volumes at baseline. After three months of follow-up all patients treated with FCM showed a TSAT >20% and a haemoglobin value >13 gr/dl. Patients in group A showed a significant increase in left ventricle ejection fraction (from 38.6 ± 1.3% to 46.8 ± 3.5%; p=0.0015) a and a slight non-significant trend in reduction of left ventricular end-diastolic volume (from 84.6 ± 26.2 ml to 79.1 ± 16.5 ml, p=0.42) from baseline. Opposite, no significant modifications in LV systolic function and remodeling parameters were showed in group B.
Conclusions: The administration of FCM in patients with STEMI in the anterior wall and iron deficiency was correlated to an improvement in LV systolic function compared to patients with normal TSAT. Potential beneficial effect of FCM administration in patients with AMI should be further examined.

Valvular Heart Disease

P1126
Prevalence, clinical features and outcomes of different phenotypes of acute kidney injury in infective endocarditis

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Background: Renal lesions in infective endocarditis (IE) clinically may appear like subclinical manifestation as well as fulminant kidney failure. However, one third of IE patients has serum creatinine elevation concordant with acute kidney injury (AKI) criteria. Clinical phenotypes of AKI in patients with IE was never studied.
Materials/methods: 209 patients with verified IE (DUKE 2009, 2015), hospitalized and treated from January 2010 to June 2018, were included in the study. Kidney function was assessed using CKD-EPI formula. AKI and chronic kidney disease (CKD) were diagnosed according to current guidelines (KDIGO 2012, 2017). Serum creatinine decrease on ≥26,5 mcmol/L in 48 hours after the hospitalization was counted as early-onset AKI. Patients with serum creatinine elevation on ≥26,5 mcmol/L in 48 hours during the hospitalization were diagnosed with late-onset AKI
Results: AKI was diagnosed in 138(66%) patients. In 70 patients (50,7%) AKI was affected by underlying CKD.
Patients with AKI with underlying CKD comparing to patients with AKI de novo had higher occurrence of dyspnea (79% vs 62%, p<0.05), had lower LV EF (52±9 vs 57±7, p<0.01) and higher perioperative risk based on EuroSCORE II (38(17-64) vs 10(3-28), p<0.001). Patients with AKI de novo had less significant symptoms of heart failure (p<0.001). Glycopeptides were more frequently used in patients with AKI and underlying CKD. In-hospital mortality was higher in patients with AKI with underlying CKD as compared to the patients with AKI de novo (52,9% vs 35,7%, p<0,05). RRT was held in 1 (1,5%) patient with AKI de novo and in 2 (2,9%) patients with AKI and CKD. Patients with late-onset AKI were older (median age 61,5±17,3 vs 51,0±18,9 p<0,01), had higher Charlson index (median points 6,7±4,1 vs 5,1±4,0 p<0,01) and higher perioperative risk based on EuroSCORE II (median score [IQR] 27,8[9,23-50,9] vs 13,0 [3,4-39,4] p<0,05) Patients with late-onset AKI had significantly lower incidence of cough (p<0.05) and septic shock at admission (p<0.05). Patients with late-onset AKI more frequently received oxacillin, and aminopenicillins, and patients with early-onset AKI more frequently received cephalosporines and lipopeptides.
Conclusions: AKI occurrence on the background of the CKD is associated with glycopeptide therapy and higher in-hospital mortality rate. Patients with late-onset AKI were older, had more comorbidities and higher perioperative complications risk. We have not found any significant data on relationships of the IE causative agent and early onset of AKI, which disagrees with the literature data.

P1127
Prognostic significance of biomarkers in infective endocarditis

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Introduction: Infective endocarditis (IE) is still a fatefull disease with a high rate of morbidity and mortality. The use of prognostic biomarkers let us focus on those patients with worse prognosis. Does heart failure biomarkers may help identify critically ill patients?
Methods: Patients presented at the Endocarditis team were prospectively assessed. Aetiology, baseline characteristics and outcomes (need of intensive care and in-hospital mortality) were collected. Brain natriuretic peptide (BNP) and troponine I (Tn I) levels at income were recorded. T test was conducted.
Results: 113 patients were studied between 2014 and 2018. Mean age was 68 years old; 70 (68%) patients were men and 21% had ischaemic aetiology. 34% had atrial fibrillation and 21% were diabetic. Aortic infective endocarditis represented 42% of the total; 37% were mitral endocarditis. Prosthetic valve endocarditis was 33%; cardiac device-related infective endocarditis was 18%. The most frequent microorganism underlying was Staphylococcus aureus (33%).Patients with higher levels of BNP had a higher need of intensive care (p=0,018), as those with higher Tn I concentration (p= 0,032). BNP was also related to more mortality (p= 0,052). However, this result was not applicable for Tn I (p=0,269). Acute phase reactants were also associated with need of intensive care: C-reactive protein (p= 0,024) and procalcitonin (p=0,008). Procalcitonin, but not C-reactive protein, associated higher in-hospital mortality (p=0,002).
Conclusions: Heart failure biomarkers have prognostic impact on patient affected by IE, predicting the necessity of intensive care. BNP has a tendency to predict also in-hospital mortality. Acute phase reactants predict both outcomes (need of intensive care and in-hospital mortality). The precise identification of heavily ill patients is crucial to try to overtake a discouraging ending, and biomarkers may play an important roll for it.

P1128
Transcatheter aortic valve replacement in patients with aortic stenosis and mitral regurgitation

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Background: Many patients undergoing transcatheter aortic valve replacement (TAVR) for aortic stenosis also have significant mitral regurgitation (MR). We sought to understand the association of concomitant MR with TAVR clinical outcomes, as well changes in MR after TAVR.
Methods: Patients who underwent TAVR at our center,between april 2008 to December 2017, were studied, with longer term clinical outcomes
Results: Of 667patients, 92 (13.8%) had moderate MR, and 47 (2.1%) had severe MR. At 3.2±2.2 years, mortality was 39.4%, 46.1%, 39.1%, 57.6% and 50% and heart failure (HF) rehospitalization was 7%, 7.9%, 17.6%, 21.9% and 46.2% (p < 0.001) in the no, mild, moderate, moderate-severe and severe MR patients, respectively. After procedure, 64 patients (9.9%) had moderate MR and 24 patients (3.7%) had severe MR. At follow-up, the mortality was 35.9%, 46.5%, 48.4%, 52.9% and 85.7%, p <0.001 and HF rehospitalizations 9.1%, 5.5%, 23.4%, 35.3% and 40 % in the no, mild, moderate, moderate-severe and severe MR patients, respectively. MR improved early after TAVI grade in 88 patients (13.2%). Baseline MR is not associated with mortality (HR= 0.883 [95 CI 0.708-1.102], p= 0.114), but MR post-TAVI was associagted with increase risk of mortality (HR= 1.539 [95 CI 1.187-1.996], p= 0.001. In 7 patients with persistent MR received percutaneous mitral repair with MitraClip.
Conclusions: In our series, Moderate or severe MR after TAVI is associated with increased mortality or HF rehospitalization, this increased risk may be atrributable to the minority of patients whose MR does not improve and could benefit from percutaneous mitral procedures (Mitraclip).

P1129

The prognostic role of late gadolinium enhancement in patients with aortic stenosis: a systematic review and meta-analysis

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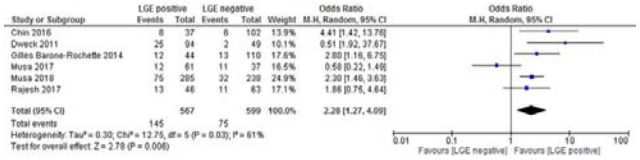
Background: Myocardial fibrosis is a common feature of many cardiac diseases. Cardiac magnetic resonance (CMR) has the ability to non-invasively detect regional fibrosis, using the LGE technique. Several studies have explored whether LGE is associated with adverse outcome in patients with AS.
Purpose: The aim of this systematic review was to explore the prognostic value of late gadolinium enhancement (LGE) in patients with aortic stenosis (AS).
Methods: Electronic databases were searched to identify studies investigating the ability of LGE to predict all-cause mortality in patients with AS. A random effects model meta-analysis was conducted. Heterogeneity was assessed with I2.
Results: Six studies comprising 1,250 patients met our inclusion criteria. LGE was present in 45.3% of patients. In the pooled analysis, LGE was found to be a strong univariate predictor of all-cause mortality (pooled unadjusted OR: 2.28, 95% CI: 1.27 to 4.09, I2=61%). Four of the included studies reported adjusted HR for mortality. LGE was independently associated with mortality, even after adjusting for baseline characteristics (pooled adjusted HR: 2.50, 95% CI: 1.64 to 3.83, I2=0%).
Conclusion: Fibrosis on LGE-CMR is a powerful predictor of all-cause mortality in patients with AS and may serve as a novel marker for risk stratification. Future studies should explore whether LGE-CMR can also be used to optimize timing of AS-related interventions.



Meta-analysis results

P1130

Impact of significant mitral regurgitation for predicting hospital readmission for heart failure after transcatheter aortic valve implantation

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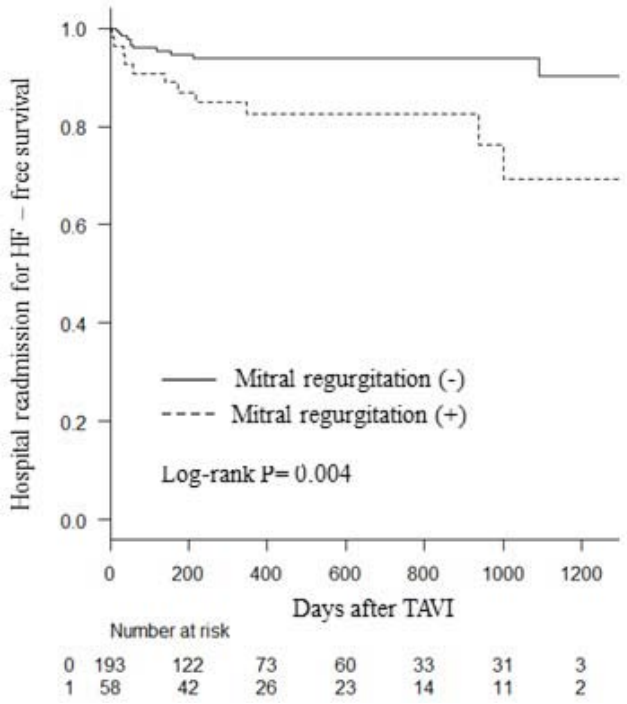
Introduction: Transcatheter aortic valve implantation (TAVI) has been performed for the patients with symptomatic, severe aortic valve stenosis (AS) deemed inoperable or at high risk for surgery. Although mitral regurgitation (MR) frequently coexists in patients with AS, there are conflicting reports regarding MR on outcomes after TAVI.
Purpose: We studied the impact of pre-existing MR for predicting hospital readmission for heart failure (HF) in patients after TAVI.
Methods: We retrospectively enrolled patients with AS underwent TAVI from December 2013 through June 2018. Significant MR was defined as grade 2 or higher MR on preoperative echocardiography. We used Cox regression analysis to estimate the hazard ratio for MR on hospital readmission for HF.
Results: We analyzed 251 consecutive patients (mean age 84.8 ± 5.0 years; male 29.9%). Of these, 55 patients (22.8%) had significant MR on preoperative echocardiography. Moreover, 19 patients (7.9%) experienced hospital readmission for HF after TAVI (the median follow up period 367 days). The significant MR group had higher hospital readmission compared to the non-significant MR group (16.4% vs. 5.4%, P<0.05). In the Cox proportional hazards model, significant MR was significantly associated with hospital readmission for HF (Figure. adjusted hazard ratio, 2.56; CI: 1.08^3/$_4$6.04; P = 0.032).
Conclusion: These results demonstrate that significant MR can be significantly associated with hospital readmission for HF in patients after TAVI.



Hospital readmission for heart failure

P1131

Pulmonary hypertension is a poor long-term prognostic factor in patients with primary mitral regurgitation, not in patients with secondary mitral regurgitation

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Background: In patients with primary mitral regurgitation (MR), the prevalence of pulmonary hypertension (PH) is about 20% and its presence is a poor prognostic factor. However, it is still unknown the prognostic significance in patients with secondary MR. We studied long-term survival in patients with MR and evaluated the prognostic significance of PH according to the type of MR.
Materials and methods: We included all consecutive MR patients with more than moderate degree. We determined MR severity with analysis of stored echocardiographic images and the presence of PH was defined as TR Vmax more than 3.0m/sec. The clinical outcome was assessed with the review of their medical records.
Results: We analyzed total of 605 patients (301 males, 67±15 years old) with significant MR patients. Of them, 354 patients (58.5%) had primary MR and 351 (58.0%) had PH. They were followed for 30±51 months for checking major adverse cardiocerbrovascular events (MACCE). During this period, total of 222 patients (36.7%) had more than 1 episode of MACCE; 229 admissions for HF, 31 strokes, 26 mitral valve surgery, and 91 deaths. On the survival analysis, the presence of PH was a significant prognostic factor of total survival (HR=2.498, 95% CI=1.364-4.573, P=0.003) and MACCE (HR=2.666, 95% CI=1.783-3.986, P<0.001) after adjustment of age, gender and LVEF. PH was a poor prognostic factor of total survival (HR=7.175, 95% CI=2.175-23.674, P=0.001) and MACCE (HR=5.828, 95% CI=2.957-11.488, P<0.001) in patients with primary MR. However, PH was not a prognostic factor total survival (HR=1.012, 95% CI=0.497-2.061, P=0.974) and MACCE (HR=1.399, 95% CI=0.852-2.296, P=0.185) in patients with secondary MR.
Conclusion: The presence of PH was a poor prognostic factor in patients with primary MR, not in patients with secondary MR.

P1132

Central nervous system complications in patients with infectious endocarditis: population characterization and predictors of embolization

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Introduction: Infectious endocarditis (IE) is a one of the major causes of morbidity and mortality in patients (pts) with valvular heart disease. Among the morbidity causes, cerebral embolism represents an important burden of disability.
Aim: To characterize patients with infectious endocarditis and neurological complications and to determine predictors of central nervous system (CNS) embolization
Methods: We analysed a population of pts with suspected/confirmed infectious endocarditis, according to Duke criteria, in the last 12 years (2006-2017). The clinical and imaging data were collected as well as complication rates and mortality data.
Results: We included 174 pts, 36,8% had evidence of systemic embolization. The most frequent embolization site was CNS (n=34, 19,5%). Pts with CNS embolization were predominantly male (73,5%), with a mean age of 62±11 years old. 58,8% had hypertension (HTN), 41,2% diabetes (DM), 17,6% chronic kidney disease (CKD). 8.8% were iv drug users ,11,8% had active cancer and 5,9% were HIV positive. None had right-sided valves involvment.The most common microbiologic agents were staphylococcus and streptococcus (both corresponding to 29,4%). 20,6% of pts had no agent isolation. 79,4% had ischemic stroke (haemorragic transformation in 20,6%), 14,7% had haemorragic stroke, 14,7% mycotic aneurism, and 2,9% had myelitis/meningitis. 35,3% had recurrence of stroke (including both ischemic and haemorragic). In-hospital mortality was 35,3%.
Comparing to global population, there were no differences between both groups in what concerns sex (n=0,663), HTN (n=0,964), CKD (p=0,734), IV drug (p=0,463) and HIV (p=0,407). There were no differences between ages or affected valve (mitral vs aortic).
CNS embolization group were more likely to have diabetes (41,2% vs 12,5% p=0,009), prosthetic valve endocarditis (35,3% vs 6,3% p=0,004) and global complications (82,4% vs 44,8% p= 0,002), especially heart failure (HF) (44,1% vs 13,8% p=0,009). They were more associated with invasive procedures in the last 3 months (teeth procedures included) (35,7% vs 11,1% p= 0,032). In addition, they had longer hospitalizations (53 vs 38 days, p= 0,021).
On the other hand, they less frequently had anemia (41,2% vs 71% p=0,016) and fever (58,8% vs 83,9% p=0,027) at presentation. No differences were found in what concerns echocardigraphic changes or survival between the two groups.
In multivariate logistic regression, the only independent risk factors were the absence of anemia (OR: 0,066 95%CI 0,009-0,467 p=0,006) and prosthetic valve EI (OR: 22 95% CI 1,3-374 p=0,032).
Conclusions: For the population studied, CNS embolization was a common complication (especially isquemic stroke) associated to longer hospitalizations. Multiple regression showed that the absence of anemia and the prosthetic valve EI were the only independent predictors of this important morbidity cause.

P1133

Type 2 diabetes is a strong predictor of mortality in patients with prosthetic valve endocarditis with or without heart failure

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Background. Prosthetic valve endocarditis (PVE) has a high mortality rate. The impact of type 2 diabetes mellitus (T2DM) on PVE in-hospital mortality and complications had different reports in the literature.
Purpose. To determine whether T2DM influenced prognosis in patients hospitalized for PVE with or without prior heart failure (HF) in non-reference centers.
Method. We analyzed retrospectively 56 patients with definite or possible PVE (modified Duke criteria) admitted in two non-reference centers over a 5 years period contemporary with The International Collaboration on Endocarditis-Prospective Cohort Study. They were divided in early (E-n=29) and late (L-n=27) PVE and presented with or without prior HF symptoms. The initial intention to treat was medical, with a full course of antibiotics established by an infectious disease physician. The influence of T2DM on patients outcome was analyzed.
Results.
About half (48%) of studied patients had type 2 diabetes at baseline (44% in EPVE and 52% in LPVE). Our findings reveal that they were older, predominantly men, compared to those non-diabetic. Among diabetes patients 84,6% had heart failure symptoms in EPVE and 57% in LPVE. The most common organism detected by blood cultures: 14,8% Coagulase-negative staphylococci; 11,1% S. aureus; 7,4 % Enterococcus, with a strong relation with the initial source of infection (p<0.0001) for all detected etiologies. Due to antibiotic pretreatment 52% of T2DM patients had negative cultures in our study. In the Infectious disease department the in-hospital mortality was strongly related to the presence of T2DM (OR=9.33, RR=2.30, p=0.047) irrespective of etiology (p=0.581). In the ID department T2DM in-hospital mortality was 41,7% vs 2% in all patients. The overall mortality, with antibiotic treatment and early surgery was 20,8% in T2DM vs 7,6 % in all studied patients. Transfer rate due to complication was 63% (DM) vs 27 % in all patients. Transfer rate in patients with diabetes was higher in late PVE (61,4%) vs early PVE (36,4%). Valvular replacement mortality was 36,4%, quite similar between early and late PVE and it was affected by heart failure presence. Analysis was performed after exclusion of patients lost to follow up.
Conclusion: Type 2 diabetes represents a strong independent predictor for mortality in early and late PVE patients with initial medical intention to treat. Heart failure syndrome, when associated to diabetes has an adverse perioperative outcome in those that need early valve surgery.

P1134

Outcomes, survival analysis and the role of kidney damage in modeling the risk of adverse outcome in patients with infective endocarditis

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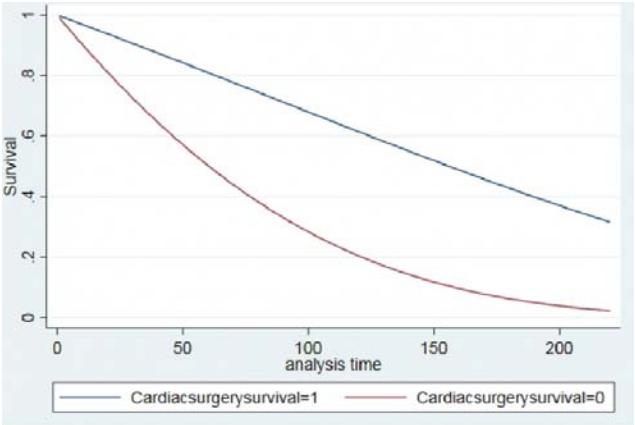
Background: Patients with infective endocarditis (IE) and renal lesions have worse outcomes even after performing a surgery. Kidney function worsening onset independently associated with increase in post-operative complications rate and in-hospital mortality.
Materials/methods: 209 patients with verified IE (DUKE 2009, 2015), hospitalized and treated from January 2010 to June 2018, were included in the study. Kidney function was assessed using CKD-EPI formula. AKI was diagnosed according to current guidelines (KDIGO 2012). Surgery was performed on 34 patients, all patients had indications for operative treatment. Cox's proportional hazards model are described.
Results: The study investigated complications and outcomes of IE, and it has been established that patients with impaired renal function are more likely to have embolic events (p=0,033), onset/worsening of heart failure symptoms (p<0,001), persisting fever (>7 days despite antimicrobial therapy) (p<0,001), persisting infection (i.e. positive blood culture despite antimicrobial therapy) (p<0,005), septic shock (p<0,003), major bleedings (p<0,028). These patients also had higher in-hospital mortality (p<0,001) (tab. 1). Survival analysis established that cumulative survival was higher in patients who underwent surgery relative to ones who were treated conservatively (fig. 1). Predictors of worse prognosis are septic shock (HR 2,8 95% confidence interval (CI) 1,6-5,0; p<0,001), AKI (HR 2,2; 95% CI 1-4,9; p<0,043), persisting fever (HR 1,9; 95% CI 1,1-3,3; p<0,023) and heart rate at admission >110 per minute (HR 1,1; 95% CI 1,0-1,1; p<0,023).
Conclusions: Current study revealed strong role of kidney lesions in development of complications, in-hospital mortality and worse survival in patients with infective endocarditis.

IE outcomes with and without AKI

	AKI(n=138)	NoAKI(n=71)	$\chi 2$
Embolic events,n (%)	72(52,2)	26(36,6)*	4,6
Onset/worsening of heart failure symptoms, n (%)	114(82,6)	43(60,6)***	8,9
Persistinginfection,n (%)	25(18,1)	3(4,2)***	7,8
Persisting fever n (%)	51(37,0)	7(9,9)***	17,2
Locally uncontrolled infection (valvular complications), n (%)	21(15,2)	6(8,5)	1,9
Septic shock,n (%)	27(19,6)	3(4,2)**	9,0
Major bleedings,n (%)	9(6,5(	0(0,0)*	4,8
In-hospital mortality,n (%)	61(44,2)	8(11,3)***	23,0
1-year mortality,n (%)	14(10,1)	9(12,7)	

*p <0,05, ***p <0,001 – significance of differences between group with AKI and without AKI



Survival with or without cardiac surgery

Myocardial Disease

P1135

Concomitant cardiomyopathies and their association with heart failure in subjects with bicuspid aortic valve

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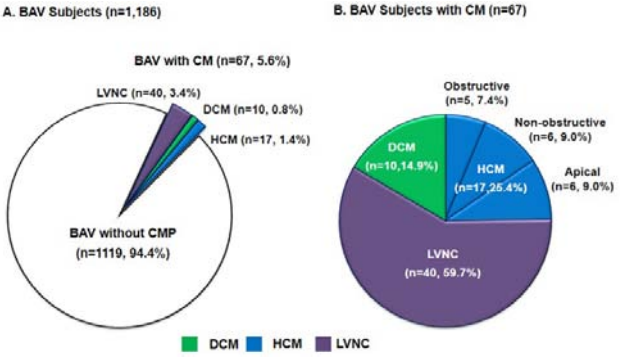
Background: In this study, the prevalence, characteristics, and clinical significance of concomitant specific cardiomyopathies were investigated in subjects with bicuspid aortic valve (BAV).

Methods: We retrospectively evaluated 1,186 adults with BAV (850 males, mean age 56 ± 14 years). Left ventricular non-compaction, hypertrophic cardiomyopathy, and idiopathic dilated cardiomyopathy were diagnosed when patients fulfilled current clinical and echocardiographic criteria. Clinical and echocardiographic characteristics including comorbidities, heart failure presentation, BAV morphology, function, and aorta phenotypes in BAV subjects with or without specific cardiomyopathies were compared.

Results: Overall, 67 subjects (5.6 %) had concomitant cardiomyopathies: 40 (3.4%) patients with left ventricular non-compaction, 17 (1.4%) with hypertrophic cardiomyopathy, and 10 (0.8%) with dilated cardiomyopathy. BAV subjects with hypertrophic cardiomyopathy had a higher prevalence of diabetes mellitus, heart failure with preserved ejection fraction, and tended to have type 0 phenotype, while BAV subjects with dilated cardiomyopathy showed a higher prevalence of chronic kidney disease and heart failure with reduced ejection fraction. BAV subjects with left ventricular non-compaction were significantly younger, predominantly male, and had greater BAV dysfunction and a higher prevalence of normal aorta shape. In multiple regression analysis, presence of cardiomyopathy was independently associated with heart failure (odds ratio 2.866, 95% confidential interval 1.652–4.974, $p < 0.001$) even after controlling confounding factors.

Conclusion: Concomitant cardiomyopathies were observed in 5.6% of subjects with BAV. A few clinical and echocardiographic characteristics including comorbidities, heart failure presentation, BAV morphology, function, and presence of aortopathy were found. The presence of cardiomyopathy was independently associated with heart failure.



BAV cardiomyopathy

P1136

Validation of heart failure risk scales in patients with genetically proven idiopathic restrictive cardiomyopathy.

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Background: Several scales exist for assessing prognosis and risk of adverse events in patients with heart failure (HF). Identification of high-risk patients with HF with a high probability of reaching endpoints over the next year may serve as an indication for the active inclusion of the patient on the waiting list for heart transplantation. The difficulty of applying these scales for patients with idiopathic restrictive cardiomyopathy (RCM) is that most of the existing scales are developed and validated for a group of patients with HF-rEF, while the group of RCM is mainly represented by patients with HF-pEF. The most well-known survival scales for HF patients are Seattle risk scale (SHFM), HFSS scale, MAGGIC scale, MECKI scale, 3C-HF and MUSIC scale. The aim of the study was to estimate the potential validity (sensitivity and specificity) for several SHFM, MAGGIC, MUSIC and 3C-HF scales in a group of patients with idiopathic restrictive cardiomyopathy.Material and Methods: the study group included 35 patients with genetically proven RCM. Death and heart transplantation were considered as endpoints. ROC - analysis was performed using STATISTICA program, comparison between various risk scales was performed using Friedman test.

Results: the study included 35 patients with genetically proven RCM with a mean follow up 2,4 years [1 – 26], being 2,2 years [1 – 18] for patients presented in childhood and 5,6 years [1 – 26] for patients presented in adulthood. Transplantationfree5-yearsurvivalwas66,5%, 10-years survival was – 52,5%; 27% reached primary endpoints within three years after disease presentation. HF risk scales (SHFM, MAGGIC, MUSIC and 3C-HF) were tested only on patients SHFM, MAGGIC, MUSIC and 3C-HF) demonstrated high sensitivity and specificity with AUC=0,920, 0,947, 0,954 and 1.0 correspondingly (Figure 1). Risk scales including atrial fibrillation and atrial dimension parameters as factor (MUSIC and 3C-HF) demonstrated superior AUC compared to others scales (SHFM, MAGGIC).

Conclusion: we demonstrated that heart failure risk scales such as SHFM, MAGGIC, MUSIC and 3C-HF can be successfully applied in a cohort of patients with idiopathic RCM with superior specificity and sensitivity of scalesincluding parameters such as atrial fibrillation and atrial dimension (MUSIC and 3C-HF).

P1137

Prevalence and prognostic impact of non-ischemic late gadolinium enhancement in patients undergoing stress perfusion cardiac magnetic resonance.

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Background: Stress perfusion cardiac magnetic resonance (stress-CMR) provides information on myocardial ischemia and fibrosis using Late Gadolinium

Enhancement (LGE). Usually an ischemic pattern of LGE (I-LGE) is expected and most frequent. However, non-ischemic LGE (NI-LGE) can be occasionally found suggesting alternative diagnosis. The prevalence and prognostic significance of NI-LGE in patients undergoing stress-CMR is yet to be defined.
Methods and results: Stress-CMR with either dipyridamole or adenosine was performed in 483 patients (355 males, 73%) and follow-up was completed in 269 (median time: 1850 days; interquartile range: 1225-2705 days). Composite endpoint included cardiac death, ventricular tachycardia, myocardial infarction, stroke, hospitalization for cardiac cause and coronary revascularization performed beyond 90 days from stress-CMR scans.
Two hundred and sixty-one patients (54%) had negative LGE (no-LGE), 165 patients (34%) I-LGE and 57 patients (12%) NI-LGE. Stress induced perfusion defects (ISCH) were found in 74 patients with no-LGE, 83 patients with I-LGE and 19 with NI-LGE. Fifty-six events occurred in the no-LGE group, 54 in I-LGE and 6 in the NI-LGE group. On Kaplan Meier curves patients with LGE had worst prognosis than patients without LGE, regardless of the presence of ISCH and type of LGE seen, either ischemic ($p < 0.0001$) or non-ischemic ($p < 0.005$). The additional presence of ISCH was associated with worse prognosis in patients with NI-LGE ($p < 0.05$).
Conclusion: Non-ischemic LGE can be detected in 12% of patients during stress-CMR providing a diagnosis of non-ischemic cardiac disease, which may be missed by alternative diagnostic tests. Patients with NI-LGE have worse prognosis than those with no-LGE. The additional presence of ischemia yields a worse prognosis in patients with NI-LGE.

P1138

Differential diagnosis of stress induced cardiomyopathy from anterior myocardial infarction with changing pattern of cardiac enzyme

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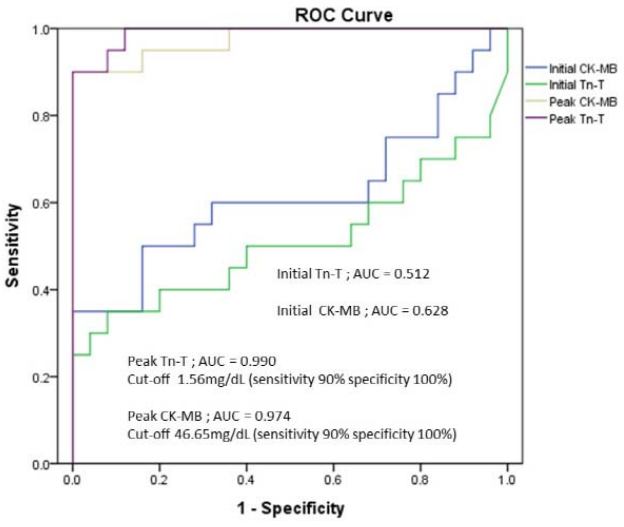
In echocardiographic study stress induced cardiomyopathy (SCMP) has similar pattern of wall motion abnormality with anterior myocardial infarction. For definite differentiation coronary angiography is needed but always available due to poor general condition of SCMP patients especially in intensive care unit. The changing pattern of cardiac enzyme can be the clue for differential diagnosis of SCMP from anterior MI.
Method: We checked initial and follow-up peak CK-MB and troponin-T(Tn-T) level in acute anterior MI and SCMP from January of 2017 to December of 2018.
Result : 27 SCMP and 30 anterior AMI patients were enrolled. Mean age was 69.3 ± 14.1 years and female was 38.6%. Age was older, female proportion was higher, and LVEF was lower in SCMP group. (75.4±10.8 vs. 63.9±14.6 years, 66.7%vs.13.3% $p<0.01$, 41.3±8.4 vs. 46.9±9.7% $p<0.05$) Initial CK-MB was higher in MI group (23.3±43.5 vs. 5.9±5.1ng/ml $p<0.05$), but initial Tn-T was not significantly different. (0.9±1.8 vs. 0.2±0.3 ng/ml p=NS), But Peak Tn-T and CK-MB and their changes from initial level were significantly higher in AMI than SCMP group. (6.8±3.2 vs. 0.4±0.4ng/ml, 197.6±99.9 vs. 9.7±10.7ng/ml, 5.1±3.4 vs. 0.2±0.4, 174.3±102.7 vs. 3.8±8.2, $p<0.001$).



ROC curves for diagnosis of anterior AMI

Conclusion: Follow-up changes of cardiac enzyme can be a good tool for differential diagnosis of SCMP from anterior acute MI. We may rule out SCMP from AMI with peak Tn-T > 1.56 or CK-MB > 46.65ng/ml.

P1139

Characteristics of patients with advanced heart failure managed in a cardiomyopathy expert center

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Background: Cardiomyopathies are a heterogenous group of intrinsic myocardial diseases most frequently genetic, whos evolution can lead to sudden cardiac death or heart failure (HF). Advanced HF (AHF) occurs when patients experience persistent severe symptoms that interfere with daily life despite maximum evidence-based medical therapy, as defined by severe persistent symptoms (NYHA class III-IV), severe cardiac dysfunction or high levels of BNP, pulmonary or systemic congestion requiring high-dose IV diuretics, episodes of low cardiac output requiring inotropes or malignant arrhytmias.
Purpose: to describe the particularities of the patients with genetic cardiomyopathies and AHF from the Expert Center for rare genetic cardiovascular diseases.
Methods: We evaluated cardiovascular parameters in all consecutive pts diagnosed with AHF in our center considering HFA-ESC criteria for defining AHF. All pts had a cardiomyopathy (dilated, DCM; hypertrophic, HCM; restrictive, RCM; arrhythmogenic, AC; specific diseases). Analyzed data on file included clinical, biologic (cardiac and renal markers), ECG, ECG holter and echocardiographic (conventional measurements and myocardial Doppler velocities and Speckle tracking based deformation study).
Results: The database included 22 pts consecutively diagnosed with AHF due to the evolution of a cardiomyopathy, with an average age of 46.2±13.9 years, 16 men (72.7%). The main diagnostics were: DCM (11, 50%), cardiac amyloidosis (5, 22.7%), HCM (2, 9.1%), RCM (2, 9.1%), Fabry disease (1, 4.5%) and AC (1, 4.5%). All patients were in NYHA class III (14, 63.6%) and IV (8, 36.4%), with INTERMACS between stages 1 and 6. Permanent pacemakers were present in 11 pts (50%), and ICDs in 7 pts (31.8%). Lab work-up showed very high levels of BNP (1608.6±1037.1pg/ml) or NTproBNP (10038.4±6008.3pg/ml), positive Troponin I (0.076±0.05ng/ml) and GFR below 60 mL/min in 11 pts (50%) at baseline. Atrial fibrillation was present in 10 pts (45.5%). Holter ECG study showed nonsustained VT in 9 pts (40.1%). Cardiac ultrasonography findings included: HpEF in 5 pts (22.7%) and HFrEF in 17 pts (77.3%), with LVEF ranges from 14% to 60%, abnormal LV longitudinal function (mean septal S' wave 3.8±1.1 cm/s), all pts had diastolic dysfunction (E/E' 23.1±10, LAVi 65.1±25.8 mL/m2). Mitral regurgitation was present in all 22 pts (severe in 8, 36.4%) and 18 pts (81.8%) presented indirect criteria for pulmonary hypertension. All pts received diuretics as part of their treatment, 20 (90.9%) needed diuretics associations, 18 (81.2%) required IV diuretics during their evolution and 3 of them (13.6%) inotropic agents.
Conclusions: Although they are not the most frequent causes of HF, genetic cardiomyopathies can lead to AHF that represents the end stage in the evolution of the disease in absence of a pathogenic treatment, leading to persistent symptoms and decreased quality of life, increasing the number of hospitalizations and their costs.

P1140

Comparison of left ventricular function changes in inflammatory and non-inflammatory dilated cardiomyopathy in the time course

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Introduction: In patients with newly diagnosed left ventricle (LV) dysfunction of non-ischemic etiology there is a considerable chance of recovery of LV function. It is known that the presence of myocarditis increases the chance of improving the left ventricle ejection fraction (LVEF) in comparison with patients without evidence of myocardial inflammation.
Purpose: To evaluate the differences in LVEF changes between inflammatory cardiomyopathy (ICM) and non-inflammatory dilated cardiomyopathy (DCM) groups in different time periods during the first year after the diagnosis was established.
Patient and methods: DCM group: 126 patients, 79% men and 21% women, mean age 48.6 ± 10.4 years, symptoms duration to diagnosis 2.9 ± 2.6 months. ICM group:

86 patients, 77% men and 23% women (p = 0.74 for the difference between groups), mean age 44.5 ± 12.6 years (p = 0.02), symptoms duration 2.3 ± 2.2 months (p = 0.07).
Results: In the DCM group, the baseline LVEF was 23.9 ± 7.0%, in the ICM group 24.3 ± 7.2% (p = 0.77). In the 12-month follow-up, LVEF in DCM group improved to 31.3 ± 10.3% (p 0.001), in ICM group to 41.1 ± 12.1% (p 0.001), the difference between the groups was 7.4 ± 9.9% (DCM) vs 16.8 ± 13.4% (ICM; p 0.001). In the first 3 months, LVEF increased by 3.9 ± 8.1% (DCM) vs 11.4 ± 9.7% (ICM; p 0.001), between the 3rd and 6th month by 2.0 ± 5.6% (DCM) vs. 3.8 ± 7.3% (ICM; p = 0.08) and between 6th and 12th month by 1.5 ± 6.7% (DCM) vs. 1.6 ± 7.3% (ICM; p = 0.63).
Conclusion: Although the improvement of LVEF in the ICM group was more pronounced throughout the first year after diagnosis in comparison to DCM group, statistical significance of the difference between the two groups was achieved only within the first 3 months after the diagnosis was established.

P1141
Efficiency of plasma exchange in patients with immune mediated dilated cardiomyopathy and arrhythmias

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Purpose: to investigate the clinical efficiency of plasma exchange (PE) in patients with arrhythmias and inflammatory dilated cardiomyopathy (iDCM) due to immune-mediated myocarditis in comparison with group without PE.
Methods: There were 20 patients with arrhythmias resistant to antiarrhythmic drugs (AADs) (premature atrial contractions (PACs, n=3), premature ventricular contractions (PVCs, n=8) more than 3000 per day, and atrial fibrillation (AF, n=9)) and 14 iDCM patients in the treatment group (left ventricular end-diastolic diameter (LVEDD) 6.3±0.6 cm, left ventricular ejection fraction (LVEF) 33.5±8.1%, NYHA functional class 2 [1;3]). All the patients had two or more fold increase of at least two anti-heart antibodies (AHA) level. PE group patients were underwent a single volume therapeutic PE. We also evaluated 26 patients with arrhythmias (PACs n=4, PVCs n=12, AF n=10) and 19 iDCM patients (LVEDD 6.6±0.8 cm, LVEF 32.6±7.3%, NYHA functional class 3 [2;3]) who were followed without PE. Patients underwent endomyocardial biopsy n=17), cardiac CT n=38, MRI n=21, myocardial perfusion scan n=39, and coronary angiography n=20 to diagnose myocarditis. Cardiac echo, AHA level and 6-minute walk test distance in iDCM patients and AHA level and Holter monitoring in patients with arrhythmias were assessed at baseline and with two follow-up (FU) visits in about 6 and 12 month in all groups.
Results: AHA level decreased just after PE and during the FU in the PE group (p<0.05). The iDCM PE group patients had significant improvement in LVEF (41.4±8.2% and 46.3±12.7% during FUs (p<0.05) vs. 39.1±13.7% and 37.2±10.7% in control group). 50% iDCM study group patients and 32% control group patients with absolute LVEF improvement >10% were classified as responders. Responders in the PE group had initial higher systolic PAP (44±13.4 vs. 27.9±6.0, p<0.05). 65% PE group patients with arrhythmias and 58% patients controls were classified as responders as they achieved a decrease of PAVs, PVCs or AF frequency > 75% relative to baseline. The PE group responders had a higher level of AHA to cardiac nuclear antigens at baseline, p<0.05. 45% PE group patients with arrhythmias and 73% control group patients got methylprednisolone respectively, p>0.05. The mean dose was 8[4;16] and 16[10;24] mg per day, p>0.05. 43% iDCM PE group patients and 89% control group patients got methylprednisolone, p<0.05. The mean dose was 11.8±6.6 and 21±12.4 mg per day respectively, p<0.05.
Conclusions: PE improves AAD's effect, cardiac function and daily activities in patients with immune mediated arrhythmias and iDCM. There were 65% and 50% PE group responders in patients with arrhythmias and iDCM respectively. Initial higher systolic PAP was good outcome predictor in iDCM patients. The high AHA level to cardiac nuclear antigens at baseline was significantly associated with good outcome in patients with arrhythmias. PE helps to avoid using immunosuppressive drugs or reduce its doses

P1142
Strain analysis reveals subtle systolic dysfunction in "confirmed" and "suspected" myocarditis with normal LVEF: a cardiac magnetic resonance study

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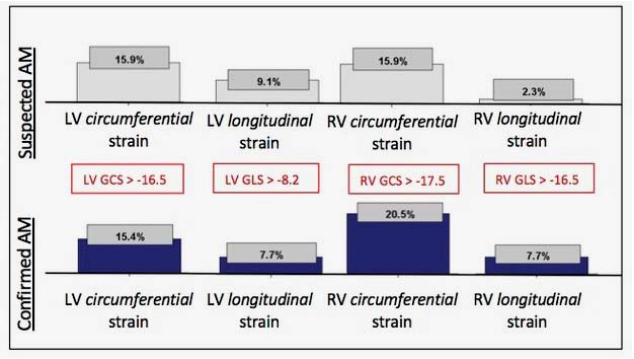
Background: Lake Louise Criteria (LLC) have a good accuracy for the diagnosis of acute myocarditis (AM) with normal left ventricular (LV) ejection fraction (EF). However, they are time dependent and some AM could be misdiagnosed, due to the limited accessibility of Cardiac Magnetic Resonance (CMR). Cardiac deformation imaging could be a novel tool in this setting of patients.
Purpose: Our aim was to assess a feature tracking (FT) imaging in patients with "suspected" and "confirmed" AM and normal LVEF without regional wall motion abnormalities.
Methods: Eighty-three patients with clinically suspected AM and normal LVEF were divided in two groups based on CMR-LLC: 39 positive LLC patients ("confirmed AM group") and 44 negative LLC patients ("suspected AM group"). An age and gender-matched control sample of 42 normal subjects underwent CMR as well. Cardiac strains of both ventricles were measured by FT analysis in all groups. Lower cut-off for normal values were defined by the 5th percentiles of control group strain values.
Results: Compared to controls, both "suspected" and "confirmed" AM patients showed significantly impaired LV global longitudinal strain [p=0,004; 7.7% and 9.1% in "confirmed" and "suspected" AM, respectively], LV global circumferential strain [p=0,04; 15.4% and 15.9%, respectively] and right ventricular global circumferential strain [p=0,013; 20.5% and 15.9%, respectively]. No significant differences in FT analysis between "confirmed" and "suspected" AM were found.
Conclusions: CMR-FT derived strain analysis can identify patients with "suspected" and "confirmed" AM with subtle ventricular dysfunction compared to healthy subjects and suggests the need for new diagnostic tools in AM.



P1143
Biomarkers of iron status (transferrin saturation, serum ferritin) in the course of acute myocarditis: relations with neurohormonal activation, cardiac dysfunction and clinical recovery

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Introduction: Immune response is considered the major pathophysiological trigger leading to acute myocarditis (MCD). Optimal iron status is essential for the functioning of immune cells, cardiomyocytes and cardiofibroblasts. Therefore, there are premises to consider iron metabolism as a significant modulator of complex pathophysiology of MCD.
Purpose: We aimed to assess iron status in the course of MCD and relate it with clinical and laboratory measures.
Methods: We prospectively enrolled consecutive patients hospitalized for acute MCD in 2 tertiary referral cardiology centers during 2015-2018 and followed them up for 30 weeks. MCD was diagnosed based on the following criteria: 1) new onset symptoms suggestive of myocarditis (effort intolerance, dyspnea, palpitations or

chest pain), 2) elevated high sensitivity cardiac troponin I (hs-cTnI), 3) exclusion of obstructive coronary artery disease.

Results: Study group comprised 41 patients with confirmed MCD [age: 31 (26–34) years, men: 95%] and 15 healthy age- and gender-matched subjects [age: 30 (28–33) years, men: 87%]. All patients survived hospitalization and follow-up, no subject needed ventricular assist device.

Patients with MCD had lower LVEF (56±10% vs. 69±14%) and higher CRP [32 (14–8754) vs. 3 (3–3) mg/l], NT-proBNP [452 (240–877) vs. 33 (18–46) pg/ml], hs-cTnI [7.3 (3.3–12.8) vs. 0,01 (0.01–0.01) μg/l] than the control group (all p<0.001). Regarding iron status, MCD group presented higher serum ferritin [213 (121–386) vs. 135 (84–210) μg/l] and lower transferrin saturation (TSAT) [21±10 vs. 28±15%] (all p<0.05). In patients with MCD ferritin correlated with CRP (r=0.46, p<0.01), TSAT correlated neither with CRP nor with ferritin (all p>0.02).

Patients with MCD and NT-proBNP >1000 pg/ml had lower TSAT (16±8 vs. 23±9%; p<0.05) and LVEF (47±13 vs. 59±7%; p<0.001) than the remaining subjects. No difference in ferritin was observed (p>0.2). 46% of patients during acute phase of MCD had LVEF≤55% – these patients presented lower TSAT (17±8% vs. 24±10%) and higher NT-proBNP – [577 (436–1657) vs. 358 (167–499) pg/ml] (all p<0.05). After 30 weeks only in 13% patients LVEF≤55% persisted and related to lower baseline TSAT (9±1% vs. 21±9%) and higher CRP (147±113 vs. 52±40 mg/l) (all p<0.05). LVEF≤55% was not related to ferritin (both p>0.2).

After 6 weeks of follow-up patients with MCD already presented higher LVEF (61±8%; p<0.05) and haemoglobin [14.7 (14.0–15.7) g/dl], lower CRP [3 (3-3) mg/l], NT-proBNP [34 (25–67) pg/ml], hs-cTnI [0.01 (0.01–0.01)], ferritin [124 (78–168) μg/l] and higher TSAT (26±7%) (all p<0.01). There was no further change in these parameters within the next 24 weeks (all p>0.2).

Conclusions: In patients with acute MCD, iron status is deranged. In these patients serum ferritin is an indicator of inflammatory response, whereas TSAT relates to neurohormonal activation and cardiac dysfunction. Iron status normalizes within 6 weeks after acute phase of MCD.

Cardiovascular Surgery - Transplantation

P1145

Long-term survival after heart transplantation or implantation of mechanical circulatory support in patients with advanced heart failure due to giant cell myocarditis or cardiac sarcoidosis

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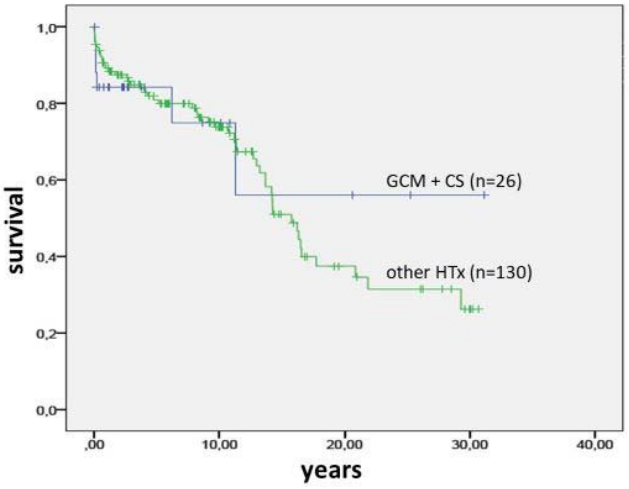
Background: Giant cell myocarditis (GCM) and cardiac sarcoidosis (CS) are rare inflammatory disorders that may cause cardiomyopathy. Both are generally progressive and often require advanced heart failure (HF) therapies. The long-term survival of patients with GCM or CS treated with heart transplantation (HTx) or mechanical circulatory support (MCS) is poorly investigated.

Purpose: To investigate outcome of patients with GCM or CS who undergo HTx or implantation of MCS.

Methods: Data from all patients who received HTx or MCS due to GCM or CS at our Institution between 1990s and 2018 was reviewed. Data was compared to 130 controls that were treated with HTx due to all other heart diseases, 5 for each patient included, matched by sex, age, and HTx duration.

Results: A total of 26 patients who underwent HTx or received MCS because of GCM or CS were included. Fifteen of them (58%) suffered from GCM and 11 from CS. Endomyocardial biopsy confirmed diagnosis in 10/15 (67%) patients with GCM and 4/11 (36%) patients with CS and the remaining were diagnosed by pathological investigation of the explanted heart. Altogether 8/15 (53%) of GCM patients and 2/11 (18%) of CS patients required implantation of durable MCS, but 2 patients with GCM died before HTx. Treatment-requiring cardiac allograft rejection was observed in 6/13 (46%) GCM patients and in 1/11 (9%) CS patients. Disease recurrence in the graft was identified in 2/13 (15%) patients with GCM as well as in 2/11 (18%) CS-patients. The mean survival time was numerically higher for patients with ICM (20.2 years, 95 % CI=12.2-28.2) than for the control group (16.9 years, 95 % CI=14.5-19.4), but the difference was not statistically significant (log-rank test (p=0.75) Breslow-test (p=0.68)).

Conclusion: Patients with GCM or CS with advanced HF who are treated with HTx or MCS have similar long-term survival as HTx recipients treated due to all other heart diseases.



Kaplan-Meier curve

P1146

Anti-thymocyte globulin induction therapy usage is not associated with short and long-term survival differences in heart transplant patients

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Purpose: The use of induction therapy for heart transplant remains in debate. Additionally, agent choice is a major consideration for centers and may influence survival outcomes. It is important to have evidence-based justification for the usage of induction therapy agents due to costs and risks.

Methods: A retrospective analysis of heart transplant patients who received anti-thymocyte globulin (ATG), anti-lymphocyte globulin (ALG), and muromonab-CD3 (OKT3) at a tertiary academic center was conducted. Patients who received cyclosporine (CyA) alone served as control. Baseline characteristics were collected for each group. Survival at 3 months, 1 year, and 10-year post transplant were compared.

Results: A total of 513 patients receiving induction therapy or CyA between April 1981 and September 2007 were included. Mean baseline characteristics of the three groups are detailed in Table 1. At 3-months post transplant ATG, ALG, OKT3, and CyA had survival rates of 78.7, 81.6, 85.1, and 61.9 percent, respectively. The survival 1-year post transplant for ATG, ALG, OKT3, and CyA were 74.5, 76.4, 81.1, and 61.9 percent, respectively. After 10-years post transplant 56.4, 53.6, 47.3, and 33.3 percent of ATG, ALG, OKT3, and CyA receiving patients survived, respectively. P>0.5 for all intervals.

Conclusions: Anti-thymocyte globulin is not significantly associated with short and long-term survival differences in heart transplant patients compared to no induction and off-market induction agents. Further controlled trials are needed to provide additional evidence for current use.

Table 1. Baseline characteristics of ind

Induction Agent	ALG	ATG	OKT3	CyA
N	250	94	148	21
Ischemic Time Minutes	200.6 (±85.8)	235.6 (±90.8)	213.0 (±83.7)	150.6 (±60.3)
Donor Age	27.8 (±11.5)	34.5 (±13.4)	32.3 (±12.2)	23.0 (±6.7)
Recipient Age	45.4 (±12.0)	49.2 (±11.5)	49.5 (±11.0)	35.0 (±11.0)
Donor Female %	31.2	35.1	36.5	28.6
Recipient Female %	12.8	14.9	19.6	14.3

P1147

Does the age of the recipient influence the survival of the heart transplant?

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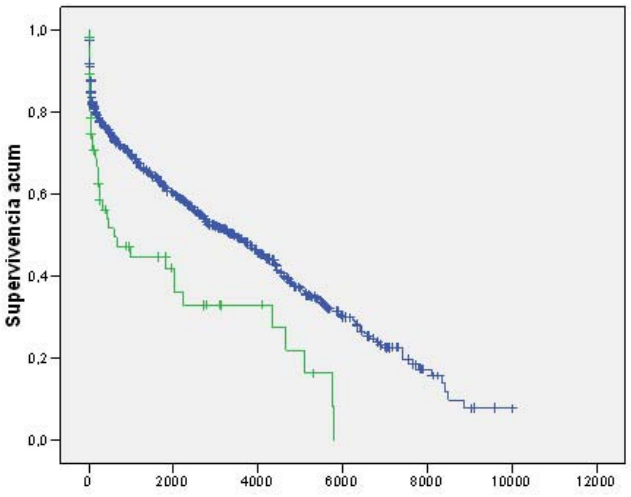
Objectives: There are many factors that are associated with mortality in heart transplantation HT). Although in earlier stages of HT the indications were limited to recipients less than 60 years of age, the continuous improvement of clinical results has encouraged the expansion of selection criteria, offering the option of HT to patients up to 70 years of age. There are no studies, based on extensive and multicentric data, that analyze the evolution and influence of the age of the recipient HT on survival. The objective of this study was to know the influence of the age of the recipient on the mortality of the heart transplant.
Methods: It is a retrospective study. All heart transplants performed in our center from 1993 to december 2018 were consecutively selected. Pediatric transplants, combined transplants and retransplantation were excluded. The data were extracted from the National Registry of Cardiac Transplantation.

Table 1

	Recipient <65	Recipient ≥65	p
Series overall survival (days)	3875±155	2077±353	<0.001
Survival at 30 days (n,%)	648 (88.3%)	44 (78.6%)	0.034
Survival at 6 months (n,%)	558 (76%)	34 (60.7%)	0.011
Survival at 12 months (n,%)	529 (72.1%)	26 (46.4%)	<0.001



Results: 802 patients were selected. The majority were males (661 patients, 83.5%), with an average age of 52 ± 11 years. 7.5% of the recipients were 65 years of age or older (60 patients). Long-term overall survival was lower in recipients older than 65 years (Figure 1). If survival data are analyzed in the short and medium term, we found that recipients aged 65 or older had a lower survival at 30 days, at 3 months and at 1 year after transplantation (Table 1). In addition, within the group of recipients aged ≥ 65 years, survival was lower in the subgroup of patients aged 69 years or older (2050 ± 409 days in recipients aged 65-66 years, 2145 ± 787 days in recipients 67 to 68 years and 924 ± 505 days in recipients 69 years of age or older, p. 0.8), although there was a small number of patients in this last subgroup.
Conclusions: HT recipients older than or equal to 65 years have a shorter survival in the short, medium and long term. Given the increasing number of elderly recipients in recent years, studies with a larger number of patients will be necessary to analyze the impact of these findings.

P1148

Usefulness of the biomarker CA125 in the diagnosis of acute cellular rejection in allogeneic heart transplantation

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OBJECTIVES: CA 125 has emerged as a marker of congestion in acute heart failure (HF). The evolution of CA125 in patients with heart transplantation (HT) and if the presence of a rejection is associated with an increase in its values is unknown. The objectives of this study are to describe the evolution of CA125 during the first year after HT and to evaluate the association between CA125 levels and the appearance, during the first year after transplantation, of acute cellular rejection. METHODS: A retrospective study in which all patients undergoing HT were selected from 2017 to 2018. Combined transplants, retransplantation, pediatric and patients who died before performing the first endomiocardial biopsy were excluded. CA 125 was determined before transplantation, and in all the post-transplant reviews: In the first week after transplantation, and in months 1.5, 3, 4, 5, 6, 9 and 12. Endomyocardial biopsy was performed in all these reviews. Cellular rejection was classified using the 2004 ISHLT criteria. The total number of patients included was 23, with 103 reviews with. RESULTS: 78.3% were males. In 19 of the 23 patients there was at least one determination of CA125 prior to transplantation, and if there were several determinations, the one closest to the HT was selected. The mean value of CA125 pretransplant was 138.78 ± 199 U / mL. Figure 1 shows the evolution of CA125 after the transplant. One month after the transplant, the average value of CA125 had been reduced to almost a quarter. After 6 months it tends to remain stable. There were 54 biopsies without rejection (52.4%), 44 with 1R (42.7%) and 5 with 2 R (4.9%). There was a tendency towards slightly higher levels of CA125 in relation to those biopsies that showed some degree of cellular rejection other than 0 R (Table 1), however, this association did not reach statistical significance. If we compare the mean value of CA 125 in patients with grade 2R acute cellular rejection, it is higher than the mean of patients with 1R rejection or without rejection (20 vs 50 U/mL respectively, p 0.02).
Conclusions: The rapid reduction of CA 125 corroborates its usefulness as a marker of congestion. The most advanced degree of rejection has the highest values of CA125. However, the elevation is light and with few cases. More studies and will be needed, in order to find a value that suggests rejection and be able to consider it as a useful marker in the non-invasive diagnosis of rejection.

Table 1

	CA125 (mean±ED)	p
No rejection (0R)	21.12± 17.76U/mL	0.44
Rejection (1R, 2R)	25.53± 29.2 U/mL	0.44

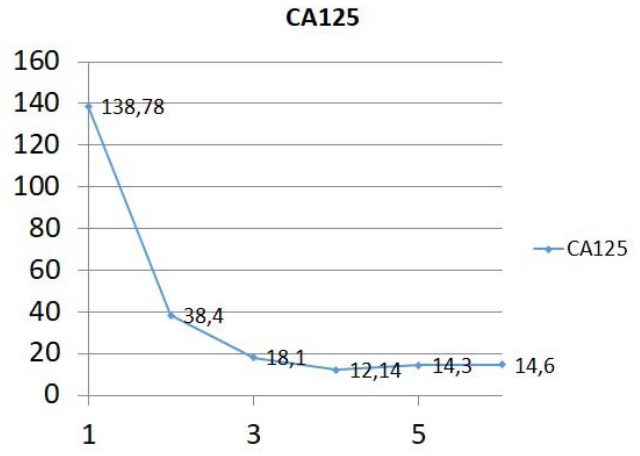

Figure 1

P1149

The impact of ischemic time and procurement distance on long-term survival following heart transplantation in a tertiary care center: 30 years of experience

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Purpose: Determining the boundaries of the catchment area for receiving donor hearts has important consequences in the balance between transplant ischemic times and increasing the supply of hearts. This is especially important in countries where there are large geographic distances, such as in Canada.
Methods: A retrospective analysis of all patients since the initiation of the heart transplant program at a tertiary academic center were included. Ischemic time and procurement distance were obtained from the surgical and medical records and survival data was collected for up to 10 years post transplant. Comparisons of mean ischemic time and procurement distance were made between short (3 months), medium (1 year), and long (10 years) term survivors and those that died.
Results: 513 patients between April 1981 and January 2009 were included. Patients that survived 3 months post transplant had a mean ischemic time of 211 minutes whilst those that did not had a mean ischemic time of 202 minutes. After 1-year post transplant, the mean ischemic time was 211 minutes for the survivors and 201 minutes for those that did not survive. And after 10-year post transplant, the mean ischemic time was 216 minutes for the survivors and 201 minutes for those that did not survive. P was greater than 0.05 for the difference in mean ischemic time for all survival intervals analyzed. Chi square analysis for the difference in survival at 3 months, 1 year, and 10 years for mean ischemic time categories of <2 hours, 2-4 hours, and >4 hours also did not show significance. Similarly, patients that survived 3 months post transplant had a mean procurement distance of 652 km whilst those that did not had a mean procurement distance of 586 km. After 1-year post transplant, the mean procurement distance was 643 km for the survivors and 631 km for those that did not survive. And after 10-year post transplant, the mean procurement distance was 667 km for the survivors and 621 km for those that did not survive. P was greater than 0.05 for the difference in mean procurement distance for all survival intervals analyzed. Chi square analysis for the difference in survival at 3 months, 1 year, and 10 years for mean procurement distance categories of <500 km, 500-1000 km, and >1000 km also did not show significance.
Conclusions: There were no significant difference in short, medium, and long-term survival outcomes with regards to ischemic time and transport distance. Further multi-centered and multi-geographical studies are needed to determine if there is a benefit to restricting donor catchment area to improve transport time.

Donor Origins

Rehabilitation and sports Cardiology

P1150

V-slope as a marker of multivessel disease in the ergometry with oxygen consumption

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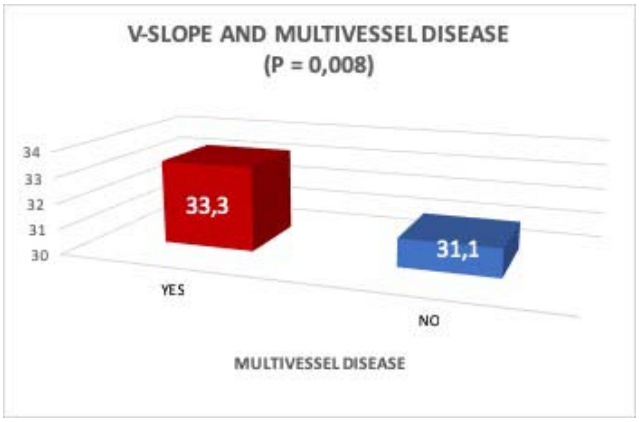
Introduction: The physiopathological mechanisms of exercise in patients with coronary disease undergoing revascularization are not yet fully known. The aim of this study is to determine the abnormalities of the different parameters of the ergometry with the oxygen consumption in patients with multivessel coronary disease, without evidence of ischemia.
Methods: Cross-sectional study. A total of 220 patients were evaluated, an exercise ergometry with oxygen consumption (ECO) was evaluated after 1 to 2 months after suffering an acute coronary event, pacientes with ergometry positive for ischemia were excluded. Patients were divided into two groups: group 1 those with single coronary vessel disease and group 2 those with disease of 2 or more vessels.
Results: Mean age was 57.5 + 8.8 years, 14.5% (32 patients) were women, mean LVEF 56.4±9.6%, 51.8% had disease of 2 or more coronary vessels. Regarding the baseline characteristics, patients with coronary disease multiple had older ages (59.1Vs.55.9 years, p=0.007), higher percentage of hypertensive patients (64%Vs37.7%, p<0.001), and peripheral arteriopathy (14%Vs4.7%, p=0.02). The univariate analysis of the different ECO parameters is shown in Table 1. In the multivariate analysis, it was found that hypertensive individuals were independent predictors of multivessel disease (OR 2.11, CI 3.85-1.15, p=0.016), peripheral arterial disease (OR 3.85, CI 14.08-1.05, p = 0.042) and higher VE/VCO2 slope (OR 1.08, CI 1.014-1.143, p=0.016) .
Conclusions: there were no statistically significant differences at aerobic capacity and cardiac output determined during the exercise test with oxygen consumption among patients with multivessel and single vessel disease. On the other hand, patients with multivessel disease were worse at ventilatory parameters. Furthermore, at the multivariate logistic regression test the VE/VCO2 slope was demonstrated as an independent predictor of multivessel disease. In brief these results may be influenced by a depressed production of nitric oxide during exercise which blunts the pulmonary vasodilatation response to exercise, contributing to V/Q mismatch.

VARIABLES	Multivessel	P	
YES	NO		
VO_2ml/kg/min	20,5±5,9	21,8±5,8	0,13
PO2 (ml/beat)	13,5±8,0	13,9±3,7	0,63
CO_2Eq	35,5±5,7	32,8±4,3	<0,001
O_2Eq	38,4±7,2	35,6±5,2	0,002
V-slope	33,3±6,7	31,1±4,4	0,008



P1151

Age-specific reference values for cardiorespiratory fitness in healthy Koreans compared to Western nations

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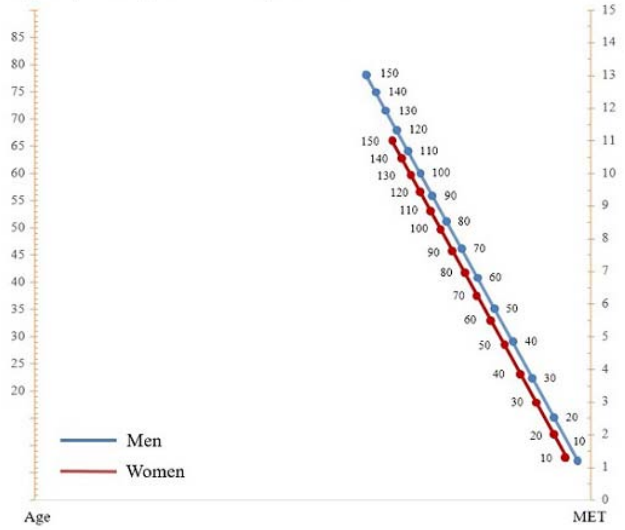
Introduction: Cardiorespiratory Fitness (CRF) is associated with a high risk of cardiovascular disease and all-cause mortality. The reference range for CRF may differ among nations, with Asians under-represented.
Purpose: We sought to establish reference values of CRF for Asians.
Methods: We analyzed 2646 healthy Korean adults recently enrolled with estimated maximal oxygen uptake (VO2max) values during treadmill test. Patients with cardiovascular or renal disease, systemic infection, pregnant women and those with injuries unable to measure physical fitness were excluded. Age-specific mean VO2max values were compared with those from recent American, Norwegian, Danish cohorts and old Korean data.
Results: Age-specific reference values for healthy Korean adults were as shown (Table). A nomogram was drawn to predict exercise capacity for a given age and MET value (Figure). Compared to other countries, Asians showed less CRF reduction as aging than other Westerners. Compared to old Korean data from the 1980s, adjusted values were similar, except for those under 30 years old which decreased.
Conclusions: While there was no significant change in CRF over time in the same ethnic group, there was a clear inter-ethnic difference. CRF should be assessed according to ethnic or national standards, and it is necessary to establish a reference for each nation or ethnicity with periodic updates.

Cardiorespiratory fitness of Koreans

Men	Women						
Age	VO2max (ml/kg/min)	N	P-value fortrend*	Age	VO2max (ml/kg/min)	N	P-value fortrend*
19-29	42.3±(6.3)	209	< 0.01	19-29	34.3±(4.3)	110	< 0.01
30-39	42.0±(5.0)	170	30-39	32.2±(4.5)	211		
40-49	41.4±(5.6)	238	40-49	30.8±(4.6)	284		
50-59	38.0±(5.7)	274	50-59	28.3±(4.6)	367		
60-69	32.4±(6.2)	134	60-69	26.0±(5.7)	336		
70-79	27.2±(5.6)	83	70-79	23.9±(4.4)	195		
> 80	24.1±(4.0)	11	> 80	21.0±(3.7)	24		
Total	38.6±(7.4)	1119	Total	28.5±(5.8)	1527		

Table. Cardiorespiratory fitness of healthy Korean adultsData are presented as mean ± (standard deviation). Analysis of variance was used to evaluate the differences in VO2max according to age.*P-value for trend refers to testing for trend of VO2max by decades of age by ANOVA.SD, standard deviation; VO2max, Maximal Oxygen uptake; N, number

Figure. Nomogram of the Percentage of Predicted Exercise Capacity for Age in Healthy Koreans.



Drawing a line connecting the subject's age (on the left scale) and the MET value (on the right scale), it intersects the percentage graph. The intersecting point stands for the percentage of predicted exercise capacity for age. The red line for women and the blue line for men.

Predicted exercise capacity

P1152

Evaluation of the cardiac efficiency to the exercise in patients with chronic bronchopathy and ischemic cardiomyopathy

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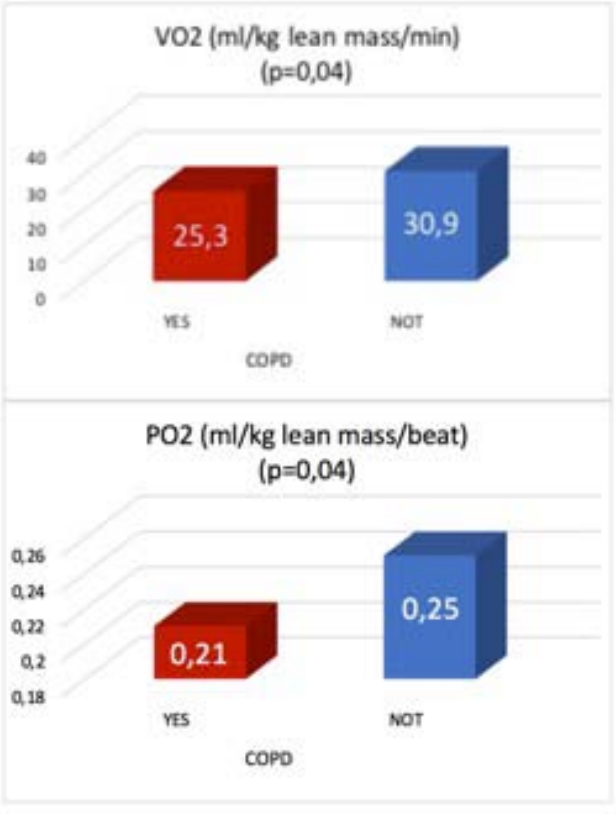
Introduction: Patients with chronic obstructive pulmonary disease (COPD) have a higher risk of cardiovascular morbidity and mortality, with ischemic heart disease being the main cause of death among these patients. This study has been developed with the intention of providing information on cardiac efficiency to exercise in this type of patients.

PARAMETERS	COPD	P	
YES	NOT		
METS	6,6+1,6	8,5+2,3	<0,001
VO2 peak (ml/kg/min)	16,2+5,1	21,1+5,9	<0,001
Predicted percentageVO2	65,7+17,1	80,0+17,6	0,001
VO2 peak (ml/kg/minlean mass)	25,3+6,8	30,9+7,5	0,04
PO2(ml/beat)	12,3+3,7	13,7+7,4	0,37
PO2 (ml/kglean mass/beat)	0,21+0,05	0,25+0,12	0,04
BR(%)	23,5+16,3	36,4+14,1	<0,001
V-slope	36,4+9,3	32,2+5,6	0,05

BR: respiratory reserve



Methods: Cross-sectional study. 162 patients subjected to ergometry with oxygen consumption, with a diagnosis of ischemic heart disease who underwent cardiac catheterization for an acute coronary syndrome, between 2 and 3 months prior to the test, excluding those with a positive result for ischemia myocardial. The diagnosis of COPD was established by spirometry at rest and cardiac efficiency and aerobic capacity using pulse oxygen (direct relationship with cardiac output) and peak oxygen consumption.
Results: A total of 162 patients were evaluated, the mean age was 57.8±8.8 years, 24 pct (14.8%) had moderate-severe COPD, 13% women, mean LVEF 55.6±10.2%. Patients were divided into 2 groups (moderate-severe COPD and without COPD/mild bronchopathy). Among the baseline characteristics of both groups, we found that the bronchopathies had a higher BMI (p=0.002), without finding differences in other CVRF and echocardiographic parameters. In the multivariate analysis, moderate-severe chronic bronchopathy was independently associated with a worse aerobic capacity (β: -0.31,95% CI -0.51,-0.11; p=0.003). The parameters of oxygen consumption in absolute value and adjusted per kg of lean mass are detailed in the table.
Conclusions: The COPD was associated independently with a worse aerobic capacity, with a lower cardiac response to exercise expressed in a lower pulse of oxygen, despite not showing significant differences in LVEF. In addition, the ventilatory parameters were altered with a worse relation of ventilation/perfusion.

P1153

Comparison of the bioelectrical impedance analyses of body composition before and after cardiac rehabilitation in patients with ischemic heart disease

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Introduction: Cardiac rehabilitation (CR) is a secondary prevention method for the treatment of cardiovascular diseases and associated with a reduction in both cardiac morbidity and mortality. CR improves functional capacity and perceived quality of life whilst also supporting early return to work and the development of self-management skills. Bioelectrical impedance spectroscopy is applied to measure changes in body composition based on the frequency-dependent electrical properties of tissues. The objective of this study was to analyze the effects of CR on body composition of patients with ischemic heart disease as evaluated by bioelectrical impedance analysis.
Methods: CR programme was performed to the participants with an integrated multidisciplinary team consisting of cardiologist, experienced nurse and physiotherapist in the CR center of our hospital. Body composition was noninvasively assigned by the bioelectrical impedance analysis using the TANITA MC-980 segmental body composition analyser before and after the CR program. All data entered into a dataset and "before & after" comparison was made between dependent variables.
Results: This study enrolled 112 patients (mean age: 57.5±9.4; male:78) who participated in CR program after the diagnosis of ishemic heart disease between 2016 and 2019. The median duration of CR was 38 (30-49) sessions. Body mass index (30.7±4.7 vs. 29.7±4.1 kg/m2; p<0.001), body fat mass (25.3±8.7 vs. 23.4±7.8 kg; p<0.001), body fat percentage (30.2±7.6 vs. 28.9±7.3 %; p<0.001), visceral fat percentage (13.1±4.1 vs. 12.2±3.9 %;p<0.001), body fat free mass (56.6±8.9 vs. 56.1±8.8 kg; p=0.003), body muscle mass (54.1±8.1 vs. 53.3±8.7 kg; p=0.009), body fat to fat free mass ratio (0.45±0.17 vs. 0.43±0.18; p<0.001) and metabolic age (59.5±11.5 vs. 56.9±11.3 years; p<0.001) decreased significantly after CR. Whereas, body muscle to fat mass ratio (2.42±0.82 vs. 2.56±0.87; p=0.004), body muscle to visceral fat mass ratio [16.4 (13.2-25.3) vs. 19.1 (14.1-28.9); p<0.001] and body fat to visceral fat mass ratio [7.7 (6.2-10.1) vs. 8.3 (6.7-10.2); p<0.001] increased significantly after CR. Total body water (40.5±5.9 vs. 40.3±6.2 kg; p=0.454) and basal metabolic rate [1709 (1487-1837) vs. 1692 (1464-1824) kcal/day; p=0.374] did not significantly differ after CR .
Conclusion: This study revealed that CR had beneficial effects on body mass composition in patients with ischemic heart disease. Body composition evaluation by bioelectrical impedance spectroscopy may be used as an easy and fast technique for the assessment of patients referred to CR and should be routinely performed.

P1154

Impact of combined multimodal approach (recommended pharmacological treatment, cardiovascular rehabilitation and dietary compliance) in rehospitalization and morbidity rate of heart failure patients.

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Background: Heart Failure (HF) is a clinical syndrome accompanied by either, reduced or preserved ejection fraction or mixed features. The goals of treatment of HF patients are to improve their clinical status, functional capacity and quality of life, prevent hospital admission and reduce mortality and morbidity. There are few medical reports investigating the effect of combined optimal pharmacological treatment according guidelines (OFT), participating at cardiovascular rehabilitation program (CRP) and restricted HF dietary program (DP) compliance, in rehospitalization rate of HF patients, in order to reduce HF morbidity (MO) and mortality (Mo).
Purpose: In our study we investigate whether, the combination of OFT, CRP before discharge and compliance of recommended dietary guidelines results in reduction of HF patients' rehospitalization, MO and Mo.The period of our study was the 1 year after patients discharge.
Patients and Methods
30 patients with HF of various etiologies [15 male (M),15 female(F),average age 65years], treated only with OFT and another group of 30 patients (15 M,15 F, average age 65 years), treated with OFT,CRP during their last hospitalization due to decompensated HF, and restricted DP (maintain water balance, avoiding salt intake, daily weight measurement, adjustment of diuretic therapy).CRP included the mobilization of the patient (active bending movements and extension of the upper and lower limbs on a bed, familiarization with self-care and self-service activities, muscle pump activation exercises) and pulmonary physiotherapy (diaphragmatic breathing training, cough exercise, combined movements of upper limbs and respiration).
Results: We found statistically significant difference (p<0.05) between the two groups, in rehospitalization rate due to decompensated HF, in the period of the one year after their discharge from the hospital. The group of patients with only intervention the OFT, rehospitalizion due to decompensated HF was more frequently (50%) in comparison to multimodal approach group (OFT,CRP and DP).
Conclusion: The combination of OFT,CRP before the discharge of hospitalized patients due to decompensated HF and following of DP, provokes a beneficial effect to various physiological mechanisms (avoiding muscle mass reduction, increase of venous return, myocardial contractility promotion, afterload reduction, increase of preload, disturbance of autonomic nervous system function preventing arrhythmias, increased alveolar ventilation, reduction of subjective feeling of dyspnea-fatigue, increase of lung capacity and strengthening of respiratory muscles). Those mechanisms presents a positive hemodynamic response in cardiac function, concluding that the multimodal approach of HF patients after their discharge from the hospital leads to reduction of rehospitalization rate, of morbidity, increasing survival rate and so saving of financial resources in health care systems.

P1155

Usefulness of exercised based cardiac rehabilitation in heart failure patients with chronic total occlusions

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Current data suggest that successful percutaneous coronary intervention for chronic total occlusions (CTO) is associated with improvement in patient symptoms, quality of life, left ventricular function, and survival. We aimed to investigate usefulness of exercised based cardiac rehabilitation in functional capacity improvement in heart failure patients with CTO after myocardial infarction (MI) and by pass surgery.
Patients and methods: Medical records from Cardiac rehabilitation Department, Institute for Rehabilitation were screened for patients with previous MI and CTO. Medical data of the identified cases was retrieved and reviewed. Patients were divided according to ejection fraction (EF) in to 3 groups: with reduced EF (<40), mild range EF (40 to 49) and preserved EF (>50).
Results: Out of 3225 patient screened patients, previous MI with CTO was diagnosed in 118 patients (92% were males, 33 to 84 years of age). PCI recanalization was successful in 14%. Risk factors were noted. Blood was sampled for lipid analysis. Target TC and LDL levels were reached in 100%. Previous medical treatment and ejection fraction were noted (20% with EF<40%,34% with EF from 40 to 49, and 46% with EF >50%). Exercise test was performed on admission and exercise based cardiac rehabilitation program was tailored individually. One to two treatment sessions per day were given by a physiotherapist seven days a week. No rhythm disorders or ST segment changes were detected by telemetry while crossing over Nyllin steps, cycling or free walking. Patients fulfilled cardiac rehabilitation program

without any complications. Exercised tests on discharged (21st day) have shown functional capacity improvement in all patients greater than 30%.
Conclusions: Patients with previous MI and CTO are not often referred to secondary prevention exercise based cardiac rehabilitation program. Our results showed that the programs are safe and useful in heart failure patients regardless EF. Further efforts are required to set up guidelines for long term management and cardiac rehabilitation might have important role.

P1156
Influence of the gender in response to phase ii of the cardiac rehabilitation program. evaluation of aerobic capacity and analytical parameters

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Introduction: We know that there are differences in the oxygen consumption to exercise between men and women, being lower in women due to differences in anthropometric measurements, body fat percentage, hormonal influence on metabolism, in addition to other factors; but the objective of this study is to determine if the improvement or increase in oxygen consumption and the control of risk factors in women with heart disease undergoing a cardiac rehabilitation program (CR-P) is similar to that of males.
Methods: Prospective observational study. A total of 233 patients were included consecutively in a conventional CR-P between March 2015 to September 2018, performing daily continuous training for 8 weeks (phase II of CR-P), they underwent an ergometry with oxygen consumption before and after phase II. In addition, echocardiographic variables, blood analysis and cardiovascular risk factors (CVRF) were evaluated.
Results: 233 patients were analyzed, mean age was 57,5±9,1 years, 38 women (16,3%), mean LVEF 56,3±9,9%, ischemic heart disease 91%, 47,6% were in functional class II-III (NYHA) prior to CR-P, 49,8% HBP, 70,4% dyslipidemia, 21,5% diabetes, 65,7% smokers and 36,5% obese. Regarding the baseline characteristics such as age, BMI, CVRF and LVEF between men and women, there were no statistically significant differences, only difference in the percentage of active smokers was observed, being higher in men (71.3%Vs36.8%, p=<0.001). In the multivariate analysis, it was determined that being a woman is a predictor of a lower increase in recovery time to exercise (0,9±7,9Vs2,5±7,7) with an OR 1,06 (IC 95% 1,01-1,13; p=0,03) and a lower increase in oxygen consumption (0,8±2,2Vs2,3±3,2) at the end of CR-P with an OR 1,21 (IC 95% 1,04-1,21; p= 0,02).
Conclusions: In our study, the percentage of women participating in CR-P is markedly lower than men. We can also conclude that the fact of being a woman is a predictor factor for a lower increase in oxygen consumption and recovery time to exercise after phase II of CR-P, nor did it show a significant reduction in some prognostic analytical markers such as B-BNP and CRP, improvements that men did.

Table 1. Comparison according to gender

PARAMETERS	MEN	P	WOMEN	P		
PRE CR-P	POST CR-P	PRE CR-P	POST CR-P			
CRP (mg/L)	3,4±5,1	2,2±2,9	0,003	3,9±7,9	3,3±5,5	0,62
B-BNP (pg/mL)	83,9±139,6	67,06±121,2	0,01	79,8±64,5	73,7±64,8	0,46
Recovery time(beat/1er min)	16,0±8,3	18,6±9,0	<0,001	14,9±8,9	15,9±8,0	0,48
VO2 peak (ml/kg/min)	22,0±5,8	24,3±6,5	<0,001	16,6±3,9	17,4±4,5	0,048

P1157
Cardiac rehabilitation in patients with systolic dysfunction, a wasted opportunity?

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Background: despite being strongly recommended in guidelines, cardiac rehabilitation programs (CRP) are often an unmet need in heart failure patients. A low referral rate and the particular conditions of these patients may explain the gap. We compared the baseline characteristics of patients referred to a CRP according to their left ventricular ejection fraction (LVEF >35% or ≤35%). Methods: 921 patients referred to a CRP were analyzed. Before starting the CRP, an echocardiogram and a treadmill exercise test was performed. Patients were classified according to their LVEF (>35% or ≤35%), and their base-line characteristics were compared. Results: we analyzed 921 sequential patients, 749 (81,4%) had a LVEF >35%, and 172 (18,6%) a LVEF ≤35%. The majority of them (91%) had been referred after an ACS. Mean age was 56,9, women were less represented in the low LVEF group (10,5% vs 16,7%, p=0,04). CV risk factors were common in both groups, with a similar distribution. Patients with low LVEF were more likely to have co-morbidities such as COPD, renal impairment, atrial fibrillation, or moderate to severe valvulopathies. As expected, exercise capacity was lower in the low LVEF group (6,37±3.0 vs 8,04±2,4 METS, p <0,001). Patients with low LVEF were more likely to dropout the program (15,1% vs 10,1%, NS). Conclusion: A higher burden of comorbidities and a worse functional status can explain the poor referral and completion of CRP in patients with left ventricular systolic dysfunction, as they require a more individualized intervention.

Baseline characteristics comparison

	EF>35%	EF≤35%	p
Female sex	16,7%	10,5%	0,04
Mean age	56,9	56,8	NS
Hypertension	50,1%	51,7%	NS
Diabetes	22,6%	27,6%	NS
Dislipideamia	61,3%	55,2%	NS
Tobacco	53,3%	56,4%	NS
Obesity (BMI≥30)	27,5%	26,7%	NS
Renal impairment	2,7%	6,4%	0,012
Sedentarism	56,4%	55,8%	NS
COPD	4,2%	7,6%	0,022
Atrial fibrillation	2,8%	6,4%	0,05
Peripheral vascular disease	5,8%	7,6%	NS
Valvulopathy (moderate to severe)	5,3%	16%	<0,001

Cardiovascular Disease in Special Populations

P1158
Trastuzumab associated cardiotoxicity in breast cancer patients: a report after 4 years of follow up at a specialized centre

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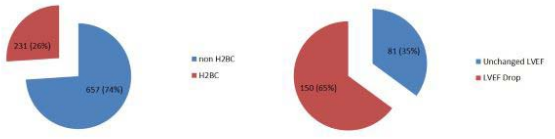
Background: about 20% to 30% of breast cancer express HER2 receptor, a member of the epidermal growth factor family, and confers a poor prognosis. Treatment of HER2+ breast cancer (H2BC) includes adriamycin and trastuzumab (T), a monoclonal antibody that recognizes an extracellular domain of HER2. HER2 is also expressed in adult cardiomyocites and serves as a coreceptor for neuregulin, a pro survival factor released by cardiac endothelial cells. Then, by binding cardiac HER2, T can produce cardiotoxicity (CTX). Although T has been extensively used in our country, its impact with regard to CTX has never been reported.
Purpose: to report the CTX associated to adjuvant T use in H2BC patients (P) in a non selected cohort after having completed cancer treatment.
Methods: 231 (26%) out of 888 consecutive breast cancer P were H2BC and received adriamycin and T. Left ventricular ejection fraction (LVEF) was assessed at baseline and every 3 months. After treatment, P were classified according to the magnitude of LVEF drop from baseline in one of three groups: group 1 (up to 10 percentage points, LVEF≥55%), group 2 (≥16 percentage points or 10 to 15 percentage points from baseline and LVEF < 55%) and group 3 (a deeper drop with an LVEF ≤ up to 45%).
Results: P were followed up to 48 ± 12 months. 150 out of 231 H2BC P (65%) showed a ≥10 percentage points decrease of LVEF from baseline: 81 out of 231 P (35%) fall into group 1, 45 out of 231P (19%) into group 2 and 24 out of 231 P (10%) within group 3. The relative decrease of LVEF along treatment was 15%, 20% and

20% (p < 0, 04) for groups 1, 2 and 3. Furthermore, within each group, 27 P (33%), 19 P (42%) and 10 P (41%) of P finished treatment and remained with a <50% LVEF in the long term (p 0, 01), for groups 1, 2 and 3, respectively.
Conclusions: >60% of H2BC P treated with T in a non-selected cohort showed a significant drop in LVEF at the end of the follow up period, irrespectively of the applied definition of CTX, and 33 to 42% of them stayed with a <50% LVEF. These facts underscore the importance of continuous cardio – oncologic surveillance along treatment with T. The mechanisms by which T causes cardiomyopathy and by which neuregulin confers cardiac protection are not fully understood. Further insight is needed regarding these aspects so that we can effectively prevent cardiac damage in this subset of P.

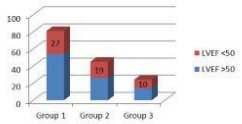
Main oncologic features of H2BC patients

	H2BC patients (n=231)	Group 1 (n=85)	Group 2(n=45)	Group 3 (n=24)	p
Mean adriamycin cummulative dose (mg)	400,54 ±68	392,44±22	411±11	409,28±33	0,7
Mean Radiotherapy dose (Gy)	2,2± 0,12	2,1±0,1	2±0,9	2,2±0,2	0,55

H2BC: HER 2 + breast cancer, Gy: Grays



Left: H2BC and non H2BC patients; Right: number of patients with H2BC that showed an LVEF drop after cancer treatment



LVEF at the end of follow up period per group of patients

Figure 1

P1159

Body mass index and resting heart rate in unselected prospectively enrolled cancer patients

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Background: In cancer patients, an elevated resting heart rate (RHR) as well as low body mass index (BMI) and weight loss (cachexia) have independently been shown to be associated with increased mortality.
Purpose: We aimed to examine, whether there is an association between BMI and parameters from resting electrocardiogram (ECG) in a prospective cancer population.
Methods: 250 unselected cancer patients without significant cardiovascular disease at baseline were enrolled between 2005 and 2018 (age 60±12 yrs, 51% men, BMI 24.5±4.6kg/m2, presence of cachexia: 48%, and cancer stage I/II/III/IV 10/12/26/52%). The cancer diagnosis was histologically confirmed and included 73 patients with pancreatic (29%), 46 with colorectal, 46 with lung (both 18%), 22 (9%) with breast cancer and 63 with lymphoma (25%). A routine clinical investigation was performed in all patients including resting ECG, blood pressure assessment and blood chemistry.
Results: We divided the cancer patients into two groups with low (BMI <23, n=100, mean BMI 20.5±1.8kg/m2) and high BMI (≥23, n=150, mean BMI 27.2±3.8kg/m2). The low BMI group showed higher resting heart rate (80±14 vs 76±14 bpm, p=0.029), Left-Sokolow-Lyon-Index (2.1±0.7 vs 1.7±0.6mV, p=0.0001), and lower PR interval (147±21 vs 156±25ms, p=0.0020). QRS and QTc duration were not significantly different (both p>0.8). Blood pressure (BP) was lower in the low BMI group (systolic BP 121±19 vs 128±18mmHg, p=0.0067, diastolic BP 74±12 vs 77±9mmHg, p=0.052, and mean BP 90±13 vs 94±10mmHg, p=0.0070). Medication with beta-blocker or ACE-inhibitor was similar in both groups (both p>0.05). Hemoglobin (11.2±1.9 vs 11.8±1.9g/dL, p=0.02) and platelets (228±96 vs 278±160/nL, p=0.002) were lower in patients with low BMI, leukocytes were not significantly different (p>0.6). Patients with NYHA grade 3/4 (18% of patients) compared to NYHA grade 1/2 (82%) demonstrated higher resting heart rate (83±14 vs 77±14bpm, p=0.019), other ECG parameters with respect to NYHA grade were not significantly different.
Conclusion: Cancer patients with low BMI and dyspnea had higher resting heart rate and showed several ECG abnormalities.

P1160

Echocardiographic assessment in cancer patients

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Introduction: Various malignant cancer diseases and various anti-cancer therapies may cause relevant cardiac morphologic and functional alterations detectable by transthoracic echocardiography.
Purpose: To compare echocardiographic characteristics of cancer patients without known significant cardiovascular disease and healthy controls.
Methods: From November 2017 to December 2018, we prospectively included 100 unselected cancer patients without significant cardiovascular (CV) disease (age 62±15yrs, 55% female, body mass index (BMI) 25±5kg/m2) and 26 controls (age 56±9yrs, 61% female, BMI 25±3kg/m2). The cancer group had the following histologically proven malignancies: 41 solid cancers (20 breast, 8 colorectal, 6 non-small cell lung, 7 others) and 59 lymphoma. Cancer stage was I/II/III/IV in 8, 16, 23, and 53%, respectively. 37% of cancer patients were treatment naïve. We performed transthoracic echocardiographic with VividE9 .
Results: Cancer patients demonstrated slightly lower left ventricular ejection fraction (LVEF, 66±5%, range 42-78%) than control subjects (69±4%, range 62-79%, p<0.006), lower E/A ratio (1.1±0.4 vs 1.2±0.3, p=0.036), higher E/e' (9±3 vs 7±2, p=0.015), and higher estimated pulmonary artery systolic pressure (PASP, 29±9 vs 25±4mmHg, p=0.027). 96% of cancer patients and 100% of controls had a LVEF≥55%. 45% demonstrated diastolic dysfunction grade 1 (E/A<1.0), 30% grade 2 (E/e'≥8 with E/A≥1), 1% grade 3 (E/e'≥15), 24% had no diastolic dysfunction – in controls the distribution was 15, 19, 0, and 66%, respectively. Interventricular septal and posterior wall thickness were significantly elevated in cancer patients vs controls (10.4±1.7 vs 9.6±1.2 mm, p=0.022; 10.2±1.5 vs 9.6±1.1 mm, p=0.038). Subgroup analyses of treatment-naïve cancer patients vs healthy controls showed increased E/e' (9±4 vs 7±2; p=0.015), PASP (30±8 vs 25±4mmHg; p=0.016), interventricular septal thickness (10.8±2.0 vs 9.6±1.2mm; p=0.0073), and posterior wall thickness (10.5±1.7 vs 9.6±1.1mm; p=0.015). Not significantly different were LVEF (67±4 vs 69±4%; p=0.12) and E/A ratio (1.2±0.5 vs 1.3±0.3; p=0.50). Subgroup analysis of patients with prior chemotherapy known to be cardiotoxic and/or radiotherapy (n=16) vs treatment naïve cancer patients (n=37) showed lower LVEF (62±9 vs 67±4%; p=0.0046), lower interventricular septal thickness (9.8±1.0 vs 10.8±2.0mm; p=0.0498), and a tendency to lower posterior wall thickness (9.6±1.0 vs 10.5±1.7mm; p=0.057).
Conclusion: Cancer patients showed normal but slightly reduced left ventricular ejection fraction. 76% of cancer patients (all without relevant CV disease) demonstrated abnormal diastolic function.

P1161

Troponin T, NT-proBNP and CRP: prognostic markers of mortality in cancer patients

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Background: In modern day cardio-oncology cardiovascular (CV) blood biomarkers are frequently used. During anti-cancer treatment these biomarkers are considered prognostic markers of later cardiovascular dysfunction. Whether they are also prognostic markers for mortality is largely unknown.
Purpose: To test whether different CV blood biomarkers are significantly prognostic of all-cause mortality in cancer patients without significant CV disease at baseline.
Methods: From November 2017 until December 2018, we enrolled 138 unselected cancer patients without significant CV disease (age 63±14yrs, 55% female, body mass index (BMI) 25.5±7.7kg/m2) as well as 25 healthy controls (age 57±10yrs,

64% female, BMI 25.1±3.4kg/m2). The cancer group had the following histologically proven malignancies: 85 lymphoma patients (62%), 11 non-small cell lung cancer (8%), 10 colorectal cancer (7%), 25 breast cancer (18%), and 7 other types (5%). Cancer stages were I/II/III/IV 11/14/20/56%. Blood samples were taken for biomarker analyses.

Results: High-sensitive Troponin T (hsTnT), N-terminal pro brain natriuretic peptide (NT-proBNP) and C-reactive protein (CRP) were significantly increased in cancer patients vs healthy controls (89ng/L [IQR 85-93] vs 44ng/L [39-48], p<0.0001; 90ng/L [85-94] vs 40ng/L [35-45], p<0.0001; 84.3mg/L [78.8-89.7] vs 27.9mg/L [22.5-33.4], p<0.0001). During a mean follow-up time of 172 days (range 1–405), 29 cancer patients (21%) died (6-month mortality 23% [95%CI 15-32]). All three CV biomarkers predicted survival in univariable Cox analyses: hsTnT (per 1ng/L, HR 1.017 [95%CI 1.006-1.029], p=0.0017), NT-proBNP (per 100ng/L, HR 1.049 [1.013-1.085], p=0.0082) and CRP (per 1mg/L, HR 1.019 [1.009-1.030], p<0.0001). In multivariable Cox analysis including all three CV biomarkers, cancer stage, cancer entity and other clinical variables, all three CV biomarkers remained significant prognostic markers of mortality (hsTnT per 1ng/L, HR 1.017 [1.005-1.030], p=0.0067; NT-proBNP per 100ng/L, HR 1.044 [1.007-1.082], p=0.0211; CRP per 1ng/L, HR 1.017 [1.005-1.029], p=0.0047). The best cut-offs for the highest product of sensitivity and specificity for predicting survival were 12ng/L for hsTnT, 260ng/L for NT-proBNP and 9mg/L for CRP.

Conclusion: Plasma levels of the cardiovascular biomarkers hsTnT, NT-proBNP and CRP are elevated in cancer patients without significant cardiovascular disease compared to healthy controls. All three CV blood biomarkers are independent prognostic markers of short-term mortality in cancer patients.

P1162

Biomarkers and imaging modalities for the diagnosis of cardiotoxicity after chemotherapy; data from the greek multicenter cardio-oncology registry

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Background/Introduction:: Cardio-oncology is an emerging field of cardiology that focuses on cardiovascular diseases in patients with cancer, especially the prevention and treatment of cardiotoxicity after chemotherapy (CARTOX).

Purpose: To record the current practice and the adherence to guidelines for the diagnosis of CARTOX in the Greek Multicenter Cardio-Oncology (GMCO) registry.

Methods: The GMCO registry is being conducted in 15 Cardio-Oncology outpatient clinics in Greece under the auspices of the Hellenic Cardiology Society. The following three groups of patients have been included: a) patients with CARTOX or patients with intermediate and high risk characteristics to develop CARTOX, b) patients with cardiac amyloidosis, and c) patients with primary or metastatic cardiac tumors. For each patient, history and predisposing factors for cardiotoxicity, previous and planned chemotherapy and radiotherapy and clinical and laboratory data were recorded.

Results: From June 2017 until June 2018, a total of 90 patients (mean age of 63 years, 44% females) were included in the GMCO. The majority of the patients were diagnosed with breast cancer (37%), 10% with cardiac amyloidosis and 3% with cardiac tumor. Forty six percent of the patients were screened before chemotherapy and 39% were included because of CARTOX. In patients with CARTOX, 34% presented with heart failure, 24% with angina, and 4% syncope. For the diagnosis of CARTOX, troponin was used in 52%, BNP in 40%, strain heart echocardiography in 5% and cardiac MRI in 10%.

Conclusions: According to GMCO registry a significant number of patients with CARTOX presented with symptoms of heart failure and angina. Sophisticated imaging techniques such as strain echocardiography and MRI were used only in the minority of patients with CARTOX.

P1163

Echocardiographic assessment of right ventricle function in HIV-infected patients during 1 year follow up.

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Introduction: HIV-infected patients are at increased risk for cardiomyopathy and pulmonary hypertension, portending a poor prognosis. Right ventricular (RV) systolic and diastolic dysfunction are associated with worse outcomes in these conditions. Little are known about the possible effects of antiretroviral therapy in right ventricle cardiomyopathy. Early identification of these entities in course disease is crucial for further treatment of these patients.

Purpose: In this study we assessed in relatively newly diagnosed HIV young patients without known cardiovascular disease several indices of RV function at baseline and over 1 year follow-up

Methods: Echocardiograms were evaluated in 18 HIV-infected adults, with stable antiretroviral therapy (ART) and adequate CD4 count, at baseline and after 1 year. Measurements included several indices of HIV infection such as duration of infection, viral load and CD4 count along with echocardiographic indices of RV anatomy and function such as right ventricle (RV) area, right atrial volume, RV fractional area change (RVFAC), tricuspid annular plane systolic excursion (TAPSE), RV Tissue Doppler Imaging-derived IsoVolumic Acceleration time (IVA), and finally we assessed the right regional and global longitudinal strain.

Results: During over one-year follow-up we analyzed echocardiograms from eighteen relatively newly-diagnosed (mean duration of HIV infection 93±77 months), HIV-infected patients with stable antiretroviral therapy (mean age 47±12 years, 16 males, body mass index 26±4,5 kg/m^2, mean period of follow-up 16±4,5 months, mean CD4 at baseline 839±318 cells/mm and at follow-up 922±316 cells/mm.In HIV infected patients with stable antiretroviral therapy, adequate CD4 count and no change of viral load during 1 year follow up, we identified statistical significant changes to indices of diastolic function of RV such as right atrial indexed volume (RAVi) (mean difference -2,41±4,7, p<0,05). Additionally we were not be able to find any statistical significant change to systolic indices of RV function such as FAC (Fractional Area Change), STDI, IVA or regional and global longitudinal strain (RVGLS) during the follow-up period, although an improvement was noticed (FAC 42,9% vs 43,6%, STDI 13,6 vs 14,2 cm/sec, RV GLS -25,3 vs -26, baseline and 1 year later respectively) after 1 year of ART.

Conclusions: These data suggest that in early stages of HIV infection stable antiretroviral therapy. along with minimal viral load and sufficient CD4 count has minimal effects on right ventricle cardiomyopathy, except progression of right atrial dilatation. In right ventricle, the effect of HIV infection on its systolic function is minimal either assessed by traditional or newer echocardiographic indices, while effects on diastolic function of RV remain inconclusive. Probable more time is needed to assess effects of HIV infection and antiretroviral therapy upon right ventricle cardiomyopathy.

P1164

Chloroquin cardiomyopathy manifested as hypertrophic cardiomyopathy

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Background: Chloroquine (CQ) traditionally has been used for the treatment and prophylaxis of malaria. Later, it was introduced for the long-term therapy of rheumatic diseases, particularly in the treatment of systemic lupus erythematosus (SLE). Severe toxicity in the form of irreversible retinopathy is well known under long-term treatment, however, cardiac complications including conduction disturbances [bundle-branch block, atrioventricular (AV) block] and cardiomyopathy -often with hypertrophy, restrictive physiology, and congestive heart failure- is less known. Aims:In our work we analyzed patients with CQ cardiomyopathy identified in our institution since 2013.

Patients and results: In the observational period 5 patients (all female, average age 57±12 yrs) were diagnosed with CQ cardiomyopathy. CQ therapy was initiated because of SLE, as underlying illness in all patients. CQ treatment duration was 10±6 yrs. Cardiac manifestation occurred in all patients, while skeletal muscle involvement, neurological involvement and GI involvement was observed in 3, 2 and 2 cases, respectively. Initial cardiac symptoms included syncope in 4 cases and sinus arrest in one case. IIIrd degree AV block occurred in 3 cases, while bifascicular block and LBBB was observed in one case each. Pace-maker implantation was necessary in three, ICD implantation in one case. Laboratory findings showed raised CK (363±185 U/l, CK-MB: 26±6 U/l) and LDH (978±120 U/l) levels, indicating skeletal muscle involvement. Cardiac phenotype was compatible with hypertrophic cardiomyopathy in one, and with restrictive cardiomyopathy in two cases, with preserved or slightly decreased LV ejection fraction (50±8%). NTpBNP levels were markedly increased (5858±3580 ng/ml). Cardiac biopsy was performed in all cases which showed histology findings compatible with CQ cardiomyopathy. Genetic screening for Fabry disease was negative in all cases. During the 14±11 month follow up we observed progression into heart failure in three cases, necessitating heart transplantation in one case. One patient died during follow up, due to rejection followed by a successful heart transplantation.

Conclusions: CQ therapy may be associated with severe cardiotoxicity, which is characterized by conduction disturbances and heart muscle disease with restrictive

diastolic dysfunction. Patients on CQ therapy should be monitored for cardiac manifestations on a regular basis.

P1165

Red cell distribution width: potential biomarker of the risk of right ventricular involvement in systemic sclerosis

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Introduction: Systemic sclerosis (SSc) is chronic disease marked by vascular inflammation and fibrosis. Primary myocardial involvement and pulmonary hypertension are common in SSc, and cardiac manifestations which include myocardial fibrosis and hypertrophy can lead to clinical complications as congestive heart failure. Impaired hemodynamic parameters of right ventricular (RV) function are predictors of poor outcome in patients with SSc, often begin in early stages of the disease and initially remain clinically asymptomatic. Identification of potential novel risk factors or markers could help clarify SSc pathophysiology, so red cell distribution width (RDW) which has been associated with different cardiovascular diseases as heart failure, pulmonary arterial hypertension and with overall cardiovascular mortality in different populations could lead to improved risk stratification in SSc.
Purpose: The aim of this study was to evaluate echocardiographic parameters of right ventricular function in patients with systemic sclerosis (SSc) without pulmonary hypertension and its correlation to red cell distribution width (RDW).
Methods: 27 consecutive SSc patients underwent echocardiography with tissue Doppler imaging to assess RV function. Of those enrolled, 21 study patients were investigated at baseline and 19 study patients in four visits of one year follow up. Echocardiographic measurements and RDW was assessed at each visit (zero month visit, 4th month visit, 8th month visit, 12th month visit).
Results: In the highest tercile RDW group (>14,25 for first follow-up visit) RV FAC was significantly lower 48,00 (45,00-51,00) compared to 50,80 (49,08-53,40); P=0,023., and in the highest tercile RDW group (>13,95 for second follow-up visit) PV Acct was significantly lower (P=0,007) in the follow-up at first and second visit respectively. In the highest tercile RDW group (>14,25 for first follow-up visit) RV FAC was significantly lower 48,00 (45,00-51,00) compared to 50,80 (49,08-53,40); P=0,023., and in the highest tercile RDW group (>13,95 for second follow-up visit) PV Acct was significantly lower (P=0,007) in the follow-up at first and second visit respectively. RDW showed a positive correlation with RIMP (rho=0,537, P=0,012) on the first visit and negative correlation with PV Acct on the first (rho=-0,495, P=0,023) and second (rho=-0,497, P=0,022) visit during the follow-up, respectively.
Conclusion: RDW in SSc may represent an integrative measure of multiple pathological processes including fibrosis and ongoing inflammation. RDW may indicate an impairment of cardiorespiratory function and right ventricular function in SSc but further investigation is needed.

P1166

Incidence of cancer in patients with heart failure with reduced ejection fraction: a single-center long-term follow up study.

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Introduction and objetives: Evidence linking heart failure (HF) with a higher incidence of cancer has been suggested previously in observational studies. However these epidemiological studies include patients with HF with reduced (HFr) and preserved ejection fraction (EF). Purpose/Methods: The aim of this study is to assess the incidence of cancer and all-cause mortality in patients with HFrEF followed prospectively in the HF Unit of a Spanish non-tertiary hospital. Results: Since the begin of Unit in 2010 until 2018, 485 patients with HFrEF have been followed (median 54 months, 79.2% men, mean age 66.5 ± 12.5 years [median 69]). 50 new cases of cancer have been identified, corresponding to an incidence rate of 21.5 per 1000 person-years (95% confidence interval [CI] 20.2–22.6) and a cumulative incidence of 1288.6 cases per 100000 person-year (vs 714.4 cases per 100000 person-year describe in general Spanish population). Median time from the diagnosis of HF to a diagnosis of cancer is 48 months (interquartile range 24–72). Patients with cancer are mainly males (90%) and compared with patients that do not have cancer in the follow-up, they are older (71.4 vs 66,0 years, p 0.004), an ischemic origin of cardiomyopathy is more frequent (60% vs 44.4%, p 0.00) and presented more comorbidity (smoking 68.7 vs 59.8%, p 0.04; arterial hypertension 66.5 vs 59.3%, p 0.03; chronic renal failure 30.0 vs 23.4%, p 0.05; and chronic obstructive pulmonary disease 44.1 vs 27.6%, p 0.00). Rate of treatment with beta blockers/ivabradine, angiotensin converting enzyme inhibitors/angiotensin receptor blockers/sacubitril-valsartan and aldosterone antagonists were similar between both groups although implantable electronic devices (ICD/CRT) were more frequently used in patients that were diagnosed of cancer in the follow-up (30 vs 21.4%, p 0.000). In multiple regression analysis predictors of cancer development have not been detected. Regarding the prognosis, mortality was higher in patients with diagnosis of cancer than patients without cancer (58% vs 26.2% with a survival median of 57.1+/- 2,2 vs 78.5 +/- 2.2 months respectively; log-rank X2 16.01 p 0.000) being the etiology of deaths mainly secondary to the malignancy (82.0% of cases) with a survival median since diagnosis of cancer until death of 12.0 +/-2.1 months. Diagnosis of cancer was an independent predictor of mortality (odds ratio 10.98, CI 95% 2.65-42.7; p 0.001). Conclusion: Incidence of cancer in patients with HFrEF is higher than general population and their prognosis is significantly worse compared with that of HF patients without cancer.

P1167

Usefulness of global longitudinal strain as predictor for sub-clinical left ventricular dysfunction and all-cause mortality among active cancer patients

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Background: Cardiotoxicity among cancer patients has become a leading cause of morbidity and mortality. The most commonly used definition is cancer therapeutic related cardiac dysfunction (CTRCD) defined as a left ventricular ejection fraction reduction of >10%, to a value below 53%. Global longitudinal systolic strain (GLS) has been shown to be more sensitive in detecting early sub-clinical systolic dysfunction. However, its role in routine follow up of cancer patients, and whether it is associated with all-cause mortality, haven't been established yet.
Objectives: To evaluate whether reduced GLS is associate with CTRCD development and all-cause mortality among active cancer patients.
Methods: Data were collected as part of the International Cardio-Oncology Registry (ICOR), enrolling prospectively all patients evaluated at the cardio-oncology clinic in our institution. Patients were divided into two groups – Reduced GLS vs. Preserved GLS. Normal GLS was defined as ≤-19% adhered to the standard benchmark set by previous studies.
Results: Among 277 consecutive patients, 91 (33%) patients had reduced GLS at first evaluated echocardiography. Patients with reduced GLS had higher prevalence of cardiovascular risk factors, including hypertension, diabetes mellitus and atrial fibrillation. There were no significant differences regarding the type of cancer treatment. Over a median follow-up period of 13.2 (7.2-19.3) months, 9 (3%) patients developed CTRCD and 35 (13%) patients died. For every 1-unit increment of GLS the risk of CTRCD increased by 25% (OR 1.25, 95%CI 1.09-1.43, p=0.002) and the risk of all-cause mortality by 16% (HR 1.16, 95%CI 1.08-1.25, p<0.001). After adjustment for baseline characteristic, including cardiovascular risk factors and systolic function, reduced GLS emerged as a significant predictor for CTRCD development (OR 6.6 95%CI 1.1-8.8, p=0.037) and all-cause mortality (HR 2.1 95%CI 1.1-4.4, p=0.037).
Conclusions: Reduced GLS is frequent among active cancer patients and can identify patients at increased risk for CTRCD development and all-cause mortality.

P1168

Cardiac immune related toxicity: a single center experience

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Introduction: . Immunotherapy (IT), aimed at boosting an immune response against tumor cells and promoting an effective antitumor response, has provoked a paradigm shift in the treatment of cancer. Its impact on terms of progression free survival and overall survival is impressive, beeing approved in first line setting of metastatic disease for different tumors. Nevertheless, it has also caused concern regarding IT-related toxicity, since side effects are rather different to those associated to classical cytotoxic agents. Cardiac toxicity is one of the most concerning due to its potential lethality. So far, the real incidence on cardiac immunotoxicity remains unknown. We have studied the incidence of cardiac disturbances in an oncological population receiving IT as a part of their oncological treatment.
Methods: This is a retrospective study performed at our clinic between 2010 and 2017, including patients diagnosed with solid tumors and receiving IT. A joint database was created between Medical Oncology and Cardiology Departments. Characteristics of the patients (previous cardiological disease, cardiovascular risk factors, immunomodulatory treatment), and the development of cardiological complications during treatment were analyzed in a descriptive manner.

Results: 187 patients were studied. Cardiac toxicity was detected in 6 (3.2%) (Fig 1). Myocarditis was the most frequent adverse event (2.14%), and was only diagnosed in patients receiving IT agents in combination.
Conclusion: Further investigation is warranted in order to determine the real prevalence of cardiac toxicity in patients treated with IT. Multicentric studies should be encouraged in order to increase the sample size and thus, having enough power to detect possible prognostic factors for predicting the development of myocarditis and other cardiac toxic events in this setting.

Patients

	Sex	CVRF	Previous CV disease	Cancer	IT (Mo vs Com)	Cardiac Toxicity
1	M	Ex smoker	No	Renal	Com	Severe HTN
2	F	No	No	Cervical	Com	Myocarditis-TrT 52 ng/L-Confirmed in CMR-Abnormal EKG-No arrhythmias
3	M	Ex smoker	CAD	Renal	Mo	Sudden death requiring CPR
4	M	HTN, Ex smoker, HS	No	Lung	Com	Myocarditis-TrT 36,76 ng/L-Suggestive CMR-Normal EKG
5	M	HTN, DM, CKD	No	Renal	Com	Myocarditis-TrT 483 ng/L-Positive PET-Inconclusive CMR
6	F	Smoker	No	Cervical	Com	Fast AF

AF: atrial fibrillation; CAD: coronary artery disease; CKD: Chronic kidney disease; CMR: cardiac magnetic resonance; Com:combination; CPR: cardiopulmonary resuscitation; DM: diabetes mellitus; F: female; HS: hemorrhagic stroke; HTN: hypertension; M: male; Mo: monotherapy; PET: positron emission tomography; TrT: T troponin.

P1169
Implementing a novel clinical scientist led cardio-oncology service in everyday clinical practice.

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Introduction: Cardio-Oncology is a novel service that addresses cardiac complications from cancer therapies, the commonest of which is myocardial dysfunction, which is classified into Type 1 (irreversible) and Type 2 (reversible). Each type requires a distinct follow up pathway as described in international guidelines. The increasing number of patients require expert echocardiographic (TTE) and clinical surveillance which exerts significant pressure on Oncology and Cardio-Oncology services. We examine the feasibility and value of a clinical scientist-led cardio-oncology surveillance clinic designed to address these needs.
Methods: We assessed activity and outcomes of the first 25 months of a novel clinical scientist-led cardio-oncology clinic. This service is set up alongside a consultant led cardio-oncology service and independently assesses new referrals to the service, organises appropriate follow up and discharge from the service. New referrals are selected from direct referrals to the service and screening of all TTE requests. Once referred to the clinical scientist-led service, all subsequent cardiac follow up is arranged, with discharge according to predetermined criteria depending on the type of chemotherapy regime (fig. 1).
Results: 222 patients were referred to the scientist led cardio-oncology clinic during January 2016 – June 2018 (mean age 57 ± 15 years; 81% female). 27 patients had a cardiotoxic response to therapy and were subsequently referred to the consultant-led cardio-oncology clinic for medical therapy and further review. 3 patients were found to have incidental findings on echo that required referral to a Consultant Cardio-Oncologist (new atrial fibrillation [n = 2]; bicuspid aortic valve [n=1]). 7 patients died from other causes not related to heart failure. TTE and clinical surveillance undertaken within this service now account for 37.5% of the total cardio-oncology activity within our departments.
Conclusions: A clinical scientist led cardio–oncology service improves standard of care, is feasible and effective and may improve patient outcomes.

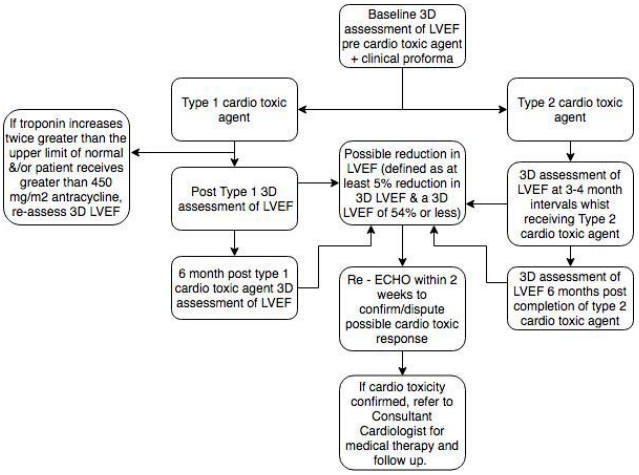

Figure 1

P1170
Incidence of cardiotoxicity over time in patients with HER2-positive metastatic breast cancer on long term treatment with trastuzumab and the potential risk factors.

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Background Treatment with trastuzumab has resulted in a remarkable response for some patients with HER2-positive metastatic breast cancer (MBC) and can be prolonged for over ten years. Since trastuzumab can be cardiotoxic, it is recommended to monitor the cardiac function during trastuzumab treatment. However, guidelines for frequency and duration of cardiac monitoring in these long term users of trastuzumab are unclear.
Purpose To study the incidence rates of cardiotoxicity over time and investigate the potential risk factors for developing cardiotoxicity in HER2-positive MBC patients receiving (long term) trastuzumab with the ultimate goal to establish guidelines for cardiac monitoring in this setting.
Methods Patients with HER2-positive MBC treated with more than one cycle trastuzumab-based therapy between January 2000 and December 2014 in eight Dutch hospitals and with LVEF >50% at start of treatment were eligible for the study. Patients were identified through the Netherlands Cancer Registry and linked to the institutes' tumour registries. Data were collected through medical records using case record forms. We investigated two co-primary endpoints: 1) total cardiotoxicity defined as a LVEF decline >10%-points from baseline to a LVEF <50% and 2) severe cardiotoxicity defined as a LVEF <40%. Multivariable cox-regression and mixed model analyses were performed to identify risk factors associated with total cardiotoxicity, severe cardiotoxicity and a continuous LVEF decline.
Results A total of 429 patients were included. The cumulative incidence of total cardiotoxicity during follow-up was 22% (94 out of 429 patients) and of severe cardiotoxicity 6% (25 out of 429 patients). The incidence rate of cardiotoxicity and severe cardiotoxicity in the first year of trastuzumab was 11.7% and 2.6%(Figure 1). The incidence rate of total cardiotoxicity decreased the following years (i.e. 8.9% in year two to 3.6% in year six), while the subsequent incidence rate of severe cardiotoxicity was lower than in the first year but remained stable over time. Smoking, low baseline LVEF (50-60%), cardiotoxicity during (neo)adjuvant treatment with anthracycline and/or trastuzumab and cumulative anthracycline dose are independently associated with an increased risk of developing total and severe cardiotoxicity. Mixed model analysis showed that low baseline LVEF (50-60%), cardiotoxicity during (neo)adjuvant treatment and cumulative anthracycline exposure resulted in an absolute lower LVEF of 9.19%, 5.14 and 0.24%.

Conclusion The incidence rate of total cardiotoxicity peaks in the first year of trastuzumab treatment and decreases to a lower rate (<5%) after four years of treatment. The incidence rate of severe cardiotoxicity peaks at a lower rate in the first year, and remains stable low thereafter. Based on these cardiotoxicity incidence rates, cardiac monitoring in MBC patients seems most important in the first 4 year of trastuzumab treatment.

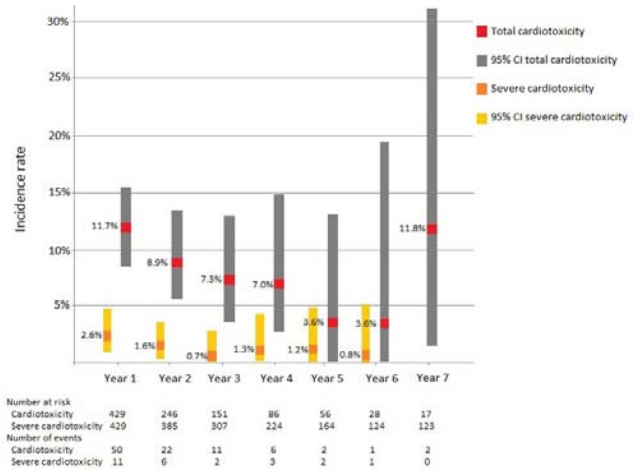

Figure 1. Cardiotoxicity incidence rates

P1171

Cardiovascular outcome of breast cancer patients with concomitant radiotherapy and chemotherapy: a 10-year multicenter cohort study

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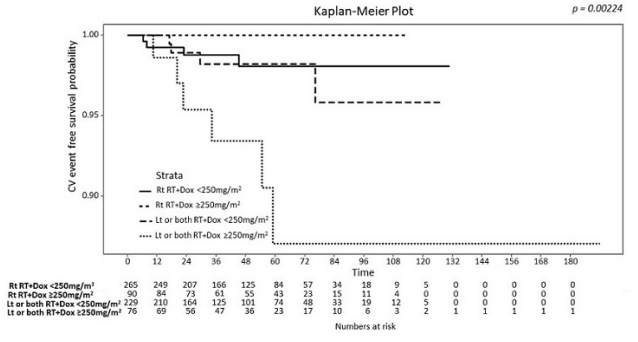
Background: Cancer treatment increases the risk of cardiovascular (CV) events. However, the long-term CV outcome of breast cancer patients who undergo radiotherapy and chemotherapy concomitantly is unknown. This study aimed to determine the incidence and risk factors of CV events among these patients.
Methods: Six hundred sixty consecutive breast cancer patients older than 50 years from November 2005 to September 2015, were enrolled in four university hospitals. The primary endpoint was CV events including CV mortality, myocardial infarction, heart failure, and stroke. CV events occurred in 14 (2.1%) patients during the follow-up period (median, 47.1 months).
Results: Left side irradiation was associated with increased risk of CV event in patients with doxorubicin dose ≥250 mg/m2 but not in patients with doxorubicin dose <250 mg/m2. On multivariable analysis, concomitant left-side irradiation with doxorubicin dose ≥250 mg/m2 and hypertension were independent risk factors for CV event.
Conclusion: The risk of CV event was further increased with concomitant left-side irradiation and doxorubicin ≥250 mg/m2 in breast cancer patients.



Cumulative K-M estimates of CV events

Pharmacology and Pharmacotherapy

P1173

Optimal administration timing of thiazide diuretics for sequential nephron blockade in cardiovascular patients receiving loop diuretics

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Background/Introduction: Volume overload poses a significant issue for many cardiovascular patients, particularly post-cardiovascular surgery or patients with heart failure faced with diuretic resistance. Sequential nephron blockade using a combination of loop and thiazide or thiazide-like diuretics (TZDs) offers a useful strategy for managing fluid accumulation through enhanced diuresis by blocking distal sodium reabsorption after the loop of Henle. A common practice is to administer TZDs 30 to 60 minutes prior to loop diuretic therapy in order to ensure maximal sequential blockade, though minimal evidence supports this practice.
Purpose: To evaluate the impact of administration timing of TZDs in relation to loop diuretics on urine output in a diverse cardiovascular population.
Methods A retrospective, single center study evaluated adult patients admitted to a cardiovascular floor who received at least one dose of a TZD (metolazone or chlorothiazide) in addition to a dose of bumetanide or furosemide. Patients were evaluated based on whether the TZD was administered early (30 minutes or more prior to the loop diuretic) or late (less than 30 minutes prior to the loop diuretic). The primary outcome was the urine output from the time of TZD administration until the next diuretic administration (maximum of 12 hours). Secondary outcomes included hospital length of stay, all-cause in-hospital mortality, and changes in electrolytes within 12 hours post-dose. The effect of TZD administration timing relative to loop diuretics was evaluated in different subgroups.
Results: A total of 1,114 patients were evaluated; 481 patients were in the early group (median TZD administration 46 minutes prior to the loop; interquartile range [IQR] 37-62) and 633 patients were in the late group (median TZD administration 0 minutes prior to the loop; IQR -1.8-1.2). Median urine output was similar with early administration at 1.68 mL/kg/h (IQR 0.93-2.5) compared to late administration at 1.55 mL/kg/h (IQR 0.91-2.33; P = 0.23). The majority of patients in the early and late groups received metolazone (97.3% vs. 92.3%; P<0.001) and furosemide (58.6% and 58.8%, respectively; P=0.96). There were no differences in hospital length of stay, all-cause in-hospital mortality, or 12-hour change in electrolytes. There was no difference in urine output between early and late TZD administration in subgroups of patients with diabetes, hypertension, left ventricular ejection fraction (LVEF) <40%, LVEF between 40-50%, LVEF >50%. Similarly, there was no difference in urine output between type of TZD given or loop diuretic route.
Conclusion(s): Early administration of TZDs prior to a loop diuretic does not appear to significantly increase urine output. Urine output after early or late administration of TZDs was not significantly influenced by subgroups based on LVEF, hypertension, diabetes, type of TZD, or route of loop diuretic.

P1174

Super-response to sacubitril valsartan: prevalence and clinical profile

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Background: Sacubitril/valsartan (SV) reduced heart failure (HF) admissions and cardiovascular mortality in the PARADIGM. However, the response to the drug may vary between patients and there is no evidence yet on potential predictors of its efficacy.
Purpose: To identify the clinical predictors of super-response to SV.
Methods: Retrospective analysis of consecutive patients prescribed SV in a single tertiary HF-clinic between September 2016-February 2018. We have defined "super-responder" as a patient (i) without HF admissions and (ii) with a ≥50% reduction in NT-proBNP levels and/or an increase of ≥5 points in LVEF in a 6-month follow-up period after starting the drug.
Results: Out of 108 patients, 27 (25%) fulfilled the super-responder criteria. They were younger and have better NYHA class but similar blood pressure, creatinine and NT-proBNP levels and previous HF admission rate than the standard response group. After a logistic regression analysis, female sex (OR 9.1,95%CI: 2.2-37.9), NYHA II class (OR 8.8,95%CI: 1.9-40.6), sinus rhythm (OR 4.9,95%CI: 1.5-15.7) and initiation of the drug at intermediate doses (OR 5.2,95%CI: 1.7-16.2) were

independent predictors of super-response to SV.Conclusion: Female sex, NYHA II class, sinus rhythm and initiation of the drug at intermediate doses could identify a substantial group of patients super-responders to SV.

	Super-responder (27 patients, 25%)	Standard responder(81 patients, 75%)	p-value
Age, years	60 (12)	65 (11)	0.058
Sex, male	18 (67%)	67 (83%)	0.078
NYHA II class	22 (81%)	43 (53%)	0.009
LVEF, %	32 (6)	30 (7)	0.248
Sinus rhythm	21 (78%)	39 (49%)	0.009
Systolic blood pressure, mmHg	123 (15)	123 (20)	0.937
NT-proBNP, ng/L	1128 (708-3695)	1200 (688-2744)	0.767
Creatinine, mg/dL	1.1 (0.3)	1.1 (0.3)	0.516
Previous 6-month HF admission	8 (30%)	21 (26%)	0.884
Initial dose 24/26 49/51 97/103	10 (37%)17 (63%)0 (0%)	47 (58%)30 (37%)4 (5%)	0.049
After 6 month follow-up			
NT-proBNP, ng/L	603 (345-1517)	968 (543-2627)	0.055
NYHA II class	23 (85%)	43 (64%)	0.034
% of change in NT-proBNP	57 (28-76)	3 (-24-29)	<0.001
HF admission	0 (0%)	15 (20%)	0.038

Results are expressed in number (%), mean (SD) or median (IQR)

P1175

Who ARNI the best responders among patients with LVEF<35%?

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Introduction: Although it is not a perfect surrogate in heart failure (HF), left ventricle ejection fraction (LVEF) is an important tool to guide therapy and evaluate ventricular function. The cutoff of 35% is of particular interest because it is helpful in guiding therapeutic decisions, pharmacological and device-related. Among patients on Angiotensin II Receptor Blocker Neprilysin Inhibitor (ARNI) with LVEF below this threshold, we wanted to identify which factors could help us predict a more favorable response to this therapy.
Methods: We retrospectively studied a population of 200 HF patients treated with ARNI. We selected patients with LVEF (evaluated with nuclear imaging) <35% and on maximum ARNI dose (n=78) and divided them into 2 groups: those who reached an EF>35% after at least 3 months of ARNI titrated up to maximum dose (optimal responders, n=14) and those who did not reach this threshold ("non-responders", n=64). There were no deaths. We characterized our population and looked for significant differences between groups.
Results: Our population had a mean age of 60.5 ± 11.9, baseline LVEF 24.9 ± 5.6%, medium blood pressure of 126.2 ± 16.2mmHg, creatinine 1.12 ± 0.38mg/dL, K of 4.55 ± 4.49mmol/L and NT-proBNP 128105 ± 1476.2pg/mL. 90.8% of patients were men and 55.1% had an ischemic etiology. Regarding symptoms, 56% were in NYHA Class II, 60% in NYHA Class III and 4% in NYHA class IV. The majority of patients had an implanted ICD (36.8%) or CRT-D (39.5%). Considering comorbidities, 40% of patients had diabetes, 38.7% AF and 30% had smoking habits. For previous events, 41.3% had a previous acute coronary syndrome and 65.8% a previous HF hospitalization. 98.7% of patients were on beta-blocker (30.7% reached maximum dose), 98.7% on angiotensin inhibitor (32% on maximum dose), 66.7% had aldosterone inhibitor on intermediate to high dose. 96% had furosemide.
There was a statistically lower rate of ischemic vs non-ischemic patients within the responder group (12.9% vs 28.5%, p=0.026) than within the non-responders (87.1% vs 61.5%, p=0.026) and a trend towards lesser rate of previous ACS (12.5% vs 34.4%, p=0.061) comparing to non-responders (87.5% vs 65.6%, p=0.061). Within ischemic patients, only 12.9% of patients reached EF>35%, compared with 38.5% of non-ischemic (RR=2.95, p=0.026). No other factors were statistically different between compared groups.
Conclusions: We observed that ischemic HF patients have an overall worse response to neuro-hormonal system modulator therapy, and this is in line with previous reports. The same remains true for this particular subset of patients, who already carry a poor prognosis and may benefit from other therapies, medical or structural. On the other hand, non-ischemic HF patients appear to be better responders and the expected favorable outcome could be helpful to better optimize the adequacy and timing of other therapies.

Etiology * LVEF>35 after 1 month with maximum dose

			LVEF>35 after 1 month with maximum dose		
			No	Yes	Total
Etiology	ischemic	Count	27	4	31
		% within Etiology	87.1%	12.9%	100.0%
		% within LVEF>35 after 1 month with maximum dose	62.8%	28.6%	54.4%
		% of Total	47.4%	7.0%	54.4%
	non-ischemic	Count	16	10	26
		% within Etiology	61.5%	38.5%	100.0%
		% within LVEF>35 after 1 month with maximum dose	37.2%	71.4%	45.6%
		% of Total	28.1%	17.5%	45.6%
Total		Count	43	14	57
		% within Etiology	75.4%	24.6%	100.0%
		% within LVEF>35 after 1 month with maximum dose	100.0%	100.0%	100.0%
		% of Total	75.4%	24.6%	100.0%

Response to ARNI based on etiology

P1176

Rationale, design and baseline characteristics of the Personalised prospective comparison of ARni with ArB in patients with natriuretic peptide eLEvation (PARABLE) randomized controlled trial

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On behalf of: STOP-HF Investigators
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Rationale: The STOP-HF study showed that asymptomatic patients with elevated B-type natriuretic peptide (BNP) levels are at higher risk of heart failure and other cardiovascular events. Genetic variants of the Nppb gene, which result in elevated BNP, have beneficial cardiovascular effects, including on progression of left ventricular dysfunction. This supports the hypothesis that elevated BNP is a protective response to volume and pressure overload as well as fibro-inflammation in asymptomatic patients. PARABLE will investigate the impact of sacubitril, a neutral endopeptidase inhibitor on progression of left atrial volume index (LAVI) using cardiac Magnetic Resonance Imaging (cMRI).
Design: PARABLE is an investigator-led, prospective, randomised, double blind, double dummy, phase II trial comparing sacubitril/valsartan versus valsartan treatment. The study will enroll 250 patients, aged over 40 years with hypertension and/or diabetes, with elevated BNP (20-280 pg/mL) or NTproBNP (100 to 1000 pg/mL) as well as LAVI above 28 mL/m2. Excluded are patients with a history of heart failure, left ventricular systolic dysfunction, haemodynamically significant mitral and /or aortic valve disease and persistent atrial fibrillation. Also excluded are those with hepatic dysfunction, severe renal insufficiency (eGFR <30 mL per minute per 1.73 m2) and any contra-indication to study therapy. The primary endpoint is change in LAVI measured by cMRI over 18 months. With 250 patients enrolled, the study has 80% power to detect a 2.5 mL/m2 difference between the groups with a two tailed α=5% and a drop-out rate of 15%. Other endpoints will assess the impact of sacubtril/valsartan versus valsartan on cMRI and Doppler-echocardiographic measures of cardiac structure and function, biochemical markers of fibro-inflammation and renal function, urinary cyclic-GMP and response to therapy based on genetic variants of Nppa, Nppb and Npra genes.
Baseline characteristics: Here we report on 203 randomised patients, 72 (35%) female, average age 72.0 ± 7.6 years. Hypertension and diabetes were present in 193 (95.1%) and 50 (24.6%) respectively. Population blood pressure was 134/75 ± 18/12 mmHg, heart rate was 63.4 ± 10.5 bpm and body mass index was 29.4 ± 7.3 kg/m2. Other baseline medical history included dyslipidaemia (n=165, 81.3%), coronary artery disease (n=95, 46.8%), stroke/TIA (n=17, 8.4%), paroxysmal atrial fibrillation (n=12, 5.9%) and chronic kidney disease (n=7, 3.4%). Median BNP was 66.2 pg/mL [IQR, 41.1, 106], average ejection fraction was 67.7 ± 6.6%, left ventricular mass index was 109.0 ± 25.6 g/m2, E/e' was 11.9 ± 7.4 and LAVI was 37.7 ± 5.0 mL/m2. To date more than 2,200 patient-months of data have accrued. PARABLE will complete in June 2020 and will define the impact of augmenting circulating BNP using sacubitril/valsartan versus valsartan alone

Table 1.

	eGFR(mL/min)	Osmolarity(mOsm/L)	Na p(mEq/L)	K p(mEq/L)	Hb(g/L)	Hct(%)	HbA1c(%)	Uric acid(mg(dL)	Furosemide dose (mg)	Eplerenone dose(mg)
Before	70,0;16,6	272,0;5,8	138,5;2,7	4,4;0,2	14,1;1,5	43,5;4,4	7,4;1,0	7,1;1,8	40,0;35,0	25,0;16,3
6-month treatment	70,5;23,3	278,0;4,9	141,0;2,0	4,8;0,35	14,9;1,9	46,5;5,8	6,9;0,9	5,6;1,7	20,0;32,8	25,0;17,4
p	0,222	0,020	0,002	0,008	0,017	0,005	0,034	0,033	0,094	0,157

eGFR: estimated glomerular filtration rate. Na p: plasma sodium. K p: plasma potassium. Hb: haemoglobin. Hct: haematocrit. HbA1c: glycated haemoglobin.

on LAVI as a personalised therapy for prevention of progression of left ventricular diastolic dysfunction.

P1177

Effect of empagliflozin on hydroelectrolytic balance in patients with heart failure with reduced ejection fraction

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Introduction: Since the EMPAREG trial demonstrated a beneficial prognostic impact, reducing death from cardiovascular causes and hospitalization for heart failure, the use of inhibitors of the sodium-glucose transport protein 2 has raised. The main mechanism of action of empagliflozin is osmotic diuresis. Is there any risk of excess body-fluid loss and electrolyte disbalance?
Methods: To describe "real life" diuretic impact of empagliflozin, a series of patients with heart failure who initiated empagliflozin was prospectively assessed between December 2016-June 2017. Clinical characteristics, bioquemical parameters and diuretic doses before and after six-month treatment were collected. Wilcoxon test was conducted.
Results: Twenty patients were included; mean age was 72 years old; 14 (70%) patients were men and 60% had ischaemic etiology. Mean left ventricular ejection fraction was 36% and median estimated glomerular filtration rate (eGFR) was 70 ml/min. Regarding to optimal medical treatment: 79% were on angiotensin-converting-enzyme inhibitor, 21% sacubitril-valsartan, 84% beta-blocker and 75% mineralocorticoid receptor antagonist. Empagliflozin was discontinued in 1 patient because of persistent genital candidiasis.
During follow-up, haemoconcentration biomarkers such as osmolarity, haemoglobin and haematocrit did significantly rise (Table 1). Actually, there is a tendency to disminish diuretic doses. There were no significant changes in eGFR (p=0,222). Serum uric acid also decreased, explained because of a known uricosuric action of empagliflozin.
Conclusions: Glycosuric action of empagliflozin may have an important roll in heart failure patients, as this effect leads to a more concentrated state with lower doses of diuretics, without impairing renal function. Larger samples and longer periods of follow-up may be needed to corroborate this effect.

P1178

Iron therapy in heart failure with preserved vs depressed ejection fraction

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Background Heart Failure (HF) with preserved Left Ventricular Ejection Fraction (LVEF) is a growing problem. Current therapies have not achieved prognostic benefit in preserved LVEF. The aim of this study was to assess the reduction of admissions in Iron Deficiency (ID) corrected and LVEF>and<45%.
Methods An ambispective cohort study was proposed. Patients were recruited once the ID was diagnosed. Previous 6-months admission rate and visits to Emergency Room (ER) were collected. The follow-up was 6.3±3.2 months. ID was described according current Clinical Guidelines.
Results
A total of 127 patients were included between June/2017 and July/2018. Of those, 63(49.6%) had LVEF>45%. Table 1 shows the baseline characteristics of the sample and treatment after the administration of Ferric Carboxymaltose. During the follow-up there were 11(8.8%) deaths.
Patients were analysed according their LVEF. The reduction of HF admissions 6 months before ID correction and after it was 79.3%(95% CI 60.5%-87.4%) in preserved LVEF group, and 50.0%(95% CI 7.5%-69.4%) in depressed group. Regarding ER visits, the reduction was 52.2%(95% CI 45.3%-54.8%) and 60.5%(95% CI 42.9%-72.9%) for preserved and depressed LVEF groups.

	Overall (n=127)	LVEF>45% (n=63)	LVEF≤45% (n=64)
Age (years)	77.7 ± 10.9	77.1 ± 10.5	78.3 ± 11.3
Female sex (n; %)	40; 32.3%	25; 42.3%	15; 23.1%
Ischaemic aetiology (n; %)	57; 44.9%	20; 31.8%	37; 57.8%
Previously-Corrected Valvopathy (n;%)	33; 25.8%	21; 33.3%	12; 18.5%
Uncorrected Valvopathy (n;%)	20; 15.8%	8; 12.7%	12; 18.8%
Glomerular Filtration Rate < 60 ml/min/1.73 m2 (n;%)	63; 49.2%	27; 42.9%	36; 55.4 %
Diabetes Mellitus (n; %)	60; 46.9%	26; 41.3%	34; 52.3%
LVEF (%)	47.0 ± 16.0	61.4 ± 8.0	33.1 ± 6.8
Treatment			
ACEI/ARBs/ANRI (n; %)	91; 71.1%	34; 54.0%	57; 87.7%
Beta-blockers (n; %)	94; 73.4%	39; 61.9%	55; 84.6%
MRA (n; %)	74; 57.8%	28; 44.4%	46; 70.8%
Furosemide daily dose (mg)	54.7 ± 45.6	56,9 ± 49.4	52.6 ± 42.0

ACEI: Angiotensin- Converter Enzyme Inhibitors; ARBs: Aldosterone Receptor Blockers; ARNI: Angiotensin Receptor and Neprilysin Inhibitors.

Conclusions In our HF Unit registry, patients showed a similar response to the correction of ID despite of their LVEF. Prospective and randomized trials are needed to confirm these data.

P1179

Acetazolamide as a potent chloride-regaining diuretic: its short- and long-term effects in cardiovascular patients

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Background: The serum chloride concentration is an important therapeutic target according to the "chloride theory" of heart failure (HF) pathophysiology (AHA2015/ACC2016/ESC2016). The carbonic anhydrase inhibitor acetazolamide is a strong candidate as a potent chloride-regaining diuretic.
Purpose: This study was a retrospective analysis of the short- and long-term effects of acetazolamide on peripheral blood tests, serum electrolytes, and renal function.
Methods: The effects of low-dose Diamox (250-500 mg/d) were evaluated in 37 HF patients during the study period from February 2016 to September 2017. Patients with replacement (n=3) or combined usage (n=4) of this agent with other diuretic(s) were excluded. Thirty consecutive HF patients for whom Diamox was added as de-novo/add-on decongestion therapy for acutely worsening HF (n=18) or modification therapy for serum hypochloremia in stable HF (<100 mEq/L; n=12) were analyzed retrospectively. Peripheral hematologic tests were performed at baseline, and at short-term (≤10 days) and long-term (˜60 days) time-points.
Results: In all 30 study patients (Table), serum chloride concentrations increased during the short-term and decreased further over the long-term. Serum potassium concentrations constantly decreased throughout the short- and long-term study periods. Blood urea nitrogen and serum creatinine concentrations increased over the short-term, but returned to baseline levels over the long-term. Responders to Diamox (n=13, defined by HF resolution and body weight loss ≥1 kg) in the decongestion group had reduced serum b-type natriuretic peptide levels and markedly increased serum chloride concentrations, but the haemoglobin/haematocrit and serum creatinine levels did not change over the long-term after treatment.
Conclusions: Acetazolamide is a clinically potent candidate "chloride-regaining diuretic" for the treatment of HF patients under the "chloride theory". Its effect to enhance the serum chloride concentration occurs promptly within 10 days and

persists for long-term (˜60 days). Plasma volume and renal function are preserved under adequate diuretic treatment with acetazolamide.

Table Changes in peripheral blood test under acetazolamide treatment (n = 30)

Variable	Before (n=30)	Short-term (≤10days) (n=21)	Long-term (11 to 60 days) (n=28)	P-value		
				Before vs. Short (n=21)	Before vs. Long (n=28)	Short vs. Long (n=18)
Peripheral blood						
Hemoglobin (g/dL)	11.3±2.1	10.9±2.5	11.1±2.1	0.18	0.28	0.15
Hematocrit (%)	33.9±5.7	33.4±7.1	33.5±6.0	0.64	0.41	0.11
Blood chemistry						
Sodium (mEq/L)	137±6.4	137±4.6	138±4.7	0.93	0.054	0.13
Potassium (mEq/L)	4.12±0.67	3.81±0.51	3.91±0.61	0.022*	0.042*	0.77
Chloride (mEq/L)	99.4±5.4	103±3.9	105±4.9	0.004*	<0.0001*	0.043*
Urea nitrogen (mg/dL)	23.1±10.0	26.0±9.2	24.5±9.5	0.004*	0.45	0.7
Creatinine (mg/dL)	1.01±0.51	1.15±0.62	1.05±0.57	0.022*	0.24	0.26
Uric acid (mg/dL)	6.78±2.6	7.02±2.5	6.46±2.4	0.78	0.28	0.046*

*Significance.

Table

P1180

Magnesium orotate for the treatment of heart failure in pregnant patients with unoperated atrial or ventricular septal defect

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Background: Women with not closed atrial or ventricular septal defect (ASD/VSD) have small increased risk of maternal mortality or moderate increase in morbidity. Nevertheless, maternal cardiac complications occur in 12% of completed pregnancies. Offspring complications, including offspring mortality (4%), are more frequent than in the general population. Magnesium orotate (MO) is a non-steroidal anabolic orotic acid plus Mg2+ approved for pregnant patients.
Purpose: To evaluate the safety and efficacy of MO in pregnant women with unoperated ASD/VSD.
Methods: We studied 64 consecutive women with unoperated ASD (n=42) or VSD (n=22), aged 26±6 years. Patients were randomized to control group with conventional follow-up (n=32) and MO-group (n=32); in addition to standard therapy, they received MO from 2nd trimester 1000 mg t.i.d. for 1 week, followed by 500 mg t.i.d. The primary endpoints were a major adverse cardiovascular event (MACE), which included death, heart failure (HF), thrombo-embolic event, pulmonary arterial hypertension (PAH), and arrhythmias and pregnancy outcomes. Baseline and outcome data were analysed and compared for control patients vs. MO-group.
Results: At baseline, there were no significant differences between control and MO-group. NYHA functional class I had 21 (65.6%) and 20 (62.5%) patients, NYHA II had 4 (12.5%) and 5 (15.6%) patients, respectively (p>0.05). Atrial and/or ventricular ectopic beats had 28 (87.5%) and 29 (90.6%) patients (p>0.05).
No maternal mortality and no thrombo-embolic event occurred in both groups. In 17 control patients, at least one MACE occurred (53.1%): 7 developed HF (21.9%), 10 worsened HF (31.3%), 2 had atrial flutter (6.3%), 1 had a ventricular tachyarrhythmia (3.1%), and 1 patient developed PAH (3.1%).
In MO-group, no patient developed a MACE (p=0.005). MO reduced the HF occurrence (p=0.028) and HF worsening during pregnancy (p=0.015). Improvements were noted in control-adjusted changes in HF signs (−46.9%; p=0.005), cardiac hospital admissions (−40.6%; p=0.009) and in frequency of ectopic beats (−37.5%; p=0.022).
Perinatal mortality rate was 0 in the cohort, premature birth occurred in 8 controls (25%) followed by being small for gestational age (21.9%) vs. 0 in MO-group (p=0.028).
MO had no maternal and offspring adverse effects.
Conclusions: Long-term MO-therapy for pregnant patients with unoperated ASD/VSD prevents MACEs, improves HF status, and contributes to successful obstetric and foetal outcome. This study provides the evidence that metabolically acting MO is a promising therapy for pregnant patients with congenital heart disease.

P1181

Management of antithrombotic/antiplatelet therapy in patients with aortic stenosis undergoing transcatheter aortic valve replacement

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Background: Many cardiac patients undergoing transcatheter aortic valve implantation (TAVI) required combined antithrombotic therapy consisting of an anticoagulant and inhibition of platelet function. Currently the optimal combination of anticoagulants and anti-platelet therapy is unknown, but it is well established that the combination increased bleeding rates.
The aim of this study was to analyze prevalence ischaemic and bleeding events in patients undergoing TAVI in according to management of antithrombotic therapy
Methods: A total of 637 consecutive patients with aortic stenosis undergoing TAVI were evaluated, between April 2008 and December 201, on base to antithrombotic/antiplatelet therapy received at discharge.
Results: The patients were characterized by had a HAS-BLED score 2.8± 1.1, CHADS2 3.35±1.0 and CHAD2-Vasc score 5.08±1.2. In 53 patiens (8.3%) were treated in monotherapy with an antiplatelet, dual antiplatelet in 424 (60.6%), (3.2%) triple therapy in 29 patients (4.6%) and 131 patients (20.6%) with oral anticoagulant plus a thienopyridine. We found not differences in mortality in according to antithrombotic therapy, respectively: 52.9% vs. 37.4% vs. 34.5% vs 47, [HR= 1.087 (95% CI 0.912-1.297), p=0.350], There were no differences in stroke 15.1% vs. 7.3% vs. 13.8% vs 10%, [HR=1.029 (95% CI 0.767-1.392), p=0.854], major bleeding 5.7% vs. 3.8% vs. 3.4% vs. 6.1% %, [HR=1.167 (95% CI 0.782-1.741), p=0.449], and myocardial infarction 1.9% vs. 3.8% vs. 3.4% vs. 0.8%, %, [HR=0.669 (95% CI 0.366-1.225), p=0.193].
Conclusions: in this study there was no differences in rate of mortality or isquemic and hemorragic events, although there were trend to higher rate of mortality in patients with only antiplatelet and anticoagulant plus thienopyridine.

P1182

Safety, pharmacodynamic and pharmacokinetic characterisation of vericiguat: key results from six phase I studies in healthy subjects

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Background: Vericiguat is a once-daily oral soluble guanylyl cyclase (sGC) stimulator in clinical development for treatment of chronic heart failure (HF).
Purpose: To characterise safety, pharmacodynamic (PD) and pharmacokinetic (PK) properties of vericiguat in healthy males. Bioavailability (BA) and effect of food on vericiguat PK were also studied.
Methods: Vericiguat (oral solution/immediate-release [IR] tablet) was administered to healthy White, Chinese and Japanese men as single doses (SDs; 0.5–15 mg) or multiple doses (MDs; 1.25–10 mg; once-daily for 7 days) in six phase I studies. Safety, PD and PK profiles of vericiguat were assessed.
Results: Overall, 265 subjects were randomised and 255 completed their respective studies. There were no deaths or serious adverse events (AEs). Results from the first in human, single-ascending dose study (vericiguat oral solution, fasted state in White subjects) are presented here as representative data of the SD studies. In this study, the most common drug-related AEs in vericiguat-treated subjects were headache (5 [8.9%] vs 0 in placebo) and postural dizziness (5 [8.9%] vs 0 in placebo), consistent with the vasodilatory effect of vericiguat. Increases in heart rate (HR; <10 bpm), vasoactive hormones and changes in cardiac impedance were observed at ≥5 mg vericiguat relative to placebo. The 15 mg dose (oral solution, fasted) was not well tolerated due to exaggerated PD effects of orthostatic reactions in 3 of 4 subjects. Mean maximum vericiguat plasma concentration (Cmax) and area under the concentration-time curve (AUC) increased with dose in a linear fashion (0.5–15 mg: 17.2–430 μg L-1 and 273–7,900 μg*h L-1, respectively).
In a representative MD study in Japanese subjects, SDs and MDs of 1.25–10 mg vericiguat for 7 days were well tolerated. Effects of vericiguat on HR corresponded to compensatory increases in HR following expected vasodilation. Vericiguat (IR tablet, fasted state) was rapidly absorbed (median time to reach Cmax [tmax]: 1.0–2.5 h) with low inter-individual variability in exposure after the first dose and at steady state. Observed half-life was 18–27 h. No evidence for deviation from dose-proportionality was observed. Slight accumulation in AUC was observed with MDs (accumulation indices for AUC and Cmax were 1.40–1.66 and 1.16–1.44, respectively); no unexpected accumulation was observed. In White subjects, administration of vericiguat IR tablet with food increased BA by 19%, reduced PK variability and prolonged vericiguat absorption (median tmax: 1–1.5 h [fasted]; 4 h [fed]).
Conclusion(s): SDs and MDs of vericiguat up to 10 mg were generally well tolerated. AEs and PD changes were consistent with the mechanism of action. Vericiguat PK was linear with low inter-individual variability; the half-life indicated suitability for once-daily dosing. The PK, PD and safety profile of vericiguat was in line with the expected effects of an sGC stimulator and consistent across populations studied.

P1183

Pharmacodynamic and pharmacokinetic interaction profile of vericiguat

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Introduction: Vericiguat is an oral, once-daily soluble guanylate cyclase stimulator in development for the treatment of heart failure (HF) with reduced ejection fraction (HFrEF).

Purpose: A series of pharmacodynamic (PD) interaction studies with drugs often used to treat HF or with a narrow therapeutic index were conducted to support the development of vericiguat.

Methods: Three studies in healthy males investigated potential PD interactions between vericiguat and sacubitril/valsartan (SV), aspirin and warfarin (Table).

Results: Treatment with SV 97/103 mg at steady state together with vericiguat 2.5 mg as single and multiple doses was well tolerated. Generally, no significant PD interactions between SV and vericiguat were observed (Table). SV at steady state had no clinically relevant impact on the pharmacokinetics (PK) of vericiguat and vice versa.

In the aspirin study, no effect of vericiguat 15 mg as a single dose (SD), and no cumulative effect of vericiguat 15 mg with aspirin 1000 mg (up to 2 days prior to and concomitantly with vericiguat 15 mg) on bleeding time or platelet aggregation

P1183 Phase I vericiguat interaction studies

Short title	Study design and description	Inclusion criteria	Objectives
Sacubitril/valsartan interaction studyEudraCT2015-004809-16	Single-centre, randomised, single-blinded, placebo-controlledCo-administration of 2.5 mg vericiguat/placebo OD and sacubitril/valsartan 97/103 mg twice-daily over 14 days at steady state2.5 mg vericiguat dose was selected as this was to be the starting dose of the titration schedule in subsequent phase II and III studiesN=32 randomised, 29 completed	Healthy male subjects with a BMI ≥18.0 and ≤29.9 kg/m^2, 40 to 60 years, inclusive	Primary: Safety and tolerabilitySecondary: PD interaction (haemodynamic profiles: SBP, DBP, MAP and HR)PK interaction (maximum observed concentration [C_{max}] and AUC)
PD findings: Point estimates for the difference of sacubitril/valsartan+ vericiguat and sacubitril/valsartan +placebo for SBP, DBP, MAP and HR were -1.66 (90% CI:-4.22, 0.90), -1.80 (-3.24, -0.36), -1.70 (-3.77, 0.37) and -0.33 (-2.25, 1.58), respectively			
Aspirin interaction studyEudraCT2014-000765-52	Single-centre, non-blinded, non-controlledPilot part: Non-randomised (SD 15 mg vericiguat), N=11 valid for safety and PK analysisMain part: Randomised, 3-period, 3-sequence, 3-fold crossover. Treatments were: A: 15 mg vericiguat, (Day 1); B: 500 mg aspirin (Day -1, Day 1); C: 500 mg aspirin (Day -1) and SD 15 mg vericiguat + 500 mg aspirin (Day 1). Subjects were randomised to A-C-B, B-A-C or C-B-ABlood sampling in the fasted state was required for coagulation measurements. Given that bioavailability is lower in the fasted state, vericiguat 15 mg (fasted) was selected to investigate interactions relevant for 10 mg vericiguat (fed) N=14 valid for safety and PK analysis; 13 valid for PD analysis	Healthy male subjects with a BMI ≥18.0 and ≤30.0 kg/m^2, 18 to 45 years, inclusive	Main primary: PD interaction: influence of a combined treatment of a SD of 15 mg vericiguat (fasted) with aspirin on bleeding time and platelet aggregationSecondary: Effects of aspirin on PK of vericiguat, safety and tolerability
PD findings: Estimated differences between vericiguat + aspirin and aspirin alone were: 2.7 sec (95% CI: -90.4, 95.8) and 2.4% (-7.0, 11.8) for platelet aggregation, assessed by turbidimetry, respectively (both non-significant p>0.05)			
Warfarin interaction studyEudraCT2014-004880-19	Single-centre, randomised, double-blind, placebo-controlled, 2-fold crossover design10 mg vericiguat/placebo OD over 9 days; warfarin administered on Day 6N=23 completed treatment	Healthy male subjects with a BMI ≥18.0 and ≤30.0 kg/m^2, 18 to 55 years, inclusive	Primary: Investigate the influence of MDs of 10 mg vericiguat OD on PK and PD (clotting parameters) of a SD (oral) of 25 mg warfarin, administered on the sixth day of treatmentSecondary: Safety and tolerability of the combination
PD findings: Least squares mean ratios of AUC (0-96 h) for vericiguat + warfarin/ placebo + warfarin for prothrombin and factors VII, II and X were 1.00 (90% CI: 0.99, 1.01), 0.97 (0.95, 0.99), 1.00 (0.98, 1.02) and 1.00 (0.98, 1.03), respectively			

AUC, area under the concentration-time curve; BMI, body mass index; CI, confidence interval; DBP, diastolic blood pressure; HR, heart rate; MAP, mean arterial pressure; MD, multiple dose; OD, once-daily; PD, pharmacodynamics; PK, pharmacokinetics; SBP; systolic blood pressure; SD, single dose

was observed (Table). Co-administration of aspirin had no effect on vericiguat PK. Vericiguat was well tolerated alone and with aspirin.
In the warfarin study, no PD effect of multiple doses (MDs) of vericiguat on the coagulation inhibition elicited by an SD of warfarin was observed (Table). No PK interactions were observed after administration of MDs of vericiguat with warfarin compared to MDs of placebo with warfarin. Co-administration of MDs of vericiguat or placebo with an SD of warfarin was well tolerated.
Conclusion(s): Co-administration of vericiguat together with SV, aspirin or warfarin was well tolerated. No clinically relevant PD or PK interactions were observed. These findings support concomitant use of these commonly used drugs in HF together with vericiguat.

Parameter (unit)	Day (profile)	Vericiguat dose (mg)	Difference "Vericiguat–Placebo"	90% CI Lower	90% CI Upper
SBP (mmHg)	0 (first dose)	2.5	−2.0	−6.7	2.7
	13 (SS)	2.5	−4.1	−7.8	−0.5
	14 (first dose)	5	−1.4	−6.6	3.8
	27 (SS)	5	−4.9	−9.7	−0.1
	28 (first dose)	10	−5.1	−9.6	−0.6
	41 (SS)	10	−2.6	−6.6	1.3
DBP (mmHg)	0 (first dose)	2.5	−0.6	−3.0	1.7
	13 (SS)	2.5	−1.0	−3.7	1.8
	14 (first dose)	5	−0.4	−2.8	2.0
	27 (SS)	5	−1.5	−4.2	1.2
	28 (first dose)	10	−2.9	−5.8	0.1
	41 (SS)	10	−1.8	−4.3	0.8
HR (bpm)	0 (first dose	2.5	0.0	−2.3	2.3
	13 (SS)	2.5	1.4	−1.3	4.1
	14 (first dose)	5	1.6	−0.8	4.0
	27 (SS)	5	1.8	−1.3	4.9
	28 (first dose)	10	1.3	−1.1	3.7
	41 (SS)	10	1.6	−2.1	5.3

bpm, beats per minute; CI, confidence interval; DBP, diastolic blood pressure; HR, heart rate; SBP, systolic blood pressure; SS, steady state

P1184

Pharmacodynamic interaction study of a long-acting nitrate co-administered with vericiguat in patients with stable coronary artery disease

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Background/Introduction: Vericiguat is a novel stimulator of soluble guanylate cyclase in development for treatment of chronic heart failure (HF) for once-daily oral administration. Guidelines recommend short- and long-acting nitrates for acute treatment and prophylaxis of angina in patients (pts) with coronary artery disease (CAD; a common comorbidity in HF). Co-administration of the short-acting nitrate nitroglycerin (NTG) with vericiguat in animal studies as well as in healthy volunteers (EudraCT 2014-001235-36) and in pts with CAD (NCT02617550) demonstrates that this combination is well tolerated.
Purpose: This study aimed to investigate the pharmacodynamic (PD) drug–drug interaction (DDI) between co-administered isosorbide mononitrate (ISMN) extended-release (ER) and vericiguat in pts with stable CAD (± HF).
Methods: The Vericiguat ISOsoRbide Mononitrate Interaction (VISOR) study (NCT03255512), a multicentre, double-blind, placebo (PBO)-controlled comparison study, investigated the co-administration of ER ISMN 60 mg with vericiguat in 41 pts. Pts were randomised to vericiguat + ISMN (n=28) or PBO + ISMN (n=13). Pts were administered ISMN once-daily for 2 weeks followed by co-administration with PBO/vericiguat. Up-titration of PBO/vericiguat from 2.5 to 5 to 10 mg once-daily was performed in 2-week increments; pts on PBO/vericiguat 10 mg + ISMN were monitored for 2 weeks. The primary objective was to evaluate PD DDIs between vericiguat and ISMN (assessed by blood pressure [BP] and heart rate [HR]); the secondary objectives were to evaluate safety and tolerability.
Results: In total, 35 pts completed treatment (n=12 and 23 for the PBO and vericiguat groups, respectively). Co-administration of vericiguat + ISMN led to mean baseline- and PBO-adjusted reductions in systolic BP (SBP) of 1.4–5.1 mmHg and diastolic BP (DBP) of 0.4–2.9 mmHg and changes in HR of 0.0 to 1.8 bpm (Table 1). These changes were not deemed clinically relevant. No consistent vericiguat dose-dependent PD effects were observed. Two discontinuations due to adverse events (AEs) occurred in the study; one patient terminated the study due to ISMN-related AEs; the other patient due to unstable angina; discontinuations were not related to PBO or vericiguat. The incidence of AEs was comparable between treatment groups (92.3% and 66.7% in the vericiguat + ISMN and PBO + ISMN groups, respectively).
Conclusion(s): Based on the lack of symptoms associated with the changes in BP and HR in pts taking vericiguat + ISMN, these changes were not considered to be clinically relevant. This combination was well tolerated and is supported by the consistency of results from previous preclinical and human studies. Concomitant use of short- and long-acting nitrates with vericiguat is unlikely to cause clinically significant AEs beyond those known for NTG and ISMN.

P1185

Observational study on the use of non antivitamin K anticoagulants in atrial fibrillation and deep vein thrombosis in the community

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Aim: To assess the indication of the use of non antivitamin K anticoagulants (NOAC) in patients (pts) with nonvalvular atrial fibrillation (NAF) or acute deep venous thrombosis/pulmonary embolism (DVT/PE) admitted in a community hospital
Method: We studied the medical records of the pts with NAF, CHA2DS2-VASc ≥ 2 or acute DVT/PE admitted in our community hospital during three successive months. We noted the aria (rural or urban) from which the pts came, the type of anticoagulation (antivitamin K (AVK), NOAC or no anticoagulation at all) at admission and at discharge. In the AVK pts we noted the international normalized ratio (INR) at admission, considering non therapeutic values <2 or >3. The prescription of NOAC was decided according to the creatinine clearance, as indicated in the guidelines. We compared the type of anticoagulant between the admission and the discharge from the hospital in relation to the initial INR values, rural or urban aria the pts were coming from, age and sex. Statistical analysis was performed using EpiInfo 8.
Results. There were 194 pts, 94 men, mean age 72.26 +/-18 years, admitted in the hospital for NAF (147 pts) and DVT or PE (47 pts) during 3 successive months. 33% pts were from the rural aria. At the admission 51% pts with NAF had AVK, 8 % pts had NOAC and 40.8% pts did not receive anticoagulant, especially in rural aria. In 57.33% pts with AVK INR level was not within the therapeutic range, 60.4% from them being from the rural aria. At discharge 44.22% pts were prescribed AVK, 51% pts were prescribed NOAC and 4.7% pts were not prescribed any anticoagulant ($p<0.01$) (fig.1). The decision to initiate the treatment with NOAC was taken in 13.9% pts with uncontrolled INR on AVK and in 45.3% pts initially without anticoagulant

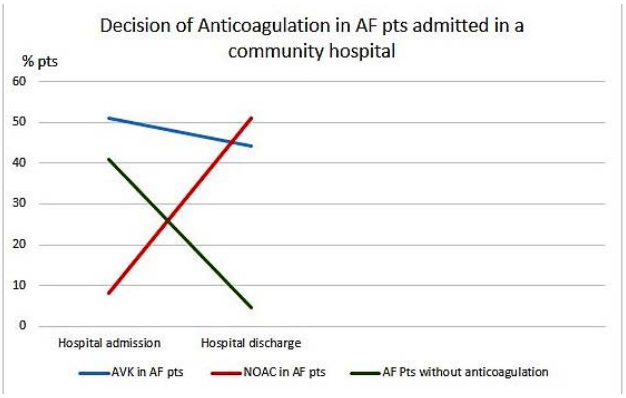

Fig. 1

treatment which lived in rural area. In the DVT/PE group 38.29% pts were prescribed NOAC especially those living in rural area and 61.7% pts were prescribed AVK. There were no differences between men and women or regarding the age. There were no bleeding or stroke during the hospitalization.
Conclusion: The rate of no anticoagulation in NAF pts in the community is still elevated. Despite their high prices, there is an increased tendency for the chronic use of NOAC in pts with NAF or DVT/PE in the community especially in those with non therapeutic INR on AVK or which cannot periodically determine INR. By respecting the contraindications, their usefulness and safety are good.

Cardiovascular Nursing

P1186
Determinants of non-pharmacological compliance in patients with heart failure

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Introduction: The prognosis for patients with heart failure (HF) can be improved effectively by disorder-specific lifestyle modifications and optimized self-care. Apart from pharmaceutical treatment, sodium-restricted diet, fluid restriction, symptom monitoring by daily weighing and maintenance of physical activity are a significant part of HF patient care and management. Poor adherence to treatment recommendation is a common problem among heart failure patients.
The aim of the study was to evaluate the adherence to non-pharmacological recommendations in the treatment of chronic heart failure.
Material and methods. 475 patients (including 222 women), mean age 69.7±7.7, with HF were included. In the study was used the Revised Heart Failure Compliance Scale to assess non-pharmacological level of compliance. The socio-clinical data were obtained from medical records.
Results: The patients least often adhered to recommendations regarding physical activity (47.8% no active at all, and 19.4% very rarely). They similarly adhered to fluid intake restrictions (25.1% no restrictions at all, and 17.3% very rarely) and to salt intake restrictions in diet (12.8% at all, and 21.9% very rarely). They better adhered to drug intake and regular check-ups (57.5%). Having calculated the sum for total compliance, it was proved that only 6.9% of respondents adhere to recommendations totally. In univariate analysis the predictors negatively influencing the total compliance were: age >65 years old (rho=-0.165), loneliness (rho=-3.002), duration of the disease>4 years (rho=-0.179), higher stage of NYHA (rho=-1.612), co-morbidities (rho=-0.729), re-hospitalizations (rho=-0.729) and beta-blockers treatment (rho=-1.612). In multivariate analysis the independent predictors of total non-pharmacological compliance were: loneliness (β=-1.816), NYHA III and IV and number of co-morbidities (β=-0.676).
Conclusions: The level of adherence to non-pharmacological recommendations in treatment of heart failure (HF) is low, in particular as regards the salt and fluid intake restrictions in everyday diet. Loneliness, NYHA III and IV, number of co-morbidities are independent predictors of worse compliance.

P1187
Advanced practice providers' utilization of EUROMACS (european registry for patients with mechanical circulatory support) : single center experience

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Background: EUROMACS was recently validated as an early predictor for post Left Ventricular Assist Device (LVAD) mortality due to right ventricular failure (RVF). Post LVAD RVF has been reported to be between 4% and 50%; and RVF associated mortality was seen in 29% of patients receiving an LVAD.
Purpose: The aim of this study is to describe advanced practice providers' role and utilization of EUROMACS predictive scores in patients requiring RVAD post LVAD implantation.
Methods: We performed a retrospective analysis of 56 (out of 63) patients who underwent LVAD implantation January 1, 2017 to May 31, 2018. Descriptive statistical analysis of the 56 cases with complete pre and post LVAD hemodynamics and echocardiograms data was performed. Cases with incomplete data was excluded from the analysis.
Results: Summary of demographics: 1. LVAD group (n-49): 40 males, 9 females, 14, 23 were for bridge to transplant (BTT), 27 were for destination therapy (DT), 3 for bridge to recovery (BTR), & 3 for bridge to intent (BTI). 2. BIVAD group (n-7): 7 males, 5 for BTI, 2 DT. All 56 patients were successfully implanted with LVAD. 12.5%(n-7) required RVAD support post implantation. 3.5% (n-2 /56) 30-days mortality rate post BiVAD implantation. Our analysis revealed that pre-LVAD, patients who required RVAD support (BIVAD group) had higher average RA (14.7 vs 11.8 for LVAD group) and PCWP30 vs 24.1 for LVAD group) ; required more inotropic (42% require 2 or more vs 4% for LVAD group) and mechanical support (71% had either ECMO, Impella orIABP pre implant vs. 16% LVAD group). Also, BiVAD group also had pre-LVAD echocardiogram noting moderate and severe RV dysfunction. In the post-operative phase, the BIVAD group also had higher average RA (13), PCWP (18), required 2 or more inotropic support (71%, n-5), and more RV dysfunction (moderate - severe RV dysfunction) on their post LVAD implant echocardiograms.
Conclusion/Implications: Advanced Practice Providers' (APP) understanding and utilization of EUROMACS as predictive tool in early intervention of BiVAD vs early RVAD support is pivotal in decreasing mortality in the first 30 days. Moreover, the echo-Doppler 'profile' of moderate to severe RV dysfunction is prevalent in patient requiring BiVAD support and immediate RVAD early post LVAD implantation. Moreover, APPs correlation of invasive hemodynamic data with the echo-Doppler provides a comprehensive assessment and a useful weaning tool of inotropes, vasodilators, and diuretic management.

P1188
LVAD-DT: The final destination

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Background: LVADs can extend and improve quality of life for individuals with advanced heart failure. Fifty percent of LVAD implantations are destination therapy (DT), which is long-term support for non-heart transplant candidates.
Purpose: To investigate whether conversations about LVAD deactivation occurred with LVAD-DT recipients and their family caregivers (FCG) and whether device deactivation occurred prior to the recipient's death.
Methods: LVAD-DT recipients and their FCGs, from 2 longitudinal prospective studies, were individually interviewed and asked if discussions about device deactivation at end of life (EOL) occurred. Following the death of LVAD recipient, FCGs were interviewed about their loved one's death and about LVAD deactivation. Interviews were analyzed using a qualitative content analysis. Electronic medical records (EMR) were reviewed to determine device deactivation.
Results: Thirty-five LVAD-DT recipients and their FCGs were interviewed. There majority of the LVAD recipients were male (80%); while FCGs were female (86%). The mean time with an LVAD was 1.5 years (3 months to 5 years). During enrollment LVAD recipients had on average 6 readmissions. Six patients (17%) died during the study, no LVADs were deactivated. Seventeen percent (6/35) had advance decisions in the EMR: all completed prior to LVAD implantation; none included wishes regarding device deactivation. LVAD recipients did not recall conversations about device deactivation at the time of implantation or after implantation and only 1 FCG remembered having those discussions. During the post-death interviews, caregivers said: One doctor came and talked to me about it and I really didn't want to hear about it. I didn't even think you had to turn it off … and we have to turn the pacemaker off and to me that was like murder. I didn't want to hear about it. I said come back tomorrow.
The first I heard about it was when I was reading some of the literature … .I never give it any thought up till then … you mentioned it as part of the research study … the doctors never did.
At some point it should be shared a little bit more … what happens at EOL and this is a possibility [device deactivation] and what you may have to do. Because it's something that we never really talked about with anybody.
Conclusions: The pre-implantation period is a very busy time, if discussions about device deactivation at EOL occurred, they were not remembered.Despite an average of 6 hospitalizations post-implantation, discussions about device deactivation did not occur.Discussions about EOL decisions are important, particularly with a person with a life-limiting disease. These discussions and the advance decisions should be updated as a person's condition changes and advanced therapies are added to prolong life. The ultimate goal is for the terminal trajectory to be one that is peaceful and acceptable to the person who is dying and their family.

P1189

Socio-clinical variables affecting the level of self-care in elderly patients with heart failure and cognitive disorders

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Introduction: Promoting self-care is the cornerstone of heart failure (HF) management. The number of hospitalizations and unscheduled visits could be reduced in elderly patients with heart failure by the patients' active involvement in self-care.
Objectives. To measure the level of self-care in elderly patients with heart failure, to examine the influence of socio-clinical variables on the level of self-care, and identify the socio-clinical variables that are predictors of self-care.
Material and methods: The study included 100 patients (48 female, 52 male) aged 60–88, diagnosed with HF, treated at the Internal Medicine Department of our Care Center. The European Heart Failure Self-care Behavior Scale 9 (EHFScB) and Mini-Mental State Examinaton (MMSE) were used.
Results: The total classic self-care score was 22.76 points (SD=8.49), and the standardized score was 61.78 (SD=23.59). Patients who were in a relationship, did not take digoxin or diuretics, were in NYHA classes I and II, and had normal scores or cognitive impairment with no dementia in the MMSE, had significantly higher levels of self-care. Self-care was also correlated with patient age (rs = −0.356, p <0.001) and LVEF (rs = 0.234, p = 0.019). Linear regression analysis demonstrated that only NYHA class has a significant impact on EHFScB scores. Compared to classes I and II, NYHA class IV decreases the standardized EHFScB score by a mean of 23.595 points.
Conclusions: Intensified self-care education should be provided to patients living alone, taking digoxin and diuretics, suffering from moderate dementia, and classified in NYHA class IV. These patients may require special educational strategies to gain the knowledge required for effective self-care.

P1191

Intervention algorithm for the heart logic device for nurse specialized in hf

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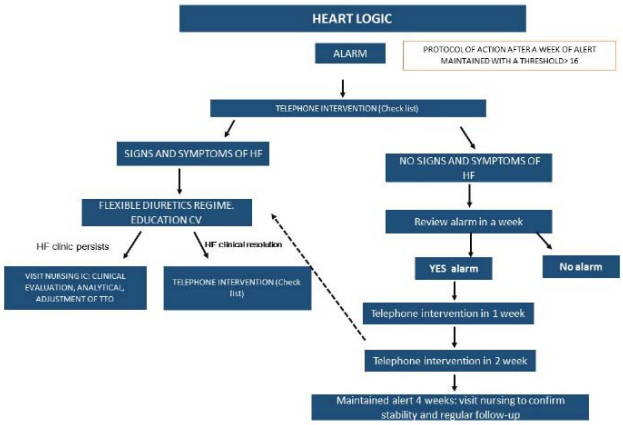
Purpose: HeartLogic is a diagnosis of heart failure implemented in ICD and CRT-D designed to detect early warning signs of worsening heart failure by combining data from 5 sensors in a single, with a specificity of 85.7% and a sensitivity of 70% allows to anticipate acute decompensation up to 34 days. The objective is to demonstrate that patients with the device and who are monitored by a nurse specialized in HF through a telephone intervention algorithm reduce the rate of IC readmission through early telephone intervention.
Methods: A prospective observational study will be conducted in all patients with this device and where an intervention and performance algorithm for specialized nursing in HF was designed, focused on early telephone intervention based on the diagnosis and detection of signs of decompensation and early application of the Flexible diet of diuretics. The activation of the protocol is carried out when the patient's device threshold is ≥16, at which time the nurse performs the telephone intervention and depending on whether or not symptoms are present, it is selected in one arm or another, to closer monitoring, this allows anticipating a possible income up to 34 days. Once the threshold <6 is stabilized, the patient leaves the algorithm.
Results: Since January 2018, 18 patients were enrolled in follow-up of alerts, of which 3 were women and 15 were men. The average age was 65.72 years. During the 6-month period, there were 11 alerts with threshold ≥ 16, to which telephone intervention was performed according to the algorithm. The cause of the alert was not found in two cases. There was a single admission related to HF in a context of severe anemia. Two of the patients lost track, and one device was cleared by infection. The rest of the case was resolved with treatment optimization.
Conclusion: The use of this algorithm allowed early intervention in most cases, with a single non-avoidable admission since the first cause that triggered it was not the CI. This algorithm will allow a greater follow-up of the patients and an early intervention in the case of decompensation



ALGORITHM

P1192

The HEART path, Help with Adaptation and Rehabilitation Trajectory

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Context: In the Netherlands today, there is a growing group of elderly patients with cardiac diseases who will not undergo cardiac surgical intervention. Cardiac surgery can technically be performed in fragile, older patients, but it is difficult for the individual patient to weigh the risks and benefits of such major surgery. A palliative approach is needed from the moment of deciding that there will be no intervention, since these patients are then confronted with a life limiting disease. Knowledge and cooperation from multi-disciplinary care professionals, who are involved in care for this patient category, is needed to develop a care pathway that supports these patients in adapting to a life limiting disease.
Method: The method of action research was chosen. Eleven patients, and one relative, with this specific cardiac condition were interviewed (semi structured). Two multidisciplinary heart teams gave input through patient assessments. Focus sessions with local cardiologists, NP's, GP's and homecare nurses provided a multi-faceted view on the concept of the care pathway. A care pathway was designed and implemented. Before discharge there is a shared decision on the treatment plan. Weekly home visits from a heart failure nurse with expertise in symptom recognition and relief are planned in the first month after discharge. This includes advanced care planning and, if necessary, continuing visits. A digital two-way patient file provides communication between home care and the heart failure clinic. At discharge the GP is informed by telephone and on paper and a home visit is planned.
Findings: At the time of the shared decision-making, patients rate honesty and expertise the highest. The cardiologists use hard data for decision-making, however, the widely used EuroSCORE does not cover this patient category. At discharge there was poor communication between care professionals, particularly with regards to symptom recognition and relief. Symptoms such as tiredness, fluid retention and weakness are experienced daily. There is a fear of acute, severe symptoms that often return at night, such as dyspnoea, chest pain and the feeling of suffocating/dying. In the first 18 months 83 patients were included in the pathway, 23 improved, 28 still have regular visits. Communication via the digital two way patient file is highly valued. Furthermore 32 patients died, 22 at home, 4 in a hospice and 4 in hospital, 2 places of death are still unclear. Re-admission data and data on symptom relief is currently being assessed.
Conclusions: Inclusion of frailty scores such as ISAR and KATZ ADL can provide a better patient assessment. Poor communication at discharge leads to inadequate symptom recognition and relief. The loss of mobility, due to symptoms and unpredictability of the disease and fear of returning symptoms can be addressed by a palliative approach. Since the start of the care pathway only 12,5% of the included patients died in hospital.

P1193

Health literacy, knowledge, treatment adhesion and self-care in heart failure in a middle income country

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Introduction: Studies show that the care of patients with heart failure (HF) in a multidisciplinary team contributes to improve knowledge, adherence and increased self-care practice. In addition, a few years of patient study and misunderstanding of common medical terms may interfere with their understanding of health concepts. Studies involving these themes are relevant to guide the practice of the multiprofessional team. Objective: To describe health literacy, knowledge on HF, adherence to treatment and self-care in patients linked to a recent implemented HF Management Program. Methods: Cross-sectional study with adult patients hospitalized for decompensated HF and who had follow-up with the multiprofessional team in a university public hospital in southern Brazil during the period from November 2017 to November 2018. To assess the level of literacy in health, the Short Assessment of Health Literacy scale was used, which evaluates the pronunciation and comprehension skills of common medical terms. It is composed of 18 questions and a score between 0 and 14 suggests inadequate health literacy. In order to assess the knowledge about HF, a questionnaire for knowledge of the disease was composed of 14 questions, which considers as appropriate 70% of assertions. Adherence to treatment was assessed with a questionnaire composed of 10 questions, in which a score of 18 points (70%) is considered adequate adherence. The skills for self-care were measured using the European Heart Failure Self-Care Behavior Scale, composed of 12 questions (lower scores indicate better self-care - maximum score 60 points). Results: 130 patients were evaluated, mean age of the participants was 64 $\pm$ 11 years. The health literacy questionnaire averaged 12 $\pm$ 4 hits; the knowledge about HF had a score of 69 $\pm$ 17; adherence to treatment had a score of 16 $\pm$ 4 and self-care of 32 $\pm$ 8. Conclusion: The results indicate that patients are unaware of common medical terms, knowledge about HF is close to adequate, and adherence to treatment. However, self-care behavior still lacks strategies for patients to achieve attitudes that impact clinical outcomes. Follow-up in a multidisciplinary team, especially after follow-up after hospital discharge, has benefits and should be implemented with a prospective evaluation of this behavior.

P1194

Evaluation of Self-Care Improvement after admission in a Heart Failure Clinic

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Introduction: Heart failure (HF) is a highly prevalent syndrome with significant morbimortality and great impact on patients (pts) and their family's quality of life. HF-related self-care behaviour reflects the actions that an HF patient undertakes to maintain life, healthy functioning, and well-being. The European Heart Failure Self-Care Behaviour Scale (EHFScB scale)is a validated scale considered easy to administer and practical to use. The scale is based on international guidelines for HF management and has been found to measure change in behaviour over time.
Aims: To evaluate the self-care capacity and its improvement over time in pts with chronic HF and reduced ejection fraction (HFrEF) in a HF Clinic (HFC).
Methods: Unicentric, retrospective analysis of pts followed in a HFC since 3/2011. Included pts with reduced ejection fraction (EF) (<50%) and previous diagnosis of HF for at least 6 months, who had completed the EHFScB scale in two different moments: the first moment (T1) before the nursing teaching session and the other (T2) 6 to 12 months after this intervention. This 12-item scale measures self-care behaviors on a 5-point likert scale ranging from 1 (strongly agree) to 5 (strongly disagree). A total score is calculated by summing responses from each item and lower score indicates better self-care.
Results: The sample consists of 58 pts with mean age of 63 +/- 12,4 years and male predominance (74%). 65% had ischemic etiology with median EF of 29.9% +/- 6,3 at admission in HFC. 62% had a prior HF hospitalization. Mean EHFScB scores in T1 and T2 was 37 +/-11 and 19 +/-5,8, respectively. All behaviours had a positive evolution in self-care capacity. The largest improvement was in the "asking for help" factor with a mean decrease of 1.8 points. The factor with the lowest evolution was 'adapting activities' with a mean increase of 1 point.
Conclusion: In this cohort, we concluded that pts adopts non-pharmacological measures in an easier way and follow the guidelines given by the professionals when properly instructed. The EHFScB scale can be used to assess self-care behaviours and as a baseline for the mutual decision between the patient and nurse or physician regarding self-care. It can also be used to improve patient compliance and empower nursing education sessions to address specific problems of heart failure patients.

P1195

Assessment of quality of life of patients followed in a heart failure clinic

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Introduction: Heart failure (HF) is a disease with a major impact in patients (pts) quality of life (QoL). It affects psychological, physical and social domains. Kansas City Cardiomyopathy Questionnaire(KCCQ) is an internationally validated questionnaire that describes social and functional limitations and quantifies symptoms and signs of HF (frequency, severity and stability) and QoL in the previous 2 weeks.
Aims: To assess the QoL of pts with chronic HF in a HF Clinic (HFC).
Methods: Unicentric, retrospective analysis of pts followed in a HFC since 3/2011. Included pts with previous diagnosis of HF for at least 1 year, who completed the KCCQ. This questionnaire has 23 questions regarding 5 fields: physical function, symptoms (frequency, severity and recent change),social function, self-efficacy and knowledge, and QoL.
Results: The sample consists of 88 pts, with mean age of 60 years, 78.4% male. 65% had ischemic aetiology and 68.2% had HF hospitalization in the previous year. Regarding the questionnaire, 60% of pts had no physical limitation in self-care activities, 25% had moderate limitation in medium-effort activities and 25% felt slightly limited. 69.3% of pts had no HF symptoms in the previous 2 weeks. Those who were symptomatic (30.7%), the majority underestimated symptoms relevance (with 32% describing symptoms as "stable" and 13.6% stated as "feeling better"). 60% regarded themselves as "satisfied" if they had to spend the rest of their lives as they were at the time of the questionnaire. No significant limitation in daily life activity was experienced by 45% of pts. 30% rarely experienced disappointment symptoms regarding the illness. Only 20% knew exactly which factors might decompensate HF. 45.4% stated that HF symptoms did not limit their lives, and 30% usually did not experience depressive feelings about it. Social limitations were felt in 25.3% of pts.
Conclusion: KCCQ allows appropriate assessment of pts symptoms and functional implications in different areas, allowing the HFC team to improve pts well-being and provide knowledge to achieve a better understanding of their condition. In this cohort, most pts had no physical significant daily-life limitations and considered themselves "satisfied", which might reflect that they have a good QoL. However, it also shows that there is room to reinforce the nursing teaching sessions mainly about the factors that can decompensate their health status.

P1196

The Dutch multidisciplinary guideline 'Palliative care for patients with heart failure'

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Purpose: Although the mean survival of patients with advanced heart failure is even shorter than of patients with cancer, and their symptom burden higher, less receive palliative care. Therefore, we developed a multidisciplinary guideline.
Methods: The guideline was developed by the Netherlands Comprehensive Cancer Organisation and experts, representing patients as well as all relevant professional associations. Using a survey, the most important barriers were collected from professionals and patients. This resulted in six topics, which were studied in depth. Based on systematic reviews, literature searches and consensus, recommendations were made regarding prognosis, palliative care provision, advance care planning, communication, organisation of care and medication in the terminal phase.
Results: There are no practically applicable prognostic models to estimate survival. The Surprise Question, SPICT indicators and RADPAC tools are recommended for timely identifying palliative care needs. Regarding advance care planning in end stage heart failure, specific attention is needed for ICD deactivation. The use of carefully titrated heart failure medication and morphine can be beneficial for symptom relief. In the organisation of care, the coordinating role can be taken by the heart failure nurse, who can also manage the contacts with the general practitioner and home care.

Conclusion: In February 2018, the multidisciplinary guideline for palliative care for patients with heart failure NYHA classification III and IV was published and is currently successfully implemented. This Dutch guideline might also inspire researchers and professionals from other countries. Therefore, an English summary is available.

P1197

Health status assessment of patients followed in a Heart Failure Clinic

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Introduction: Heart failure (HF) is a syndrome with significant morbidity and socioeconomical impact. Health status (HS) relates to pts perception of the functional impact of symptoms in daily life. The European Quality of Life Index (EuroQol) is an internationally validated questionnaire that reflects pts insight on their HS, improving their sensitivity and understanding of the disease.
Aims: To evaluate HS and assess its variation in pts with HF followed in a HF Clinic (HFC).
Methods: Unicentric, retrospective analysis of pts followed in a HFC since 3/2011. Included pts with diagnosis of HF for at least 1 year and with a HF hospitalization (HFH) within this period, who had completed the EuroQol questionnaire 6 months after the first nursing teaching session. EuroQol comprises 3 components: a visual scale measured from 0 to 100, with a higher number reflecting better HS perception on the day of the appointment; a question about pts perception of their HS comparing with 1 year before; 5 main fields related to mobility, self-care, daily life activities, pain/discomfort and depression/anxiety, according to the pt status.
Results: Included 88 pts, mostly men (78.4%), with a mean age of 60 +/-13,4 years. 65% had ischemic etiology. No significant differences in HS self-assessment were found between genders. There was an inverse correlation between HS and age. Pts living in urban areas and with higher education levels had better HS perception. The majority of pts had no limitations in the 5 fields assessed in the questionnaire. There was a high prevalence of anxiety/depression (46%), with 16% feeling extremely anxious/depressed. Regarding the visual scale, the mean HS perception in the moment of the appointment was 64.3 +/-17,59, ranging from 10 to 100. Considering the point "HS insight compared to one year before", there was an improvement in 54.5% of pts, while 16% felt worse and 29.5% had a similar HS.
Conclusion: The EuroQol is a useful tool to help pts recognise the functional impact of their disease on daily life and its evolution over time. By assessing various fields, it highlights important areas for intervention in nursing teaching sessions, in order to improve pts overall HS and decrease HFH. In our cohort, pts had high levels of anxiety/depression, emphasizing the need to develop interventions in this area. There was also an improvement in HS insight comparing with the previous year, which may reflect the impact of HFC and nursing teaching sessions in this disease.

P1198

New concept of triage in patients with heart failure due to specialized nursing

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Purpose: The pre-discharge is a fundamental step after an IC admission, a poor management of the transicon of care have been shown to increase the hopsitalar re-entry and the morbi-mortality.
The objective is to demonstrate that the realization of a new method of triage by specialized nursing, as it is done in the emergency services, allows to stratify the risk of the patient from discharge, until his / her entrance in the UIC, through the prealta .
Methods: A prospective observational study will be conducted in all patients admitted with a diagnosis of HF and compared with the standard pre-discharge method, based on an early visit to the unit.
The admitted patient will be assessed at 24-48 hours by the IC specialist nurse who will perform a comprehensive biopsychosocial assessment, as well as the pre-discharge, where he will define the "care route" in which the patient should be included, stratifying the risk and the patients. months of follow-up In this way, from the hospital discharge, a "triage" of referral to the UIC will be carried out by the nursing specialist according to the risk and the clinical profile.Triage method;
Low / medium risk patients (3-6 months follow-up / Yellow label):Preserved LVEF and absence of valvular heart disease / severe PHT and Absence of important cardiorenal sd or high diuretic requirements.
High-risk patients (12 months follow-up / Red label):First episodes of heart failure,Patients with ventricular dysfunction who require adjustment of medical treatment or are candidates for devices, Carriers of devices (DAI / DAI CRT or TAVI / mitraclip) especially to clinical stabilization, Revenue despite treatment optimization, Need for high doses of diuretics and / or important cardiorenal sd, In cases of previous strategy failure with high diuretic requirement, income despite treatment optimization and HDD visits. Advanced IC patients: (Prognostic study and close management / Black label): Patients admitted to UCOR by IC,Candidates to Tx / LAVD and Palliative patients.
Results: Since December 2018 a pilot is being carried out in the CI unit to assess the efficacy and safety of this new method described above compared to standard peraltas that are performed
We included 12 patients in the heart failure program of our center, 7 women and 5 men with an average age of ± 74.9 In the triage of the prealta 5 were stratified to the high risk arm, 6 in the low arm - medium risk and 1 patient in the advanced therapies that was referred to our referral center for transplantation. None of them re-enter since the discharge and continue in the established care route.
Conclusions: The nurse will carry out the pre-discharge, where she will define the care route with the aim of creating individualized care plans (NANDA) where she can perform interventions (NIC) and evaluate them (NOC). With the implementation of this method, the aim is to demonstrate the effectiveness and safety of the program in reducing re-entry rates and early intervention.

Clinical Cases

P1199

Acute hypertensive heart failure - when the etiology is misleading

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Introduction: Malignant hypertension is an important cause of acute heart failure (AHF) and left ventricle (LV) dilatation, as a result of abnormal response to pressure overload. Recent literature data suggest that the variability in the development of either a LV hypertrophic pattern or/and dilatation and failure is highly dependent on modulating factors less described so far. Associated myocarditis could explain a transitory severe LV dysfunction in patients with hypertensive heart disease.
Clinical case report: We present the case of a 44-y/o patient, with history of untreated arterial hypertension for 26 years and associated cardiovascular risk factors (dyslipidemia, central obesity), admitted for AHF. Physical examination upon admission revealed high blood pressure (260/140mmHg), bilateral pulmonary crackles, orthopnea, severe pedal edemas and high jugular venous pressure. Biological assessment showed NT-proBNP (11643pg/ml), hs-troponinI (217 ngl/L), newly diagnosed renal impairment (glomerular filtration rate 29 ml/min/1.73m2), hypokalemia and mild anemia. Echocardiography described severe dilated left ventricle, moderate systolic dysfunction (LV EF 35%), severe concentric hypertrophy, moderate functional mitral regurgitation.
Coronarography was performed and showed normal coronary arteries along with renal angiography which revealed normal renal arteries, therefore excluding a renovascular cause of hypertension. Abdominal ultrasonography excluded a renal parenchymal disease. Moreover, urinary and plasmatic metanephrines and normetanephrines, ACTH, cortisone, aldosterone, chromogranine A, thyroid tests and Fabry tests were normal.
As anamnesis was reassessed, the patient mentioned an upper respiratory tract infection with bronchitis 3 months prior to the admission, period in which symptoms progression occurred (bilateral pedal edema, shortness of breath), myocarditis was suspected. Cardiac-MR confirmed the diagnosis by showing T2-weighted focal myocardial enhancement (edema) and late gadolinium enhancement corresponding to the lateral and apical anterior walls, located mostly in the mid-wall to subepicardial layer.
The patient was discharged one week later with antihypertensive and evidence based HF maximal medical treatment. One month follow-up revealed normal BP values, normal LV diameters, important concentric hypertrophy, preserved global systolic function and mild mitral regurgitation.
Conclusions: AHF due to left ventricular dilation and severe LV dysfunction is reported to be the least frequent form of hypertensive heart disease, affecting patients with severe long-term overload. On a different matter, LV wall stress associated with hypertension may predispose to ensuing cardiac infection, thus overlapped myocarditis can be a cause of unexplained AHF. Early diagnostic work-up, recognition and characterization of myocarditis is important, as it may help to improve the treatment, LV function and future HF prognosis.

P1200

Wild type TTR amyloidosis disguised as concentric hypertensive left ventricular hypertrophy

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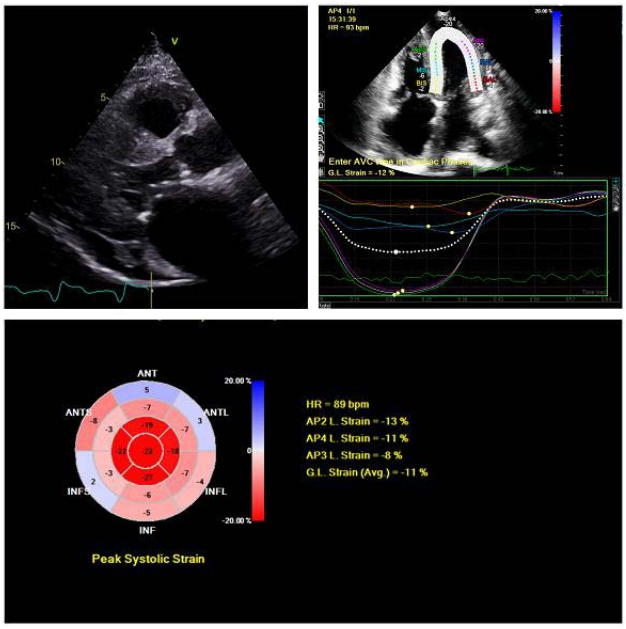
Introduction: Amyloidosis is a great imitator and is paradoxially both over and under-diagnosed. Wild type TTR amyloidosis (previously called senile) has an estimated prevalence of approximately 8-16% in the elderly population and may co-exist with other pathologies such as hypertension and aortic stenosis, indicating common pathophysiologic pathways.
Case presentation: An 85 year old male was admitted to the Emergency Department of our hospital with symptoms of deteriorating dyspnoea. The patient was hospitalised two years prior due to complete atrioventricular block that required permanent DDDR pacemaker implantation. Echocardiography then revealed mild concentric left ventricular hypertrophy with good overall systolic function and grade I diastolic dysfunction, which was attributed to his hypertension. The present echocardiographic study revealed severe concentric hypertrophy (interventricular septum and posterior wall 20 and 18 mm respectively) with a sparkling quality, preserved ejection fraction, severe left atrial dilatation and a small pericardial effusion. Transmitral flow and lateral mitral annulus tissue doppler imaging demonstrated a restrictive physiology. Strain imaging further revealed reduced global longitutinal strain with reduced deformation in the basal and mid segments and preserved in the apical segments, so called cherry on the top (bulls eye) appearance. The patient underwent fatty tissue biopsy which manifested scattered infiltration by an amorphous eosinophilic substance identified as amyloid by Congo red stain with green birefrigence under polarized light and abscence of clonal plasmocytic series suggesting wild type TTR amyloidosis.Conclusion/Discussion: Amyloidosis is characterized by excessive infiltration of the heart affecting to varying degrees different structures such as the myocardium, the pericardium, the valves and the conduction system. Electrocardiographic findings are frequently preceding echocardiographic ones. In elderly patients presenting with unexplained concentric hypertrophy accompanied by abnormalities of signal production and conduction wild type TTR amyloidosis should be suspected. Newer imaging techniques such as strain, strain rate and deformation imaging may help in the diagnosis and follow up of such patients.



P1201

"Burned-out" hypertrophic obstructive cardiomyopathy presenting as acute coronary syndrome

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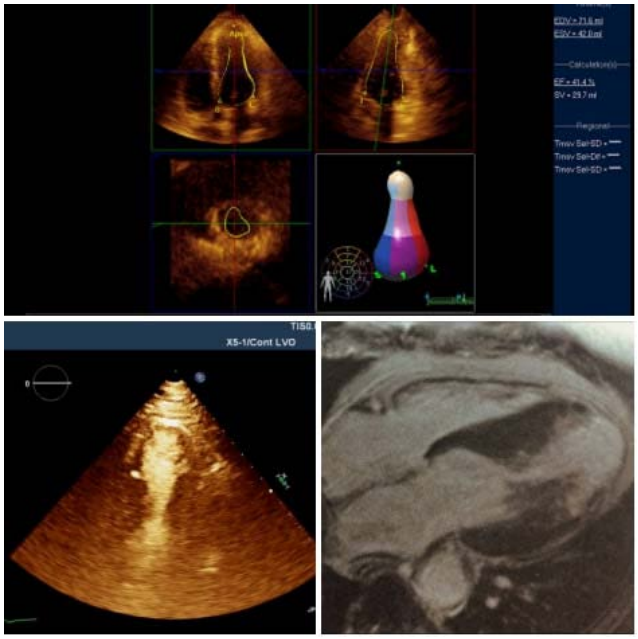
Introduction: Hypertrophic cardiomyopathy is defined as left ventricular hypertrophy not solely explained by abnormal loading conditions. Besides the macroscopic picture of tissue hypertrophy, the disease is microscopically characterized by disarray and fibrosis and associated with small vessel disease.
Case presentation: A 49 year old male was admitted to the Emergency Department of our hospital with symptomatic sustained ventricular tachycardia which converted to sinus rhythm in response to intravenous amiodarone administration. Cardiac enzymes were elevated and troponin showed a rise and fall pattern. Ultrasound examination revealed a non-dilated left ventricle with moderately reduced ejection fraction. Basal and mid wall hypertrophy was observed with pronounced apical thinning and akinesis resulting in hourglass left ventricular remodelling. Intracavitary mid-ventricular gradient of 30 mmHg at rest and upon Valsalva manoeuver was recorded. The patient underwent coronary angiography which demonastrated an atheromatous coronary network with minor non-obstructive lesions. Cardiac magnetic resonance confirmed the regional wall motion abnormalities described by the ultrasound; in particular an hourglass shaped left ventricle with hyperdynamic mid segments and thin akinetic to dyskinetic apical segments. Moreover subendocardial late gadolinium enhancement was demonstrated indicative of extensive fibrosis, compatible with "burned-out" hypertrophic cardiomyopathy that has entered a dilative phase. The patient was programmed for genetic family counselling and implantable cardioverter-defibrillator placement.
Conclusion/Discussion: Hypertrophic cardiomyopathy is a genetically and phenotypically heterogeneous disease with varied penetrance, ranging from asymptomatic "grey-zone" hypertrophy to severe left ventricular obstruction and/or end-stage dilated left ventricle with reduced ejection fraction. Prognosis and sudden cardiac death risk assessment takes into account several structural and functional parameters, including wall thickness, left atrial size, maximum left ventricular outflow tract gradient, episodes of non-sustained ventricular tachycardia, unexplained syncope and family history of sudden death. However physicians should be alert to recognize more atypical presentations of the disease.



Hourglass shaped left ventricle

P1202

Successful antiarrhythmic therapy with combination of quinidine and mexiletine in Purkinje-related ventricular arrhythmia, persistent atrial tachyarrhythmia and DCM associated with R814W SCN5Amutation

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Background: SCN5A gene mutations are described in 2-4% of patients with dilated cardiomyopathy (DCM). In such cases DCM is associated with different arrhythmias like His-Purkinje-related ventricular contractions and atrial fibrillation/flutter (AF/AFL)

as well as symptomatic sick sinus and conduction disturbances. Arrhythmia often occurs in young age and is the first symptom of heart disease.
Family case:
We present cases of 56 year old man and 36 year old woman, father and daughter, with symptoms of heart failure (HF) in the course of familial DCM and complex ventricular tachyarrhythmias (VEBs/VT) with atrial fibrillation. Father has 20-year history of HF and ventricular arrhythmias, which constituted 50-60% of whole rhythm, and longstanding AF/AFL for 10 years with coexistent diabetes mellitus type 2, hypertension, coronary artery disease. Daughter stays symptomatic at the age of 32, after significant increase of ventricular and supraventricular arrhythmias. Both have ICD-VR implanted since 2006. There were two cases of sudden cardiac death and one case of heart transplantation among their siblings.
We found a heterozygotic mutation R814W in SCN5A by whole exome sequencing in the proband and confirmed its presence in all affected subjects.
In a father after quinidine treatment we observed significant reduction of ventricular arrhythmia with reduction of HF symptoms and elevation of LVEF from 35% to 55%. This effect was constant during 2 year observation. Adding mexiletine to quinidine therapy reduced the arrhythmia (VEBs/includingVT from 47 thousand/day to 6-8 thousand/day and reversion longstanding AF to sinus rhythm) and remains effective during 1,5 year follow-up. However, quinidine in monotherapy was unsuccessful and badly tolerated in daughter. In her case mexiletine and overdrive AAI/DDD stimulation were effective in ventricular arrhythmia treatment (VEBs decreased from 25 thousand/day to 50/day), reduced HF symptoms and improved of left ventricle function. Because of growing number of AF/AFL recurrences we used the combination of mexiletine with reduced dose of quinidine (then flecainide) with antiarrhythmic success in 6 month follow-up.
Questions: When in DCM patients genetic testing should be offered?
How to treat severe ventricular arrhythmia in SCN5A mutations?
Is it possible to avoid/delay heart transplant in this subgroup of DCM patients?
Conclusions: Treatment with quinidine combined with mexiletine for patients with SCN5A R814W associated disease leads to significant reduction of severe ventricular arrhythmia, reversal of long-standing persistent AF and improvement in myocardial function. Genetic screening should be performed in patients with His-Purkinje related ventricular arrhythmia and DCM. Our report highlights the role of genetic testing for perosnalized treatment in cardiology.

P1203
Clinical case of effective treatment of ventricular arrhythmias with ranolazine in a 32-year-old woman with unclear aetiology cardiac inflammation

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A 32-year-old patient (pt) presented with dilated cardiomyopathy, frequent premature ventricular contractions (PVC) and unstable ventricular tachycardia (VT) first revealed in 2012. In echocardiography, there were diffuse left ventricular hypokinesis andreduced left ventricular ejection fraction up to 40%. With daily ECG monitoring, up to 17 thousand PVC with different QRS morphologies and up to 150 episodes of unstable VT were detected. According to a survey in 2012, coronary angiography revealed normal coronary anatomy without evidence of obstructive coronary artery disease; cardiac magnetic resonance detected no abnormalities except a diffuse hypokinesis and a midrange ejection fraction. Endomyocardial biopsy was obtained, inflammatory features of unclear aetiology were detected (myocardial stroma infiltration by lymphoid type cells, must cells with degranulation; immunohistochemistry detected cells containing macrophages, T-cells). A diagnosis of myocarditis was suggested, but diagnostic criteria were not fully met.It was also suggested that reduced left ventricular ejection fraction was triggered by frequent PVC. Antiarrhythmic therapy was recommended in this regard; 1 C class was ineffective, and severe thyrotoxicosis developed on amiodarone. The pt also takes ACE inhibitors and b-blockers in the maximum tolerated dose, as well as eplerenone. Given the lack of an appropriate antiarrhythmic therapy, the probable inefficiency of radiofrequency ablation due to significant polymorphism of PVC without any dominant focus, an attempt was made to treat with ranolazine. On 1000 mg / day the PVC decreased from 17 thousand to 10 thousand, just one unstable VT was detected. However, the pt developed severe dyspepsia and epigastric pain and ranolazine was stopped. After 2 months, the pt started ranolazine again, PVC decreased from 14 thousand to 9 thousand. However, even with the omeprazole intake, epigastric pain remained, so the pt was unable to continue taking this drug.
Discussion: ranolazine is a medication for the treatment of refractory angina. At the same time, it has also been reported as antiarrhythmic. It has been found to prevent acute myocardial infarction ventricular arrhythmias, as well as to cure drug-refractory ventricular arrhythmias. However, despite having effeciency, ranolazine caused side effects and significantly reduced the quality of life in this pt. The diagnosis of myocarditis cannot be ruled out. It is also possible that the pt has an arrhythmogenic inflammatory cardiomyopathy (a recent clinical description of patients with non-ischaemic cardiomyopathy who have ventricular arrhythmias and evidence of active unclear aetiology cardiac inflammation). Most probably, re-MRI/PET and endomyocardial biopsy are necessary. Taking into account the unpredictable course of both conditions, implantation of ICD should be considered, despite the moderately reduced left ventricular ejection fraction.

P1204
Young patient with syncope during exercise: should we be worried?

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Although the etiology of syncopes in young patients is most frequently benign in nature, one should keep in mind that the cause might be a severe one, even in this age category. For this reason, the evaluation of a young patient should necessarily include some additional tests, useful in risk stratification, according to the current clinical guidelines.
We present the case of a 29-year-old male patient, without any significant medical or family history, who was admitted for recurrent episodes of palpitations, accompanied by hyperpyrexia and impaired tolerance for effort. The patient also describes a syncopal episode at age 19, during strenous exercise, preceded by rapid palpitations. He was not properly evaluated at the time.
The clinical exam, ECG and echocardiography raise the suspicion of an arrhythmogenic right ventricle cardiomyopathy (ARVC). The diagnosis was confirmed by performing a cardiac magnetic resonance exam, which showed biventricular dilation and dysfunction, right ventricle free wall aneurism and left ventricle fibrosis. 24-hour ECG monitoring records polymorphic ventricular extrasistoles and a few episodes of unsustained ventricular tachycardia.
ARVC is a progressive disease, with genomic substrate and initially electrical, afterwards morphological expression, with a serious risk of sudden death for the patient. Early diagnosis and appropriate treatment, often by implanting a defibrillator, are of crucial importance.

P1205
A case of brachial arteriovenous fistula secondary to venipuncture

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Background: The common cause of an acquired arteriovenous fistula (AVF) is single or repeated diagnostic or therapeutic arterial or venous punctures. Its iatrogenic nature is somehow an obstacle to registering the accurate incidence because of the expected hesitation of the involved medical staff in reporting such cases. Nevertheless, it is generally considered rare. Under certain circumstances, an AVF can result in severe clinical consequences if it remains untreated. We report a case of brachial arteriovenous fistula secondary to venipuncture diagnosed by color Doppler ultrasonography.
Case presentation: A 19-year-old student with a palpable thrill on the medial aspect of left elbow was admitted to our clinic. He had no history of penetrating injury, coagulopathy; nevertheless, two year ago, he had been admitted to a hospital for 7 days, where he was treated for Dengue fever. At that time, he had received venipunctures in his arm for measurement of the complete blood count and fluid supply. Physical examination revealed a palpable thrill on the medial aspect of the left arm, 2 cm above the elbow, with a continuous murmur. Peripheral pulses were palpable, and arms were equal in length and width. Cardiac examination showed no abnormalities. Color Doppler ultrasonography of the left upper extremity revealed a large communication channel between the brachial artery and the vena comitans at the level of the antecubital fossa. The artery was markedly enlarged compared with the right side, and had a low-resistance waveform. One of the left pair of brachial veins accompanying the brachial artery was also markedly enlarged with arterialized flow. The original color Doppler ultrasonographic diagnosis was confirmed by computed tomography angiography. A diagnosis of brachial arteriovenous fistula secondary to venipuncture was made. He was treated surgically to repair the fistula to avoid long-term complications such as high-output heart failure and ischemic changes in the involved extremity.
Discussion: Iatrogenic AVFs are rare, are usually located at the level of femoral and antecubital vessels, and can even be diagnosed as late. Over the injury site, a palpable thrill and a continuous murmur are frequently found. The type of treatment depends on the cause, acute or chronic nature, location, and size of the AVF. There are 3 treatment options: surgical repair, exclusion with a covered stent, and transcatheter embolization. Finally, it is important that physicians be aware of this rare complication of venipuncture and avoid deep probing and running through with the needle. Conclusion: Iatrogenic AVFs are rare. Color Doppler ultrasonography is a valuable and safe diagnostic tool for peripheral AVFs. Physicians must be aware of

this rare complication of venipuncture and avoid deep probing and running through with the needle.

P1206

Patient and caregiver contribution in self-care heart failure - clinical case

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Introduction: A 31-year-old male, with obesity, hypertension (untreated so far), a mild alcohol consumer without personal of family history of cardiovascular disease (CVD). He was admitted to the cardiology department for the symptoms of heart failure (HF) de novo. He complained for malaise, worsening shortness of breath which had been growing for two months (NYHA II/III), for resting dyspnea in the last days. For several weeks, he noticed a fast, irregular heart rate. During the physical exam the stagnation over the lungs (the chest X-Ray was done) with accompanying edema in the lower limbs was confirmed. Lab exams revealed: high NTproBNP (10475.0 pg/ml), slightly increased TnT (18.33 pg/ml) and D-dimers (2450.00 ng/ml). Electrocardiogram showed overload of the left chamber with significantly impaired ejection fraction (EF 25%) and features of high filling pressure, and a high probability of pulmonary hypertension. After the intensive HF treatment of HF was implemented, the patient response was good, but without his care and commitment. The patient was qualified for a further extension diagnosis of HF.
Identification of the problem: It is obvious that the assessment of HF patients' self-care is extremely important not only to involve the patient (P) but also his caregiver (CG). During the patient's hospitalization we wanted to check his and the CG' (his mother) contribution to HF self-care.
The evaluation included the analysis of data obtained from the completed socio-demographic, clinical data and questionnaires by the patient (Self Care Heart Failure Index, SCHFI) and the CG (the Caregiver's Contribution to Self-care of HF Index (CC-SCHFI)). At each stage of the self-care concept, the relations of the maintenance, symptom perception and management process was insufficient. The patient never or rarely takes prescribed medicines, visits health care provider, eats a low salt diet or avoids getting sick. Also in a situation when the symptoms of HF get worse, he would not do anything to reduce salt and fluid intake or even take an extra diuretic. The only thing he would probably do is contact the doctor. If he had any symptoms of HF, he was not sure to be able to control them.
The analysis of the data showed that the CG's contribution to the patient's self-care management was also low in identifying and monitoring symptoms. Despite the recognition of them, the CG only sometimes advised the patient to reduce salt and call the doctor or nurse, but rarely would order them to take an additional diuretic or reduce a fluids intake. Moreover, the CG would never or rarely recommend to check the weight or do some physical activity.
Conclusion: The assessment showed that neither the patient nor the CG showed a significant contribution to the HF self-care. Therefore, it seems obligatory to educate not only HF patients, but also their CGs. All interventions that increase CG confidence can potentially improve to contribute to the HF self-care.

P1207

Case report: peripherally inserted central catheter in patient with heart failure and cardiac implantable electronic device in catheterization laboratory

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BACKGROUND: Patients with heart failure have benefit from peripherally inserted central catheter (PICC) insertion because they require a safe catheter for a prolonged period, in view of the use of inotropic therapy, vasoactive drugs and diuretics. In a public teaching hospital in the south of Brazil, the patients eligible to use this device are hospitalized in units with telemetry monitoring, are listed for heart transplantation or palliative care. The use of PICC allows the patient to have greater comfort and safety, avoids innumerable venous punctures and blood collections; and allows the preservation of its venous patrimony, including the jugular veins by short term central venous catheter, protecting these vessels for possible biopsies after cardiac transplantation. Bedside peripherally inserted central catheter (PICC) insertion can be limited in cases of patients with cardiac implantable electronic devices due to the difficulty of catheter or wire guide's progression. In these cases, it is possible to ally different technologies to assist in the guidance of PICC insertion. Fluoroscopy is a safe and effective technique to guide the catheter to the optimal position. PURPOSE: To describe the case report of a patient with a cardiac implantable electronic device within which a peripherally inserted central catheter was inserted in an unusual way. CASE DESCRIPTION: Case report of a PICC insertion guided by fluoroscopy in a hemodynamic catheterization laboratory. The procedure was performed by PICC's team and interventional radiologist. Male patient, with right arm thrombosis history, with a cardiac implantable electronic device on the left arm and a difficult-to-access peripheral vasculature even under ultrasound guide, submitted to multiple unsuccessful bedside punctures. The wire guide didn't progress probably due to the cardiac implantable electronic device, so the procedure took place in a hemodynamic catheterization laboratory, with use of fluoroscopy technology. RESULTS: Puncture under local anesthesia in left basilic vein with catheter monitoring to the cavoatrial junction. Patient progressed without any PICC related complications, maintaining the catheter for 41 days until the end of therapy. Time of radiation exposure was as minimum as possible and there wasn't any kind of clinical complication during hospitalization. IMPLICATIONS AND
CONCLUSIONS: Despite of exposing patient to radiation, PICC insertion under ultrasound guidance and positioned by fluoroscopy is a safe and effective alternative in cases of hard vascular access. Therefore, the initiative to combine two technologies was determinant for patient safety.

P1208

An unusual case of infective endocarditis with Staphylococcus warneri, presenting as heart failure

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Introduction: S. warneri a member of the coagulase-negative Staphylococcus (CoNS) group, has rarely been reported to cause disease in healthy people, because of a lack of aggressive virulence properties.
Case report : A 79-year-old Caucasian male presented to the emergency department with shortness of breath, bilateral leg edema and fatigue. He was known with hypertension and aortic valve stenosis that were treated medically. On physical examination he was afebrile, with lower limb pitting edema, HR 70/min, BP 180/80 mmHg; systolic murmur at the aortic and mitral area. His respiratory examination revealed decreased breath sounds bilaterally at lung bases with crackles, otherwise unremarkable. 12-lead electrocardiogram showed atrial fibrillation. Chest x-ray showed cardiomegaly with congestion and large bilateral pleural effusions. Blood results showed a BNP of 2000 pg/ml, mild anemia, increased impaired renal function (Creatinine 2 mg/dl), CRP 9 g/dl (normal <5 g/dl), ESR 30 mm/hour. Further blood tests were in the normal range. TTE showed mild left ventricle hypertrophy. Systolic function was normal. The aortic valve was trileaflet with severe stenosis (AVA 0.4 cm2) and moderate regurgitation. The mitral valve showed a mobile hyperechogenic formation of 12 mm seen on the atrial side of anterior mitral leaflet. Vegetation was confirm on TOE. Doppler examination showed severe mitral regurgitation due to perforation of the mitral anterior leaflet (figure 1). Three blood culture bottles grew gram-positive cocci in clusters, identified as methicillin-sensitive coagulase negative Staphylococcus (subsequently identified as S. warneri). We initiated therapy with Intravenous Oxacillin and Ciprofloxacin. The patient also received medication for heart failure and was anticoagulated with Acenocoumarol for his atrial fibrillation. The patient's clinical condition improved slowly, with gradual remission of congestion, and normalization of nonspecific inflammation markers, and improvement in kidney function. He was discharged after one month with a good clinical condition but with similar aspect of the TTE. The patient was referred for surgery - double valve replacement.

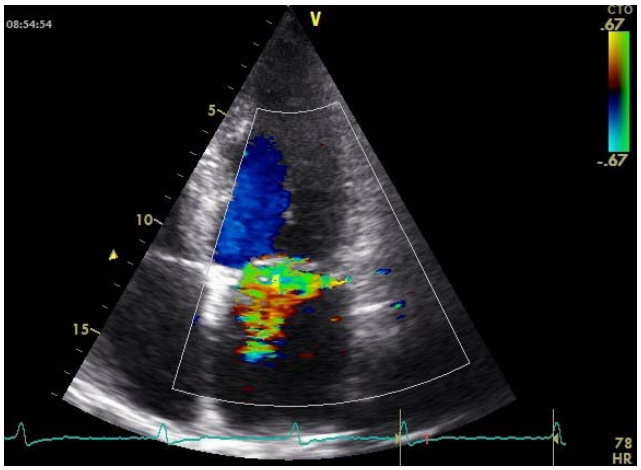

figure 1

Discussion: This represents the tenth case described in the English medical literature, being the second appearing in an immunocompetent individual without any history of infections or previous invasive procedure. Having a low virulence, the infection with Staphylococcus warneri can lack fever and other signs and symptoms of infection. The patients had no clinical signs of infection, only signs of heart failure. Heart failure represents the most frequent complication of infective endocarditis, being the most common indication for surgery. In our case patient's condition has deteriorated due to severe mitral regurgitation secondary to valve perforation.
Conclusion: Staphylococcus warneri is rare or underreported cause of native infective endocarditis in an immunocompetent individual.

P1209

Emerging cardio-oncology therapeutics: the role of ivabradine and levosimendan in acute heart failure reversible toxicity

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A 38 year old man, diagnosed to have Acute Myeloid Leukemia, s/p induction Idarubicin/Cytarabine followed by consolidation Idarubicin/Cytarabine with relapsed disease s/p re-induction with persistent disease. Patient was then started on vidaza + sorafenib. Reevaluation showed residual AML with 21% blasts. He continued cycle 2 vidaza + sorafenib.
He was initially admitted for severe left thigh, not controlled by medications and was shown to have bony infiltration. During his stay, he developed pancytopenia and complained of sudden onset chest pain. ECG showed sinus tachycardia with a rate of 110 bpm and no acute ischemic changes. Troponin was elevated. Urgent TTE showed severely impaired left and right systolic function with an estimated LVEF of 20% and severe MR/TR. Patient's condition rapidly deteriorated and became hypotensive requiring escalation in treatment (BP=82/55 mmHg, HR=130 bpm, T=39 degree C orally, RR=20/min. CXR showed bilateral patchy air space disease in the lower lobes and right middle lobe, compatible with an infectious process.
Patient was then transferred to the cardiac care unit and started on levosimendan/norepinephrine/IV furosemide and ivabradine. No invasive mechanical support /Swan Ganz instituted due to severe thrombocytopenia (37000) associated with elevated bleeding risk.
Patient's status improved markedly and was weaned off pressors. A repeat TTE 2 weeks later showed normalization of his LV and RV systolic function with an estimated ejection fraction of 55-59% with mild MR.
Discussion: Acute heart failure/cardiogenic shock in cardio-Oncology can be reversible. The cardiomyopathy can be secondary to one or combination of the following: chemotherapy, tachycardia and sepsis-induced. Heart Rate lowering medications and inodilators such as ivabradine and levosimendan are cornerstone in such conditions.

Echocardiograohic parameters			
	prior to admission	on presentation	2 weeks after admission
LVEF (%)	55	20	55
LVEDD (mm)	55	63	59
GLS (%)	-18	-11	-15
RV function	Normal	Severely Impaired	Normal
MR grade	Mild	Severe	Mild
TR grade	Mild	Severe	Mild
sPAP (mmHg)	26	46	38

LVEF=left ventricular ejection fraction, LVEDD=left ventricular end diastolic diameter, GLS=global longitudinal strain, RV=right ventricle, MR=mitral regurgitation, TR=tricuspid regurgitation, sPAP=systolic pulmonary artery pressure

P1210

Heart failure and tachycardiomyopathy in a patient taking ibrutinib: a novel tyrosine kinase inhibitor.

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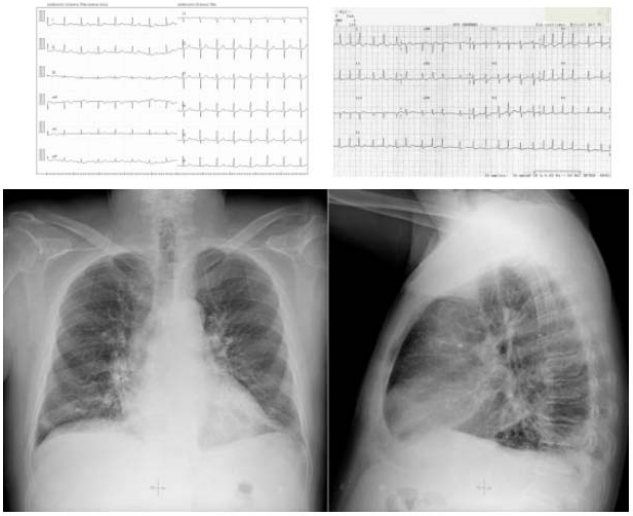
We presented 71 y.o. patient (pt), male, former smoker with hyperuricemia, dyslipidemia. Pt was diagnosed with chronic lymphocytic leukemia (cll) in 2008 and he started treatment (tt) with complete remission (cr). In 2015 cll relapsed. After different tts cll early relapsed and Ibrutinib (ib) was started. The patient basal EKG and analysis were anodyne.
4 months after, pt presented to emergency room with a 1-week history of shortness of breath and mild limb swelling. Symptoms began 3 weeks ago. Pt did not notice palpitations. EKG showed rapid atrial fibrillation (af). Chest ray was consistent with heart failure (hf). Analysis showed mild hypoxemia, normal renal function without anemia, acidosis or dyselectrolytemia. Pt was diagnosed with rapid af and secondary hf. Hematologist proceed to ib discontinuation, patient was treated with i.v. loop diuretics and digoxin (dig). After stabilization he was hospitalized. Echo showed a mild dilated left ventricle (LV) with severe LV dysfunction (LVEF 20%), severe mitral regurgitation (MR), moderately dilated left atria. Coronary artery disease and endocrine disruption were excluded. Heart rate (hr) control strategy was chosen. Carvedilol (carv) was started and progressively increased, dig was discontinued. Eplerenone was associated. Ramipril was not initiated due to symptomatic hypotension. Stroke risk was assessed (CHADS2-VASc 2) and acenocoumarol was started. HASBLED was 1.After favourable evolution patient was discharged. In follow-up, pt complained of dyspnea persistence and symptomatic hypotension, he had no signs of congestion and good peripheral perfusion. Hr still elevated. Carv was reduced and low dose of dig was started. One week after, symptoms improved, hr was controlled.6 months later, pt was on Class I NYHA, echo showed normal LVEF and mild MR. In the other hand, cll aggressively relapse and pt finally deceased after a septic shock. An ib related af (ibraf) tachycardiomyopathy diagnoses can be made. Although ib has been linked to af, there are barely case-reports of an association with cardiomyopathy.
The ibraf incidence is 6-16%, usually appears in the first 6 months. Age ≥ 65 y.o, male, arterial ht, af background, diabetes and long ib tt are risk factors. Prior to ib initiation cvd, af, hormone or electrolytic alterations have to be excluded. Toxicity criteria ≥3 are uncommon and demands ib discontinuation (dis). Ib dis has been correlated to an inferior progression free survival. Ib has interactions (inter) with antiarrythmic and oral anticoagulant (oa) drugs: diltiazem, verapamil, amiodarone, dronedarone have to be avoid. Ibr increases dig and dabigatran levels and increases the risk of bleeding (40-69%) due to platelet inhibition effect. It is important to assess the pros and cons of oa before starting tt.
It is important to know the ibraf management to avoid unnecessary dis or inter. A multidisciplinary management in cardio-onco-hematology units is essential.



Basal and AF EKG and Chest Ray

P1211

The case of primary systemic amyloidosis with a clinical picture of congestive heart failure refractory to symptomatic therapy

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A 55-year-old woman without a history of arterial hypertension, MI, heart disease for 1.5 years before was hospitalized with gradually progressive symptoms of biventricular CHF (recurrent bilateral hydrothorax with 2 thoracocentesis). The first manifestations of heart disease were paroxysms of atrial fibrillation (4 episodes in total, were stopped with medication) without antiarrhythmic and anticoagulant therapy. Further, the tendency to hypotension, the presyncope and syncopal states began to appear without any connection with arrhythmia. Then, exercise tolerance decreased due to general weakness and shortness of breath, and the edematous syndrome increased despite regular use of diuretics.

Patient had previous echocardiography with symmetric thickening of the left ventricular myocardium (up to 18 mm), which, in the absence of anamnesis of arterial hypertension, was regarded as hypertrophic cardiomyopathy. Smoking, drinking alcohol, drugs denied.

During patients' examination moderate jaundice, numerous scratching on the back and arms, acrocyanosis, moderate swelling of the face, feet and legs to the bottom third was found. BP was 95/70 mm. Hg, pulse was 78 per minute, rhythmic. On auscultation, heart sounds are deaf, in the lungs breathing was weakened in the lower sections on both sides. Tongue crimson, enlarged, with imprints of teeth. The abdomen was moderately enlarged due to subcutaneous fat and moderate ascites, enlargement of liver.

At a normal level of total protein in the blood, a decrease in albumin and an increase in α1- and γ-globulins were revealed. Urine protein was 0.40 g per day. Free light chains of immunoglobulins of lambda-type were increased both in serum up to 17 μg / ml (at a rate of up to 10 μg / ml) and in urine. Reducing of the amplitude of the R-wave in all leads was found on ECG. By EchoCG symmetric LVH was detected (up to 18 mm), the thickness of the RV was 5 mm, the ventricular cavities were not increased, LV was increased, LV EF was 39%, normal pressure in the pulmonary artery. CT of the chest: increased pulmonary pattern, signs of thromboembolism of a single small branches of the left pulmonary artery with infarction of the lower lobe in S9 of the left lung, a blood clot in the ear of the LP, fluid accumulation in the pleural cavity, pericardial cavity, in the abdominal cavity. MRI of the heart with contrast was confirmed restrictive type of myocardial dysfunction. The diagnosis of AL-type amyloidosis was verified on the basis of myocardial biopsy using histological and immunohistochemical methods. Despite the initiated pathogenetic therapy, the patient died within 6 months from her onset and 2 years from the onset of the first symptoms of the disease.

This clinical case draws the attention of doctors to the problem of differential diagnosis of hypertrophic cardiomyopathy, early diagnosis and pathogenetic treatment of primary amyloidosis.

P1212

Right ventricular failure and severe functional tricuspid regurgitation caused by atrial fibrillation

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Background: Atrial remodeling associated with atrial fibrillation(AF) is known to be a risk factor for significant tricuspid regurgitation(TR). AF with secondary tricuspid annular dilatation leading to TR and right ventricular(RV) failure occurs in approximately 10-15 percent of patients with TR.

Case: 71 year old female with history of hyperthyroidism was admitted to the hospital with severely decompensated RV failure and was found to have severe TR on echocardiogram. She was recently diagnosed with AF and was started on metoprolol and rivaroxaban. Basic laboratory testing including thyroid function test was found to be within normal limits. Cardiac MRI ruled out infiltrative heart disease. She was started on diuretic with some symptomatic relief. She successfully underwent Cardioversion (DCCV) as an outpatient but subsequently reverted back to atrial fibrillation. She was not started on antiarrhythmic therapy after the DCCV. She was thought to be a poor candidate for amiodarone given her methimazole for hyperthyroidism. She continued to remain symptomatic and demonstrate severe tricuspid regurgitation on examination and decision was made to admit her to the hospital for sotalol loading followed by cardioversion. Her symptoms improved dramatically with restoration of sinus rhythm and her echocardiogram demonstrated normalization of the RV and severe tricuspid regurgitation.

Discussion: TR is caused by tricuspid valve systolic coaptation loss due to tricuspid annular dilation associated with atrial dilation. Functional TR (FTR) is rarely seen in patients with AF duration of less than 1 year; functional TR has been reported in one-fourth of patients with longstanding AF of more than 10 years. The prevalence of functional TR is growing due to the increased number of senior patients with longstanding AF in today's aging population. The exact determinants of functional TR remain uncertain. AF can lead to heart failure(HF), and their association brings a poor prognosis. In fact, cardiac death is more frequent than stroke- related death in AF patients, and a substantial proportion of the cardiac death results from HF. There is high probability of RV failure events in AF patients who have severe TR, thereby suggesting that more intensive therapy may be required to prevent HF events in AF patients.

Conclusion: Severe FTR leads to increased prevalence of right-sided heart failure underscoring the nonbenign nature of AF.

Our case is unique since the patient had atrial fibrillation duration of less than a year and presented with severe TR and right heart failure which is normally seen in patients with chronic atrial fibrillation. FTR is associated with poor prognosis in AF patients with preserved left ventricular ejection fraction and should be treated more intensively with the goal to restore normal sinus rhythm.

P1213

Left ventricular non-compaction and coronary artery disease: what's causing systolic dysfunction? a case report

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Background Left ventricular non-compaction is a rare cardiomyopathy, characterized by hypertrabeculations and deep recesses of the left ventricle.

Clinical manifestations range from no symptoms to progressive left ventricular systolic dysfunction and heart failure, atrial or ventricular arrhythmias and systemic thromboemboli.

The diagnosis of left ventricular non-compaction cardiomyopathy can be made by echocardiography as well as magnetic resonance imaging.

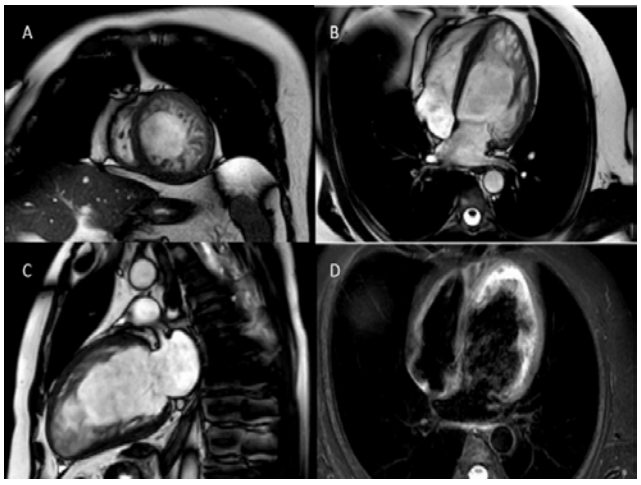
Case Summary We report a case of a 51-year-old man without cardiac risk factors referred to hospital after the finding of complete left bundle block on the ECG and a 6-month history of mild exertional dyspnea. Echocardiography showed a left ventricular ejection fraction of 25%, with prominent hyper-trabeculations, especially in lateral and apical wall.

Cardiac magnetic resonance imaging confirmed the diagnosis of left ventricular non-compaction cardiomyopathy (see Picture).

Coronary angiography showed an unexpected obstructive coronary artery disease: a severe stenosis of both the middle tract of left anterior descending artery and first diagonal branch. Lesions were treated with angioplasty and DES implantation.

One month after the revascularization and an adequate medical therapy, repeated echocardiogram confirmed the severe depression of left ventricular function, so an ICD-CRT device was implanted.

Discussion This is a rare case of coexisting left ventricular non-compaction and coronary artery disease in a young patient without cardiac risk factors. An explanation of this association might be that left ventricular compaction occurs simultaneously with the development of the coronary vessel system during gestation. So, the same genes might be involved both in left ventricular non-compaction and in the predisposition to coronary atherosclerosis even in patients without cardiac risk factors.



Cardiac magnetic resonance imaging scans

P1214

Haemochromatosis: an under-recognised and treatable cause of dilated cardiomyopathy

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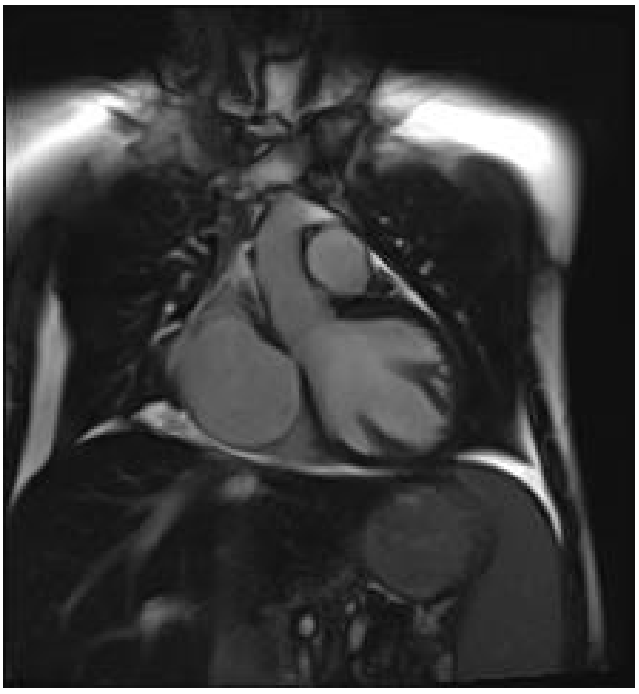
A 27 year old male PhD student presented with a short history of breathless and fatigue. There was no past medical history and no background of smoking or substance misuse. There were signs of heart failure, including elevated central venous pressure and bilateral pleural effusions. An echocardiogram showed a non-dilated left ventricle (LV), severe biventricular dysfunction with an LV ejection fraction (LVEF) of 15%, moderate mitral regurgitation and severe tricuspid regurgitation. His cardiac Troponin-I was slightly elevated at 65 ng/L. There was concern about his outlook because of tachycardia and hypotension. He was transferred to our hospital for ongoing management.

On arrival at our hospital, he was treated with intravenous diuretics and required a period of inotropic support because of hypotension and renal dysfunction. We undertook a cardiac MRI scan to investigate the etiology of heart failure. The MRI showed a dark liver and mid wall late gadolinium enhancement, raising the possibility of an iron-overload cardiomyopathy (see figure). Iron studies were abnormal with serum Ferritin 6654 mcg/L and transferrin saturation (TSAT) 100%. We repeated the MRI scan with T2* sequences and this showed iron overload in the heart (T2* 10ms) and liver (T2* 2.1ms). We made a diagnosis of iron overload cardiomyopathy with probable juvenile form of haemochromatosis. Genetic studies have confirmed this with compound heterozygosis for 2 mutations in HJV gene.

He was treated with iron chelation therapy, comprising intravenous Desferrioxamine 50 mg/kg/day as a continuous infusion and oral Deferriprone 100mg/kg/day. We looked for endocrine manifestations of haemochromatosis and found evidence of hypogonadotrophic hypogonadism. He was started on Testosterone supplementation. As his heart failure settled, we were able to wean inotropic support and establish conventional oral medical therapy for heart failure. He was eventually discharged from hospital with a peripherally inserted central cannula and continuous IV Desferrioxamine.

There was a dramatic response over three months, with complete resolution of heart failure symptoms, improvement in biventricular function (LVEF 40%, normalization of RV function) and complete suppression of NTproBNP levels. As his Ferritin level reduced, we stopped Desferrioxamine and then Deferriprone, converting to regular venesection for control of iron overload. He has returned to his studies.

Conclusions: Reversible causes of heart failure must be considered in any case of new-onset heart failure. Iron-overload cardiomyopathies may be diagnosed by a combination of iron studies, cardiac MRI assessment and genetic testing. Correct diagnosis and treatment may lead to complete recovery of cardiac function, avoiding treatments such as ICD implantation, mechanical circulatory support and heart transplantation.



Cardiac MRI

P1215

Constrictive pericarditis: a forgotten cause of heart failure

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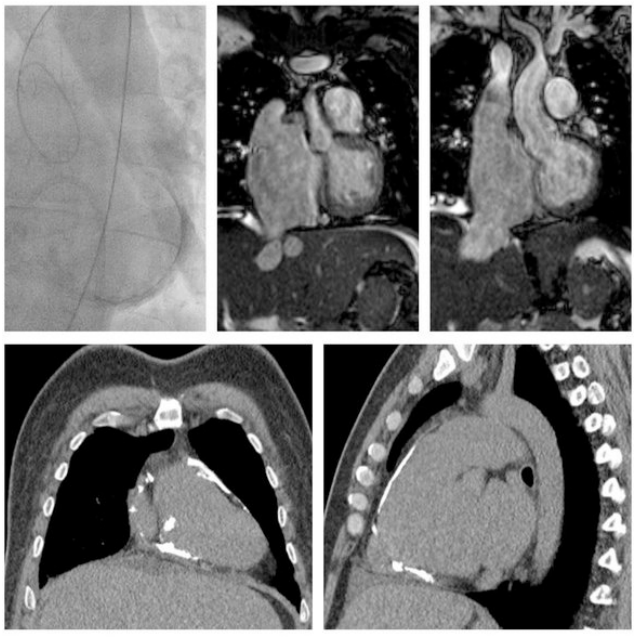
A 49 year old man with dyspnoea and lower extremities oedema was admitted the hospital. The past medical history was negative for cardiovascular disease. The physical exam was relevant for the presence of signs of congestive heart failure, the EKG showed atrial fibrillation. The echocardiogram showed an EF of 33%. Medical treatment for HFrEF was started. Coronary artery disease was rouled out with left cath and tachycardiomyopathy was considered the most probably aetiology.

After one year of treatment his clinical condition doesn´t improve, he developed worsening heart failure and had 2 more hospital admissions. A new echocardiogram showed an EF of 35%, with severe dilatation of atria, right ventricular dysfunction and a dense image compressing extrinsically both ventricles. A CT showed pericardial calcification and a MRI showed compression of both ventricles at the mid third by the pericardium. The diagnosis of constrictive pericarditis was confirmed by right heart cath that showed diastolic equalization of the right atrial pressure, right ventricular pressure, pulmonary artery pressure and pulmonary capillary wedge pressure. The myocardial biopsy was negative for infiltrative disease or myocarditis. An anterior pericardiectomy was performed. After surgery, our patient had a good evolution, with resolution of the heart failure symptoms and with an improve of the EF to 50%. The pericardium pathology reported degenerative changes with calcification and fibrosis, tuberculosis or malignancy were rouled out.

This patient did not have an evolution compatible with heart failure induce tachycardiomiopathy. This reveal the need of look for another cause of his symptoms. The new echocardiogram showed a dense image compressing cardiac chambers, which pointed to a restrictive pathology. The CT was very useful in order to identify the calcium in the pericardium and the right heart cath confirmed the presence of constrictive physiology and the only effective treatment was offered: pericardiectomy.

Constrictive pericarditis was not suspected at the beginning because he did not debuted with normal ejection fraction, which is more common in this pathology. This drive to a late diagnosis which can favour complications due to multiples episodes of decompensation, which turns in a worst prognosis. As a differential diagnosis there are toxic and hormonal cardiopathies and myocarditis; with further impairment, pulmonary thromboembolism, restrictive myocardiopathy and tumoral cardiac compression must be considered. In Colombia, tuberculosis is the main cause of constrictive pericarditis, however the pathological study ruled out this diagnosis.

Constrictive pericarditis is an important differential diagnosis in patients with heart failure with an unclear cause, in whom identification and treatment drives to a dramatic improvement in symptoms and ventricular function; therefore, a high grade of suspicion is required to make a prompt diagnosis.



Constrictive pericarditis

P1216

Difficult diagnosis of co-existence of constrictive pericarditis and cardiomyopathy due to rheumatoid arthritis

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Introduction: Constrictive pericarditis (CP) is the most common cardiac involvement of rheumatoid arthritis (RA). Heart failure (HF) may develop due to CP through pericardial stiffening that hampers diastolic ventricular filling. Cardiomyopathy (CM) is another manifestation of RA and may also cause HF. RA-associated cardiomyopathy is complex and it is not necessarily easy to assess its association and the type of cardiomyopathy accurately. This is particularly true if the patients with RA had both CP and CM because these cause in similar hemodynamic alteration. We present such a case.
Case: A 62-year-old female patient with a history of RA was administered prednisolone and tacrolimus for 8 years, and was considered to have associated CP 5 years ago. Her pleural effusion (PE) and dyspnea on exertion (DOE) due to CP was incremental recent several months, and a work-up for surgical treatment was initiated. She was in sinus rhythm with a heart rate of 88. Her jugular venous pressure with sitting-up position increased to the level of the right earlobe. Laboratory findings showed normal renal function with brain natreutic peptide (BNP) of 345 pg/ml. The PE was transudative. Transthoracic echocardiography (TTE) revealed a septal bounce. Chest CT showed thickened pericardium. Invasive hemodynamics showed dip and plateau pattern in the bi-ventricles. According to these results, she underwent pericardiectomy. Histological finding of the resected pericardium was obviously fibrous thickening with calcification, supporting the diagnosis of CP. After the surgery, she had residual DOE with a further elevation in BNP (818 pg/ml). TTE showed a disappearance of the septal bounce without LV dilatation. Invasive hemodynamics was re-assessed a month after the operation. Mean pulmonary artery wedge pressure was 25 mmHg, mean right atrial pressure, 22 mmHg, right ventricular end-diastolic pressure, 23 mmHg, and left ventricular end-diastolic pressure, 29 mmHg, respectively. There was no ventricular interdependence by Valsalva maneuver. Histological finding of the myocardial biopsy showed moderate interstitial fibrosis with inflammatory cell infiltration, suggesting CM due to RA. Then, she received a titration of drugs for heart failure.
Discussion and
Conclusions: This case was initially considered to have only CP because there was clear evidence of CP in imaging modalities such as echocardiography and cardiac CT, and because hemodynamic alterations were explained solely by the presence of CP. However, there was little improvement in HF symptoms after surgical treatment, and the association of CM became evident. A slight increase in BNP level may have been only a clue of the association of CM with CP before surgery in this particular case. Future studies are definitely required to assess the presence or absence of CM and CP in a sophisticated fashion in patients with RA.

P1217

A cause of left ventricle dilatation and dysfunction which may benefit from aetiological therapy

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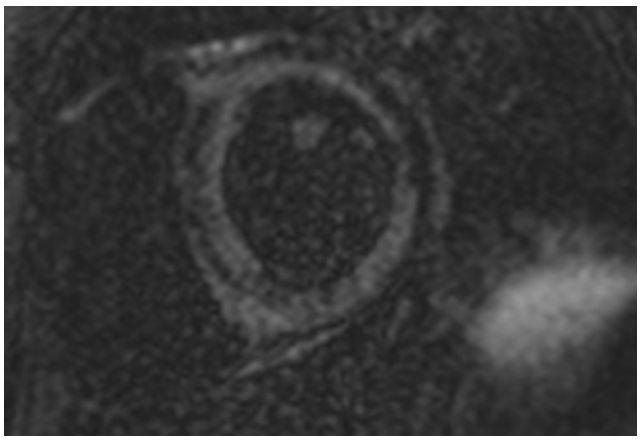
A 54-year-old male presented with worsening dyspnoea and chest pain on exertion in the last 3 months. He denied any history of alcohol/drug abuse and no relevant family history of cardiovascular disease was identified. His blood pressure control was optimal on a combination of 5/1.25/5mg perindopril/indapamide/amlodipine. Physical examination revealed fine bibasilar crackles and no cardiac murmurs. Initial laboratory data showed elevated NT-proBNP (2013 pg/ml) and hs-Tn (68.6 ng/l), normal renal and hepatic function. The invasive angiography revealed normal epicardial coronary arteries.
The echocardiography showed a dilated left ventricle (LV), with asymmetrical septal hypertrophy (19mm) and severe systolic dysfunction due to global hypokinesia (ejection fraction 38%, with severely impaired global longitudinal strain of the mid and basal myocardial segments with apical sparing). Both atria were severely dilated and the transmitral Doppler showed a restrictive pattern. Despite LV dilation and hypertrophy, the ECG showed low voltage rather than LV hypertrophy.
In this context an infiltrative myocardial disease was suspected and a CMR was pursued, which confirmed both LV and right ventricle dilation, hypertrophy and systolic dysfunction. Moreover, a diffuse transmural myocardial hyperenhancement was seen on LGE sequences typical for cardiac amyloidosis (figure). T1 mapping was suggestive of a highly expanded interstitium with an extracellular volume fraction of 67%, while the T2 imaging showed no evidence of oedema.
A complete work-up for systemic amyloidosis revealed high blood values of free lambda chains with a free kappa/free lambda ratio of 0.01. The abdominal fat biopsy was positive for amyloid deposition while the genetic testing was negative for TTR mutations. A diagnosis of AL cardiac amyloidosis (CA) was made and targeted chemotherapy with a triple regimen of bortezomib/cyclophosphamide/dexamethasone was initiated.
Cardiac involvement in amyloidosis usually presents as a nondilated cardiomyophathy with concentric hypertrophy and restrictive diastolic pattern. We hereby report the case of a patient who presented with LV dilatation, asymmetrical septal hypertrophy and severe systolic dysfunction, in which the diagnosis work-up indicated amyloid deposition to be the etiologic process.
Although the endomyocardial biopsy is considered to be the gold standard for diagnosing CA, CMR provides a pathognomonic pattern which accurately differentiates CA from other specific cardiomyopathies such as the hypertrophic cardiomyopathy, hypertensive heart disease or Fabry disease.
Early diagnosis is imperative in CA since both AL and ATTR forms benefit from specific aetiological therapy. While the classical heart failure drugs are inefficient or may be even dangerous in patients with CA due to a susceptibility to orthostatic hypotension, the development of targeted therapies improved the prognosis to a median survival >5 years.



figure

P1218

Coronary artery disease in a systemic sclerosis sine scleroderma female patient

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INTRODUCTION: Scleroderma sine scleroderma is part of the scleroderma spectrum of diseases. Skin involvement is lacking in this subtype, however, typical scleroderma internal organ involvement is present. Cardiac involvement in scleroderma is characterised by fibrosis extended to the endocardium, conducting tissue, myocardium and pericardium, resulting in rhythm and conduction disturbances, pericarditis, valvular regurgitation and/or heart failure. Myocardial fibrosis has a focal distribution involving both ventricles and can be distinguished from coronary atherosclerosis using cardiac magnetic resonance: fibrotic lesions are inconsistent with the coronary distribution, immediate subendocardial layers are affected, and hemosiderin deposits typical for atherosclerosis are absent.
Coronary artery disease in scleroderma patients is known to have an unremarkable prevalence that could be comparable to general population, as inflammation is less important in scleroderma when compared to other rheumatic diseases. However, recent reports highlight the possibility of subclinical silent involvement of the coronary arteries that might be detected using imaging studies such as single-photon emission computed tomography, magnetic resonance and computed tomography.
CASE PRESENTATION: We report the case of a 58 year old woman with a history of inflammatory arthritis with an undetermined cause nor an underlying specific treatment. The patient developed a non-ST elevation myocardial infarction (NSTEMI), 2 month prior to admission. She had no documented history of heart disease, or a notable dyslipidemic profile.
At admission, the patient presented dyspnoea, dysphagia, dry cough, Raynaud's phenomenon, important bilateral ankle synovitis. An extensive panel of imaging (echocardiography, computed tomography and cardiac magnetic resonance

scans), respiratory (spirometry) and digestive (, abdominal ultrasound, upper digestive endoscopy) studies were performed. Laboratory tests were negative for specific rheumatic disease antibodies, including scleroderma, nonetheless, she did present high erythrocyte sedimentation rate, positive C-reactive protein. Data collected rise the suspicion of scleroderma sine sclerodema, with ischemic heart disease, myocardial and subendocardial fibrotic lesions suggestive of a primary cardiac involvement, mild pulmonary hypertension, interstitial lung disease, esophageal dysmotility.
CONCLUSIONS: Our patient's case highlights the importance of early sensitive investigations and is an advocate for the possibility of coronary artery involvement as a result of scleroderma spectrum of diseases.

P1219
The clinical case of cardiac amyloidosis associated with multiple myeloma

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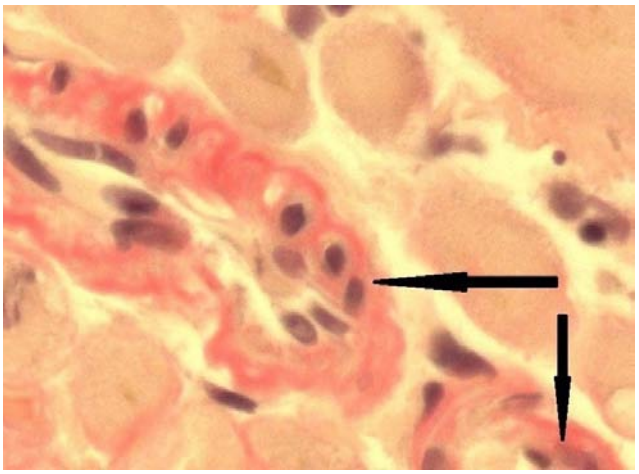
Nowadays, amyloidosis is a group of diseases with diverse clinical signs characterized by extracellular deposition of insoluble pathological fibrillar proteins leading to development and progression of heart failure. Clinical manifestations are very diverse which leads to late diagnosis and the only method for determining the type of amyloidosis is a biopsy followed by histochemical research. We present a clinical case of cardiac amyloidosis associated with myeloma and confirmed by a morphological study. The case describes a 67-year-old patient complaining of irregular heartbeat, alopecia for 3 years and a 13 kg weight loss in the last 6 months. She suffered from acute myocardial infarction with complications: pulmonary edema, bilateral hydrothorax; peripheral edema. After 1 month she was hospitalized with blood pressure of 90/60 mm of mercury, hepatomegaly and peripheral edema. Blood analysis: hypoproteinemia. Urinalysis: Bence-Jones protein. Electrocardiography showed sinus tachycardia with a heart rate of 104 beats per min. In laboratory tests data for myeloma were obtained. Invasive coronary angiography was performed, no coronary atherosclerosis was detected. Magnetic resonance imaging showed both ischemic and non-ischemic (amyloidosis/ glycogenosis) damage in the background of myocardial degeneration (Fig. 1). An endomyocardial biopsy of the right ventricle was performed: positive periodic acid Schiff substance in the interstitium and in the endocardium, amyloid deposits are determined.
Based on all the data it was possible to verify the diagnosis of primary cardiac amyloidosis, probably of the AL type associated with myeloma. During therapy with beta - adrenergic blocker, ACE inhibitor, diuretics hydrothorax was stopped but hypotension, severe weakness, insomnia and lack of appetite persisted. The patient was transferred to the Department of Nephrology and chronic hemodialysis where bone marrow trepanobiopsy was performed and the diagnosis of myeloma and renal amyloidosis was confirmed. Hydrothorax and hydropericardium in the hospital recurred, weakness increased, cachexia, hypotension, pulmonary edema recurred. The patient died in the intensive care unit in two weeks.
This clinical case demonstrates the complexity of timely in vivo diagnosis of amyloidosis and the selection of adequate drug therapy which is associated not only with the limited ability to establish an accurate diagnosis and the lack of specific treatment in most cases but also with the late visit of patients for medical care. Thus, the development/ improvement of non-invasive screening methods of examination will allow to identify pathology at earlier stages with the possibility of selecting effective drugs and in some cases – heart transplantation.



P1220
Numb Chin syndrome, intracardiac mass in right ventricle and pulmonary nodules as metastasis of diffuse large B-cell lymphoma (DLBCL) of non-germinal center (non-GC) type

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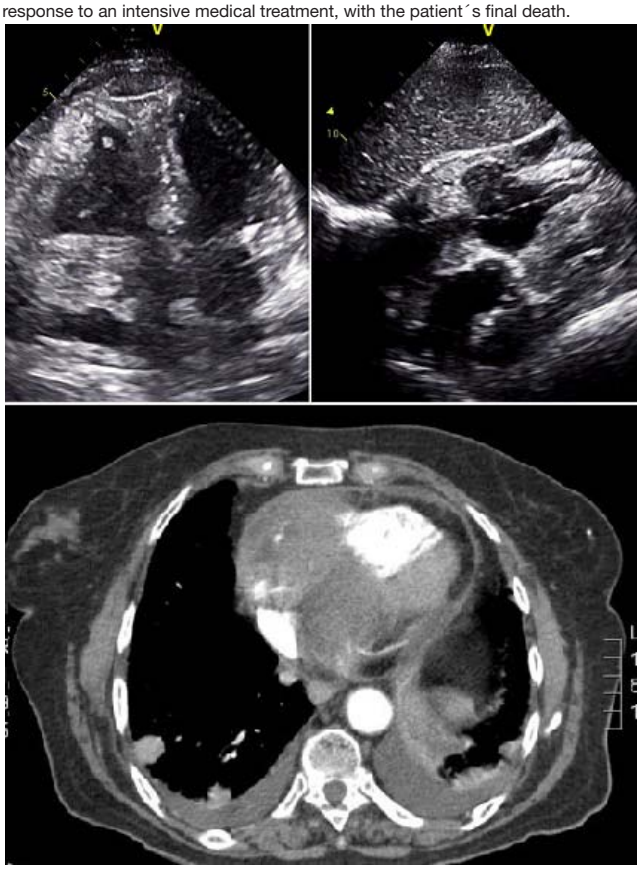
A 74-year-old female patient diagnosed with myelodysplastic syndrome (MS) with 1,5 years of follow-up, presented heart failure with a NYHA III functional class for last 2 months, dyspnea and bimalleolar edema, bibasal lung crackles on auscultation, high BNP levels (1500 pg/ml) and cardiac enzymes levels not elevated, with a first episode of hypoesthesia and pain over the chin in the region supplied by mental nerve and its branches or Numb Chin Syndrome (NCS).
Angiotomography of the chest showed pulmonary segmentary thromboembolism, pulmonary nodules, bilateral hiliar and mediastinal adenopathies, pericardial and bilateral pleural effusion and heterogeneous and irregular solid thickening of the cardiac base/right ventricle (RV). The ECG showed ST depression in leads V1 to V3 and negative T wave in leads III and aVF. Echocardiography showed LA dilated, LV showed mild diastolic dysfunction with preserved ejection fraction (70%), with large mass at the tricuspid valve ring and posterior interventricular sulcus that includes the right coronary artery, of smooth profile, which captures contrast and extends with infiltrating aspect to the entire RV free wall, that is thick and heterogeneous in appearance, no pericardial effusion and normal flows.
Ultrasound-guided lung nodule biopsy was diagnostic of suspected non-Hodgkin lymphoma B. Waiting to transesophageal echocardiography biopsy, the patient presented complete atrioventricular block. It was then decided by cardiac and thoracic surgery, pacemaker implantation and open lung wedge biopsy to establish the correct histological diagnosis prior to treatment.
This one was from diffuse large B-cell lymphoma (DLBCL) of non-germinal center (non-GC) type, stage IV (pulmonary and possible cardiac metastasis) with a high risk international pronostic index (IPI).
In this moment, evidence of worsening heart failure was observed. Treatment was started with rituximab plus chemoteherapy regimen including liposomal adriamycin (lower cardiotoxicity) and prednisone. After 4 days, the patient presented severe acute respiratory failure with distress that required admission to an intensive care unit. The evolution was torpid, requiring invasive mechanical ventilation and without response to an intensive medical treatment, with the patient´s final death.



NCS is an uncommon underappreciated though well documented neurological manifestation of metastatic malignancy. Together with the pulmonary involvement and cardiac mass, the first possibility is metastasis of a primary tumor (solid organ, hematologic-lymphoma,..).DLBCL is aggressive and fast-growing (60% diagnosed in advanted stages). The extranodal involvement (40%) in our patient was cardiac, pulmonary and peripheral nerves. Due to the type and stage of the lymphoma, IPI, affected organs and cardiotoxicity of treatment, it is an entity of difficult diagnosis, poor prognosis with serious complications and a high mortality, as occured in this case.

P1221

Takotsubo-like syndrome in a patient with BRAF mutated metastatic lung cancer

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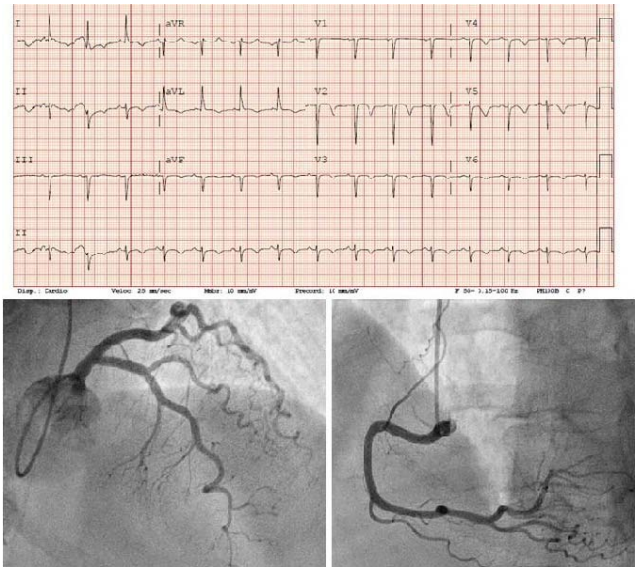
A 72 year-old woman was admitted to hospital with dysnea. She had a history of lung adenocarcinoma with liver metastasis and bilateral carcinomatous lymphangitis diagnosed one year before. She received treatment with carboplatin and pemetrexed and nivolumab without response. Initial molecular testing revealed a BRAF V600E mutation so treatment with trametinib/dabrafenib was initiated 4 months before admission.The patient complained of progressive shortness of breath, orthopnea and intermittent opressive chest pain the last 4 days before admission. Heart failure was diagnosed based on bilateral pulmonary crackles on examination, an X-ray that showed bilateral pulmonary oedema and NT-pro-BNP of 7339 pg/mL. The treatment with trametinib/dabrafenib was stopped because of suspected cardiotoxicity. High-sensitivity cardiac troponin was elevated (peak level 261.5 ng/L) with ischemic kinetic and ECG showed left axis with profound negative anterolateral T waves and prolonged QT. A coronary angiography was performed and showed coronary arteries without stenosis. The echocardiogram revealed normal left ventricle (LV) size with severe systolic dysfunction due to extensive anterolateral and apical akinesia with hyperkinetic basal LV. Thus the diagnosis of Takotsubo-like syndrome was established. In the following hours the patient progress to cardiogenic shock with elevated serum lactate and inotropic support with levosimendan was required. Rapid improvement was observed with hemodynamic recovery and resolution of heart failure. Treatment with B-blockers and ACE inhibitors was started. A cardiac magnetic resonance, done 1 week after, evidenced normal LV function without regional wall motion abnormalities. No myocardial oedema or late gadolinium enhancement was proved. The ECG after 1 week was normal.

To our knowledge this is the first case report of tramefinib cardiotoxicity presented as Takotsubo-like syndrome. The treatment with BRAF and MEK inhibitors is usually used in melanoma. However, as persistent hyperactivation of the RAS-RAF-MEK-ERK pathway is common in solid tumours; their use is being extended. Tramefinib is a selective inhibitor of MEK 1/2. Cardiac adverse events include elevated blood pressure, prolonged QT duration, LV dysfunction and myocarditis. LV systolic dysfunction incidence varies from 3 to 9% and although it is not very frequent it can be life-threating. The specific effect of trametinib over cardiac cells is not well studied. It is likely the result of suppression of ERK1/2 activation in the heart; a receptor with cardioprotective effects. As MEK/ERK receptor is inhibited with tramefinib beta-adrenergic signalling shunts toward the cardiotoxic p38 MAP kinase pathway. That's why levosimendan was preferred instead of other inotropics with beta-adrenergic effect as dobutamine. Periodic cardiac function monitoring must be implemented in patients treated with tramefinib for early detection of cardiotoxicity.



ECG and coronary angiography

P1222

Acute heart failure in patient with cervical cancer

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Introduction

The frequency of cardiac tumors –primary or secondary- is very low. The heart is an uncommon site of metastasis due to relatively less vascularity of endocardium, continuous movement of myocardium, striated cardiac muscle,rapid blood flow circulation, and the lack of lymphatic communication of between the surrounding tissues. If the metastatic cancer is observed, the most common involved side is right, but lesions could be located everywhere.

The presence of cardiac metastasis from cervical carcinoma is extremely rare 1.23% based on autopsy findings.The distant metastases are most frequently spreads to liver, lungs, bones, brain and supraclavicular lymph nodes.The usual spreading route of these cervical carcinomas is hematogeneous through the cervical plexus, inferior vena cava into right atrium finally right ventricle.

Case report We report a case of 51 years old woman, with known cervical carcinoma since 1,5 year/T3N1M1/, after many courses of chemo and radiotherapies. She presented in intensive care unit, because of signs of acute heart failure one day prior hospitalisation. She had a severe dyspnea, central cyanosis, pulmonary edema, low blood pressure and extremities edema.

Her vital signs were poor: BP 70/40 mmHg, pulse rate 113 BPM/AF, respiratory rate of 43/min, PO2 65mmHg, PCO2 30mmHg and SpO2 of 83% on 3 L/min Oxygen via nasal canula.

ECG- atrial fibrilation 113 BPM, no signs of acute coronary disease. The chest X ray was with signs of pulmonary congestion.

The laboratory results were out of range: Hb 85 g/l, Plt 113 g/l , WBC 14,5 109/l, CRP 145 mg/l, ASAT 77,ALAT 68, Total protein 55 g/l, Alb 21 g/l,NT proBNP 1250 pg/l.

The heart ultrasound found a huge tumor of the free wall of right ventricle with dimensions -6/5cm. The lesion was 3.7cm wide, penetrate 3cm in the cavity of ventricle and almost 3cm in pericardium.There was an obstruction of the cavities both left and right due to the mass compression, poor LVEF 41%, RVEF 15% and pericardial effusion 250ml.

The abdominal echo showed multiple metastases in liver.

The patient refused either any CT scan or MRT.

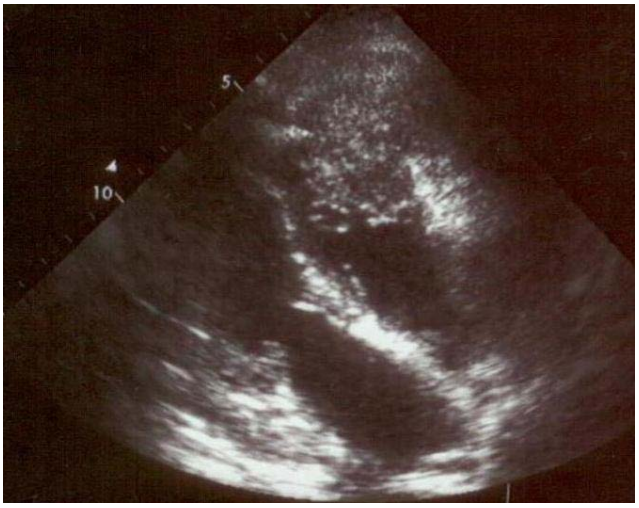
The therapy was:oxygen (nasal canula),diuretics,antibiotics,cardio inotropic medications,pain reliefs, hemotransfusion, protein substitution, hepato and gastroprotection,LMWH. Our patient refused any cardiac surgery and chemo-or radiotherapies. She was discharged on the 9th day in better condition, but with poor short time prognosis.

Do you think this patient needs anticoagulation?

Our desicion was to left her 1 month on LMWH but low doses.

Conclusion Cardiac metastases may cause many different symptoms heart failure, arrhythmias, intracardiac obstruction, pulmonary embolism and many others.The prognosis is extremely poor and it is important to suspect them in patient with history

of any malignant disease. There is no specific treatment but surgery and aggressive therapy may lengthen patients survival and quality of life.



P1223

The obsessional synovial sarcoma

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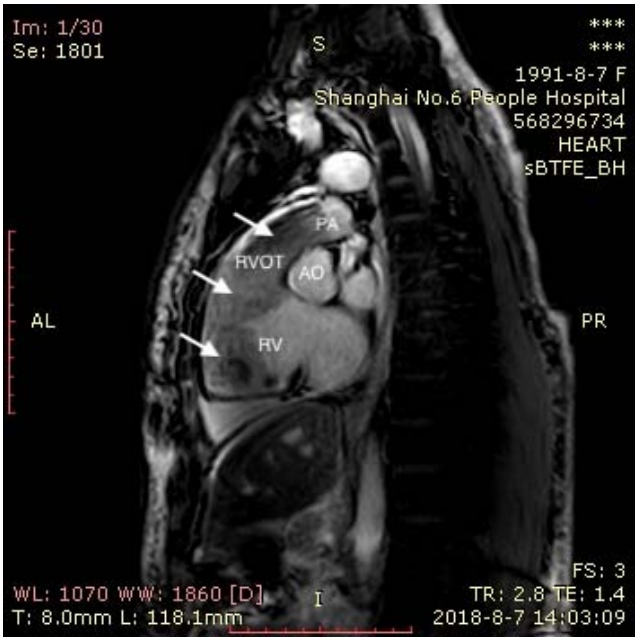
On behalf of: Shanghai No.6 Hospital Heart Center

A 25-year-old girl, suffering from persistent left upper abdominal pain, was diagnosed as left renal mass. Computed tomography (CT) showed the mass at the inferior of the left kidney with ipsilateral renal vein embolus. Histopathology demonstrated well-differentiated spindle cell tumor. Three months after the surgery, ICV embolus was found by follow-up CT angiography (CTA). The embolectomy was performed and ICV was replaced by artificial blood vessel. Relapse of the synovial sarcoma was confirmed by pathology. Six months later, complaining of dyspnea and palpitation, she was diagnosed as right ventricular mass by echocardiography. Further cardiac magnetic resonance (CMR) demonstrated a huge mass taking up 2/3 space of the right ventricle, striding over the tricuspid annulus and obstructing the right ventricular outflow tract (RVOT) . The mass was removed and her tricuspid valve was replaced emergently for fish like tumor eroded the valve. Spindle cell tumor was confirmed by histopathology again . Unfortunately, the patient died of infection and disseminated intravascular coagulation 45 days after the third operation. Radical nephrectomy and lymphadenectomy remain the most positive and effective approach to treat renal carcinoma, while the postoperative recurrence rate in 2 years is up to 50%. It is very urgent to find effective measures to prevent relapse of sarcoma.



CMR-RVOT

P1224

Successful video-assisted thoracoscopic atrial appendectomy for a 4-year-old child with intractable atrial tachycardia with tachycardia-induced cardiomyopathy

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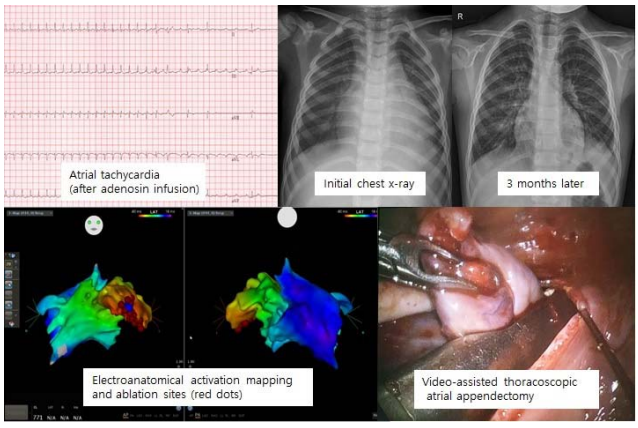
Case report: A 4-year-old boy visited the Emergency Department due to prolonged abdominal pain. His pulse rate was 208 bpm, blood pressure was 96/56 mmHg, body temperature was 36.5 °C, and oxygen saturation by pulse oximeter was 97%. He did not complain of palpitation, however, his mother said she could notice his precordial heaving since several days ago. His body weight was 22kg, and his weight has recently increased by 2kg. Chest x-ray showed cardiomegaly with pleural effusion. Echocardiography showed dilated all cardiac chambers and left ventricular ejection fraction (LV EF) was around 30%. Plasma level of B-type natriuretic peptide (BNP) was 3296 pg/mL. An EKG showed narrow QRS tachycardia without normal P wave. After adenosine infusion, ectopic P waves were apparent during atrioventricular conduction block. He was admitted to the pediatric intensive care unit for management of incessant ectopic atrial tachycardia (AT) and associated heart failure. Because he was not tolerated to even very low dose beta-blockers, he started amiodarone infusion. However, amiodarone infusion was discontinued because he showed recurrent Torsade pointes and non-sustained ventricular tachycardia with prolonged QT interval. We tried radiofrequency catheter ablation for ectopic AT using CARTO® system. There were multiple origins of AT in the left atrial appendage; anterior apex, inferior side, and posterior base. Even though we attempted multiple RFCA, AT was terminated and then frequently recurred at other sites. Finally, we decide to perform video-assisted thoracoscopic atrial appendectomy for refractory AT. Immediate after the appendectomy, AT was terminated and restored to sinus rhythm. Immediate postoperative LV EF was 40%, and it increased to 53% the day after the operation. Two months after treatment, LV EF was measured as 57% and BNP level decreased to 31 pg/mL. He had no arrhythmia during the 4-month follow-up.

Conclusions: In children, heart failure can present with atypical symptoms such as abdominal pain. Heart failure associated with incessant tachycardia can be improved by aggressive treatment of arrhythmias. Arrhythmia surgery should be considered for malignant arrhythmia that is not responding to drugs or radiofrequency ablation.



P1225

High degree AV block and ventricular septal rupture unmasking silent myocardial infarction.

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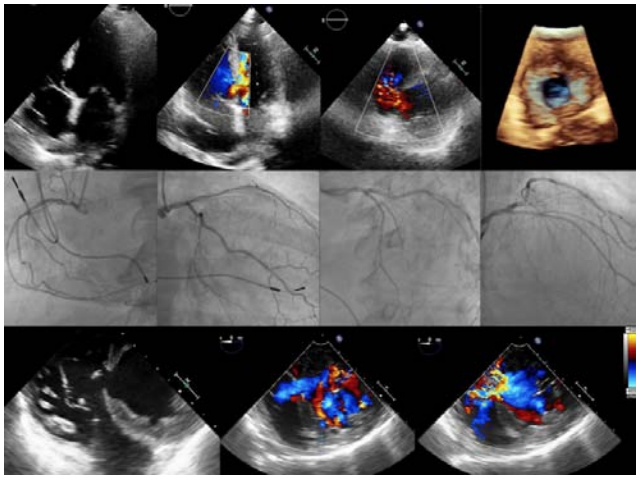
Ventricular septal rupture (VSR) is a rare mechanical complication of acute myocardial infarction (MI). An early diagnosis is necessary because of high mortality rates. Surgical or percutaneous repair is generally required but the timing is still a matter of debate. We report the case of a 79-year-old man affected by hypertension, who was implanted with a PM for a 2:1 atrioventricular (AV) block symptomatic for syncope. At that time transthoracic echocardiography (TTE) and laboratory analysis were not consistent with MI. Two weeks later he presented complaining dyspnea. At physical examination a new 3/6 systolic murmur, pulmonary rales, mild jugular distension, hepatomegaly and ankle oedema were present. BP was normal. ECG showed sinus tachycardia, first degree AV block, right bundle-branch block and left posterior fascicular block. Chest X-ray showed cardiomegaly and congestion. Diuretics and oxygen were started, but soon after the clinical picture deteriorated to pulmonary edema. TTE showed a dilated left ventricle with normal systolic function (EF 60%.) Unexpectedly, the exam revealed a ventricular septal rupture (VSR) in the infero-basal segment of the interventricular septum (14 mm), close to the tricuspid valve, with a left-to-right shunt. The septum showed a paradoxical movement as for right ventricle overload. The interrogation of the PM reported normal functioning. Coronary angiography showed a complete occlusion of the first septal branch of the left anterior descending artery. Right heart catheterization confirmed a left-to-right shunt with increase of pulmonary pressures. An intra-aortic balloon pump (IABP) was positioned. A diagnosis of recent silent MI complicated by high degree AV block and VSR was made. After Heart Team discussion, surgery was delayed to permit healing of the myocardium. In the ICU hemodynamic remained stable with i.v. diuretics and IABP. After 14 days, despite the challenging anatomy, a surgical repair with bovine pericardium patch was successfully performed with no residual shunt. This case singularly shows a AV block followed by a VSR as the sole signs of a silent MI. The diagnosis was challenging for the unusual presentation. The new systolic murmur heralded the mechanical complication and brought to the correct diagnosis. Echocardiography played a pivotal role in both diagnosis and surgical planning. VSR is still a hot topic because the optimal timing and type (surgical vs percutaneous) of repair is debatable.



Ventricular septal rupture following MI

P1226

Takotsubo cardiomyopathy as a rare complication of guillain-barre' syndrome

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Takotsubo cardiomyopath is defined as reversible left ventricular dysfunction mainly triggered by physical or emotional stress in postmenopausal women. It may be associated with different neurologic conditions such as intracranial hemorrhages, strokes and multiple sclerosis.
In following case report we will present Takotsubo cardiomyopathy secondary to severe
form of Guillain Barre syndrome and preceded by PRES syndrome
64 year old woman, without any previous serious medical condition, presented with hypertension, acute confusion and disorientation followed in next days by upper and lower extremity weakness. CT and MR scans disclosed patchy lesions in parietooccipital lobes which were consistant with posterior reversible encephalopathy (PRES) syndrome . CSF examination and EMG were in line with acute demyelinating polyneuropathy According to clinical, neurological and neurophisyological findings, diagnosis of Guillain Barre' syndrome (GBS) was established. In the meantime, muscular weakness progressed to quadriplegia and respiratory failure, accompanied by hypotension. Intubation and mechanical ventilation were needed. Treatment by intravenous immunoglobulin was introduced. Due to elevated troponin, ECG changes and heart failure signs with elevated BNP and congestion on lung x rey an acute coronary sindrom was suspected. Transthoracic echo revealed apical akynesia with hyperkinesia of basal segments and moderately reduced systolic function (EF 42%), without apical thrombus or left outflow tract obstruction. CT coronary angiogram ruled out sever coronary disease. Upon haemodinamic stabilisation, therapy with ACE inhibitor and β was commenced. After introduction of immunoglobulin therapy there was a substantial clinical improvement with successful weaning from mechanical ventilation. Blood pressure was in normotensive range. Repeated transthoracic echocardiogram performed 4 weeks later demonstrated normal systolic function, without any regional wall motion abnormality, confirming diagnosis of takotsubo cardiomyopathy. 6 months later patient was symptom free, without any neurological sequelae.
Takotsubo cardiomyopathy is usually reversible and self-limited. Nevertheless sever complicatons may develope in acute stage. Recognition and treatment of precipitating factors and predisposing disease is fundamental and may have an impact on improving prognosis and in preventing recurrence.

P1227

Native aortic valve endocarditis mimicking meningitis in a rare setting

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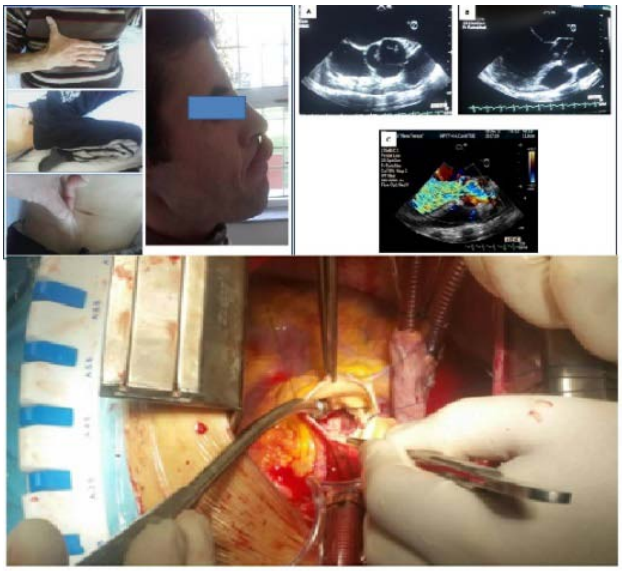
Introduction: The Ehlers-Danlos syndromes(EDS) are a group of connective tissue disorders that can be inherited,generally characterized by joint hypermobility,skin hyperextensibility,tissue fragility.Some of these pt have cardiac involvement which management is a challenge
Case report:A 38y.o male presented to the ER with viral infection signs(temperature, myalgia and respiratory symptoms),followed by headache,nucal rigidity.A cerebrospinal fluid analysis showed normal glucose,mild elevation of protein levels and a small number of cells,mostly neutrophils.Nasal culture and HIV test negative.The head CT normal.Considering a viral meningitis iv acyclovir was initiated.Because of constitutional findings(hypermobility of the big and small joints,hyperelastic skin,facial features,thoraco-lumbar kyphoscoliosis,long neck),the pt was consulted by a rheumatologist and an EDS diagnose was made based on Beighton Score(7/9) and Gorlins sign.A temp of 39.5°C persisted,dyspnea,cough,subcrepitant rales at the right lung base appeared.High levels of WBC and thrombocytopenia were present,negative hemocultures,high CRP(81.7mg/L).ANA(+++);IGA-(N);IGM-(5.65mg/dl);C3-(N).Ceftriaxon+levofloxacin were started.A diastolic aortic murmur was present,BP 120/50mmHg,HR 100/min.ECG had signs of LV hypertrophy and sinus tachycardia.The pt was evaluated by a cardiologist.TTE suggested an infective endocarditis(IE) of the native tricuspid aortic valve with several small vegetations on the noncoronary and right coronary cusp,aneurism of the noncoronary cusp(NCC) with probable perforation and severe aortic regurgitation(AR),LV dilation(74mm),normal EF(66%),mild MR,PFO,moderate TR,severe PAP(70 mmHg).A TEE(a week later)confirmed the NCC rupture,massive AR(2 jets),no visible vegetations and no perivalvular abscess.Vancomycin was added.After 10 days the pt was afebrile,dyspnea improved(NYHA 2),normal WBC,mild decline of Hb and RBC.CRP 36mg/dl,negative hemocultures.Antibiotics continued 4 weeks,afebrile pt with HF signs thus intervention was scheduled.A small abscess at the NCC level was noticed during cardiac surgey which reconfigured the aortic annulus through pericardial patch and replaced the valve with a mechanical prosthesis without complications.The pt recovered well,without HF signs
Conclusion:We present a case of IE mimicking initially a viral meningitis,diagnosed during a degenerative syndrome course similar to Marfan.The indication for surgery was HF.Despite valve destruction,VM dilation from fluid overload,a good tolerance of HF suggest a preexisting lesion of the aortic valve that can classify our pt in the

cardio-vascular form of EDS,rare and characterized by progressive cardiovascular lesions.Because of increased vascular fragility there is a high risk for severe bleeding and hematomas.Special care is needed during intubation and central venous catheters insertion.In case of valve replacement, suture dehiscence or aortic rupture during cannulation can happen more often.



EDS clinical features, aortic valve IE

P1228

A case of acute myocarditis due to 5-fluorouracil cardiotoxicity.

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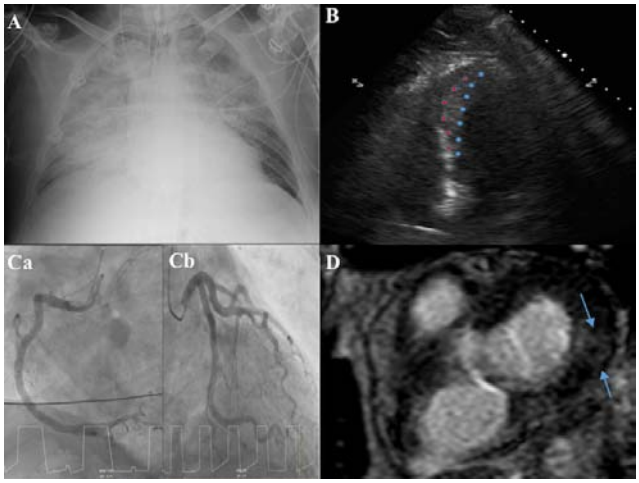
We present a case of a 56 years-old male, with stage III colorectal cancer (T3N2M0) undergoing chemotherapy treatment one month following surgical resection, without other medical history. The patient was receiving a cycle of chemotherapy, with intravenous oxaliplatin and 5-fluorouracil (5FU).
During treatment, the patient presented with chest pain, discomfort and perspiration. The first electrocardiogram (ECG), troponine levels and echocardiogram were normal. After a few hours, the patient developed respiratory failure due to acute pulmonary edema (image A) and cardiogenic shock, in need of orotraqueal intubation and vasoactive drugs. In the sequential ECG, ST segment elevation from V2 to V5 and I-II-aVF was appreciated, indicating an infarction code.
The coronary angiography demonstrated no lesions (Image Ca-Cb). That, joined with a new moderate systolic dysfunction of the left ventricle, made us consider a myocardial infarction with non-obstructive coronary arteries as a probable diagnosis. Cardiogenic shock progress to an INTERMACS 1 situation, led us to implant a venoarterial extracorporeal membrane oxygenation (ECMO) as a bridge to a definitive treatment decision. Furthermore, the patient presented arrhythmic storm with fast ventricular tachycardia and ventricular fibrillation, requiring 27 electric shocks, amiodarone, and finally propranolol to control the rhythm. After the initial stabilization, our patient presented with severe dysfunction of the left ventricle, without the possibility of opening of the aortic valve and the presence of an apical thrombus (image B: red line indicates the endocardium, blue line indicates the thrombus surface), requiring an increase of the dosage of inotropes.
With the suspicion of 5FU cardiotoxicity, we contacted with the oncology service, which recommended the use of uridine triacetate as an antidote. Upon administration the patient showed a gradual improvement, descending the need of vasoactive drugs and mechanical support. In a cardiac magnetic resonance image, we observed inferior-lateral-basal non-ischemic contrast pattern, which supported the diagnosis of acute myocarditis (image D).
Following 16 days of hospital admission, the patient recovered a normal left ventricular function and was discharged. Five months later, the patient continued to be stable, without any signs of heart failure and sustained normal left ventricular function.
The cardiotoxicity from chemotherapy drugs is a common complication that may appear during the treatment of different types of cancers. 5FU cardiotoxicity is a known adverse affect of this drug, however the mechanism of which this toxicity occurs in not clear. Uridine triacetate has been considered an effective antidote for the most severe cases of toxicity.



Images of the case

P1229

Takotsubo syndrome complicated by left ventricular outflow tract obstruction in a woman with chronic beta-blocker therapy

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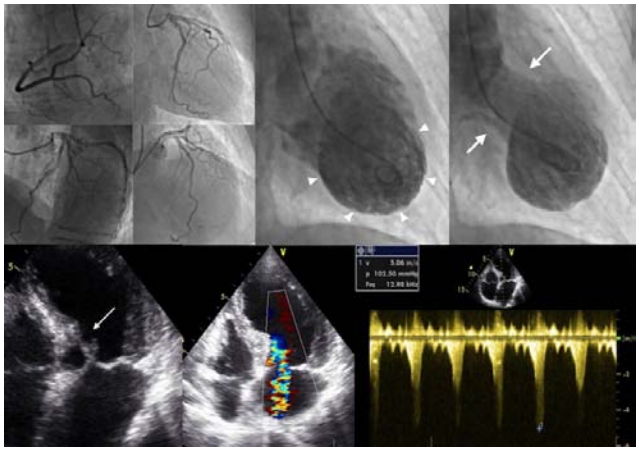
Takotsubo syndrome (TS) is characterized by acute and transient left ventricular (LV) regional systolic dysfunction. Although in most patients the myocardial dysfunction is reversible, the prognosis may be poor because serious life-threatening complications can occur, such as acute heart failure and cardiogenic shock.A 60-years-old smoker woman presented to the emergency department (ED) for sudden chest pain. She had a history of hypothyroidism and hypertension treated with bisoprolol 2.5 mg once daily. Vital signs were normal. On cardiac auscultation a 3/6 olosystolic murmur was audible in all the auscultatory areas, lung sounds were clear. ECG showed sinus rhythm and ST-segment elevation in the inferior leads and in V4-V6 leads. Intravenous nitroglycerin (NTG) was started in the ED and she was transferred in the cath lab. At the angiography the coronary arteries were normal, while ventriculography showed an apical ballooning of the apex with severe mitral regurgitation (MR). A diagnosis of TS complicated by severe MR was made and the patient was admitted to the Intensive Coronary Unit. Soon after, she developed hypertensive pulmonary edema (BP 160/100 mmHg) which was treated with repeated bolus of loop diuretic and increased nitrate infusion. Unexpectedly, she presented abrupt hypotension (BP 70/50 mmHg), tachycardia (HR 110 bpm), worsening dyspnea and diaphoresis with mild elevation of serum lactates (2.5 mmml/L). The transthoracic echocardiography (TTE) showed severe functional MR secondary to systolic anterior motion of the mitral valve (SAM), with severe dynamic left ventricular outflow tract obstruction (LVOTO), peak gradient > 100 mmHg. NTG and diuretics were immediately stopped. After administration of intravenous methoprolol and fluid, BP normalized and LVOTO decreased. The subsequent course was uneventful: oral bisoprolol was continued and TTE documented progressive improvement of the LV systolic function, with disappearance of SAM, dynamic LVOTO and MR.The present case shows how TS can occur during chronic beta-blockade. Treatment of hypertensive pulmonary edema by intravenous loop diuretics and nitrate can exacerbate the LVOTO in the setting of TS and trigger cardiogenic shock. Despite severe hypotension, the intravenous administration of a beta-blocker, by reducing the LV basal hyper-contractility, may remove the dynamic LVOTO and the associated MR with stabilization of the hemodynamic conditions.



Takotsubo syndrome complicated by LVOTO

P1230

Fulminant myocarditis: should we wait for recovering? Biopsy says no

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We report the case of a healthy 24-year-old woman who presented to the Emergency Department of another Center with a two-days history of fever (38°C), nausea, vomiting, diarrhea and epigastric pain. Hemodynamic instability and signs of general hypoperfusion were observed.

Laboratory analysis revealed leukocytosis, impaired renal and hepatic function and a marked elevation of CKs, CK-MB and troponin. ECG (Figure 1-a) showed ST elevation in aVR and V1-V2, with a diffuse ST depression in other leads. Initially diagnosed with STEMI, she was treated with heparine and double antiplatelet therapy, and emergently transferred to our hospital for coronary angiography, which showed no artery disease. Initial echocardiogram showed severe biventricular dysfunction and diffuse hypertrophy suggesting edema. Swan-Ganz measurements showed cardiac index 1.3L/min/m2. An intra-aortic balloon pump was implanted and inotropes and vasopressors were initiated due to cardiogenic shock.

She quickly developed severe multiorgan dysfunction, with hypertransaminasemia (peak ASAT 44711U/L) and anuria. Two hours after admission, while she was being transferred to the OR for central biventricular support implant, she presented a cardiac arrest from ventricular tachycardia and was placed in veno-arterial ECMO. In the following hours, heart rhythm changed from persistent ventricular tachycardia to an agonic rhythm and asystole (Figure 1-b). After 24hours, mechanical cardiac support was converted into a mini-thoractomy biventricular assist device, associated to an oxygenator due to pulmonary edema. An endomyocardial biopsy was then obtained, which showed a diffuse lymphocytic T-type infiltrate (Figure 1-c), with diffuse and severe myocardial destruction, confirming the diagnosis of myocarditis. Considering her fast progression and the diffuse tissue damage on biopsy, she was placed in the highest priority list for emergent heart transplantation, which was successfully performed 4 days later. Post operative heart transplantation course was uneventful, with progressive organ recovery. She was discharge to a rehab facility 3 weeks after surgery.

Explanted heart pathological report became available 2 weeks after transplant. The histopathological evaluation of the explant specimen revealed a diffuse and dense interstitial lymphocytic infiltrate, which immunohistochemically consisted of CD3+ T lymphocytes with very few accompanying CD20+ B lymphocytes. Immunohistochemical staining for C9 exhibited extensive necrosis of the myocardial fibers (Figure 1-d). Severity of these results perfectly matched the aggressive clinical presentation, and confirmed the scarce possibility of myocardial recovery.

P1231

Rare cause of acute heart failure in a young patient

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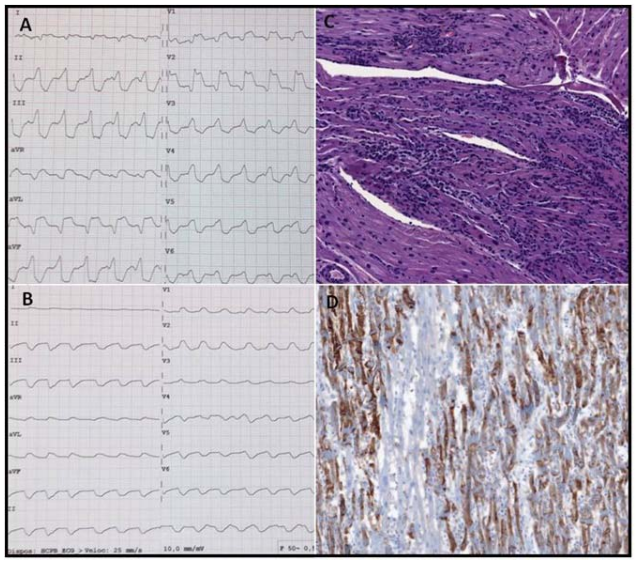
Introduction: Primary cardiac lymphoma (PCL) is extremely rare and accounts for 5-6 % of primary malignant cardiac tumors and 1-2% of all primary cardiac tumors, and mainly manifests over the 5th age decade, and in immunocompromised patients or in HIV. PCL generally emerges in the right atrium or right ventricle and has a poor prognosis.

Results: This is an unusual case of a 23 year old male referred to our hospital with increasing severe dyspnea, chest pain, palpitations, signs of upper venous congestion and elevated NT-proBNP (395.5 pg/ml). Echocardiography and cardiac MRI findings revealed a large cardiac mass infiltrating the right atrium (tumor diameter 5.5 cm), right ventricle (tumor 3 cm) and tricuspid valve (Figure 1a). Cardiac surgery was performed with tumor resection and bioprosthetic tricuspid valve replacement. Histological assessment yielded diffuse large B-cell lymphoma. Additionally, the patient underwent four cycles of chemotherapy (CHOP: cyclophosphamide, doxorubicin, vincristine, prednisone), without further metastasis. Two years post surgery, the patient is asymptomatic, but has elevated cardiac enzymes with troponine and NT-proBNP. Echocardiography displayed normal LV ejection fraction, but impaired global systolic longitudinal strain (GLS) as subclinical sign of heart failure (Figure 1c and 1d). Assessment by MRI showed normal right ventricular function and normal function of the tricuspid valve bioprothesis also in echocardiography (Figure 1b).

Conclusion and implications for clinical practice: Rapid imaging in heart failure is crucial to differentiate the etiology. Cardiac tumors causing heart failure need urgent surgical treatment. Patients undergoing chemotherapy require cardio-oncology follow up with echocardiography for detection of cardio-toxicity and early start of heart failure therapy.

Figure 1a Pre-surgery: MRI demonstrates an inhomogeneous enhancing mass (arrow on four chamber SSFP-sequence in systole), arising in the region of the



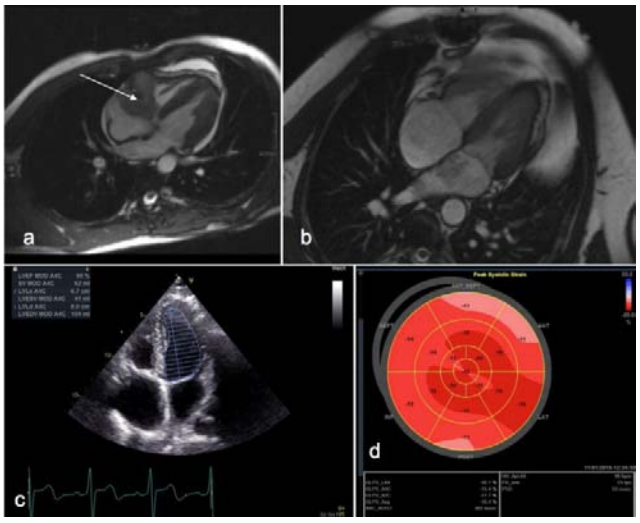


Figure 1

right atrium and right ventricle with tricuspid valvular involvement. The mass has polylobulated shape and does not infiltrate into the anterior mediastinum. There is a moderate pericardial effusion, indicating acute heart failure.
b Follow-up: right ventricular function assessment by cardiac MRI two years after surgery.
c Assessment of left ventricular ejection fraction by echocardiography.
d Assessment of global longitudinal strain of left ventricle by echocardiography.

P1232

Leptospirosis: an unusual cause of multiorgan failure and severe cardiac involvement with impressively wide QRS complex

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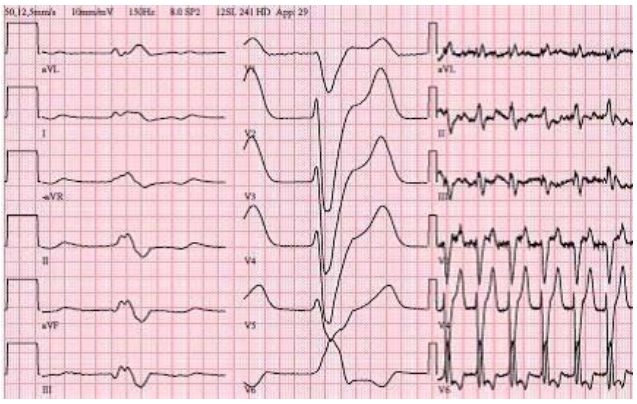
Case Report: A 64 years old male patient presented to the Emergency Department with complains of fatigue, malaise and anorexia. The patient also gave a history of diarrhea and vomiting one-week prior. He worked as a fish dealer and gave no history of significant past illness. On presentation, he had no fever, was hemodynamically stable with mild tachypnea. The ECG showed sinus tachycardia with left bundle branch block (LBBB) and QRS duration of 258 msec. Clinical features revealed icterus, peripheral cyanosis, no signs of congestion and a normal neurological status. Bedside Echocardiography showed: a dilated left ventricle with generally, moderate impaired function without any pericardial effusion. The blood samples revealed elevated infection parameters and severe metabolic acidosis with elevated lactic acid. Additionally, he had an acute renal failure with electrolyte disturbances and even acute liver failure as well as sings of acute myocardial injury. As his clinical status deteriorated, he was immediately shifted to the intensive care unit, where he received inotropes, fluids, antibiotics, and was put on hemodialysis. A temporary pacemaker was also implanted because of tachy-brady arrhythmias. The infectious disease consultant suggested examining serology for Leptospira and even considered mushroom poisoning as an alternative diagnosis, because the patient mentioned consumption of self-collected mushrooms. Therefore, he was transferred to the liver transplantation center for further investigation. Coronary angiography ruled out coronary disease, cardiac magnetic resonance showed signs of myocarditis and severely impaired biventricular systolic function. Thus, he was a poor candidate for a liver transplant and was treated conservatively. Fungal poisoning could be excluded, as the mushroom sample was innocuous. However, leptospira-specific immunoglobulin M (IgM) turned out to be highly positive, confirming the diagnosis of Leptospirosis. Further interrogation revealed that he was exposed to rats in his workplace. On subsequent days, the patient showed significant clinical recovery with normalization of biochemical parameters. He was discharged after 75 days of hospital care with only a mild degree of heart failure and an ECG showing normal sinus rhythm and LBBB with QRS duration of 150 msec.
Discussion: Here, we present a case of Leptospirosis with multiorgan dysfunction (Weil´s disease) including acute renal and liver failure and non-ischemic biventricular heart failure with cardiac arrhythmias. The ECG showed LBBB with an unusually wide QRS complex attributed to electrolyte disturbances and myocarditis. Cardiovascular involvement in Leptospirosis tends to predict poor outcome.
Conclusion: Cardiac manifestations in leptospirosis are variable ranging from myocarditis and heart failure to severe cardiac arrhythmias. Meticulous intensive care management and prompt antibiotic therapy are crucial, as laboratory confirmation can be delayed.



The patient´s ECG on admission

P1233

Postpartum acute heart failure in a patient with bicuspid aortic valve

N Avram[1]; GD Baltag[1]; S Guberna[1]; R Brezeanu[1]; A Lacraru[1]; A Avram[1]; I Dimitriu[1]; V Chioncel[1]; I Calangea[1]; A Catana[1]; A Teasa[1]; A Ion[1]; CJ Sinescu[2]; CL Andrei[2]
[1]Bagdasar-Arseni Emergency Hospital, Cardiology, Bucharest, Romania; [2]University of Medicine and Pharmacy Carol Davila, Bucharest, Romania

A 27-year-old woman was hospitalized for orthopnoea and major legs swelling progressively aggravated in the last month. Medical history: caesarean delivery 5 weeks before, bicuspid aortic valve (BAV) with moderate stenosis and minimal regurgitation incidentally discovered during pregnancy. She had been monitored until birth with no significant changes of the aortic valvular dissease (AVD) or LV function (LVEF the day before cesarean- 50%). At admission: orthopnea, subcrepitant rales, decreased oxygen saturation (75%), systemic congestion, BP= 100/60 mmHg, sinus tachycardia (126 bpm), ejection aortic murmur, small suprapubic postoperative dehiscent wound, pallor of teguments and mucous membranes. Laboratory test: elevated NTproBNP level, mild anemia and hepatic cytolysis syndrome. ECG: sinus rhythm, QRS axis +30 degrees, no change of repolarization, no rhythm or conduction disorders. Transthoracic echocardiography: eccentric LV hypertrophy, severe global systolic LV dysfunction, LV apical trombus, BAV: severe stenosis (aortic valve area (AVA) = 1 cm2), mild regurgitation, RV dysfunction. Transesophageal echocardiography: BAV, severe aortic stenosis (AVA= 0.95 cm2); two hyperecogenic structures, in the left atrium (LA) and LV apex suggestive of thrombi. Clinical and paraclinical data concluded the diagnosis of acute congestive heart failure with LV severe dysfunction, BAV with low-flow low-gradient stenosis and minimal regurgitation. To find the precipitating factors that led to acute heart failure we incriminated three potential causes: peripartum cardiomyopathy, myocarditis, infective endocarditis. Repeated hemocultures had negative results, cardiac MRI excluded myocarditis and confirmed echocardiographic findings. Diagnosis: Acute HF with LV severe systolic dysfunction. BAV with low-flow low-gradient stenosis and minimal regurgitation. Peripartum cardiomyopathy with postpartum late onset. The patient received conventional treatment for acute heart failure and her evolution was favorable. Betablocker and ACE inhibitor were added in titrated doses after hemodynamic stabilization, with good tolerance. 6 months after this acute event ecocardiography showed systolic LV improvement (LVEF= 40%). Particularity of the case: BAV with moderate stenosis and minimal regurgitation, asymptomatic for 27 years, incidentally diagnosed with the occasion of cardiac examination during pregnancy in a patient that developed cardiomyopathy with severe LV dysfunction 2 weeks after child birth. Discussions: 1. Counseling of a nulliparous pregnant woman without other cardiovascular risk factors who was incidentally diagnosed with moderate congenital aortic valvular disease during pregnancy regarding the maintaining or not of the pregnancy before the correction of valvular disease. 2. Counseling the same patient for future pregnancies in relation to the risk of recurrence of cardiomyopathy.

Basic science - Cardiomyopathies

P1235

HFWM: - Title: Selenium deficiency impairs mitochondrial function in human cardiomyocytes and is associated with worse clinical outcomes in patients with heart failure

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On behalf of: BIOSTAT-CHF
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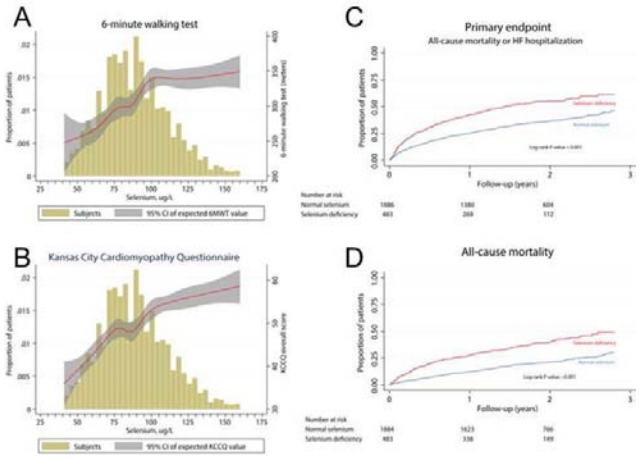
Background: Selenium is an essential trace element involved in the antioxidant defense mechanism. Extreme selenium deficiency can lead to dilated cardiomyopathy. However, whether modest deficiency have an impact on outcome in patients with heart failure (HF) is currently unknown. Here, we investigate the involvement of selenium deficiency in worsening of HF symptoms and outcome, at a clinical and molecular level.
Methods: BIOSTAT-CHF is a multinational, prospective, observational study cohort that included patients with worsening heart failure. Serum selenium levels were measured by mass spectrometry. Primary outcome was a combined outcome of all-cause mortality and hospitalization for HF, secondary outcome was all-cause mortality alone. To investigate the direct effects of Se deficiency on cellular level, human cardiomyocytes were cultured selenium deficient. Mitochondrial metabolic function and distribution, cellular ROS levels, mRNA expression of cellular stress and metabolic markers were assessed.
Results: In the 2382 HF patients included in this study, selenium deficiency (<70 ug/L) was found in 485 (20.4%) of all patients. Selenium deficient patients were older,

more often women with a higher NYHA class, more severe signs and symptoms of HF and a lower exercise capacity (6-Minute Walk Test [P <0.001]) and quality of life (Kansas City Cardiomyopathy Questionnaire [P <0.001]). Selenium deficiency was independently associated with higher rates of the primary combined outcome (Hazard ratio [HR] 1.23; 95%CI 1.06-1.42) and all-cause mortality alone (HR 1.52; 96%CI 1.26-1.86). Finally, in human cardiomyocytes, low selenium reduced mitochondrial function and therewith oxidative phosphorylation and increased intracellular ROS levels.

Conclusions: Selenium deficiency in heart failure patients is independently associated with an impaired exercise tolerance, a 50% higher mortality rate and an impaired mitochondrial function in human cardiomyocytes. Clinical trials are needed to investigate the potential role of selenium supplementation in patients with worsening HF and low selenium levels. Translation of our findings towards clinical application of selenium as a low cost "nutraceutical" should be initiated.



P1236

HFWM: - Title: Gene therapy with phosphodiesterase 4B in a murine model of pressure overload-induced cardiac hypertrophy

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Funding Acknowledgements: DZHK, ERA-CVD

Background: Heart failure (HF) is characterized by chronic neurohormonal hyperactivation and increased production of the second messenger 3',5'-cyclic adenosine monophosphate (cAMP) which regulates force of contraction, cardiac relaxation, and beating frequency. Specific hydrolysing enzymes phosphodiesterases (PDEs) tightly regulate intracellular cyclic nucleotide levels and generate multiple functionally relevant cAMP microdomains. In HF, protein levels of several PDEs are altered, resulting in a dramatic downregulation of PDE3 and PDE4 activities. Furthermore, the interplay between β-adrenergic receptors (β-ARs) and PDEs is compromised leading to disease-associated alterations in cAMP compartmentation.
Purpose: To restore cyclic nucleotide compartmentation in the sarcoplasmic ryanodine receptor (RyR) microdomain by cardiac-specific overexpression of PDE4B in a mouse model of pressure overload-induced heart failure.
Methods: Transgenic (TG) mice expressing a cAMP biosensor localized in the RyR microdomain were subjected to Transverse Aortic Constriction (TAC) and gene therapy with adeno-associated virus type 9 (AAV9) expressing the phosphodiesterase PDE4B. At different time points, echocardiography was performed to assess heart dimensions and contractile function. Eight weeks after TAC, the hearts were excised and freshly isolated ventricular cardiomyocytes were subjected to Förster Resonance Energy Transfer (FRET)-based cAMP imaging. FRET measurements were performed upon β-AR stimulation with the non-selective β-AR agonist isoproterenol (ISO) and subsequent pharmacological inhibition of PDE2, PDE3 or PDE4.
Results &
Conclusions: In the RyR microdomain of healthy cardiomyocytes, PDE4 tightly controlled cAMP levels, especially after a saturating dose of ISO. After submaximal β-AR stimulation, the effect of PDE4 inhibitor was less pronounced, suggesting cAMP-dependent protein kinase (PKA)-dependent phosphorylation and increase in PDE4 activity. However, the PDE4 contribution was dramatically reduced in failing cardiomyocytes. AAV9-PDE4B treatment resulted in PDE4B overexpression at the protein level and partial improvement of hypertrophy and contractile function, as measured by echocardiography. Interestingly, gene therapy led to increased PDE4 inhibitor-like effects in the RyR microdomain. This strategy might be promising to restore altered cAMP compartmentation and to improve cAMP dynamics at the microdomain specific level.

P1237

Trace ions in failing hearts: only iron, or also others?

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INTRODUCTION: Micronutrients and trace ions play the complex and multiple physiological and pathophysiological role in myocytes function. Their balanced levels are essential for adequate physiological functioning, whereas dysregulation can cause harm.
AIM: The aim of this study was to assess the content of selected ions (iron – Fe; zinc- Zn, selenium-Se, cobalt-Co) in the failing left ventricle also with regard to the severity of heart failure (HF).
METHODS: The study group consisted of 27 HF patients (21 men and 6 women), aged 50.23±13.13 yrs, referred to heart transplantation with advanced HF. Mean ejection fraction values was 26 ±16%. Mean NT-pro BNP levels was- 6076 ± 5083 pg/ml. The main aetiology was ischemic cardiomyopathy 18 pts. whereas nonischemic in 9pts. Myocardium samples were collected during a heart transplantation. The control group consisted of 7 non-failing hearts (NFH) of male subjects aged 22-47 years who had died from head trauma and were unsuitable for heart transplantation. Instrumental Neutron Activation Analysis (INAA) was used to assess the concentration of selected ions: Fe, Zn, Se, Co in failing left ventricles (FH and NFH). STATISTICS: Test for normality of each analysed parameter was performed by Shapiro-Wilk test. Comparisons between groups (FH vs. NFH) were performed with the ANOVA or Wilcoxon tests. Spearman's rank test was used to assess the correlation between the severity of HF based on the ejection fraction and NT-pro BNP and the concentration of individual ions.
RESULTS: We found in FH vs NFH left ventricle a significant reduction in myocardial Fe load (186.34 ug/g ± 58.77vs 267.89 ug/g ±129.1; p= 0.031) and increased Zn concentration (136,17 ug/g ± 26,76 vs 108.6 ug/g ±34.55; p=0.029). The concentration of the remaining ions Se, Co - did not differ between FH vs NFH. HF aetiology and gender did not modify ions concentration.
With regard to HF severity we found correlation with Se concentration: positive EF (p=0.033, r=0.42); negative NT pro BNP (p=0.033, r=-0.49), without significant correlation with other ions.
CONCLUSIONS: Our study confirm the multidirectional disturbances in the ion balance in FH. We found not only reduction in Fe but also increase in Zn concentration in FH. Both changes were not related to gender, aetiology or HF severity. Moreover we found an important correlation between reduced Se and HF severity. The importance of our finding with relation to Zn/Se and requires further investigation.

P1238

HFWM: - Title: Rescue of a proarrhythmic CaMKII-transgenic heart failure mouse model by selective knock-out of sodium channel NaV1.8

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Background: An enhanced late sodium current (INaL) as a determinant of electrical remodeling is present in several cardiac pathologies such as heart failure and is associated with proarrhythmogenic cellular triggers like early-(EADs) and delayed afterdepolarizations (DADs). We have recently shown that the neuronal sodium channel isoform NaV1.8 is involved in formation of INaL in human in heart failure. Therefore, we tested if selective inhibition or knock-out of NaV1.8 could reverse proarrhythmogenic triggers in settings of enhanced INaL. Additionally, we examined if this antiarrhythmic potential is potent enough to improve survival in a heart failure mouse model with increased CaMKII-expression.
Methods/Results: To investigate cellular proarrhythmogenic triggers we isolated cardiomyocytes from Wild-Type (WT) and SCN10A-knock-out (SCN10A-/-) mice. After pharmacological enhancement of INaL with anemone toxin II (ATX-II, 5nmol/L) we measured action potentials (AP) with whole cell patch clamp technique in voltage-clamp mode. Application of the respective NaV1.8-specific blockers A-803467 (30 nmol/L) or PF-01247324 (1µmol/L) significantly reduced EADs in ATX-II treated cells. Further, ATX-II treated cells from SCN10A-/–mice showed less

EADs than cardiomyocytes from WT. We further measured cellular arrhythmias such as diastolic Ca2+-waves using confocal microscopy (Fluo4-AM). Significantly less Ca2+-waves occurred in cells treated ATX-II and additionally with either A-803467 or PF-01247324.
For investigation of possible in-vivo effects of NaV1.8-depletion we crossbred SCN10A-/–mice with CaMKIIδc transgenic mice exhibiting a proarrhythmogenic heart failure phenotype. Our preliminary data indicate a strong trend towards improved survival in CaMKIIδc transgenic mice crossbred with SCN10A-/- (CaMKII+/T & SCN10A-/-) compared to CaMKIIδc transgenic (CaMKII+/T) mice (93 vs 71.5 days, n=68 p=0.06). Heart weight to body weight ratio was not significantly different between the two groups. In addition, confocal line scan measurements of isolated cardiomyocytes from these mice showed no significant differences in Ca2+-transient characteristics. However, preliminary data indicate that cells from CaMKII+/T & SCN10A-/- mice exhibited less diastolic Ca2+-waves as cellular proarrhythmogenic events. Additionally, cells from CaMKII+/T & SCN10A-/- mice showed less EADs or DADs during AP-recordings. Therefore, we hypothesize that this crossbreeding of CaMKII+/T & SCN10A-/- has no relevant effect on heart failure progression but significantly reduce the arrhythmogenic burden.
Conclusion: We hereby demonstrate that inhibition of NaV1.8 reduces proarrhythmogenic cellular triggers such as EADs and DADs. Most importantly, the selective knock-out of NaV1.8 improved survival in a proarrhythmogenic mouse model phenotype with CaMKII-overexpression. Taken together, our findings imply an antiarrhythmic potential of NaV1.8-inhibition that needs further investigation in vivo.

P1239

HFWM: - Title: Intact DNA repair in differentiated cardiomyocytes is essential for maintaining cardiac function in response to physiological as well as pathological stimuli

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Introduction: DNA in every cell is continuously being damaged and DNA repair systems are essential for protection against DNA damage-induced aging-related diseases. Evidence indicates that DNA damage is associated with heart failure. We have shown that unrepaired endogenously generated DNA damage drives the early onset of progressive heart failure. Here we studied the effects of physiological as well as pathological stimuli on cardiac function in a mouse model with deficient DNA repair. Methods: To increase the burden of DNA damage, we generated mice with cardiomyocyte-restricted inactivation of DNA repair endonuclease XPG (αMHC-Xpgc/-). To induce physiological left ventricular (LV) hypertrophy, mice were exposed to 11 wks of voluntary wheel running. Another subset of mice was subjected to 8 wks of pressure overload by transverse aortic constriction (TAC) to produce pathological LV hypertrophy. LV function was assessed at age 16 wks. Results: Cardiomyocyte-restricted inactivation of Xpg resulted in systolic as well as diastolic LV dysfunction, demonstrated by decreases in fractional shortening (49%), LVdP/dtP40 (36%) and LVdP/dtmin (42%) compared to WT (all $p<0.05$), while LV end-diastolic lumen diameter (LVEDD) was markedly increased (36%; $p<0.05$). Physical activity has been shown to be beneficial for maintaining and improving cardiac function in mice after myocardial infarction . In contrast, exercise failed to ameliorate LV remodeling and dysfunction in αMHC-Xpgc/-, as it produced further increases in LVEDD (9%) and relaxation time constant tau (41%) compared to sedentary αMHC-Xpgc/- (both $p<0.05$). Moreover, myocardial collagen content was increased (159%) and the number of γH2A.X-positive nuclei, an indicator of DNA damage, was elevated (45%; both $p<0.05$). TAC-induced LV hypertrophy was similar in both groups (WT 38%, αMHC-Xpgc/- 34%; both $p<0.05$) compared to corresponding control. In WT, LV hypertrophy was accompanied by minimal LV dilation (14%; $p<0.05$) and modest changes in LV function. Conversely, TAC in αMHC-Xpgc/- produced severe LV dysfunction and resulted in overt congestive heart failure, demonstrated by aggravation of LV dilation (24%) and marked increases in LV end-diastolic pressure (286%), lung fluid weight (102%) and myocardial fibrosis (338%; all $p<0.05$). Interestingly, TAC resulted in a reduction of γH2A.X-positive nuclei (28%; $p<0.05$). However, TUNEL staining revealed elevated levels of cell loss (96%; $p<0.05$). Conclusion: Cardiomyocyte-restricted loss of DNA repair protein Xpg increases cardiac vulnerability to develop heart failure in response to exercise training and particular to pressure overload. These findings underscore the importance of genomic stability for maintenance of cardiac function, not only during basal conditions, but also in response to physiological and pathological stimuli.

P1240

Review of the protective effects of Compound 21 and valsartan in iso-induced heart failure in rats

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Aim: The study aimed to research the protective effects of Compound 21, the first specific non-peptide AT 2receptor agonist, from cardiac injury in the rats with isoproterenol-induced heart failure in vivo and compare it with valsartan, AT 1 receptor antagonist.
Materials and Method: In this study, 56 Wistar albino race male rats (estimated body weights250 to 400 g) were used. They were divided into 8 groups of 7. Group 1 (SHAM group) was not given any drug while Group 2 (ISO group) was injected with two doses of İsoproterenol (180 mg/kg s.c) at intervals of 24 hours. Group 3, Group 4, and Group 5 were administered with Valsartan (30 mg/kg per oral), C21 (0.03 mg/kg intraperitoneal), and the combination of Valsartan and C21 for 30 days respectively. Group 6, Group 7, and Group 8 were subjected to the same administration mode, duration, and dose and in the 29th and 30th day of the experiment, İsoproterenol (180 mg/kg s.c) was given. Transthoracic echocardiography was performed in the rats at the beginning and end of the experiment. The blood pressure, heart rate, and EKG alterations were monitored via the carotid artery cannula before ending the experiment. The histopathological and biochemical measurements were made on the cardiac tissue of the rats.
Results: In our study, the protective effect of C21 from heart failure is found to be superior to that of Valsartan. According to the echocardiographic and biochemical measurement results, C21 and Valsartan showed the protective effect from heart failure. In the histopathological findings, the treatment with C21 and the combination of Valsartan and C21 statistically reduced the heart failure progression more than the administration of Valsartan alone did.
Conclusion: These results support the hypothesis that Ang II plays a key factor in heart failure via AT 1 and AT 2 receptors. The mechanisms of antagonist action of Valsartan at AT 1 receptor and of agonist action of C21 at AT 2 receptors protect the heart from the harmful effects of AII.

P1241

Distinct signalling pathways mediated phosphorylation of sarcomere proteins in the right and left ventricle contribute to diverse cardiac dysfunction in the failing heart

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Background: Altered signalling pathways play a central role in sarcomere dysfunction in the pathophysiology of heart failure (HF). Treatment options for HF are still limited perhaps because of the distinct remodelling processes and molecular mechanisms in the right (RV) and left (LV) ventricle of the failing heart.
Purpose: Our purpose was to reveal interventricular differences of cardiomyocyte signalling pathways that lead to heterogenous sarcomere dysfunction in HF.
Methods: HF patients with reduced ejection fraction (<40%, HFrEF) and post-ischemic rats were studied, and compared to non-HF and sham-operated controls, respectively. Human cardiac biopsies were obtained and studied from both the LV and RV of the same heart. Activities of protein kinases, levels of oxidative and inflammation parameters, gene expressions, protein expressions and phosphorylation were assessed. Cellular mechanical performance was measured in single skinned cardiomyocytes.
Results: In HF vs. control, oxidative and inflammation parameters were high in both LV and RV, but more pronounced in the LV. HF cardiomyocyte passive tension was increased in both RV and LV. This increase was restored by CaMKII treatment in the RV, but there was no effect of CaMKII treatment in the LV. This could be explained by the fact that CaMKII activity was decreased in the RV, but increased in the LV. While PKG lowered passive tension in both LV and RV, but the effect was more pronounced in the LV vs. RV, which goes along with decreased PKG activity in

both ventricles. Despite CaMKII and PKG activity were reduced in the RV, total titin phosphorylation was preserved in the RV, but reduced only in the LV, perhaps because of increased PKC activity. Phosphorylation of titin at CaMKII phospho-site Ser-4062 was reduced in the LV, but unaltered in the RV. Ca2+-sensitivity was higher in both LV and RV in HF vs. controls, but Ca2+-sensitivity was higher in the LV vs. RV. However, Ser-23/24 phosphorylation of cTnI was decreased in both LV and RV. While Ser-282 phosphorylation of cMyBP-C was decreased only in the LV, but unaltered in the RV. Gene expression of CaMKII-targeted HDAC4, NFAT and MAPK1 genes were all increased in both LV and RV in HF vs. control, as well as PKG-targeted genes such as PDE2 and PDE9, while PDE1 and PDE5 were increased only in the LV, but unaltered in the RV. In addition, we also found increased sGC, CG-A, and CG-B in the LV, but unchanged in the RV.

Conclusions: Our data suggest different mechanical modulation of cardiomyocytes due to distinct changes of signalling pathways in the LV and RV in the failing heart. Such interventricular differences in sarcomere dysfunction may have important therapeutic relevance when uniformly targeting cardiomyocyte signalling pathways in HF.

P1242

HFWM: - Title: Single cell mechanics in failing heart: role of microtubules and mitochondria re-arrangement

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Funding Acknowledgements: NHLI Imperial College London PhD Studentship

Background and Purpose

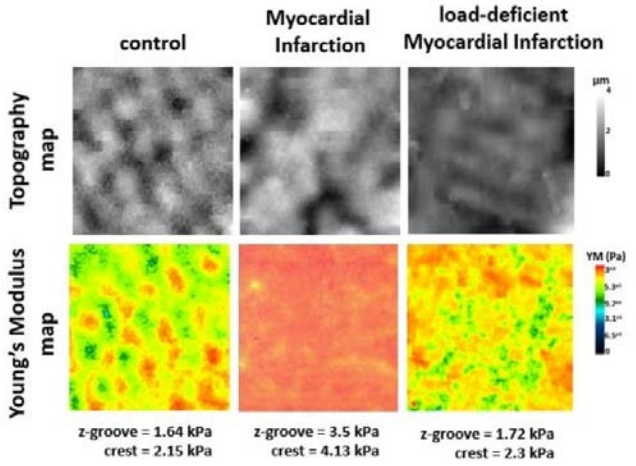
Myocardium experiences considerable mechanical stress throughout its lifespan. As a result cardiac tissue is very adaptive to the mechanical load. In the failing heart, mechanical properties differ from the normal heart. Modified extracellular matrix, in particular increased collagen deposition, corresponds to an increased stiffness of the failing heart. At the cellular level, increased stiffness is observed in isolated myocytes after a myocardial infarction. We aimed to further study how the cell mechanics changes in cardiomyocytes in different heart disease models.

Methods Using high resolution Scanning Ion Conductance Microscopy in combination with pressure application we obtained a map of Young's modulus (YM) and a map of cell surface of adult rat and human cardiomyocytes isolated from healthy hearts. Inhibition of several cytoskeleton networks was used to investigate the contribution of cellular proteins to cell stiffness. The stiffness of normal cells was compared to Myocardial Infarction (MI) and partial mechanical unloaded rat models, as well as human cardiomyocytes isolated from patients with dilated and ischemic cardiomyopathy.

Results Our data confirm that mechanics of adult cardiomyocytes change in the cardiac pathology, displaying higher stiffness in MI compared to control cells. Similarly, human healthy cardiomyocytes are softer when compared to dilated/ischemic cardiomyopathies. Interestingly, the surface of the sarcolemma (crest) becomes significantly stiffer than the z-groove in failing rat cells. On the other hand, mechanical unloading of the failing hearts reduces the YM to control values. Mitochondria-specific staining shows bigger submembrane mitochondria areas in the MI model (due to clustering). Also, unloaded hearts showed a decrease in size and number of mitochondria. Inhibition of actin-myosin cross bridging interaction using blebbistatin, decreases cell YM, showing incomplete actin-myosin relaxation in the MI model. Blocking actin assembly with cytochalasin D also decreases cell YM, as does blocking the microtubules polymerization with vinblastine. Further investigating microtubules post-translational modifications, inhibition of detyrosination or deacetylation with parthenolide and HDAC6 inhibitor respectively, reduces cell stiffness.

Conclusions Our findings show that both mechanical stimulation and intracellular elements significantly contribute to the cell mechanical properties and they are modified under pathological conditions.

Specifically, mitochondria may contribute to a stiffer crest domain of the sarcolemma, whereas microtubules are critical in maintaining mechanical resistance.



Topography and Young's Modulus maps

P1243

Circulating NEP concentrations and activity in the low-, medium- and high-renin HFrEF phenotypes

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Background. Previous investigations of plasma Renin-Angiotensin-System (RAS) fingerprints of patients with heart failure with reduced ejection fraction (HFrEF) revealed the existence of low-, medium- and high-renin HFrEF phenotypes independently of disease severity. Plasma renin indicates RAS-activation and serves as surrogate for total angiotensin metabolite levels including AngII, which exerts deleterious effects thereby triggering disease progression. Neprilysin (NEP) inhibition has been proven to be effective with marked clinical benefits within angiotensin-receptor neprilysin-inhibitor (ARNI) therapy in HFrEF. NEP is implicated in the homeostasis of vasoactive peptides, suggesting a relationship between RAS and NEP regulation. The study aimed to investigate the relationship between plasma NEP concentrations (sNEP) and activity and different HFrEF phenotypes based on plasma renin levels.

Methods. We prospectively enrolled 369 consecutive patients with stable HFrEF, who were clinically followed-up routinely. Laboratory markers including NT-proBNP and active renin concentration (ARC) were assessed. sNEP and NEP activity were measured by a specific ELISA (R&D systems, UK) and a fluorimetric peptide cleavage assay. The association of all three measures on all-cause mortality was assessed. The correlation between sNEP and NEP activity was determined. sNEP and NEP activity between low-, medium- and high-renin phenotypes (i.e. <15. percentile, 15.-85. percentile and >85. percentile of ARC) was compared.

Results. Median age was 65 (IQR 53-73) years, 75% of patients were male. Median NT-proBNP levels were 1936 (IQR 855-4126) pg/ml. Median ARC levels in the low-, medium- and high-renin HFrEF phenotypes were 4.2 (IQR 2.0-7.8) µIE/mL, 155.1 (IQR 43.3-353.5) µIE/mL and 2360 (IQR 1483-3250) µIE/mL (p=<0.001), respectively. No correlation could be shown between sNEP and plasma NEP activity [r=0.09, p=0.088]. In the univariate analysis plasma ARC, but not sNEP levels and NEP activity, were associated with outcome. This association remained significant after adjustment for age, gender, kidney function and NT-proBNP [adj. HR per 1-IQR increase of ARC 1.27 (95%CI 1.04-1.22), p=0.003]. Similarly, there were no differences in sNEP levels and NEP activity between the low-, medium- and high-renin HFrEF phenotypes (Figure 1).

Conclusions. ARC is a risk factor for mortality in HFrEF patients, independently of NT-proBNP. Circulating sNEP levels and NEP activity neither correlated with each other nor were associated with outcome. Similarly, neither sNEP nor NEP activity was related to RAS-activation, suggesting either that there is no simple direct relationship between RAS and NEP regulation or that plasma NEP measures are not potent biomarkers appropriately reflecting systemic NEP regulation.

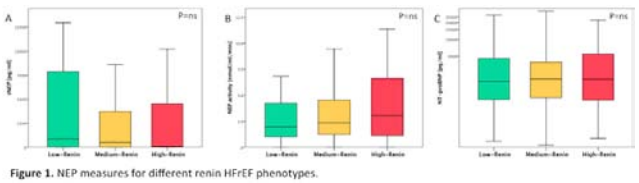

Figure 1. NEP measures for different renin HFrEF phenotypes.

Figure 1.

P1244

Inhibition of apoptosis signal-regulating kinase 1 ameliorates cardiac dysfunction by reducing hypertrophy and fibrosis in a rat model of cardiorenal syndrome

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Background: Cardiorenal syndrome (CRS) is a global health burden with suboptimal treatment options requiring novel therapeutic strategies. Previously, we reported that inhibition of apoptosis signal-regulating kinase 1 (ASK1), using a small molecule inhibitor (GSK2261818A, G226), attenuated pathological cardiac hypertrophy and cardiac and renal collagen synthesis in vitro. The present study assessed the therapeutic potential of ASK1 inhibition in a rat model of CRS.
Methods: Adult male Sprague-Dawley rats underwent surgery for myocardial infarction (MI) (week 0) followed by 5/6 subtotal nephrectomy (STNx) at week 4 to induce CRS. At week 6, MI+STNx animals were randomized to receive either 0.5% carboxymethyl cellulose (Vehicle, n = 13, Sham, = 10) or G226 (15mg/kg daily, n = 11). Cardiac and renal function was assessed by echocardiography and glomerular filtration rate (GFR) respectively, prior to treatment at week 6 and at endpoint (week 14). Haemodynamic measurements were determined at week 14 prior to tissue analysis.
Results: G226-treated animals demonstrated an improvement in absolute change in left ventricular (LV) ejection fraction, fractional shortening, preload recruitable stroke work and reduced LV end-diastolic and end-systolic volume and LV posterior wall thickness compared to Vehicle group. CRS-induced increase in myocyte cross sectional area, cardiac interstitial fibrosis, immunoreactivity of cardiac collagen-III and TGF-β1 and cardiac TIMP-2 activation, were also significantly reduced by G226. G226 ameliorated renal interstitial fibrosis, diminished renal collagen-I, -IV and kidney injury molecule-1 immunoreactivity and macrophage infiltration as well as renal p-SMAD2 activation, with no effect on GFR.
Conclusion: Inhibition of ASK1 ameliorated LV dysfunction and diminished cardiac hypertrophy and cardiorenal fibrosis in animals with CRS. This suggests that ASK1 is a critical pathway with therapeutic potential in the CRS setting.

P1245

Polymorphic variants and the expression level of the Ca(2+)-ATPase SERCA2a and ryanodine receptors genes are associated with systolic myocardial dysfunction

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Funding Acknowledgements: This work was supported by the Russian Foundation for Basic Research 17-04-01450.

Purpose. To study the association of polymorphic variants rs1860561, rs3766871 and expression level of ATP2A2, RYR2 genes with the severity of chronic heart failure (CHF). Methods. The sample included 174 patients aging 64 (59; 70) years with CHF of ischemic origin. The distribution of CHF class I (NYHA), II, III was 25 (14.4%), 97 (55.7%), 52 (29.9%). The left ventricular ejection fraction was 62% (52; 66). The expression level and polymorphic variants rs1860561 (110345436G>A) of the ATP2A2 gene encoding Ca(2+)-ATPase SERCA2a, and rs3766871 (5656G>A; Gly1886Ser) of ryanodine receptor RYR2 gene were determined. Results. An association of variant rs1860561 with CHF class (p = 0.041) and the frequency of type 2 diabetes mellitus (DM2) (p = 0.027) was detected. Among the AA homozygotes, CHF of severe class III and cases of DM2 were more common. Among women, carriers of the AA genotype had a higher frequency of left ventricular hypertrophy (p = 0.040), the left ventricular ejection fraction was reduced (p = 0.032), and the end-systolic volume was increased (p = 0.030). An increase in the expression level of ATP2A2/GAPDH and ATP2A2/ACTB was observed in DM2, but the expression level was not dependent on the rs1860561 variant. In the studied sample there was no association of the variant rs3766871 with the severity of CHF. But in the presence of DM2, the expression level of RYR2/GAPDH was higher (p = 0.009) than in the case of impaired glucose tolerance or in the absence of disturbances in carbohydrate metabolism. There was a relationship between the worsening of CHF class and a decrease in the expression level of the RYR2/GAPDH (p = 0.023). Conclusion. The polymorphic variant rs1860561 was associated with systolic myocardial dysfunction. Expression level of ATP2A2 and RYR2 genes was increased in patients with CHF and DM2. Expression level of RYR2 gene was reduced in patients with CHF class III.

P1246

Clinical, humoral and hemodynamic predictors of cardiac fibrosis in advanced heart failure

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Funding Acknowledgements: Institute of Cardiology Research Grant

Background: Cardiac fibrosis is one of the key features of remodeling in heart failure (HF). Modern pharmacotherapy is aimed at halting/reversal of these pathological changes through effects on renin-angiotensin-aldosterone axis, beta receptor blockage and, more recently, augmenting the natriuretic peptide action.
Aim: To identify humoral, hemodynamic, echocardiographic or clinical factors, including pharmacological agents, influence the degree of cardiac fibrosis in patients with advanced HF referred for heart transplantation (HTx).
Methods: We collected left ventricular tissue samples from 66 patients with advanced HF at the time of HTx (2013-2015). Tissues were fixed in formaldehyde and parafin, and subsequently stained with H&E stain. Histological assessment was performed and the extent of cardiac fibrosis was assessed according to the following criteria: mild or no fibrosis (fibrosis encompassing $\leq$30% of tissue section), moderate (30-70%), or severe ($\geq$70% of tissue section). All patients underwent through clinical, biochemical, hemodynamic, and echocardiographic evaluation at the time of qualification for HTx and the data were used to create a discriminant analysis model determining predictors of cardiac fibrosis. Chi-square test was used to evaluate the predictive value of therapy with pharmacological agents constituting the gold standard of HF therapy on the degree of fibrosis. Rank-Spearman test was used to establish the direction of the correlation.
Results: The best discriminant analysis model ($p<0.001$ for the entire model) included biochemical parameters such as: red blood cell count (RBC) serum glucose concentration and white blood cell count (WBC), which predicted the degree of cardiac fibrosis (p=0.004, 0.026, and 0.053, respectively). In case of glucose and WBC the relationship was positive, while RBC correlated negatively with the severity of fibrosis. Also, the use of mineralocorticoid receptor inhibitors influenced the degree of cardiac fibrosis.
Conclusions: Clinicians should be aware that certain hematological and biochemical (RBC, WBC, serum glucose) parameters are important predictors of cardiac fibrosis in HF. The rationale behind this relationship (inflammation, disorders of glucose metabolism or iron turnover) requires further investigation. We corroborated the value of mineralocorticoid receptor inhibitors as an important factor influencing the extent of cardiac fibrosis.

P1247

Activation of Toll Like Receptor 4 (TLR4) promotes cardiomyocyte apoptosis and fibrosis through SIRT2-dependent p53 deacetylation

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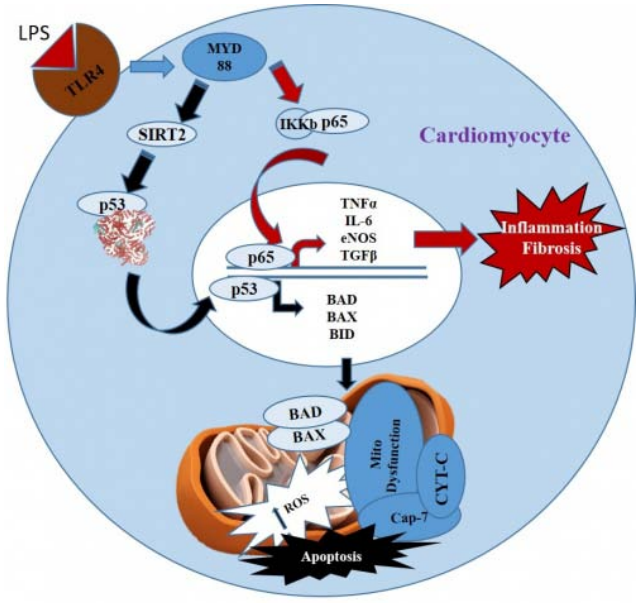
Background: Cardiomyocyte inflammation followed by apoptosis and fibrosis are common mechanism for the development and progression of heart failure. As a key regulator of inflammation, toll like receptor 4 (TLR4) plays an important role in pathogenesis of cardiac diseases. However, the precise mechanism of TLR4 mediated cardiac complications is still elusive. Therefore, the present study was designed to find the role of TLR4 in cardiac fibrosis and apoptosis, and molecular mechanism thereof.
Method: Rats were treated either with saline or TLR4 agonist (LPS 12.5ug/kg/day) through osmotic pump for 14 days. To simulate the same condition in vitro, H9c2 cells were treated with LPS (1ug/ml). Similarly, H9c2 cells were transfected with TLR4 ORF plasmid for overexpression. Cardiac inflammation, oxidative stress, fibrosis and mitochondrial parameters were evaluated both in vitro and in vivo. Expression and acetylation of p53 and its downstream proteins BAX, caspase 7 were evaluated.
Results: Cardiac inflammation after LPS treatment was confirmed by increased TNF alpha and IL-6 expression in rat heart. There was a marked increase in oxidative stress along with mitochondrial dysfunction in LPS treated group. Histopathology study showed the presence of cardiac fibrosis after LPS treatment. Protein expression of nuclear p53 and cleaved caspase 7 was significantly increased in LPS treated heart. Similar to in vivo study, nuclear translocation of p53, mitochondrial dysfunction and cellular apoptosis was significantly increased in H9c2 cells after LPS treatment. Our data also indicate that decrease expression of SIRT-2 was associated with increased acetylation of p53 and its increased nuclear translocation after LPS treatment.
Conclusion: TLR4 activation in rats promotes cardiac inflammation, mitochondrial dysfunction, apoptosis, and fibrosis. p53 and caspase 7 were found to play an

important role TLR4 mediated apoptosis. Reducing TLR4 mediated fibrosis and apoptosis could be a novel approach in the treatment of heart failure, where TLR4 mediated inflammation plays a major role.



Graphical Abstract

P1248

Inhibition of myeloperoxidase in an obese/hypertensive mouse model attenuates obesity and liver damage, but not cardiac remodeling

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Funding Acknowledgements: This work was supported by a grant from AstraZeneca.

Background: Heart failure with preserved ejection fraction (HFpEF) is a major health problem for which no proven therapy exists. Low-grade systemic inflammation caused by obesity, diabetes and hypertension is believed to contribute to HFpEF development and progression. The enzyme myeloperoxidase (MPO), involved in inflammation, has been linked to HFpEF and obesity.
Purpose: In this study, the effect of a novel MPO inhibitor, AZM198, on cardiac remodeling was investigated in an obesity/hypertension mouse model with HFpEF characteristics.
Methods: Male C57BL/6J mice aged 8 weeks were subjected for 16 weeks to either low fat diet (LFD) or high fat diet (HFD) with or without AZM198. During the last 4 weeks this was combined with angiotensin II (AngII) or saline (control) infusion. Just before sacrifice, body mass composition was determined, and cardiac magnetic resonance imaging (MRI) measurements and left ventricular (LV) pressures were recorded. The heart and other tissues were investigated at the molecular and histological level.
Results: A combination of HFD and AngII infusion did not reduce left ventricular ejection fraction (LVEF%), but did result in mild, but significant, elevated pathological cardiac hypertrophy and fibrosis and in diminished LV relaxation, all characteristics of HFpEF. MPO plasma levels were significantly elevated in this HFpEF model and this was driven by the HFD. AZM198 treatment significantly reduced the elevated MPO levels to control, LFD, levels. No adverse AZM198 effects were observed in any of the AZM198 mouse groups and AZM198 treatment had no significant effect on any of the measured cardiac parameters, including fibrosis, hypertrophy and relaxation (dP/dtmin; Tau). AZM198, however, significantly attenuated adipose tissue accumulation and reduced inflammatory crown-like structures and inflammatory gene expression in adipose tissue. Liver ballooning degeneration was also significantly less prominent in AZM198 treated HFD groups.
Conclusions: AZM198 treatment normalized MPO levels in obese/hypertensive mice, but did not improve functional and structural cardiac parameters. However, AZM198 did reduce adipose inflammation, fat deposition and liver degeneration. These positive effects could be important for the obese human HFpEF population.

P1249

Correlation between myofilament Ca2+ sensitivity and left ventricular contractility parameters during the progression of pressure overload-induced left ventricular myocardial hypertrophy

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Background: During the development of pressure overload (PO)-induced pathological left ventricular (LV) myocardial hypertrophy (LVH) and its progression to heart failure distinct alterations could be observed both in LV contractility and myofilament function. However, whether the dynamic alterations on the two levels (contractility on the global ventricular level and myofilament function on the cellular level) correspond to each other has been not studied.
Purpose: Therefore, we aimed at investigating the relation between LV contractility and myofilament function in PO-induced LVH.
Methods: PO was evoked by abdominal aortic banding (AB) in male, Sprague-Dawley rats for 6, 12 and 18 weeks. Control animals underwent the same surgery without constricting the aorta (Sham). Characteristic PO-induced alterations were investigated by serial echocardiography, histology, quantitative real-time PCR and western blot. LV function was assessed by pressure-volume analysis. Force measurement was carried out in permeabilized cardiomyocytes.
Results: Sustained PO resulted in the development of pathological LVH in the AB groups as indicated by macroscopic (increased heart weight-to-tibial length ratio and LV mass index), microscopic (increased cardiomyocyte diameter) and molecular markers (reactivated fetal gene program: increased atrial natriuretic peptide and β-to-α myosin heavy chain expression). These alterations were already present at early stage of LVH (AB-week6). Furthermore, at more advanced stages (AB-week12, AB-week18), interstitial fibrosis and chamber dilatation were also observed. The detailed analysis of the pressure-volume loops revealed that the AB-wk6 group was associated with increased LV contractility (as indicated by increased end-systolic elastance [ESPVR]: 1.74±0.22 vs. 3.28±0.36 mmHg/µl, preload-recruitable stroke work [PRSW]: 104±8 vs. 140±8 mmHg and preload-adjusted maximal slope of systolic pressure increment [dPdt-EDV]: 33±2 vs. 53±6 (mmHg/s)/µl Sham-week6 vs. AB-week6, $P<0.05$), maintained ventriculo-arterial coupling (VAC) and preserved systolic function. In the same experimental group, increased myofilament Ca2+ sensitivity (pCa50) and hyperphosporylation of cardiac troponin-I (cTnI) at Threonin-144 was detected. In contrast, in the AB-wk12 and AB-wk18 groups, the initial augmentation of LV contractility, as well as the increased myofilament Ca2+ sensitivity and cTnI (Threonin-144) hyperphosphorylation diminished, resulting in impaired VAC and reduced systolic performance. Strong correlation was found between LV contractility parameters (ESPVR, PRSW and dP/dtmax-EDV) and myofilament Ca2+-sensitivity (pCa50) among the study groups.
Conclusion: Changes in myofilament Ca2+ sensitivity might underlie the alterations in LV contractility during the development and progression of PO-induced LVH.

P1250

HFWM: Circulating relaxin-1 is a surrogate marker of myocardial fibrosis and left ventricular diastolic function in HFrEF

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Recently relaxin-1 (RLX-1) has emerged as a possible therapeutic tool or target in myocardial fibrosis due to its anti-fibrotic effect on the failing myocardium. Previous randomised clinical trials investigated the therapeutic role of exogenous relaxin in patients with acute-on-chronic heart failure with reduced ejection fraction (HFrEF) and failed to meet clinical endpoints. Here we aimed to assess endogenous, circulating RLX-1 levels in patients with HFrEF of ischemic origin. Furthermore, we analyse the relation of RLX-1 levels and left the ventricular diastolic function, left

and right ventricular remodeling and fibrosis. The unique feature of our study is the availability of ex vivo human myocardial samples.
Human myocardial samples were available from the Heart and Vascular Centre Heart Transplantation Biobank System (Semmelweis University) upon local ethical authorisation and informed consent of all participants (n=55). Human myocardial tissue was collected immediately after heart explantations, peripheral blood was collected before the induction of anesthesia. Myocardial sections were stained for Masson's trichrome and Picrosirius red staining in order to quantify fibrosis rate. Medical records of all participants were analysed (ECG, anthropometry, blood tests, medication, echocardiography, and invasive hemodynamic tests).
Our patients were divided into a low- and high-RLX-1 group; on average, RLX-1 levels were comparable with those measured in pregnant women. (702±283 pg/ml in HFrEF vs. 560-1060 pg/ml in pregnancy (literature data)). Age and gender-matched healthy control human subjects had low levels of circulating RLX-1 (44±27pg/ml). In the HFrEF patient population circulating RLX-1 was independent of age, gender, hypertension, diabetes mellitus, BMI and BSA. Eight participants required mechanical circulatory support (IABP+LVAD) before heart transplantation, which did not influence RLX-1 levels or outcomes. We found a moderate inverse correlation between RLX-1 levels and myocardial fibrosis rate of both ventricles (r=-0.493, p=0.0005 in the right ventricle vs. r=-0.487, p=0.0006 in the left ventricle). Parallel, a moderate correlation was found in left ventricular diastolic function (E/A r=0.456, p=0.0025) and RLX-1 levels. RLX-1 levels showed moderate correlation with RLX-2 levels (r=0.453, p=0.0003).
Increased RLX-1 levels were accompanied by lower myocardial fibrosis rate, which is a novel finding in a small patient population with HFrEF of coronary artery disease etiology. Interestingly, our results suggest that RLX-1 can have a biomarker role and may be targeted in anti-fibrotic therapeutics.

P1251

HFWM: Natural compound-derived small molecules to target fibrosis

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Introduction One of the main causes for heart failure with preserved ejection fraction (HFpEF) is the increasing stiffness of the heart due to proliferation and activation of cardiac fibroblasts (HCF), which leads to accumulation of excess extracellular matrix (ECM). In search of a pharmacological treatment option, we previously identified the natural compounds bufalin (toad exudate) and lycorine (Amaryllidaceae) as promising anti-fibrotic effectors for in vitro and in vivo models. The aim of this study was to generate chemical derivatives of these substances to further improve their efficacy and toxicological profiles.
Methods and results
Using primary human cardiac fibroblasts (HCFs) we screened 26 derivatives (15 for bufalin and 11 for lycorine) for inhibition of primary HCF proliferation by BrdU incorporation. 15 out of these generated derivatives showed activity below 10μM and potently reduced fibroblast proliferation, also validated by WST-1-derived metabolic activity. 12-point dose-response curves determined EC50s in the range of 5 to 500nM. One derivative showed over 100× increased potency over its natural precursor lycorine. Parallel to the evaluation of newly synthesized small molecules, we additionally compared performance towards the already available anti-fibrotic drugs Nintedanib and Pirfenidone (approved for idiopathic pulmonary fibrosis). In addition to efficacy measurements, physicochemical properties, pharmacokinetics, drug- and lead-likeness, as well as bioavailability were predicted in silico and used as additional ranking dimension.
The highest ranked candidates were assessed for further functional outcome in HCF culture by applying a model of scratch wounding. Moving towards relevant in vivo testing, rat myocardial slices, a living multicellular ex vivo cardiac model, were used to test these shortlisted candidates for cardiotoxicity and potential effects on contractility. Early results indicated maintained contraction force for favorite candidates.
Conclusions In summary we screened chemical derivatives of the natural compounds bufalin and lycorine. Favorite small molecules showed promising efficacy and safety in vitro and ex vivo. Thus we speculate on their therapeutic use for fibrosis-underlying cardiac disease such as HFpEF or in the setting of other organ-related fibrosis.

P1252

Fibroblasts as inflammatory supporter cells-a matter of tissue origin?

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Background: Heart failure is a syndrome not solely affecting the heart, but also other organs like the skeletal muscle. We previously have shown how transforming growth factor (TGF)-ß1 and interferon (IFN)-γ affect cardiac fibroblast activation and the attraction of pro- and anti-inflammatory monocyte subsets. However, how cardiac and muscle fibroblasts intrinsically and in response to TGF-ß1 and IFN-γ differ from each other, has not been investigated before.
Purpose: The study aimed to investigate the responsiveness of heart- and muscle-derived fibroblasts towards TGF-ß1 and IFN-γ, mimicking an inflammatory environment.
Methods: Therefore, primary fibroblasts were obtained from the left ventricle (LV) and muscle of C57BL6/j mice by outgrowth culture. Cells were stimulated with TGF-β1 (5 ng/mL), IFN-γ (10 ng/mL) or both for up to 72h. mRNA expression of extracellular matrix proteins was examined by real-time PCR. Supernatants were used to analyze chemokine release by ELISA or to perform migration assays followed by flow cytometry to characterize the migrated pro- (Ly6Chigh) and anti-inflammatory (Ly6Clow) monocyte subsets.
Results: In LV fibroblasts, TGF-ß1 induced myofibroblast differentiation, as obviated by higher collagen I, III, lysyl oxidase (Lox)-1 and lysyl oxidase-like (LoxL)-2 mRNA expression levels compared to controls, respectively. IFN-γ suppressed the TGF-ß-induced myofibroblast differentiation, as indicated by lower collagen I, III, and LoxL2 mRNA expression levels compared to sole TGF-ß1 administration, respectively. Similar observations were found in muscle fibroblasts. Furthermore, both LV and muscle fibroblasts stimulated with sole TGF-β1 or IFN-γ displayed a higher CC-chemokine ligand (CCL) 2, CCL7 and chemokine C-X3-C motif ligand (Cx3CL1) release compared to control fibroblasts. The induction in the expression of the chemokines CCL2 and CCL7, attracting pro-inflammatory monocytes, was hereby the most pronounced upon IFN-γ stimulation and was further elevated by TGF-β1+IFN-γ co-stimulation in LV fibroblasts as well as in muscle fibroblasts. In general, muscle-derived fibroblasts displayed lower CCL2, CCL7 and Cx3CL1 production, but higher CCL2/Cx3CL1 and CCL7/Cx3CL1 ratios compared to LV fibroblasts. Subsequent analysis of monocyte migration towards TGF-β1-conditioned media from LV fibroblasts further revealed a higher Ly6Clow/Ly6Chigh monocyte ratio compared to control media. Combination of IFN-γ with TGF-ß1 reduced the Ly6Clow/Ly6Chigh monocyte ratio. Compared to all corresponding LV conditioned media, supernatant of muscle-derived fibroblasts attracted more Ly6Chigh monocytes, indicative for a more inflammatory phenotype.
Conclusion: LV and muscle fibroblasts differ in their responsiveness towards pro-inflammatory and pro-fibrotic stimuli in terms of their potential to attract pro-inflammatory monocytes, suggesting fundamental differences in subsequent remodelling under disease conditions between heart and muscle.

P1253

The secreted matrix glycoprotein ADAMTSL3 is up-regulated in heart failure and mediates anti-fibrotic effects in cardiac fibroblasts

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Background/Introduction
Fibrosis is a central remodelling process in heart failure where cardiac fibroblasts (CFB) become activated, transdifferentiate into myofibroblasts, and produce excessive amounts of extracellular matrix (ECM) constituents. The ADAMTSL (a disintegrin and metalloproteinase with thrombospondin motif like) protein family consists of seven glycoproteins secreted into the ECM. They are structurally similar to the matrix metalloproteinase and ADAMTS protein families, yet lack a catalytic domain. Despite suggested roles in ECM microfibril formation and connective tissue disorders, the function of ADAMTSL proteins remain largely unknown, including in the heart.
Purpose
The purpose of this study was to investigate the regulation and role of ADAMTSL3 in heart failure.
Methods Expression level of ADAMTSL3 was examined in myocardial biopsies from patients with aortic stenosis (AS) and ischemic dilated cardiomyopathy (iDCM). ADAMTSL3 levels were also examined in mouse hearts after aortic banding (AB) and in primary cultures of CFB and cardiomyocytes (CM) from neonatal rats. Finally, adenoviral overexpression of ADAMTSL3 was performed in CFBs to investigate the effects of increased ADAMTSL3 levels on fibrosis.

Results
In cardiac biopsies from patients with AS and iDCM, ADAMTSL3 mRNA was increased 2-fold and 1.5-fold, respectively, compared to controls, suggesting that ADAMTSL3 levels are increased in the heart of patients with heart failure. Similarly, mice subjected to AB showed elevated left ventricular mRNA levels of ADAMTSL3 during concentric hypertrophic remodelling and dilated, end-stage heart failure (1.5-fold and 2-fold, respectively). In rat heart cell cultures, mRNA expression of ADAMTSL3 was 3-fold higher in CFB than in CM, suggesting that CFBs are the main producers of ADAMTSL3 in the heart. CFBs overexpressing ADAMTSL3 showed reduced mRNA levels of the stiff fibrillar collagen type I (70% of control) and reduced total collagen protein synthesis to 50% of controls, measured by radioactive proline incorporation, suggesting anti-fibrotic effects. In line with this, ADAMTSL3 overexpression reduced mRNA levels of the collagen cross-linking enzyme lysyl oxidase (80% of control). Furthermore, expression of the ECM scaffold proteins fibrillin-1 and fibronectin was reduced to 80 and 50% of control, respectively, and the myofibroblast signature gene, alpha smooth muscle actin, was reduced to 80% of control. These anti-fibrotic effects of ADAMTSL3 overexpression was likely mediated through reduced TGFb-signaling, as ADAMTSL3 overexpressing CFB showed reduced phosphorylation of the TGFb-directed transcription factor SMAD2.
Conclusion
Our results suggest that ADAMTSL3 mediates anti-fibrotic effects in the heart. This will be investigated further in ADAMTSL3-knock out mice subjected to heart failure.

P1254
Sepsis-induced myocardial dysfunction is associated with epigenetic modulation of parkinson susceptibility gene DJ-1/PARK7

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Introduction: Myocardial depression and associated hemodynamic collapse are among the major causes of death in severe sepsis. Management of severe sepsis is largely supportive.
Purpose: Emerging evidence suggests that the antioxidant DJ-1 (PARK7) may have a role in resistance to sepsis; however, a role of DJ-1 in severe sepsis-induced myocardial dysfunction remains uninvestigated.
Methods: Using both in in vivo (murine model of cecum ligation and puncture) and in vitro (lipopolysaccharide (LPS) treatment of cultured murine cardiac myocytes) approaches we determined whether DJ-1 is a putative novel target for sepsis.
Results: In response to cecum ligation and puncture (CLP) for 48hrs, wild type (WT) mice developed bacterial peritonitis, a marked inflammatory response (3-5 fold increases in serum interleukin-1β and tumor necrosis factor-α), myocardial dysfunction (20-35% decreases in dp/dt and echo-derived % ejection fraction and % fractional shortening), a 20-fold increase in serum DJ-1, 1.5-3 fold increase in left ventricular (LV) DJ-1 mRNA and protein and a 55-70% decrease in LV mRNA and protein of the transcriptional repressor Jarid-2 compared to WT-sham. Targeted deletion of DJ-1 rendered the mice resistant to CLP-induced bacterial peritonitis resulting in improved cardiac function and survival despite a similar hyper-inflammatory response to WT mice. In adult cultured cardiac myocytes derived from WT mice, basal DJ-1 is transcriptionally repressed by binding of Jarid-2 to A/T-rich target sequences in the DJ-1 promoter as determined by gel-shift assay. Chromatin immunoprecipitation demonstrated that basal DJ-1 repression is also associated with increased H3 methylation (H3K9me3 and H3K27me3) facilitating complex formation with Jarid-2 at A/T-rich sequences of the promoter. Treatment of WT adult cardiomyocytes with the endotoxin LPS (1 μg/mL) for 24 h, decreased Jarid-2 and histone marker formation resulting in a 1.7 fold increase in DJ-1 expression.
Conclusions: These findings reveal that the loss of DJ-1 enhances bacterial clearance and inflammatory responses resulting in improved cardiac function and survival following CLP-induced sepsis.

Basic Science - Metabolism

P1257
Empagliflozin modulates GTP enzyme cyclohydrolase 1 in chronic heart failure

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Purpose. Empagliflozin (EMPA), a drug approved for type II diabetes management, reduced cardiovascular death. The cardioprotective effect of EMPA may be mediated by anti-oxidative mechanisms that prevent cardiac remodeling and slowdown HF progression; however, the molecular mechanisms have not been well elucidated. The present study aimed to analyze whether EMPA modulates the cardiac GTP enzyme cyclohydrolase 1 (cGCH1), a key protein in the development of remodeling in HF.
Material and methods. First, male Wistar rats (6-8 weeks old, 180-250 g) were used to undergo an experimental condition of diabetes (50 mg/kg streptozotion, i.p) and then MI was induced by permanent ligation of the left anterior descending coronary. Animals were randomly assigned to not receive treatment or to receive EMPA (10 mg/kg/day, oral) from the day of surgery and for 4 weeks. A sham group was used as control. The infarcted and border areas of the left ventricle were processed at 4 weeks. The mRNA and protein expression of cGCH1 and other remodelling markers (Galectin 3, collagen I, collagen III, TIMP1) were analyzed by qRT-PCR and western blot. In parallel, regulation of nitric oxide synthase (NOS) isoforms were evaluated using western blot. BH4 levels were measured by HPLC. Each value is expressed as fold of control.
Results. Compared with sham group, MI group, showed lower levels of cGCH1 in both the infarcted ($p<0.01$) and border areas ($p<0.001$). cGCH1 was increased by treatment with EMPA ($p<0.001$) in both areas. MI group also showed higher levels of galectin-3, collagen I, collagen III and TIMP-1 than the sham group in the infarcted area ($p<0.001$, in all cases); whereas in the border area, only the galectin 3 and TIMP-1 were increased ($p<0.01$). The treatment with EMPA significantly reduced the expression levels of all these remodeling markers in both areas ($p<0.001$, in all cases). When we evaluated the effect of EMPA on NOS isoform, compared with sham group, MI group, showed an increase in nNOS, eNOS and iNOS, in both the infarcted ($p<0.001$, in all cases) and border areas ($p<0.001$, in all cases). EMPA treatment prevented this deleterious effect ($p<0.001$, in all cases). EMPA treatment induced an up-regulation in BH4 levels in comparison with MI group ($p<0.01$).
Conclusions: Our results suggest that the overexpression of cGCH1 may be an important mechanism involved in the cardioprotective action of EMPA in the context of post-infarction HF. Its cardioprotective effect could be related to an improvement in oxidative damage following MI.

P1258
The myocardial metabolism shift results to cardiomyocyte dedifferentiation in dilated cardiomyopathy and chronic heart failure.

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Background: One of the main cause of chronic heart failure (CHF) is dilated cardiomyopathy (DCM). The CHF progression is accompanied with a metabolic remodeling characterized by shifting from cardiac fatty acid oxidation as a primary energy source to glucose oxidation. Cardiac energy metabolism is under the transcriptional control of nuclear receptors, such as peroxisome proliferator activated receptor alpha (PPARα). PPARα plays a critical role in controlling cardiac energy. The high level of PPARα expression is observed in differentiated cardiomyocytes. So we propose that myocardial metabolism shift results to cardiomyocyte dedifferentiation. Dedifferentiated cardiomyocytes may take part in regenerative processes in DCM and CHF. Formation of new functional cardiomyocytes may come both of dedifferentiation and proliferation of pre-existing cardiomyocytes without complete reversion to a cardiac progenitor state, or by cardiac differentiation of stem cells (embryological or dedifferentiated origin). Aim: The aim of the work to determine PPARα expression level in DCM and CHF, to detect dedifferentiated cardiomyocytes in DCM and CHF.
Methods: RT-qPCR was used to assess PPARα and ANP expression levels in endomyocardial biopsies (EMB) in15 patients with CHF and DCM. Atrial natriuretic peptide (ANP) was used in this work as well-known marker of the dedifferentiated cardiomyocytes. Resident cardiomyocyte progenitors and dedifferentiated cardiomyocytes were found by the immunofluorescence approach and the electron microscopy.
Results: The PPARα expression level decrease was detected in EMB in CHF in comparison with the myocardial samples without cardiovascular pathology. Significant ANP expression level increase was detected in EMB in CHF in comparison with the myocardial samples without cardiovascular pathology. We detected the cardiomyocyte progenitor cells which express c-Kit and Nkx-2.5, other cells express Mdr-1 and GATA-4. Revealed the cardiomyocyte progenitor cells may be of the embryological or dedifferentiated origin. Cardiomyocytes with hallmarks of dedifferentiation have been found in our study. Revealed cardiomyocytes have main features of dedifferentiated cardiomyocytes - sarcomere disorganization and mitochondria disposition.

Conclusions: PPAR-alpha expression level decrease shows shift from oxidative phosphorylation to glycolysis, a transition to dedifferentiated state of cardiomyocytes. Elevated ANP expression levels are associated with cardiomyocyte dedifferentiation. Identified dedifferentiated cells can participate in revealed the shift from oxidative phosphorylation to glycolysis. Metabolism modulating by acting on PPARα gives an opportunity to govern by cell differentiation and dedifferentiation and therefore it is an attractive therapeutic avenue in regenerative medicine.

P1259

Empagliflozin ameliorates post-infarction cardiac remodeling through overexpression of GTP enzyme cyclohydrolase 1

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Purpose. Empagliflozin (EMPA) have profound benefits on reducing heart failure (HF) and mortality in patients with type II diabetes, although the mechanism(s) of this benefit remain poorly understood. A plausible mechanism could be relate to its action on oxidative damage. Here we evaluated whether EMPA improves adverse cardiac remodeling following MI, through modulation of the cardiac GTP enzyme cyclohydrolase 1. (cGCH1), a key protein in the development of cardiac adverse remodeling in HF.
Material and methods. A rat model of type II diabetes (50 mg/kg streptozotocin, i.p.) was subjected to MI by ligation of the left anterior descending coronary artery. Animals were randomly divided into two groups treated with placebo (PL) or EMPA (10 mg/kg/day) from the day of surgery and for 4 weeks. Additional controls consisting of sham-operated rats with diabetes (DS) and sham-non-operated rats with diabetes treated with EMPA, were used. The mRNA and protein expression of cGCH1 and other remodeling markers were analyzed by qRT-PCR and western blot. Both phospholamban (PLN) as well as protein phosphatase 1 α (PP1α) activation were evaluated by western blot. Adult primary cardiomyocytes (CMs) under normal or high glucose (Glc) conditions (25 mM Glc, 24 h) and untreated or treated with EMPA (500 nM, 2 days), were then subjected to a simulate ischemia/reperfusion (I/R). CMs were used: (1) to measurement of [Ca2+]cyt and sarcoplasmic reticulum (RS) Ca2+ release by spectrofluorometry; (2) To study the role of cGCH1 through its specific silencing (siRNAs) and (3) To measurement NO and O2.- levels by chemioluminiscence analyzer.
Results. Compared with sham group, cGCH1 is degraded in both infarcted and border areas ($p<0.001$). EMPA treatment prevented this degradation ($p<0.01$), significantly reduced the expression of all remodeling markers evaluated ($p<0.001$, in all cases) and improved echocardiographic and hemodynamic parameters. In addition, infarcted and border areas from rats treated with EMPA showed higher NO levels ($p<0.05$) and lower O2.- ($p<0.001$) compared to sham group. A significant down-regulation in the phosphorylation state of PLN ($p<0.001$), as well as an increase in phosphorylation of PP1α ($p<0.01$) was observed in MI group. EMPA reversed these effects ($p<0.001$, in all cases). CMs treated or not with EMPA under I/R, showed similar results to those obtained in vivo. Moreover, I/R induced a significant increase of [Ca2+]cyt and a decrease in [Ca2+] inside sarcoplasmic reticulum (SR). Similarly, EMPA reverted these effects ($p<0.001$, in all cases). Silencing of cGCH1 in CMs reversed all cardioprotective effects related to EMPA treatment.
Conclusion. Our results suggest, for first time, that the overexpression of cGCH1 may be an important mechanism involved in the anti-remodeling effect of EMPA in the context of HF. Furthermore, our results highlight an EMPA mechanism of action on calcium metabolism, establishing clear pharmacological targets

P1260

Pharmacological mitochondrial stabilization to prevents adverse cardiac remodeling following MI using empagliflozin

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Purpose. The oxidative damage associated with cardiac dysfunction following myocardial infarction (MI), is related to a mitochondrial dysfunction in the cardiomyocyte. Although empagliflocin (EMPA) has showed to prevent cardiac remodeling and slowdown heart failure (HF) progression, the molecular mechanisms have not been well elucidated. Cardiac GTP enzyme cyclohydrolase 1 (cGCH1), a key protein in the development of remodeling in HF, is down-regulated in MI and could be a therapeutic target for EMPA. Here we evaluated whether EMPA improves mitochondrial dysfunction following MI, through the modulation of cGCH1.
Material and methods. Diabetic rats (50 mg/kg streptozotocin, i.p.) were used to induce MI by ligation of the left anterior descending coronary artery. Animals were then randomly divided into two groups treated with placebo (PL) or EMPA (10 mg/kg/day, oral) from the day of surgery and for 4 weeks. Additional controls consisted of sham-operated rats with diabetes (DS) and sham-non-operated rats with diabetes treated with EMPA, were used. The mRNA and protein expression of GCH1 and other remodeling markers were analyzed by quantitative RT-PCR and western blot. The effect of MI on mitochondrial performance was characterized by analyzing Complex I activity by ELISA, ATP synthesis by HPLC (AMP/ATP ratio) and the mitochondrial membrane potential ($\Delta\Psi$m) using JC-1 as a fluorescent indicator. Apoptosis was characterized by analyzing cytochrome c release and caspase 3 activation by Western blotting. The involvement of GCH1 was determined via siRNA-mediated knockdown using adult primary cardiomyocytes (CMs) under normal or high glucose (Glc) conditions (25 mM Glc, 24 h) and untreated or treated with EMPA (500 nM, 2 days), were then subjected to a simulate ischemia/reperfusion (I/R).
Results: Acute-MI to cause a significant decrease in cGCH1 levels ($p<0.001$) mitochondrial function, as quantified by a depression of Complex I activity ($p<0.001$), diminution of $\Delta\Psi$m ($p<0.01$) and the increase in AMP/ATP ratio ($p<0.05$), both infarcted as well as border areas. In these areas, EMPA treatment attenuated the decrease of cGCH1 ($p<0.001$), complex I activity ($p<0.01$) and $\Delta\Psi$m ($p<0.05$) and prevented the increase in AMP/ATP ratio ($p<0.05$). Interestingly, treatment with EMPA prevented cytochrome c release and caspase 3 activation induced by MI ($p<0.001$, in all cases). Similar results were obtained in an experimental model of diabetes under simulated I/R. When CMs under I/R were knock-down for cGHC1, the cardioprotective effects induced by EMPA, were eliminated ($p<0.001$, in all cases).
Conclusions: This study shows that cGHC1 is the main mediator of mitochondrial protection, in the prevention of MI-induced cardiomyopathy by EMPA. These results suggest that therapeutic strategies based on cGHC1 modulation could protect cardiomyocytes from mitochondrial dysfunction in the setting of oxidative stress.

P1261

Age-specific features of cardioprotective action of meldonium under the experimental severe hypoosomolar hyperhydration

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The aim of our study was the determination of morphological changes in the rat's heart of different age under the experimental severe hypoosmolar hyperhydration and attempt to correct the identified changes by means of cardioprotector.
Materials. The experiment was performed on 54 white laboratory rats, which were divided into 2 experimental and 1 control series. The first experimental series included 6 rats in the prereproductive period at the age of 3 months, 6 rats in the reproductive period at the age of 8 months and 6 rats of the elderly age of 22 months. Animals were modeled a severe degree of hypoosmolar hyperhydrylion by introduction of distilled water and a synthetic analogue of ADH (vasopressin) "Minirin" twice a day at a dose of 0.01 mg trough the probe.The second experimental group included rats of all age groups (6 in each), which morphofunctional changes were corrected by meldonium. Rats of the control series were injected with "Minirin" twice a day at 0.01 mg, taking into account the potential effects of the drug onthe cardiovascular system. Cardiometry and statistical methods were used to assess the effect of hyperhydration on the morphofunctional state of the heart.
Results. In the 3-month-old rats of the first experimental series, the weight of the atria (AW) increases by21.98% ($p<0.0001$), the left ventricular weight (LVW) - by 28.65% ($p<0.0001$), the right ventricular weight (RVW) - by 25.77% ($p<0.0001$), and the area of the endocardial surface of the right ventricle (AESRV) - by 18.05% ($p=0.0099$) as compared with the control series.In the young rats of the secondexperimental series it is noted increasing of LVW by 23.03% ($p<0.0001$), RVW – by 20.1% ($p<0.0001$), AW – by 18.68% ($p=0.0003$) as compared with the control.The area of the endocardial surface of both ventricleschanges insignificantly. In the 8-month-old rats of the first experimental series AW is greater than the control by 25.35% ($p<0.0001$), LVW-by 15.4% ($p=0.0002$), RVW – by 48.13% ($p<0.0001$). The AESLV increases insignificantly, while AESRV increasesby 29.28% ($p<0.0001$). In mature rats of the second experimental series the AW is greater than control by 22.46% ($p<0.0001$), LVW – by 17.22% ($p<0.0001$), RVW – by 23.88% ($p<0.0001$), AESRV increases by 13.63% ($p=0.0499$). In the 22-month-old rats the AW increases by 22.89% ($p=0.0001$), LVW - by 24.48% ($p< 0.0001$), RVW – by 45.88% ($p<0.0001$), AESLV– by 31.35 % ($p<0.0001$), AESRV – by 35.12% ($p<0.0001$) as compared with the control. In old rats of the second experimental series we observe increasing of LVW by 25.45% ($p<0.0001$), RVW – by 37.28% ($p<0.0001$), AW – by 20.33% ($p=0.0002$), AESLV– by 18.33% ($p=0.0013$), and AESRV – by 22.68% ($p=0.0012$).
Conclusion. Under the influence of hypoosomolar hyperhydration was observed a significant increase of massometric indices in both experimental groups. At the same time, the application of meldonium slows growth of the mass of the right ventricle and its dilatationin all age categories.

P1262

Cardioprotective regulation of the mitochondrial permeability transition pores induced by metabolic preconditioning

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The mitochondrial permeability transition pore (mPTP), located on the inner mitochondrial membrane, has become an important goal in investigating initiation and signalling pathways involved in cardioprotection. Metabolic preconditioning (MP) is an experimental cardioprotective model that has demonstrated sufficient protection to compensate for the mitochondrial energy of the heart under pathological conditions. A suitable method for elucidating the molecular structure and regulatory components of the multienzyme mPTP complex is shown to be proteomic analysis. Our attention was also concentrated on mitochondrial creatine kinase (mtCK) as one of the proposed mPTP regulators, whose function is particularly important from the energy conservation position.

The isolated Wistar rat heart mitochondria on the MP model represented by acute 8-day streptozotocin-induced diabetes mellitus (65 kg/mg i.p.) versus the healthy control group were examined. Proteomic analysis by nano-liquid chromatography and mass spectrometry were preceded by separation of mitochondrial proteins by 1D gel electrophoresis and digestion of proteins in gel by using trypsin.

At the level of using proteomic analysis, we have focused on proteins currently considered as structural and regulatory components of mPTP. The abundance of the investigated proteins as a whole was significantly lower in the MP-affected group ($p = 0.048$). However, in the individually analysed proteins of the MP-treated group, we did not observe statistically significant differences except from the ATP synthase β subunit, which was significantly reduced. The remaining identified mPTP proteins retained expression at the level of healthy mitochondria without significant change. Also, the mtCK enzyme activity was preserved in MP.

The results of mPTP proteomic analysis and unchanged mtCK activity under MP conditions indicate the positive effect of mPTP-regulated mechanisms present in the state of increased calcium influx into the mitochondria, thereby contributing to the maintenance of the energy of the pathologically affected myocardium.

P1263

Restoration of endogenous hydrogen sulfide synthesis decreases the sensitivity of mitochondrial permeability transition pore opening to Ca2+ and increases of cNOS activity in old rat heart

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Introduction . Mitochondria are the key organelles that regulate the vitality of cells, the central hub for metabolic reactions and the main source of cellular ATP. In addition, mitochondrial dysfunction is one of the main causes of cardiovascular disease in various pathological conditions and aging. It is known that the protective effect on the cardiovascular system can be carried out by a gas transmitter - hydrogen sulfide (H2S). The aim of the current work was to study the effect of H2S-synthesizing enzymes cofactor pyridoxal-5-phosphate (PLP) on the sensitivity of mitochondrial permeability transition pore (MPTP) opening to Ca2+ as natural inducer in old rat heart, as well as the H2S content and cNOS activity in heart mitochondria.

Materials and Methods. Wistar male rats were divided into 3 groups: adult (6 months), old (24 months) and old+PLP. PLP was administered per os in dose of 0,7 mg per kg daily for 2 weeks. MPTP opening was registered spectrophotometrically as mitochondrial swelling. Additionally, the content of H2S, cNOS and iNOS activity, was measured in heart mitochondria.

Results. Our results show that H2S content and cNOS activity was 2 times lower in old rat heart mitochondria comparing to adult ones. However, PLP administration induced the increase of endogenous H2S content and cNOS activity in 4,2 times and 1,9 times respectively, compared with those in older animals. Additionally, iNOS activity was 2,5 times higher in old rat, but the administration of PLP caused decreasing of this parameter in 4,6 times. It has also been shown that PLP application prevents Ca2+-induced MPTP opening by reducing the sensitivity to the inductor in old rat heart.

onclusions. Overall, our results showed that H2S acts as a regulator of MPTP opening, increasing activity cNOS and recoverability of enzyme coupled state, indicating the importance of this gaseous transmitter in the pathology of the cardiovascular system. Thus, the 2 weeks administration of PLP might be used for stimulation of endogenous H2S synthesis and restoration of cNOS activity in heart mitochondria of old rat.

P1264

Inflammatory state and the development of low triiodothyronine syndrome in advanced heart failure.

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Background: Inflammatory state may accompany heart failure and lead to disturbed function of deiodinases. The aim of the study was the evaluation of the prevalence and clinical significance of low T3 syndrome in HF in relation to hsCRP - inflammatory state marker.

Methods: The study group consisted of 59 consecutive patients hospitalized due to decompensated HFrEF NYHA III or IV.

Exclusion criteria: thyroid dysfunction, severe systemic disease, treatment with amiodarone, steroids or propranolol.

We included all 59 consecutive patients hospitalized due to decompensated HFrEF. Group A included 9 patients with low fT3 concentration below 3.1 pmol/L. Group B consisted of the remaining 50 patients with normal fT3 levels.

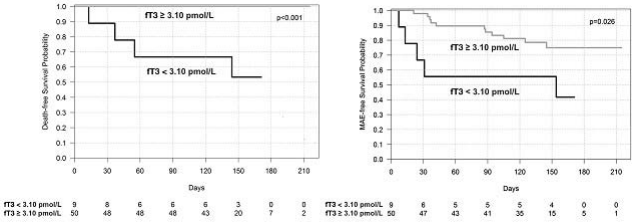
Laboratory tests and echocardiography were performed.

Results: The prevalence of low T3 syndrome was 15.3%. We demonstrated correlations between free T3 (fT3) and main clinical variables (Table 1.). Kaplan-Meier survival analysis showed lower survival probability in patients with low fT3 ($p<0.001$).

Conclusions: Low T3 syndrome is frequently found in patients with HFrEF and is associated with a poor outcome. We found correlation between hsCRP and fT3.

Table 1. Correlation analysis.

Variable	Byvariable	Correlation	p-value
fT3	hsCRP	-0.4505	0.0003*
fT3	NT-proBNP	-0.5368	<0.0001*
fT3	LVEF	0.4311	0.0007*
fT3	MAPSE	0.2819	0.0305*
fT3	+dp/dt	0.2981	0.0467*
fT3	TAPSE	0.3345	0.0096*
fT3	E/A	-0.4496	0.0087*



The Kaplan-Meier survival curves

P1265

Altered fatty acid oxidation and mitochondrial function and structure in skeletal muscle of patients with preserved and reduced ejection fraction compared to healthy controls

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Background: Several studies suggested altered metabolism and mitochondrial function in skeletal muscle of patients with heart failure (HF).

Purpose: To compare mitochondrial structure and function in skeletal muscles of symptomatic outpatients with preserved (HFpEF) and reduced ejection fraction (HFrEF) and age-matched healthy controls (HC) and its relationship to exercise capacity.
Methods: 55 participants were recruited prospectively in our University Hospital, Germany: 17 HFpEF, 18 HFrEF, 20 HC (Age: 71±6 vs. 68 ±9 vs. 66±7 years, p=0.1; sex (m/f): 8/9 vs. 3/15 vs. 7/13, p=0.0001; BMI: 28.7±4.6 vs. 27.9±5.3 vs. 26.4 ±4.2 kg/m2, p=0.2). All participants underwent echocardiography, cardiopulmonary exercise test, muscle function tests, and muscle biopsies from the vastus lateralis. Total RNA was prepared (10 HFpEF, 13 HFrEF, and 11 HC) and expression levels of fatty acid translocase (CD36), carnitine palmitoyltransferase IB (CPT1ß), medium-chain acyl-CoA dehydrogenase (ACADM), uncoupling protein (UPC-3) and Mitofusin (Mfn2) was measured using real-time polymerase chain reaction. CPT1ß-protein was evaluated using Western Blot. Mitochondrial number and size were analysed using an electron microscope and measured in pictures with enlargement of 13.000x. Serum samples were analyzed for SuPAR by means of ELISA.
Results: Comparing patients with HFpEF and HFrEF to HC gene expression of fatty acid uptake [CD-36: (0.17±0.10 vs. 0.22±0.14 vs. 0.34±0.12, p=0.01)], transportation across the mitochondrial membrane [CPT1ß: (1.79±0.71 vs. 2.27±1.24 vs. 4.38±1.49, p<0.0001), degrading medium-chain fatty acids [(ACADM: 3.99 ±0.79 vs. 3.90±1.71 vs. 5.48 ±1.66, p=0.03)], Uncoupling proteins [UPC-3: 0.9±0.5 vs. 0.5±0.3 vs. 1.2±0.5, p<0.0001], Mitochondrial fusion [(MFN2: 0.2±0.07 vs. 0.2±0.1 vs. 0.4±0.1, p<0.0001)], protein level of CPT1ß (0.5±0.2 vs. 0.5±0.2 vs. 0.7±0.2, p=0.03)], number of mitochondria (15.8±8.2 vs. 14.0±4.6 vs. 30.5±9.8, p=0.003) and size (1487±640 vs. 2524±1114 vs. 5612±4242, p=0.008) were reduced in skeletal muscles. Mitochondrial size was associated with higher levels of ACADM, MFN2-gene expression and CPT1ß-protein (r=0.7, p=0.003; r=0.5, p=0.03; r=0.6, p=0.04, respectively), PVO2 (r= 0.5, p=0.02), muscle strength (Knee flexion: r=0.53, p=0.01), and with distinct cardiac structure abnormalities: left atrial volume index (r=-0.74, p=0.004), intraventricular septum thickness (r=-0.5, p<0.0001), and with e´ lateral (r=0.76, p=0.003), and inversely with the level of an inflammatory biomarker SuPAR (r=-0.44, p<0.05). Logistic regression showed MFN-2 to be an independent factor for predicting a reduced PVO2 adjusted for LVEF, CD36, ACADM (odds ratio: 1.1, p=0.04).
Conclusion: Distinct alterations of mitochondrial structure and function were observed in patients with HF, especially those with HFpEF, compared to HC. These changes were associated with reduced exercise capacity, muscle strength, and elevated levels of inflammatory Biomarkers.

P1266
Effects of phosphodiesterase-5A inhibition on right ventricular cardiomyocyte function in diabetic cardiomyopathy

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Elevated intracellular cyclic guanosine monophosphate (cGMP) levels have been shown to prevent the development of diabetic cardiomyopathy. Here we studied the effect of the phosphodiesterase-5A (PDE-5A) inhibitor, vardenafil in a rat model of diabetic cardiomyopathy on cardiomyocyte function of the right heart.
Experiments were performed in male Zucker Diabetic Fatty (ZDF) and ZDF Lean (ZDFL) rats (as controls). Seven-weeks-old animals received either vehicle (ZDFL, ZDF) or 10 mg/bwkg vardenafil per os (ZDFLV, ZDFV) for 25 weeks. Permeabilized cardiomyocytes from right ventricle (RV) were used during isometric force measurements. Maximal Ca2+-activated active force production (Fmax), its Ca2+-sensitivity (pCa50), and Ca2+-independent passive force (Fpassive) were monitored. Western immunoblotting was applied to assess site-specific phosphorylation status of cardiac troponin-I (cTnI) and cardiac myosin binding protein C (cMyBP-C). Total phosphorylation status of titin protein was probed by ProQ Diamond phosphoprotein kit. Fpassive values were significantly higher in ZDF rats (1.95±0.08 kN/m2, n=6-7) than in the ZDFL (1.38±0.12 kN/m2, n=6-7), ZDFLV (1.30±0.11 kN/m2, n=6-7) and ZDFV (1.13±0.16 kN/m2, n=6-7) groups (P<0.05). No significant differences were observed in Fmax among the four groups (ZDF: 14.20±1.40 kN/m2, ZDFL: 11.15±1.17 kN/m2, ZDFLV: 12.36±0.97 kN/m2, ZDFV: 10.96±0.50 kN/m2, n=6-7). pCa50 values were significantly lower in ZDFV groups (ZDF: 5.84±0.02, ZDFL: 5.85±0.02, ZDFLV: 5.83±0.02, ZDFV: 5.67±0.02, P<0.05, n=6-7). Cardiac troponin-I (cTnI) was hyperphosphorylated at Ser-22/23, Ser-43 and Thr-143 sites in ZDFV groups when compared to ZDF animals (ZDFV: 1.08±0.13, 1.45±0.19 and 2.32±0.32, ZDF: 0.95±0.07, 0.98±0.05 and 1.04±0.21; in relative units, respectively, P<0.05, n=6). No significant differences in the site specific phosphorylation status of cMyBP-C at Ser282 and in the total phosphorylation status of titin between the groups were observed.
Increased passive force production developed in RV cardiomyocytes of rats with type 2 diabetes mellitus which could be limited by chronic phosphodiesterase-5A inhibition through markedly increased protein phosphorylation.

P1267
Mitochondrial dysfunction results from the loss of ERK5 in diabetic cardiomyopathy

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The prevalence of cardiomyopathy from metabolic stress has increased dramatically; however, its molecular mechanisms remain elusive. Here, we show that extracellular signal-regulated protein kinase 5 (Erk5) is lost in the hearts of obese/diabetic animal models and that cardiac-specific deletion of Erk5 in mice (Erk5-CKO) leads to dampened cardiac contractility and mitochondrial abnormalities with repressed fuel oxidation and oxidative damage upon high fat diet (HFD). Erk5 regulation of peroxisome proliferator-activated receptor γ co-activator-1α (Pgc-1α) is critical for cardiac mitochondrial functions. More specifically, we show that Gp91phox activation of calpain-1 degrades Erk5 in free fatty acid (FFA)-stressed cardiomyocytes, whereas the prevention of Erk5 loss by blocking Gp91phox or calpain-1 rescues mitochondrial functions. Similarly, adeno-associated virus 9 (AAV9)-mediated restoration of Erk5 expression in Erk5-CKO hearts prevents cardiomyopathy. These findings suggest that maintaining Erk5 integrity has therapeutic potential for treating metabolic stress-induced cardiomyopathy.

P1268
Post-rest inotropic reaction of the myocardium in dependence on SERCA2a expression level and metabolic enzyme activity in patients with coronary artery disease and diabetes mellitus

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Background. Contractile dysfunction in heart failure (HF) and diabetes mellitus is tightly associated with the abnormal excitation-contraction coupling, associated with sarcoplasmic reticulum (SR) dysfunction. The role of changes in the intracellular calcium handling in the pathogenesis of HF associated with diabetes remains poorly understood. The inotropic behavior of isolated preparation of myocardium of patients with coronary artery disease (CAD) and CAD combined with type 2 diabetes mellitus (DM2), its relation with the expression SERCA2a and enzyme activity of the energy suppling metabolism were evaluated.
Methods. The study included patients with chronic CAD and patients with CAD combined with DM2 undergoing coronary artery bypass grafting. Inotropic reaction on rest period was studied on isolated trabeculae of the right auricular myocardium of patients. Post-rest reaction of myocardium assessed for analyze the sarcoplasmic reticulum function (4 - 60 sec). The protein levels of SERCA2a in myocardium were determined by Western blotting. Oxygen consumption by mitochondria was measured using a Clark-type oxygen electrode. The activity of lactate dehydrogenase and succinate dehydrogenase were determined by histochemical method.
Results. It was shown that potentiation and decay of post-rest contraction force of myocardium was observed in both CAD patients with and without DM2. The potentiation of post-rest contractions of myocardium corresponds to the "high content" of the SERCA2a expression, and the decay of post-rest contractions coincides to the "low content" of the SERCA2a. In the combined development of CAD and DM2 with short duration of the disease, the potentiation of post-rest contractions is manifested to a greater degree and corresponds to a higher of SR SERCA2a expression than in CAD patients. Activity of the enzymes of the energy suppling metabolism succinate dehydrogenase (SDH) and lactate dehydrogenase (LDH) was higher in the myocardium of CAD patients while the rate of oxygen uptake by cardiomyocyte mitochondria was higher in the myocardium of patients with combined pathology.
Conclusion. In CAD with and without DM2 the potentiation of post-rest contractions of isolated muscle strips of human myocardium corresponds to 'high level' of SR SERCA2a expression, while the decay of post-rest contractions is associated with 'low level' of SR SERCA2a expression. In combined development of CAD and DM2 with short-term duration of disease the potentiation of post-rest contractions is manifested to a greater degree and corresponds to a higher level of SR SERCA2a

expression than in CAD alone patients. In CAD ATP synthesis is realizes mainly in result of glycolytic processes and Krebs cycle and, opposite, the mitochondrial oxidative phosphorylation prevail in comorbid development of CAD and DM2 in the production of ATP.

P1270

HFWM: - Title: CaMKII-HDAC4 interplay governs the function of the diabetic heart

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Worldwide, diabetes mellitus (DM) and heart failure (HF) are frequent co-morbidities with constantly growing prevalence. DM patients not only have a higher lifetime risk of developing HF, cardiovascular complications also represent a major cause of death in these patients. However, clinical evidence exists that intensive glucose lowering treatment in patients with DM paradoxically increases the risk of hospitalization due to HF. These findings raise the question whether glucose might even possess protective effects. In the current project, we investigated hyperglycaemic signalling in DM with respect to detrimental versus protective effects to the heart. DM was induced in HDAC4 deficient mice and cells were transfected with plasmids encoding either HDAC4, its inactivating upstream regulator CaM Kinase II (CaMKII) or its activating upstream regulator protein kinase A (PKA) in low versus high glucose conditions. We found that diabetic HDAC4-KO mice develop impairment of systolic function, whereas control littermates were protected. We now found that addition of O-linked b-N-acetylglucosamine (O-GlcNAc) at S642 of histone deacetylase 4 (HDAC4) is essential for its proteolysis and production of a cardioprotective N-terminal fragment, which we named HDAC4-NT. In a series of biochemical experiments, we provide additional evidence that O-GlcNAcylation of HDAC4 at S642 is not only essential for HDAC4-NT production but also reduces HDAC4 inactivation through detrimental CaMKII-mediated phosphorylation of S632. Vice versa, CaMKII phosphorylation of HDAC4 triggered decreased levels of HDAC4-NT production. Altogether, this suggests that O-GlcNAcylation at S642 and phosphorylation at S632 are mutually exclusive events and that HDAC4 contains a molecular domain that decides about protective and detrimental downstream signaling. Thus, we propose a new model potentially explaining the ''diabetic paradox'': HDAC4 serves as a molecular checkpoint in diabetic metabolism consisting of S632 (target of detrimental CaMKII signaling) and S642 (target of protective O-GlcNAcylation) and thereby controls cardiac function. Further investigation is necessary to identify mechanisms that control specificity of O-GlcNAcylation in the diabetic heart and might be suitable as potential drug targets in the future.

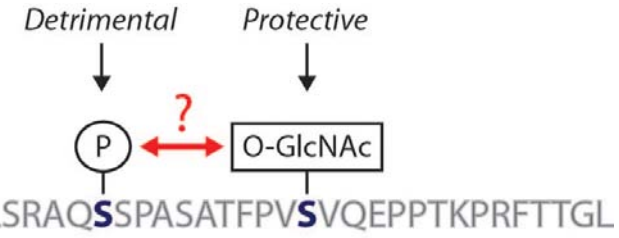

Fig. 1: peptide sequence of HDAC4 displaying S632 phospho- and S642 O-GlcNAc-site in close proximity

P1271

Circulating micrornas associated with c-type natriuretic peptide in childhood obesity

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Background: Circulating microRNAs (miRNAs) are biomarkers of metabolic disease implicated in the pathogenesis of obesity and C-type natriuretic peptide (CNP) was recently indicated as important natural regulator of adipogenesis during pediatric obesity. At present, no data are available on a possible contribution of CNP-linked miRNAs to childhood obesity.

Purpose: Our aims were to 1) perform a detailed in silico analysis to identify miRNAs targeting CNP gene through the use of bioinformatic algorithms; 2) recognize CNP-linked miRNAs associated with obesity; 3) characterize their circulating profiling in normal-weight (N) and obese adolescent (O).
Materials & Methods: A clinical examination was performed in 26 N and 50 O adolescents aged 13.5±0.4 years. CNP plasma levels were detected by immunometric assay while miRNA expression was carried out on peripheral blood using Real Time PCR.
Results: Plasma CNP resulted significantly lower in O than in N (5.58±0.62 vs. 14.78±1.35 pg/ml, $p<0.0001$). In silico analysis disclosed several specific circulating CNP-linked miRNAs with miR-33a-3p, miR-223-5p and miR-142-5p being also associated with obesity. MiR-199 and miR-4454, known to be associated with obesity but not with CNP, were also studied. Only circulating miR-223 and miR-33a expression resulted significantly ($p=0.05$) higher in O (0.97±0.1; 0.85±0.1, respectively) than in N (0.66±0.11; 0.51±0.08, respectively). Plasma CNP correlated inversely with miR-33a (r= -0.25, $p=0.036$), miR-223 (r= -0.33, $p=0.004$), miR-199 (r= -0.35, $p=0.003$) and miR-4454 (r= -0.48, $p<0.0001$). Significantly positive correlations were observed between miR-33a and miR-223 ($r=0.35$, $p=0.002$) and between miR-199 and miR-4454 ($r=0.45$, $p=0.0001$). Applying a multivariate logistic regression analysis, miR-199 ($p=0.016$) and miR-142 ($p=0.006$) resulted significantly associated with CNP in pediatric obesity.
Conclusions: Our data confirm miR-199, previously reported as an important player in early childhood obesity, as a key regulator of CNP expression in pediatric population. Nevertheless, further investigations are needed to validate the differential expression of miRNAs in childhood obesity. The regulation of CNP-mediated miRNA may contribute to better understand the potential action of miRNAs in childhood obesity by fine-tuning target gene expression, as CNP.

P1272

HFWM: Endothelial-to-mesenchymal transition contributes to aortic stiffness in type 2 diabetes mellitus

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Background/introduction – In the past decades, the prevalence of diabetes mellitus has risen considerably and is currently affecting more than 422 million people worldwide. Cardiovascular diseases including myocardial infarction and heart failure represent the major cause of death in type 2 diabetes. Diabetes patients exhibit accelerated aortic stiffening which is associated with myocardial infarction and heart failure. Importantly, aortic stiffening is an independent predictor of cardiovascular disease and mortality in diabetes mellitus patients. We recently showed that aortic stiffness precedes hypertension in a mouse model of diabetes (db/db mice), making aortic stiffness an early contributor to cardiovascular disease development.
Purpose – Elucidating how aortic stiffening develops is a pressing need in order to halt the pathophysiological process at an early time point. We now identified the endothelial-to-mesenchymal transition (EndMT) as a novel regulator of aortic stiffness.
Methods – To assess the occurrence of EndMT, we performed co-immunofluorescent staining of an endothelial marker (CD31) with mesenchymal markers (α-SMA and S100A4) in aortic sections from db/db mice. Moreover, we performed qRT-PCR to analyze the mRNA expression of the EndMT transcription factors (Snail, Slug and Twist) in aortic sections of db/db mice as well as diabetic patients with aortic stiffness. To identify the underlying mechanism by which EndMT contributes to aortic stiffening, we overlapped the Micronome of aorta's from db/db mice and high glucose treated human umbilical vein endothelial cells (HUVECs).
Results – We demonstrate robust co-localization of CD31 and α-SMA or S100A4 in aortic sections of db/db mice which was almost absent in control mice. Moreover, we demonstrate a significant upregulation of the EndMT transcription factors in aortic sections of both db/db mice and diabetic patients with aortic stiffness. We also show co-localization of CD31 and α-SMA or S100A4 and upregulation of EndMT transcription factors in high glucose treated HUVECs. As underlying regulator, we identified miR-132-3p as the most significantly downregulated miR in both the micronome of db/db mice and of high glucose treated HUVECs. Indeed, miR-132-3p was also significantly downregulated in aortic tissue from diabetic patients with aortic stiffness. We identified Kruppel-like factor 7 (KLF7) as a target of miR-132-3p and show a significant upregulation of KLF7 in aortic sections of both db/db mice and diabetic patients as well as in high glucose treated HUVECs.
Conclusion(s) – To the best of our knowledge, this is the first report to demonstrate that EndMT contributes to aortic stiffening in the context of type 2 diabetes. We identified miR-132-3p and KLF7 as novel regulators of EndMT in this context. Altogether, this gives us new insights in the development of aortic stiffening in type 2 diabetes.

P1273

Omega-3 fatty acids prevent the development of heart failure with preserved ejection fraction in a preclinical model

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Funding Acknowledgements: University of Reading, United Kingdom.

Background: The prevalence of heart failure with preserved ejection fraction (HFpEF) is increasing, and there are no evidence based therapies for this condition. The main molecular defect in HFpEF is reduced activity of the nitric oxide-cyclic GMP-protein kinase G (NO-cGMP-PKG) pathway, which appears to be triggered by low-grade inflammation-induced endothelial dysfunction, secondary to cardiometabolic comorbidities frequently associated with HFpEF (e.g. hypertension, diabetes, obesity). Omega-3 polyunsaturated fatty acids (n-3 PUFA) have pleiotropic beneficial cardiovascular effects, including improvement of diastolic and endothelial function, anti-inflammatory effects and a positive cardiometabolic profile.
Purpose: We hypothesized that n-3 PUFA supplementation could prevent the development of HFpEF in a preclinical model.
Methods: Male Dahl salt sensitive (DSS) rats were fed a high salt diet (8% NaCl) without supplementation of n-3 PUFA from 7 weeks of age (HFpEF group), whilst another cohort received a high salt diet supplemented with 1.2% fish oil (n-3 PUFA group). Another cohort of DSS rats was fed a low salt diet (0.3% NaCl) throughout the duration of the study protocol until 19 weeks of age (Control group). Blood pressure was evaluated by the tail cuff method. A complete echocardiographic evaluation was performed at baseline and repeated every 2 weeks thereafter, which included evaluation of diastology parameters, such as mitral valve inflow velocities, and tissue Doppler evaluation of myocardial tissue relaxation velocities. Fatty acid content was measured in plasma, red blood cells and myocardium, and the omega-3 index was also calculated.
Results: Rats in both the HFpEF and the n-3 PUFA groups developed severe hypertension, whilst the control group remained normotensive. Only the HFpEF group developed signs of heart failure (e.g. reduced activity, laboured respiration, weight loss), and deterioration of health status, which was associated with higher indices of cardiac hypertrophy and pulmonary congestion (Figure 1A). Of note, all groups exhibited normal left ventricular ejection fraction throughout the study. Significantly, only the HFpEF group presented diastolic dysfunction (elevated E/e' ratio, reduced e', increased a', and reduced e'/a' ratio), whilst the n-3 PUFA and Control groups exhibited normal diastolic function (Figure 1B-C). Taken together, the above results suggest that n-3 PUFA supplementation prevented the development of HFpEF. The protective effect of n-3 PUFA was associated with substantial enrichment of n-3 PUFA content in the myocardium and concomitant elevation of the omega-3 index in the n-3 PUFA group, compared to the HFpEF and Control groups (Figure 1D).
Conclusion: Our data suggest that chronic supplementation of n-3 PUFA through the diet prevents the development of HFpEF in the DSS hypertensive model, and therefore may be a promising therapeutic option for HFpEF patients.

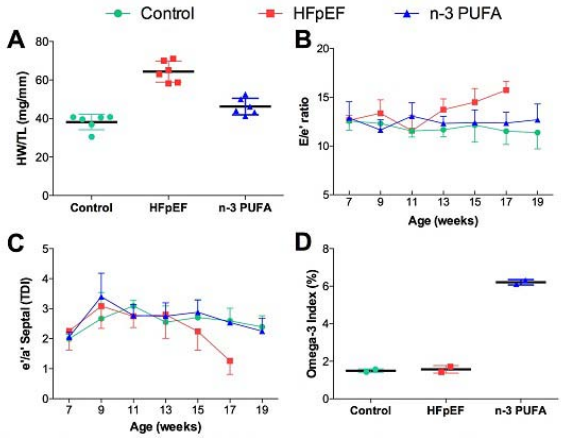

Figure 1. A. Heart weight/tibia length (HW/TL) ratio suggest attenuated cardiac hypertrophy in the n-3 PUFA group compared to the HFpEF group. **B-C.** HFpEF group exhibits diastolic dysfunction as indicated by alterations in the E/e' and e'/a' ratios. The Omega-3 Index (% of EPA+DHA fatty acids in red blood cells) was only increased in the n-3 PUFA group. Data shown as mean ± SEM.

Figure 1.

P1274

HFWM: The missing link between the immune system and endothelial dysfunction in HFpEF

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Heart failure with preserved ejection fraction (HFpEF) is a major public health concern, characterized by normal heart ejection fraction but with inability of the myocardium to relax normally. It lacks effective therapies, and is worsened by obesity, diabetes and hypertension epidemics in an ageing population.
Recent advances in HFpEF pathophysiology were possible due to the development of the ZSF1 obese rat model, which display HFpEF phenotype, including preserved systolic function and diastolic dysfunction . Mounting evidence suggest that these associated comorbidities prime a systemic pro-inflammatory milieu and microvascular endothelial activation which trigger subsequent myocardial dysfunction .
Targeting the immune response has been proposed as an effective strategy to prevent cardiovascular dysfunction in HFpEF. However, a comprehensive analysis on immune alterations and the subsequent implications to endothelial and organ dysfunction are yet to be reported. This work aimed to characterize systemic immune cell populations in a HFpEF animal model, and their crosstalk with endothelial cells. Flow cytometry characterization of immune cell populations in blood, spleen and lymph nodes of ZSF1 obese rats showed a variation in their proportions, when comparing with lean animals, namely an increase in CD11b/c+ myeloid cells accompanied by a decrease in T and B cells. These data indicate that systemic immune alterations occur in HFpEF and suggest a higher involvement of innate immunity in the disease. We also detected higher expression levels of the senescence marker p21 in peripheral blood mononuclear cells which is a scenario compatible with chronic inflammation.
Although we observe that endothelial activation correlates with augmented inflammatory infiltration in ZSF1 obese animals, their association is yet to be defined. Based on this, we studied the interaction between immune cells, namely bone marrow-derived macrophages, with microvascular endothelial cells (MVEC), stimulating MVEC with extracellular vesicles isolated from cultures of macrophages from obese and lean ZSF1 rats. Preliminary results suggest an involvement of macrophage secretome in MVEC activation status. In conclusion, our findings suggest that in HFpEF alterations in the immune system precede endothelial dysfunction. However, further studies are required to advance current understanding on the role of the immune system in disease pathophysiology, and to translate this knowledge in the identification of effective therapeutic targets.

Rapid Fire 4 - Chronic heart failure - Pharmacology

1278

Heart failure outcomes in patients with diabetes with and without atrial fibrillation - data from the EMPA-REG OUTCOME study

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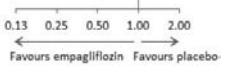
Funding Acknowledgements: Boehringer Ingelheim and Eli Lilly and Company Diabetes Alliance

Introduction – Atrial fibrillation (AF) is a frequent comorbidity in heart failure (HF), and it worsens the outcome, reflecting a more advanced myocardial disease. AF confers an additional risk associated with HF, and HF treatments, such as beta blockers, have not demonstrated reductions in mortality in patients with AF. In the EMPA-REG OUTCOME study, empagliflozin led to a reduction in HF hospitalisations (HHF), cardiovascular (CV) death, CV death or HHF, and incident or worsening nephropathy in patients with type 2 diabetes (T2D) and established CV disease.
Purpose: This post-hoc analysis of the EMPA-REG OUTCOME study aimed to examine (1) classical and expanded HF outcomes in a T2D population with and without pre-existing AF, and (2) the effect of empagliflozin in patients with AF compared with those without AF.

Figure 1: Impact of empagliflozin on HF outcomes by AF at baseline

	Empagliflozin n/N (%)	Placebo n/N (%)	HR (95% CI)	HR (95% CI)	p-value for interaction
Hospitalisation for HF					0.7509
AF Yes	21/247 (8.5)	18/142 (12.7)	0.60 (0.32, 1.12)		
AF No	105/4440 (2.4)	77/2191 (3.5)	0.67 (0.50, 0.90)		
CV death					0.5570
AF Yes	21/247 (8.5)	21/142 (14.8)	0.52 (0.29, 0.96)		
AF No	151/4440 (3.4)	116/2191 (5.3)	0.64 (0.50, 0.81)		
Hospitalisation for HF or CV death					0.5630
AF Yes	38/247 (15.4)	33/142 (23.2)	0.58 (0.36, 0.92)		
AF No	227/4440 (5.1)	165/2191 (7.5)	0.67 (0.55, 0.82)		
Introduction of loop diuretics					0.9716
AF Yes	29/157 (18.5)	23/90 (25.6)	0.61 (0.35, 1.06)		
AF No	311/3805 (8.2)	239/1879 (12.7)	0.62 (0.52, 0.73)		
Oedema					0.1344
AF Yes	14/247 (5.7)	23/142 (16.2)	0.32 (0.16, 0.61)		
AF No	237/4440 (5.3)	212/2191 (9.7)	0.53 (0.44, 0.64)		
Incident or worsening nephropathy					0.1987
AF Yes	26/207 (12.6)	29/118 (24.6)	0.44 (0.26, 0.74)		
AF No	499/3917 (12.7)	359/1943 (18.5)	0.62 (0.54, 0.71)		



AF, atrial fibrillation; CV, cardiovascular; HF, heart failure.

Figure 1

Methods: In total 7020 patients with T2D and CV disease were treated with empagliflozin 10 mg, 25 mg or placebo, and followed for a median of 3.1 years. We explored the association between investigator-reported history of AF at baseline and time to first HHF, CV death, HHF or CV death, first introduction of loop diuretics, first occurrence of oedema and incident or worsening of nephropathy. We also assessed the consistency of the effect of empagliflozin treatment in patients with and without AF at baseline. Differences in the risks between treatment groups were assessed using a Cox proportional hazards model with factors for age, sex, baseline body mass index (BMI), baseline glycated haemoglobin (HbA1c), baseline estimated glomerular filtration rate (eGFR), region, treatment, AF and treatment by AF interaction. All analyses were performed on a nominal two-sided alpha of 0.05 without adjustment for multiplicity.
Results: A total of 389 patients had investigator-reported AF at baseline. Patients with AF were more often male (78.1 vs 71.1%), older (mean age 68.4 vs 62.8 years), had higher BMI (mean 31.7 vs 30.6 kg/m^2), and lower eGFR (mean 67.4 vs 74.4 ml/min/1.73 m^2). Furthermore, patients with AF vs without AF at baseline had higher rates of HHF or CV death on placebo (Plac) and empagliflozin (Empa): (Plac/Empa 23.2%/15.4% vs Plac/Empa 7.5%/5.1%). Increased risks were also detected for HHF (Plac/Empa 12.7%/8.5% vs 3.5%/2.4%), introduction of loop diuretics (Plac/Empa 25.6%/18.5% vs 12.7%/8.2%), first occurrence of edema (16.2%/5.7% vs 9.7%/5.3%) as well as incident or worsening of nephropathy (24.6%/12.6% vs 18.5%/12.7%). Empagliflozin consistently reduced HHF, CV death, HHF or CV death, introduction of loop diuretics, occurrence of oedema and incident or worsening of nephropathy in patients with and without AF (Figure).
Conclusion – In patients with T2D and CV disease, AF is associated with an increased risk of CV and HF outcomes and mortality. The treatment effects of empagliflozin are consistent in patients with and without AF.

1279

Eligibility for EMPEROR trials in a real-world heart failure population: data from the Swedish heart failure registry

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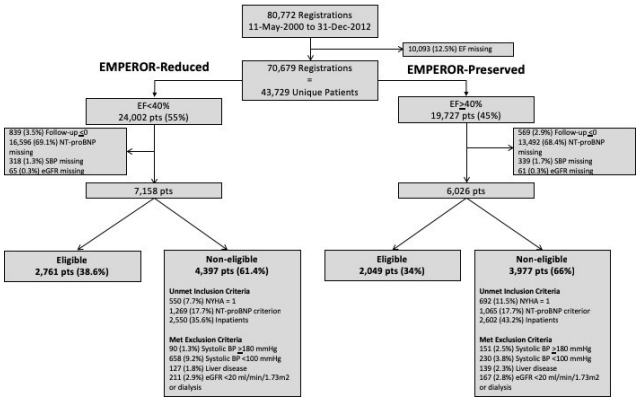
Background Randomized controlled trials (RCT) populations may use inclusion/exclusion criteria for trial-specific reasons, e.g. to enrich for higher cardiovascular (CV) risk, in order to establish the benefit of the investigational compound in a practically feasible manner. Generalizability of RCT results to real-world settings is an important question.
Purpose To investigate the eligibility criteria for the Empagliflozin outcome trial in patients with chronic heart failure (HF) with preserved ejection fraction (EF)(EMPEROR-Preserved) and reduced EF (EMPEROR-Reduced) in a real-world HF population.
Methods Patients enrolled as out- or as in-patients at discharge in the Swedish HF Registry (SwedeHF) in 2000-2012 were included. Inclusion criteria in EMPEROR trials were applied, specifically NYHA class II-IV and being outpatient on stable HF therapy. Considered exclusion criteria were systolic blood pressure (SBP)≥180 or <100 mmHg, liver disease, and eGFR<20 ml/min/1.73m2 or dialysis. Patients with EF≥40% and <40% were considered eligible for EMPEROR-Preserved and -Reduced, respectively. NT-proBNP>300 pg/ml for patients without atrial fibrillation (AF) or >900 pg/ml for those with AF was inclusion criterion in EMPEROR-Preserved, whereas NT-proBNP>600 pg/ml and ≥1200 pg/ml, respectively, was applied for patients with EF <40%.
Results (Figure): Of 24,002 patients with EF<40% and 19,727 with EF≥40%, 68-69% could not be screened due to missing NT-proBNP measurements. Of 7,158 patients with EF<40% and 6,026 with EF≥40%, 38.6% and 34.0% would have been eligible for EMPEROR-Reduced and -Preserved, respectively. Major unmet inclusion criterion was sufficiently high NT-proBNP levels and major exclusion criterion was in-patient status. SBP<100 mmHg limited eligibility for EMPEROR-Reduced. Comorbidity burden was similar in eligible vs non-eligible, except for more AF, anemia and hypertension in the eligible patients regardless of EF, and less COPD in EMPEROR-Preserved eligible vs. non-eligible patients. Eligible patients were less likely to have NYHA IV class and more likely to be followed-up in specialist care, to receive RASi and beta-blockers. In outpatients, risk of CV death/HF hospitalization, of any and HF hospitalization was higher in eligible patients.
Conclusions In SwedeHF, eligibility for EMPEROR trials was around 35%, which is higher compared with other contemporary trials in HF, and mainly determined by the NT-proBNP cut-off. Using NT-proBNP for eligibility is a common approach in heart failure RCTs to optimize the evaluation of the benefit of the investigational compound

in a manageable trial setting. The likelihood of receiving empagliflozin in real-world practice may be influenced by factors other than trials' inclusion/exclusion criteria (i.e. frailty, life expectancy, access to care, patients' willingness). Further analyses exploring factors influencing eligibility are needed at the time empaglifozin will become available for HF treatment.



Figure

1280

Metformin reduces myocardial oxygen consumption and improves myocardial efficiency in pre-diabetic heart failure patients

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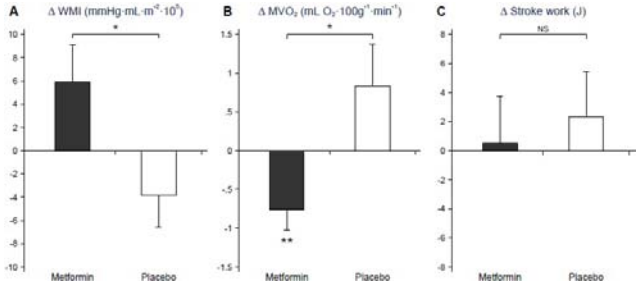
Funding Acknowledgements: Danish Diabetes Academy; Arvid Nilsson Foundation; Aarhus University; Danish Heart Foundation; Kirsten Anthonius Fund; Augustinus Foundation

Background Heart failure (HF) is characterized by myocardial mitochondrial dysfunction and reduced myocardial efficiency (stroke work / oxygen consumption). Metformin has direct mitochondrial effects and is associated with improved survival in HF registry studies. The present study investigated the effects of metformin on myocardial oxygen consumption and myocardial efficiency in pre-diabetic HF patients.



Efficiency, Oxygen consumption, Work

Methods In a double-blinded design, 36 pre-diabetic HF patients with reduced ejection fraction (EF ≤ 45%; HbA1c 37-47 mmol/mol) were randomized to three months of metformin treatment (n = 19) or placebo (n = 17) in addition to standard HF therapy. All patients underwent 11C-acetate positron emission tomography (PET), comprehensive transthoracic echocardiography, and cardiopulmonary exercise testing. The primary endpoint was change in myocardial efficiency expressed as work metabolic index (WMI) derived from 11C-acetate PET and echocardiography.
Results The median age was 66 (interquartile range 58-69); 81% were men, and the mean EF was 37 ± 8%. Compared with placebo, metformin treatment (1,450 ± 550 mg/day) reduced myocardial oxygen consumption (MVO2) by -1.6 mL O2/100g/min (95% confidence intervals [CI]: -2.8 to -0.4; p = 0.014) and increased WMI by 1.0 mmHg·mL·10^6/m^2 (95% CI: 0.1 to 1.8; p = 0.03), equivalent to a 20% relative myocardial efficiency increase. Cardiac stroke work was preserved, -1.8 J (95% CI: -10.9 to 7.3; p = 0.69). Metformin treatment reduced glycated hemoglobin levels, HbA1c, by -1.7 mmol/mol (95% CI: -3.0 to -0.3; p = 0.02) and reduced body weight by -2.2 kg (95% CI: -3.6 to -0.8; p = 0.003). Changes in EF, global longitudinal strain, and exercise capacity (VO2max) did not differ between groups.
Conclusions Metformin treatment in pre-diabetic HF patients with reduced EF improved myocardial efficiency by reducing myocardial oxygen consumption. These energy-sparing effects of metformin encourage further large scale investigations in pre-diabetic HF patients.

1281

Effects of combined uptitration of ACE-inhibitors and beta-blockers in heart failure with reduced ejection fraction

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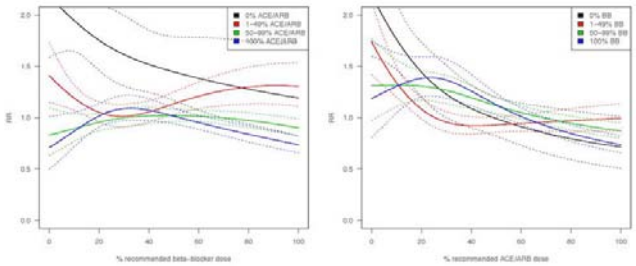
Background: Both Angiotensin-converting enzyme(ACE)-inhibitors/Angiotensin receptor blockers (ARBs) and beta-blockersare guideline-recommended first line therapies in patients with heart-failure and reduced ejection–fraction (HFrEF); yet in real-world practice many patients are not on optimal combination treatment at target doses. We aimed to investigate the effect of combined uptitration of ACE-inhibitors/ARBs and beta-blockers on outcomes in real-world patients with HFrEF.
Methods: We studied 4,704 patients with HFrEF from the prospective longitudinal multinational European (BIOSTAT-CHF; n=2,100) and Asian (ASIAN-HF; n=2,604) studies. Patients were analyzed according to achieved % guideline-recommended doses (GRD) of combination ACE-inhibitor/ARB and beta-blocker therapy, with adjustment for indication bias by inverse probability weighting.
Results: Only 4% (n=190) and 21% (n=981) patients achieved 100% and 50% for both ACE-inhibitor/ARB and beta-blocker, respectively. The risk of death/HF hospitalization was lowest with achieving 100% guideline-recommended doses of both ACE-inhibitor/ARB and beta-blocker (hazards ratio [HR] 0.5; 95%CI 0.41-0.6), and highest with no therapy (HR 2.39; 95%CI 1.42-4) compared to those achieving at least 50% GRD of both) (Table). In combination therapy, increasing doses of ACE-inhibitors/ARBs resulted in greater reductions in risk of death/HF hospitalization, compared to increasing doses of beta-blockers. In fact, uptitration of beta-blockers in combination with suboptimal doses of ACE-inhibitors/ARBs was associated with increased risk of adverse outcomes (figure).Conclusion: While combined therapy with ACE-inhibitors/ARBs and beta-blockers at guideline-recommended target doses is associated with the best outcomes in HFrEF, our multinational real-world data suggest that when patients are on ACE-inhibitors/ARBs and beta-blockers, uptitrating ACE-inhibitors/ARBs may be of greater prognostic benefit than uptitrating beta-blockers.

	0% ACE/ARB	1-49% ACE/ARB	50-99% ACE/ARB	100% ACE/ARB
0% BB	2.39 (1.42-4); p=0.001; n=20	1.33 (0.92-1.92); p=0.12; n=60	1.12 (0.72-1.73); p=0.62; n=45	1.13 (0.59-2.16); p=0.71; n=17
1-49% BB	1.84 (1.46-2.32), p<0.0001; n=126	1.01 (0.9-1.13); p=0.93; n=1524	0.75 (0.65-0.87); p=0.0001; n=797	0.79 (0.66-0.94); p=0.008; n=431
50-99% BB	1.67 (1.14-2.44), p=0.008; n=42	0.88 (0.74-1.05); p=0.15; n=458	-,n=340	0.94 (0.83-1.07); p=0.35; n=273
100% BB	1.64 (0.9-2.98); p=0.11; n=18	1.12 (0.89-1.41); p=0.33; n=185	0.85 (0.73-0.98); p=0.03; n=178	0.5 (0.41-0.6); p<0.0001; n=190

Hazard ratios (with 95% CI); p-value; number of patients for the first occurrence of death or heart failure related hospitalization of achieving four different levels of recommended treatment dose (0, 1-49% 50-99%,100%) for the combination of both ACE-inhibitor/ARB and beta-blocker



1282

Angiotensin-converting enzyme inhibitors and angiotensin receptor blockers in heart failure patients with mid-range and preserved ejection fraction and clinical outcomes: from the KCHF Registry

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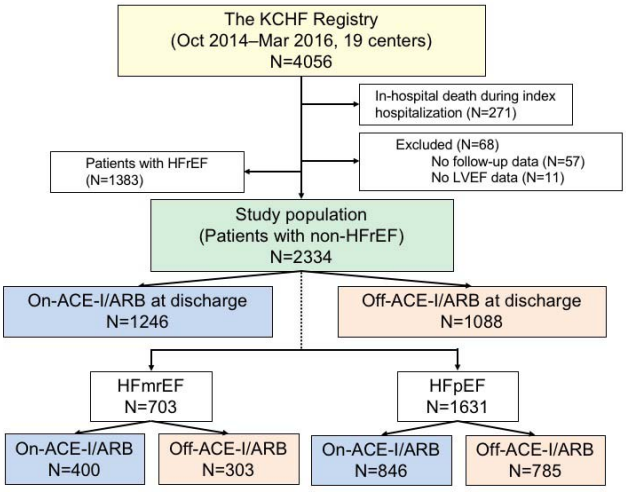
On behalf of: The KCHF Registry Investigators

Background Angiotensin-converting enzyme inhibitors/angiotensin receptor blockers (ACE-I/ARB) is an established medical treatment for heart failure with reduced ejection fraction (HFrEF), whereas it remains to be elucidated who derive merit from ACE-I/ARB in heart failure (HF) patients with left ventricular ejection fraction (LVEF) ≥40%. In the current guidelines, LVEF ≥40% has been divided into the following categories; heart failure with mid-range ejection fraction (HRmrEF) and preserved ejection fraction (HFpEF).
Purpose The aim of this study is to assess the association between ACE-I/ARB and clinical outcomes of HF patients with LVEF ≥40%.



Study flowchart

Methods The Kyoto Congestive Heart Failure (KCHF) Registry a multicenter registry without any exclusion criteria which included consecutive patients hospitalized for congestive HF in Japan. We classified the patients into the two groups according to medication status at discharge: those on ACE-I/ARB and those without ACE-I/ARB. We compared these two groups and their 1-year clinical outcomes. The primary endpoint was defined as a composite of all-cause death and re-admission for HF. We assessed hazard ratios (HRs) by the Cox regression model for the primary endpoint. Then, we subdivided the population into those with HFmrEF and HFpEF, and assessed HRs in each group and the interaction of the LVEF category. We also performed a sensitivity analysis by propensity score-matching method in each of the LVEF categories group for the primary endpoint.
Results A total of 4056 patients were enrolled, where 2334 patients had LVEF ≥40%. The study population was divided into those who were prescribed ACE-I/ARB at discharge (N=1246) and those not (N=1088). The multivariable analysis showed the adjusted hazard ratio (HR) of those on ACE-I/ARB relative to those without for the primary endpoint was marginally significant (adjusted HR 0.86 [95% confidence interval (CI) 0.74–1002], P=0.053). The subgroup analysis showed the HR was significant in HFmrEF group (N=703, adjusted HR 0.61 [95% CI 0.45–0.82], P=0.001), whereas the HR was not significant in HFpEF group (N=1631, adjusted HR 0.95 [95% CI 0.80–1.14], P=0.61); the interaction was statistically significant (P interaction=0.039). The propensity score-matched analyses showed a marginally significant HR in HFmrEF group (HR 0.73 [95% CI 0.50–1.07], P=0.10) and an insignificant HR in HFpEF group (HR 0.98 [95% CI 0.79–1.21], P=0.86).
Conclusions In the HF patients with LVEF ≥40%, ACE-I/ARB as discharge medication was associated with a lower HR for death and HF admission, especially in those with HFmrEF. ACE-I/ARB has a potential to be a treatment option for HFmrEF.

1283

The role of candesartan or carvedilol for prevention of anthracycline induced subclinical cardiotoxicity in breast cancer patients.

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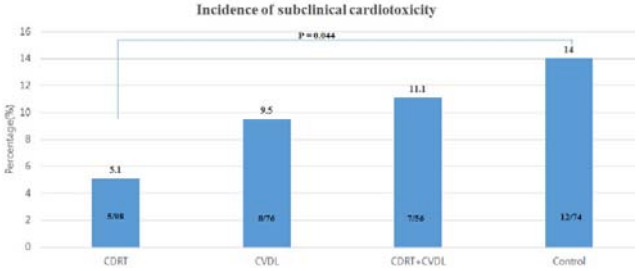
Background Despite of its effectiveness among breast cancer patients, anthracycline is associated with irreversible cardiotoxicity. But the effectiveness of prevention with angiotensin receptor blocker and/or beta blockers remains controversial.
Purpose: The Aim of this study is to investigate the preventive effect of concomitant therapy with candesartan and/or carvedilol in the anthracycline-induced subclinical cardiotoxicity (SC).
Methods We identified 485 patients with breast cancer with normal ejection fraction before receiving anthracycline chemotherapy at our institution between Dec,2013 and Nov,2017, randomly assigned to receive candesartan 4mg daily(n=98), carvedilol 3.125mg daily(n=84), candesartan 4mg daily plus carvedilol 3.125mg daily(n=63) and control(n=86). Cardiac functions of patients were evaluated by transthoracic echocardiography (TTE) before and after chemotherapy. Primary outcome was detection of SC (defined as either decreased left ventricular ejection fraction (LVEF) more than 10% or the LVEF declines under 55% from baseline without heart failure symptoms) after anthracycline chemotherapy. Secondary outcomes were effects of candesartan and/or carvedilol on diastolic dysfunction, left atrium (LA) size and left ventricle (LV) dimension.
Results: Primary endpoint occurred in 5 patients (5.1%) in the candesartan group, 8 patients (9.5%) in the carvedilol group, 7 patients (11.1%) in the candesartan plus carvedilol group and 12 patients (14.0%) in the control group. (Figure.1) A significant absolute difference in LVEF observed between chemotherapy (-0.85%, -2.11%, -1.81%, -1.45%, candesartan, carvedilol, candesartan+carvedilol, control, respectively). Compared to control, candesartan showed significant lower incidence of SC (p=0.04, OR=0.33(98% CI: 0.11-0.98)) (Figure.1) and demonstrated lesser decline of LVEF (-0.95% vs. -1.45%, p=0.054). Additionally, candesartan noted more protective effect against prevention of SC (p=0.266, OR=0.51(95%CI: 0.16-1.64)) and early decline in LVEF compared to carvedilol (-0.95% vs. -2.11%, p=0.024). No significant effect on diastolic dysfunction and overall change in LA size and LV dimension were observed in all study groups.
Conclusions In our trial, concomitant administration of low dose candesartan with chemotherapy significantly reduce incidence of SC and prevent LV dysfunction compared to control. Compared to carvedilol, candesartan also resulted in lesser decline of LVEF. However, there are no significant difference in terms of diastolic dysfunction and left heart chamber size.



Incidence of subclinical cardiotoxicity

1284

Initiation of sacubitril/valsartan in patients with de novo heart failure with reduced ejection fraction: an analysis of the TRANSITION study

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On behalf of: TRANSITION study Investigators
Funding Acknowledgements: Novartis Pharma AG

Background: Initiation of sacubitril/valsartan (S/V) in hospitalised patients with heart failure (HF) with reduced ejection fraction (HFrEF), stabilized after admission for decompensated HF (ADHF), was associated with superior NT-proBNP reduction compared to enalapril in the PIONEER-HF study. Treatment effect was the same in patients with and without a prior diagnosis of HFrEF.

Table 1

Event	De novo HFrEF (N=286), n (%)	Previous diagnosis of HFrEF (N=705), n (%)	P-value
At least one AE	178 (62.2)	478 (67.8)	0.103
Selected AEs of interest			
Hyperkalemia	24 (8.4)	85 (12.1)	0.116
Hypotension	26 (9.1)	108 (10.9)	0.263
Cardiac failure	13 (4.5)	58 (8.2)	0.042
Renal failure	3 (1.0)	16 (2.3)	0.306
Blood creatinine increase	3 (1.0)	26 (3.7)	0.023
Renal impairment	8 (2.8)	32 (4.5)	0.284
At least one serious AE	33 (11.5)	130 (18.4)	0.008
Death	1 (0.3)	5 (0.7)	0.679
Temporary interruption due to AE	22 (7.7)	87 (12.3)	0.034

AE, adverse event

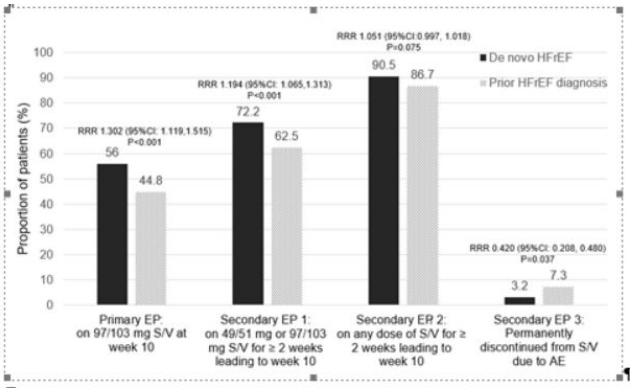

Figure 1. Primary endpoint (EP)

Methods: In TRANSITION (NCT02661217), 1002 patients with HFrEF, hospitalized for ADHF, after hemodynamic stabilization, were randomized 1:1 to start open-label S/V either pre-discharge or during days 1–14 post-discharge. Primary endpoint was the proportion of patients achieving the target dose of 97/103 mg S/V bid at 10 weeks. Endpoints, adverse events (AE) were compared by HF history status in the combined pre- and post-discharge arms.

Results: 286 patients (28.8%) had de novo HFrEF and 705 (71.0%) had a previous diagnosis of HFrEF. At baseline, de novo HF patients were younger, had lower systolic blood pressure, higher pulse rate, more non-ischemic HF, lower serum creatinine, higher e-GFR, lower high-sensitive Troponin T levels, and fewer had comorbidities. More de novo HF patients achieved the target dose compared to subjects with a prior HF diagnosis (56.0% vs. 44.8%, RRR 1.30, 95% CI 1.12, 1.52, P<0.001) and 90% were able to achieve and maintain any S/V dose (Figure 1). Serious AEs, temporary and permanent discontinuation of S/V due to AEs were lower in patients with de novo HFrEF (Table 1).
Conclusion: Patients with de novo HFrEF can be safely initiated on S/V and are more likely to achieve the target dose and maintain S/V treatment by week 10, compared to patients with a previous diagnosis of HFrEF.

1285

Sex differences in optimal doses of heart failure medication

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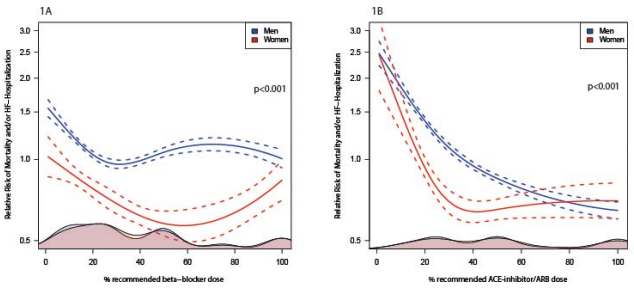
Funding Acknowledgements: Netherlands Cardiovascular Research Initiative and a grant from the European Commission [FP7-242209-BIOSTAT-CHF; EudraCT 2010–020808–29]

Background: Guideline-recommended doses of angiotensin-converting-enzyme (ACE) inhibitors/angiotensin-receptor blockers (ARBs) and beta-blockers are similar for men and women with heart failure with reduced ejection fraction (HFrEF), even though there are known sex differences in pharmacokinetics of these drugs. We hypothesized that there may be sex differences in the optimal dose of ACE-inhibitors/ARBs and beta-blockers in patients with HFrEF.
Methods: We performed a post-hoc-analysis of BIOSTAT-CHF, a prospective study of HF patients in whom initiation and up-titration of ACE-inhibitors/ARBs and beta-blockers was encouraged by protocol. Findings were validated in an independent cohort (ASIAN-HF) of 3,539 men and 961 women with HFrEF.
Results: Among 1,308 men and 402 women with HFrEF from BIOSTAT-CHF, women were older (74 vs. 70 years, p<0.001), and had lower body weight (72 vs. 85 kg, p<0.001) and height (162 vs. 174 cm, p<0.001) than men. A similar % of men and women reached guideline-recommended target doses of ACE-inhibitors/ARBs (25 vs. 23%; p=0.61) and beta-blockers (14 vs. 13%; p=0.54). The lowest hazards of death and/or HF-hospitalization occurred at 100% of the recommended dose of ACE-inhibitors/ARBs and beta-blockers in men, but at only 50% of the recommended doses in women. These sex differences were still present after adjusting for clinical covariates including body surface area. In ASIAN-HF, similar patterns were observed for both ACE-inhibitors/ARBs and beta-blockers, with women having a better clinical outcome at significantly lower doses as compared to men.
Conclusion: The optimal doses of ACE-inhibitors/ARBs and beta-blockers may be lower in women than in men with HFrEF.



Cubic splines B-blockers and ACE-i/ARBs

1286

Ivabradine improves systolic ejection time in heart failure with reduced ejection fraction by heart rate-dependent and -independent mechanisms - results from the SHIfT echocardiography substudy

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Funding Acknowledgements: The SHIfT study was initially funded by Servier, France.

Background: Systolic ejection time (SET) is the phase of systole, during which blood is ejected from the left ventricle (LV). In heart failure with reduced ejection fraction (HFrEF), SET decreases (Weissler et al., Circulation1968). However, SET closely depends on heart rate and the data on SET in HFrEF stem from a time, when patients with HFrEF were naïve to HR-lowering drugs. In the general population, decreased SET was associated with increased risk of incident heart failure independent of cardiovascular risk factors and systolic LV function (Biering-Sørensen et al., Eur J Heart Fail2017). Together, it remains unresolved, whether SET is an epiphenomenon of tachycardia in HFrEF or might be per se a promising therapeutic target for advancing substances.Hypothesis: We hypothesized that ivabradine increases SET in patients with HFrEF through two mechanisms, 1) by lowering HR and 2) by improving LV systolic function.
Methods: We analysed data from the echocardiography substudy of the randomised, double-blind SHIfT trial (n=411 patients), which evaluated the effect of ivabradine on LV remodelling compared to placebo in HFrEF. Complete echocardiographic data were available at baseline and at 8 months after ivabradine treatment. Values are shown as means ± SD.
Results: At baseline, HR and SET were similarly distributed in patients assigned to placebo or ivabradine (HR: 71±12 bpm in both groups; SET: placebo, 284±34 ms; ivabradine, 291±38 ms; p=n.s.). SET inversely correlated to HR in both groups (placebo, r=-0.58; ivabradine, -0.55; p<0.0001, respectively), but without any differences of the slopes between groups (placebo, -1.63; ivabradine, -1.81; p=n.s.). After 8 months of treatment, HR decreased and SET increased in ivabradine, but not in the placebo group (HR: placebo, 69±13 bpm; ivabradine, 61±10 bpm; p<0.001; SET: placebo, 289±34 ms; ivabradine, 310±39 ms; p<0.001). If SET improvement was explained only by HR reduction, then the slope between HR and SET would be unchanged. However, the slope between HR and SET steepened in ivabradine-, but not placebo-treated patients (ivabradine, -2.58; placebo, -1.51; p<0.01). Especially in patients with HR <70 bpm, SET was increased by ivabradine versus placebo at any given HR, with the strongest improvements in those patients with the lowest HRs. Conclusions: Ivabradine increases SET by two mechanisms, one that is explained by the HR lowering per seand one that is independent of the HR-lowering effect. Both mechanisms are synergistic. The HR-independent effect may be related to the known effects of ivabradine on LV function, with improvements of LVEF and decrease in LV end-diastolic volumes.

1287

The importance of optimal dosing of ferric-carboxymaltose to treat iron deficiency

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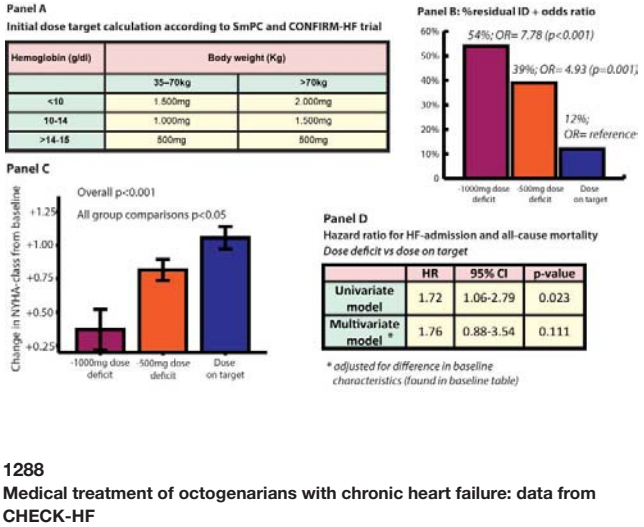
BACKGROUND
Treatment with ferric carboxymaltose (FCM) beneficially influences symptomatic well-being and exercise capacity in heart failure with reduced ejection fraction (HFrEF) and iron deficiency (ID). However, the maximal dose of FCM during one administration is limited to 1gram, which is insufficient in patients with a higher body weight or low hemoglobin (Hb). The clinical relevance of sub-dosing remains unstudied, yet is common in clinical practice.
METHODS
We retrospectively assessed all HFrEF patients with ID receiving ambulatory daycare treatment with intravenous FCM between October 2015 and December 2017. This time-frame was chosen as during this time-frame we employed a treatment protocol of 1-gram FCM for all patients (unless Hb=14-15mg/dl, than 500mg). We compared the actual given dose (by protocol) versus the calculated target dose, based on Hb and weight, as calculated based on the dosing calculation in the SmPC of FCM (and tested in the CONFIRM-HF study; see figure panel A). The difference between the calculated target dose and the actual dose was calculated (termed dose deficit). Patients were typically followed-up after 12 weeks for clinical and laboratory re-assessment. We assessed the impact of dose deficits on clinical (NYHA-class) and biochemical (change in TSAT and ferritin) status.
RESULTS A total of 211 HFrEF-patients with ID (ferritin <100 µg/L or between 100-300 µg/L if TSAT<20%) received treatment with FCM during study follow-up. The actual given dose FCM was 918±188mg, while the calculated target dose was 1308±470mg. In 121(61%) patients a standard of 1-gram resulted in a dose-deficit, of whom 93 had a dose deficit of 500mg and 35 had a dose deficit of 1000mg. Clinical and laboratory follow-up was available in 81% of patients at a median of 12 weeks (IQR=9-16 weeks). A dose deficit of 500mg was associated with a 4.93 higher odds, while a dose deficit of 1000mg was associated with a 7.78 higher odds of residual ID at follow-up (figure panel B). After adjusting for baseline NYHA-class in an ANCOVA-model, a dose deficit was associated with less symptomatic improvement (figure panel C). During 442±292 days of follow-up, 68 patients were readmitted with heart failure and 15 patients died. In an univariate model, a dose deficit was associated with adverse clinical outcome. However, the significance of this association was lost after multivariate correction (figure panel D).
CONCLUSION
A majority of HFrEF patients with iron deficiency require doses exceeding 1 gram of FCM, and thus require follow-up appointments to correct a residual dose deficit. A residual dose deficit is associated with less functional and biochemical improvement.



1288

Medical treatment of octogenarians with chronic heart failure: data from CHECK-HF

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On behalf of: CHECK-HF Investigators
Funding Acknowledgements: Servier, the Netherlands, funded the inclusion of data and software program.

Background/introduction: Elderly heart failure (HF) patients are underrepresented in clinical trials, though comprise a substantial number of patients in real-world practice. Particularly, data in octogenarians on actual use of HF therapies are scarce.
Purpose: to evaluate practice-based medical treatment of chronic HF patients aged >80 years, from a large registry at HF outpatient clinics.
Methods: We analyzed 3,490 octogenarians with chronic HF at 34 Dutch outpatient clinics in the period between 2013 and 2016. The mean age was 84.7 ± 3.6 years. Forty-nine percent were females. The study patients were divided into HF with preserved ejection fraction (HFpEF) (LVEF≥50% (n= 911 (26.1 %) and HF with reduced ejection fraction (HFrEF, LVEF <50% (n= 2,579 (73.9%)), according to the 2012 ESC HF Guidelines.
Results: Most HFrEF patients aged >80 years received a beta-blocker and a RAS-blocker, i.e. 77.0% and 71.6% respectively. An MRA was prescribed in 51.4% of patients and diuretics in 90.4%. All three of the HF medication (beta-blocker, RAS-inhibitor and MRA) were given in 28.7% of octogenarians with HFrEF. In total 65 patients (2.5%) received ivabradine, which represents 77% of them received those where it was indicated. At least 50% of target doses of beta-blockers, RAS-inhibitor and MRA were prescribed in 36.9%, 40.4% and 50.1% of the total group of octogenarians with HFrEF, respectively. In HFpEF, beta-blocker, RAS-inhibitor and MRA were used by 74.3%, 62.0% and 44.6% of patients, respectively.

Conclusion: The majority of octogenarians received guidelines-recommended HF medication. However, target doses of beta-blockers and RAS-inhibitor were prescribed in the minority. Although, it is unclear whether very elderly patients benefit to a similar extent from HF medication as compared to younger patients.

1289

Association between cardiovascular medication and readmission in heart failure patients

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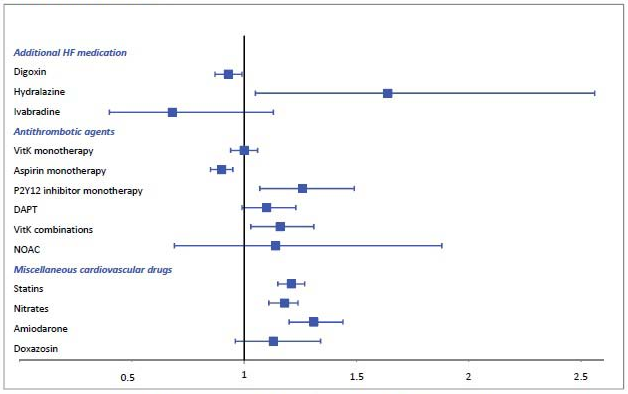
Introduction and purpose
Patients discharged after an admission for heart failure (HF) have a high risk of HF readmission. The aim of this population-based cohort study was to compare hospital readmission rates of HF patients using additional HF medication and/or non-HF cardiovascular (CV) medication versus patients not using the particular additional HF medication and/or non-HF CV medication in a real-world scenario.
Methods and results
Medication at hospital discharge was determined on the basis of dispensing data from the Dutch PHARMO Database Network including 22,476 patients with a diagnosis of HF between 2001 and 2015. Median follow-up was 29.3 months. Thirty percent of patients were readmitted for HF. Propensity scores were calculated as a proxy for comorbidities and hazard ratios were adjusted (HRadj) accordingly. The prescription of digoxin was associated with a decreased readmission risk (HRadj 0.93; 95%CI 0.87-0.99), aspirin monotherapy with a decreased risk (HRadj 0.90; 95%CI 0.85-0.95) and P2Y12 inhibitor monotherapy with an increased risk (HRadj 1.26; 95%CI 1.07-1.49) and. The risks of readmission for statins, nitrates and amiodarone were all significantly increased, with HRadj between 1.18 and 1.31.
Conclusion: Use of digoxin, added in selected HF patients on top of core HF medication according to the guidelines, was associated with a lower risk of HF readmission. On account of the lower risk of HF readmission, aspirin monotherapy should be preferred to P2Y12 inhibitor monotherapy. The risk of readmission for patients on statins, nitrates and amiodarone is increased, compared to patients not prescribed these drugs.

Figure 1 Forest plot for adjusted hazard ratios* associated with cardiovascular medication in heart failure patients



*HR versus non-use adjusted for age, gender, number of drugs (excl particular drug), year of admission, propensity score of particular medication (based on baseline covariates and co-medication)
DAPT: dual antiplatelet therapy (aspirin and P2Y12 inhibitor)
VitK combinations: vitamin K antagonist and (aspirin and/or P2Y12 inhibitor)
NOAC: non-vitamin K antagonist oral anticoagulant

1290

Repetitive levosimendan infusions for patients with advanced chronic heart failure in the vulnerable post-discharge period: the LeoDOR Trial

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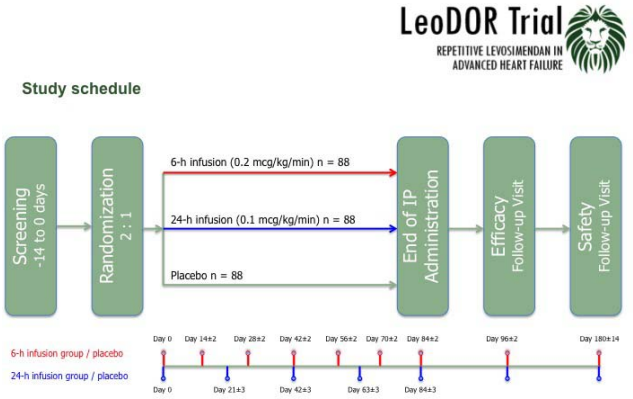
Funding Acknowledgements: Unrestricted grant from Orion Pharma

Background Readmission and mortality rates are high during the vulnerable period following an episode of acute heart failure. Experience in several clinical studies has indicated that administration of intravenous levosimendan in intermittent cycles may be effective in patients with advanced HF. We here describe the rationale and protocol of the LeoDOR study that will assess the efficacy and safety of intermittent levosimendan therapy during the vulnerable phase after a recent hospitalisation for acute HF in advanced HFrEF patients. The overarching hypothesis is that, compared with placebo, repetitive administration of levosimendan during the post-acute phase will be associated with greater clinical stability over a follow-up period of 14 weeks.
Methods The LeoDOR study is a randomised, double-blind, placebo-controlled, three-armed trial designed to evaluate the efficacy and safety of intermittent levosimendan therapy, administered in addition to standard therapy for a period of 12 weeks either as a 6-h continuous infusion at a rate of 0.2 μg/kg/min every 2 weeks or as a 24-h continuous infusion at a rate of 0.1 μg/kg/min every 3 weeks. The primary endpoint will be evaluated after 14 weeks. Information on safety events will be obtained after 6 months. The study that was started in March 2018 intends to include 264 patients in 30 centres in nine European countries.
The primary efficacy assessment will be made using a global rank endpoint in which all participants are ranked across three hierarchical groups: (i) time to death or urgent heart transplantation or implantation of a ventricular assist device (VAD); (ii) time to non-fatal HF requiring i.v. vasoactive therapy; and (iii) time-averaged proportional change in N-terminal pro-brain natriuretic peptide (NT-proBNP) from baseline to week 14 with (i) as the most important event. Secondary efficacy endpoints include individual components of the primary endpoint at short- (14 weeks) and intermediate-term (26 weeks) follow-up, as well as changes in functional status.
Conclusion The LeoDOR trial will test efficacy and safety of intermittent levosimendan therapy in patients with "very" advanced but not acute heart failure with the highest short- and long-term mortality and rehospitalisation rates. The study is configured to examine evidence of efficacy of an intensified therapy using clinically relevant endpoints for severely ill patients managed on an outpatient basis.



Study design of the LeoDOR Trial

1291

Higher doses of loop diuretics limit uptitration of inhibitors of the renin-angiotensin system in patients with heart failure and reduced ejection fraction

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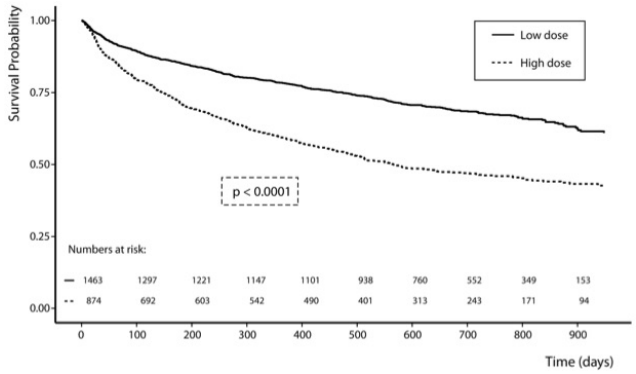
Introduction Loop diuretics are frequently prescribed to patients with heart failure and reduced ejection fraction (HFrEF) for the treatment of congestion, however these might hamper the uptitration of inhibitors of the renin-angiotensin system.
Purpose We aimed to assess the effect of loop diuretic dosage on the ability to uptitrate patients to guideline recommended doses of inhibitors of the renin-angiotensin system, as well as to assess the association of loop diuretic dosage with outcome.
Methods Loop diuretic dose at baseline was recorded in 2,338 patients with HFrEF enrolled in BIOSTAT-CHF, an international study of HF patients on loop diuretic therapy who were eligible for uptitration of angiotensin-converting-enzyme inhibitors (ACEi)/mineralocorticoid receptor antagonists (MRA). The association between loop diuretic dose and uptitration of ACEi/MRA to percentage of target dose was adjusted for a previously published model for likelihood of uptitration and propensity score adjustment was performed.
Results Baseline median loop diuretic dose was 40 [40-100] mg of furosemide or equivalent. Higher doses of loop diuretics were associated with higher NYHA class and higher levels of NT-proBNP, more severe signs and symptoms of congestion, more frequent MRA use and lower doses of ACEi reached at 3 and 9 months (all P<0.01). The results remained statistically significant after adjustment for potential confounders. After propensity adjustment, higher doses of loop diuretics remained significantly associated with poorer uptitration of ACEi (beta per log doubling of loop diuretic dose: -1.66,P=0.021), but not with uptitration of MRAs (P=0.758). Additionally, higher doses of loop diuretics were independently associated with an increased risk of all-cause mortality or heart failure hospitalization (HR per doubling of loop diuretic dose: 1.06 (1.01-1.12), P=0.021).
Conclusions Patients with HFrEF and higher doses of loop diuretics had a worse uptitration of ACEi and a higher risk of death and/or heart failure hospitalization, independent of their lower likelihood of uptitration and higher baseline risk. These data support the recommendation that unnecessary high doses of loop diuretics should be avoided in order to uptitrate inhibitors of the renin-angiotensin system.



KM loop diuretic dose and outcome

1292

Prediction of dialysis in heart failure patients with diuretic resistance

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Funding Acknowledgements: PLAGH Medical Bigdata R&D Fund 2016MED-007

Background: Renal replacement therapy is an addition to enhanced diuretic therapy, but there are no widely accepted indications for its use and timing of initiation.
Purpose: We intended to explore use of renal replacement therapy in heart failure population with diuretic resistance and figure out risk factors predicting a renal replacement therapy application in the end.
Methods: We searched the Multiparameter Intelligent Monitoring of Intensive Care Database III Version 1.4 (MIMIC-III v1.4) and identified heart failure patients with an ejection fraction of less than 40%. Diuretic resistance was defined as in need of more than 2 loop diuretic units per day. The primary outcome was application of renal replacement therapy. Secondary outcomes included in-hospital mortality, 30-day mortality, 90-day mortality, intensive care unit and hospital length of stay, total fluid intake, total fluid output, total urine output and total fluid overload. Models based on patient demographics, comorbidities, vital signs and laboratory results at addmission and occurrence of diuretic resistance was developed by logistic regression and random forest analysis to predict RRT application.
Results: We identified 1217 heart failure patients with an ejection fraction lower than 40% and diuretic resistant. Among them 7.6% ended up with renal replacement therapy. Cox proportional hazards models showed no difference of mortality between renal replacement therapy group and non renal replacement therapy group. Renal replacement therapy group showed shorter hospital stay and more total fluid output. AUCs of models including oxygen saturation and glomerular filtration rate at admission, albumin level, level of creatinine and glomerular filtration rate when diuretic resistance appears and so on were nearly 90%.
Conclusions: Renal replacement therapy did not increase mortality of moderate or severe heart failure patients with diuretic resistance. Models include oxygen saturation and glomerular filtration rate at admission, albumin level, level of creatinine and glomerular filtration rate when diuretic resistance appears are predictable of nearly 90% of renal replacement therapy application. Earlier use of renal replacement therapy in diuretic resistant moderate or severe heart failure patients might be acceptable.

Clinical Case Corner 4 - Have you seen this before? Rare presentations

1323

Acute heart failure in pregnancy, do not forget zika and the pericardium.

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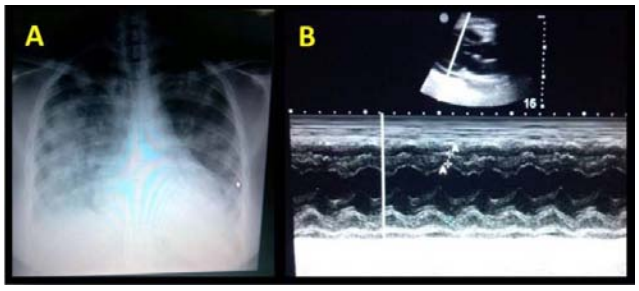
Background. Acute heart failure (HF) during pregnancy is one of the most important complications, causing maternal and foetal morbidity and mortality. It is usually related to preeclampsia, rarely to myocarditis or pericarditis and it has not been associated to Zika virus infection (ZVI), considered the worst outbreak of the XXI century. There is only one report of HF associated with ZVI and none in pregnant women.
Case report . A 22-year-old G2P1 developed low-grade fever, conjunctivitis, polyartralgias, widespread pruritic maculopapular rash and mild myalgia at 36 weeks of gestation, five days after the onset of this acute episode was admitted to the hospital emergency with rapidly progressive dyspnoea NYHA IV. She had no appreciable past history before pregnancy and had normal blood pressure. The patient also experienced an episode of mild substernal chest pain. The electrocardiogram showed sinus tachycardia with low voltage. Chest X-ray exhibited bilateral pulmonary congestion and cardiac dilatation (cardiothoracic ratio 2:1, figure A). Echocardiogram revealed a moderate pericardial effusion with normal ejection fraction 61%. Zika induced pericarditis was diagnosed based on the following criteria: 1.) Zika RNA was detected in serum with the use of RT-PCR and ZV specific IgM antibody; 2.) Potential simultaneous infection including Dengue, Chikungunya, and other viral or parasitic infection were ruled out; 3.) Clinical, ECG, echocardiographic evidence of myocarditis was detected. The patient was treated with intravenous furosemide and aspirin as a holistic therapy. She had a favourable outcome with disappearance of symptoms, ECG improvement, normalization of X-ray findings, and resolution of pericardial effusion on echo control. Two weeks later she developed pre-eclampsia and caesarean section was performed. Her new born, male weighed 2600 mg and Apgar score was 3/5, uneventful development and without microcephaly.
Discussion. Zika virus infection is usually mild with non-specific symptoms. Cardiovascular (CV) complications might be underdiagnosed in clinical practice. Therefore the importance of CV screening in suspected cases, and awareness of the possibility of cardiac involvement in patients with Zika.
Conclusion. This is the first report of cardiac involvement with acute HF and pericardial effusion in a pregnant patient with Zika. This case is unique since the patient previously known to have normal cardiac function developed rapidly progressive acute HF. Future research is needed to determine the incidence of cardiovascular involvement of Zika virus infection.



Zika_Pregnancy_Xray_Echocardiogram

1324

Right heart failure related to diffuse large b cell lymphoma

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Isolated right heart failure requiring a specific work-up regarding the etiology: We report the case of a 76 year-old man admitted in our department for the clinical presentation of the aforementioned condition. His past medical history included refractory diffuse large B cell lymphoma (currently treated with Rituximab and Lenalidomide), type A thoracic aortic dissection surgically treated with a Tirone-David procedure (bioprosthetic aortic valve), complete atrio-ventricular block implanted with dual-chamber pace-maker (PM), a successful ablation for atrial flutter and deep vein thrombosis on left internal jugular Port-a-Cath.
Clinical examination: at admission in our department, we observed major bilateral edema, systolic murmur heard in all auscultation sites and diastolic murmur on the left sternal border. 12-lead ECG demonstrated right ventricle pacing. Transthoracic echocardiography showed: a preserved systolic left ventricular function (LVEF at 55%), mild aortic and mitral regurgitations. The right atrium and ventricle were severely dilated (RV/LV ratio > 1). Right systolic function was reduced (TAPSE 9 mm, DTI S' velocity 9 cm/s) and color Doppler indicated a severe tricuspid regurgitation. Right atrial pressure was estimated above 15 mmHg. Transeosophageal echocardiography (TEE) noticed: no left to right shunt, tricuspid valve infiltration with a nodular lesion, spontaneous contrast in the right atrium and multiple abnormal masses in the lateral wall of the right atrium and ventricle. Pace-maker leads and valves were cautiously observed and no sign of infective endocarditis was retained. Treatment with intravenous diuretics was started with a progressive regression of fluid overload.
We discuss the potential differential diagnosis of the intra-cardiac masses observed. Many hypotheses were supposed: thrombi (echogenicity, spontaneous contrast in the right ventricle), infective endocarditis (IE) (presence of a pace-maker and immunosuppression due to chemotherapy) and infiltration by the lymphoma (multiple sites of infiltration already present on previous PET-CTs and history of lymphoma). Infective endocarditis was ruled out by a complete biological check-up (blood cultures, serology). We also analyzed the differential diagnosis that could explain the right heart failure: tricuspid regurgitation induced by a PM lead, left to right shunt induced by the aortic surgical procedure, pulmonary hypertension other than the one classified as WHO Group II, other diseases in relationship with the masses showed by the TEE, infiltration by lymphoma and pulmonary embolism (PE). The final diagnosis was made with PET-CT which demonstrated an infiltration of the anterior wall of the right atrium adjoining the tricuspid valve, of lymphomatous nature and no argument for IE, PE or intra-cardiac thrombi.

1325

P-wave asystole in a 26-year-old male; a complex clinical course

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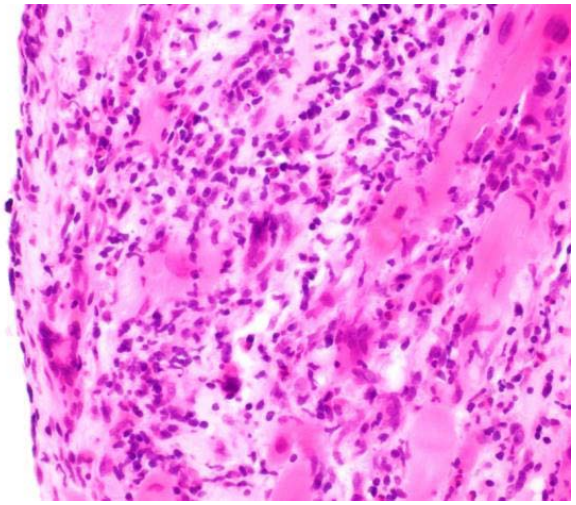
A 26 year-old male, with a history of ulcerative colitis (UC), presented acutely with syncope, 8 days after returning from travelling in Thailand. An initial 12-lead electrocardiogram (ECG) demonstrated complete heart block with a broad (RBBB) escape rhythm. He was normotensive.
He had an elevated high sensitivity cardiac troponin T (cTnT) at 2949mg/L and NT-proBNP of 900pg/L. Due to episodes of P-wave asystole, a temporary pacing wire was inserted. An initial transthoracic echocardiogram (TTE) revealed severe left ventricular (LV) systolic impairment (LVEF 20%) with multiple regional wall motion abnormalities.
A cardiac MRI (CMR) was performed which showed biventricular dilatation and severely reduced biventricular function (LVEF 25%, RVEF 30%). Myocardial oedema

was present in the anterior septum and there was extensive delayed gadolinium enhancement, some of which was transmural, within both ventricles. These findings were suggestive of myocarditis and we opted to perform an endomyocardial biopsy (EMB) for definitive diagnosis (Picture 1). Cardiac sarcoid and atypical viral myocarditis were among the differential diagnoses.
The EMB demonstrated prominent multinucleated giant cells (GC) confirming a diagnosis of giant cell myocarditis (GCM). He was treated with oral prednisolone and cyclosporine. Due to ongoing pacing requirements with marked RBBB and NYHA II symptoms, despite optimal heart failure therapy, we implanted a cardiac resynchronisation device (CRT-D), after which his LVEF increased to 40% on TTE.
22 months later he was readmitted in cardiogenic shock. Cyclosporine had recently been switched to azathioprine after a flare of colitis. His cTnT and NT-proBNP were elevated at 236mg/L and 3462pg/L respectively. Repeat TTE demonstrated severe global biventricular dysfunction. We decided to perform cardiac catheterisation and repeat the EMB. His mean capillary wedge pressure (MCWP) was elevated at 24mmHg, with reduced cardiac output (3.1L/min) and index (1.4L/min/m2), respectively. An intra-aortic balloon pump was inserted and he was commenced on inotropes. Repeat EMB confirmed recurrent GCM. We commenced oral prednisolone, after methylprednisolone, and restarted cyclosporine. He received a single dose of the monoclonal antibody alemtuzumab. He was transferred, acutely, for transplant/ventricular assist device assessment but his condition stabilised and he was discharged 4 weeks later.
At 5years after recurrence of GCM he remains admission and arrhythmia free. He is NHYA class I on cyclosporine, mercaptopurine, sacubitril/valsartan, eplerenone and nebivolol. His NT-proBNP is 743ng/L.
The management of recurrent GCM often warrants cardiac transplant, but 5-year transplant-free survival is possible with medical therapy. In this case, we report the successful management of recurrent GCM with temporary mechanical ventricular support and inotropy, followed by cyclosporine-based immunotherapy which remains the gold standard treatment for GCM.



Endomyocardial biopsy (EMB)

1326

Old therapies of new fashion: a better way to use diuretics and normal saline in acute decompensated heart failure

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[1]Cardiology Center Monzino IRCCS, Milan, Italy

Clinical case: A 40 years old man was admitted for acute decompensated heart failure (ADHF). He was known for Arrythmogenic Right Ventricle dysplasia (ARVD) since 12 years. 3 years before admission a Cardiac Magnetic Resonance was performed showing RV dilatation with moderate biventricular dysfunction (RVEF 36%, LVEF 44%) and RV fibrosis (LGE+ with non-ischaemic pattern). Two years before admission he was hospitalized for ADHF with dyspnea. During hospitalization episodes of sustained ventricular tachycardia occurred. A coronary angiography was normal and a permanent ICD was implanted. On admission he was symptomatic for dyspnea (NYHA class III/IV), he reported reduced urine output and a weight increase of +12 Kgs in the last 4 weeks. On examination: respiratory rate 23/min with slight orthopnea, jugular vein distension at 45°, pitting edema at both legs and hepatomagaly. ECG showed sinus rhythm, atrial enlargement, small complexes in the peripheral leads with incomplete right bundle branch block and RV strain. An epsilon wave was noted in the anterior precordial leads (Fig.1A).
A cardiac echo showed a severe LV and RV dilatation and dysfunction (Fig.1B) while a cardiopulmonary exercise test showed exercise cardiogenic limitation with a peak Vo2 of 39% of the predicted and oscillatory breathing. Patient was treated with i.v. furosemide (40 mg bolus followed by continuous infusion) with matched de-hydration to obtain a more controlled and physiologically-oriented dehydration. This was achieved with the RenalGuard System. Current evidences on its use comes from studies on acute kidney injury prevention in patients undergoing intravascular contrast exposure. In this specific field, furosemide-induced high-volume diuresis with concurrent maintenance of intravascular volume through matched hydration, by the RenalGuard, is now considered a recommended strategy. In this patient we set an estimated daily targeted negative fluid balance of 2.4 liters (-100 ml/h, Fig.1C). Results are shown in Fig.1D.
In summary the patient was successfully treated with i.v. diuretics and normal saline matched with RenalGuard with a 7.5 Kgs weight reduction and NYHA class improvement. During the treatment kidney function didn't worsen (a mild improvement in creatinine and BUN was noted).
After one month he was on stable clinical condition with stable kidney function and he was started on Sacubitril/Valsartan according to the guidelines. He was also referred to a transplant center.

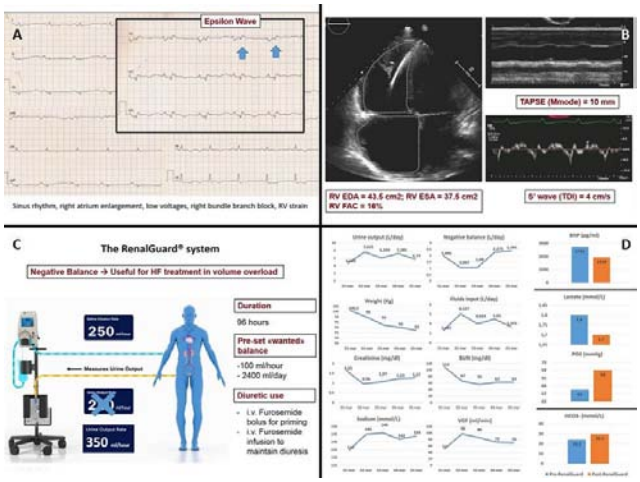

Fig.1

1327

A new mutation causing arrhythmogenic right ventricular cardiomyopathy with atypical presentation

A Aimo[1]; A Barison[2]; GD Aquaro[2]; U Startari[2]; G Vergaro[2]; C Passino[3]; M Emdin[3]
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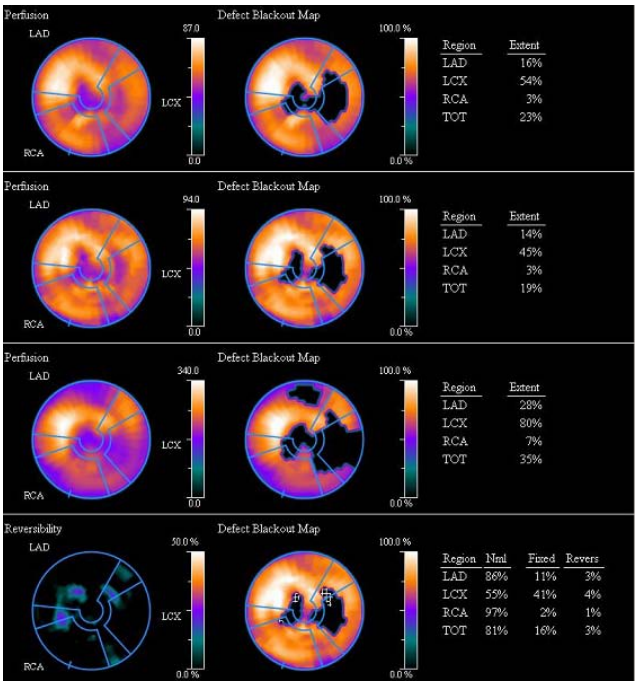
A 38-years old woman with referred familiarity for myocardial infarction (MI) was admitted to an Emergency Department because of chest pain. While biomarkers of myocardial necrosis and B-type natriuretic peptide were normal, and the electrocardiogram showed only a right ventricular (RV) conduction delay, transthoracic echocardiogram revealed diffuse left ventricle (LV) wall motion abnormalities and an apical aneurism. A coronary angiography demonstrated a normal coronary tree, leading to the diagnosis of "unstable angina with normal coronary arteries, possible prior MI."
A rest and stress myocardial perfusion imaging with 99mTc-sestamibi was negative for inducible ischemia, but showed "evidence of prior myocardial infarction (MI) in the anterior and apical regions of the LV." Even the findings at cardiac magnetic resonance (CMR) were deemed "compatible with previous MI" because of late gadolinium enhancement in the apical and inferolateral LV segments, and the thinning of LV apex. The RV was overlooked.
After discharge, a re-evaluation of CMR findings at another institution raised the suspicion of arrhythmogenic right ventricular cardiomyopathy (ARVC). Gene sequencing allowed to find homozygosity for the c.428 T>A mutation in the desmoglein gene (DSG2). Although not previously reported, this was considered a pathogenic variant as it produces a stop codon, which blocks protein synthesis after inclusion of 143 amino acids instead of 1119. A definite diagnosis of ARVC was then made (two major criteria: CMR findings and a pathogenic mutation).
Considering the ventricular ectopic burden (over 6000 ectopic beats during the 24 hours, with 100 couplets), the patient underwent mapping and ablation of an arrhythmogenic focus located into the LV apex. She then repeated the CMR

examination. The reader found "diffuse regional wall motion abnormalities and alterations of signal intensity within both ventricles, suggesting multiple, large areas of fibrofatty replacement." A single chamber defibrillator was eventually implanted for primary prevention. Cardiologic assessment and genetic screening of other family members is currently underway; the c.428 T>A mutation and CMR abnormalities have already been found in the patient's sister.
This is the first report of the c.428 T>A mutation as the cause of ARVC. It also demonstrates that the clinical and imaging presentation of ARVC may be misleading, so that a high index of suspicion is needed to come to the correct diagnosis.



1328

Clinical case of heart failure and atrial fibrillation due to long persistent migrated cava-filter in the right ventricle and tricuspid valve

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Introduction Cardiovascular diseases occupy leading positions in the structure of morbidity and mortality of the world's population. One of the problem areas is venous thrombosis, which includes thrombosis of deep veins of the lower extremities and it frequent life-threatening consequence - pulmonary artery thromboembolism (PAE). The main option of treating of venous thrombosis is anticoagulant therapy with additional strategies like the implantation of cava-filter (CF). Implantation of CF carries some risk of complications, one of which is the device dislocation which extremely rare can lead to heart failure (HF).
Aim of the work: to analyze the clinical case of dislocation and migration of the CF in the right ventricle with the development of HF
Results and discussion
Patient M. 71 y.o. come to our National Institute of Cardiovascular Surgery with NYHA III HF. From the anamnesis it became known that 10 years ago CF was implanted due to thrombosis of deep veins of the lower extremities and recurrent PAE, after which the patient did not undergo any medical examination at his will. In echocardiogram: severe tricuspid regurgitation and echo negative shadow of unknown etiology in the area of the tricuspid valve.
Performed CT revealed that the shadow of unknown etiology is migrated CF, most of which body is intimately adherent to endocard of the right ventricle and presses the septal leaflet of the tricuspid valve, leading to severe regurgitation. Patient undergone open heart surgery, during which CF was removed (Figure 1) tricuspid valvular anuloplasty was done, left atrial appendage was cut and MAZE-IV procedure was performed; sinus rhythm was restored.
The postoperative period was unremarkable. Control echocardiography showed an adequate function of the valves. To maintain the sinus rhythm, the patient was given amiodarone at a dose of 200 mg twice daily. At the examination 3 months after surgery, the patient have no complains no signs of HF. His ECG showed sinus rhythm, echocardiography - minimal tricuspid regurgitation.
The dislocation of implanted CF is a known complication of this procedure, which occurs in 10-12% of cases according to literature data. Migration of cava-filter into the cavity of the right ventricle with symptomatic tricuspid insufficiency is an extremely rare phenomenon, which is devoted to isolated publications of clinical cases in the world . Our clinical case is unique because the cava-filter has been in the right ventricle cavity for a long time (probably up to 9-10 years) and has been tightly entwined to the endocardium, which has led to the choice of open heart surgery in this patient.
Conclusion This clinical case broadens the understanding of possible complications of cava-filter implantation and emphasizes the need and importance for regular medical control of the position and function of medical implants.

Macropreparation of cava-filter

1329

A defect never comes alone. How many anomalies discovered by chance can hide a single heart?

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Cardiomyopathies (CM) are a heterogenous group of myocardial diseases associated with mechanical and/or electrical dysfunction due to various causes that are most frequently genetic. Left ventricle (LV) noncompaction is a rare nonclassified CM affecting the LV or both of the ventricles consisting in the persistence of the fetal spongiform structure of the ventricular walls. The purpose of this presentation is to illustrate the importance of imaging techniques in the diagnosis of associations in a rare CM and the importance of family screening (FS) in genetic cardiovascular diseases.
We present the case of a 19-y-o patient with no significant medical history who was sent to our clinic for evaluation after an abnormal ECG finding that showed left atrial anomaly and a slight fragmentation of the ORS complex, lacking significant terminal phase anomalies. The patient is asymptomatic, with normal clinical examination, except for the lower limbs blood pressure which was with 10 mmHg lower than in the upper limbs. The lab work-up was also unremarkable, except for a slight elevation of the BNP levels (48 pg/mL).
Transthoracic echocardiography revealed normal LV dimensions and a noncompacted myocardium, especially in the apex, mild LV sysyolic dysfunction (LVEF 45%) with restrictive filling pattern, severe longitudinal dysfunction with particular apical sparing aspect of the GLS. Furthermore, a large interatrial septum aneurism, which protrudes towards the right atrium and a bicuspid aortic valve with a relatively normal function were discovered. Also, the thoracic descending aorta presented a turbulent flow, with a maximum velocity of 2.4 m/s (continuous Doppler) suggesting a large aortic coarctation. Echocardiographic findings were confirmed using cardiac MRI and thoracic aorta angioCT.
FS included both parents and his 10-y-o sister. On one hand, the patient's mother showed a slight trabeculated LV myocardium in the apex, but with a normal global and longitudinal systolic function, as well as an IAS aneurysm. The patient's sister was however intensely symptomatic (dyspnea at low-moderate physical activity and frequent respiratory infections) and was diagnosed with restrictive CM with

LV dysfunction due to myocardial noncompactation, associated with 2 small atrial septal deffects and pulmonary hypertention.
Although a rare cause of heart failure, noncompactation CM remains a notable diagnosis, especially in young patients with significant symptoms or ECG anomalies. In addition, reports show possible associations with other congenital heart defects such as atrial septal defects or bicuspid aortic valve. We stress the importance of FS and the significant intrafamilial phenotypic variability of the disease, as shown by the presence of different forms of severity in the same family, especially in its youngest members.

1330

Right heart failure in basedow-graves disease: a tricky diagnosis

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The thyroid function has a fundamental role in controlling cardiovascular system. Thyropathies can be associated with many patterns of cardiovascular disfunction, as heart failure and pulmonary vascular disease. The most common presentation of hyperthyroidism is high cardiac output biventricular heart failure; rarely it presents as isolated right heart failure associated with pulmonary hyperthension. A 69-year-old Caucasian man with a history of recent deep vein thrombosis of the legs in discontinuative anticoagulant therapy was hospitalized in another clinical division for heart failure. He was symptomatic for dyspnoea, the physical examination suggested right heart failure, brain natriuretic peptide was 2338 pg/ml. Transthoracic echocardiography showed an important dilatation of right heart chambers, moderate tricuspidal rigurgitation with severe pulmonary hypertension (pulmonary artery systolic pressure 62 mmHg), left ventricular ejection fraction was normal. He underwent a computed tomography angiography of the chest which ruled out pulmonary thrombosis. A right heart catheterization was performed and led to the diagnosis of a mild precapillary pulmonary hyperthension (pulmonary artery mean pressure 27 mmHg, wedge pressure 15 mmHg, cardiac index 3,9 L/mq, pulmonary vascular resistance 1,8 WU). These alterations were attributed to a referred chronic obstructive pulmonary disease, without any other investigations, and he was discharged after medical therapy. The next month he had a new episode of heart failure and he was admitted to our pulmonary hyperthension ambulatory for further investigations: pulmonary functional tests excluded a relevant pneumopathy, the rheumatological tests were negative, the endocrinological profile showed a basedow graves disease. A specific antithyroid therapy was started with a significant clinical and laboratoristic improvement, stable during time. Thyroid hormones may cause cardiovascular disfunction in many ways: blood volume increase and excessive preload, endothelial damage (due to inflammation, high cardiac output and autoimmunity), increased metabolism of intrinsic pulmonary vasodilators (prostacyclin and nitric oxide), decreased metabolism of vasoconstrictors (serotonin, endothelin-1 and thromboxane), stimulation of the sympathetic nervous system causing pulmonary vasoconstriction. Hyperthyroidism is associated with an increased risk of cardiac death. Even if pulmonary hypertension due to thyroid diseases has long been known, it is still underdiagnosed. Our case report demonstrates how important is to follow the recommended algorithm in order to achieve the correct diagnosis and to start as soon as possible the specific therapy. Nowadays there are no scientific evidences for using specific pulmonary vasodilators drugs in pulmonary hypertension associated to thyroid diseases. Antithyroid drugs are the therapeutic choice for these patients, with good long term prognosis.

1331

A sporadic or a familial case of left ventricular noncompaction?

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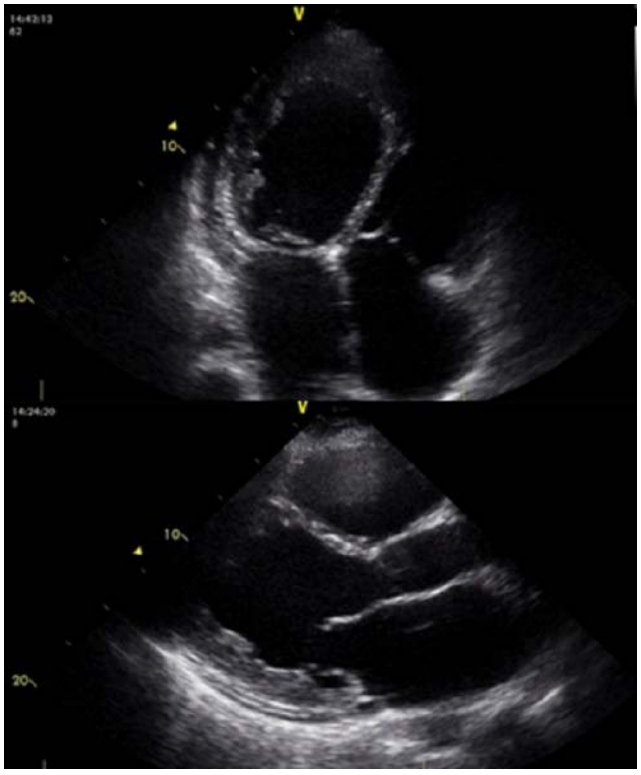
Introduction: Left ventricular noncompaction (LVNC) is a rare congenital disorder that can be sporadic, but familial recurrence and associated dysmorphism has been reported. Diagnosis is challenging and often with a predilection for overdiagnosis. Progressive heart failure, ventricular arrhythmias and systemic embolic events are the classical triad of complications.
Clinical case description: We report a case of a 41-year-old male patient with signs of congestive heart failure during the previous 2 months. He had no chest pain, palpitations, or syncope. Physical examination revealed bilateral crackles in the lower-lung fields and edema of the lower extremities. The electrocardiogram showed a sinus rhyth, 85 beats/min and a few premature ventricular contractions. Ambulatory ECG (Holter) monitoring (24h) registered frequent premature ventricular contractions. Transthoracic echocardiography (TTE) showed a severe dilatation of all heart chambers, a severe reduced ejection fraction (EF 25%), diffuse hypokinesia and a lot of trabeculae located on the posterolateral wall of the left ventricle (LV) and apex (Picture 1, 2). The blood flow into the intertrabecular recesses. The Jenni (2001) criteria for the diagnose of LVNC where positive. The lateral wall of right ventricle was highly trabeculated and the contraction was poor. Third degree LV diastolic disfunction, moderate regurgitation of mitral and tricuspid valves, severe signs of pulmonary hypertension. The CMR analysis showed non-compact myocardium at the level of left and right ventricles, the ratio of non-compacted myocardium to compact myocardium was 5:1 at the postero-lateral wall and of 8:1 at the apex of the LV. From first-degree relatives, patient's father has no cardiac pathologies. Patient's mother was diagnosed with dilatative cardimyopathy (DCM) 7 years ago. The remodeled LV examined through repetead TTE made it difficult to exclude DCM. Further, we examened the patient's daughter (14 years old, asymptomatic), through TTE we identified small trabeculation localized on posterolateral wall and apex of the LV. The girl's CMR ratio of non-compacted myocardium to compact myocardium at the end of systole was 1:2.5 and the mass of trabeculation was 33% with a slightly decreased EF (47%). Patient's brother and nephew showed no cardiac abnormalities. Medical management of the patient included: β-blockers, ACEI, a loop diuretic, spironolactone, digoxin and warfarin. We obtained a significant improvement in dyspnea and a reduction of peripheral congestion at one month follow-up.
Questions: LVNC is a distinct cardiomyopathy or a morphological expression of different cardiac diseases? Still no gold standard exists for diagnosis and the applied criteria lack specificity, especially in children. So there is a large diagnostic 'grey area' between LVNC, DCM and even normal myocardium. It is unknown whether the prognosis could be improved by early diagnosis and treatment.



Picture 1

1332

Pulmonary thromboembolism in the patient with single ventricle id type and opening kava-caval collaterals

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Objective: When genetic mutations or teratogenic effects occur on the fetus in the early stages of embryogenesis, a three-compartment heart can develop, considered as severe congenital defect. This clinical case demonstrates the patient with a single ventricle of the heart who reached 56 years old without surgery.
The patient K., female, 56 years old, was admitted to our cardiological intensive care unit with complaints of hemoptysis. It was known that the patient had a congenital heart defect - single left ventricle, accompanied by the secondary

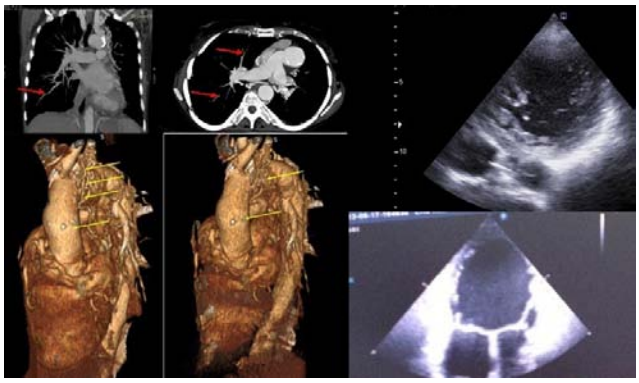
erythrocytosis, congenital complete proximal atrioventricular block and history of nasal bleeding caused by thrombocytopenia. The patient underwent a multispiral computer arteriotomography (MCTA) of the chest. MCTA revealed: Defects of contrasting in the subsegmental arteries A1, A2, A6, A8, A9 (red arrows) of the right lung and A9, A10 of the left lung; in the lower lobes of the lungs areas of infiltration of the pulmonary parenchyma were determined ("frosted glass" type). It was noted that there were venous collaterals of the mediastinum, more to the left. Those vessels allowed bypath blood flow to the right atrium through the v.azygos, v.hemiazygos (system of the vena cavasuperior) and vv. lumbales (system of the vena cavainferior) (Yellow arrows).

Echocardiography revealed single LV with eccentric hypertrophy and dilatation, with preserved global contractility of their function, EF - 57%, no areas of local LV discontractility were detected. Mitral valve cusphas diffuse thickening and tightening with severemitral regurgitation (degree III), the calculated bloodpressure in the pulmonary artery was not increased. (Picture 1)

Haematology: Haemoglobin 251 g/l, RBC - 7.83 x 1012 / l, Haematocrit 73.7%, Platelets 39.15 x 109 ESR - 0 mm / h. Coagulation profile: APTT 118.8 seconds, PT 26.9 seconds, INR 2.56 D-dimer was 2311.13 ng / ml (normal range - 0-250 ng / ml).

The patient underwent daily ECG monitoring: bradycardia with a heart rate of 34 to 51 (average 41) beats / min., complete AV-blockproximal type), episodes of replaced rhythm from the AV-node, numerous atrial extrasystoles were observed.

Summary. Single ventricle is a condition characterized by poor prognosis. Most patients (75%) without treatment die during the first months of life from rapidly progressive complications, such as severe heart failure, fatal cardiac arrhythmias, pulmonary embolism, and severe pneumonia. The average life expectancy of such patients is about 6-7 years [1]. Our clinical case describes the only left ventricle in a 56-year-old woman without pulmonary stenosis. It is known that the survival rate of persons with pulmonary artery stenosis is higher, due to the slower development of congestion in the pulmonary circulation. Only isolated cases of survival of such patients up to 50 years old were described.



Patient's echocardiograms, tomograms

Moderated Poster Session - Non pharmacological approach to heart failure world

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Palliative care on end-stage heart failure: EPICTER Study

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On behalf of: EPICTER investigators group

Introduction Palliative care in patients with advanced heart failure (HF) is strongly recommended by Clinical Practice Guidelines. However, limited data exist on the real use of End-of-life care in patients admitted for acute HF.
Purpose To calculate the prevalence of end-stage HF in patients admitted for decompensation and to describe their characteristics, treatments, procedures and management.
Method A total of 3153 patients admitted with acute HF in 74 spanish hospitals were consecutively included in 2 different periods (winter and summer), and followed up for 6 months. Hospitals began collecting data on the same day, in which all patients admitted for HF should be included. Each hospital continued to include patients on subsequent days until the required number was completed. Patients were classified into 2 groups according to whether or not they met criteria for end-stage HF. To define end-stage HF, a combination of cardiac and general criteria was used (including functional class, left ventricular ejection fraction (LVEF), physical and functional deterioration, multiple readmissions, estimated survival less than 6 months...). The groups were compared.
Results 23.4% of patients (739) met criteria for end-stage HF. They were more likely to be women, older and to have a history of anaemia, chronic kidney disease and cognitive impairment. Compared to patients that did not meet criteria, they had more often reduced LVEF and higher levels of natriuretic peptides. The most frequent symptom among these patients was dyspnea (90.7%), followed by insomnia (48.7%) anxiety (46.8%) and erratic pains (37.7%). For the management of acute HF, furosemide infusion (29.6%) and vasodilators (21.0%) were mainly used. Refractory symptoms were treated with intravenous and subcutaneous opioids (46.9%), benzodiazepines (44.1%), phenothiazines (21.8%) and anticholinergics (6.2%). A multidisciplinary approach, involving Palliative Care specialists was only sought in 15% of the end-stage HF patients. The use of invasive procedures was: angiography (10.1%), central venous catheters (10.7%), reservoirs (14.6%) and bladder catheters (57.2%). Although in more than half of the patients there was an agreement to avoid unnecessary tests and not to resuscitate (Figure 1), in 47.8% of the patients palliative care were only provided on the agony. Patients with end-stage HF had significantly higher 6-month mortality than the rest of the patients (44.5% vs. 17.6%; p <0.001)
Conclusion The prevalence of end-stage HF in patients admitted to hospitals is high. It is associated with advanced age and comorbidities. The use of therapeutic procedures should be carefully evaluated with the priority to improve the quality of life of patients. The management by a multidisciplinary team, following the recommendations of the Guidelines, is only sought in a small number of patients.

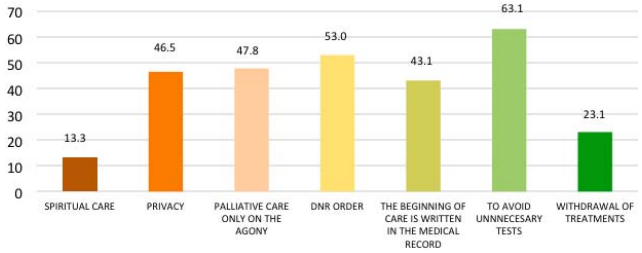

Figure 1: Management of End-Stage HF

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Heart failure and palliative care: an integrated service for patients across hospital and community settings

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Background: Effective integration of care across care settings and between clinical teams is essential to improve patient reported outcomes and resource use. We evaluate a new integrated clinical service for patients with end-stage heart failure (HF) palliative care (PC) needs.
Method: Six GP practices referred patients over 1 year. Patients were assessed and followed up by an Advanced Nurse Practitioner (ANP). The ANP worked closely with cardiology consultants and HF/PC hospital teams, the Community PC Team and primary care colleagues. Following initial assessment, patients were discussed at joint multidisciplinary team meetings (MDM) to assess both cardiac and palliative needs. Patient reported outcomes included the Integrated Palliative Care Outcome Scale (IPOS) and quality of life (QUAL).
Results: 102 patients, mean age 84.2 $\pm$ 10.2 years, were referred, 89 were accepted onto the pilot. 55 (61.8%) had left ventricular systolic dysfunction (LVSD), 14 (15.7%) patients had HF with preserved ejection fraction, 13 (14.6%) had predominately valvular dysfunction, 5 (5.6%) had right sided HF. This frail, elderly population had multiple co-morbidities.
44% of patients died during the 18 month pilot period; 69% at home/hospice versus 31% in hospital. For most patients, preferred place of care and death were home. Compared with the year pre-pilot, we demonstrated a 36% reduction in hospital admissions with 51% reduction in hospital bed days. There was a 9% increase in A&E attendances, but the proportion attending for cardiac reasons reduced (20% versus 13%). Actions from the MDM meetings included almost a half of patient's having cardiac medications titrated and a quarter had other medications titrated to aid symptom control. Joint decisions regarding switching or stopping anticoagulation were key. A small number of patients received hand held echocardiography and assessment at home by the cardiology consultant or were treated with subcutaneous Furosemide in the home setting, both to guide management and avoid hospital admissions where preferred place of care was home. The pilot supported integrated care across settings including referrals to hospice (inpatient admissions, breathlessness management service, living well at home), Community Services (District nurses, OT and Physio, Respiratory nurses). Ongoing carer support from the ANP was key.
IPOS improved over time in 55% of patients; declined in 40% and the remainder stayed the same. Views on Care showed that in 82% of assessments support from the palliative care service had made a benefit and patients reported a significant improvement in QUAL (p<0.001, 7 point Likert scale).

Conclusion: This model of care has had significant benefits in reducing hospital bed days and admissions, increasing patients dying outside of hospital, providing timely support and care to improve symptoms and wellbeing for palliative patients (and their carers) with end-stage heart failure.

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A constructivist approach to teaching patients with heart failure. Results from an intervention study

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On behalf of: Cardiopulmonary Exercise Testing & Rehabilitation Laboratory, School of Medicine. National and Kapodistrian University of Athens, Greece.
Funding Acknowledgements: National and Kapodistrian University of Athens, Greece

Background/Introduction: Despite published guidelines emphasizing the importance of education in management of Heart Failure (HF), the most effective method of educating remains unknown.
Purpose: The purpose of this study was to test the efficacy of Constructivist Teaching Method (CTM) on the patients with HF.
Methods: This is a single-center, randomized controlled trial. Patients in the intervention group were educated using the CTM. For the study outcome measures five questionnaires were used: Atlanta Heart Failure Knowledge Test (AHFKT), Minnesota Living with Heart Failure (MLHFQ), Self-Efficacy for Appropriate Medication Use Scale (SEAMS), European Heart Failure Self-care Behaviour Scale (EHFScBS-9), Duke Activity Status Index (DASI).Repeated measurements analysis of variance (ANOVA) was used in order to investigate differences in study measures between the control and intervention group, during the six month follow up.
Results: A total of 122 adults (83.6% male, mean age ±SD 67.1±12.3 years) were enrolled in the study; 61 in the intervention group and 61 in the control group. The two groups were similar in terms of age, educational level and disease status. Concerning knowledge there was a significant improvement in both control and intervention group but the degree of improvement was greater in the intervention group ($p<0.001$). Minnesota dimensions for quality of life were also significantly improved in both study groups but at 6 months the intervention group reached better levels at both physical and emotional subscales ($p<0.001$). Furthermore, self-efficacy for medication adherence and the dimensions from EHFScBS-9 (adhering to recommendations, fluid and sodium management, physical activity and recognition of deteriorating symptoms) were improved in both groups but the degree of change was greater in the intervention group as indicated from the results of repeated measurements ANOVA ($p<0.001$). The functional capacity was improved only in the intervention group ($p<0.001$) and no significant change was found in the control group ($p=0.455$). Significantly lower proportion of readmission at hospital at one month (8.2% vs. 23%, $p=0.025$), and six months (13.1% vs. 36.1%, $p=0.003$) were found for the intervention group.
Conclusions: These data support the use of an intervention with CTM to improved clinical outcomes. This study will be an important step in creating an evidence base for the relative benefits of different educational strategies for management of HF.

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Quality of life measures in heart failure with reduced ejection fraction: sex differences and association with outcome

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Funding Acknowledgements: BIOSTAT-CHF was funded by a grant from the European Commission (FP7-242209-BIOSTAT-CHF; EudraCT 2010–020808–29).

Background: Heart Failure (HF) is associated with poor quality of life (QoL). Less is known about sex differences in QoL and their association with outcome in HF.
Aim:Our aim is to analyse sex differences in QoL and in the relationship between QoL and outcome in patients(pts) with HF and reduced ejection fraction (HFrEF).
Methods:We analysed 1216 HFrEF pts from BIOSTAT-CHF, all with Kansas City Cardiomyopathy Questionnaire overall score(KCCQos), EQ-5D visual analogue scale(VAS) and EQ-5D utility score(US). Higher scores reflect better health status. We used multivariable Cox regression to test the relationship between QoL with all-cause mortality and with all-cause mortality and/or HF hospitalization. 5-point change(pc) in KCCQos and EQ-5D VAS (range 0-100), and 0.1 pc in EQ-5D US(range -1 to 1) were considered because of clinical meaning and comparable magnitude.
Results: At baseline, mean±SD age was 66±12 years old, 81.9% pts were males, 62.4% had ischemic HF. Females had worse QoL when assessed with KCCQos and EQ-5D US, but not EQ-5D VAS (Figure). KCCQ and EQ-5D components showed more physical and social limitation in females. After adjustment for clinical confounders, all measures of QoL were independent predictors of both outcomes in the whole sample and in males. A non-significant trend was present for better outcomes in females with higher QoL scores(Table). For both outcomes, there was no interaction between QoL and sex (all $p>0.5$). KCCQos-based multivariable model was the best at predicting both outcomes in the entire sample and in males (all $p<0.001$).
Conclusions: In pts with HFrEF, QoL was worse in females than in males. Sex differences in QoL are better detected and characterized by KCCQ. QoL was an independent predictor of outcome in the whole sample and males, with a similar trend in females. KCCQos showed the best predictive value towards outcome.

Table. Association of QoL and outcome

Predictor	Population	Adjusted* HR (95% CI)for all-cause mortality	P value	Adjusted* HR (95% CI)for all-cause mortal-ityand/or HF hospitaliza-tion	P value
KCCQos	All	0.94 (0.91-0.97)	<0.001	0.94 (0.92-0.96)	<0.001
Males	0.93 (0.90-0.97)	<0.001	0.94 (0.91-0.96)	<0.001	
Females	0.94 (0.85-1.04)	0.263	0.94 (0.87-1.00)	0.07	
EQ-5D VAS	All	0.97 (0.94-0.99)	<0.001	0.97 (0.95-0.99)	0.007
Males	0.97 (0.94-0.99)	0.021	0.97 (0.95-0.99)	0.03	
Females	0.97 (0.89-1.04)	0.323	0.95 (0.90-1.01)	0.09	
EQ-5D US	All	0.94 (0.91-0.97)	<0.001	0.96 (0.93-0.99)	0.004
Males	0.93 (0.90-0.96)	<0.001	0.95 (0.92-0.96)	0.004	
Females	0.97 (0.87-1.07)	0.479	0.96 (0.89-1.03)	0.249	

CI=confidence interval;HR=hazard ratio.

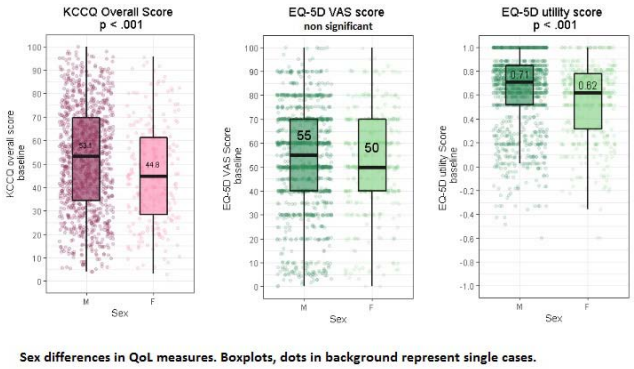

Figure. Sex differences in QoL

1337

Exercise capacity is negatively associated with cerebral white matter hyperintensity in elderly patients with heart failure

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Background: The extent of cerebral white matter hyperintensity (WMH) on magnetic resonance imaging (MRI) increases with age. Frailty associated with aging produces subclinical dysfunction across multiple organs and increases the risk of death. There is little information about the relationship among the extent of WMH, frailty status, and exercise capacity in patients with heart failure (HF).
Aims: To clarify the relationship among WMH, frailty, and exercise capacity in patients with HF.
Methods: Seventy-eight stable elderly patients with HF were subjected to cardiopulmonary exercise testing (CPX) and evaluated for WMH and with the Kihon Checklist (KCL), on which a score of ≥8 indicates frailty. WMH volume was quantified on brain MRI. Patients were classified into three groups (using tertiles of 0.52% and 1.05%) according to WMH as a percentage of intracranial volume, and their KCL scores and exercise capacities were compared.
Results: Mean age was 80.0 years, mean left ventricular ejection fraction was 56.7%, mean plasma brain natriuretic peptide content was 181 pg/mL, and mean KCL score was 8.7. The three WMH groups were mild (n = 26, 0.26% ± 0.14% of intracranial volume); moderate (n = 26, 0.70% ± 0.15%), and severe (n = 26, 1.75% ± 0.67%). Although there were no significant differences in Mini Mental State Examination scores, peak VO2 was 15.2 ± 3.7 mL/kg/min in the mild WMH group, 12.9 ± 3.5 mL/kg/min in the moderate group, and 11.4 ± 2.3 mL/kg/min in the severe group (mild vs. moderate, P = 0.049; mild vs. severe, P = 0.001). The KCL score was 6.6 ± 4.7 in the mild WMH group, 8.4 ± 6.0 in the moderate group, and 11.6 ± 5.6 in the severe group (mild vs. severe, P = 0.008). Linear regression analysis showed a positive association between WMH and peak VO2 (r = −0.344, P = 0.004) and between WMH and KCL score (r = 0.276, P = 0.021).
Conclusions: Frailty status was significantly positively associated, and exercise capacity was significantly negatively associated, with WMH percentage volume in stable elderly patients with HF. WMH volume may be useful for assessing the frailty of stable elderly patients with HF.

1338

Variation of exercise oscillatory ventilation characteristics is related to the severity of chronic heart failure

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Introduction: To date, presence of exercise oscillatory ventilation (EOV) is associated with increased severity and poor prognosis in chronic heart failure (CHF) patients, but the relationship between EOV characteristics with CHF severity has not been investigated.
Purpose: To investigate the relationship between EOV characteristics with indices of functional capacity and severity in CHF.
Methods: Three hundred eighty-seven consecutive patients with stable CHF (LVEF <50%, age: 55±12years) underwent a maximal cardiopulmonary exercise testing (CPET) and were evaluated for EOV presence according to EOV criteria (amplitude of exercise ventilatory cycles ≥15% of the average resting amplitude, lasting ≥60% of total exercise duration). Correlations were made in two hundred-eighteen patients presenting EOV between each EOV characteristic [duration (d), length (λ), amplitude (h or h%)] with parameters of CPET (VO2peak, VO2peak predicted, VE/VCO2 slope, VO2/t slope). The same patients were divided into groups according to the median value of each EOV characteristic [d:80%, λ:46.8sec, h%:12.9%] and expressed as mild (M) or severe (S) when their values were < or ≥ of the median value respectively. (M) and (S) groups for each EOV characteristic were compared for CPET parameters. Values are expressed as mean ± standard deviation.
Results: Length (λ) and amplitude (h%) ($p<0.05$) but not duration (d) ($p>0.05$) were correlated with cpet variables examined. Comparison between (M) and (S) groups for each EOV characteristic showed that dM did not differ from dS ($p>0.05$) as for parameters examined, while λM and h%M had higher values of functional capacity indices compared to λS and h%S respectively ($p\leq0.05$, Table 1).
Conclusions: Length and amplitude of EOV were found to relate to functional capacity and hence to severity in CHF. Specifically, increased values of them are associated to lower functional condition potentially reflecting greater haemodynamic and ventilatory abnormalities. More research is required to clarify clinical and prognostic significance of EOV characteristics in CHF.

	dM <80% (N=107)	dS≥80% (N=111)	λM <46.8sec (N=109)	λS ≥46.8sec (N=109)	h%M <12.9% (N=109)	h%S ≥12.9% (N=109)
VO2peak (ml.kg-1.min-1)	16.7±6.1	17.7±6.4	18.3±6.5	16.1±5.8*	19.7±6.0	14.7±5.6*
VO2peak predicted (%)	57±19	59±19	61±18	56±20*	65±17	52±19*
VE/VCO2 slope	35.0±8.0	34.0±8.0	32.9±6.2	36.1±8.8*	31.4±6.3	37.6±7.9*
VO2/t slope (L.min2)	0.52±0.27	0.55±0.31	0.56±0.29	0.51±0.28	0.61±0.31	0.47±0.24*

* $p \leq 0.05$

Table 1. Differences between (M) and (S) groups for each EOV characteristic based on its median value in terms of CPET parameters.

1339

Skeletal muscle dysfunction in patients with heart failure with preserved compared to reduced ejection fraction: association with an elevated level of pleiotropic cytokine (GDF-15)

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Background: The main symptom of patients with HFpEF is exercise intolerance. The role of peripheral factors, such as skeletal muscle mass and function seems to play an important role in explaining the exercise intolerance in patients with HF.
Purpose: To compare skeletal muscle function, body composition and quality of life (QoL) among symptomatic and clinically stable outpatients with heart failure (HF) with preserved (HFpEF) and reduced ejection fraction (HFrEF) and age-matched healthy controls (HC).
Methods: 55 participants were recruited prospectively at our University Hospital. 17 HFpEF, 18 HFrEF, 20 non-diseased controls (HC): (Age: 71±6 vs. 68 ±9 vs. 66±7 years, p=0.1; sex (m/f): 8/9 vs. 3/15 vs. 7/13, p=0.0001; BMI: 28.7±4.6 vs. 27.9±5.3 vs. 26.4 ±4.2 kg/m2, p=0.2). All participants underwent standardized tests including echocardiography, cardiopulmonary exercise test (CPET), 6-minute walk test (6MWT), muscle function tests, blood tests, QoL assessment. Serum samples were analyzed for GDF-15 by means of ELISA.
Results: Patients with HFpEF compared to those with HFrEF showed reduced muscle mass in the trunk (muscle mass in the trunk/BMI 0.8 ±0.2 vs. 1.0 ±0.3, p=0.03) and worse muscle strength both in arms (Peak muscle strength in the internal rotation of the right shoulder 150°.sec 25.5 ±12.0 vs. 34.6 ±14.0 Nm, p<0.05) and legs (Peak torque knee extension 30°.sec/right leg lean mass: 13.3 ±5.0 vs. 18.0 ±5.9 Nm/kg, p=0.04, as well as worse bone mineral contents in both arms and legs (right arm bone/BMI: 6.2 ± 2.0 vs. 7.8 ± 2.0, p=0.03, left leg bone/BMI: 17.4 ± 5.0 vs. 21.5 ± 6.4, p=0.04). Patients with HFpEF scored worse in HADS- Questionnaire (Anxiety: 6.5 ±3.2 vs. 3.3 ±2.8, p=0.02). The above-mentioned alterations occurred in spite of the similarity of the reported and estimated physical activities among patients with HF (HFpEF: 93.0±52.3 vs. HFrEF: 74.2 ±42.7 MET, p=0.3). We found that GDF-15 - a pleiotropic cytokine- was significantly higher in patients with HF compared to HC: (HC: 590±152 vs. HFpEF: 870±246 vs. HFrEF: 1030±606 pg/ml, p=0.004). GDF-15 was associated with reduced muscle strength of both upper and lower extremities [internal rotation of the shoulders (r=-0.4, p=0.005) and muscle strength of quadriceps in all movements for example (knee extension with speed of 60° sec: r=-0.4, p=0.002)], increased BNP (r=0.7, p<0.0001), reduced 6MWT (r=-0.6, p<0.0001), reduced PVO2 (r=-0.5, p<0.0001), and elevated respiratory efficient slope (VE/VCO2): r=0.65, p<0.0001).
Peak torque internal rotation of the dominant shoulder 150°.sec correlated stronger with Peak VO2in HFrEF than HFpEF (p=0.001 r= 0.69 vs. p<0.05, r=0.47).
Conclusion: In spite of age-matching and similar physical activities, patients with HFpEF have worse muscle strength and quality of life compared to both HFrEF and HC. Elevated levels of inflammatory biomarkers seem to play an important role in explaining the reduced described muscle function.

1340

New approaches for the respiratory muscle trainings based on morphological features of the diaphragm

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Background: Respiratory muscle trainings (RMT) is an essential part of physical rehabilitation in patients with severe heart failure. The studying of the morphological features of diaphragm and its role in ventilation disorders in patients with HF allowed proposing a new way of RMT prescription for severe HF pats.
The purpose: To study the effectiveness of RMT, prescribed based on morphological and functional status of diaphragm.
Materials: 1 Stage: 32 diaphragm autoptat (14 male, 16 female) with different lethal outcomes (8 myocardial infarction, 9 stroke, 5 pulmonary embolism, 10 pneumonia) were taken in 1 hour after death. Pats were selected from research data base of patients with NYHA I-IV class HF. The percentage composition of muscle, connective, adipose tissue was compared with the results of maximal inspiratory pressure (MIP)provided no longer then 90 days before the lethal outcome. Patients with 79-73% of muscle tissue had 43±9 mmH2O MIP, 58-55% - 21±4 mmH2O MIP. 2 Stage: 67 pats (35 men and 32 women) 64,6±7,2 years old with NYHA III-IV HF were divided into 3 groups: Group 1 with MIP ≤ 20mmH2O, Group 2 - 20 < MIP ≤ 40 mmH2O , Group 3 - MIP > 40 mmH2O. Pats in each group were randomized to either 1 of 4 ways of RMT: with gradual increase of inspire resistance (IRG)or with prolonged inspire at maximum resistance (MRG), their combination of IRMRG or to a control group (CG) with inspire without resistance. Trainings were held for 16 minutes twice a day for 12 months with Threshold IMT. VO2peak, MIP heath related quality of life by SF-36 and compliance in training participation by patients diary were measured at baseline and 3, 6, 12 months.
Results: In 12 months pats from Group 3 demonstrated better increase in physical capacity (PC) according to base line (VO256% vs 37 % in Group 2, no statistically significant change in VO2in Group 1). There was less hospitalization in period 6-12 month due to HF progression and pneumonia in pats from Group 3 (11,3 vs 17,9 vs 21,5%). There were less lethal outcomes in Group 3 (9,5 vs 14,7 vs 19,1). In Group 3 IRG and MRG and IRMRG patients demonstrated statistically significant increase in PC and less hospitalizations due to pneumonia over CG, with statistically better results in IRMRG. In Group 2 statistically significant best results showed IRG and IRMRG patients, with no big difference between them. In Group 3 no statistically significant difference in PC and pneumonia frequency was found. But CG patients showed better compliance and SF-36 results.
Conclusion: Morphological structure of diaphragm directly correlates with respiratory functional disorders and influence on the way of RMT with best benefits from combination of static and dynamic exercises with the over 70% of muscle tissue, dynamic exercises for 60-70% of muscle tissue and deep breathing without resistance for less than 60 % of muscle tissue.

1341

The long term effect of exercise in the mobilization of endothelial progenitor cells in patients with chronic heart failure

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Introduction: Vascular endothelial dysfunction is an underlying pathophysiological feature of chronic heart failure (CHF). Exercise has been shown to stimulate the mobilization of endothelial progenitor cells (EPC) in healthy populations and populations with cardiovascular comorbidities. EPC, an index of vascular endothelial function, contribute to the regeneration of the inflammatory endothelium and promote neovascularization.
Purpose: The purpose of the present study was to evaluate the effect of a 36-session exercise training program on the EPC mobilization in patients with CHF.
Methods: Thirty eight patients (32♂, 6♀) with stable CHF [mean±SD, Age (years): 56±10, EF (%): 32±9, VO2peak (ml/kg/min): 18.1±4.1] enrolled a 36-session exercise training program including either high-intensity interval training (HIIT) or HIIT combined with resistance training (COM). All patients underwent a symptom limited maximal cardiopulmonary exercise testing (CPET) on a cycle ergometer before and after the training program. Venous blood was sampled before and after of each CPET. Five endothelial circulating populations were quantified by flow cytometry (table 1). EPC values are expressed as "cells/million enucleated cells" in median (25th, 75th percentiles).
Results: A significant intervention effect in CD34+/CD45-/CD133+, CD34+/CD45-/CD133+/VEGFR2, CD34+/CD45-/CD133- and CD34+/CD45-/CD133-/VEGFR2 populations and a significant time effect in CD34+/CD45-/CD133+ and CD34+/CD45-/CD133+/VEGFR2 populations were observed (table 1, p<0.001). An increase in 4 cellular populations was also observed during baseline after the 36-session training program (p<0.05). Finally, there were significant intervention by time differences in CD34+/CD45-/CD133+ /VEGFR2 and CD34+/CD45-/CD133-/VEGFR2 (p<0.001).
Conclusion: A 36-session training program stimulates both the acute and long term mobilization of different EPC populations in patients with CHF. The clinical relevance of these findings and the potential mechanisms need further investigation.

Table 1

Endothelial cellular populations	Before rehabilitation	After rehabilitation	Observed significance in intervention, time or intervention by time		
	Before CPET	After CPET	Before CPET	After CPET	
$CD34^+/CD45^-/CD133^+$	66 (39-95)	106 (78-148)	112 (83-176)*	189 (104-229)	#, †
$CD34^+/CD45^-/CD133^+/VEGFR_2$	2 (1-3)	5 (3-8)	6 (4-9)*	16 (11-25)	#, †, ‡
$CD34^+/CD133^+/VEGFR_2$	11 (7-22)	14 (8-22)	20 (12-29)*	24 (17-35)	
$CD34^+/CD45^-/CD133^-$	367 (253-955)	620 (380-1728)	358 (229-880)	533 (233-1211)	#
$CD34^+/CD45^-/CD133^-/VEGFR_2$	1 (1-2)	4 (2-6)	4 (2-4)*	9 (6-12)	#, ‡

Quantification of endothelial cellular populations before and after exercise
*Significance in baseline values (p<0.05)#
Significance in intervention (p<0.001)
†Significance in time (p<0.001)
‡Significance in intervention by time (p<0.001)

1342

The impact of patients adherence to the lifestyle advice on all-cause mortality in patients with heart failure: data from the Optimize Heart Failure Care Program

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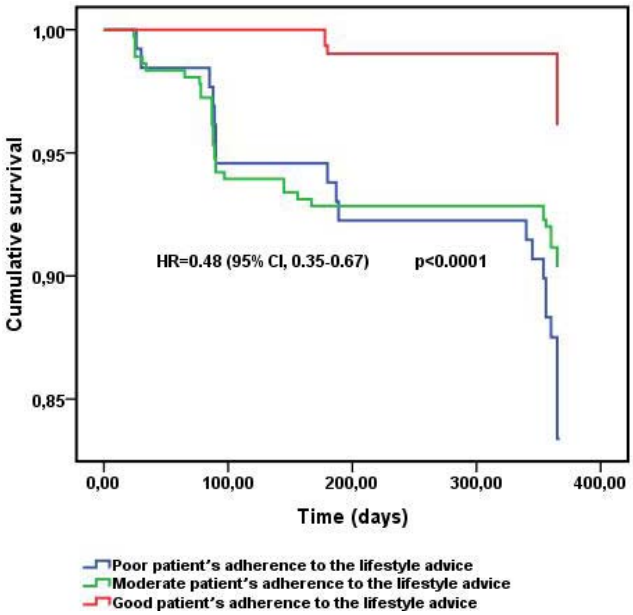
Background. Lifestyle advice is considered as a key component of education for self-care management in patients with heart failure (HF). However, little is known about the impact of specific lifestyle advice on prognosis in HF patients. The aim of our study was to analyze the impact of HF patients' adherence to lifestyle advice on all-cause mortality.
Methods. The analysis included data from the international prospective multicenter Optimize Heart Failure Care Program which was collected over 12 months from

801 patients (mean age 62.4 ± 11.9 years, 71% male, 76% with sinus rhythm) hospitalized with decompensated HF, NYHA II-IV (mean 2.7 ± 0.6), mean left ventricular ejection fraction 35.0 ± 10.0%, mean heart rate 87.0 ± 17.6 bpm, mean systolic/diastolic blood pressure 130 ± 23/81 ± 12 mm Hg. The underlying etiology of HF was ischemic in 66% of cases. Before discharge from the hospital all HF patients were provided with sufficient up-to-date information to make decisions on lifestyle adjustment and self-care. To assess patients' adherence to the lifestyle advice, an indirect method (patient-reported compliance, which was measured using a special questionnaire) was used. Three types of adherence were determined: good (patients always followed the lifestyle advice), moderate (patients sometimes followed the lifestyle advice) and poor adherence (patients did not follow the lifestyle advice).

Results. During 12 months of follow-up, 309 patients (38.6%) demonstrated good adherence to lifestyle advice, 363 patients (45.4%) had a moderate adherence to lifestyle advice and 129 patients (16%) did not follow lifestyle advice at all. After 12 months of follow-up, the rates of all-cause mortality were significantly lower in the group of good patients' adherence (5.8%, p<0.0001) in comparison with the groups of moderate and poor patients' adherence (8.8-16%, respectively, HR 0.48, 95% CI 0.35–0.67, p=0.0001) (Figure).

Conclusion. Less than half of HF patients demonstrated good adherence to the guideline-recommended lifestyle modification. The rates of all-cause mortality in the group of good patient's adherence were significantly lower compared with the groups of moderate and poor adherence to lifestyle advice. Greater efforts to promote lifestyle modification in HF patients are needed.



Clinical Case 2

1346

Challenges in preventing sudden cardiac death. The importance of familial background, genetic profiling and follow-up in specialised units.

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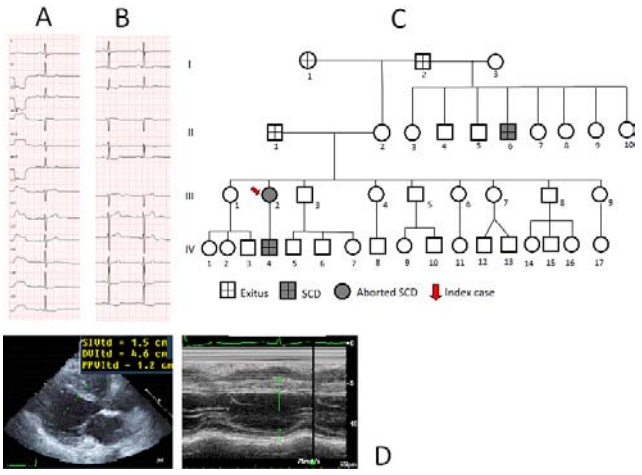
We present a case of a 50-year old woman diagnosed of idiopathic ventricular fibrillation (case III.2), following an episode of aborted cardiac sudden death (SCD) in her country (Colombia) at the age of 41 (2010). An implantable cardiac defibrillator (ICD) was placed for secondary prevention. Subsequent studies only showed mild septal hypertrophy on echocardiography. Right ventricle was normal. Single photon emission computed tomography (SPECT) showed no ischemia. Idiopathic ventricular fibrillation (VF) was the diagnosis suspicion.



She was referred to our unit in 2013. ECG showed rectified ST and low voltage T waves on inferior and lateral leads (figure A), exacerbated during exercise test. She complained of occasional atypical chest pain so an SPECT was repeated resulting negative for ischemia again. Non-invasive CT coronary angiogram ruled out epicardial stenosis. Follow-up ecocardiography did not change.
Family background revealed another case of SCD: her uncle died at rest at the age of 35 (case II.6). Later, in 2017, her son suffered a SCD while walking on a sloping street at the age of 22 (IV.4); pathology did not show relevant findings (no report was available as it occurred in a foreign country).
In 2018, she presented an appropriate discharge due to VF. On the ECG, repolarization abnormalities progressed with greater ST rectification in the aforementioned leads (figure D). Echocardiography showed a hypertrophic septum of 15 mm (figure C). Hypertrophic cardiomyopathy (HCM) with a highly arrhythmogenic substrate was suspected. Next generation sequencing genetic panel found one pathogenic mutation TNNI3 p.Ala157Val and three other variants of uncertain significance in SCN1B p.(Val160Ile); DMD p.(Arg1728Cys); EMD p.(Gly156Ser).
Family screening with echocardiography, cardiac magnetic resonance (CMR), and 24-hours ECG recording and exercise test was only possible among individuals IV.1, II.4, IV.8, demonstrating a normal phenotype (genotype pending); the remainders are living in Colombia.
Malignant ventricular arrhythmias in spite of non-severe hypertrophy have been described among patients with TNNT2 and TNNI3 mutations. These phenotypes are characterized by the presence of myocyte disarray that contributes to the arrhythmogenic substrate.
Diagnosis might be challenging in mild HCM phenotypes that may not accomplish HCM diagnostic criteria in spite of an already established arrhythmogenic substrate. Even if the HCM is correctly identified the European Heart Society risk of SCD score has not a good predictive value in this sub-population with troponin mutations. According to that, high suspicion of this entity, the integrated family evaluation in specialised units and the support of diagnostic tools as the genetic study, contribute to an accurate diagnosis in the index case, which is crucial for the prevention in the other family members as early identification of genetic carriers can aid in SCD risk stratification.

1347

Early detection of hTTR cardiac amyloidosis with bone DPD scintigraphy in a patient with a rare transthyretin mutation

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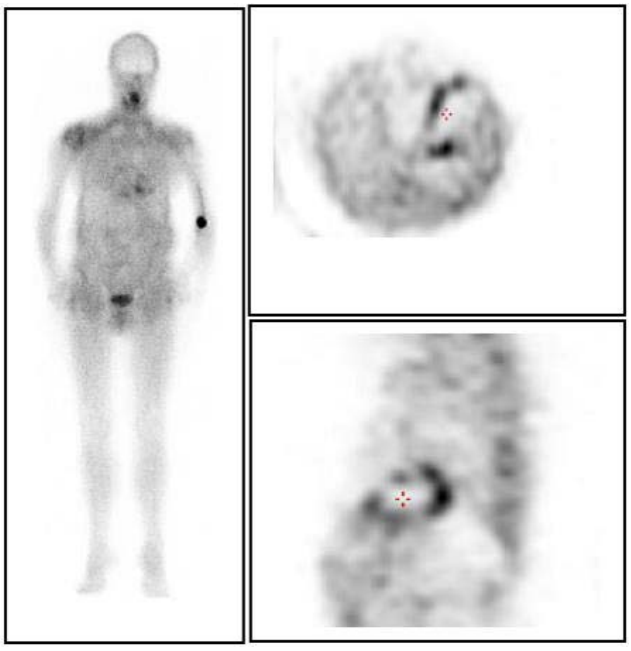
Hereditary transthyretin-mediated (hATTR) amyloidosis is an inherited, progressive, life-threatening disease caused by mutation of the transthyretin (TTR) gene, responsible for accumulation of amyloid fibrils in the heart and in the nerves. Recently specific disease modifying therapies have proven efficient to reduce mortality and major cardiac events, thus enhancing the interest of an early diagnosis.



DPD scintigraphy: cardiac uptake

A 78 years old female patient was referred to our institution in 2017 for assessment of her cardiac condition, after being diagnosed with a rare amyloidogenic genetic mutation of TTR (Glu61Lys) . She had a history of hypothyroidism, bilateral carpal tunnel surgery at the age of 60, and familial history of hTTR amyloidosis: one brother with symptomatic hTTR amyloidosis being the index case diagnosed at 68 years old and one asymptomatic carrier sister. Amyloid deposits were present in her accessory salivary glands biopsy.
Her clinical examination showed minor length dependent sensory neuropathy (PND grade 1). She was in NYHA class 1, her cardiac examination was normal, as well as ECG. During a 6min walk test she walked 531 m (expected distance 425 m). The BNP value was normal at 41ng/l (n<80), troponin value was normal. On echocardiography, interventricular septum thickness was measured at 8 mm, ejection fraction was 71%, global longitudinal strain was -19%, valves were normal. The cardiac MRI could not be performed because of claustrophobia. The 24h ECG Holter was normal. MIBG scintigraphy showed a normal uptake with a heart to mediastinum ratio of 2.4 (normal value >1.85). DPD "bone" scintigraphy showed a cardiac uptake with a Perugini grade 3 with a heart to lung ratio of 4, and attenuation of bone uptake.
A treatment with Tafamidis was initiated in June 2017, because of stage 1 hTTR neuropathy. Repeat assessment in October 2018 showed a stable disease: the patient had no cardiac symptoms, normal examination, normal BNP and troponin, normal ECG; interventricular myocardial thickness was measured 9 mm.
In this patient with biopsy proven hTTR amyloidosis, DPD "bone" scintigraphy was the only proof of cardiac involvement, while there was no myocardial wall thickening by echo and no cardiac denervation by MIBG scintigraphy. This pattern is unusual as MIBG reuptake is altered early in the course of hTTR cardiac amyloidosis, while DPD "bone" scintigraphy is usually positive when cardiac amyloid deposits produces wall thickening >12 mm.
Conclusion: positive "bone" DPD scintigraphy can be the first sign of cardiac hTTR amyloidosis in asymptomatic patients with some rare mutations; this prompts complete assessment of cardiac condition with multimodality imaging, even when echocardiography is normal.

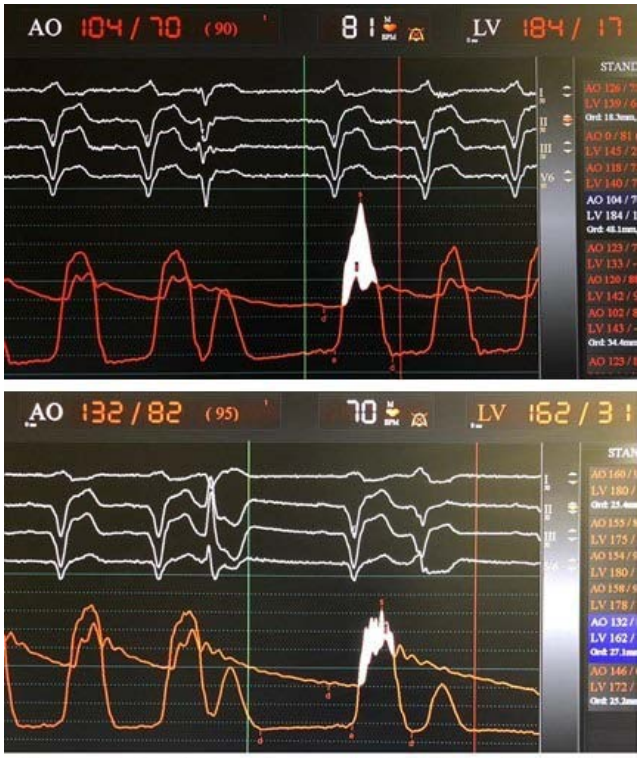


Figure 1: Peak-to-peak systolic LVOT gradient before (top, 80mmHg) and immediately after (bottom, 30 mmHg) alcohol injection at post-extrasystolic beat with Valsalva provocation, respectively

Figure 1

1348

Alcohol septal ablation in a patient with hypertrophic obstructive cardiomyopathy due to Anderson-Fabry disease

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Introduction A 63 year-old male patient with known Anderson-Fabry disease (AFD) presented with progressive deterioration of functional capacity (NYHA III). In the medical history, he had coronary artery disease (CAD) treated with PCI, ICD-implantation due to malignant ventricular arrhythmia, chronic kidney disease stage IV and depression. Besides enzyme replacement therapy he was treated with AT-II antagonist, beta-blocker, calcium antagonist, low-dose aspirin, statin and ezetimibe.
Methods Echocardiography showed severe global cardiac hypertrophy with pronounced interventricular septum thickening (maximal end-diastolic thickness of 31 mm). Left ventricular ejection fraction was preserved with grade II diastolic dysfunction and evidence of increased filling pressures, supporting the diagnosis of HFpEF. Maximal LVOT gradient was 52 mmHg at rest and 86 mmHg at post-extrasystolic beat. Mitral valve showed incomplete systolic anterior motion (SAM). At the time of presentation NT-proBNP levels were 1.108 pg/ml.
After treatment with verapamil at maximally tolerated doses NT-proBNP was lowered to 426 pg/ml and peak LVOT gradient declined to 26 mmHg at rest. However, during bicycle echocardiography the gradient increased to 76 mmHg after maximal workload. Also, the patient did not report relevant improvement in symptoms indicating septal reduction therapy. In face of comorbidities and high perioperative risk, percutaneous transluminal septal myocardial ablation (PTSMA) was preferred.
By PTSMA of the first septal branch provoked peak LVOT gradient dropped from 80 mmHg to 30 mmHg as measured invasively. Peak post-procedural levels of CK and high-sensitive Troponin T were 1.766 U/l and 6.600 pg/ml, respectively. Pre-discharge echocardiography showed a peak LVOT gradient of 16 mmHg without relevant increase during provocation and no evidence of SAM.
Conclusion Cardiac manifestation of AFB can mimic the phenotype of hypertrophic obstructive cardiomyopathy (HOCM). Therefore, AFB patients with signs or symptoms of heart failure should undergo a comprehensive diagnostic HOCM assessment. In case LVOT obstruction is confirmed, PTSMA in experienced hands can be a safe and effective treatment option for these patients.

1349

Ventricular hypertrophy in a family with sarcomeric hypertrophic cardiomyopathy: always of genetic origin?

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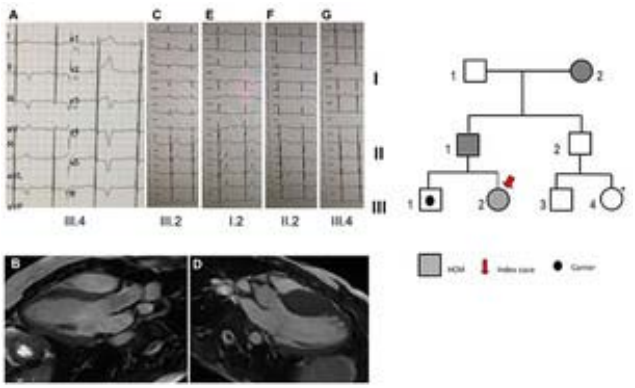
A case of a young girl (III.4)* initially diagnosed of hypertrophic cardiomyopathy (HCM) during routine sports medical exam is presented.
In 2012, at 13 years old, suspicion of HCM raised after an ECG showing negative T-waves in inferior and lateral leads (A). Echocardiography showed anterolateral and anteroseptal apical hypertrophy of 13-14mm confirmed by cardiac magnetic resonance (CMR), without fibrosis (B). She was competing at basketball at that time; thus, competition sport cessation was recommended.Previously, her cousin (III.2) had been diagnosed of severe HCM at the very early infancy (<1 year old) and MYH7_p.Arg723Cys pathogenic mutation was identified. ECG showed Q-wave in inferior leads (C). In the last follow-up (24 years old), non-obstructive anteroseptal hypertrophy (30mm) was present with patched fibrosis in anteroseptal segments on CMR (D).
One year before, in 2011, also her grand-mother (I.1) had been diagnosed of obstructive HCM (20mm thickness) after admission for a stroke at the age of 76. ECG showed inferior Q-waves (E). No genotype was performed.
During the family screening, her uncle (II.1) showed as well hypertrophy of 14-15mm on echocardiography but he refused any further studies.
Her father (II.2), also a previous athlete, has an abnormal ECG showing negative T-waves in inferior and lateral leads similarly to the patient (F). Mild hypertrophy in CMR (13mm) has also been observed. Genetic study is pending at this time.The 17 year old brother of her cousin (III.1), carrier of MYH7 pathogenic mutation, has non-pathologic Q-wave on V3 to V6 ECG-leads but no hypertrophy in echocardiography or in CMR has been detected. After reduction of sport activity, the last CMR

of the discussed patient (III.4) demonstrated complete reversal of the aforementioned hypertrophy and absence of fibrosis. The genetic study of 34 genes by Next Generation Sequencing did not detect any mutation in either MYH7 nor in other genes related to structural cardiomyopathies. The last ECG showed isolated negative T-wave in lead III with normalization of all other parameters (G).We want to focus on the utility of genetic analysis to recognize phenocopies of hypertrophic cardiomyopathy identified during family screening. However, it is not always easy to completely exclude myocardiopathy. Particularly, in this family, it seems probable that the abnormalities observed in members II.2 and III.4 are secondary to left ventricle overload in response to exercise but also, an undiscovered sarcomeric mutation could be involved. Due to the severity of the observed abnormalities in repolarization, it has been recommended to maintain exercise restriction and continue clinical follow-up. Of note, a differential ECG expression (inferior Q-waves versus inferolateral negative T-waves) correlated with a clear phenotype of sarcomeric HCM in this family.



1351

Restrictive cardiomyopathy and anomalous origin of the right coronary artery in a patient with desmin- and myotilin-gene variants: a deleterious combination.

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Introduction A previously healthy 22-year-old Caucasian woman with a history of fatigue and unexplained exertional dyspnea was admitted to our clinic due to palpitations and chest pain. On admission, blood pressure was 110/70 mmHg, ECG showed sinus rhythm 60 bpm with incomplete left bundle branch block configuration. Blood tests showed slightly increased troponin-T 23 ng/L and NT-proBNP 2100 pg/mL.ProceduresTrans-thoracic echocardiography (TTE) revealed severely enlarged atria, decreased right ventricle function (TAPSE 10mm), restrictive filling pattern and hypertrophy (posterior left ventricular wall thickness 13mm). No wall motion abnormalities were observed and left ventricular systolic function was normal (LVEF 55%). Subsequent cardiac magnetic resonance imaging depicted myocardial oedema on the lateral wall and minor pericardial effusion. Positron emission tomography showed no inflammatory activity. Renewed TTE revealed diastolic flow between the aorta and the pulmonary valve (Figure 1). Multi-detector computed tomography for coronary anatomy analysis showed anomalous origin of the right coronary artery (ARCA) from the left coronary sinus with inter-arterial course between the aorta and pulmonary trunk (Figure 2a & 2b).

Patient management

The patient experienced recurrent chest pain while at hospital with troponin-T peaking at 520 ng/L. Subacute coronary angiography confirmed significant ARCA ostium narrowing (FFR 0.76) while IVUS revealed ARCA compression during systole, suggesting restricted ARCA blood flow. The patient underwent CABG with revascularization of the ARCA territory using right internal mammary artery and after uncomplicated post-operative clinical course was dismissed from the hospital. Comprehensive cardiology panel gene analysis at follow-up revealed simultaneous heterozygosity for desmin- [DES, c.1360C>T; p.Arg 454Trp] and myotilin-[MYOT, c.1423C>T; p.(Gln475*)] gene variants. Differential diagnosis

Desmin mutations have been associated with ventricular arrhythmias, atrioventricular conduction disturbances, progressive cardiomyopathy and sudden death. Myotilin mutations are associated with myofibrilar myopathy and peripheral neuropathy with uncertain significance for cardiac disease. In this heterozygous patient for DES- and MYOT- mutations we describe a novel cardiac phenotype of restrictive hypertrophic cardiomyopathy and malignant course ARCA.

Conclusions Multi-modality imaging and serial clinical assessment may lead to the discovery of rare cardiomyopathy. Genetic testing can offer insight into relations between unique gene profiles and specific cardiac phenotypes and facilitate improved outcomes in such patients. The patient in this case is considered for early ICD- referral due to high risk for sudden death while heart failure follow-up is ongoing due to progressive cardiomyopathy. In such patients genetic counselling and family member screening should be encouraged.

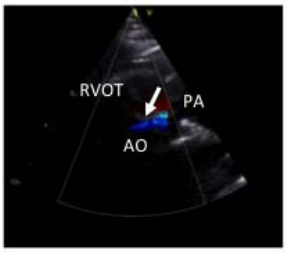

Figure 1. Echocardiography shows a short axis view at the aortic level where a diastolic flow (arrow) can be seen between the aortic valve (AO) and the pulmonary artery (PA).

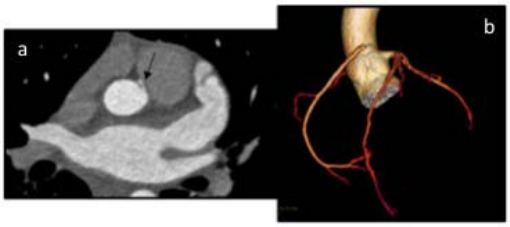

Figure 2. Computed tomography with a) contrast and b) volume reconstruction showing anomalous origin of the right coronary artery from the left coronary sinus with inter-arterial course between the aorta and the pulmonary trunk (arrow).

Figures 1 & 2

Rapid Fire 5 - Non-pharmacological treatments: beyond conventional

1417

Treatment of central sleep apnoea with phrenic nerve stimulation is associated with reduction in heart failure-related hospitalizations

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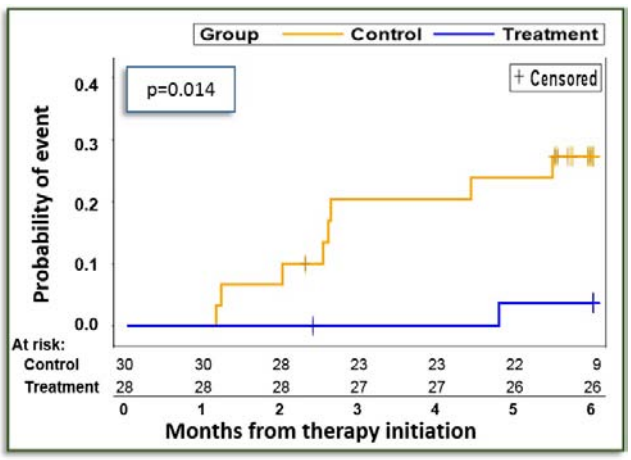
Funding Acknowledgements: Respicardia, Inc.

Background: Patients with heart failure and reduced ejection fraction (HFrEF) often have central sleep apnoea (CSA), which increases the risk for HF exacerbation and hospitalization.
Purpose: Investigate the effects of phrenic nerve stimulation (PNS) on sleep metrics, quality of life (QoL), safety and HF hospitalization rate in symptomatic HFrEF patients.



Heart Failure Hospitalization by Group

Methods: We analysed data of HFrEF subjects (NYHA Class II-III, ejection fraction ≤ 45%) who participated in the remedē System Pivotal Trial. They were randomized to 6-month nightly treatment with PNS (remedē System, Respicardia, Inc.; n=28) or to control group (device implanted, no therapy; n=30). All subjects underwent full night attended polysomnography, blindly scored centrally. A Kaplan-Meier analysis estimated HF hospitalization rates.
Results: The cohort had mean age of 68 years, was primarily male (95%), with 52% in NYHA III, median LVEF of 27%, with severe CSA (median treatment arm [Tx] apnoea-hypopnoea index [AHI] was 47 events/hour vs 39/hour in the control arm [Ctrl]). Concomitant cardiovascular diseases included hypertension (79% Tx, 90% Ctrl), CAD (79% Tx, 80% Ctrl), and atrial fibrillation (57% Tx, 60% Ctrl). In the year prior to randomisation, 21% of Tx and 33% of Ctrl had a documented HF hospitalization.
With therapy, 52% of patients achieved a ≥50% reduction in AHI while compared to 7% of controls ($p < .001$). The median AHI decrease was 23 events/hour on therapy compared to an increase of 2 events/hour for Ctrl (between group difference $p < .001$). The AHI improvement was driven by a reduction in the central apneoa index, which decreased a median of 23 events/hour in the Tx group compared vs. 2 events/hour in controls ($p<.001$).
Patient global assessment was markedly or moderately improved in 48% of Tx subjects compared to 15% of Ctrl (p=0.010). Additionally, the Epworth Sleepiness Scale improved by 2 points in the Tx group and worsened 1 point in the Ctrl group (p=0.058).
Over a 6-month follow up period, heart failure-related hospitalizations were significantly fewer in patients receiving active PNS than the Ctrl group (3.7% versus 27.3%). The time to first heart failure-related hospitalization was significantly shorter in the treated group (log-rank test p-value 0.014) (Figure).
During the same period, 3 patients died: 1 in the Tx group (cause of death intracranial bleed subsequent to fall but conservatively called cardiac sudden death by clinical events committee) and 2 in the Ctrl group (both cardiac pump failures).
Conclusions: According to this exploratory analysis, treatment of CSA with PNS was associated with improved sleep indices, QoL, and fewer heart failure-related hospitalizations in symptomatic HFrEF subjects. The results of this subgroup analysis of a randomized controlled trial should be confirmed by larger studies.

1418

Bacterial infections as a mediator of ventricular assist device-induced HLA allosensitization

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Introduction: Induction of anti-Human Leukocyte Antigen (anti-HLA) antibodies after Ventricular Assist Device (VAD) implantation, a process called allosensitization, is insidious but potentially catastrophic, as it may impede the perspective of successful transplantation. The effect of VAD-related bacterial infections on allosensitization remains unknown.
Purpose: Aim was to describe the time-course of allosensitization during the first year after VAD implantation and to examine the potential effect of bacterial infections on allosensitization.
Methods: Fifty five VAD recipients were retrospectively studied with regard to anti-HLA allosensitization during the first year after VAD implantation. Anti-HLA antibodies were assessed with Panel Reactive Antibody (PRA) method till 2003, with ELISA (2003-2005) and with Single-Antigen method (2005-today). Allosensitization was defined as PRA>10% or as Mean Fluorescence Intensity (MFI)>1000 units. It was assessed at baseline, at 3,6 and 12 months post-implantation, as well as before and after the first documented bacterial infection. Bacterial infections studied comprised bloodstream infections (BSI) and VAD-specific infections. BSI was defined as >1 blood cultures positive for the same microorganism in a clinical context of infection. VAD-specific infection was defined as >1 cultures from VAD per-cutaneous drive-line/pocket with the same microorganism in a clinical context of infection with negative blood cultures. Comparisons were made using Pearson's Chi square test/Fischer Exact test.
Results: Twenty patients receiving left-sided VAD (LVAD) and 35 biventricular VAD (BiVAD) as bridge to transplant, (12 ischemic, 43 non-ischemic cardiomyopathy) were studied. Allosensitization time-course is shown on table 1. BSI was documented in 12 patients, 3 of them sensitized before BSI and 8/12 after (p 0.056). VAD-specific infections were documented in 30 patients, 6 of which sensitized before infection and 13/30 after (p 0.052).
Conclusions: VAD implantation induces allosensitization, potentially reducing the likelihood of successful heart transplantation. Bacterial infections, both BSI and VAD-specific infections seem to contribute to VAD-induced allosensitization.

Table 1

Timepoint	Sensitized patients	p (vs baseline)
Baseline	1/54 (1.9%)	-
3 months	14/45 (31.1%)	0.000
6 months	14/44 (31.8%)	0.000
12 months	11/31 (35.5%)	0.000

1419

Improvement of right ventricular function with intraaortic balloon pump counterpulsation

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Introduction: Right Ventricular (RV) Failure occurrence after Left Ventricular Assist Device (LVAD) implantation is a major contributor to morbidity and mortality among patients with end-stage bi-ventricular heart failure. On the other hand, patients who require bi-ventricular support (BiVAD) consistently show worse outcome compared to LVAD recipients.

Purpose: Purpose of this study was to investigate the effect of Intraaortic Balloon Pump counter-pulsation (IABP) on RV function in candidates for mechanical circulatory support due to end-stage bi-ventricular heart failure.

Methods: Patients with end-stage heart failure who required IABP support due to haemodynamic compromise were studied. RV function before and after IABP placement was studied echocardiographically (legacy methods and free wall RV strain analysis) and haemodynamically (invasive right heart catheterization). Specific laboratory parameters were also obtained. Paired-samples Student T-test was applied to compare values before and after IABP placement.

Results: Twelve patients with end-stage heart failure aged 35±13 years were supported with IABP for 73±58 (3-180) days. Haemodynamic compromise was the indication for IABP placement in 11/12 patients and further analysis refers to this population. Two out of 11 patients presented further clinical deterioration on IABP and required temporary/long-term BiVAD support, while 2 patients got stabilized on IABP but without significant amelioration, one of them receiving BiVAD on a non-urgent basis and the other dying on IABP due to infection. RV function significantly recovered in 7 patients. In the cohort of 11 patients, Central Venous Pressure (CVP) decreased from 18±6 to 11±9 mmHg (p=0.014), CVP/Pulmonary Capillary Wedge pressure decreased from 0.61±0.19 to 0.42±0.20 (p=0.022) and Pulmonary Artery Pulsatility index (PAPi) increased from 1.32±0.56 to 2.76±1.30 (p=0.009). RV free wall strain also improved from -12.6±4.4% to -17.5±3.0% (p=0.013). The above parameter optimization rendered the patients suitable for LVAD implantation, despite initial bi-ventricular compromise.

Conclusion: In patients with end-stage bi-ventricular heart failure, IABP placement might improve RV function and alter mechanical support type (LVAD instead of BiVAD), with potential morbidity and mortality benefits.

1420

Response to cardiac resynchronization therapy is present across all stages of chronic kidney disease

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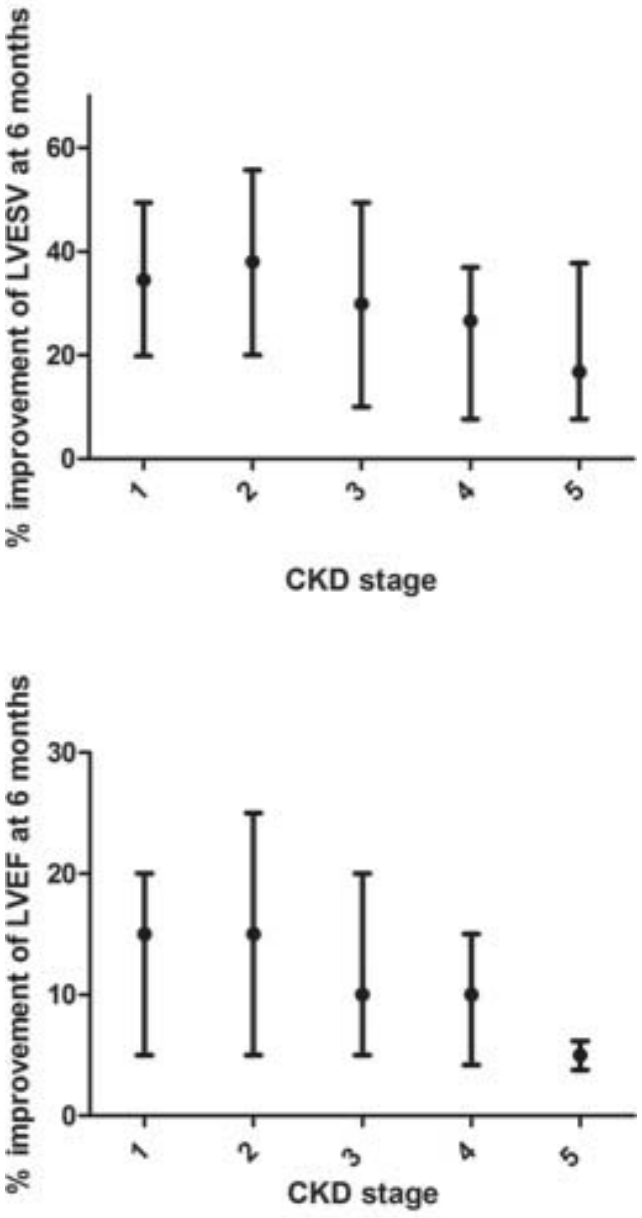
Introduction Limited data is available on the effect of chronic kidney disease (CKD) on the response to cardiac resynchronization therapy (CRT) as these patients are often excluded from trials.

Purpose We therefore aimed to assess the effect of CRT on renal function, reverse remodeling and outcome across all stages of CKD in a large patient population of CRT recipients.

Methods 798 consecutive heart failure (HF) patients undergoing CRT implantation between October 2008 and September 2016 were retrospectively evaluated. Renal function was available at baseline and 6 months following CRT. Remodeling based on left ventricular end systolic volume (LVESV)/left ventricular ejection fraction (LVEF) and clinical outcome was assessed using a combined endpoint of all-cause mortality and HF hospitalization.

Results Median baseline eGFR was 62.8 [43.6-77.8] ml/min/1.73m2. 33.6% of patients were in CKD stage 3, 11.0% in stage 4, and 1.1% in stage 5. At 6 months, compared with CKD stage 1-2, renal function improved among CKD stage 3-5 patients (P<0.001). LVEF and LEVSV improved across all CKD stages, however patients with CKD stage 1-2 exhibited a greater degree of improvement in LVEF (median 15% vs. 10%, P<0.001) and LVESV (median -37.2% vs. -29.9%, P<0.001) compared to patients with CKD stage 3-5. Despite a greater degree of reverse remodeling in CKD stage 1-2, the most accurate cutoff of remodeling predicting good clinical outcome was lower for patients with CKD stage 3-5, respectively 5.5% vs. 9.5% (LVEF), and -6.67% vs. -12.41% (LVESV).

Conclusions CRT results in reverse remodeling across all stages of CKD, although to a lesser extent in patients with renal dysfunction. However, patients with CKD derive benefit on outcome at a lesser degree of remodeling. Secondly, CRT results in stabilization of renal function in patients with CKD stage 3-5.



LV remodeling to CRT over CKD stages

1421

Transcatheter Mitral-Valve Repair in patients with heart failure and severe dysfunction.

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Significant functional mitral regurgitation (FMR) is associated with a worse prognosis in patients with dilated cardiomyopathy and severe systolic dysfunction.

Surgical indication is not clear in these patients, and there is still not enough data on the benefit of transcatheter mitral-valve repair (TMVR)in this setting. Besides symptomatic benefit, TMVR could contribute to left ventricular reverse remodeling and improvement of hemodynamic parameters.

Purpose: Analyze the clinical benefits of TMVR and echocardiographic changes.

Methods: Prospective and unicentric observational registry of patients with significant FMR and symptomatic heart failure with severe systolic dysfunction under optimal medical treatment. Functional NYHA class and heart failure (HF) hospitalizations before and after the procedure were assessed; as well as the need of heart transplantation and mortality during follow-up. Echocardiographic characteristics were also analyzed.
Results: From December-2012 to July-2017, 38 patients were included. Age 71±9; 84% were men, 73.7% with ischemic heart disease, 15.8% under resynchronization therapy and 57.9% with an implantable cardioverter-defibrillator. Logistic Euroscore II 9.7±10. Average EF 32,4±5%. TMVR was associated with an improvement in NYHA class (p <0.005, Figure 1) and lower HF hospitalizations (46.9% before vs 13% after, p <0.005). Two patients left the elective cardiac transplant list due to functional improvement. Regarding echocardiography data, there were no differences in left ventricular end-diastolic diameter (LVEDd; pre 63 ± 9 mm vs post 62 ± 11 mm, p = 0.5) or in left ventricular ejection fraction (LVEF; pre 32%±5 vs post 31%±10, p = 0.63). Systolic pulmonary pressure (PAPs) decreased post procedure (PAPs pre 54±14mmHg vs post 49±14 mmHg p=0.05). With a minimum follow-up of 6 months, 8 patients (21.1%) have died and two have undergone cardiac transplant.
Conclusions: In our population,TMVR resulted in an improvement of the NYHA class and a lower rate of HF hospitalizations; which could be related to the decrease in systolic pulmonary pressure.

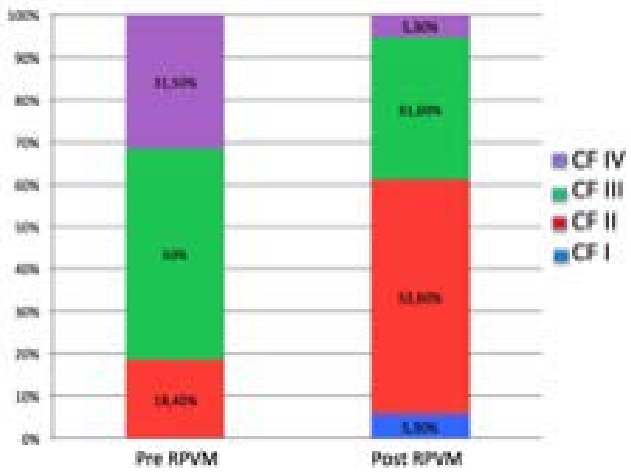

Figure 1; NYHA Class

1422
A novel rotary blood pump for HFpEF

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Heart Failure with preserved ejection fraction (HFpEF) has no treatment options to improve survival. We have developed a novel assist pulsed device for treatment of HFpEF.
The system consists of a small diagonal centrifugal rotary blood pump using hydrodynamic suspension of a four bladed impeller with partial unloading from the left atrium (LA) to the descending aorta. The pump is adaptive to patient physiological needs and is adjusted by feedback from the ECG and sensors. Pulsed rpm maintains pulse pressure. Implantation is by a small left side thoracotomy and minimally invasive procedure.
Animal studies in sheeps 50-80 kg have tested a spectrum of unloading and demonstrated adequate pulsed pump unloading between 1.5-3.0 l/min. ECG gated rpm increase in systole avoided LA suction and arrhythmia, interference with mitral valve opening and ventricular underfilling. Blood pulsepressure was maintained at 95-70 mmHg, CVP 10 mmHg and native cardiac output of 3.0-5.0 l/m. Human whole blood without added anticoagulation for 8 hours and 6 consecutive days have demonstrated no hemolysis, increase in energy consumption, heat increase or clotting inside the pump. Long-term animal studies will be performed.
Partial systolic pulsed unloading of LA demonstrated adequate hemodynamics and maintained pulse pressure. This novel pump may be the first effective treatment for HFpEF.

1423
Temporal improvement in CRT response and survival: a review of multicenter trials

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Funding Acknowledgements: Medtronic, plc

Background: Despite new features and algorithms designed to promote the optimal delivery of CRT, the non-responder rate is often perceived to remain at 30%. The collective improvement in CRT response rates over time and correlation with survival remains unknown.
Purpose: We aimed to characterize contemporary versus historical CRT response rates and correlation of CRT response with survival at one year.
Methods: CCS at 6 months and 12-month survival values were evaluated for the CRT treatment arms 7 Medtronic CRT studies of 2413 patients, with starting dates ranging from 1999-2017. Analysis was limited to patients with NYHA III symptoms at baseline.
Results: Earlier CRT studies from 1999-2004 reported 6-month CCS improved rates from 52.7%-69.3% (see Table). More contemporaneous CRT studies from 2009-2017 have reported 6-month CCS improved rates from 74.2%-79.9%. 12-month survival rates correlated with CCS scores, with higher survival in CCS improved/unchanged patients and greater mortality risk in patients with worsened CCS scores.
Conclusion: CRT response rates appear to improve over time in correlation with improvements in device technology aimed at promoting effective, synchronized CRT. Overall, patients with a CCS of improved or unchanged at 6 months appeared to have greater survival at 12 months compared to patients with a worsened CCS, suggesting that unchanged CCS may also indicate CRT response.

1424
Predictors of maximal exercise capacity in long-term mechanical circulatory support

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Funding Acknowledgements: No funding

Introduction: As a consequence of the shortage of donor hearts and implantation as destination therapy, duration of mechanical circulatory support (MCS) is extended. Especially in longer term support, quality of life is important, which is promoted by a good exercise capacity. However, little is known about factors associated to exercise capacity in MCS patients, in whom hemodynamics are totally different from the normal heart function.

Table 1.

		CPET results at 6 months	
Etiology - dilated (No. of patients, %)	84 (57)	Maximal load - Watt (mean±SD)	98 ± 30
Etiology - ischemic (No. of patients, %)	42 (29)	pVO2 - l/min (mean±SD)	1.19 ± 0.36
Etiology - other (No. of patients, %)	21 (14)	pVO2/kg - ml/kg/min (mean±SD)	15.6 ± 4.1
Heartmate-II (No., %)	101 (69)	Anaerobic threshold (mean±SD)	10.5 ± 2.8
HVAD (No.,%)	31 (21)	Respiratory quotient(mean±SD)	1.20 ± 0.11
Heartmate 3 (No.,%)	15 (10)	EqCO2(mean±SD)	37.1 ± 6.4
BMI - kg/m2 (mean±SD)	24.4 ± 3.4	Max. heart rate - bpm (mean±SD)	135 ± 27
LVEDd - mm (mean±SD)	60 ± 13	% max pred. HR- % (mean±SD)	80 ± 16
TAPSE - mm (mean±SD)	12.5 ± 2.7		
TDI-s RV - cm/s (mean±SD)	6.1 ± 1.5		

EqCO2: ventilatory equivalent of carbon dioxide. % max pred. HR: percentage of maximal predicted heart rate (=220-age).

ABSTRACT 1423: CCS and Survival by Study

Study(NYHA III only)	Year(start)	N	CCS improvedat 6 mo	CCS unchangedat 6 mo	CCS worsenedat 6 mo	%Death at12 mo in CCSimproved at 6 mon	%Death at12 mo in CCS unchanged at6 mo	%Death at 12 mo in CCS worsened at 6 mo
MIRACLE	1999	211	64.9%	18.0%	17.1%	4.0%	0.0%	8.3%
MIRACLE ICD	1999	165	52.7%	15.8%	31.5%	2.4%	3.9%	16.2%
Marquis	2003	225	69.3%	15.6%	15.1%	3.2%	3.0%	16.7%
Prospect	2004	449	68.8%	14.7%	16.5%	2.3%	6.1%	9.3%
AdaptivCRT	2009	453	74.2%	13.3%	12.6%	1.0%	2.9%	17.1%
Attain Performa	2013	721	79.9%	4.7%	15.4%	2.1%	5.9%	5.0%
Attain Stability Quad*	2017	189	74.6%	7.4%	18.0%	—	—	—

*12 month results pending, will be available at time of presentation.

Purpose: The purpose of this study was to determine predictors of exercise capacity in terms of peak VO2 per kilogram (pVO2/kg), assessed by cardiopulmonary exercise test (CPET).
Methods: Data of all adult patients, who received a MCS in the University Medical Center Utrecht (UMCU, The Netherlands) between 2006-2018 and underwent CPET 6 months postoperatively were included. Data consisted of baseline characteristics, CPET and echocardiographic results at 6 months. IBM SPSS Statics 25 was used for linear regression analysis to search for predictive factors for pVO2/kg.
Results: 147 patients (102 (69%) male, mean age 50.6±11.9 years) underwent a CPET at 6 months after MCS implantation (table 1). Factors most associated with pVO2/kg were age and percentage of maximal predicted heart rate (=220-age); $F(2,43)=17$, $p<0.001$, $R2=0.664$. Both factors added significantly to the prediction ($p<0.001$). All other variables, including echocardiographic RV-function and left ventricular dimensions, were not associated with pVO2/kg.
Conclusion: Age and percentage of maximal predicted heart rate are significant predictors for pVO2/kg. This supports the importance of maximal heart rate with regard to maximal exercise capacity in MCS support.

1425
Continuous-flow ventricular assist device to small left ventricle: Is it nightmare?

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Objectives: Continuous-flow ventricular assist device (cf-VAD) implantation results have been improving. Small ventricle may pose serious problem. We sought to examine whether small LV is a hurdle for cf-VAD implantation using contemporary devices.
Patients and methods: Consecutive 146 patients were implanted with cf-VAD for bridge to transplantation, which is only an indication for use in Japan. Ninety-four axial-flow and 52 centrifugal-flow pumps were implanted. There were 38 females (26%) with an average age of 40.4 years. Follow-up rate was 100%. Small LV was defined as end-diastolic dimension (LVEDD) less than 55mm, and small indexed LVEDD (I-EDD: LVEDD divided by body surface area) was defined as < 35. Observed and event-free survivals were calculated and compared by Kaplan-Meier method with log-rank test.
Results: One, 2, 3 and 4-year survivals were 92.3%, 88.9%, 86.6% and 84.8%. Survival of small LV group (n = 24) or small I-EDD group (n = 28) was comparable to the counterpart. Cerebrovascular event-free survival in these small LV groups was also not significantly different from the counterparts. Pump thrombosis was only 4 cases (2.7%) in the whole cohort.
Conclusion: Small LV did not affect the long-term survival or adverse events of cf-VAD patients by using contemporary devises.

1426
The detrimental effect of right atrial pacing on left atrial function and clinical outcome in cardiac resynchronization therapy.

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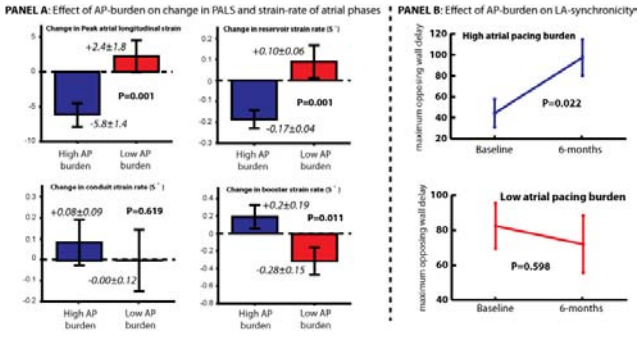
BACKGROUND: Data on the effects of right atrial (RA)-pacing on left atrial (LA) synchronicity, function and structure after cardiac resynchronization therapy (CRT) are scarce.

OBJECTIVE To assess the impact of RA-pacing on LA-physiology and clinical outcome.
METHODSThe effect of RA-pacing on LA-function, morphology and synchronicity was assessed in a prospective imaging cohort of HF-patients in sinus rhythm with guideline indication for CRT. Additionally in a retrospective outcome cohort of consecutive HF-patients undergoing CRT-implantation the relation of RA-pacing was assessed with various outcome endpoints. High versus low atrial pacing burden was defined as atrial pacing above or below 50% in both cohorts.
RESULTS Thirty-six patients were included in the imaging cohort (age=68±11years). Six-months after CRT, patients with high RA-pacing burden showed less improvement in LA-maximum volume, minimum volume and total emptying-fraction ($p<0.05$). Peak atrial longitudinal strain, reservoir and booster strain-rate but not conduit strain-rate improved after CRT in patients with low RA-pacing burden and worsened in patients with high RA-pacing burden ($p<0.05$ for all). A high RA-pacing burden induced significant intra-atrial dyssynchrony (maximum-opposing-wall-delay; 44±13msec vs 97±17msec, $p=0.022$) (see figure). A total of 569-patients were included in the outcome-cohort. After covariate adjustment, a high RA-pacing burden was associated with LV-reverse remodeling (β=0.146,95%CI= [3.101;14.374],p=0.002), and new-onset or recurrence of atrial fibrillation (AF; 41% vs. 22% at median 31 [22-44] months follow-up; $p<0.001$). There was no difference in time to first HF-hospitalization or all-cause mortality ($p=0.185$) after covariate adjustment. However in a recurrent event analysis, heart failure readmission were more common in patients exposed to a high RA-pacing burden ($p=0.002$).
CONCLUSIONSRA-pacing in CRT patients negatively influences LA-morphology, function and synchronicity, which is associated with worse clinical outcome including diminished LV- reverse remodeling, increased risk for new-onset or recurrent AF and heart failure readmission. Strategies reducing RA-pacing burden might be warranted.



effect of RA pacing on LA-function

1428
Consequences of a revised heart allocation system on the cost effectiveness of cardiac transplantation in the united states: game theory based insights

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Purpose: Heart transplantation (HT) is a cost-effective (CE) therapy for end stage Heart Failure. A new US organ allocation system expands the listing statuses

and favors short-term, mechanical circulatory support (MCS) therapies and greater regional organ sharing with longer ischemic times and reduced survival.
Methods: CE (Quality adjusted life year (QALY) and Cost for Year of Life Expectancy (LE)) of HT was evaluated using a decision-tree model populated with local and published clinical probability, LE and Cost data. Sensitivity analyses was performed to assess the impact of changing clinical practices. Data are expressed in inflation adjusted 2018 USD and costs are discounted at 3%. A Willingness to Pay (WTP) threshold of $50,000 was considered acceptable.
Results: CE of HT is $75,751.88/QALY and $61,914.18/LE based on 79 % MCS use pre-HT and 21% short-term (ST) MCS use assuming a procurement radius (PR) of 350-miles. Varying % ST MCS (Fixed PR) from 5-79% negatively impacted CE; $57,239.12 - $163,299.40/QALY and $46,717.69-$183,819.12/LE. Increasing PR (<100 miles, 100-350 miles, 351-500 miles and > 500 miles) adversely impacted CE; $75,751.88- $78,548.65/QALY and $61,914.18-$64,200.06/LE. Assuming longer ischemic times (< 3.49 hours, 3.5-4.9 hours and > 5.5 hours) reduce post-HT survival (-1.4 yrs for 3.5-4.9 hrs and - 2.8 yrs for > 5.5 hrs), CE was negatively impacted: $75,751.88 (<3.49 hrs), $97,604.57 (3.5-5.5 hrs) and $137,177.02/QALY (>5.5 hrs); $61,914.18/LE (<3.49 hrs), $80,971.59/LE (3.5-5.5 hrs); and $116,977.76/LE (>5.5 hrs). Varying % ST MCS use (5%-79%) with a "worst case" ischemic time (4.9 hrs) significantly worsened CE; $76,925.93 -$219,268.68/QALY and $63,680.29 - $183,819.12/LE. Sensitivity analysis (Monte Carlo) confirmed a WTP of >$70,000 to render HT more cost-effective.
Conclusion: HT is a cost-effective strategy. CE of HT will be adversely impacted with the revised allocation system due primarily to increased ST MCS use, increased PR, longer ischemic times and secondary reduced post HT survival. It will be increasingly important to monitor CE as HT programs adjust to the new allocation system.

1429

Identifying urinary microRNAs for heart allograft rejection monitoring using small RNA sequencing - Pilot results

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Introduction: Heart failure (HF) represents one of the leading causes of death in the developed countries and heart transplantation (HT) is the only solution for patients with terminal refractory HF. Patients after HT are at risk of acute cellular rejection (ACR) potentially causing graft damage and failure. Diagnostics of ACR is based on histopathologic evaluation of endomyocardial biopsies (EMB) as no non-invasive biomarker has been found yet. microRNAs (miRNAs, miRs) are tiny non-coding RNA molecules involved in post-transcriptional regulation of gene expression. Extracellularly they are potentially involved in intercellular communication and because of their high stability they represent novel potential biomarkers.
Purpose: The purpose of the current study was to identify potential urinary miRNAs that would reflect ACR occurrence without the need of EMB and even blood sampling performance.
Methods: Prospective monocentric study. 26 consecutive patients after HT have been enrolled and followed-up for one-year. During the follow-up period, patients absolved 12 regular check-ups including EMB performance and urinary sampling. 8 patients experienced at least one episode of ACR of grade IB and higher (using ISHLT criteria) during the follow-up. Three distinct urinary samples were analyzed from each patient: prior to rejection, during the rejection and after the rejection (as correlated with the results of EMB). Total RNA enriched for small RNAs was isolated using Urine microRNA Purification Kit and next-generation sequencing was performed using Illumina instrument according to manufacturer´s instructions. Differentially expressed miRNAs were identified using multiple comparisons and appropriate statistical methods.
Results: We have identified 737 individual miRNAs in urinary samples. Levels of 8 miRNAs were statistically significantly decreased (hsa-miR-582-3p, hsa-miR-7a-3p, hsa-miR-139-5p, hsa-miR-3065-5p, hsa-miR-676-3p, hsa-miR-199b-5p, hsa-miR-504-5p and hsa-miR-7706) and levels of one miRNA (hsa-miR-6764-5p) was statistically significantly increased (p value < 0.05) during the rejection episode.
Conclusions: We have identified several candidate miRNAs whose levels are altered in urinary samples in patients with histologically proven ongoing ACR. Results need to be validated on the rest of the patient cohort using qRT-PCR. Identification of such a non-invasive marker of ACR could lead to a decrease in number of EMB and would increase patients´ safety.

1430

Exercise oscillatory ventilation improves the performance of prognosis scores currently used for heart failure

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Background and aim: Several prognostic risk scores are available for heart failure with reduced ejection fraction (HFrEF), and are used, together with other criteria, to help decide the ideal timing for listing candidates for a heart transplant. The detection of an oscillatory ventilatory pattern (OVP) during cardiopulmonary exercise testing (CPET) has been associated with more advanced HF and a worse prognosis, but was not considered in the development of all the current risk scores. We evaluated whether OVP adds significant prognostic information to four contemporary HF scores.
Methods: Single-centre retrospective cohort study of consecutive HFrEF patients undergoing CPET for functional and prognostic assessment from October 1996 till May 2018. The Heart Failure Survival Score (HFSS), Seattle Heart Failure Model (SHFM), Meta-analysis Global Group in Chronic Heart Failure (MAGGIC) and Metabolic Exercise Cardiac Kidney Index (MECKI) were obtained in each patient. Cox model was fit with time to death or urgent transplant (whichever came first within 2 years) as the dependent variable and OVP and respective HF score as the independent variables. We further assessed the added discriminative power by performing ROC curve comparisons.
Results: We studied 387 patients, median age 58 (IQR 49; 65) years, and 77% were male. The most common HFrEF aetiology was ischemic heart disease (54%). Median peak oxygen consumption was 15,7 mL/kg/min (IQR 12,8; 20,0). OVP was present in 150 (39%) patients. Over the 2-year follow-up period, 48 patients died, and 52 underwent heart transplantation (of which 25 were urgent). HFSS showed the weakest (c-statistic 0,625; 95% [CI] 0,54-0,71) and MECKI score the strongest (c-statistic 0,819; 95% [CI] 0,76-0,88) discriminatory ability. The presence of OVP predicted the study endpoint independently of the HF prognosis score used (see table). Adding the occurrence of OVP to the HFSS and the MAGGIC scores significantly improved their prognostic performance (see Table).
Conclusion: An OVP is a common finding in HFrEF patients undergoing CPET, and adds prognostic information to contemporary HF prognosis scores. Systematic evaluation of this easily available criterion may assist the decision on the appropriate timing for heart transplantation listing.

SCORE	HR	CI	AUC	Modified SCORE	Adjusted HR	CI	AUC	p for AUC comparison
SHFM	1,02	1,02-1,03	0,806	*SHFM modified*	1,02	1,01-1,03	0,822	0,373
				+OVP	4,54	2,49-8,28		
HFSS	1,05	1,03-1,07	0,626	*HFSS modified*	1,04	1,02-1,06	0,754	0,009
				+OVP	4,45	2,42-8,2		
MECKI	1,04	1,03-1,05	0,819	*MECKI modified*	1,04	1,03-1,05	0,836	0,363
				+OVP	3,01	1,56-5,81		
MAGGIC	1,05	1,03-1,07	0,670	*MAGGIC modified*	1,03	1,01-1,06	0,762	0,04
				+OVP	4,21	2,25-7,87		

Table: Added prognostic value to HF scores

Table

1431

From transcatheter atrial septal defect closure to atrial left-to-right shunt as a novel application of heart failure with preserved ejection fraction (HFpEF)

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Background: Transcatheter atrial septal defect (ASD) closure is a well-accepted therapeutic approach for wide ASD populations. Conversely, iatrogenic inter-atrial shunt creation recently emerged as a potential treatment modality for patients with heart failure with preserved ejection fraction (HFpEF). Given the opposing approaches of ASD closure versus creation, we hypothesized that some patients undergoing ASD closure may be predisposed to develop HFpEF. Thus, we aimed to investigate the early and sustained cardiac functional changes following transcatheter ASD (T-ASD) closure and their clinical correlates.
Methods: A prospective study of all adult secundum type ASD patients undergoing transcatheter closure enrolled between 2013 and 2017 in the University Medical

Center Groningen, the Netheraldns. Each patient underwent 3 sequential transthoracic echocardiography (TTE), pre- (Echo 1), 1 day post- (Echo 2) and within 1 year post- (Echo 3) procedure to determine hemodynamic characteristics associated with ASD and T-ASD closure. The associations between risk factors of HFpEF and significant hemodynamic changes after T-ASD closure were also investigated.

Results: Thirty-nine patients (mean 48±16years, 61.5% women) were included. T-ASD closure resulted in early and sustained decrease of right ventricle (RV) systolic and diastolic function (Table 1), indicated as significant decrease of relative values of RV global longitudinal strain (RV GLS, mean -20.7, -18.5 at Echo 1 vs Echo 2), RV S' (mean 14.3, 12.7 cm/s at Echo 1 vs Echo 3) and right atrium GLS (RA GLS, mean 36.9, 31.4, and 30.4 at Echo1, Echo2, Echo3 respectively) post-procedure. Comparatively, T-ASD closure resulted in early and sustained increase of left ventricle (LV) systolic function and deterioration of LV diastolic function with increase of LV filing pressure (LVFP) estimated by echocardiography (Table 1), which overall were demonstrated as significant increase of LV ejection fraction (LVEF, 54.0, 56.7 at Echo 1 vs Echo 2), LV mass index (LVMi, mean 72.9, 81.7 g/m2, at Echo 1 vs Echo 3), mean E/e' (mean 6.3 vs 7.3 at Echo 1 vs Echo 2)and decrease of left atrium GLS (LA GLS, mean 32.8, 26.7 and 26.7 at Echo1, Echo2, Echo3 respectively) post-procedure. Age (β= 0.31, p=0.009) and atrial fibrillation (β=0.24, p=0.03) were associated with sustained increase of LVFP after T-ASD closure estimated by mean E/e', while ASD size, sex and hypertension were not.

Conclusion: Older ASD patients and those with atrial fibrillation predisposed to sustained increases in left-sided filling pressures and HFpEF following ASD closure. We argue that in particular elderly HFpEF patients with atrial fibrillation might benefit from the artificial creation of a atrial left-to-right shunt.

Table 1. Echocardiographic Characteristics before (Echo 1), day 1 (Echo 2) and within 1 year (Echo 3) after transcatheter ASD closure

	Echo 1 (n=39)	Echo 2 (n=27)	*P* value (Echo 1 vs Echo 2)	Echo 3 (n=39)	*P* value (Echo 1 vs Echo 3)
Right Ventricle (RV) Systolic Function					
RV GLS	-20.7±3.1	-18.5±4.6*	0.01	-17.9±6.9	0.06
RV TDI s', cm/s	14.3±2.3	13.4±2.1	0.07	12.7±2.8**	0.003
TAPSE (mm)	24.4±5.6	23.7±4.7	0.54	23.1±4.5	0.22
RV FAC, %	40.4±7.5	41.5±6.8	0.63	39.7±6.7	0.29
RV Diastolic Function					
RV IVRT, ms	61.8±21.9	61.8±18.8	0.39	72.8±23.6**	0.005
RAVi, ml/m²	58.7±35.8	47.4±25.9*	0.04	44.1±19.7**	0.02
RA GLS	36.9±14.6	31.4±13.2*	0.02	30.4±13.4**	0.03
RV TDI e'	13.0±3.0	12.42±3.1	0.32	12.1±2.8	0.18
Left Ventricle (LV) Systolic Function					
LVEF (Biplane, %)	54.0±7.0	56.7±8.6*	0.04	55.1±7.3	0.22
LV Mass index (LVMi, g/m2)	72.9±16.9	74.4±14.7	0.07	81.7±17.1**	<0.001
LV GLS, %	-15.7±3.1	-15.8±2.9	0.79	-16.0±3.2	0.51
LV Diastolic Function					
MV inflow E velocity (m/s)	0.68±0.2	0.77±0.28*	0.048	0.78±0.18**	0.01
Mean E/e'	6.3±2.0	7.3±3.2*	0.003	6.8±1.8	0.34
LAVi (ml/m²)	29.6±12.4	29.9±11.2	0.85	34.5±13.9**	0.04
LA GLS (%)	32.8±13.9	26.7±9.9*	0.006	26.7±10.7**	0.01

GLS = global longitudinal strain, TDI = Tissue doppler imaging, TAPSE = tricuspid annular plane systolic excursion, RV FAC = RV fractional area change, RV IVRT = RV isovolumetric relaxation time, RA = right atrium, RAVi = right atrium volume index, LVEF = LV ejection fraction, MV = mitral valve, LAVi = left atrium volume index, LA = left atrium.

Table 1

Clinical Case Corner 5 - Cardio-oncology pearls

1457

Refractory Pericardial Effusion associated with Churg-Strauss Syndrome

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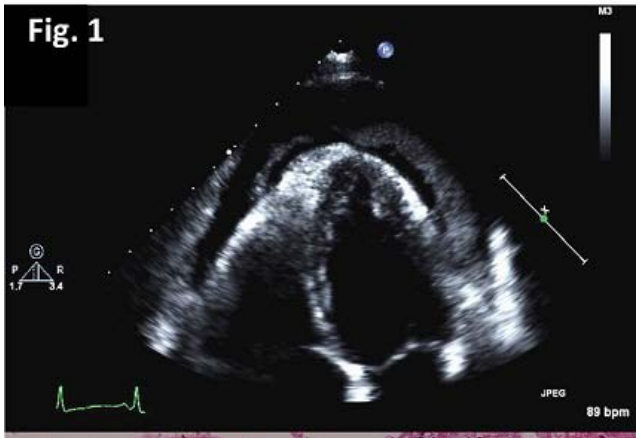
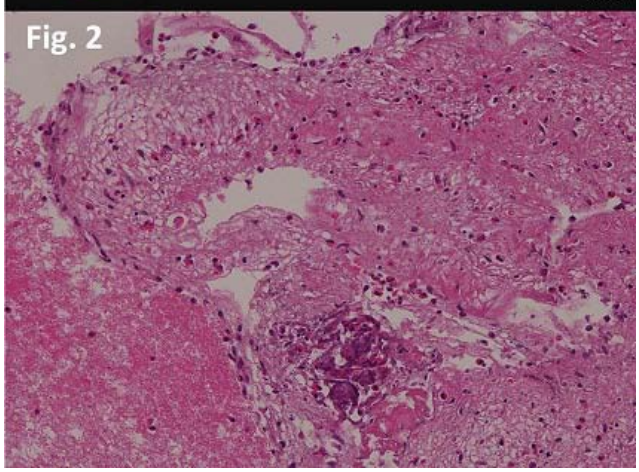
Case: A 46-year-old female with a history of allergic rhinitis visited for cardiomegaly on chest X-ray. She presented with intermittent mild fever, abdominal bloating, and worsening shortness of breath since 10 days ago. She had a history of eosinophilic pneumonia in 2012, and had never taken drugs which are known to induce eosinophilia. Immediate transthoracic echocardiogram (TTE) demonstrated moderate to large amount of pericardial effusion without hemodynamic significance. We decided to start acute pericarditis medications first, including NSAIDs, colchicine, and diuretics. After 7 days of medications, her symptoms and cardiomegaly on chest X-ray were improved, however, 3 months after treatment, her dyspnea and cardiomegaly were aggravated and repeat TTE showed large amount of pericardial effusion with fibrin-like material in pericardial space (Fig 1.). Pericardiocentesis was performed, and 300 ml of yellow-turbid fluid with many whitish crumb-like materials were aspirated. The fluid analysis revealed 9,825 WBC/mm3 with a differential count of 88% eosinophils, 1% neutrophils, and 2% monocytes. Bacterial and mycobacterial cultures were negative. Histopathologic examination of the pericardial fluid with needle biopsy revealed marked eosinophilic infiltrate with granulomatous lesion (Fig. 2) without malignant cells. Laboratory test revealed marked peripheral eosinophilia (38%, 4.4×103/μL) with mild leukocytosis (11.5×103/μL) and this finding was consistently noticed since her first visit. Furthermore, we could also detect nasal polyps on both sided of the nose by nasal endoscopy. The combination of clinical (allergic rhinitis, nasal polyposis, and a history of eosinophilic pneumonia) and laboratory (peripheral eosinophilia, eosinophilic tissue infiltrates) features, we could confirm the diagnosis as Churg-Strauss syndrome (CSS). After diagnosis, we started prednisolone at an initial dose of 1mg/kg/day, and her pericardial effusion with symptoms improved and peripheral eosinophilia declined rapidly.





Figures

Problems: There are numerous causes of pericardial effusion that includes viral and bacterial infection, neoplastic and metabolic diseases, and idiopathic pericarditis. In this situation, it is hard to doubt rare cause of pericardial effusion (such as CSS) as a first line. In addition, there are no commonly accepted diagnostic criteria for CSS, which makes more difficult to make proper diagnosis.

Discussion and conclusion: Pericardial effusion appears during CSS in 20-30% of cases, and it is generally mild and asymptomatic. But in our case, patient demonstrated refractory and symptomatic pericardial effusion with hemodynamic significance. This is rare, but may be a fatal complication. Hence, proper diagnosis with adequate treatment is essential. Based on our case, pericardial fluid analysis with biopsy was the key to differential diagnosis and therefore, timely therapy.

1458

A case of chemotherapy-induced heart failure

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Introduction: Chemotherapy-induced cardiotoxicity is one of the most common complications of cancer therapy that can significantly impact morbidity and mortality. With a high prevalence of cardiovascular disease in cancer patients, the risk of developing HF is significantly increased especially in patients with co-morbidities such as hypertension and diabetes.

Case report :

A 59-year-old female patient presented to our facility with rapidly progressive dyspnea that was diagnosed as acute pulmonary oedema. Patient had a history of hypertension, diabetes, smoking and she was receiving Adriamycin on top of an excised left breast cancer.

Patient was managed in the intensive care unit according to the guidelines of acute heart failure and a bed side transthoracic echocardiography was done and revealed dilated left ventricular (LV) dimensions and volumes with severely reduced systolic function, ejection fraction was 25% with severe global hypokinesia and evidence of a large LV apical thrombus.

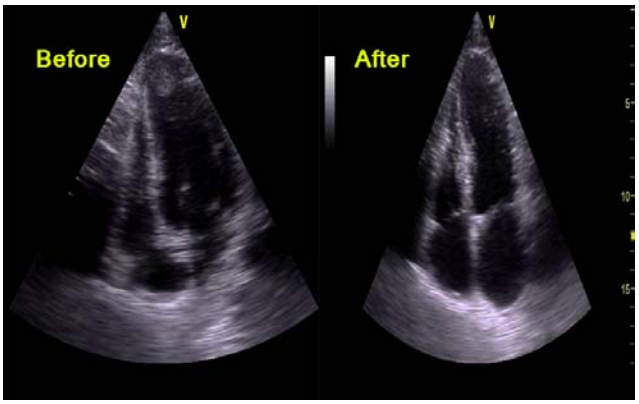
Anti-failure measures were initiated immediately in the form of diuresis for her symptoms, Ramipril 2.5 mg once daily and bisoprolol 2.5 mg once daily in addition to warfarin for the LV apical thrombus.

On her second day in the intensive care the patient developed right lag and she was diagnosed as acute ischemic stroke with a cardioembolic cause.

After 1 month of discharge, follow-up echocardiography revealed marvelous improvement of the LV dimensions and ejection fraction which returned to normal (65%) and the LV apical thrombus disappeared completely.

Patient was advised to continue of her medications and the Cardio-Oncology team decided to stop giving Adriamycin to her.

Conclusion: Chemotherapy-induced left ventricular dysfunction and heart failure is a common complication in cancer patients and close follow-up for those patients is very important, and its management demands a multidisciplinary approach from cardiologists, oncologists and the interdisciplinary team involved in the management of these patients.



2D LV apical thrombus

1459

The role of levosimendan and ivabradine in cardio-oncology: acute doxorubicin toxicity

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Funding Acknowledgements: not applicable

A 31 year old male patient, known to have Adult onset Still's disease maintained on methotrexate and recently diagnosed with T-cell lymphoma, admitted initially for chemotherapy session and administered R-CHOP regimen.
Two hours after receiving his chemotherapy regimen, the patient developed severe acute chest pain radiating to the back, orthopnea.
His initial vital signs were BP of 120/75 mmHg and HR of 120 bpm, O2 saturation of 90% on room air.
ECG showed sinus tachycardia with early repolarization of the ST segment. Troponin level was elevated (0.086 ng/ml) and trended up to 0.247 ng/ml. CXR showed congested lungs.
Urgent TTE showed a severely impaired LV and RV systolic function with estimated LVEF of 15%, severe MR and TR.His condition rapidly deteriorated and became hypotensive, tachypneic with evidence of cardiogenic shock (BP=62/46 mmHg and HR=115 bpm).
Urgent coronary angiography done showed normal coronaries. LVEDP was 35 mmHg, RA pressure of 25 mmHg and cardiac index of 1.6 L/min/m2. An intra-aortic balloon pump and Swan-Ganz catheter were inserted. He was started on norepinephrine/Dobutamine with IV diuresis with no significant improvement of his condition in the next 6 hours.
Decision was to switch treatment to Levosimendan/Norepinephrine/ivabradine/furosemide.
Over the course of few days, patient's condition improved and was successfully weaned of IABP, pressors and ventilator while ivabradine was kept at maximal dose. He became hemodynamically stable with normal vitals. A repeat TTE at 10 and 26 days showed significant improvement of his cardiac function with normalization of right and left systolic function (refer to table).
Discussion: Here we describe a rare presentation of acute doxorubicin toxicity with cardiogenic shock and successful treatment with recovery using levosimendan, ivabradine along with mechanical support.

Echocardiographic Parameters evolution			
	Day 0 (on presentation)	Day 10	Day 26
LVEF (%)	15	40	55
LVEDD (mm)	59	59	55
GLS (%)	-6.4	-12.0	-17.4
RV function	Severely impaired	Normal	Normal
MR grade	4	2-3	1
TR grade	4	2-3	1
sPAP (mmHg)	Inaccurate	57	38

LVEF= left ventricular ejeciton fractionLVEDD= left ventricular end diastolic diameterGLS= global longitudinal strainRV= right ventricleMR= mitral regurgitationTR= tricuspid regurgitationsPAP= systolic pulmonary artery pressure

1460

Behind the curtain - frequent is not always the answer

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Introduction: Nonbacterial thrombotic endocarditis is a rare disease characterized by the deposition of thrombotic material in cardiac valves, in the absence of infectious cause. It has been described its association with neoplastic disease, with high risk for central or peripheral embolism and high mortality.

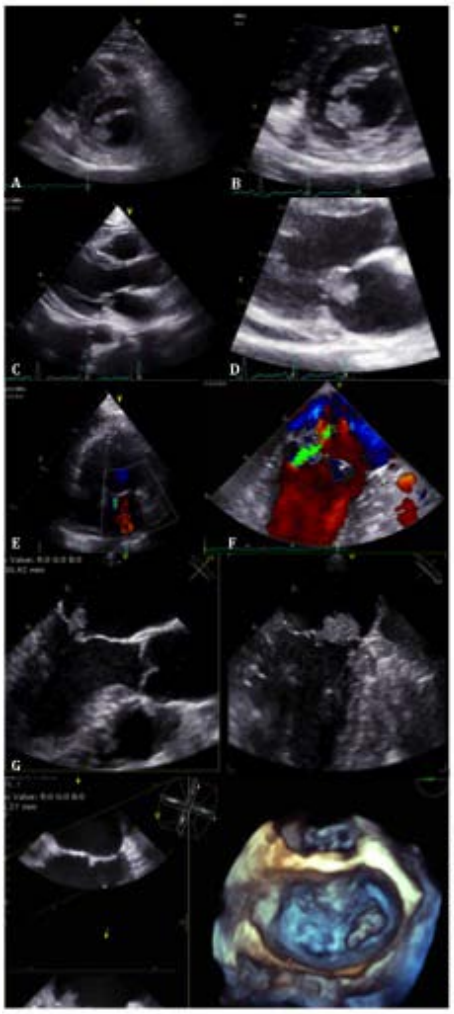

Figure 2.
Echocardiographic study of the mitral mass: A, B – Transtoracic small axix view; C, D Transthoracic longa xis view; E – Mild mitral regurgitation in transthoracic and (F) in transesophageal;
G – transesophageal view.

Echocardiograms

We report a case of a 63 yo female patient with no relevant medical history, presenting at the ED with insidious symptoms of dizziness and mnesic deficits for 1 month, lately associated with weakness of the right hemibody and speech abnormalities. At examination she was hypertensive, with right hemiplegia and aphafia of nomination. Head CT scan showed multiple non-recent bilateral parietal and occipital ischemic lesions, and a recent focal lesion in the left frontal lobe. Lab tests: Hb 13.0g/dL, WBC 11.9x10^3/uL, CRP 24mg/L, normal renal tests. Blood gas with hypoxemia and chest x-ray with evidence of left pleural effusion. Better characterization with MRI confirmed multiple subacute ischemic strokes and no vascular defects. Considering the multiples focal cerebral lesions, cardioembolic source was suspected. Transthoracic echocardiogram observed a hyperechogenic, non-mobile mass in the atrial face of posterior leaflet of the mitral valve, 9x10mm, with mild regurgitation; thin circumferential pericardial effusion and pleural effusion of moderate volume. Transesophageal echo confirmed preservation of the valve leaflets. Absence of infectious history and negative serial blood cultures led to investigation of alternative diagnosis to explain also polyserositis. Thoraco-abdominal CT showed multiple bilateral pulmonary and right axillary nodules. Pathology of the pleural effusion and excision

biopsy of the nodes were consistent with lung adenocarcinoma. Progressive clinical deterioration ultimately led to patient death.
Conclusion: This case reflects the importance of meticulous investigation of repeated embolic events, keeping high suspicion index for this rare and lethal entity, sometimes even masking other potential severe diseases.

1461
Complete atrioventricular block revealing cardiac metastasis of pulmonary adenocarcinoma

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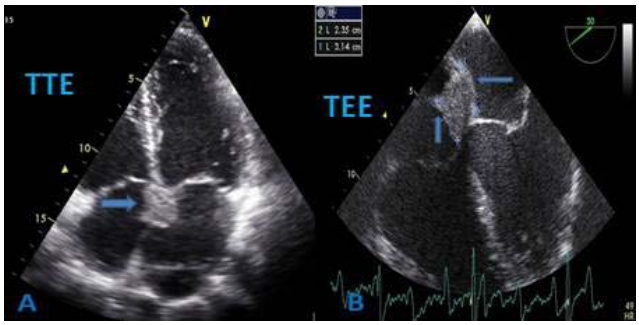
Background: Metastases in lung cancer are common; however the heart represents a rare metastatic site in which the diagnosis is often made in post-mortem. We report a case of complete atrioventricular block resulting from a bronchopulmonary tumor's secondary site at the atrial septum.
Case report : It was a 57-year-old patient, with no particular medical history, smoking at 35 packs a year, who for four months had chronic bronchitis with deterioration of health condition and dyspnea. This symptomatology was related to a pulmonary adenocarcioma with multiple metastatic sites: lymph node, adrenal and peritoneal metastases. The patient was hospitalized in the emergency room because of a worsening of his dyspnea. The clinical examination found an apyretic and eupneic patient at rest. The blood pressure was 130/80 mmHg with a heart rate of 40 cpm and oxygen saturation of 95% on room air. The electrocardiogram showed complete atrioventricular block at 37 cpm with narrow QRS complex (Figure 1). Transthoracic echocardiography (TTE) revealed an echogenic ovarian mass infiltrating the lower half of the interatrial septum (IAS) (measuring 26 x 17 mm), which did not interfere with the mitral valve function except for a grade 1 mitral regurgitation. Ventricular contractility was preserved and pulmonary arterial hypertension at 55mmHg with a minimal pericardial effusion was also observed. Transesophageal echocardiography confirmed the results of the TTE (Figure 2). The patient was implanted by a dual-chamber pacemaker without incident and then transferred to the pneumology department for further treatment by chemotherapy.
Conclusion: which have metastasized to the heart are found in six to 20% of patients with malignant neoplasms. In case of a conduction disorder in a patient with a neoplasia, it is necessary to evoke a secondary cardiac location. TTE is the key exam that has to be conducted systematically.



TTE A/TEE B: mass infiltrating the IAS

1462
Cardiogenic shock in a postoperative patient with neoplasia: what went wrong?

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Takotsubo cardiomyopathy is a rare stress-induced acute heart disease, which can manifest as severe left ventricle (LV) dysfunction. Data suggests that the underlying mechanism might be coronary spasm, induced by either the perioperative catecholamine storm, or by the anesthetics used in surgery, sometimes with a delay of a few days. Recent studies also show possible molecular correlations between neoplasia and this type of cardiomyopathy.
We present the case of a 48-year-old female patient, with a history of uterine cervical cancer for which she received surgical and radiotherapy treatment. One year later, a second intervention was performed, for occlusive syndrome in the setting of post-irradiation enteritis. While in the ICU, in the 48 hours after surgery, the patient developed dyspnea with orthopnea and anterior thoracic pain. The clinical exam shows tachycardia, LV gallop, pulmonary crackles, systemic congestion and hypotension, despite vasopressor support. Blood tests showed positive troponin levels and a high NT-proBNP. The ECG revealed ST-segment elevation, while the echocardiography showed circumferential apical akinesia and severe LV systolic dysfunction with an ejection fraction of 25%. An emergency angiography was performed, which did not find any coronary lesions. For the next 10 days, the patient's condition improved constantly, with significant improvement of systolic function. As such, the final diagnosis was Takotsubo cardiomyopathy, triggered by the surgical intervention.
Our case had an association of all of the possible trigger factors (neoplasia, anesthesia, major surgery), which perhaps explains the severity of the disease in a patient with no previous cardiovascular disease.

1463
Early onset of coronary artery disease in young survivor after combined treatment of non-Hodgkin lymphoma

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Introduction: the success and continued progress of cancer control strategies have resulted in a rise in the number of long-term cancer survivors. Cardiovascular diseases are increasingly observed as late effects of B-cell Non-Hodgkin lymphoma treatment.
Case report : a thirty five-years-old female without previous cardiovascular risk factors and established diseases was diagnosed with B-cell Non-Hodgkin lymphoma (CD20+, CD3-, CD79a, CD15-, LCA+), II BE stage in March of 2012. After six courses of R-CHOP the radiation therapy was done (total dose 40 Gy). In January of 2013 complete disappearance of all detectable clinical evidence of disease and disease-related symptoms presented before therapy (fever, lymphadenopathy, cough, dyspnea) were observed. Complete remission was confirmed by CT-scan and Immunohistochemistry assay. All clinical exams and CT-scan were repeated every 6 month, no relapse symptoms were identified. Arterial hypertension grade II (transient), obesity class I, dyslipidemia (LDL-cholesterol 3.44 mmol/l) were observed without intake of any medications. In October of 2018 new onset angina (Canadian Cardiovascular Society class I – during intensive aerobic exercises in fitness club) occurred. Two weeks later the patient was hospitalized with acute coronary syndrome (Class III angina). Negative T-wave were registered on ECG in I, avL, V2-V6. Troponin I was 0.02 ng/ml at admission and 0.05 ng/ml after 6 h. Two-vessels disease (critical stenoss of left main disease and proximal left arterial descending artery) were observed on coronary angiography. Stent was placed into left main stem with optimal results of PCI (TIMI III). No angina attack were registered in post-PCI period and during follow up. On echocardiography one month after PCI – pulmonary hypertension grade I, concentric remodeling, ejection fraction >50%, LV global longitudinal strain was -19% (-14% in septal segments). NT-proBNP level was 256 pg/ml.
Conclusion: anthracyclines therapy and exposure of the heart to ionizing radiation during non-Hodgkin lymphoma treatment increases the subsequent rate of ischemic heart disease. Echocardiography and functional stress tests should be recommended at long-term follow up of non-Hodgkin's lymphoma survivors, especially after combined anthracycline and radiation therapy.

1464
AV Block with unconventional cause

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Complete atrioventricular (AV) block can occur due to many structural causes. Common structural etiologies include sclerodegenerative disease of the conduction system, ischemic heart disease and following cardiac surgery. Rare structural causes could be infiltrative myocardial disease and congenital heart disease (1). Herein, we present a case of a 78-year-old male with primary cardiac sarcoma who was admitted to our institution with complete AV block.
A 78-year-old patient without known history of cardiovascular disease was referred to our institution for permanent pacemaker implantation due to complete AV block. The patient reported nonspecific symptoms of fatigue, anorexia, weight loss and progressive dyspnea (NYHA class II) over a period of 2 months. There were no symptoms of dizziness, chest discomfort, or syncope. His electrocardiogram revealed a complete AV block with a junctional escape rhythm (40 bpm). Transthoracic echocardiography revealed normal LV function with a mass located in the right atrium (RA) and protruding into in the right ventricle (RV) through the tricuspid valve. For further differentiation cardiac magnetic resonance (CMR) imaging was performed. CMR showed a mass in the inferior RA and basal RV wall (60 x 40 x 49 mm; Figure 1), involving the atrioventricular node and the posterior leaflet of the tricuspid valve

with inhomogeneous gadolinium enhancement. The patient was transferred to the operation theater. A jelly-like mass was detected, which was diffusely infiltrating the RA and RV wall. A curative resection was impossible and biopsies were performed. Additionally, a permanent epicardial pacemaker was implanted. In the pathological examination, a malignant spindle cell tumour was seen. Moreover, morphological and immunohistochemical findings were compatible with a synovial sarcoma. A metastatic workup revealed one pulmonary metastasis. After an interdisciplinary team discussion, chemotherapy with Olaratumab and Doxorubicin was initiated.
Primary cardiac tumours are extremely rare entities with an incidence of 0.001% to 0.03%. In adults, approximately one-fourth of primary cardiac tumours are malignant with sarcomas representing the most common histology (2). Data from patients with primary cardiac sarcomas show that median survival is approximately 6 months.
In summary, it is always important to investigate the cause of complete AV-Block.

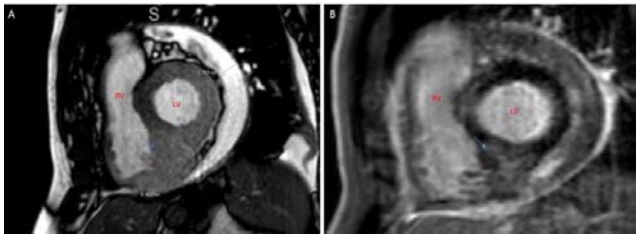

Figure 1

Moderated Poster Session - Basic Science

1465

Serum uric acid levels and xanthine oxidase activity in chronic heart failure patients with chronic kidney disease

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Background. Recent experimental and clinical data suggest that there might be a direct pathophysiological role for increased xanthine oxidase (XO) activity and hyperuricemia in the progression of heart failure (HF).
Purpose. To evaluate the impact of hyperuricemia and XO activation in HF patients with chronic kidney disease (CKD).
Methods. Baseline characteristics were: 112 patients with chronic HF (among them 51 men and 61 women), mean age – 72.5±8.6 years. All patients were divided into 2 groups: within CKD (n=72) and non-CKD (n=40) participants. We used enzymatic colorimetric test, PAP – method with antilipid factor to evaluate serum uric acid (SUA) levels. Asymptomatic hyperuricemia was defined as SUA levels >7.0 mg/dl in men and >6.0 mg/dl in women. XO activity was determined by a coupled enzyme assay, which resulted in a colorimetric (570 nm)/fluorometric (lex= 535/lem=587 nm) product, proportional to the hydrogen peroxide generated. One unit of XO was defined as the amount of enzyme that catalyzed the oxidation of xanthine, yielding 1.0 mmole of uric acid and hydrogen peroxide per minute at 25 °C.
Results. In patients group 62,5% had asymptomatic hyperuricemia. The mean SUA levels for matched patients were (8,47±0,23) mg/dL, in the group without hyperuricemia – (5,38±0,19) mg/dL. SUA correlated negatively with left ventricular ejection fraction (LVEF) (r=-0,3, <0,05). Patients with functional class New York Heart Association (NYHA) III have significantly higher SUA levels compared to patients with NYHA II: (8,5±0,39) mg/dL and (6,88±0,25) mg/dL respectively (<0,01). The kidney function significance in the development of the xanthine metabolism violations proves the revealed inverse correlation between estimated glomerular filtration rate (eGFR) and XO activity (r=-0,7, p<0,05) as well as SUA levels in patients with chronic HF (r=-0,3, p<0.05). Patients with concomitant CKD had higher XO activity levels compared to non-CKD patients: (7,51±0,77) mU/ml vs (4,69±0,77) mU/ml respectively (=0,01). The mean SUA levels were not significantly different: (7,63±0,27) mg/dl vs (7,46±0,39) mg/dl respectively (=0,73). Comparison of mean GFR in patients with and without hyperuricemia revealed significantly lower GFR in patients with asymptomatic hyperuricemia: (59.9±2.95) ml/min/1.73m2 and (76.6±6.05)ml/min/1.73 m2 respectively (p<0.01). Data also showed that patients with eGFR≤60 ml/min/1.73 m2 have significantly higher SUA levels and XO activity compared to those with eGFR>60 ml/min/1.73 m2: (8,21±0,29) mg/dl vs (6,73±0,31) mg/dl (<0,001) and (8,72±0,8) mU/ml vs (4,15±0,56) mU/ml respectively (<0,001).
Conclusion. Uric acid itself rather than up-regulated XO activity in patients with chronic HF is associated with LVEF and the progression of HF functional class. But the presence of concomitant CKD in chronic HF patients can modify the xanthine metabolism towards oxidase pathway.

1466

Epigenetic changes in heart failure cohorts: novel insights into methylation changes of protein and RNA coding genes in human cardiac tissue

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BACKGROUND: Limited knowledge exists of the extent of epigenetic alterations, such as DNA methylation, in Heart Failure (HF). We conducted targeted DNA methylation sequencing to identify DNA methylation alterations in coding and non-coding RNA across different etiological sub-types of HF.
METHODS AND RESULTS: A targeted bisulfite sequence capture sequencing platform was applied to DNA extracted from cardiac interventricular septal tissue of 30 male HF patients encompassing etiologies including Hypertrophic Obstructive Cardiomyopathy (HOCM, n=12), Ischemic Cardiomyopathy (ISCM, n=9), Dilated Cardiomyopathy (DCM, n=9), and 9 control patients with non-failing hearts (NF). We detected 62,678 differentially methylated regions (DMR) in the studied HF cohort. By comparing each HF sub-group to the NF control group we identified 195 unique DMRs: 5 in HOCM, 151 in DCM, and 55 in ISCM. These translated to 4 genes/1 non-coding RNA (ncRNA) in HOCM, 131 genes/17 ncRNA in DCM, and 51 genes/5 ncRNA in ISCM. Subsequent gene/ncRNA expression analysis was assessed using qRT-PCR and revealed 6 genes: 4 hypermethylated (HEY2, MSR1, MYOM3, COX17), 2 hypomethylated (CTGF, MMP2); and 2 microRNA: 1 hypermethylated (miR-24-1), 1 hypomethylated (miR-155) with significantly up- or down-regulated expression levels consistent with the direction of methylation in the particular HF sub-group.
CONCLUSIONS: For the first time DNA methylation alterations and associated gene expression changes were identified in etiologically-variant pathological heart failure tissue. The methylation-sensitive and disease-associated genes/non-coding RNA identified from this study represent a unique cohort of loci that demonstrate a plausible potential as a novel diagnostic and/or therapeutic target in HF and warrant further investigation.

1467

Sodium-glucose co-transporter 2 inhibition with empagliflozin improves cardiac function in non-diabetic rats with heart failure after myocardial infarction

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Purpose: Sodium glucose co-transporter-2 (SGLT-2) inhibition reduces heart failure (HF) hospitalizations in patients with diabetes, irrespective of glycemic control. We examined the effect of SGLT-2 inhibition with Empagliflozin (EMPA) on cardiac function in non-diabetic rats with HF after myocardial infarction (MI).
Methods: Male non-diabetic Sprague-Dawley rats underwent permanent coronary artery ligation to induce MI, or sham surgery. Rats received chow containing EMPA (30 mg/kg/day) or control chow, starting before surgery (EMPA-early) or 2 weeks after surgery (EMPA-late). Cardiac function was assessed using echocardiography and histological and molecular markers of cardiac remodelling and metabolism were assessed in the left ventricle. Renal function was assessed in metabolic cages. The investigation conforms to the Guide for the Care and Use of Laboratory Animals published by the US National Institutes of Health and in accordance with national regulations.
Results: EMPA increased urine production by 2-fold without affecting creatinine clearance and serum electrolytes. EMPA did not influence MI size, but left ventricular ejection fraction was significantly higher in the EMPA-early and EMPA-late treated MI-groups compared to MI-group treated with vehicle (LVEF 54%, 52% and 43% respectively, all $P < 0.05$; Figure 1). EMPA also attenuated cardiomyocyte hypertrophy and reduced interstitial fibrosis. Mitochondrial DNA damage and mitochondrial biogenesis were augmented by EMPA treatment, associated with restoration of the myocardial uptake and oxidation of glucose and fatty acids. EMPA also increased circulating ketone levels and enhanced the myocardial utilization of ketone bodies.
Conclusion: EMPA favourably affects cardiac function and remodelling in non-diabetic rats with HF after MI, associated with substantial improvements

in cardiac metabolism. Importantly, it did so without renal adverse effects. Our data suggest that EMPA might be of benefit in HF patients without diabetes.

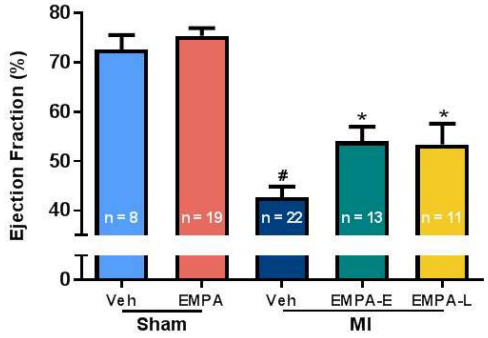

Figure 1. Ejection fraction of the left ventricle. Veh, Vehicle; EMPA, empagliflozin; EMPA-E, EMPA early; EMPA-L, EMPA late. Data are presented as means ± SEM. * $p < 0.05$ vs. MI-Veh; # $p < 0.05$ vs. Sham-Veh.

Figure 1

1468

Rest myocardial perfusion defects are related to increased 99mTc-sestamibi washout and inflammation in CCC

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Funding Acknowledgements: São Paulo Research Foundation (FAPESP)

Background: Physiopathological mechanism of Chronic Chagas cardiomyopathy (CCC) includes myocardial inflammation and perfusion abnormalities resulting in interstitial fibrosis and cardiac dilation. 99mTc-Sestamibi (MIBI) is a myocardial perfusion tracer, whose uptake and retention depends on mitochondrial integrity, a process that can be altered by inflammation. Purpose: We tested the hypothesis that myocardial perfusion defects (MPD) are related to increased MIBI washout that is associated with inflammation in experimental CCC. Methods: Female Syrian hamsters infected with 3.5x104 trypomastigotes forms of T. cruzi Y-strain (n= 12) and their respective controls (n=5) were studied 8 months after infection. Planar scintigraphy imaging was acquired at 30min and 90min after MIBI injection to assess global washout rate followed by SPECT imaging for quantification of MPD extension. The left ventricular ejection fraction (LVEF) was assessed by using 2D-echocardiogram. The animals underwent PET imaging to assess myocardial inflammation. Neonatal rat cardiomyocytes (NRCM) and fibroblasts (NRFB) were isolated and stimulated by increasing concentrations of interferon-γ (5, 10 or 25 ng/mL) or vehicle for 24 or 48 hours. 99mTc-Sestamibi activity was measured at 30min, 90min, and 240min to determine tracer washout. Results: Compared to control infected animals displayed larger MPD at 30min (% of LV, 18.7±8.7 vs 2.4±2.4, p=0.0003), and at 90min (21.3±10.4 vs 3.3±2.7, p=0.001), higher MIBI washout (%, 13.3±7.1 vs 7.3±2.8, p=0.047) and more intense myocardial inflammation (cells/mm2, 555.1±128.7 vs 388.2±106.81, p=0.01). The MPD in infected animals increased from 30min to 90min (p= 0.02). The washout rate correlated positively with MPD area (r=0.55, p=0.03), negatively with LVEF (r=-0.6, p=0.016) and positively with myocardial inflammation (r= 0.75; p=0.0005). There was no correlation between the washout rate and fibrosis extension (p> 0.05). Areas of MPD presented visual topographic correlation with increased 18F-FDG uptake assessing myocardial inflammation. Compared to control, NRCM stimulated with 25ng/ml of IFN-γ over 24h resulted in accelerated MIBI washout (%, 90min: 55±3,5 vs 50,4±2,9, p=0.016; 240min 86,1±1,1 vs 83,6±1,7, p=0.001). Longer pro-inflammatory stimulation resulted in higher MIBI washout compared to matched control NRCM (%, 90min: 62.6±2.8 vs 56±5.6, p=0.013; 240min: 91.3±3 vs 86.6±4.8, p=0.024)band modest NRCM hypertrophy. By contrast, inflammatory cytokines did not affect washout in NRFB. Conclusion: Rest MPD extent is related to increased MIBI washout, and is topographically associated with myocardial inflammation in experimental CCC. In vitro data show that IFN-γ lowers uptake and enhances MIBI washout in isolated cardiomyocytes, reinforcing the correlation between inflammation and altered MIBI kinetic. Delayed MIBI imaging, with assessment of MIBI washout and rest MPD, is a potential tool to detect inflammation in CCC.

1469

Different pathophysiological pathways between ischaemic and non-ischaemic heart failure

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BACKGROUND: Ischaemic heart failure (HF) and non-ischaemic cardiomyopathy are largely treated the same, despite important potential underlying differences in pathophysiology. However, the mechanisms underlying these different aetiologies of HF remain unclear.OBJECTIVES The purpose of this study was to establish biological pathways specifically related to ischaemic HF relative to non-ischaemic cardiomyopathy.
METHODS: A network analysis was performed to identify biological pathways up/down-regulated in ischaemic HF versus non-ischaemic cardiomyopathy using 92 biomarkers from different pathophysiological domains in a cohort of 1,160 HF patients. Patients with ischaemic HF were defined as those having HF with a history of documented myocardial infarction. Non-ischaemic cardiomyopathy patients were those with primary cardiomyopathy in the absence of documented coronary artery disease. Results were externally validated in an independent cohort of 867 patients with ischaemic HF and non-ischaemic cardiomyopathy according to the same definitions. Networks were built using the relative difference in expression profiles of the 92 biomarkers from the Olink platform. Networks were enriched using existing knowledge of protein-protein interactions and categorised into biological pathways up-regulated in ischaemic HF versus non-ischaemic cardiomyopathy.
RESULTS: In the index cohort 715 (62%) patients had ischaemic HF and 445 (38%) patients had non-ischaemic cardiomyopathy. The median age of the 715 ischaemic HF patients was 71 years with 82% being male. The non-ischaemic cardiomyopathy patients were younger, with a median age of 64 years and 73% were males. In the index cohort, 23 protein-biomarkers were differentially expressed and statistically significant between the two groups. When adjusted for age and sex 3 biomarkers remained statistically significant. Of these, Galectin-4 and Growth-Differentiation Factor-15 were up-regulated while Paraoxonase-3 was down-regulated in ischaemic HF relative to non-ischaemic cardiomyopathy. The former two are implicated in inflammation while paraoxonase-3 is linked to the inhibition of both LDL oxidation and monocyte activation. Validation of protein-protein interactions led to the identification of several biological pathways that were up-regulated in ischaemic HF. These pathways were related to bone resorption, proteins involved in invasion and metastasis of cancer, neuroinflammatory responses, regulation of superoxide free radicals and dissolution of fibrin clots.
CONCLUSIONS: Ischaemic HF exhibits different expression levels of several biomarkers when compared to those with non-ischaemic cardiomyopathy. These ischaemic HF proteins appear to be involved in inflammatory processes and atherosclerosis. Further analysis using transcriptomics may help to consolidate the place of these proteins in the context of their biological pathway, and therefore facilitate further interpretation of their role in ischaemic HF.

1470

Generation and phenotyping of a novel knock-in mouse model of arrhythmogenic cardiomyopathy

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Rationale and purpose: Arrhythmogenic Cardiomyopathy (AC) is a cardiac disease, mainly caused by mutations in genes encoding desmosomal proteins, accounting for most cases of sudden death in the young and athletes. AC hearts display cardiomyocyte (CM) death and fibro-fatty tissue replacement, which lead to contractile dysfunction and generate the substrate for arrhythmias, triggered by physical stresses. The AC pathogenesis is unknown and no therapies are available. Up to now, most AC models express disease-causing mutations selectively in CM and, likely because they do not replicate the human genetics, they fail to faithfully reproduce the disease phenotype. Considering that all cell types forming the myocardial network express desmosomal proteins, knock-in (KI) mice represent the preclinical model most appropriate for AC studies. We thus aimed to generate a KI mouse model, harbouring the point mutation Serine (S) 311 Arginine (R) in Desmoplakin (DSP), which corresponds in the mouse to the mutation identified in a large part of the Italian AC population.

Methods and Results. Crispr-Cas9 was used to precisely edit the DSP gene. The first step was to design the targeting guide which was built around the target locus. Secondly, the expression plasmid for the guide and Cas9 was constructed, transfected into 3T3 cells, which were screened and the positive clones singularly isolated, let grow and selected by sequencing. Once confirmed that the guide worked as expected, we created the exogenous donor in the form of dsDNA targeting constructs, with homology arms flanking the mutation. The following step was to use the Crispr-Cas9 system to generate the mouse. To this purpose, one-cell-staged embryos were microinjected with Crispr components and transferred into a pseudo-pregnant mouse. At the time being, five heterozygous DSP S311R/WT mice have been obtained.
Conclusions and Perspectives. We successfully generated the founders of a novel AC DSP S311R/WT KI mouse strain, which will be characterized, structurally by gross histology, immunofluorescence and electron microscopy, and functionally by echocardiography and telemetry-based ECG analyses.

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Inhibition of complement-coagulation system cross talk attenuates cardiac tissue injury in an ARVC animal model

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Inflammatory processes may influence arrhythmogenic right ventricular cardiomyopathy (ARVC) onset, progression or flares in disease activity associated with periods of increased arrhythmia. We have previously found that inhibition of complement receptor C5aR ameliorates disease severity in the desmin null (Des-/-) ARVC animal model. In the present study, we investigated the role of initial steps of complement cascade activation in ARVC disease progression. By generating C3 and desmin double knock out animals (C3-/-Des-/-), a more severe cardiac pathology was unexpectedly found. An 18% increase in cardiac tissue injury was observed in 4 month-old C3-/-Des-/- mice compared to Des-/-; and the survival rate at the end of 12 months period was reduced in C3-/-Des-/- mice (83.8%) compared to wildtype (98.2%). Although in the conventional way of C5 activation no C5 cleavage is expected to occur, as activated C3 is part of the C5 convertase, we observed intense C5 staining by immunocytochemistry in the myocardium of C3-/-Des-/- mice, in areas of coagulative necrosis and dystrophic calcification. In addition, increased levels of the C5a anaphylatoxin were found in the serum of C3-/-Des-/- mice compared to wildtype, indicating C5 activation independently of conventional convertase, presumably via the coagulation system. Increased staining for fibrinogen and von Willebrand factor was observed by immunofluorescence in the myocardium of C3-/-Des-/- and Des-/- animals when compared to wildtype, in the same areas where C5 deposition was also observed. Moreover, inhibition of the coagulation system activation by treatment with lepirudin, (a specific thrombin inhibitor) resulted in a 25.5% reduction in cardiac tissue injury compared to vehicle-treated Des-/- animals. C5 deposition was also reduced indicating a causative role of coagulation cascade activation in complement activation.
In conclusion, our data indicate an interplay of coagulation and complement systems in the myocardium of the Des-/- ARVC model, which could exacerbate the observed pathology.

1472
Pharmacological inhibition of GRK2 in experimental heart failure

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Introduction: G protein-coupled receptor kinase 2 (GRK2) levels are upregulated in failing cardiomyocytes and contribute to desensitization and downregulation of the β adrenergic receptor (βAR), impaired adrenergic response, cardiac insulin resistance and reduced metabolic plasticity. Several therapeutic options for targeting GRK2 in HF have been developed, but none have reached the clinical scenario so far. We here propose a recently synthesized cyclic peptide, C7, that has been showed to inhibit potently and selectively GRK2 activity in vitro. Purpose: Evaluate the pharmacological effects of C7 in an animal model of HF. Methods: Isolated adult ventricle myocytes (AMVM) from 12 weeks old C57BL/6J (WT) and MHCcre/GRK2fl/fl mice, carrying selective deletion of GRK2 in heart, were challenged with C7 (1μM) to verify specific GRK2 inhibition. Intraperitoneal (i.p.) injection of C7 was performed in WT mice to evaluate its effects on cardiac functions. Post-MI HF mice were then treated for 4 weeks with either C7 (2 mg/Kg/day) or vehicle by miniosmotic pumps and effects on both geometry, function and hemodynamic were assessed by echocardiography and cardiac catheterization. Results: C7 induces cardiac cell contractility and significant increase of FS% in AMVM from WT but not MHCcre/GRK2fl/fl mice. Stimulation with isoprenaline (ISO) was performed as a control and it increases FS% in AMVMs from both WT and transgenic mice, which is significantly higher in MHCcre/GRK2 fl/fl. In mice, C7 acutely produces a significant and rapid increase in heart rate at 10 min post i.p. injection, accompanied by a reduction of left ventricle diastolic diameter, increase in ejection fraction and systemic blood pressure. These effects disappear within 90 min. C7–treated but not vehicle treated Post-MI HF mice show a significant reduction of left ventricle diameter, improvement of ejection fraction and amelioration of +dP/dT both at baseline and after stimulation with ISO. Finally, C7 improves substrates utilization and recovers ATP production as compared to vehicle in post-MI HF. Conclusions: Collectively, these results demonstrate that 1) GRK2 is confirmed a key molecule in the physiological regulation of cardiac function 2) C7 is able to increase cardiac cell contractility through specific inhibition of GRK2 2) GRK2 inhibition with C7 represents as a novel pharmacological approach to promote cardiac reverse remodeling, metabolic and functional recovery in an animal model of HF.

Rapid Fire 6 - Risk stratification and prognosis

1474

Machine learning based risk stratification of patients undergoing cardiac resynchronization therapy

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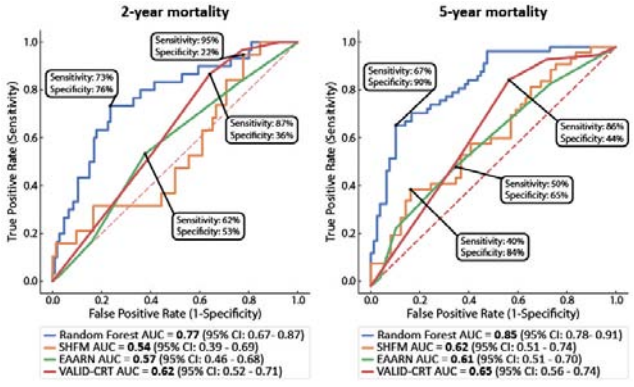
Background: Cardiac Resynchronization Therapy (CRT) is a cornerstone in the management of patients with advanced heart failure, reduced ejection fraction and wide QRS complex. Despite its well-known beneficial effects, mortality rates still remain high in this patient population. Therefore, accurate risk stratification of these patients would be essential, however, the currently available risk scores have several shortcomings which limit their utilization in the everyday clinical practice.
Purpose: Accordingly, our aim was to design and validate a machine learning based risk stratification system to predict 2-year and 5-year mortality from pre-implant parameters of patients undergoing CRT implantation.
Methods: We trained two models separately to predict 2-year (model 1) and 5-year mortality (model 2). As training cohort of model 1 we used 2098 patients (67±10 years, 1574 [75%] males, 1026 [49%] CRT-P, 1072 [51%] CRT-D) undergoing CRT implantation. Out of this population 1650 patients (66±10 years, 1258 [76%] males, 899 [54%] CRT-P, 751 [46%] CRT-D) also had 5-year follow-up data available and they served as the training cohort for model 2. At the time of implantation, demographics, cardiovascular risk factors, medication and laboratory test results were assessed. Forty-seven pre-implant parameters were used to train the models. Our models were designed in a way to tolerate missing values. Among non-linear classifiers, random forest (number of trees: 200) demonstrated the best performance. We validated our models, along with the Seattle Heart Failure Model (SHFM), VALID-CRT risk score and EAARN score on an independent cohort of 136 patients (66±10 years, 110 [81%] males, 114 [84%] CRT-P, 22 [16%] CRT-D).



ROC curves of the prediction models

Results: There were 458 (22%) deaths in the 2-year, 879 (53%) deaths in the 5-year training cohort. In the validation cohort, there were 30 (22%) deaths at 2 years and 58 (43%) deaths at 5 years after CRT implantation. For the prediction of 2-year mortality, the Area Under the Receiver-Operating Characteristic Curve (AUC) for model 1 was 0.77 (95% Confidence Interval [CI]: 0.67-0.87; p=0.002), for SHFM was 0.54 (95% CI: 0.39-0.69; p=0.006), for EAARN was 0.57 (95% CI: 0.46-0.68, p=0.002), and for VALID-CRT was 0.62 (95% CI: 0.52-0.71; p=0.002). To predict 5-year mortality the AUC for model 2 was 0.85 (95% CI: 0.78-0.91; p=0.001), for SHFM was 0.62 (95% CI: 0.51-0.74; p=0.003), for EAARN was 0.61 (95% CI: 0.51-0.70, p=0.002), for VALID-CRT was 0.65 (95% CI: 0.56-0.74; p=0.002). The AUCs of the machine learning based models were significantly higher than the AUCs of the pre-existing scores (DeLong test, all p<0.05).

Conclusion: Our results indicate that machine learning algorithms can outperform the already existing linear model based scores. By capturing the non-linear association of predictors, the utilization of these state-of-the-art approaches may facilitate optimal candidate selection and prognostication of patients undergoing CRT implantation.

1475

Prognostic impact of ICD interventions in a real-world primary and secondary prevention population

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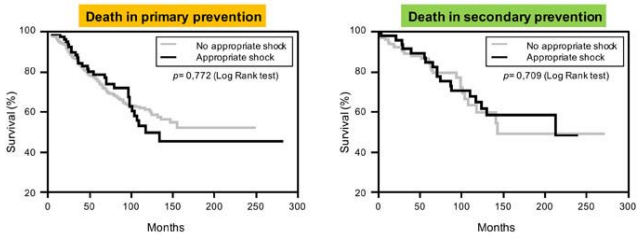
Introduction and study aims: Implantable cardioverter-defibrillator (ICD) are recommended in primary (P1) and secondary (P2) prevention of sudden cardiac death (SCD). Recommendations in P1 patients rely primarily on reduced LVEF (i.e. ≤35%) and advanced NYHA functional class (i.e. II or III). The progressive reduction in SCD observed in the last 20 years and the non-superiority of ICD vs. optimal medical treatment in reducing overall mortality in a recent P1 trial have questioned these indications. Few surveys have analyzed the prognostic impact of ICD interventions in unselected real-world ICD recipients. The aim of this retrospective analysis was to compare the characteristics and mortality of P1 and P2 ICD recipients, and to investigate the association between appropriate ICD interventions and overall mortality.
Material and Methods: The study population was drawn from the ICD registry of a tertiary hospital. Patients with hypertrophic cardiomyopathy were excluded. The selected 611 patients underwent ICD implantation for P1 (=444, 72.7%) or P2 (=167, 27.3%) of SCD between January 2004 and February 2018. T test and $\chi 2$ test were performed for comparisons as appropriate. Cox analysis was performed to predict mortality, and Kaplan-Meier curves were plotted.



Figure

Results: The study population had a mean age of 66±10 years and a mean LVEF of 29±8%. P1 vs. P2 patients were significantly younger (65±10 vs. 69±10 years), with a lower LVEF (27±6 vs. 34±11%) and a longer follow-up (59±44 vs. 39±38 months, p<0.001 for all). 1-year appropriate shock rate was 3.32% in P1 and 6.06% in P2 group, whereas cumulative shock rate at a mean follow-up of about 4 years was 15.1% and 16.2%, respectively (both p=NS). 1-year death rate was 6.18% in P1 and 6.25% in P2 (p=NS), whereas overall mortality at final follow-up was 30.6% and 20.4%, respectively (p=0.01). Nonetheless, Kaplan-Meier curves did not show a statistically significant difference in mortality between P1 and P2 patients. In addition, Kaplan-Meier curves did not demonstrate a difference in mortality between patients who did or did not receive an appropriate shock during follow-up, both in P1 and P2 (Figure). In the overall cohort, older age and lower LVEF at ICD implantation were associated with increased mortality (HR 1.04; 95%CI 1.02-1.06; and HR 0.94; 95%CI 0.91-0.96; p<0.001 for both, respectively). These associations persisted in P1 patients (HR 1.04; 95%CI 1.02-1.06; p=0.002 and HR 0.95; 95%CI 0.91-0.98; p=0.003), but in P2 patients only lower LVEF remained associated with increased mortality (HR 0.92; 95%CI 0.87-0.96; p=0.001).

Conclusions: Appropriate ICD interventions were not independently associated with mortality in our cohort, both in P1 and P2 patients. Age and LVEF remain the primary determinants of mortality in these patients. These findings further support the need for more specific criteria in the selection of candidates to ICD implantation, especially in the setting of primary prevention.

1476

Predicting arrhythmic risk in dilated cardiomyopathy: a meta-analysis of clinical parameter

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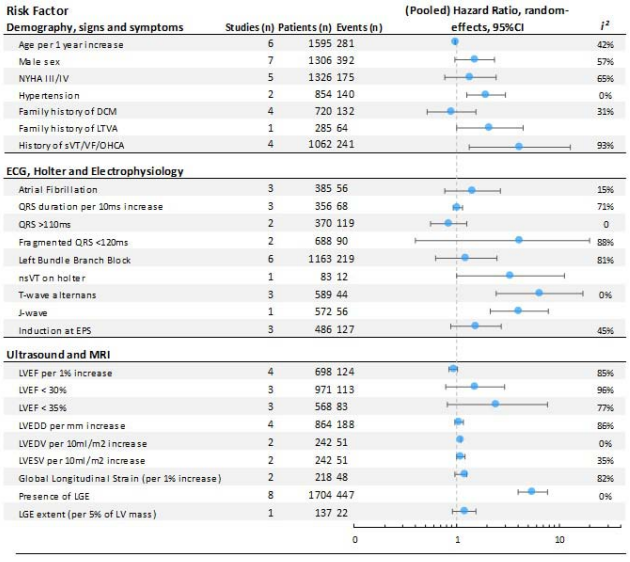
Background: Patients with non-ischemic dilated cardiomyopathy (NIDCM) are at increased risk of ventricular arrhythmias and sudden cardiac death (SCD). However, identifying patients at high risk for life-threatening ventricular arrhythmia (LTVA) who may benefit from an implantable cardioverter defibrillator (ICD) remains challenging.
Methods: We searched MEDLINE and EMBASE for prognostic studies describing predictors of LTVA (defined as sustained ventricular tachycardia (VT), haemodynamically unstable VT, ventricular fibrillation, (aborted) SCD or appropriate ICD intervention) in patients with NIDCM. We excluded articles with composite heart failure and arrhythmic endpoints but lacking (subgroup) analysis for LTVA. Study quality and risk of bias was assessed using the QUIPS-tool, and articles with high risk of bias in ≥2 areas were excluded from analysis. Univariable hazard ratios of reported predictors were pooled from the remaining studies in a meta-analysis using a random-effects model and presented with 95% confidence interval (CI).
Results: Out of 1402 unique citations, 28 studies were included comprising 5927 patients (mean age 55±4.1 years, 72% male) with a mean follow-up of 3.7±1.9 years. Crude event rate was 4.3% (95%CI 4.02-4.57) per year. Hypertension (HR 1.95;CI[1.26-3.00]), history of out of hospital cardiac arrest or sustained VT (HR 4.15;CI[1.32-13.02]), T-wave alternans (HR 6.50;CI[2.46-17.14]), LVEDV per 10ml/m2 increase (HR 1.10;CI[1.10-1.10]), LVESV per 10ml/m2 increase (HR 1.10;CI[1.00-1.22]) and delayed gadolinium enhancement (HR 5.55;CI[4.02-7.67]) were significantly associated with LTVA (figure). The quality of evidence was moderate and there was significant heterogeneity (median i2 57%;IQR 76%) among studies.
Conclusion: The risk of LTVA in NIDCM is 4.3% per year and is considerably higher in patients with hypertension, history of LTVA, high LVEDV, high LVESV, T-wave alternans, and delayed gadolinium enhancement. These results may help determine appropriate candidates for ICD implantation. The high heterogeneity in reported results indicate the need for future multicentre studies to further improve risk stratification in NIDCM.



Summary of meta-analysis results

1477

Serial change of Layer-specific myocardial functionby Chemotherapy in Breast cancer patients

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Background As increasing prevalence of breast cancer and advance of treatment, chemotherapy induced cardiotoxicity (CIC) has emerged as one of major problem in breast cancer patient. Myocardium is composed with three layers of endocardial, mid myocardial and epicardial layer and recent advancements in echocardiography provide the capability to estimate function of each myocardial layer. It is not known which layers are vulnerable or more impaired by chemotherapy. The aim of this study was to evaluate layer-specific functional change in patients with CIC in breast cancer patients.
Methods Consecutive 45 patients with breast cancer (mean age=54.6±8.9 years) who undergone chemotherapy were included. Baseline echocardiography was performed within 1 day before chemotherapy and was followed up 3 and 6 month after start of chemotherapy. The function of myocardial layer was assessed by global longitudinal strain of endocardium (GLSendo), mid-myocardium (GLSmid) and epicardium (GLSepi). The definition of CIC was a decrease of LVEF by 5% or ≤55% in the presence of symptoms of heart failure or an asymptomatic decrease in LVEF by 10% or ≤55% at 3 month follow up (FU)
Results During 6 month FU, CIC occurred in 8 patients (18% of total patients). The prevalence of hypertension, diabetes, dyslipidemia, obesity and administrated chemo agents were not different between patient with and without CIC
The baseline LVEF, GLSendo, GLSmid and GLSepi were not different between patients with and without CIC. At 3 month FU, LVEF was significantly decreased and GLS of each layer were significantly decreased in patients with CIC. And these trends persisted at 6 month FU. In patients without CIC, GLSs of each layer were also decreased at 3 month FU and that persisted at 6month FU, although LVEF was not significantly decreased. The amount of decrement was larger in patients with CIC (figure 1). On the analysis of gradient of GLS from epicardium to endocardium, the decrement of strain gradient was larger in patients with CIC than in patients without CIC (figure 2).
Conclusion: In patients with CIC, myocardial function was decreased at 3 month FU and it persisted at 6 month FU. The decrement of endocardial function was greater than that of other layers. In addition, even in patients without CIC, LV function assessed by strain was also decreased by chemotherapy. Therefore, the close monitoring of LV function is needed to all patients with chemotherapy and endocardial layer might be most vulnerable to the chemotherapy in early period.

Figure 1. The comparison of changes of LVEF and GLSs of each layer between patients with and without CIC

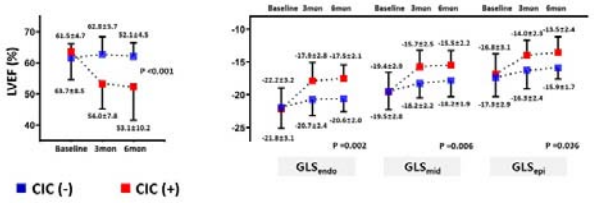
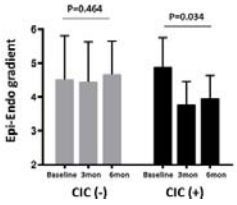


Figure 2. The comparison of changes of global longitudinal strain from epicardium to endocardium in patients with and without chemotherapy induced cardiotoxicity



1478

Forecast of mOrtality Risk Early in the postCardiac Arrest Syndrome Therapy: pilot score for estimate early mortality in post cardiac arrest syndrome patient population

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Intruduction: Sudden cardiac death (SCD) is one of the most significant cardiovascular causes of death. In the treatment of SCD – following a successful cardiopulmonary resuscitation (CPR) and return of spontaneous circulation (ROSC) - patients often require complex intensive care. Currently there are only a few validated risk-stratification score systems given to quickly and reliably estimate the

mortality risk of these patients at the time of admission to the intensive care unit (ICU).
Aim: In addition to cardiovascular risk factors that indicate instability, we also investigated factors, that potentially worsen the outcome of CPR, and examined them as predictors of mortality.
Methods: Medical records of 260 consecutive resuscitated patients, that received treatment between 2008-2014 at the Heart and Vascular Center of our University, were screened retrospectively. We were only able to include patients who's documentation contained all the data regarding the parameters in the FORECAST score at our disposal: initial rhythm, presence of an eyewitness at the event of SCD, time factors of CPR (time elapsed between SCD and administration of advanced life support (ALS) - TSCD-ALS, SCD and ROSC - TSDC-ROSC), catecholamine given pre- and in-hospital [first six hours in the ICU], age, any form of coronary disease (acute coronary syndrome [ACS]/ coronary artery bypass graft [CABG]/ myocardial infarction [MI]), left ventricular ejection fraction (LVEF), serum lactate levels and eGFR (estimated glomerular filtration rate). Due to missing data, 140 patients met our criteria and were included in the FORECAST study. The maximal FORECAST point that one could receive was 15, but due to the lower number of patients in certain groups we contracted the mortality data of groups that received 1-3, 4-6, 7-9 and 10+.
Results: The main characteristics of the examined population are as follows: 66%/34% shockable/ non-shockable rhythm, in 91% of cases there were eye-witnesses, TSCD-ALS=5,5±4,3min, TSDC-ROSC=19,4±19,6min, in 49% of cases patients were given prehospital adrenalin, 66,3±12,3 years, 1%/23% CABG/MI in the past, 81% of the cases ACS was responsible for the SCDs, 39,5±13,8% LVEF, 5,4±4,2mmol/L serum lactate, 53,3±17,2 ml/min eGFR. Number of patients by groups were: 26 (1-3), 40 (4-6), 61 (7-9) and 10 (10+). The 30-day mortality in group "1-3" turned out to be 4% (n=1), in group "4-6" 28% (n=11), in group "7-9" 59% (n=36) and in group "10+" 62% (n=8). The 180-day mortality was 4% (n=1), 35% (n=14), 70% (n=43) and 77% (n=10) by groups. The 360-day mortality was 8% (n=2), 38% (n=15), 72% (n=44) and 85% (n=11). Conclusion: The FORECAST pilot score shows increasing and distinct mortality tendencies in all four groups in the early and late CPR outcomes.

1479
Early heart remodeling in type 1 diabetes patients: possible phenotypes

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Background: Both epidemiologic and clinical studies confirm the close link between type 1 diabetes (T1DM) and cardiovascular disorders. Pathophysiology of this association is poorly understood, but changes appear to be caused by several factors, and occur even in the early stages of the disease. The degree of involvement of each of these factors in combination with individual patient features may lead to different types of heart remodeling. But the data concerning early heart remodeling in patients (pts) with T1DM is scarce.
We aimed to characterize early heart remodeling in T1DM pts without known cardiovascular disorders.
Methods: This cross-sectional study compared 90 T1DM pts (mean age of 29±8 years) without known heart disease with 20 healthy control subjects (mean age 28±8 years). All study participants underwent conventional and speckle tracking Echo (VIVID 7, GE). Subclinical systolic dysfunction is defined as global longitudinal strain (GLS)<20%. To assess ventricular-arterial coupling (VAC) arterial elastance (Ea), ventricular elastance (Ees) and the Ea/Ees ratio were calculated. Geometry of left ventricle (LV) remodeling was assessed using LV myocardial mass index (LVMI) and relative wall thickness (RWT). Normal values for RWT were <0.42 and for LVMI ≤ 95 g/m2 for women and ≤ 115 g/m2 for men. The level of NTproBNP (excluding pts with HF), glomerular filtration rate and albumin to creatinine ratio were measured for each patient.
Results: Compared to healthy subjects, pts with T1DM had significantly lower GLS (22±2 vs 18±5% p=0.001). Moreover, 95.6% of pts with diabetes had signs of early heart remodeling. Systolic dysfunction (GLS<20%) occurs in 67.7% of diabetes pts and dominates over diastolic, which occurs in 12.2% of them. The values of albumin to creatinine ratio > 14.5 mg/g (odds ratio (OR) 8.2; 95% confidence interval (CI) 1.3-13.2; p<0.05) and HbA1c≥9,6% (OR 3.6; 95% CI 1.2-10.9; p<0.05) were established as predictors of early systolic dysfunction (GLS<20%). Based on structural and functional characteristics of the LV, we distinguish 3 phenotypes of heart remodeling. The first – isolated systolic dysfunction (GLS<20%) – was observed in 33.3% pts, the second – structural remodeling (LV concentric remodeling) with preserved systolic function (GLS≥20%) and VAC imbalance (Ea/Ees <0.5) – in 29% of pts and the third – both structural (concentric remodeling) and systolic function alterations (GLS<20%) with VAC imbalance (Ea/Ees<0.5) – in 33.3% of the pts.
Conclusion: The vast majority of young pts with T1DM had structural or/and functional remodeling of the heart with the predominance of longitudinal systolic dysfunction over diastolic. Depending on the degree and type of these alterations, there are 3 distinct phenotypes of heart remodeling in this group of pts. Deep understanding of these phenotypes might be a key to personalized prevention of cardiac complications in T1DM pts.

1480
Specific pattern of cardiopulmonary exercise testing in patients with right heart failure

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Introduction ardiopulmonary exercise testing (CPET) is used to examine pts with right heart failure (RHF) mainly to assess the severity and prognosis. But it's role in RHF of different etiology is not yet completely defined.
Purpose
The purpose of the study was to detect the value of CPET in assessing the RHF etiology and prognosis.
Methods 84 pts with proven RHF I-III functional classes (fc) were examined: idiopathic pulmonary arterial hypertension (IPAH) – 60.7%, chronic thromboembolic pulmonary hypertension (CTEPH) – 39.3%. All pts underwent the right heart catheterization (RHC) and CPET with an assessment of peak oxygen uptake (VO2 peak), arterial oxygen saturation (SpO2), breathing reserve (BR), anaerobic threshold (VO2at AT), oxygen pulse (VO2/HR), oxygen delivery per power (dVO2/dW) , ventilation equivalent CO2 (VE/VCO2), end-tidal arterial carbon dioxide pressure (PET CO2). NT-proBNP level was assessed in all pts.
Results
VO2 peak, BR, VO2at AT were lower in pts with IPAH compared in pts with CTEPH (only II fc; p<0.05). Parameters of CPET related with traditional prognosis markers: high RA pressure and low cardiac index. Increased RA pressure was associated with higher PET CO2 (AUC= 0.661, p<0.05) and VE/VCO2(AUC= 0.351, p<0.05). Decreased cardiac index (<2.5 l/m2) was connected with increased VO2/ HR (AUC= 0.340, p<0.05) and decreased VO2AT (AUC= 0.358, p<0.05) Pts with NT-proBNP level>1400 pg/ml showed decreased VO2 peak (F=15.3; p<0.001), increased VO2/ HR (F=12.5; p<0.001), decreased dVO2/dW(F=20.5; p<0.001), VE/VCO2 (F=12.5; p<0.001) and decreased VO2AT (F=14.3; p<0.001).
Conclusions Specific patterns of CPET were reveled only in II fc pts with IPAH and CTEPH. Perspectively CPET could be used as non invasive method for risk assessment during follow-up.

Table 1

Parameters	IPAHn=51	CTEPHn=33	p-value
Age,yrs	38.8±1.8	50.1±1.7	p>0.05
Female, (%)	69.1	39.4	p<0.05
MeanPAP, mmHg	52.04±1.9	53.64±2.2	p>0.05
RApressure, mmHg	6.22±0.72	11.76±1.3	p>0.05
Cardiacindex, l/min/m2	2.09±0.91	1.9±0.62	p>0.05
PVR, dyn·s·cm−5	976.35±60.5	919.39±62.8	p>0.05
NT-proBNP,ng/ml	1648.00±250.1	2227.64±501.3	p<0.05
VO_2peak, ml\min	1012.2±43.1	1189.3±84.8	p<0.05
VE/VCO_2	50.5±1.9	54.6±2.7	p>0.05

1481
Extent of late gadolinium enhancement was associated with re-worsening left ventricular ejection fraction in patients with non-ischemic dilated cardiomyopathy

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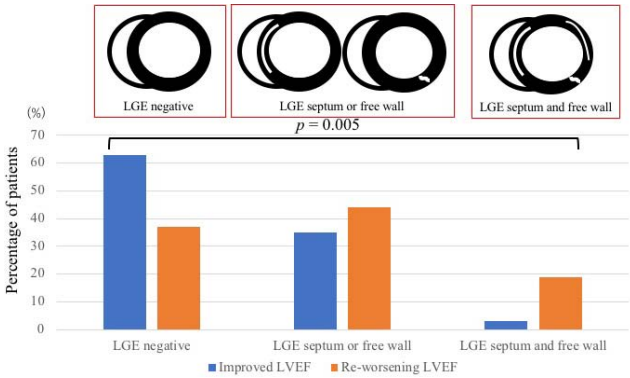
Background: Re-worsening left ventricular ejection fraction (LVEF) after initial recovery is associated with cardiovascular events in patients with non-ischemic dilated cardiomyopathy (DCM). However, relationship between myocardial damage and re-worsening LVEF is unclear.
Purpose: To investigate relationship between late gadolinium enhancement (LGE) on cardiac magnetic resonance (CMR) and re-worsening LVEF in patients with DCM.
Methods: We included patients with recent onset DCM who had an LVEF 45% at diagnosis and LVEF 45% after medical therapy during 2007 to 2014. Patients divided

into two groups, Improved: defined as sustained recovery of LVEF 45% from initial improvement to final follow-up, Re-worsening: defined as LVEF 45% after initial improvement. LGE-CMR was performed in all patients at diagnosis. The extent of LGE defined as the location of LGE: only located at septum or free wall and located both septum and free wall (Figure). Cardiac events defined as hospitalization due to worsening heart failure, sustained ventricular arrhythmias, and sudden death.

Results: In the final cohort, 105 patients were included in this study. During 6.7 ± 2.7 year after diagnosis, Re-worsening LVEF was occurred in 27 (26%) patients. Median duration from initial improvement LVEF to Re-worsening LVEF was 3.7 ± 2.1 years. LVEF at diagnosis (31.4± 8.2% vs 30.6 ± 7.7%, p = 0.808) were not significantly different between the two groups. LVEF in the Re-worsening group was significantly lower than those in the Improvement group at initial improvement (52.8 ± 7.3% vs 56.7 ± 7.3%, p = 0.020) and final follow-up (40.2 ± 8.4% vs 60.0 ± 8.3%, p < 0.001). The type of medication regimen including beta-blockers was not significantly different among the two groups at baseline and initial improvement. The percentage of patients with LGE was higher in the Re-worsening group than those in the Improved group (17/27:63% vs 29/78:37%, p = 0.020). Particularly, the percentage of patients with LGE located both septum and free wall were significantly higher in the Re-worsening group than those in the Improved group (p = 0.005, Figure). Age and gender adjusted multivariate logistic analysis demonstrated that LGE located both septum and free wall was independently associated with re-worsening LVEF (odds ratio: 11.1, 95% confidence interval 1.82-67.38, p = 0.009). Cardiac events occurred in 15 patients during follow-up. Cardiovascular event rate in the Re-worsening group was higher compared with the Improved group (9/27:33% vs 6/72:8%, p = 0.001).

Conclusion: Re-worsening LVEF occurred in 27 patients after initial recovery. The extent of LGE was independently associated with Re-worsening LVEF.



Figure

1482

Differences in circulating cardiac biomarkers between immunoglobulin light-chain and transthyretin cardiac amyloidosis

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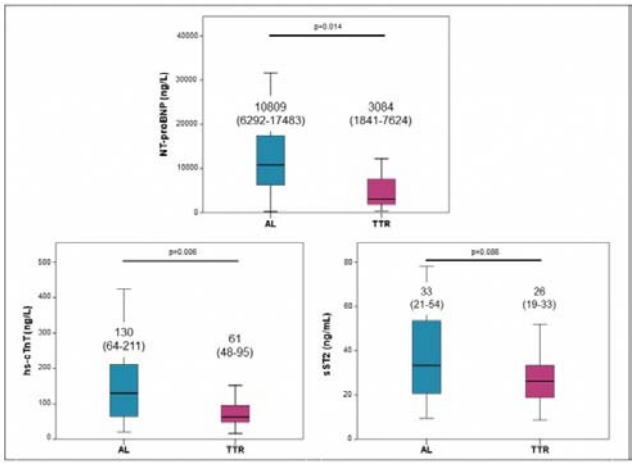
Background: Cardiac amyloidosis is caused by progressive accumulation of a misfolded protein, mostly represented by immunoglobulin light chains (AL) or transthyretin (TTR). AL amyloidosis is characterized by a much more rapid progression and worse outcome, possibly due to a greater cytotoxic effect of AL fibrils. This mechanism may impact on circulating levels of biomarkers reflecting myocardial damage (natriuretic peptides and cardiac troponins), or inflammation and tissue remodeling (soluble suppression of tumorigenicity-2, sST2). This point has never been evaluated so far.

Purpose: We aimed to assess circulating levels of N-terminal fragment of proBNP (NT-proBNP), high-sensitivity cardiac troponin T (hs-cTnT), and sST2 in a cohort of patients with established diagnosis of cardiac AL or TTR amyloidosis.

Methods: 86 patients with cardiac AL (n=25, 29%) or TTR amyloidosis (n=61, 71%) underwent an echocardiographic and biohumoral characterization, including NT-proBNP, hs-cTnT and sST2 assays.

Results: Patients with AL amyloidosis were younger (70±9 vs. 80±7 years) and showed a lower left ventricular mass (302±83 vs. 349±88 g, p=0.028) and septal thickness (17±3 vs. 18±3 mm, p=0.029) compared to TTR, conversely there was no difference in terms of glomerular filtration rate between the two groups (59±34 vs. 56±23 mL/min/1.73 m2, p=0.622). Circulating levels of NT-proBNP (10,809 [interquartile interval 6,292-17,483] vs. 3,084 [1,841-7,624] ng/L, p=0.014) and hs-cTnT (30 [IQR 64-211] vs. 61 [48-95] ng/L, p=0.006) were higher in AL amyloidosis, while sST2 was not significantly higher in AL compared to TTR amyloidosis (33 [21-54] vs. 26 [19-33] ng/mL, p=0.086) (Figure). Prominent differences were found when biomarker levels were normalized for left ventricular mass: NT-proBNP 33.891 [20.409-53.803] vs. 9.966 [5.826-23.465] ng/L/g, p=0.002; hs-cTnT 0.476 ng/L/g [0.248-0.707] vs. 0.186 [0.141-0.258], p=0.001; sST2 0.102 [0.066-0.142] vs. 0.073 [0.057-0.106] ng/mL/g, p=0.029.

Conclusions: Despite a lower degree of pseudohypertrophy, circulating levels of cardiac biomarkers are higher in AL than TTR amyloidosis, especially when normalizing for cardiac mass. This may reflect a greater toxic effects of AL fibrils on the myocardium.



Figure

1483

Early identification and prognosis of tachy-induced cardiomyopathy

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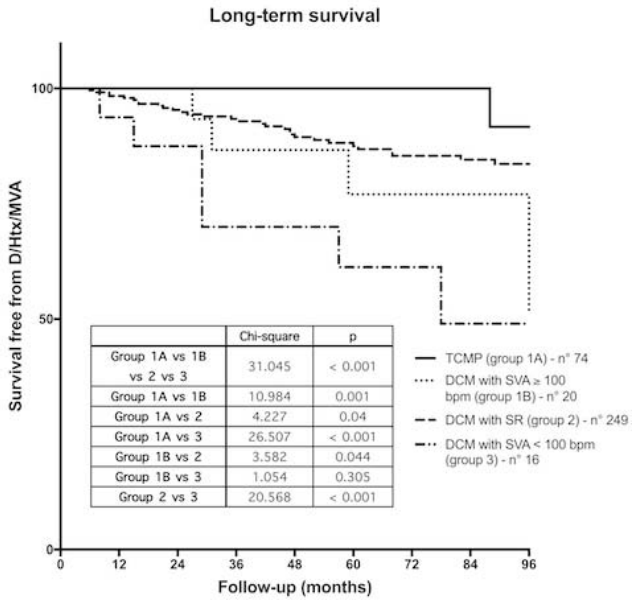
Background/Introduction: Diagnostic tools for early discrimination between tachyarrhythmia-induced cardiomyopathies (TCMP) and dilated cardiomyopathies



Kaplan-Meier curves: long-term survival

(DCM) and long-term prognosis of TCMP remain controversial. Aims were to assess baseline markers which may identify TCMP among a cohort of patients presenting with high-rate supraventricular arrhythmias (SVA) and reduced LVEF, and to compare the outcomes between TCMP and DCM.
Purpose: To assess baseline markers which may identify TCMP among a cohort of patients presenting with high-rate supraventricular arrhythmias (SVA) and reduced LVEF, and to compare the outcomes between TCMP and DCM.
Methods: 339 patients with non-ischemic LVEF<50% were enrolled and divided according to baseline rhythm and heart rate: group 1 (74 patients), SVA≥100 bpm; group 2 (249 patients), sinus rhythm; group 3 (16 patients), SVA<100 bpm. After 6-month follow up and re-evaluation of LVEF, group 1 was divided in TCMP (recovered LVEF ≥50%, group 1A) or DCM (persistent LVEF<50%, group 1B) patients. A survival-free from death, heart transplant or major ventricular arrhythmias comparison among the 4 groups (1A, 1B, 2, 3) was performed.
Results: Fifty-four patients (73%) of group 1 were re-classified as TCMP. At the multivariable analysis, a successful rhythm control strategy (Odds ratio [OR] 7.37, 95% confidence interval [CI] 1.46-37.27, p=0.016) was the only feature associated with 6-month LVEF recovery. During a median follow-up of 47 months, TCMP patients (group 1A) had the best prognosis (1 death); conversely, patients presenting with SVA and persistent dysfunction, regardless from baseline heart rate (group 1B and 3), showed the worst survival (p<0.001).
Conclusions: In non-ischemic patients presenting with LV dysfunction and high-rate SVA, a successful early rhythm control was associated with a higher likelihood of LVEF normalization. Conversely, patients who did not recover LVEF had a particularly poor prognosis.

1484

Screening of LAMP2 expression in peripheral white blood cells by flow cytometry effectively identifies Danon disease among young females with advanced heart failure.

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Introduction: Danon disease (DD) is a rare X-linked disorder associated with severe heart failure. DD is caused by mutations in the LAMP2 gene. As a result, LAMP2 protein is universally or mosaic absent in the tissues of male and female DD patients, respectively. Contrary to the noticeable phenotype in DD males, presentation in DD females is variable and includes isolated dilated (DCM) or hypertrophic cardiomyopathy (HCM) regularly progressing to advanced heart failure (AHF) between 20-40 years of age. In our study, we aimed to evaluate the prevalence of DD in young females (<40 years) with advanced heart failure due to non-ischemic cardiomyopathy.
Methods: The study cohort comprised of 60 female patients (pts), 47 pts (79%) were heart transplant recipients, 2 pts (3%) were treated by ventricular assist device and 11 pts (18%) were in pre-transplant phase. Median age of disease onset was 22 years, median age at surgery or pre-transplant assessment 28 years, and median age at screening 37 years. DCM was found in 77%, HCM in 15%, and other type of CM in 8% of pts. LAMP2 was detected by flow cytometry (FC) in peripheral leukocytes in 45 females with unexplained aetiology of cardiomyopathy and 2 females with previously diagnosed DD. The remaining 13 pts have already been diagnosed with a different disease at the time of FC screening. Whole exome sequencing and LAMP2 immunohistochemistry (IHC) in explanted myocardial samples were used as independent methods to confirm/exclude the diagnosis of DD.
Results: LAMP2 FC identified DD in 5 patients. In all of them, the diagnosis was confirmed by genetic analyses (and when possible also by IHC). The total DD prevalence in the cohort was 12%. FC detected DD with a sensitivity of 100% and specificity of 90% (p<0.001). Females with DD had more frequently HCM (57% vs. 9%; p=0.011) and delta waves in electrocardiogram (57% vs.0%, p=0.001).
Conclusion: Danon disease is an underdiagnosed cause of advanced heart failure in young females.
To facilitate timely diagnosis, treatment and family counselling in these specific patients. LAMP2. FC can be used as an effective screening method.

1485

Crude mortality risk in dilated cardiomyopathy. Comparison of the utility of general heart failure mortality scales derived from the Barcelona 2.0, MAGGIC and MUSIC studies in dilated cardiomyopathy.

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Introduction: Numerous survival scales exist in heart failure (HF). Yet, their applicability in dilated cardiomyopathy (DCM) is less certain. Purpose: Comparison of mortality between own DCM cohort and derivation cohorts from the Barcelona 2.0, MAGGIC and MUSIC studies.
Methods: Between January 2014 and October 2018 we analysed hospital records of 285 DCM patients (53 ± 13 years, 81% male, EF 26 ± 11%, NYHA 2.5 ± 0.9). Mortality risks were assessed based on survival scales: Barcelona 2.0 (clinical model) and MAGGIC. According to MUSIC scale patients were divided in 2 groups: high (>20points) and non-high (£20) mortality risk during 44 months.
Results: The 1-, 3- and 5-years mortality risks, obtained from Barcelona 2.0 calculator, were significantly higher in our DCM cohort compared to initial HF cohort. However, the 1- and 3-years mortality risks assessed by MAGGIC scale were significantly lower in our DCM cohort than in derivation HF cohort. As for the MUSIC scale, our patients were characterized with higher total HF mortality risk but lower sudden cardiac death (SCD) risk than derivation cohort.
Conclusions: The mortality risks of our homogenous DCM cohort, assessed with the Barcelona, MAGGIC and MUSIC calculators, significantly differed from the original general HF derivation cohorts. Further studies are needed in order to construct unique DCM-specific outcomes scales.

Comparison of mortality risks.

	DCM cohort	Derivation cohort	p-value
Barcelona 2.0 scale	(n=272)	Barcelona cohort	
1-year mortality risk [%]	9.7 ± 8.5	5.8	<0.001
3-years mortality risk [%]	29.4 ± 20.2	12.5	<0.001
5-years mortality risk [%]	46.27 ± 25.1	19.8	<0.001
MAGGIC scale	(n=247)	MAGGIC cohort	
1-year mortality risk [%]	10.9 ± 6.4	13.4	<0.001
3-years mortality risk [%]	25.5 ± 12.8	31.6	<0.001
MUSIC scale	(n=208)	MUSIC cohort	
High HF mortality risk [n (%)]	101 (48.6%)	374 (37.7%)	0.004
High SCD risk [n (%)]	41 (19.7%)	310 (31.3%)	<0.001

1486

Differences in clinical features of hypertrophic cardiomyopathy with or without left ventricular enlargement: a single-center and retrospective study

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Background: Few studies have focused on the clinical features of hypertrophic cardiomyopathy (HCM) with enlarged left ventricle (ELV). Hypothesis: HCM patients with ELV exhibit unique clinical features. Methods: Study participants were patients with HCM (n = 170), divided into two groups, ELV and normal sized left ventricle (NLV). Patients were also divided according to diagnosis of obstructive (n = 40), septal (n = 88), and apical (n =42) HCM. Age at diagnosis, sex, complications, electrocardiogram, symptoms, drug treatment, and echocardiographic parameters were compared among the NLV (n = 153) and ELV groups (n = 17). Results: The incidence of end-stage HCM (ES-HCM) among all HCM patients was 5.29%, and 10% in those with ELV. For all patients with HCM and those with septal HCM, there were more males with ELV than NLV. Of patients with HCM and septal HCM, left ventricular ejection fraction was significantly lower in the ELV group than the NLV group; accordingly, rates of diuretic use were higher in the ELV group than the NLV group. Among apical HCM patients, the left atrial diameter, incidence of atrial fibrillation or ST-T change, and rate of angiotensin converting enzyme inhibitor/angiotensin receptor blocker use in the ELV group were all higher than those in the NLV group. Conclusions: HCM

patients with ELV are more likely to progress to ES-HCM than those with NLV. Additionally, ELV is more common in men than women and there are differences in the clinical features of different types of HCM with ELV.

Comparison of echocardiographic paramete			
Characteristics	ELVn=17	NLVn=153	p
AOVmax, cm/s	118.69±54.95	152.67±53.03	0.014
VE, cm/s	68.28±28.16	78.23±26.79	0.162
VA, cm/s	62.70±22.87	81.34±31.13	0.026
LVOTV, cm/s	161.25±95.38	245.76±153.44	0.174
LVOT PG, mmHg	13.21±13.48	35.46±36.81	0.032
EDV, ml	173.85±21.92	97.94±25.74	0.000
ESV, ml	69.13±24.17	31.23±11.85	0.000
LVEF, %	59.04±12.73	68.14±8.32	0.000
IVST, mm	17.32±10.54	16.25±5.84	0.517
LAd, mm	43.77±7.23	39.77±6.32	0.016
LVEDd, mm	59.20±3.20	45.67±5.52	0.000
LVESd, mm	37.03±10.82	28.33±4.39	0.004

1487

Cardiovascular dysfunction associated with tyrosine kinase inhibitor use in patients with metastatic thyroid cancer

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Introduction: Cardiovascular disease and cancer represent leading causes of morbidity and mortality in the developed world. The prevalence of cancer is increasing partly due to advancements in treatment, including targeted therapies such as tyrosine kinase inhibitors (TKIs). Despite improvements in oncological outcomes, associated cardiovascular disease remains a concern. Metastatic thyroid cancer is a rare condition with a poor prognosis; TKIs have improved survival but data regarding cardiotoxicity is limited.
Purpose: We investigated cardiovascular dysfunction associated with TKI use in metastatic thyroid cancer patients; specifically, the incidence of cardiovascular dysfunction, associated clinical outcomes and its risk factors.Method: A retrospective case series of 58 patients with metastatic thyroid cancer who received TKI therapy, with cardio-oncology review, between May 2013 and May 2018.
Results: The incidence of cardiovascular dysfunction in metastatic thyroid cancer patients receiving a TKI was 74%. Left ventricular dysfunction occurred in 59%, hypertension in 43% and QTc prolongation in 19%. Survival for greater than 12 months was significantly higher in patients with TKI associated cardiovascular dysfunction. There was no difference in 24-month survival or the proportion of patients completing 12 months of therapy. Age over 50, pre-existing hypertension and baseline cardiac MRI abnormalities were associated with TKI induced hypertension.
Conclusions: Most metastatic thyroid cancer patients experience TKI associated cardiovascular dysfunction, though not worse outcomes. Cardiovascular dysfunction is associated with improved 12-month survival, potentially demonstrating TKI efficacy. This has been described in other cancers as 'on-target' toxicity related to shared tyrosine kinase pathways, but not previously in thyroid cancer. Our results agree with studies of non-thyroid cancers regarding age and pre-existing hypertension as risks for TKI induced hypertension and demonstrates baseline cardiac MRI abnormalities as an additional risk. Our analysis is limited by a small cohort and its retrospective nature. Prospective studies with cardiovascular endpoints are needed.

1488

Longitudinal Diastolic strain as predictor for systolic dysfunction among active breast cancer patients

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Background: Cardio-toxicity, defined as a left ventricular ejection fraction reduction, is a significant side effect of cancer therapy. Global longitudinal systolic strain (GLS) has been shown to identify early systolic dysfunction in patients with active cancer. Although diastolic dysfunction is common among cancer patients, no evidence has been shown that it predicts systolic dysfunction. Early diastolic strain rate is considered to be a predictor of cardiac events in the general population; however, longitudinal diastolic strain (Ds) was not evaluated among cancer patients.
Objectives: The aim of this study was to evaluate the correlation of Ds with echocardiography filling pressure and to estimate its role in the early detection of cardio-toxicity among breast cancer patients.
Methods: Data were collected as part of the International Cardio-Oncology Registry (ICOR), enrolling all cancer patients evaluated at the cardio-oncology clinic in our institution. All patients preformed serial echocardiography, including GLS and Ds, at baseline and following therapy. GLS relative reduction of ≥11% was considered to be clinically significant. Ds was assessed as the early lengthening rate=diastolic slope (cm/sec2) and measured in 6 segments in each of the 3 apical views.
Results: A total of 69 patients (97% women, mean age 54±13 years) with diagnosis of breast cancer were prospectively recruited. Significant GLS reduction was observed in 13% at 2nd echo and 29% at 3rd echo. Assessment of all Ds segments at 2nd echo showed that four chamber mid septum (p=0.003), two chamber mid inferior (p=0.017) and two chamber base inferior (p=0.024) segments were all a significant predictor of GLS reduction at 3rd echo. All of the mentioned segments had significant correlation with E/e' average (p=0.005, 0.009, 0.003) and E/A (p<0.001, <0.001, 0.005).
Conclusions: Among breast cancer patients, Ds showed high correlation to filling pressure parameters and emerged as significant early predictor for clinically significant systolic dysfunction.

Poster Session 3

Atrial Fibrillation

P1521

Worsening renal function in acute decompensated heart failure patients with atrial fibrillation

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Background. Our purpose was to determine the influence of worsening of the renal function (WRF) regard to its reversibility on clinical course of the hospital period in "wet and warm" patients with acute decompensated heart failure (ADHF) with atrial fibrillation (AF).
Methods. In to the prospective study were included 84 patients with ADHF and AF at the age from 38 to 85 years (mean age 67,1 ± 2,2). Transient WRF was defined as increase of creatinine ≥26.5 mmol/L after 48 hours with subsequent decrease to baseline at discharge. Patients with persistent WRF didn't have decrease of creatinine to baseline at discharge. Endpoints were CVP at day 4 (D4), ortho-oedema congestion index Lala, E/E' and NT-proBNP at discharge (Dsc).
Results. WRF occurred in 24 (29%) patients. The patients with persistent WRF comparing to patients transient WRF and with no WRF had significantly more increased values of ortho-oedema index Lala, E/E', NT-proBNP, CVP and worse results of decongestion treatment. In the same time the patients with transient WRF didn't have significant differences in main parameters and endpoints (see in table).
Conclusion: Only presence of persistent WRF is associated with significantly worse clinical course and outcome comparing to patients with transient WRF and with no WRF in the "wet and warm" patients with ADHF and AF.

	No WRF	WRF transient	WRF persistent	P1-2	P1-3	P2-3
Ortho-oedema index Lala D1	3,48 ± 0,11	3,59 ± 0,11	3,96 ± 0,12		p<0,01	p<0,01
Ortho-oedema index Lala Dsc	2,3 ± 0,05***	2,4 ± 0,05***	2,86 ± 0,09**		p<0,01	p<0,01
CVPD1	174± 10,6	182 ± 10,74	198 ± 11,94		p<0,05	p<0,05
CVP D 4	82± 4,98**	93 ± 5,46**	113 ± 6,72**		p<0,05	p<0,05
E/E' D1	18,4 ± 1,1	18,8 ±1,2	21,3 ± 1,3		p<0,01	p<0,01
E/E' Dsc	12,8 ± 0,8 **	14,2 ±0,9**	17,4 ±1,06**		p<0,01	p<0,01
NT-proBNPD1	1162 ±70	1223±72	1369 ±83		p<0,01	p<0,05
NT-proBNP Dsc	758 ± 45***	789 ±46,98***	961 ±56,64**		p<0,05	p<0,05

* - p<0,05, ** - p<0,01, *** - p<0,001 compared to D1;

P1522

Short and long-term outcomes after radiofrequency catheter ablation of the his bundle: the experience of a tertiary center

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Background: In refractory supraventricular arrhythmias (SA) with rapid ventricular rates and in HFrEF with need of biventricular pacing and high burden of atrial fibrilation (AF) despite a rhythm control approach, catheter ablation of the His bundle (AHB) may be performed.
Purpose: To assess outcomes of AHB and pacing therapy in patients with refractory SA or patients with HFrEF under resynchronization therapy and with high burden of AF. Methods: Patients referred for AHB from 1997 to 2018 were retrospectively included. Baseline clinical data, procedural variables and outcomes of AHB were collected.
Results: 123 patients were included (69±9 years, 52% male). During a mean follow-up of 8.4 years, 28 patients died (23%). Patients presented advanced HF (NYHA class III- 42%, class IV – 3%), left ventricular dysfunction (mean LVEF 47% ± 13), AF (65%) and rapid ventricular rates (mean heart rate 114 ± 33 bpm). Most of the patients needed hospital admission due to decompensated HF: once 31%, twice 20%, three or more times 9%. Devices were implanted before the procedure: pacemaker 82%, CRT-P 6%, CRT-D 8% and ICD 4%. AHB was performed in 113 patients at right side (91%) and in 13 patients at left side (11%). There were no procedure complications. At follow-up patients were less symptomatic (HF NYHA class III 8%, class IV 2%) and had fewer hospitalizations: once 9%, twice 1%, three or more times 4%. After univariate logistic regression, multiple emergency department visits due to HF (OR 58.7, 95% CI, 16.2-116.7, p=0.004), hospitalizations due to HF and the use spironolactone (OR, 268, 95% CI, 26.7 – 969.8, p=0.017) before the procedure, were found to be independent predictors of the composite endpoint after the procedure (death, hospitalization or emergency department visit due to decompensated HF).
Conclusion: His bundle ablation and pacing therapy is a safe and effective method to control heart rate in patients with supraventricular arrhythmias and rapid ventricular rates who have failed medical therapy.

P1523

Conflicts of interest among authors of the ESC guidelines for the management of atrial fibrillation

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Background: In 2011, the Institute of Medicine (IOM) published standards for developing trustworthy clinical practice guidelines. It is recommended that "Whenever possible guideline development group members should not have conflicts of interest (COIs). In some circumstances, a guideline development group may not be able to perform its work without members who have COIs, such as relevant clinical specialists. Members with COIs should represent not more than a minority of the guideline development group members. The chair or cochairs should not be a person with COIs."
Aim of the present study was to assess if the ESC guidelines for the management of atrial fibrillation are in accordance with the standards proposed by the IOM.
Methods: The declaration of COIs from task force members (TFM) and reviewers of the 2010 and 2016 ESC atrial fibrillation guidelines were retrieved from the ESC homepage. The number and the type of COIs were assessed for each guideline and compared.
Results: Regarding the 2010 guidelines, 8 of the 25 TFM (32%) reported no COI. In the remaining 17 TFM, 148 COIs were reported (8.7±10.2 per member, range 1-44). The chairperson declared 11 COIs. Consulting and advising was reported by 15 and research contacts by 13 TFM. Among the guideline reviewers, 12/26 (46%) reported no COI, and 14 reviewers declared 72 COIs (5.1±3.3 per reviewer, range 2-14).
Regarding the 2016 guidelines, 3 of the 17 TFM (18%) reported no COI. The remaining 14 TFM declared 182 COIs (13.0±10.4 per member, range 1-32). The chairperson of the task force had the second most COIs (n=30). Direct personal payment was reported by 14 and research funding of the department by 10 TFM. Among the guideline reviewers, 16/79 (20%) reported no COI, and 63 reviewers declared 473 COIs (7.5±6.8 per reviewer, range 1-34).
Comparing the 2010 and the 2016 guidelines, there was an increase of TFM with COIs (from 68% to 82%), of the number of COIs per TFM (from 8.7±10.2 to 13.0±10.4) and the COIs of the chairperson (from 11 to 30). Moreover, the proportion of TFM receiving personal payment (60% vs 82%) and the number of COIs due to personal payment (5.9±7.3 vs 7.7±7.4) were higher in the 2016 guidelines. In addition, more guideline reviewers had COIs in 2016 (54% vs 80%).
Conclusion: The high and increasing rate of TFM and reviewers with COIs is not in accordance with the recommendations of the IOM. Since COIs can influence healthcare decision makers and may consciously or unconsciously influence choices made throughout the guideline development process, the ESC should follow the standards of the IOM.

P1524

Right ventricular systolic pressure predicts the future development of atrial fibrillation in end-stage renal disease patients with enlarged left atrium

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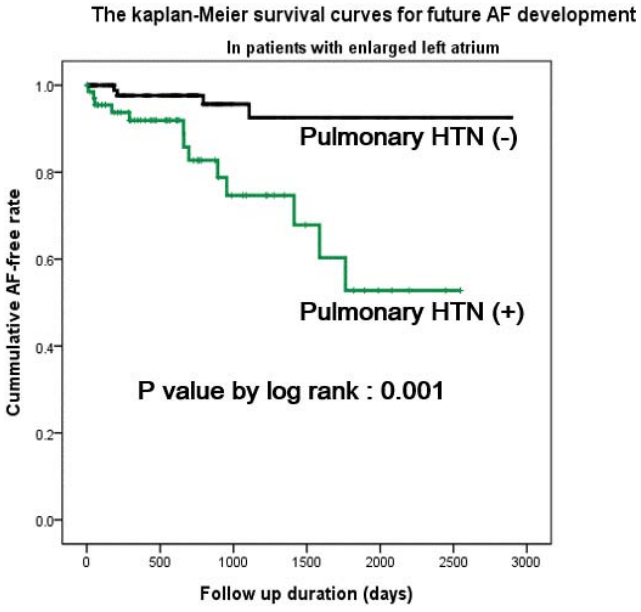
Background: The outcome of patients with end-stage renal disease (ESRD) is associated with cardiac disease. Atrial fibrillation (AF) is a common cause which leads to adverse cardiovascular outcome. It is unclear the predictors of future AF in patients with ESRD.
Purpose: We investigated the predictors for future development of AF in patients with ESRD who had never documented AF.
Methods: We enrolled 226 patients with ESRD who has performed transthoracic echocardiography. We excluded the 16 patients who had been received a diagnosis of AF, and 210 patients (130 males, mean 62 ±13 years) were analyzed. The patients were classified into two groups according to size of left atrium (LA); anterior-posterior (AP) dimension>35.7mm or≤35.7mm. Cut-off value of LA AP dimension was measured using ROC curve for LA dimension.
Results: During a mean follow-up period of 911±725 days, AF occurred in 24 (11.4%) patients. The patients with AF development was older (68±12 vs. 61±14 years, p=0.038) and had a higher right ventricular systolic pressure (RVSP) (30±16 vs. 37±14mmHg, p=0.046). RVSP was a significant predictor of AF development in multivariate analysis (hazard ratio, 1.028; 95% confidence interval, 1.004-1.052; p=0.040). RVSP (hazard ratio: 1.027, 95% confidence interval: 1.003-1.052, p=0.027) predicted AF development, and LA dimension tended to predict AF development (hazard ratio: 1.057, 95% confidence interval: 0.990-1.129, p=0.097) in univariate Cox regression analysis. When we divided the patients into two groups according to LA AP dimension, RVSP predicted AF development (hazard ratio: 1.033, 95% confidence interval: 1.005-1.061, p=0.020) in patients with enlarged LA (LA dimension> 35.7mm). In group with enlarged LA, the area under the ROC curve of RVSP for newly developed AF was 0.677 (p=0.017), and optimal cut-off value was 26.4mmHg with 88% of sensitivity and 41% of specificity).
Conclusion: In patients with ESRD, elevated RVSP predicts an increased risk of future AF development, especially in patients with enlarged LA. This study supports the necessity of strict volume control or associated factors to increase RVSP for prevention of future AF and adverse cardiovascular outcome.



The Kaplan-Meier curve for future AF

P1525

Left atrial function and left atrial late gadolinium enhancement magnetic resonance in patients with atrial fibrillation.

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BACKGROUND: Left atrial (LA) remodelling is a physiological response in patients with atrial fibrillation (AF) due to pressure overload. AF is associated with LA structural and functional changes. Left atrial late gadolinium enhancement (LGE) and feature-tracking quantification by cardiac magnetic resonance are capable of noninvasive assessment of LA fibrosis and myocardial motion. The aim of this study is to determine the relationship between LA function and LA-LGE magnetic resonance in patients with AF.
METHODS: We conducted a prospective study on 98 patients with AF (48±7 years, 52 men) and 30 healthy volunteers (47±9 years, 19 men), which were all evaluated by cardiac magnetic resonance. To achieve our purpose, we measured LA volumes during reservoir, conduit and pump phases, peak global longitudinal LA strain, LA systolic strain rate; early and late diastolic strain rates were evaluated using cine-cardiac magnetic resonance imaging and LGE by quantification of LA fibrosis.
RESULTS: Medium LA volume indexed to body surface was significantly higher in patients with AF 48.8 ±6.3 ml/m2 compared to the healthy volunteers 36.3 ±4.5 ml/m2 with a p value of p<0.001. Compared to patients with paroxysmal AF (58% of cohort), those with persistent AF had a larger maximum LA volume index (51±10.1 versus 45±8.2 mL/m2; p<0.01), and an increased LGE (28±10% versus 33±11%; p<0.001). All LA parameters (LA active emptying fraction, passive emptying fraction, peak global longitudinal LA strain, systolic strain rate, early diastolic strain rate, and late diastolic strain rate) were lower in patients with persistent AF (p<0.05 for all). Compared to healthy volunteers, patients with AF and mild diastolic dysfunction had lower corrected passive emptying fractions (p<0.01) and higher corrected active emptying fractions (p<0.001), as result leading to a similar corrected total emptying fraction. However, in patients with AF and moderate diastolic dysfunction, passive, active and total emptying fractions were decresed. In multivariable analysis, increased LA-LGE was associated with lower LA passive emptying fraction, peak global longitudinal LA strain, systolic strain rate, early diastolic strain rate, and late diastolic strain rate (p<0.01).
CONCLUSIONS: LA indexed volumes evaluation during the reservoir, conduit and pump phases proved to be valid parameters for early diastolic dysfunction assessment in patients with AF. LA-LGE is associated with decreased LA reservoir, conduit, and booster pump functions. LA function using feature-tracking cardiac magnetic resonance may bring important information about the physiological importance of LA fibrosis

P1526

Heart failure patients discharged with atrial fibrillation showed significantly higher readmission rate.

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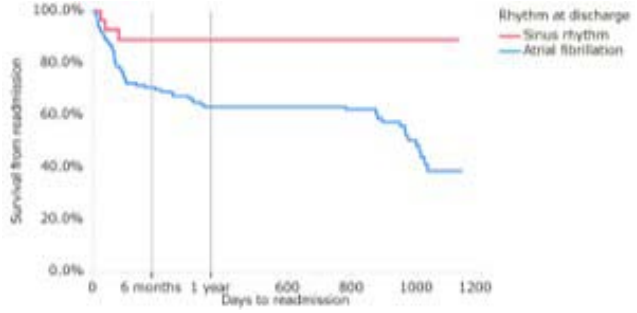
Background: Relationship between atrial fibrillation (AF) and heart failure (HF) is often compared with proverbial question of which came first, the chicken or the egg. Some patients showing AF at the HF admission result in restoration of sinus rhythm (SR) at discharge. It is not well elucidated that the restoration into SR during hospitalization can render the preventive effect for rehospitalization.
Purpose: To investigate the impact of restoration into SR during hospitalization for readmission rate of the HF patients showing AF.



Methods: We enrolled consecutive 167 HF patients showing AF on admission in our hospital from January 2015 to December 2015. Patients data were retrospectively investigated from medical record. Patients were divided into 2 groups based on the rhythm at discharge, SR group and AF group. The endpoint was rehospitalization due to HF. Readmission related to HF was followed up until 2 years later.
Results: During mean follow up of 24 months, 29 patients were discharged with SR (17%) and 138 patients were discharged with AF (83%). Nineteen patients in SR group (66%) were performed pharmacology or electrical defibrillation. Only one patient in SR group (3%) and one patient in AF group (1%) underwent catheter

ablation. Baseline characteristics of gender, age, BMI, and history of HF hospitalization, hypertension, diabetes, dyslipidemia, stroke, and chronic kidney disease were similar between two groups. History of myocardial infarction was more frequent in AF group(p=0.04). Readmission rate due to HF was significantly lower in SR group compared with AF group (3% vs. 44%, p<0.01). To compare the risk factors related to readmission due to HF with the cox proportional-hazards model, discharge with AF was significantly associated [Hazard Ratio (HR)=1.86, p=0.01]. LVEF<40% (HR=1.79, p=0.02), beta blocker use (HR=1.62, p=0.02), CHADS2 score (HR=1.43, p=0.04) were also independently associated with HF readmission.
Conclusion: AF patients who restored to SR until discharge was a good marker to forecast future readmission due to HF.

P1527
High prevalence of sleep apnea in patients with paroxysmal atrial fibrillation

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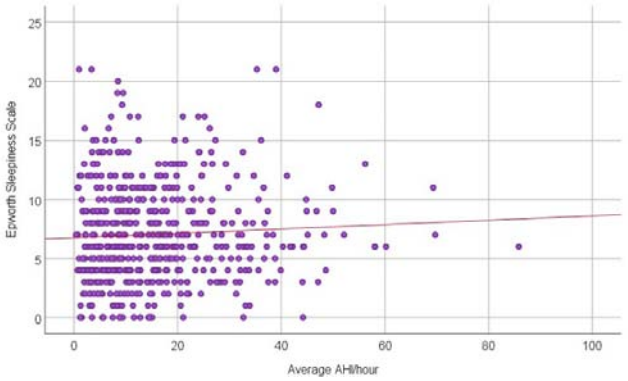
Background Recent studies have suggested an association between sleep apnea (SA) and different cardiovascular disorders. The prevalence, severity and type of SA in patients with paroxysmal atrial fibrillation (AF) are less known.
Purpose We aimed to examine the prevalence, severity and type of SA in patients with paroxysmal AF.
Methods We prospectively studied 578 patients with paroxysmal AF scheduled for catheter ablation at two centers. SA was diagnosed using portable respiratory polygraphy two nights at home. Sleep studies were analyzed by an experienced specialist, using standard American Academy of Sleep Medicine definitions. The degree of subjective daytime sleepiness was assessed by the Epworth Sleepiness Scale (ESS), with scores ranging from 0 to 24 (most sleepy). We calculated differences in variables between SA categories by Chi-Square Test or ANOVA as appropriate (Table).
Results 158 women (27 %) and 420 men (73 %) were enrolled. Mean age was 59.9 (9.6) years, with a mean BMI of 28.6 (4.4) kg/m^2. 477 (83 %) of the patients had an apnea-hypopnea index (AHI) ≥ 5/h, while moderate/severe SA (AHI ≥ 15/h) was diagnosed in 243 patients (42 %). Men had a higher prevalence of moderate/severe SA (47 %) than women (30 %). The type of SA was predominantly obstructive, with mean AHI 15.3/h (12.1) (range 0.4/h-85.8/h). Mean central apnea index was 0.8/h (2.1). AHI increased with age, BMI, weight, neck-and waist circumference. Mean ESS score was 7 (4.1), indicating normal daytime sleepiness. There was no association between ESS and AHI/h, Spearman rho = 0.08.
Conclusion In our AF population we found no correlation between the ESS and SA severity. The prevalence of moderate/severe SA was 42 %, which is several times higher than in the general population (8 %). The high prevalence of SA in this study may indicate that SA is under-recognized in patients with AF. More studies are needed to evaluate if treatment of SA can reduce the burden of AF.

AHI/h and clinical characteristics

	AHI < 5No SA	AHI 5-15 Mild SA	AHI 15-30 Moderate SA	AHI ≥30 Severe SA	P-value
Total n=578 (%)	101 (17.5)	234 (40.5)	174 (30)	69 (12)	
Male n (%)	59 (58)	165 (71)	144 (83)	52 (75)	< 0.001
Age, years	54.9 (11.9)	59.4 (9.5)	62 (7.7)	63.6 (6.9)	< 0.001
BMI, kg/m^2	26.7 (3.8)	28.1 (4.1)	29.2 (4.4)	31.4 (4.8)	< 0.001
Neck circumference, cm	37.2 (3.2)	38.6 (3.3)	39.7 (3.3)	40.6 (2.9)	< 0.001
Waist circumference, cm	92.6 (11.9)	98.5 (11.3)	102.5 (11.6)	106.3 (12.4)	< 0.001
Waist-Hip Ratio	0.93 (0.09)	0.97 (0.08)	0.99 (0.07)	1.00 (0.07)	<0.001
Epworth Sleepiness Scale	6.8 (4.4)	6.9 (4.1)	7.4 (3.7)	7.1 (4.2)	< 0.532

Data are mean with standard deviation, or otherwise stated.



Correlation ESS and AHI/h

P1528
Assessment of diastolic function in patients with heart failure and atrial fibrillation

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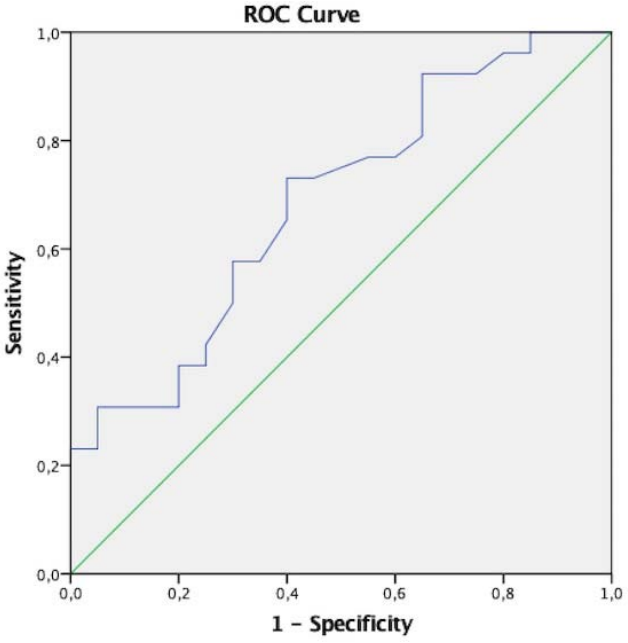
Introduction Atrial fibrillation (AF) is the most common sustained cardiac arrhythmia and is associated with an increased risk of thromboembolic events (TE), all-cause mortality, heart failure (HF) and cardiovascular morbidity. In patients (pts) with HF, AF is also the most common arrhythmia and a marker of worse outcomes. Assessment of left ventricular (LV) diastolic function (DF) is paramount in echocardiographic evaluation of HF pts.



Average e' velocity ROC curve.

Purpose To investigate the impact of LV DF transthoracic echocardiographic parameters on the prognosis of pts with AF and HF.
Methods Retrospective case-control study of pts with permanent AF and HF, who were assessed in our echocardiography laboratory between January 2015 and December 2016 with a comprehensive evaluation of DF (mitral inflow E velocity, E wave deceleration timeand tissue Doppler septal and lateral mitral annulus velocities (e') and E/e' ratios). The follow-up (FU) duration was 2.6±0.8 years. Clinical and

echocardiographic data were collected. The outcome was a composite of TE, HF hospitalization (HHF) and all-cause mortality.
Results Of the 171 pts with AF, 113 were included (mean age 74.7±9.3years; 46.0% male; left ventricular ejection fraction 44.6±13.4%; CHA2DS2-VASc 4.4±1.4).During FU, 72 pts had at least one event of the composite outcome. Sixteen (14.2%) had at least one TE, 43 (38.1%) had a HHF and 42 (37.2%) died. Pts with events were older (76.3±8.8years vs 71.9±9.5years, p=0.015), had higher CHA2DS2-VASc score (4.6±1.2 vs 4.0±1.6, p=0.059), NT-proBNP levels (3351±4735pg/mL vs 1046±1162pg/mL, p<0.0001) and average E/e' ratio (15.5±6.8cm/s vs 11.8±5.5cm/s, p=0.044). Additionally, these pts were more likely to have had increased left atrium dimensions (73.1±23.6mL/m2 vs 71.2±64.6mL/m2, p=0.822) and lower estimated glomerular filtration rate (59.7±26.6mL/min/1.73m2 vs 68.6±24.6mL/min/1.73m2, p=0.094), E wave deceleration time (186.8±38.7ms vs 210.8±61.6ms, p=0.083) and average e' velocity (7.3±2.1cm/s vs 9.0±2.6cm/s, p=0.02).In multivariate analysis, only average e' velocity was the only independent predictor of the composite outcome (OR 0.296, CI 0.10-0.88, p=0.029). ROC curve showed a reasonable discriminative capacity for average e' velocity (AUC 0.687, p=0.032), with similar findings for pts with HF with preserved, mid-range and reduced ejection fraction.
Conclusion Average e' velocity was a predictor of adverse events in patients with HF and AF, independent of other clinical and echocardiographic data. Echocardiographic assessment of LV DF is a simple and fundamental step of any HF routine echocardiographic evaluation. If prospectively validated, this finding may may be useful in risk stratification of pts with HF and AF, either alone or potentially integrated in a model of risk prediction.

P1529
Clinical use of a atrial fibrillation detection device for screening in highrisk patients

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On behalf of: General physicians

Purpose: Detection of atrial fibrillation in high risk patients. Atrial fibrillation is the most common arrhythmia. However atrial fibrillation frequently does not cause symtoms and is unrecognized. Atrial fibrillation can cause blood cloths leading to a cerebral vascular accident. This can be prevented by adequate anti coagulation.
Methods: During the inluenza vaccination campaign of the general practioners in 22 locations in the region of Utrecht 3198 patients were prior to the vaccination asked to hold the MyDiagnostick device for 60 seconds. The lamp on the device turns green indicating a normal rhythm or red in case of atrial fibrillation. The name of the positive patients, time of measurement and number of stick were noted in al logbook. Afterwards the stored ecg's of positive tests were separately analyzed by assistent and cardiologist.
Results: We had per session 10 devices at our disposal. In 247 of 3198 screened patients we had a positive result. However after analizing the stored ecg's the diagnosis atrial fibrillation stood in 95 patients (3,0%). Of these 20 patients (21%) were known with atrial fibrillation and 75 patients (79%) were newly diagnosed with atrial fibrillation. The results were communicated to their general physician who calculated their CHADSvasc score (mean 4) and started treatment for anticoagulation and rate control. In 152 patients there was a false positive result, which was corrected by analysis of the stored ecg's.
Conclusion: Screening for atrial fibrillation in high risk groups is fruitfull. In this flue vaccination group the incidence of newly diagnosed atrial fibrillation was 2,3% with an mean annual stroke risk of 4%. In these 75 patients adequate coagulation will yearly prevent 3 strokes. However we should realize that this is only a snapshot and paroxysmal atrial fibrillation can be missed. Although the MyDiagnostick device is proven to be highly sensitive it gave 153 false positieve results (specificity of 95%). It is an adequate screening tool for a quick search in large patient groups. The analysis of the stored ecg's was easy and lightly time consuming. In the daily practice of cardiovascular risk management this can be a very useful tool when there is a good back office for the analysis of the stored ecg's. The ecg-pdf's can easaly be sent digitally to the back office.

P1530
A meta-analysis of rhythm versus rate control for atrial fibrillation in chronic heart failure

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INTRODUCTION: Atrial fibrillation is a pathology with growing incidence and mortality; it is also beginning to be viewed and treated differently when in the context of chronic heart failure. There is still debate about whether rate or rhythm control is the preferred therapy, given their different benefits, adverse effects and possible impact on the underlying chronic heart failure. The purpose of this meta-analysis is to evaluate the effectiveness of rhythm control when compared to rate control in patients with both atrial fibrillation and chronic heart failure.
MATERIALS & METHODS: A PubMed and Cochrane Library search was conducted for randomized controlled trials (RCTs) and their sub-studies up until December 2018. Outcomes were all-cause mortality, cardiovascular mortality, stroke-related mortality and number of hospitalizations. Five studies and sub-studies were selected totaling 2640 patients.
RESULTS: The studies had a wide range of inclusion criteria for both chronic heart failure (varying degrees of severity) and atrial fibrillation (from paroxysmal to sustained). There was no statistical difference for all-cause mortality (p=0.25), cardiovascular mortality (p=0.28) or stroke-related mortality (p=0.94). However, patients in the rhythm control group suffered more hospitalizations (RR: 1.08, 95% CI: 1.01 to 1.16, p=0.01).
CONCLUSIONS: Rhythm control seems to offer no improved outcomes compared to rate control in patients with both atrial fibrillation and chronic heart failure. However, there was heterogeneity among the selected studies, which may be a confounding factor. More specific studies are needed for the treatment of atrial fibrillation in the context of chronic heart failure.

Device Therapy

P1531
Characteristics and predictors of super response to the Cardiac Resynchronisation Therapy(CRT). An Algerian single Center Experience.

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Introduction: In some patients with dilated cardiomyopathy (DCM) and left bundle branch block (LBBB), cardiac resynchronization therapy (CRT) has been shown to reverse almost completely left ventricular (LV) function.

predictors of super response

		univariate analysis		multivariate analysis	
Parameters	Odss ratio(95%)	p value	Odss ratio(95%)	p value	
female gender	0.33 (0.12,0.91)	0.03			
Hospitalisation for HF before CRT	0.3 (0.15,0.62)	0.001			
Renal Failure	0.52 (0.19,1.39)	0.03			
CRTP versus CRTD	5.47 (1.48,20.27)	0.01	5.47 (1.48,20.27)	0.007	
QRS duration post implantation	0.94 (0.9,0.99)	0.007			
Normal RV function		3.19 (1.25,8.15)	0.01		
LVEF		1.18 (1.04,1.33)	0.005		
LVEDD		0.92 (0.85,0.99)	0.01		
LVEDV		0.97 (0.95,0.99)	0.001	0.97 (0.95,0.99)	0.002
PAPS		0.92 (0.87,0.96)	0.001	0.92 (0.87,0.96)	0.001

RV: right ventricle, LVEDD: LV end diastolic diameter.

Purpose: Determine the proportion of super responders among patients with DCM and attempt to determine their profile in a tertiary implantation center of Algeria.
Methods: Consecutive patients with DCM (LV ejection fraction (LVEF) <35%, LV end-diastolic diameter>60mm) and LBBB implanted with a CRT were prospectively followed. Patients were considered super-responders if they fulfilled two criteria:class NYHA I/II and LVEF≥ 50%.
Results: Among the 98 DCM patients, 19 (19.5%) were found to be superresponders following CRT (LVEF increased from 29.89± 4.44 to 53.37± 3.76 %, p=0.001). in

the 79(81%) remaining patients, there was a significant increase in LVEF from 26.49± 4.67 to 37.27± 7.20, p=0.001). At baseline, there were no significant differences between super-responders and other patients, except that they were female, had no hospitalization for HF before CRT and no renal deficiency. Super responders had also less severe LVEF and lower pulmonary artery systolic pressure (PASP).CRT-P (OR, 5.47; 95% CI, 1.48–20.27; P= 0.007), lower left ventricular end-diastolic volume (LVEDV)(OR, 0.97; 95% CI, 0.95–0.0.99; P=0.002) and lower PASP (OR, 0.92; 95% CI, 0.87, 0.96; p<0.001) were independent predictors of super-response to CRT (see the table).
Conclusion: Among patients with DCM and LBBB, Patients in earlier phases of the CMD, with a less altered ventricular geometry, seem to have a greater probability of becoming super-responders.

P1532

R wave sensed from the left ventricle as mortality predictor in patients with cardiac resynchronization therapy for primary prevention

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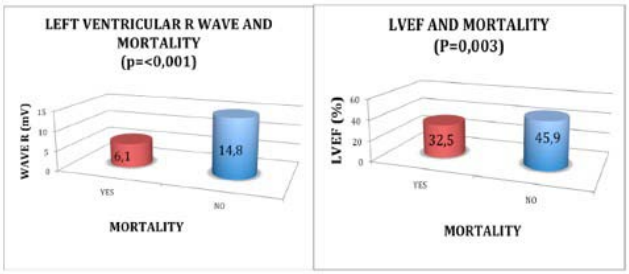
BACKGROUND: A lower left ventricular R wave (LVRW) and a higher left ventricular threshold (LVT) could be related to a greater extent of myocardial scarring and lower myocardial vitality.

VARIABLE	MORTALITY	P	
YES	NO		
Paced QRSd (ms)	138,13+23,59	125,74+21,19	0,152
LVRW (mV)	6,09+3,05	14,81+7,6	< 0,001
LVT (V x 0,5ms)	1,83+0,85	1,17+0,65	0,021
LVEF postCRT%)	32,50+10,88	45,91+10,59	0,003
Absence of reverse remodelling (%)	62,5	22,9	0,028
NYHA III-IV postCRT (%)	62,5	0	< 0,001



PURPOSE: The purpose of this study was to analyze the value of left ventricular (LV) electrode measurements during the implant as predictors of mortality in patients with implantable cardioverter-defibrillator (ICD) with cardiac resynchronization therapy (CRT) in primary prevention.
METHODS: We retrospectively analyzed data of patients with implanted biventricular defibrillator between January 2010 and December 2013. CRT was indicated according to the guidelines of the ESC. During the implant, left ventricular sensing, impedance and threshold were measured. Clinical characteristics, left ventricular lead position and measurements, electrocardiography and echocardiography were evaluated before and after CRT. Statistical analysis SPSS 20. The variables were compared bye T-Student and Chi2. Multivariate analysis logistic regression. Statistical significance for p <0.05.
RESULTS: 43 patients were enrolled. Mean age was 72 y and 90% were men. Ischemic cardiomyopathy 49%. NYHA functional class III-IV 63%. LBBB was identified in 46,5% and permanent atrial fibrillation (AF) 35%. After the implant mean biventricular paced QRSd was 128±21ms. The mean duration of follow-up was 33.3±7.8 months. The mortality rate was 19% (N=8). The univariate analysis is detailed in table 1. With multivariate analysis, only a lower LVRW during the implant (6.1±3.1V vs 14.8±7.6V, OR 1.3, 95% CI 1.03-1.7, p=0.03) and a very low LVEF after the implant (32.5±10.9 Vs 45.9±10.6, OR 1.14, 95% CI 1.03-1.3, p=0,03) remained as independent predictors factors of mortality.
CONCLUSIONS: In our study, a lower left ventricular detection and a very low LVEF were independent predictors of mortality. However, a higher left ventricular threshold did not reach statistical significance. These variables could identify a subgroup of patients who would benefit from a closer follow-up.

P1533

Comprehensive approach to the outpatient management of patients with prosthetic heart valves

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Background: Patients with prosthetic heart valves require life-long anticoagulant therapy. The reduced length of in-hospital stay of patients after heart valve replacements determines the relevance of the outpatient management. Purpose: To develop an integrated approach to outpatient management of patients with prosthetic heart valves to increase the effectiveness and safety of anticoagulant therapy and improve the quality of life. Methods: Group 1 patients (n = 118) underwent simultaneous sequential restoration of the sinus rhythm, including (1) mitral valve replacement combined with maze procedure; (2) electropulse therapy; (3) catheter radiofrequency ablation. Group 2 patients (n = 144) received patient education in addition to the standard management. Group 3 patients (n = 216) had warfarin pharmacogenomic testing to guide anticoagulant therapy. Group 4 patients (n = 98) self-tested the INR using portable devices and were remotely monitored (1 in two weeks) by nurses using telephone and Skype calls in the anticoagulant center. Patients with mechanical and tissue heart valves were equally distributed in the study groups. The quality of life was assessed using the SF-36 questionnaire at the beginning of the outpatient monitoring and 12 months after it. Results. Sequential sinus rhythm restoration contributed to the 100% recovery of the sinus rhythm in patients with tissue heart valves, followed by the discontinuation of the anticoagulant therapy. Warfarin pharmacogenetic testing reduced 2-fold the selection of the warfarin dosing and resulted in an 25.2% increase of the therapeutic range (TTR) (p = 0.0056). Patient education reduced the risk of thrombotic and hemorrhagic complications by 1.8 and 2.6 times, respectively. Promising clinical outcomes were observed in the group of remote monitoring, whose TTR reached 82% (p = 0.014). The correlation between TTR and patients' quality of life have been deternibed. Conclusion. A comprehensive approach to the management of patients with prosthetic heart valves, including sinus rhythm restoration, warfarin pharmacogenetic testing, patient education ensures the effectiveness and safety of anticoagulant therapy and improved quality of life.

P1534

A decline in physical activity precedes sustained ventricular arrhythmias in women

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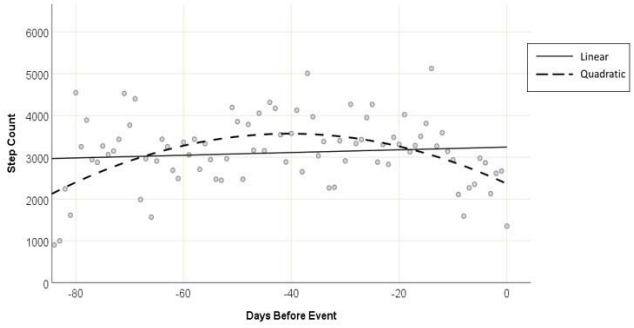
Background. Changes in physical activity before a ventricular arrhythmia event have not been described previously, especially in women. The wearable cardioverter defibrillator (WCD) provides continuous cardiac monitoring and delivers a shock if a sustained VT/VF occurs. Multiple accelerometers in the WCD provide information about patient activity. Understanding activity changes leading up to a VT/VF event may improve patient care and prevent sudden cardiac death.
Purpose. Describe the decline in physical activity in the days preceding a VT/VF event among female patients with reduced ejection fraction (EF).
Methods. Female adult patients prescribed a WCD after a diagnosis of either dilated cardiomyopathy or post myocardial infarction (n = 4972) with low EF were included. Step count was measured by the WCD. Curve estimation was used to evaluate the relationship between physical activity (defined as 24-hour step count) and number of days before a sustained ventricular arrhythmia. A linear model, suggesting a monotonic relationship between activity and time leading up to a ventricular arrhythmia, was compared to a quadratic model. Results. Sustained VT/VF was experienced by 27 patients. Mean age of all patients was 65 years (SD = 13), mean age of shocked patients was 64 years (SD = 10). On average, patients wore the WCD for 47 days (SD = 24) prior to receiving a shock for sustained VT/VF. The figure shows the median step count for 85 days preceding a sustained ventricular arrhythmia. The

solid line represents the non-significant linear equation (adjusted R^2 = -.003, p = .40). The dashed line represents the quadratic equation (adjusted R^2 = .206, p < .001). The significant quadratic equation suggests a non-linear relationship exists between activity and time leading up to a sustained ventricular arrhythmia. Using the quadratic equation, Step Count = 2370 - 59.52*(Day) - 0.74*(Day)^2, physical activity increased starting at the beginning of WCD use up until day -39 (39 days before the WCD shock) when activity begin to decline. Activity continues to decline up to day 0 (day of WCD shock).

Conclusions. Among women with cardiomyopathy or post myocardial infarction and a reduced EF a decline in physical activity began an average of 39 days before a VT/VF event. Activity monitoring for a sustained decline in activity may be useful to identify patients at near term risk of a cardiac arrest.



P1535

Progressive worsening in device-base failure sensors measurements are associated with sub-optimal BiV pacing percentages in CRT-D patients

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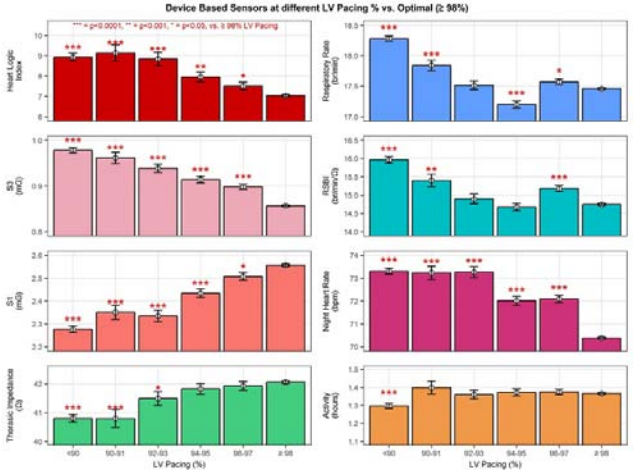
Funding Acknowledgements: Boston Scientific

Background: Lower percentages of BiV pacing (<98%) have been associated with significantly worse survival in a cohort of >35000 remotely monitored CRT patients. HeartLogic (HL), a heart failure (HF) composite index and alert algorithm available in both CRT-D and ICD devices, aggregates physiologic trends associated with multiple aspects of HF status (e.g. heart sounds, heart rate, thoracic impedance, respiration rate, tidal volume, and activity). HL alerts were recently shown to detect HF events with 70% sensitivity, and identify patients with 10-fold increased risk of worsening HF.

Objective: We plan to investigate association between daily % BiV pacing and device measured individual heart failure sensors and HeartLogic.



Methods: The ALTITUDE database collects de-identified data recorded by the implanted devices from the LATITUDE remote monitoring system. Patients with HeartLogic enabled CRT-D devices and a minimum of 30 days of daily sensor data were included. All days with AF burden were excluded. Each patient day was grouped into 6 groups based on the daily % BiV pacing values (<90%, 90-91%, 92-93%, 94-95%, 96-97%, and ≥98%). For each pacing group, the mean of different device sensors, the HeartLogic index, and the proportion of days in HeartLogic alert were evaluated.

Results: Out of 2736 CRT-D patients, 594 met the selection criteria and had 248 alerts over 155.1 years. Sub-optimal BiV pacing percentages were associated with progressively worse device sensor values (see figure). HeartLogic index reflected significant worsening even for a small reduction in % BiV pacing. The proportion of days in HeartLogic alert was about 2x higher with <90% BiV pacing (19.08%; 95% CI 18.0-20.19) vs. ≥98% (11.29%; 95% CI 10.99-11.60; p<0.0001). Further, each individual sensor worsens with sub-optimal compared with optimal BiV pacing.

Conclusion: Lower %BiV pacing is associated with multiple worsening heart failure sensors. This analysis provides strong evidence that the poor survival associated lower %BiV pacing is likely caused by worsening heart failure.

P1536

Preliminary experience of remote management of heart failure patients with a multisensor ICD alert.

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Background: The HeartLogic index combines data from multiple implantable cardioverter-defibrillator (ICD)-based sensors and has proved to be a sensitive and timely predictor of impending heart failure (HF) decompensation.

Purpose: To describe a preliminary experience of remote HF management of patients who received a HeartLogic-enabled ICD or cardiac resynchronization therapy ICD (CRT-D) in clinical practice.

Methods: The HeartLogic feature was activated in 101 patients (74 male, 71±10 years, ejection fraction 30±7%). From implantation to activation (blinded phase), the HeartLogic index trend was not available, thus no clinical actions were taken in response to it. After activation (active phase), remote data reviews and patient phone contacts were performed monthly and at the time of HeartLogic alerts (when the index crossed the nominal alert threshold value of 16), to assess the patient decompensation status. In-office visits were performed when deemed necessary.

Results: During the blinded phase, the HeartLogic index crossed the threshold value 24 times (over 24 person-years, 0.99 alerts/pt-year) in 16 patients. HeartLogic alerts preceded all hospitalizations and unplanned in-office visits for HF (sensitivity: 100%, median early warning: 38 days for hospitalizations, 12 days for HF visits). No clinical events were detected during or within 30 days of recovery of 10 HeartLogic alerts (unexplained alert rate: 0.41 per patient-year). Thus, the positive predictive value was 58% (14/24). During the active phase, 44 HeartLogic alerts were reported (over 46 person-years, 0.95 alerts/pt-year) in 30 patients. 26 (59%) HeartLogic alerts were judged clinically meaningful (i.e. associated with worsening of HF and/or influenced the clinician's decision to make changes to the subject's management).

Conclusions: In this first description of the use of HeartLogic in clinical practice, the algorithm demonstrated its ability to detect gradual worsening of HF. The results of the blinded phase of our experience favorably compare with those reported in the validation study. In the active phase, the HeartLogic index provided clinically meaningful information for the remote management of HF patients.

P1537

ICD-measured heart sounds and their correlation with echocardiographic indexes of systolic and diastolic function

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Background: Novel ICDs allow the estimation of first (S1) and third (S3) heart sounds (HS) using the embedded accelerometer. ICD-measured S1 and S3 were previously shown to significantly correlate with hemodynamic changes in acute animal models. The HeartLogic algorithm (Boston Scientific) measures and combines multiple

P1538: Longer desaturation and arrhythmias

	Crude Model	Model 1	Model 2						
	OR	CI al 95%	p	OR	CI 95%	p	OR	CI 95%	p
AF	1.36	0.43 a 4.27	0.59	1.68	0.51 a 5.56	0.38	4.04	0.82 a 19.88	0.08
Pause	0.97	0.18 a 5.1	0.98	1.05	0.19 a 5.58	0.95	2.36	0.29 a 18.91	0.41
VT	1.93	0.59 a 6.26	0.27	2.05	0.61 a 6.84	0.24	2.25	0.59 a 8.6	0.23
SVT	1.84	0.73 a 4.61	0.19	2.23	0.85 a 5.86	0.10	2.83	0.92 a 8.64	0.06
Paired	2.38	1.01 a 5.56	0.04	2.56	1.06 a 6.18	0.03	3.31	1.1 a 9.91	0.03
Tachycardia	1.99	0.75 a 5.29	0.16	2.05	0.76 a 5.50	0.15	3.58	1.02 a 12.59	0.04
VPB > 1 %	1.34	0.53 a 3.34	0.52	1.4	0.55 a 3.52	0.47	2.51	0.8 a 7.82	0.11
SVPB > 1 %	0.56	0.12 a 2.49	0.44	0.55	0.12 a 2.52	0.44	0.28	0.04 a 2	0.20

AF.- Atrial fibrillation, SVT.- Supraventricular tachycardia, SVPB.- supraventricular premature beats, , VT.- ventricular tachycardia, VPB.- ventricular premature beats

parameters, including S3 and S3/S1, in a single index to predict impending HF decompensation.
Purpose: To evaluate the echocardiographic correlates of ICD-measured S3 and S3/S1 in patients with ICD and cardiac resynchronization therapy ICD.
Methods: The HeartLogic feature was activated in 104 patients (76 male, 71±10 years, left ventricular ejection fraction (LVEF) 29±7%). At in-office visit, 96 patients underwent echocardiographic evaluation and parameters of systolic and diastolic function were correlated with S3 amplitude and S3/S1 ratio measured on the same day of the visit.
Results: S3 amplitude significantly correlated with the deceleration time of E wave (DT) (r=-0.30, p=0.010). Patients with S3 >0.86mG (median value) showed significantly lower values of DT than patients with lower S3 (197±72ms vs. 242±85ms, p=0.022). Interestingly, S3 was detected at auscultation only in 8 patients who did not show lower DT values at echocardiography (201±70ms vs. 222±84ms, p=0.543). S3/S1 ratio significantly correlated with the LVEF (r=-0.34, p=0.002). Patients with S3/S1 >0.36 (median value) showed significantly lower values of LVEF than patients with lower S3/S1 (32±8% vs. 38±7%, p=0.0003).
Conclusions: The ICD-measured HS parameters are significantly correlated with echocardiographic indexes of systolic and diastolic function. This confirms their utility for remote HF patient monitoring when considered as single sensors, and their potential relevance when considered in combination with other physiological ICD sensors that evaluate different aspects of HF physiology.

P1538

Risk of arrhythmias in relation to hypoxia in patients with heart failure and chronic obstructive pulmonary disease

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Introduction: Arrhythmias are present in Heart Failure (HF) and Chronic Obstructive Pulmonary Disease (COPD) patients. Currently, the prevalence and risk of arrhythmias in subjects with HF and COPD concomitant and their relationship to hypoxia are unknow, which could explain the greater morbidity and mortality when they coexist.
Objective: To determine the prevalence and risk of arrhythmias in relation to hypoxia in patients HF and COPD concomitant.
Methods: In a cross-sectional study, patients with a confirmed diagnosis of HF and / or COPD were included, asthma and cancer subjects were excluded. Arrhythmias were determinate by 24-hour Holter electrocardiogram and hypoxia by 24-hour pulse oximetry.
Results: Were evaluated 98 patients, divided into three groups (HF + COPD, COPD and HF), predominantly women (60.47% vs 56.10% and 28.579%, p= 0.10). Subjects with COPD + HF had a higher prevalence of ventricular premature beats (VPB) > at 1% (of the total beats in the study) (35.15 vs 23.26 and 7.69, p = 0.15 respectively), R/T phenomenon (41.46 vs 23.08 and 20.93, p=0.10 respectively) compared to the other groups. The rest of the variables were not statistically significant. Subjects with a longer desaturation time (> 327 minutes/day) had major risk to arrhythimias: atrial fibrillation, OR: 4.04, CI 0.82-19.88, supraventricular tachycardia, OR: 2.83, CI95%: 0.92-8.64, paired extraheart beats OR: 3.31, CI95%: 1.1-9.91, sinus tachycardia OR: 3.58, CI95%: 1.02-12.59, and VPB > 1% OR: 2.51, CI95%: 0.08-7.82 compared with subjects with low desaturation time (<327 minutes/day) adjusting for age, sex, LVEF and oxygen use.
Conclusions: HF and COPD concomitant had higher prevalence of arrhythmias. The risk of arrhythmias increases in long desaturation time.

P1539

Efficacy of cardiac resynchronization therapy at severe chronic heart failure

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On behalf of: B.Akhyt. R.Rekvava. K.Koshumbayeva. R. Kuanyshbekova
Funding Acknowledgements: Research Institute of Cardiology and Internal Diseases, Almaty

Introduction: Cardiac resynchronization therapy (CRT) has emerged as the predominant electrical treatment strategy for patients on pharmacological therapy who present chronic heart failure (CHF) with low ejection fraction. The objective of this study was to investigate whether cardiac resynchronization therapy improved morbidity among patients with heart failure.
Materials and methods: This follow-up study enrolled 70 adult patients undergoing CRT device implantation. Inclusion criteria was presence of heart failure (CHF New-York Heart Association functional class III, IV) and left bundle branch bloc. We performed measurements of cardiac contraction parameters by echocardiography (on the Vivid 7 GE) at the beginning of the study and 12 month after CRT device implantation. All patients received beta-blockers, angiotensin-converting enzyme inhibitors/angiotensin II receptor antagonist, diuretics (including aldosterone antagonists), antiplatelet agents, anticoagulants and HMG-GoA Reductase Inhibitors (up to indications).
Results: We observed significant increase in ejection fraction 12 months after CRT implantation (28.3 ± 0.9 % to 37.9 ± 0.9%, $p < 0.0001$ vs 0). There was no significant difference in left ventricle end diastolic dimension and mean pulmonary artery pressure. Intraventricular conduction delay significantly decreased in 12 month after CRT device implantation (238 ± 23.7 ms, $p < 0.05$). Interventricular conduction delay showed significant decrease after CRT device implantation (29.7 ± 5.6 ms for 12 month $p < 0.005$). We observed significant trend to increase in diastolic filling time (44.7 ± 0.98 for 12 month, at 0 point, $p < 0.05$). Positive changes in the parameters of central hemodynamics were accompanied by improvement of the clinical state of patients (reduction in dyspnea, increased tolerance to physical exercise).
Conclusion: Our results suggest that implantation of CRT device for patients with heart failure helps to improve contraction and relaxation of heart muscles, but has no positive effect on the end diastolic dimension of left ventricle and mean pulmonary artery pressure.

P1540

Super responders to cardiac resynchronization therapy- A terciary centre experience

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Introduction: Patients submitted to Cardiac Resynchronization Therapy (CRT) implantation may develop response patterns that are higher than expected with almost complete normalization of clinical and echocardiographic parameters (super-responders).
Purpose: To characterize patients (pts) who underwent CRT implantation and to evaluate clinical and echocardiographic characteristics of super-responders.
Methods: Restrospective study of a single center analysing patients submitted to CRT implantation in the last 6 years (2012-2018). Super-responders were classified as patients who normalized left ventricular ejection fraction (LVEF >= 50%) at 6 months after implantation.

Results: We analysed 103 pts, 65% males with mean age of 70± 10 years, with optimized medical treatment. Non ischemic etiology was present in 74,5% of pts. 68,1% pts had QRS > 150ms and 80,9% had left bundle brunch block (LBBB). Mean LVEF was 27,9±7,5%, mean left ventricular end-diastolic volume índex (LVEDVI) was 113± 38 ml/m2. By the time of CRT implantation, 67% of pts were in SR (n=69) and 33% had AF (13,6% with paroxystic AF and 19,4% with persistent AF), and NYHA class 3 was present in 56,3% of pts. Subsequent hospitalizations occurred in 18,4%, and 11 pts died. 76,7% of pts were considered responders. 21,4% of pts were considered super-responders (n=22).
Comparing both groups (super-responders vs global population), we found no differences between groups in respect to gender (p=0,990), presence of previous sinus rythm (SR) (p=0.156), etiology (p= 0,053) and previous QRS width (p=0,086). There were also no differences in long term outcomes (hospitalizations (p=0,371) or death (p=1)). However, super-responders had higher baseline ejection fraction (32 vs 26%, p= 0,002), lower left ventricular end-diastolic volume (167 vs 225 ml /m2, p=0,016) and lower left ventricular end-systolic volume (112 vs 156 ml/m2, p=0,016).
Conclusion: In this population, the super-responders appear to be pts with less advanced heart disease at baseline, with higher LVEF and lower left ventricular volumes. Surprisingly, we found no predictors of super-response in this population, not confirming previous studies that associated female sex, non-ischemic etiology and wider QRS duration with a super-response. This raises the question whether there are others non-recognized predictors of CRT response that would improve selection of patients for this therapy. Further studies are necessary to clarify this.

P1541

Bachmanns bundle pacing combined with his bundle pacing a new approach to reverse cardiac remodeling

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On behalf of: Students' Scientific Association, Wroclaw Medical University

The treatment of patients with heart failure and concomitant atrioventricular conduction delay is difficult. The recommendations indicate the possibility to use the classic resynchronization but in the presence of narrow QRS-complex such approach could be even harmful. The therapeutic option for those patients to re-establish the physiological atrioventricular mechanical sequence is the permanent His-bundle pacing. The use of Bachmann's-bundle pacing can additionally correct the prolonged interatrial conduction thus further contribute to the echocardiographic and clinical improvement.
Aim of the study is to assess the influence of Bachmann's-bundle pacing and His-bundle pacing on the reversed remodeling of the heart in patients with heart failure and atrioventricular block.
The study group included 11 patients (5 women and 6 men), aged 73+/-9 years undergoing cardiac resynchronization using Bachmann's-bundle pacing and permanent His-bundle pacing from LV channel. All the patients had narrow QRS-complex which prevented us to use classic resynchronization. Five CRT-D and 6 CRT-P devices were implanted according to the ejection fraction and ventricular arrhythmia risk assessment. In all patients the direct His-bundle pacing was successfully achieved, selective in 10 and non-selective in 1 patient. The mean follow-up period was 8 months (1-18 months). The echocardiographic, clinical and ECG results are presented in the table:
Conclusions: 1. The correction of atrioventricular and interatrial conduction delay resulting in improvement of atrioventricular mechanical coupling can contribute to the reversed remodeling of the heart. 2. This also improves the patient's functional status. 3. In some patients this approach could lead to the normalization of echocardiographic parameters of the left ventricle.

	Before	After	P value
LVEDD (mm)	65.1+/-6.6	59.1+/-4.6	<0.05
EF (%)	38.2+/-8.2	49.5+/-7.2	<0.01
NYHA (1-4)	2.6+/-0.5	1.2+/-0.4	<0.01
PQ (ms)	327.3+/-31.0	185.5+/-6.9	<0.01

P1542

Responders and non-responders after cardiac contractility modulation in patients with chronic heart failure and narrow QRS.

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Background: Cardiac contractility modulation (CCM) is a novel method for treating patients with moderate-to-severe chronic heart failure (CHF) despite optimal medical therapy. Recent studies of CCM used left ventricle ejection fraction (LVEF) and peak O2 parameters for responders assessment, however data regarding brain natriuretic peptide (BNP) level as additional efficacy endpoint in patients with CCM are limited.
Purpose: To assess the number of responders after CCM therapy in moderate-to-severe CHF patients based on LVEF, end diastolic volume (EDV) and BNP.
Methods: The CCM device was implanted in 15 CHF patients (14 men, mean age 60±5 years). All patients had LVEF 35%, and QRS duration < 120 msec during sinus rhythm. The responder criteria was changing at least one of the following paraments on 10% (increasing LVEF, decreasing EDV and BNP). Patients were followed up during 12 months after CCM implantation with Echo and BNP level assessment each 3 month within observation period.
Results: There were no complications during implantation procedure. At the 12 months follow up 10 (67%) patients had achieved one or more responder criteria. One patient (6,7%) demonstrated increasing of LVEF and decreasing EDV, 3 (20%) patients had decreased BNP level and 6 (40%) patients developed improvement of all three parameters. In total study the was a tendency to improvement as compared to baseline, but without statistical significance (LVEF-31±5% vs 35±7%, p= 0,6; EDV - 148±44 ml vs 142±41 ml, p= 0,7; BNP-285±313 pg/ml vs 232±199 pg/ml, p=0,367, respectively). Two patients died due to heart failure progression within follow up.
Conclusion: The cardiac contractility modulation therapy can be acceptable method in moderate-to-severe chronic heart failure patients. More studies are needed to assess number of responders and clinical outcomes in larger patient's cohort.

P1543

Day-case implant of complex pacing devices is safe and preferred by patients; a 4 year experience.

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Background/Introduction: Across Europe, there is wide variation in length of stay of patients following pacemaker device procedures, requiring up to a two night hospital stay. We have previously reported the safety and acceptability of Day-Case pacing for bradycardia and our unit has operated a Day-Case Implant service for simple pacing for many years, but patients undergoing implant of complex devices; Cardiac Resynchronisation Therapy (CRT) or Implantable Cardioverter Defibrillator (ICD) stayed overnight. In August 2016 our institution introduced an extensive policy of Day-Case procedures, including implant of complex devices.

	Group A (overnight stay)n=50	Group B (Day-Case)n=60	p-value
Satisfied withdischarge strategy, n (%)	45(90)	57 (95)	0.46
Would have preferredthe alternative strategy, n (%)	17 (34)	9 (15)	0.024
Satisfactory pre-discharge information, n (%)	48 (96)	55 (93.2)	NS
Adequate analgesia, n (%)	49 (98)	50 (83.3)	0.021
Did the dischargestrategy cause inconvenience for family / friends? n (%)	5 (10)	8 (13.3)	NS
Long delay prior todischarge, n (%)	20 (40)	6 (10.1)	0.0003

NS - non-significant

Purpose To assess the feasibility, acceptability and safety of Day-Case implant of complex pacing devices.
Methods A single-centre retrospective study. Questionnaires were distributed to patients who had received elective complex device implant between August 2015

and August 2017, before (Group A- 50 patients) and after (Group B-60 patients) introduction of the Day-Case policy. In addition patients' electronic medical records were reviewed from August 2014 to August 2018 and the presence or absence of complications at first follow-up clinic (6 weeks) was recorded for Group A (105 patients) and Group B (120 patients).
Results Findings from the questionnaires are shown in Table 1. There were no adverse findings at 6 weeks that would have been avoided by or caused by overnight stay at implantation. Complications were recorded at 6 weeks in 11 subjects in Group A (10.5%) and 8 subjects (6.7%) in Group B. Between groups comparisons were made using Fisher's exact test.
Conclusions Day-Case implant of complex pacing devices appears safe and is preferred by most patients. Although most patients in both groups received appropriate analgesia, it is important to ensure that this is not compromised for day-case patients. While this approach may not be suitable for all patients, we suggest that overnight stay for elective complex device implantation should be the exception. As well as being better for patients, there is a significant economic advantage of this approach.

P1544

PR interval prolongation, still a marker of worse outcome in patients treated cardiac resynchronization therapy patients

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Background: Patients without left bundle branch block (non-LBBB) generally derive little benefit from CRT. Recently, CRT has been suggested to be beneficial in patients with prolonged PR interval. However, in the general HF population the presence of a prolonged PR interval is associated with worse outcome.
Purpose: To evaluate the association of a prolonged PR interval with clinical outcome in CRT-treated LBBB and non-LBBB patients.
Methods: Pre-implantation 12-lead ECGs from 1.245 consecutive CRT patients without atrial fibrillation from 3 implanting centres in the Netherlands, were evaluated for the presence of LBBB QRS morphology and PR interval prolongation (≥230ms). The primary endpoint was the combination of left ventricular assist device implantation, cardiac transplantation and all-cause mortality.
Results: Patients with LBBB (n=620) showed a significantly shorter mean PR interval than non-LBBB patients (n=625) (187ms vs 198ms, p<0.001). Prolonged PR interval was found in 12.6% of patients with LBBB and 19.2% of non-LBBB patients (p=0.001). In non-LBBB patients with PR prolongation event rate was significantly higher (54 vs 34%, p<0.001). In LBBB patients there was a non-significant difference (28 vs 20%, p=0.1). Regression analyses (figure 1) showed similar results, with a significantly higher odds of experiencing an event in non-LBBB patients with PR prolongation (2.24 [1.68, 2.99], p<0.001), and a trend to significantly higher odds in LBBB patients with PR prolongation (HR 1.61 [1.02, 2.56], p=0.04).
Conclusion: In HF patients treated with CRT, PR prolongation is negatively associated with long term clinical outcome. This association seems to be stronger in non-LBBB patients than in LBBB patients.

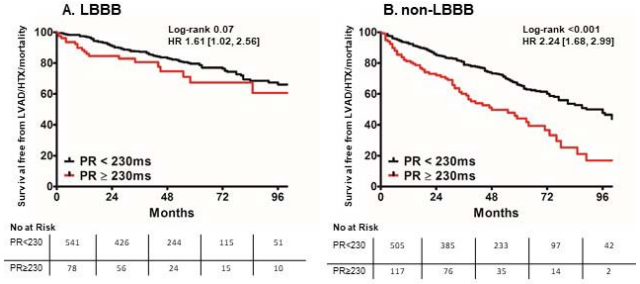

Figure 1.

P1545

LV only fusion pacing CRT without RV lead: clinical and echocardiographic characteristics of super-response

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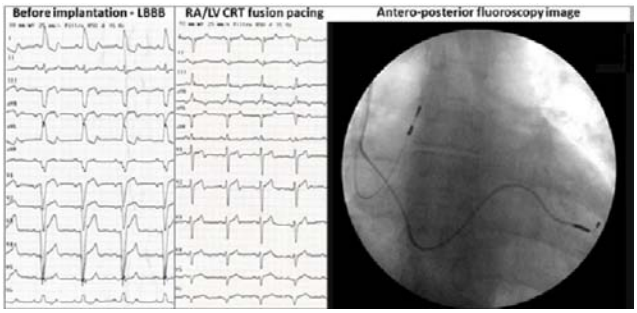
Background: LV only CRT pacing is an accepted option stated in the current guideline, however few data exist regarding fusion pacing super-response, even fewer for CRT without RV lead. Purpose: To identify predictors of super-responders (SRs) in this population.
Methods: LV only CRT patients (pts) with right atrium/left ventricle (RA/LV) DDD pacing system implanted in 3 CRT centers in Romania with nonischemic LBBB low EF cardiomyopathy were included. Device interrogation, exercise test, echocardiography and individualized drug optimization were performed each 6 months during close follow-up. SRs pts were defined those with left ventricular end-systolic volume (LVESV) improvement ≥30% and stable ejection fraction (LVEF) ≥45%.
Results: 16 pts (29%) were SRs out of 55 pts (29 male, 62±10y.o) initialy included. The mean follow-up was 37±18 months. Patients were divided in two groups: SRs and nonSRs (35 responders/4 hyporesponders). Four predictors were found in SRs group (males 56%): younger age (SRs 57±13y.o vs. non SRs 64±9y.o, p=0.0269), higher baseline LVEF (SRs 29±4% vs. nonSRs 26±5%, p=0.0382), lower pulmonary arterial systolic pressure (SRs 35±10mmHg vs. nonSRs 52±16mmHg, p=0.0003) and lower left atrium (LA) volumes (SRs 82±27ml vs. nonSRs 118±30ml, p=0.0001). Baseline severe MR was found in 19% of SRs vs. 50% in nonSRs group.
Conclusions: SRs in carefully selected pts in LV only CRT without RV lead is significative. Higher baseline LVEF, mild pulmonary arterial hypertension, lower atrial volumes and younger age were independently associated with super-response.

	LV only CRT SRs(N=16)	NonSRs(N=39)	p
Age (years), mean±SD	57±13	64±9	0.0269
QRS interval (ms), mean±SD	164±17	163±18	0.8505
QRS axis (degree), mean±SD	-18±37	-23±36	0.6458
PR interval (ms), mean±SD	192±27	186±34	0.5338
EF (%), mean±SD	29±4	26±5	0.0382
LV EDV (ml), mean±SD	222±97	256±71	0.1566
LV ESV (ml), mean±SD	181±96	183±63	0.9281
LA volume (ml), mean±SD	82±27	118±30	0.0001
PASP (mmHg), mean±SD	35±10	52±16	0.0003



P1546

Baseline characteristics determine long-term outcome to CRT, intermediate endpoints identify those at risk of adverse events.

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Background: cardiac resynchronization therapy (CRT) reverses cardiac remodelling, reduces heart failure complaints and heart failure (HF) hospitalizations, and finally reduces mortality in the long term. However it is not known whether intermediate endpoints are independently associated with long term outcomes in CRT patients.
Purpose: To evaluate the individual associations of endpoints with long term outcome in CRT patients.
Methods: 874 patients from a multicentre retrospective CRT database were included in this study. Intermediate endpoints were improvement in NYHA functional class and echocardiographic LVESV reduction (≥15%) at 6 months post-implantation, and HF hospitalization within the first year post-implantation. Long term outcome was the combined event of LVAD implantation, cardiac transplantation or all-cause mortality.
Results: The absence of NYHA class improvement (HR 1.36 [1.06, 1.75]) and LVESV reduction (HR 1.94 [1.53, 2.47]) are significantly associated to the occurrence of long term events. HF hospitalization (HR 5.00 [3.36, 7.44]) is also significantly associated to the occurrence of long term events. However, correcting for baseline parameters, intermediate endpoints occurring during follow-up are not independently associated to long term outcome in CRT patients.
Conclusion: Intermediate endpoints like functional improvement, echocardiographic remodelling and HF are all associated to long term outcome, and events during follow-up therefore identify those patients at increased risk of poor long term outcome. Though this association is not independent from baseline characteristics, which puts emphasis on the importance of patient selection for CRT.

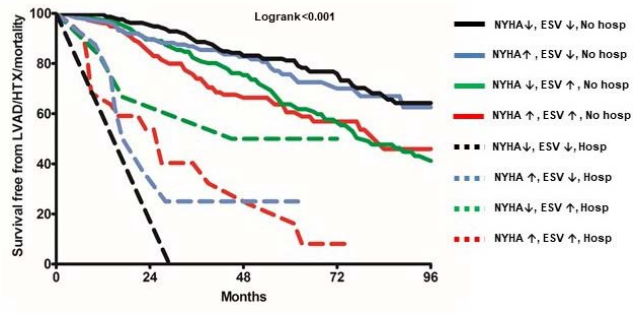

Figure 1.

P1547

Prognostic significance of cardiac sympathetic activity and dyssynchrony in response to cardiac resynchronization therapy

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Purpose: The purpose of the study was to identify the scintigraphic predictors of the cardiac resynchronization therapy efficacy (CRT).
Methods: This study included 28 chronic heart failure patients (mean age of 56.5±10.2 years; 17 male; NYHA class III, mean QRS = 161.2±17.56 ms). Before CRT all patients underwent 123I-metaiodobenzylguanidine (123I-MIBG) scintigraphy as well as rest myocardial perfusion imaging (MPI) with 99mTc-MIBI for cardiac sympathetic activity and myocardial perfusion evaluation, respectively. Early and delayed heart to mediastinum ratio (eH/M and dH/M) as well as 123I-MIBG washout rate (WR) were calculated. According to the MPI we analyzed Summed Rest Score (SRS). Before CRT and six months after all patients underwent gated blood-pool SPECT (GBPS) for left and right ventricular end-systolic (ESV) and end-diastolic (EDV) volumes, ejection fraction (EF) and dyssynchrony (intra- and interventricular)evaluation. All scintigraphic images were acquired on the hybrid SPECT/CT unit with CZT detectors.
Results. Six months after CRT all patients were divided into two groups: (1) responders (n=15) – LV ESV decreased by ≥15% or LV EF increased by ≥5%; (2) non-responders (n=13) - LV ESV decreased by <15% and LV EF increased by <5%. Prior to CRT, significant differences in the following preoperative scintigraphic parameters between responders and non-responders were found: eH/M (2.42 and 1.87; $p<0.05$), dH/M (1.89 and 1.78; $p<0.05$), LV EDV (271 and 299; $p<0.05$); LV ESV (206 and 227; $p<0.05$) and interventricular dyssynchrony (109 and 62; $p<0.05$). Correlation analysis demonstrated the presence of significant association between baseline dH/M value and the LV volumes and EF 6 months after CRT: LV EDV ($r=-0.78$, $p < 0.5$), LV ESV ($r=-0.833$, $p < 0.5$) and LV EF ($r = 0.904$, $p < 0.5$) in (1) group. Moreover, only in responder group dH/M was significant association with baseline RV EF (-0.702, $p<0.05$). Univariate Cox proportional hazard analysis showed that dH/M and Interventricular dyssynchrony were strongly related to CRT response. In multivariate analysis, cardiac dH/M (hazard ratio=4.25; 95% confidence interval 1.4-12.92) and IVD (hazard ratio=1.01; 95% confidence interval 1.003-1.03) were the only independent predictors of response to CRT.
Conclusion: In multivariate analysis, both dH/M and IVD were independent predictors of CRT response. The results of 123I-MIBG scintigraphy with gated blood-pool SPECT may be used for prediction of the efficacy of CRT.

P1548

Connection of clinical indicators and various response to cardiac resynchronization therapy in patients with chronic heart failure and atrial fibrillation

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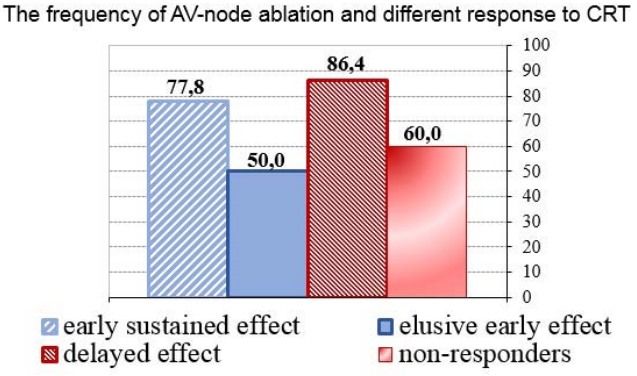
Background. Previously any form of atrial fibrillation (AF) was considered a contraindication to cardiac resynchronization therapy (CRT). The search for ideal responders remains relevant and is widely discussed.
Purpose: To assess the echocardiographic response to CRT depending on the etiology, severity of chronic heart failure (CHF) and comorbidities in persons with persistent AF.
Methods. The study included 101 patients with CHF NYHA II – III, left ventricular ejection fraction <35% and QRS≥130 ms. All patients underwent CRT. Then atrioventricular node ablation (AVNA) was performed to 83 patients, but 18 patients refused it. The criterion for the effectiveness of CRT was a decrease in the end-systolic volume ≥15%. The survey was conducted initially, after 3 and 12 months from the date of inclusion in the study.



Picture 1

Results. The study did not reveal statistically significant differences between patients with ischemic and non-ischemic etiology of CHF in terms of the duration and sustainability of a positive response to CRT. Patients with early and delayed response (3 and 12 months) were characterized by significantly higher median values of the 6-minute walk test. By the 12th month after CRT the proportion of respondents increased both in NYHA II and III patients, but a comparative analysis of the frequency of different responses to CRT revealed that in NYHA II there were significantly more patients with early response and preservation of effect by 12 month (61.0% compared with 30.0% in NYHA III, $p = 0.003$). Among those with NYHA III there were more non-responders (27.0% compared to 5% with NYHA II, $p = 0.008$). Type 2 diabetes mellitus with the same frequency was diagnosed both in responders and non-responders by the 12th month (23.8% and 20.0%, respectively, $p = 0.709$),

but more often it was detected in patients with an 'elusive' early CRT effect. Among delayed responders the proportion of individuals with AVNA was significantly higher than of non-responders (81.6% and 57.1%, p = 0.031), which confirms the need for ablation of the AV node. Picture 1 demonstrates the frequency of performed ablation among patients with CHF and different response to CRT.
Conclusions. The early sustained response to CRT was more commonly detected in NYHA II patients. There were more non-responders among those with NYHA III. Patients with an early and sustained response to CRT were characterized by higher median values of the 6-minute walk test. Diabetes mellitus was more often detected in individuals with the "escape" of the early CRT effect. A smaller proportion of AVNA was found in the subgroup with an elusive effect, which allows us to conclude that ablation of the AV node increases the effectiveness of CRT in patients with AF.

P1549
Normal cardiac autonomic control in good CRT responders is not reliable predictor of future major ventricular arrhythmias in patients with severe heart failure.

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Purpose: Although cardiac resynchronization therapy (CRT) is expected to reduce the risk of arrhythmias in heart failure patients (pts) in long-term by the induction of reverse remodeling, its real impact in severe ventricular arrhythmias is not clear. Aim of the study was to analyze the ventricular arrhythmias ensuing in pts receiving CRTD and to combine it with a random assessment of cardiac autonomic control.
Methods: The study population consisted of 70 severe heart failure pts with CRTD, (13 ♀ and 57♂), mean age 61±15 years, with underlying disease ischemic cardiomyopathy in 36 and dilated cardiomyopathy in 34. Forty-six pts received CRTD as primary prevention (group A) and 20 pts as secondary prevention (group B). We analyzed the occurrence of ventricular tachycardia including appropriate VT therapies.Fifty-one pts underwent 24h Holter monitoring HRT analysis with calculation of 2 parameters, TO and TS. Abnormal values: TO>0, TS<2.5msec/RR. Pts were defined as HRT (+) when TO or/and TS were abnormal and as HRT (-) when both TO and TS were normal or when HRT could not be calculated because of none or too few suitablePVCs.
Results: Fifty-two pts were found as clinical responders, 8 super responders and 11 pts poor responders. Seven pts died of pump failure. After 10 years follow-up including at least one device replacement, we found almost similar incidence of sustained ventricular tachycardia (VT) (15%) in both groups, irrelevant to clinical improvement and underlying substrate. Pts who received CRTD as secondary prevention, although good responders, continued to experience VT and appropriate therapies. HRT was found abnormal in 51% of all pts, responders or not.
Conclusion: Due to electrical and mechanical heterogeneity among severe heart failure pts the antiarrhythmic effect of CRTD is unpredictable. The ventricular arrhythmia risk in CRT pts is independent to CRT-induced improvement of the failing heart and the cardiac autonomic status.

Chronic Heart Failure-Pathophysiology and Mechanisms

P1550
Endomyocardial injections of autologous mesenchymal stem cell for treatment the patients with non-ischemic cardiomyopathy

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Background and purpose: The aim of our study was to determine the optimal areas of viable myocardium for the autologous mesenchymal stem cell (MSC) endomyocardial injections in treatment of Non-ischemic Cardiomyopathy (NICMP) patients with end-staged chronical heart failure (CHF).
Methods. The study included 30 patients (mean age 45.8 ± 3.4 years; 5 females, 15 males) with NICMP and end-staged CHF. All patients underwent echocardiography (EchoCG), heart magnetic resonance imaging (MRI), electromechanical myocardial mapping (EMM), endomyocardial injections of 0.2 ml autologous MSC culture (CD105+, CD90+, CD73+ cells) into akinetic and hypokinetic myocardial segments using endovascular method.
Results: After 12 months from MSC transplantation, an improvement of local contractility (LC) was found in 21.49% segments, 78% of which were akinetic (p = 0.018). We separated akinetic segments into two groups: A – segments with improvement of LC, B – segments with a lack of positive dynamics or worsening of LC. Significant differences were observed between groups A and B before MSC transplantation in median values of left ventricle (LV) myocardial systolic thickness (6 [5; 7] mm in group A vs. 4 [3; 6] mm in group B, p = 0.013), LV myocardial diastolic thickness (5 [3; 67] mm in group A vs. 3 [3; 5] mm in group B, p = 0.038) as confirmed by heart MRI; LV longitudinal strain (-8 [-10; -5]% in group A vs. - 5 [-9; -3]% in group B, p = 0.028) as confirmed by EchoCG; linear local contractility (5.8 [3.1; 7.5]% in group A vs. 3.9 [2.2; 5.0]% in group B, p = 0.049), unipolar voltage (9.0 [8.2; 10.8] mV in group A vs. 7.4 [6.8; 9.6] mV in group B, p = 0, 050) as confirmed by EMM. Characteristics of ROC-curves, optimal cut-off values for the mentioned parameters are presented in the table below.
Conclusions: Our study shows that the optimal areas of LV myocardium for MSC endomyocardial injections for NICMP patients with CHF are akinetic segments with longitudinal strain values ≤-7%, myocardial systolic thickness ≥6 mm, myocardial diastolic thickness ≥4 mm, linear local contractility of myocardium ≥5% and unipolar voltage ≥8.7 mV.

Parameter	Characteristics ofROC-curve	Cut-off value		
Area under curve	Standard error	95% Confidence interval		
LV longitudinal strain, %	0.61	0.13	0.50-0.71	≤-7
LV systolic myocardial thickness,mm	0.70	0.11	0.55-0.89	≥6
LV diastolic myocardial thickness,mm	0.77	0.10	0.58-1.0	≥4
Unipolar voltage, mV	0.63	0.15	0.52-0.94	≥8,7
Linear LC of myocardium, %	0.62	0.14	0.54-0.90	≥5

P1551
Altered number of apoptotic-modified endothelial cells originated micro vesicles predict phenotypes of heart failure

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Background: Heart failure (HF) remains a global health problem with increased risk of premature death and extremely high economic and social burden. Numerous factors corresponding to HF severity, such as some hormones (angiotensin-II, aldosterone, endothelial-1), pro-inflammatory cytokines, chemokines, components of oxidative stress may be triggers of an apoptosis of endothelial cells and thereby negatively influence on vascular function. Apoptotic-modified endothelial cells release micro vesicles (MVs) that are not just cargo of several active molecules, peptides, growth factors, and microRNAs participating in cell-to-cell cooperation, but they are able to directly injury endothelium and sub-intima layer inducing microvascular inflammation and extracellular matrix accumulation
The aim of the study was to evaluate the associations between signature of MVs and biomarkers of fibrosis, inflammation and cardiac remodeling in patients with different phenotypes of chronic HF.
Methods: The study cohort consisted of 388 prospectively involved subjects with established chronic HF. Phenotype of HF was determined according to left ventricular ejection fraction (LVEF) value per contemporary clinical guideline. HFrEF (LVEF ≤40%), HFmrEF (41-49%) and HFpEF (LVEF ≥50%) were determined. All biomarkers were measured at baseline.
Results: The number of circulating CD31+/annexin V+ MVs in HFpEF patients was significantly different from both HFrEF and HFmrEF individuals, but it was similar in HFrEF and HFmrEF patients. The number of circulating CD144+/annexin V+ MVs in HFrEF patients was significant higher to HFmrEF and HFpEF. We determined that a combination of number of circulating CD31+/annexin V+ MVs and galectin-3 (AUC=0.68; 95% CI = 0.61 - 0.77; P=0.001) was the best predictor of HFpEF. The predictive values of sST2 (AUC=0.65; 95% CI = 0.60 - 0.69), number of circulating CD31+/annexin V+ MVs (AUC=0.63; 95% CI = 0.58 - 0.69) alone and their combination (AUC=0.65; 95% CI = 0.59 - 0.70) for HFmrEF did not distinguished significantly (P=0.48). The double combinations of number of circulating CD144+/annexin V+ MVs and sST2 (AUC=0.70; 95% CI = 0.66 - 0.75) or number of circulating CD144+/annexin V+ MVs and galectin-3 (AUC=0.71; 95% CI = 0.65 - 0.76) were the best prognosticators for HFrEF.
Conclusion: we found that number of circulating CD31+/annexin V+ MVs may improve a prediction of galectin-3 for HFpEF, and that number of circulating

CD144+/annexin V+ MVs is able to increase predictive capabilities of sST2 and galectin-3 for HFrEF

P1552

The plastics of atrioventricular valve in patients with chronic heart failure and severe left ventricular dysfunction

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The patients with severe mitral regurgitation (MR) with severe left ventricular systolic dysfunction (LVHD) are potential applicants for orthotopic heart transplantation (OHT). However, the issue of atrioventricular valve repair in patients with severe LV dysfunction is currently debatable, in that the operative risk may exceed the expected benefit.
The purpose to estimate the efficiency of atrioventricular valve repair in patients with CHF and LVHD.
Methods we included patients with ischemic and non-ischemic cardiomyopathy (class III-IV of NYHA) underwent atrioventricular valve repair from 2012 to 2017 (n = 149). The men were 140 (94%), women - 9 (6%). The mitral insufficiency was corrected according to Carpentier. The tricuspid valve (TV) was operated according to DeVega. The isolated MR repair were performed in 33 (22%) patients, MV + TV repair in 116 (78%) patients. The end points were considered death, OHT. The intermediate points were recurrent regurgitation (RR) after surgical correction of MR. We performed echocardiography, MRI, 6-minute walk test before and 6 months after operation, NTproBNP, CRP. We were assessed the Minnesota Quality of Life Questionnaire (MQLQ).
Results and discussion RR (≥2 degrees) in early postoperative period was detected in 25 (17%) patients. Preoperative MR decreased from severe to moderate in 19 (13%) cases, to mild in 103 (69%). RR was absent in 21 (14%) patients. Patients with RR on the MV showed a significant increase LV volume sizes by 12 months after surgery: Dynamics indexes (DI) End diastolic volum – (Me(LQ;UQ)) befor 110 (98;117) and 12 months after surgery 88 (67; 90), respectively (=0,039); End systolic volum – 105 (93;113) and 88 (76; 105), respectively (p = 0.047). In patients with no RR, a significant decrease in LV size was recorded by 12 months after surgery: End diastolic dimension – befor 72 (67; 78) and 12 months after surgery 66 (62; 75) (=0,002). End systolic dimension : befor 62 (57; 67), after 57 (50; 60) (=0, 01). A statistically significant decrease in size LV, RV2, LVEF, Pap was observed during the observation period: Left ventricle befor 51 (47; 55) after 12 months 48 (46; 53) (=0,05); Right ventricle befor 80 (75; 86) after 77 (70; 80) (=0,038); Ejection Fraction, B mode befor 28 (25; 29) after 33(32; 35) (=0,05); Pulmonary artery pressure- befor 48 (40; 56) after 38 (30; 44) (<0,001).
There were no significant biomarker changes levels after surgery (p> 0.05). NT-proBNP levels was decreased (p = 0.087). 6-minute walk test distance increased in all patients (from 243 (188; 265) after 348 (205; 325), p <0.03) and the quality of life improved according to MQLQ (with 74 (55; 85) points to 38 (25; 48) points, p = 0.04).
Conclusions Thus, surgical valve repair of MR in patients with severe HF and severe LVHD improves cardiac hemodynamics, clinical status, quality of life and increases patient life expectancy free of heart transplantation

P1553

Population pharmacokinetics and pharmacodynamics of vericiguat in heart failure patients with reduced ejection fraction

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Background: Vericiguat is a once-daily, novel oral stimulator of soluble guanylate cyclase (sGC) in development for chronic heart failure (HF).
Purpose: This analysis aimed to characterise the pharmacokinetics (PK) and PK/pharmacodynamic (PK/PD) relationship of vericiguat in HF patients with reduced ejection fraction (HFrEF).
Methods: Non-linear mixed-effects modelling was used to develop a population PK/PD model describing vericiguat PK and PK/PD relationships based on data from 454 patients with HFrEF from the Soluble Guanylate Cyclase Stimulator in Heart Failure with Reduced Ejection Fraction Study (SOCRATES-REDUCED; NCT01951625).
Results: Vericiguat PK was well-described by a one-compartment model parameterised by apparent clearance (CL/F), apparent volume of distribution (V/F) and an absorption rate constant (ka). The population mean estimates (inter-individual variability [%]) for CL/F, V/F and ka were 1.3 L/h (38.5), 38.9 L (28.2) and 1.5 1/h (103.0), respectively. Clearance and V/F were allometrically scaled by body weight. Body weight and albumin were identified as covariates for ka. Age, body weight, creatinine clearance standardised by body weight and bilirubin partially explained the variability in CL/F, and gender and body weight partially explained the variability in V/F. Acute haemodynamic response after vericiguat intake (post-dose measurement at 2 h ± 15 min) was investigated using linear regression analysis. This revealed a maximum observed concentration (Cmax)-dependent lowering of systolic blood pressure (SBP) on Day 1 (Visit 1; when dosing started at 1.25 mg), but not on Day 56 (Visit 4; when most patients had been up-titrated to 10 mg vericiguat). This finding suggests that the studied vericiguat dose range (up to 10 mg) caused no long-term decrease (Day 56) in SBP in patients with HFrEF. For heart rate, no changes from pre- to post-dose were observed at either Visit 1 or Visit 4. A PK/PD correlation analysis of change from baseline in N-terminal pro-B-type natriuretic peptide (NT-proBNP), did not show any significant relationship. In contrast, an exposure- and time-dependent turnover PK/PD model for NT-proBNP considering production rate as a surrogate for physiological release of natriuretic peptide levels in response to myocardial stress in HF and an elimination rate as a surrogate for urinary excretion, clearly demonstrated an exposure-dependent reduction of NT-proBNP by vericiguat on top of standard of care (SoC) compared to SoC alone. This vericiguat-dependent reduction of NT-proBNP was dependent on baseline NT-proBNP values and duration of treatment.
Conclusion(s): Vericiguat has predictable PK, minor haemodynamic effects with low clinical impact at initial co-administration with SoC but no long-term haemodynamic effects in patients with HFrEF. The NT-proBNP turnover model showed exposure-dependent reduction of NT-proBNP with vericiguat which was dependent on disease severity.

P1554

Slow and steady wins the race- the managment of tachycardia induced cardiomyopathy

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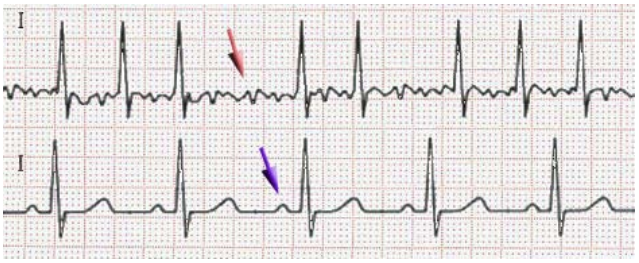
Aims & objectives: Heart Failure (HF) and Atrial Fibrillation (AF) coincide in many patients. They share common risk factors and can both cause and exacerbate each other. The aim of this study was to examine the management of patients presenting to a regional 440 bed hospital who had a tachycardia induced cardiomyopathy as a result of their AF.
Methods Included were patients known to the heart failure support service that had a diagnosis of tachycardia induced cardiomyopathy. In addition, a hospital information patient enquiry (HIPE) system search was undertaken for primary admission with AF and secondary diagnosis of HF and the medical chart reviewed. Patients with known ischaemic heart disease or preserved ejection fraction HF were excluded. Data was analysed using SPSS.
Results48 patients were identified, with a mean age of 67yrs (range 44-88). The majority had AF and HF diagnosed at the same hospital presentation. Hypertension was the most common comorbidity.
96% of patients had an ejection fraction (EF) of <40% at presentation. The majority of patients were appropriately anti coagulated and had good levels of HF medications (ACEi / Beta-blockers) although MRA use was low.
44% underwent direct current cardioversion with an additional 6% reverting to sinus rhythm chemically or spontaneously. While the whole group showed increased EF at one year, those who remained in SR had markedly better improvements with only 12% remaining at EF <40% compared to 46% of those who were in AF at follow up.
Conclusion Tachycardia induced cardiomyopathy is a potentially reversible cause of heart failure and when sinus rhythm is restored it resulted in substantial increases in EF. Further study is required to identify how this group of patients could be identified early for rhythm control strategy in order to improve outcomes.

Results

	Baseline	Follow up SR	Follow up AF		At follow up
EF <25	31%	0%	4%	ACEi	95%
EF 25-40	65%	0%	23%	BB	80%
EF 41-54	4%	65%	61%	MRA	20%
EF>55	0%	35%	12%	OAC	90%
LA normal	2%			SR	39%
LA mild dilated	19%			AF	61%
LA mod dilated	38%				
LA sev dilated	41%				



P1555

Higher levels of ferritin as a predictor of improvement of left ventricular ejection fraction in recent-onset idiopathic dilated cardiomyopathy

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Background: Improvement in the left ventricular ejection fraction may occur in patients with dilated cardiomyopathy.
Purpose: This study was designed to determine the frequency and to identify predictors of improvement of left ventricular ejection fraction in a cohort of Spanish patients with recent-onset idiopathic cardiomyopathy receiving contemporary medication
Methods: A consecutive series of patients admitted from June 2014 to November 2018 with the clinical diagnosis of idiopathic dilated cardiomyopathy and left ventricular ejection fraction <40% by echocardiography at presentation were followed up 12 months to identify those with improvement of left ventricular ejection fraction, define as an increase in left ventricular ejection fraction >15% or to a final level of >50%.
Results: After a follow-up of 12 months, 52% of 85 patients had improved their left ventricular ejection fraction Multivariate analysis demonstrated that improvement of left ventricular ejection fraction was associated with a electrocardiographic QRS duration<120ms, lower left ventricular ejection fraction at baseline and a higher levels of ferritin and haemoglobin
Conclusion: In our study, the presence of higher levels of ferritin and haemoglobin was related with an improvement of left ventricular ejection fraction in recent-onset idiopathic dilated cardiomyopathy. This finding adds a new objective to the treatment of iron deficiency in patients with heart failure with reduced ejection fraction, apart from the improvement of functional capacity and quality of life

P1556

Importance of serum sodium in ischemic heart failure with systolic dysfunction

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We assessed the effects of addition of ivabradine to Optimal Medical Therapy (OMT) in patients of ischemic heart failure with systolic dysfunction on left ventricular function, exercise duration, serum Brain Natriuretic Peptide (BNP) levels. As a part of this study we studied the serum sodium levels in these patients.

Methods: In this open-label, randomized, a total number of 309 patients of stable, ischemic heart failure were included and were randomly assigned into Ivabradine (n=157) and control (n=152)Baseline assessments included assessment of Left ventricular dimension and Left ventricular ejection fraction (LVEF), Exercise duration (in seconds) by exercise test and Serum BNP level . Influence of serum Sodium levels at baseline were studied. Patients were divided into two groups, based on Serum Sodium <137 meq/l and > 137 meq/l .
Observations : The main observations are given in Table 1 .
Conclusions : Patients in low serum sodium levels at baseline had lower ejection fraction, exercise duration and higher BNP level and LV end-systolic and end-diastolic dimensions in both groups as compared to patients with higher serum Sodium values . Serum Sodium may serve as a simple clue to lower EF, higher BNP and poorer effort tolerance in stable patients of ischemic systolic heart failure.

Table 1

IVABRADINE (n=157)	S. Na+< 137 meq/l (n=73)	S. Na+ >137 meq/l (n=84)	P VALUE
Average S.Na+level	134.19	139.28	0.000
LVESD(mm)	43.72 (±7.36)	38.35 (±3.97)	0.000
LVEDD(mm)	53.43 (±6.73)	49.34 (±4.48)	0.000
LVEF	30.83 (±4.38)	33.98 (±1.84)	0.001
TMT	256.61 (±101.9)	334.55 (±143.3)	0.021
BNP	372.79 (±219.4)	246.93 (±109.8)	0.032
Control Group (n=152)	S. Na+< 137 meq/l (n=68)	S. Na+ >137 meq/l (n=84)	P VALUE
Average S. Na+level	132.82	139.31	0.000
LVESD(mm)	47.00 (±6.125)	39.85 (±3.79)	0.000
LVEDD(mm)	56.28 (±6.03)	50.13 (±3.21)	0.001
LVEF	29.65 (±4.96)	32.70 (±3.56)	0.003
TMT	121.60 (±99.36)	288.15 (±163.3)	0.001
BNP	833.75 (±531.9)	218.28 (±172.3)	0.000

Comparison of Serum Sodium values on Effort tolerance , BNP and Echo parameters

P1557

Influence of decompensated heart failure on cardiac acoustic biomarkers: impact on early readmissions

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Background: Outpatient management of heart failure (HF) is essential to reduce costs of care and improve patient quality of life. Many patient based factors have been analyzed in an attempt to identify 'at risk patients' and predict future episodes of decompensation.
Purpose: To assess the value of cardiac acoustic biomarkers (CABs - combination of heart sounds synchronized with ECG) in HF decompensation prediction.
Methods: A total of 304 patients with EF<35% and hospitalization for decompensated HF were enrolled in a prospective observational protocol. All wore a wearable cardioverter defibrillator, equipped with an accelerometer capable of recording heart sounds and ECG, as outpatients. Univariate followed by multivariate analyses were

used to determine the model that best predicted the occurrence of early HF readmission or emergency room (ER) visit for HF, which were collected for all patients.
Results: Patients were divided into 2 groups (HF patients/ non-HF patients) based on occurrence of HF events (HF hospitalization or ER visit). 69 HF events occurred in 49 (16%) HF group patients. The HF group had a lower BMI (26 +/- 5 vs 29 +/- 6, p<0.05) than the non-HF group, all other demographics were similar. A multi-parameter model using heart rate (HR), electromechanical activation time (EMAT, from onset of QRS to S1), and S3 strength (based on S3 timing, intensity, persistence, and frequency) produced the best predictive model (Table) for a decompensated HF event. All-cause readmissions prior to start of WCD wear (HF 62% vs nonHF 63%) and NYHA class (I+II, HF 68% vs nonHF 69%) were similar between the 2 groups. The ability of NYHA class to predict HF events was lower than the CAB predictor (sensitivity=30%, PPV=18%).
Conclusions: Cardiac acoustic biomarkers were superior to NYHA classification in predicting post discharge HF events. Our data suggest that use of CABs may be useful in early detection of decompensated HF after an episode of acute decompensated HF in at-risk patients.

	HF Event N = 40	No HF Event N = 224	
Prediction of increased risk for HF event	27	68	Positive Predictive Value (PPV) = 28%
Prediction of not at increased risk for HF event	13	156	Negative Predictive Value (NPV) = 92%
	Sensitivity = 68%	Specificity = 70%	

Predictive model for HF decompensation

P1558

Two-years effect of cardiac contractility modulation on reverse left ventricular remordeling in patients with heart failure and sinus rhythm

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Introduction: Perspective device treatment Cardiac Contractility Modulation (CCM) is proposed to become an addition to optimal medical therapy (OMT) in HFrEF and narrow QRS complex. Purpose: To analyze the influence of CCM stimulation on LV ventricular remordeling and HFFC in 2 years of follow-up (FU). Methods: During 2015-2017 ys 57 CCM devices (Optimizer IVs, Optimizer Smart) were implanted to the patients with HFrEF I-III FC after obtained informed consent. 47 patients were male,10 female, 55,0 ±10,6y.o,37- CAD, 20- DCM, sinus rhythm, QRS<120 ms. Patients were educated, FU visits provided in HF clinic include: device programming, QoL, 6-MWT, cardiopulmonary exercise test, ECG, Holter Monitoring, Echocardiography and NT-proBNP level. Results: In 2 years of FU 47 patients participated in the program, 8 were excluded (1- device deimplantation, 1- heart transplantation, 8- died due to sudden cardiac death or HF decompensation). Patients had good compliance and tolerated CCM stimulation well. 85% were clinically stable, 15% - had hospitalization with HF decompensation annually. 75% of patients had ICD. ECG did not show PQ, QRS, QT prolongation, significant rhythm or conduction disorders. In 21 patients (44%) stimulation of the CCM pocket was due to ventricular lead insulation failure, 1 lead was switched off in 14 patients (29%). 2 years FU visits were in 43 patients, positive trend in HF FC, LV reverse remodeling, VO2peak, physical capacity, NT-proBNP level were observed. During 2 years of FU in 50% of patients HF FC was unchanged, in 23%- increased on 1grade, in 27%- decreased on 1 grade. Baseline HF FC I/II/III - 2%/81%/16% vs 1 year - 25%/64%/14%- vs 2 years - 21%/69%/9%. Positive dynamics in LV indices, volumes, LV EF was observed compared to baseline: LV EDD 68.0±6.6 mm vs 64.0±8.6mm, p= 0,02, LV ESD 59.0±8.0 mm vs 55.0±9.0 mm,p=0,01, LVEDV 241.0±57.8 ml vs 209.0±62.2 ml, p=0,03, LVESV 164.0±56.2 ml vs 150.5±56.1 ml, p=0,02. In 76% of patients LV EF increased, in 18%-unchanged, in 6%- decreased: LVEF 26.0±6.3% vs 30.0±7.6% in 1 year p=0,003 and vs 32.0±6.2% in 2 years, p=0,01. NT-proBNP level – 1010 pg/ml vs 575 pg/ml, p=ns. CPET results in 30 patients (61% of patients) showed: VO2 peak 16.9±5.2 ml/kg/min vs 20.9±6.6 in 1 year, p=0,001 and vs 17.8±5.3 ml/kg/min in 2 years,p=0,02., VO2peak after 2 years improved in 54% of patients, worsened in 41%, unchanged in 5% in comparison with baseline. Conclusions: During 2 years of FU majority of patients with sinus rhythm and CCM devices showed positive trend in reverse cardiac remodeling, with most evident response in the second year. Tendency to improve functional capacity, decrease in CHF FC were obvious. Delayed response to CCM stimulation is possible and need to be studied further. Negative aspect of CCM devices was presented in pocket device stimulation due to ventricular lead insulation failure, situation that need to be resolved in technological process.

P1559

Gut microbiome and heart failure with reduced ejection fraction in patients with coronary artery disease

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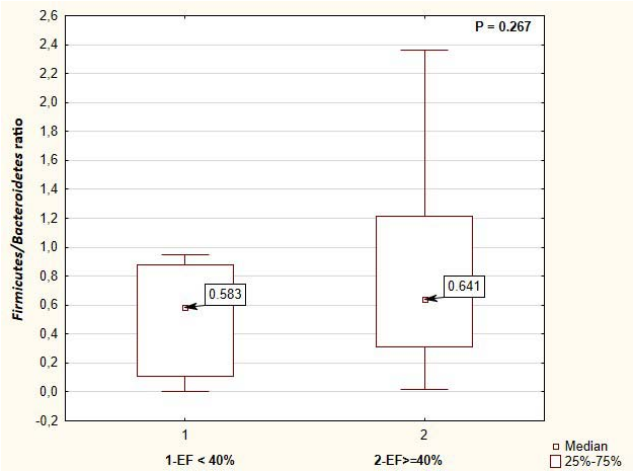
Background: Coronary artery disease (CAD) is one of the most common causes of hospitalization and death in Europe. It might leads to heart failure with reduced ejection fraction (HF-REF), which results in disability and decreases quality of life. As a consequence, new factors, like gut microbiome, that may lead to CAD, and then HF-REF are widely investigated.
Purpose: To evaluate gut microbiota composition in CAD population. To compare the composition of the intestinal microbiome of CAD patients with HF-REF and those who have ejection fraction (EF) at least of 40%.
Methods: The study included stool microbiome of 89 CAD patients, aged 64.3±7.4 years (72 males) who were hospitalized 12-18 months prior recruitment due to an acute coronary syndrome (n=57) or percutaneous coronary intervention (n=32). All patients underwent detailed assessment of health status, including echocardiography with biplane ejection fraction (EF) assessment. Based on EF, HF-REF subgroup was distinguished (n=12).
Stool samples were collected in Stool Tubes with DNA stabilizer. DNA was isolated with the use of the PSP-Spin Stool-DNA kit. Further analyses were based on the V3-V4 region of the 16S rRNA gene (Next Generation Sequencing method).
Results: We identified 8 clusters of bacteria (Table). The analysis revealed that the gut microbiome consists mostly of Bacteroidetes, Firmicutes and Actinobacteria, with the largest abundance of reads for Bacteroidetes (Table). HF-REF group was characterized with almost half of the operational taxonomic units reads in

Table

Cluster	Patients with HF-REF (n=12)	Patients without HF-REF (n=77)	All coronary artery disease patients (n=89)	P value
Bacteroidetes	11349.5 IQR: 4698 - 18406.5	9161 IQR: 5891 - 15058	9161 IQR: 5881 - 16069	0.815
Firmicutes	3210 IQR: 2327 - 5499.5	6040 IQR: 3484 - 9826	5815 IQR: 3334 - 9470	0.018
Actinobacteria	67.5 IQR: 25.5 - 447.5	223 IQR: 46 - 770	205 IQR: 46 - 679	0.264
Lentisphaera	0 IQR: 0 - 8	4 IQR: 0 - 16	2 IQR: 0 - 14	0.182
Proteobacteria	6IQR: 2 - 14.5	3 IQR: 1 - 8	3 IQR: 1 - 9	0.218
Cyanobacteria	0 IQR: 0 - 0	0 IQR: 0 - 0	0 IQR: 0 - 0	0.778
Verrucomicrobia	0 IQR: 0 - 0	0 IQR: 0 - 3	0 IQR: 0 - 2	0.192
Tenericutes	0 IQR: 0 - 0	0 IQR: 0 - 0	0 IQR: 0 - 0	0.475
Other	0 IQR: 0 - 48.5	1 IQR: 0 - 62	0 IQR: 0 - 62	0.505

Table. The distribution of operational taxonomic unit reads in study groups.

Firmicutes than group without HF-REF (Table). There was no difference in Firmicutes/Bacteroidetes ratio between study groups (Figure).
Conclusions: HF-REF among CAD patients was associated with altered microbiome composition. The analyses in larger subpopulations and in control group is required.



Firmicutes/Bacteroidetes ratio

P1560
Renal sympathetic denervation as a "mini-invasive bridge" to heart transplantation in patients with congestive heart failure and metabolic disorders

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On behalf of: Laboratory of Chronic Heart Failure

Background/Introduction: The gold standard treatment for patients with end-stage chronic heart failure (HF) is heart transplantation. The possibilities of heart transplantation (HT) and 'surgical bridge' (coronary revascularization, valvular correction) application are limited in this group of patients by carbohydrate and lipid metabolism disorders. The search of minimally invasive treatment methods in this group of patients is particularly relevant.
Purpose: effectiveness evaluation of renal sympathetic denervation in patients with congestive heart failure and metabolic disorders
Methods: Twenty patients underwent renal sympathetic catheter-based denervation (RSD), performed by unique operator. Data were performed before the denervation, and at 12 months of follow-up. All the patients were man in New York Health Association (NYHA) class III heart failure, left ventricular (LV) ejection fraction (EF) > 40% by Simpson, without indications for cardiac resynchronization therapy (CRT), with body mass index (BMS) > 30, blood level of HbA1 > 6.5%.
Results: According to echocardiography examinations in 12 months after RSD a significant increase of LV EF (p = 0.03) and significant decrease of pulmonary artery pressure (= 0,05) have been observed. Although there was an evident improvement in 6-minute walk test (p = 0.004). Contractility myocardial index (p = 0,06) and blood level of HbA1 (p = 0,55) showed a tendency to decrease in 1 year after RSD. We didn't find a significant increase of systolic or diastolic blood pressure levels associated with renal denervation (p = 0,36) and there were no local complications after RSD. In 12 months after RDS 1 patients undergo HT, 2 patients were removed from waiting list of HT due to improved condition.
Conclusions: RSD seems to be an effective and safe mini – invasive method for patients with chronic HF and metabolic disorders which can improve echocardiographic characteristics, reduce functional NYHA class of HF and give necessary time to recipients for chance to receive an optimal donor organ.

P1561
Characteristics of heart failure patients treated with sacubitril/valsartan in the province of Quebec, Canada

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INTRODUCTION- In Canada, sacubitril/valsartan (SacVal) is indicated for the treatment of heart failure (HF) with reduced ejection fraction (HFrEF) in patients with NYHA Class II or III, to reduce the incidence of cardiovascular death and HF hospitalization. SacVal has been reimbursed by the Quebec public health insurance plan (RAMQ) since March 2017. As the second largest public payer in Canada, RAMQ covers over 3.6 million patients, including ≥65 y/o, beneficiaries of the social assistance program, and people without private drug insurance.
PURPOSE- The primary objective of this study was to describe the use of SacVal in a real-world setting, including patient characteristics, concomitant medications, treatment persistence, resource utilization as well as healthcare costs prior to SacVal treatment initiation.
METHODS- This was a retrospective database study based on RAMQ claims for drugs and medical services. The cohort consisted of patients whose first claim (index date) for SacVal was between June 2017 and April 2018. Patients had to be ≥18 y/o and covered by RAMQ for at least one year preceding the index date. Medical services and prescription drug claims were categorized into all-cause and HF related. All costs are reported in Canadian dollars and the mean monthly cost includes drug costs, physician fees, hospitalizations, as well as intensive care unit, emergency department and outpatient visits.
RESULTS- 1,483 patients were identified. The mean age was 70.0 years (SD=10.8) with 77% of patients ≥65 y/o. In the year prior to the index date, medication use included the following: 93% angiotensin-converting enzyme inhibitor or an angiotensin II receptor blocker, 98% beta-blocker (BB) and 67% mineralocorticoid receptor agonist (MRA). In the same period, 55% experienced at least one hospitalization due to any cause with an average length of stay (LoS) of 11.7 days (SD=15.1), and 21% had at least one HF hospitalization for whom the average LoS increased to 13.3 days (SD=16.1). The mean number of outpatient visits was 13.5 (SD=8.5), with an average of 3.1 (SD=2.2) for HF-specific outpatient visits. The mean monthly healthcare cost was estimated to be $3,688 (SD=$9,189), whereas that related to HF was $1,204 (SD=$5,478). Physicians prescribing SacVal were primarily cardiologists (71%), followed by general practitioners (15%). Following the index date, the majority of patients (91%) used a BB in concomitance with SacVal, and over half (57%) used a MRA. The mean duration of follow-up was 6.6 months (SD=2.9), and persistence with SacVal was 97% (95%CI=96;98) and 95% (95%CI=94;96) after 3 and 6 months, respectively.
CONCLUSION- This analysis describes real-world patient characteristics and prior healthcare resource utilization of HFrEF patients initiating SacVal in Quebec. Longer follow-up would be valuable to compare resource use and costs following initiation of SacVal to evaluate the impact of the drug on patients and the healthcare system.

P1562
Latino american experience with Sacubitril/Valsartan in a heart failure unit : Real insight

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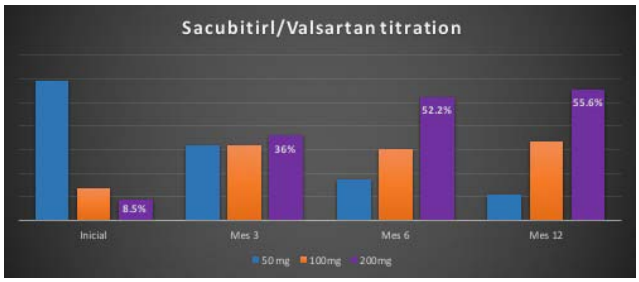
Background: Sacubitril/Valsartan was included in the 2016 ESC guidelines as class IB recommendation for symptomatic heart failure patients with reduced ejection fraction. However, there is few information in the real world regarding its use in Latin America.
Purpose: To describe clinical characteristics and outcomes of patients that were prescribed with Sacubitril/Valsartan in a heart failure unit in Bogota, Colombia.
Methods: A cohort study of 59 patients with sacubitril/valsartan indication was conducted from January 2017 to December 2018. Baseline characteristics ,and changes in clinical outcomes were assessed at 3 months and 1-year.
Results: Overall 1-year mortality was 1.77%(n=3), one due to cardiovascular cause. At 3-months and 1 year, 2.9% and 8.7% of patients were hospitalized respectively. Patients improved ejection fraction in 6.8% (p<0.000), and functional status from NYHA III to NYHA II in 47% (p=0.005). Systolic blood pressure changes were statistically significant(p=0.026). Adverse side-effects were hyperkalemia (1.61%), renal failure (1.61%), and symptomatic hypotension (18%). Nonetheless, there was no withdrawal of treatment.
Conclusions: In our experience with real-life patients, sacubitril/valsartan is a safe and effective therapy. Patients have significant improvements in functional status

and ejection fraction, which suggest our results are similar to the PARADIGM-HF Latino American population.

Table 1. Baseline characteristics (n=59)

Age(years)‡	74(63-80)
Female Sex	28(47.5)
Ischemic heart failure	39(66.1)
Previous use of medications	
ACE inhibitor or ARB	51(36.4)
Beta-blocker	58(98.3)
MRA	50(84.7)
NYHA class	
I-II	24 (40.7)
III-IV	35 (59.3)
Left ventricular ejection fraction(%)	30.9(±6.606)
NT-proBNP‡	3300 (2163-5391)
Systolic blood pressure‡	120(108-138)
Serum creatinine‡	1.005(0.88-1.19)

‡ Median and interquartilic range¥ Mean ± standart deviation n (%)



sacubitril/valsartan titration

P1563

High-risk percutaneous coronary intervention with mechanical support - Protected PCI. Initial experience

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Introduction: Availability of mechanical support in cardiology enables its use both in acute and elective settings. Mainly, the high risk interventions including coronary, electrophysiological and surgical are being consider for mechanical assistance. Severe coronary artery disease is a frequent cause of advanced heart failure and revascularization playes an important role in the overall clinical management. In cases considered to bear unacceptable risk for surgery, percutaneous coronary intervention (PCI) with mechanical support (protected PCI) is being performed. The aim of the present work is to share our initial experience with protected PCI in pacients with advanced left ventricle (LV) dysfunction.
Methods: Percutaneous unloading device Impella CP (Abiomed, USA) has been used for protected PCI. We used preferentially femoral approach for pump cannulation and radial approach for PCI. Femoral puncture was performed using ultrasound guidance. We have evaluated periprocedural paramaters, hospitalization courses, survival and complications.
Results: During the study period from October 31, 2017 till December 2018, protected PCI has been performed in 15 patients, average age 70,2±10,4 years, 10 males. Average LV ejection fraction was 26% ±13%, Syntax score 31±10, 8 patients had over 35, 3 over 40.Twelve from 15 patients survived with average follow-up of 170 days, 30-day survival was 13 of 15 patients. Thus, hospitalization mortality was 13%.Following complications occured: 1 LV perforation (patient survived and was discharged), 1 unplanned groin surgical revision, 1 coronary artery rupture (patient survived) and 1 PCI was unsuccesful.
Conclusion: Protected PCI is an effective and safe method for high risk profile heart failure patients with severe coronary artery disease unsuitable for surgical revascularization.

P1564

Heart failure hospitalization in patients with reduced ejection fraction in a heart failure clinic

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Introduction: Heart failure (HF) is a major clinical and public health concern. The high prevalence and clinical course of HF results in increased burden of hospitalizations and healthcare expenses. HF hospitalizations (HFhosp) remain a strong predictor of mortality and efforts should be made to recognize predictors that might help reduce HFhosp.
Purpose: Identify clinical and prognostic features in a cohort of pts with HF with reduced ejection fraction (HFrEF) in a HF Clinic (HFC) who had HFhosp in the previous year.
Methods: Unicentric and retrospective analysis of pts followed in a HFCsince 3/2011. Included pts with reduced ejection fraction (EF) (<50%) and previous diagnosis for at least 6 months; divided in two groups: pts with HFhosp (G1) and no HFhosp (G2) in the previous year.Clinical, demographic, analytical and echocardiographic characteristics and mortality (from cardiovascular (CV) cause (CVm) and non-CV cause (nCVm)) were appraised.
Results: Included 374 pts with a mean age of 60.6 ± 13.2 years. G1 consisting of 68 pts (18%) with male predominance (85 vs 73%, p=0.032); no differences were found between groups regarding age. Ischemic etiology was more prevalent in G1 (56 vs 37%, p=0.004) but there were no significant differences in CV risk factors prevalence, except for diabetes (50 vs 29%, p<0.001) and dyslipidaemia (78 vs 55%, p<0.001). G1 correlated positively with the presence of atrial fibrillation (AF) (50 vs 31%, p=0.003) and chronic kidney disease (CKD) (52 vs 26%, p<0.001). HFhosp group were associated to higher value of serum uric acid (p=0.005) and BNP (p<0.001). Left ventricle EF (LVEF) at admission (p=0.041) and during follow-up (FU) (p<0.001) were lower in G1, as well as right ventricle dysfunction (RVD) (p=0.005). On the other hand, G2 had more LVEF recovery (p<0.001). During the FU, G1 had higher mortality (53 vs 16%, p<0.001), mostly related to mCV (p<0.001). After multivariate analysis adjustment, ischemic etiology, CKD, AF and diabetes remained significantly associated with HFhosp.
Conclusion: In our cohort, HFhosp group showed a marked relationship with HFrEF severity surrogates, namely initial and FU LVEF and RVD. HFhosp had higher mortality rate, particularly related to mCV.

P1565

Correlation of nutritional status with chosen biochemical parameters in patients hospitalized due to heart failure with reduced ejection fraction.

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Background: Heart failure (HF) is a cardiovascular disease with still increasing morbidity. The fact that most European countries have a problem with aging society also contributes to raising a number of HF patients. HF is a clinical state which damages next to the heart, also other organs. Moreover, it can cause malnutrition and afterwards even cardiac cachexia. Cachexia is a medical condition when the balance between anabolic and catabolic processes is disturbed and it leads to a worse prognosis. That's why it is so important to diagnose HF patients with malnutrition and react as soon as possible by e.g. intensifying pharmacological therapy or adding non-pharmacological treatment like diet or supplements.
Purpose: To evaluate nutritional status of HF with reduced ejection fraction (HFrEF) patients and analyze the relationship between nutritional status and chosen biochemical parameters in this group of patients.
Methods: This study included 100 consecutive patients hospitalized due to HFrEF in Ist Cardiology Department, Poznan University of Medical Sciences. We assessed the clinical condition – NYHA class, decompensation of HF and chosen biochemical parameters eg.: blood cell morphology, natriuretic peptides, lipid panel, creatinine, fasting glucose, serum albumin, AST/ALT. We evaluated patient's nutritional status at the admission with use polish version of MNA form (Mini Nutritional Assessment), which consists of 2 parts: Screening and Assessment.
Results: Mean age of the study cohort was 55±11 years, 33% of patients were women. Mean left ventricular ejection fraction (LVEF) was 27±11% and mean NYHA class – 2,8±0,7. Among all patients just 40% had a normal nutritional status (group 1), 52% were at risk of malnutrition (group 2) and 7% were malnourished (group 3). Exacerbation of HF occurs significantly more frequently in group 3 than in group 1 (p=0,0016). In patients with diabetes mellitus and pre-existing stroke, malnutrition appeared more often. Higher NYHA class and lower body mass index (group 1 BMI-28,4 ± 4,1 kg/m2; group 3 BMI-23,6 ± 8,1 kg/m2) were significantly associated with malnutrition. Furthermore, there was much lower LDL-C (p=0,037) and total cholesterol (p=0,038) level in a group of malnourished patients as well as elevated

bilirubin level (p=0,028) and lower fasting glucose (p=0,039) in group 3. There were no significant changes in natriuretic peptides level observed.
Conclusions: In this study cohort the majority of patients has abnormal nutritional status. Mostly they are at risk of malnutrition, but some of them has already been malnourished Malnutrition was associated with the risk of HF exacerbation. There is correlation between decreased LDL-C and total cholesterol levels and nutritional status in patients with HF.

P1566
Insulin resistance as a predictor of mortality in patients with HFrEF in relation on follow-up duration.

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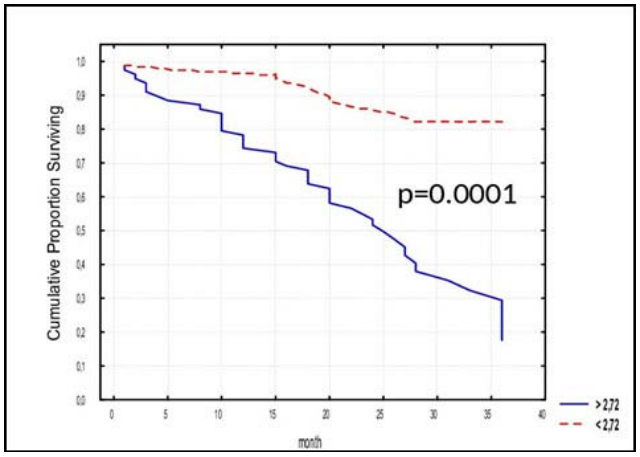
Background: Despite of knowledge about high predictive value of insulin resistance (IR) in chronic heart failure (CHF) the effect on the mortality of these patients in relation of patient's follow-up duration is still non-well investigated.
Aim: The purpose of the study was to identify the impact of IR on the mortality of patients with HFrEF depending on the duration of observation (12-, 24- and 36-month mortality).
Methods: 267 CHF patients with reduced LVEF < 40 % were analyzed. Survival analysis was performed using the "STATISTICA for Windows. Release 6.0" program (Non parametric and Survival Analysis sections) using the Kaplan-Meier method. The predictive value of the indicators was calculated as the odds ratio (OR) with a confidence interval of 95%.
Insulin sensitivity was assessed by the HOMA index, which was calculated using a standard formula based on fasting blood glucose and insulin levels. To assess the effect of IR on life expectancy in HFrEF, patients were separated "below vs above median HOMA index" (2.72 [2.07; 3.4]).
Results: The HOMA index above 2.77 was found in 47.1% of the examined patients. Cumulative 36-month survival was significantly lower in the patients with above median HOMA index (Fig. 1).
The NOMA index was one of the three strongest predictors of HFrEF patient's mortality irrespective of follow-up duration (Tabl.1)
Conclusions: HOMA index is the strong predictor of survival in HFrEF, irrespective of follow-up duration.

Predictors of mortality in HFrEF pts*

12 month	OR	24 month	OR	36 month	OR
HOMA>2,65	8.48	BMI<22kg/m^2	6.88	HOMA>2,65	6.67
HR>75 beats p.m.	7.9	HR>75 beats p.m.	6.23	BMI<22kg/m^2	5.99
SAP<100mmHg	5.4	HOMA>2,65	4.64	SAP<100mmHg	3.95

* Only most three significant predictors are included (p<0.05).



Cumulative proportion surviving

P1567
VO2 recovery delay is a useful predictor for impaired recovery of left ventricular function in heart failure with reduced ejection fraction

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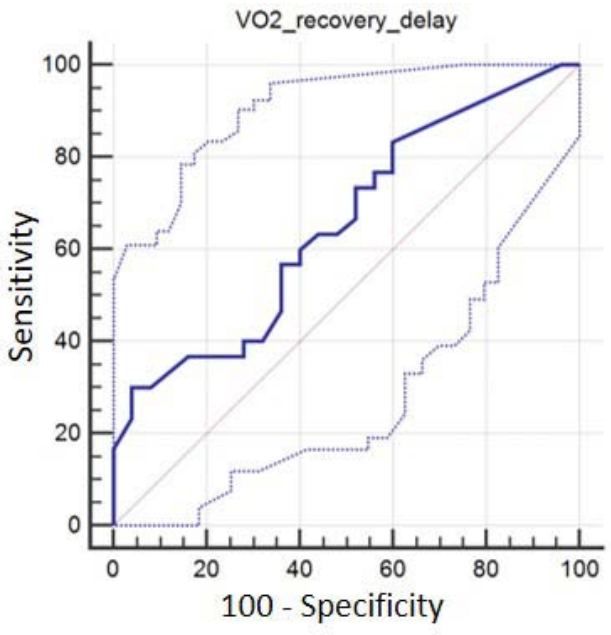
Background: The pattern of VO2 recovery following exercise reflects cardiovascular response, related to the prognosis of heart failure (HF). We aimed to assess the VO2RD as a useful predictor for impaired recovery of left ventricular function (RLVF) in HFrEF.
Method: We investigated pts with HFrEF (EF ≤45%) who underwent cardiopulmonary exercise test (CPET). All CPET was performed VO2RD was defined as time until post-exercise VO2 falls permanently below peak VO2. We defined impaired RLVF as decreased EF or improvement in EF <10 %, RLVF as improvement in EF ≥10 % during follow-up period (median 16.5 months).
Result: Total 55 pts with HFrEF (mean 55.0 years old, 78.2% male, 20.0% ischemic) were included. We found 30 pts (54.5%) of impaired RLVF. In terms of baseline characteristics, there were no differences in age, sex, NT-proBNP level, NYHA class and baseline EF between 2 groups. There was significantly different in VO2RD between 2 groups (14.5±11.4 for RLVF group vs. 24.4±19.8 sec for impaired RLVF group, p=0.031). Multivariate regression analysis revealed VO2RD was an independent predictor for impaired RLVF (OR=1.055, p=0.021) when controlled for age, ischemic heart disease and EF. And the cut-off value of VO2RD > 30 sec was associated with impaired RLVF with sensitivity 30.0 % and specificity 96.0 % (ROC area under curve of 0.653, p=0.038).
Conclusion: Post-exercise VO2RD, reflecting impaired cardiac output augmentation may be a useful parameter to predict impaired RLVF in patients with HFrEF.

Cardiopulmonary exercise test

	Recovered group(N=25)	Non-recovered group(N=30)	p-value
Pre SPO2	97.3± 1.7	97.3± 1.2	0.917
Post SPO2	97.2± 1.6	97.9± 1.2	0.173
Exercise time	10.9± 3.6	10.8± 3.8	0.936
METs	6.1± 1.7	6.4± 1.9	0.657
VE/VCO2 slope	30.9± 7.8	30.6± 5.9	0.868
Peak HR	153.3± 32.6	150.3± 34.9	0.744
HR at recovery 1min	131.6± 28.3	126.0± 28.2	0.473
HR at recovery 5min	101.7± 22.8	93.8± 18.9	0.167
Peak VO2	22.3± 6.5	22.2± 7.0	0.328
VO2 at recovery 1min	1051.7± 438.1	1050.8± 312.9	0.993
VO2 at recovery 5min	407.9± 158.6	432.1± 123.1	0.527
VO2 recovery delay, sec	14.5± 11.4	24.4± 19.8	0.031
Peak VCO2	1746.2± 896.9	1735.8± 734.9	0.973



P1568

Heart failure with mid-range ejection fraction: a distinct entity or rather a transitional phase?

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Introduction Since 2016 the European Society of Cardiology has introduced a new category of heart failure (HF) with borderline reduced left ventricular ejection fraction (LVEF), called heart failure with mid-range ejection fraction (HFmrEF). However, the clinical features of HFmrEF, analysis of LVEF transition in time and predictive factors related to LVEF changes are still inadequately addressed.
Purpose This study aims to (1) assess the clinical characteristics of patients with HFmrEF, (2) examine their transition during follow up and (3) search for characteristics that predict a deterioration, improvement or stabilization of the LVEF.
Methods We retrospectively examined clinical characteristics and echocardiographic measurements in 374 patients with HFmrEF from a large referral teaching hospital heart failure database (n = 3040; 12,3%) dating from January 2006 till October 2018. We assessed the evolution of LVEF during a mean follow up of 967.98 ± 859.37 days and analyzed if there were any clinical or echocardiographic parameters that could predict their evolution to HFrEF, HFmrEF or HFpEF. To compare continuous variables between the three groups Kruskal-Wallis test was used and the Chi-Square test was used for the comparison of the categorical variables. Multinomial logistic regression was used to examine the predictors for transition of heart failure phenotype.
Results Mean age of our study population was 75.9 years, 46% were female, 62.6% had atrial fibrillation and 51. 6% had coronary artery disease of whom 89.1% underwent revascularization (42.4% CABG, 43.0% PCI, 14.5% PCI + CABG). Diabetes was present in 29.7%, hypertension in 79.4%, smoking in 41.2% and hypercholesterolemia in 70.1% of the patients.
After a mean follow-up of 967.98 ± 859.37 days, 41.7% entered the classification of HFpEF, 25.1% the classification of HFrEF and 33.2% stayed in the original category of HFmrEF. By multinomial logistic regression, left ventricle end diastolic diameter (LVEDD) > 50mm was a strong, independent predictor for deterioration of the LVEF and transition to the HFrEF classification (<0.0001, 95% CI, 0.159-0.514). Patients with coronary artery disease were more prone to stay in the HFmrEF - or entered the HFrEF classification (0.001, 95% CI 1.442-4.147).
Conclusions We found in our study population that most patients with HFmrEF made a transition to HFpEF and HFrEF, suggesting that HFmrEF represents a transitional phase between HFpEF and HFrEF, rather than a distinct mid position phenotype. Furthermore, there seems to be a strong association between LVEDD > 50mm and deterioration of the LVEF, whereas LVEF stabilizes or deteriorates in patients with coronary artery disease.
These results could advocate the early start of heart failure treatment in patients diagnosed with HFmrEF and a LVEDD > 50mm or coronary artery disease. Prospective, randomized trials are necessary to confirm these data.

P1569

Clinical and echocardiographic phenotypes of patients with postinfarction cardiosclerosis: focus on patients with heart failure with mid-range ejection fraction.

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Purpose. To investigate the clinical and echocardiographic characteristics and features of myocardial remodeling in patients with HFmrEF of ischemic etiology.
Materials and methods. 612 men aged 30-65 y.o., who had MI more than 3 months ago, were evaluated. The index group consisted of 74 patients with HFmrEF, with HF I-II NYHA and EF LV (Sim) 40-49% (gr.1). The diagnosis of HF was set according to the guidelines of ESC 2016. The reference groups included 276 patients with HF I-IV NYHA, EF LV (Sim) <40% (gr.2) and 262 patients without HF clinic with EF LV (Sim) >55% (gr.3). Exclution criteria in the study: primary and post-myocarditis DC, HCM, organic valvular diseases, dilatation of the heart chambers due to accumulation diseases, secondary hypertension, cardiac surgery/percutaneous coronary intervention /valvuloplasty within 3 months before. Standard clinical, laboratory and instrumental, including ECHO with defining signs of the LV hypertrophy and dilatation, diastolic function were performed.
Results. Patients of all groups were comparable in age. Duration of IHD was higher in gr. 1, 2 vs. gr. 3: 8 and 10 vs. 6.8 years. MI with Q wave (Q-MI) all groups developed more often. Q-MI of the anterior wall and Q-MI of the inferior wall of the LV were found in 39, 64, 30% and in 31, 29, 99% in the gr. 1, 2, 3, respectively. Myocardial revascularization (CABG/PCI) transferred 28/43; 30/36; 62/35% of respondents in gr. 1 ,2, 3, respectively. Significant differences in the groups related to the number of transferred MI. The groups were comparable in the duration of AH but different in the AH prevalence (86, 69, 83%) in the gr. 1, 2, 3 respectively. AF, COPD, CKD were more common in patients with HFpEF and HFrEF. Diabetes was detected predominantly in patients with HFrEF. ECHO data of gr. 2 and gr. 3 significantly differed from each other. In most cases, eccentric LV hypertrophy was observed among patients with HFrEF, concentric variants of LV remodeling prevailed in gr. 3. Phenotypic changes in the LV of patients with HFmrEF took an intermediate position. LV diastolic dysfunction (mainly type 1) was most often recorded in respondents with HFmrEF (65, 38, 26% in gr. 1, 2, 3, respectively).
Conclusion: The clinical and echocardiographic characteristics of patients with post-MI remodeling allow to consider HFmrEF of ischemic etiology as an intermediate phenotype that has similarities and, at the same time, differences with HFrEF. The echocardiography patterns of the studied groups require further study, including molecular genetic markers. New prospective studies are needed to improve the understanding of the pathophysiology of HFmrEF and to determine effective therapeutic strategies.

P1570

One year follow-up of clinical and mortality data of heart failure patients with mid-range ejection fraction

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Background: The ESC guideline for the diagnosis and treatment of acute and chronic heart failure, published in 2016, introduced the terminology of heart failure with mid-range ejection fraction (HFmrEF) (40%≤LVEF<50%), besides heart failure with reduced (HFrEF) (LVEF<40%) and preserved (HFpEF) (LVEF≥50%) ejection fraction.
Aim: The aim of the study was to evaluate the one year clinical and mortality follow-up data of the patients diagnosed as HFmrEF based on the ESC criteria in our Heart Failure Outpatient Clinic. We assessed that one year after the diagnosis, how many of them stayed HFmrEF, and what proportion of them got into the HFrEF and HFpEF groups. We also analyzed the one-year mortality of this patient group and compared it to the one-year mortality of HFrEF and HFpEF patients, who were also diagnosed during the same period.
Patients and methods: In the study, we examined the data of 76 patients (age: 75.5 years, men: 73.7%, LVEF: 44.5 ±3.4%; NYHA: 2.69±0.84; NTproBNP: 3266.3±7456.3 pg/mL) managed at our Heart Failure Outpatient Clinic, between 1 December 2013 and 30 November 2018. The patients were newly diagnosed with HFmrEF and were not treated because of heart failure before.
Results: One year after the diagnosis, out of the 76 HFmrEF patients, the LVEF fell under 40% in 10 cases (13.2%), meaning they got into the HFrEF group. In 50 patients (65.8%) the LVEF stayed between 40 and 50%, making them stay in the HFmrEF group. In 16 cases (21.0%) the LVEF rose above 50%, therefore making them part of the HFpEF group.

The one year mortality was 7.7% in the HFmrEF group. During the same period, the one year mortality of the 392 newly diagnosed HFrEF patients was 11.0%, and 5.1 % for the 189 newly diagnosed HFpEF patients.
Conclusion: According to our study one year after the diagnosis, two thirds of the HFmrEF patients stayed in the group, approximately 10% became HFrEF, and about 20% became HFpEF. The one-year mortality of the HFmrEF patients lies between the mortality of the HFrEF and the HFpEF patients.

P1571
Prognosis value of the mini nutritional assessment short form tool in outpatients with heart failure with mid-range ejection fraction

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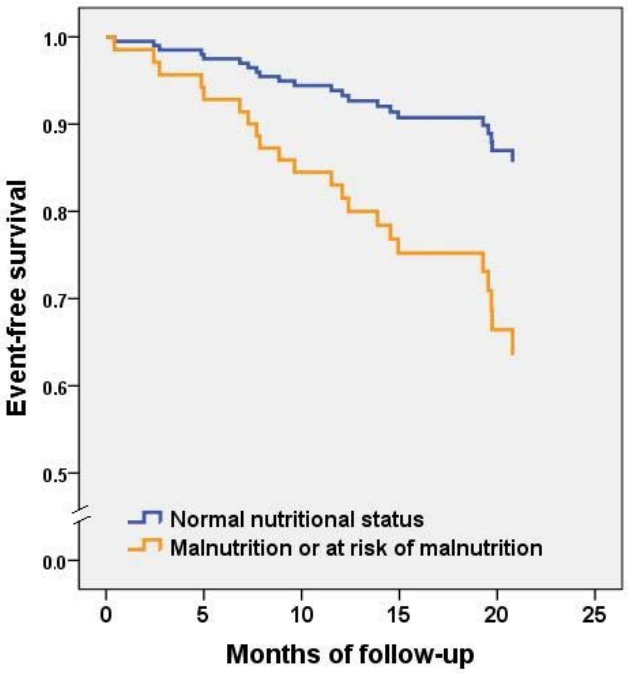
Background: Nutritional status is an important prognostic factor in patients with heart failure (HF) beyond body mass index, although its prognostic value in patients with mid-range left ventricular ejection fraction (HFmrEF) is not completely elucidated. In a pilot study we observed that the Mini Nutritional Assessment Short Form tool (MNA-SF) was the best approach for the screening of nutritional status in HF outpatients over others screening tools.
Purpose: To assess the prognostic role of malnutrition or risk of malnutrition in HFmrEF outpatients after the implementation of the MNA-SF screening tool in a routine way in a multidisciplinary HF.
Methods: The MNA-SF screening tool was administered during the global nurse evaluation of patients. The scoring ranges from 0 to 14, being considered 0 to7 as malnutrition status, 8 to 11 as being at risk of malnutrition and 12 to 14 as normal nutritional status. For the present study those patients with malnutrition and at risk of malnutrition were merged and considered abnormal nutritional status. All-cause death was the primary end-point. Univariate and multivariate (backward conditional stepwise) Cox regression analyses were performed.
Results: Since October 2016 to November 2017, 153 HFmrEF patients were studied (mean age 68.8 ± 11.7 years, 72.5% men, body mass index 28.4 ± 4.4, LVEF 44% ± 3, NYHA class I 5.9%, II 86.3%, and III 7.8%). According to the MNA-SF 25 patients were (16.3%) fulfilled criteria of malnutrition (4) or where at risk of malnutrition (21). During a mean follow-up of 17.4 ± 6.1 months, 23 patients died (15%). In the univariate analysis, nutritional abnormal status was significantly associated with all-cause death (HR 2.93 [1.23-7], p=0.02). In the multivariate analysis which included age, sex, NYHA functional class, body mass index, ischemic aetiology of HF and years of duration of HF, abnormal nutritional status remained significantly associated with all-cause mortality (HR 3.64 [1.39-9.54], p=0.009), together with NYHA functional class (HR 7.93 [2.69-23.4], p<0.001) and years of HF duration (HR 1.10 [1.04-1.16], p=0.001).



Conclusions: Nutritional status assessed with the screening tool MNA-SF was an independent predictor of all-cause death in ambulatory patients with HFmrEF –beyond BMI– together with NYHA functional class and HF duration.

P1572
Determination of optimal energy needs, protein, fats and carbons in patients with obesity and chronic heart failure with mid- range ejection fraction (HFmrEF)

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Research objective. Determination of resting energy in obese patients with HfmrEF.
Materials and methods. A total of 92 obese people were examined. According to echocardiography and cardiovascular functional assessment test systems (test with 6 minute walk) all patients had HFmrEF.
Analyses of basal metabolic rate was performed to all patients by indirect calorimetry with using a stationary metabolograph.
Results. We found lower rates of basal metabolism in patients with heart failure (HF) compared with patients without HF: with obesity I class (1687 ± 148kcal / day versus 1715.5 ± 63 kcal / day, p> 0.05), with obesity II class (1635 ± 164 kcal / day against 1843 ± 52 kcal / day, p> 0.05), with obesity III class (2072 ± 51 kcal / day versus 2334 ± 110 kcal / day - p <0.05).
Patients with HF also showed a significantly (p <0.01) more low rate of oxidation of carbohydrates compared with patients without HF. In studies have revealed an increase in the rate of protein oxidation in patients with HF by as obesity progresses; at the same time, in the group without HF, this pattern is not was observed.
So, in the group with obesity I class protein oxidation rate was 79 ± 11 g / day vs 55 ± 3.2 g / day, II class - 88 ± 6 g / day vs 69.4 ± 3.94 g / day, III class- 92 ± 4 g / day vs 73.75 ± 3.98 g / day for patients with HF and without HF, respectively.
Conclusion. Thus, obesity in combination with HFmrEF compared to obesity without HF accompanied by marked changes in nutritional status patients, in particular: lower basal metabolic rate, reduced speed oxidation of carbohydrates and an increase in the rate of oxidation of protein. It may be reflection of such pathogenetic processes as reduction of energy consumption of mitochondrial system, insulin resistance and catabolism of muscle tissue. The identified features justify the need to optimize diets in this category of patients.

P1573
Is the obesity paradox also present in heart failure with mid-range ejection fraction?

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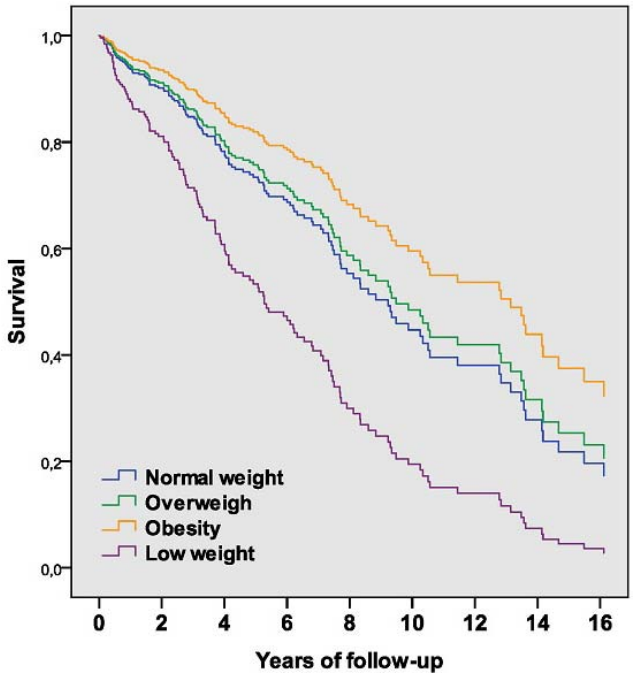
Background: Obesity is identified as an independent risk factor for developing congestive heart failure (HF). Paradoxically it has been reported that obesity is associated with improved survival in different cohorts of HF patients. Nevertheless, the presence of obesity paradox in HF with mid-range ejection fraction (HFmrEF) is not completely elucidated.
Objective: To analyse the relationship between body mass index (BMI) and mortality in a HFmrEF ambulatory cohort of different aetiologies followed in a HF unit, with especial focus on the role of obesity in prognosis.
Methods: Baseline BMI was analysed as continuous variable and categorized in 4 groups based on 2009 WHO classification: low weight (BMI <20.5 kg/m2), normal weight (BMI 20.5 to <25.5 kg/m2), overweight (BMI 25.5 to <30 kg/m2) and obesity (BMI ≥30 kg/m2). All-cause mortality was the primary end-point of the study. Cox regression analyses adjusted by age, sex and NYHA functional class were performed and survival curves plotted.
Results: Three-hundred thirty patients were included in the study (age 65.9 ± 13.2 years, 68% men). The main aetiology was ischemic heart disease (52%, followed by dilated cardiomyopathy (11%) and hypertensive cardiomyopathy (11%). The majority of patients were in NYHA class II (65%) and III (26%). Mean ejection fraction was 43.2% ± 2.7. During a mean follow-up of 5.3 ± 4.6 years 142 patients (42%) died. BMI showed a protective effect on survival in Cox regression analysis (HR 0.96 [95%CI 0.92-0.99], p=0.01). When categorized groups of BMI were analysed, obese patients showed a trend towards lower mortality than normal weight patients (reference): HR 0.65 [95%CI 0.40-1.03], p=0.07. Adjusted survival curves according to BMI category are depicted in the figure. As a significant interaction (p=0.02) was found between BMI and ischemic aetiology of HF, separate analyses were performed for BMI categories for ischemic and non-ischemic patients, with remarkably different results: ischemic aetiology: HR 0.97 [95%CI 0.52-1.79], p=0.91; non-ischemic aetiology HR 0.28 [95%CI 0.13-0.64], p=0.003.

Conclusions: A greater BMI was associated with lower mortality rates in patients with HFmrEF during a mean follow-up of five years. Obesity showed a protective effect in HFmrEF patients, which remarkable in patients from non-ischemic aetiology and was absent in patients from ischemic aetiology.



P1574

Characteristics of LV left ventricular myocardium remodeling in patients with acute decompensated heart failure and intermediate LV left ventricular ejection fraction

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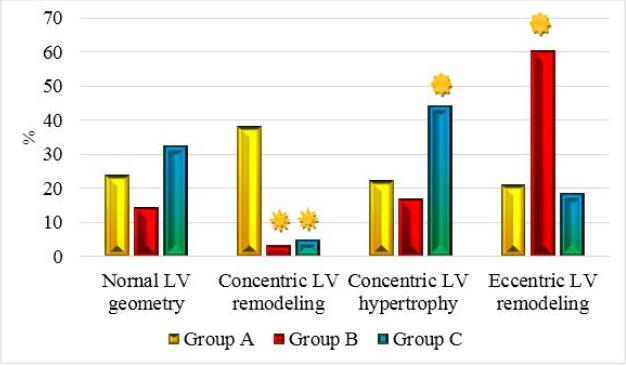
Background. One of key points in the acute decompensated heart failure (ADHF) pathogenesis is left ventricular (LV) myocardium remodeling which is considered a complex of structural and geometrical alterations occurred under the impact of pathogenic factors. Determination of remodeling type as well as its interaction with changes in extracellular matrix are important for assessment of cardiovascular events risk and selection of optimal therapeutic strategy in future.
Purpose. To determine types of myocardium remodeling in patients with mid-range left ventricular ejection fraction (LV EF) in comparison with reduced and preserved LVEF in the situation of ADHF.
Materials and methods. 195 patients with ADHF were examined, 141 were males , 54 - females. Their average age was 64,6+-14,8 years. Echocardiography was performed, LV EF by Simpson was measured, type of remodeling was established. General cohort was divided into 3 groups – A: LV EF = 40-49%, B: < 40%, C: >= 50%. Volume fraction of interstitial collagen (VFIC) was calculated indirectly. Results were statistically parsed.
Results. VFIC in group A was 6,6±0,6%, in group B - 10,4±1,0 % (p<0,001), in group C -3,31±0,2% (p<0,001). Distribution of remodeling types is showed on the Graph.1.
Normal LV geometry was observed more often in A and C cohorts, concentric LV remodeling – in A group. Eccentric LV remodeling was more typical for group B, concentric LV hypertrophy did notdominate in any group.
Dominant type of LV geometry in group A was concentric LV remodeling – 38,0%, against group – 3,2%, and – 4,9%, p<0,001.
Normal LV geometry in group occurred in 23,9% of all observations, 14.3% in and 32,5% in group, but those differences were proven statistically insignificant.
Rate of concentric LV hypertrophy had shown no significant differences between groups and : 22,2% vs 16,9%, p>0,05, but this type was significantly more often observed in cohort: 44,3%, p<0,001. Eccentric LV remodeling was significantly less common in persons of group as compared to cohort : 21,1% versus 60,3%, p<0,001; no significant differences observed between groups and (18,3%).

Conclusions: 1. VFIC in patients with intermediate LVEF is 6,6±0,6%, whichis significantly higher than in persons with intact LV EF -3,31±0,2%, but significantly lower than in patients with reduced LV EF, p<0,001.
2. In patients with ADHF and intermediate LV EF, signs of concentric LV remodeling were observed in 38% of all cases. Normal LV geometry was registered in 23,9% of cases without any statistical differences between the groups.



Note: ✹ - The differences are significant p<0,001

Graph.1 Rate of LV geometry types in pat

P1575

Heart failure with mid-range ejection fraction in southern Brazil: an eight year follow up cohort

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On behalf of: PUCRS Heart Failure Study Group

Background - Heart failure with mid-range ejection fraction (HFmEF), their epidemiological characteristics and particularly their clinical outcomes rates represent an important issue in developing countries due to the contingency of resources for health care.
Purpose - The study aimed to describe clinical characteristics, total mortality and cardiovascular mortality in an eignt-years follow up HFmEF population.
Methods - The study population was admitted in a period between January 2009 and December of 2011 with acute heart failure (HF) diagnosis by Boston Criteria and was followed up for a maximum period of 8 years (mean follow up: 4,7 years). The sample was divided in three groups according left ventricle ejection fraction (LVEF): HF with preserved ejection fraction (HFpEF), when LVEF was >50%, HF with reduced ejection fraction (HFrEF) when LVEF was < 40% and HFmEF when LVEF was ≥40% and <50%. In-hospital characteristics and outcomes were registered. A post-discharge follow up registered the incidence of total and cardiovascular mortality. The association between the categorical variables was performed using the Chi-square tests with adjusted residuals analysis and the comparison between the means of the continuous measures, through the analysis of variance - ANOVA with Bonferroni Post Hoc test. The Kaplan-Meier survival curve was used according to the ejection fraction categories. A P value <0.05 was considered statistically significant.
Results - A total of 380 pacientes were admited and followed up. The mean age was 68 (±13) years and the majority (53%) were female, 51% were HFpEF, 32% HFrEF and 17% were HFmEF. Patients considered HFmEF had a higher rate of myocardial ischemic disease than HFrEF and HFpEF (52,4% x 46,3%x 32,1%, P=0,004), respectively. The total in-hospital morality was 7,6% and was not different among the HF groups. The total cardiovascular mortality in the whole follow up was higher in the HFmEF group in comparison to the HFrEF and HFpEF (61,1% x 58,3% x 38,5%, P=0,38), respectively.
Conclusion - Our result demonstrated the HFmEF patients were associated to a higher myocardial ischemia rate, a non-different in-hospital mortality and had higher cardiovascular mortality in the whole period of follow-up.

P1576

Profile and differential management of patients with a mid-range ejection fraction compared to patients with depressed ejection fraction, long-term follow-up

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Introduction Heart failure (HF) with midrange ejection fraction (EFmr) rises as a differential group.
The objective of this study is to characterize this type of patients and their comparison with the prototype of patients with heart failure with reduced EF (EFr).
Methods Patients with a diagnosis of HF admitted to a Cardiology Service of a tertiary hospital between July 2016 and March 2017 have been collected prospectively and consecutively, and their follow up.
Results Of the total of 341 patients collected, 49 patients had EFmr (40-49%) and 114 patients with EFr (<40%). The median follow-up was 403 days. The baseline characteristics are in Table 1. Patients with EFmr have a generally poorer cardiovascular risk profile, and more often have tachyarrhythmias or acute ischemic heart disease as triggers.
More beta-blockers were used at discharge in patients with EFr (83.8% vs 73.5%) without reaching statistical significance. The use of ACEi or ARA2 is similar (65% in both cases), but in the EFmr group, ARA2 was used in a higher percentage (20, 4% vs 8.1%, p 0.027). MRAs are used in both groups, with greater use in patients with EFr (65% vs 30% at discharge, p <0.001). The use of diuretics at discharge was higher in the group of patients with EFr than in the EFmr group (82% vs 69.4%), p 0.07).
In the long-term follow-up, patients with EFmr are admitted for different causes than the HF in a greater percentage, without reaching statistical significance (15.6% vs 8.6% at 6 months and 26.2% vs 18.6 % in more than one year, NS). No significant differences were found in terms of mortality due to HF or all causes.
Conclusions The patient with EFmr who is admitted for HF mainly due to tachyarrhythmias or acute ischemic heart disease. They also have less right ventricular dysfunction. Diuretics are used in smaller amounts, as well as ARMs. In long-term follow-up, a higher percentage of readmissions due to causes other than HF was observed in this subgroup.

Characteristic	Midrange EF	Reduced EF	p value
Mean age	77,0	71,7	0,002
Sex female	36,7%	23%	0,066
Hypertension	87,8%	75,2%	0,072
Smoker	6,1%	15%	0,117
Ischemic cardiopathy as trigger	20,4%	10,6%	0,095
Tachyarrythmia as trigger	26,5%	15,2%	0,089
Mean EF (%)	44,8%	27,6%	<0,001
Right ventricle disfunction	16,3%	43,2%	<0,001

Table 1

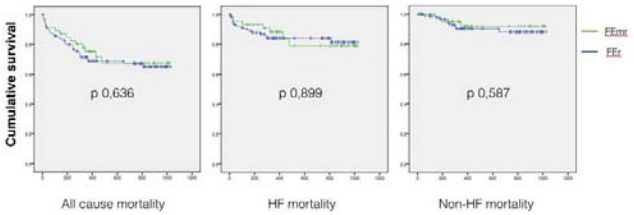

Figure 1

P1577

On mid-term, had mid-range ejection fraction heart failure the same prognosis with reduced ejection fraction heart failure?

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Introduction: Heart failure (HF) is a progressive disease with an increasing incidence and a severe prognosis. Its mortality overpasses that of some malignancies and its evolution is marked by an altered quality of life and frequent hospitalizations. Few data are available from East European countries.
Objective: The aim of the study was to analyze the mid-term cardio-vascular events, (mortality, re-hospitalizations) of the patients with mid-range ejection fraction (HFmrEF) and to compare them with the events occurred in patients with heart failure with reduced (HFrEF) and preserved ejection fraction (HFpEF), respectively, in a county hospital from an East European country.
Method: 353 patients consecutively hospitalized for all cause acutely decompensated heart failure were included (age 70±11,2 years, 47% males; HF diagnosed < 1year in 63,7% of patients, more than 5 years in 11,6%) and followed up for 18 months. We noted the re-hospitalizations and all-cause of deaths.
Results: During the 18 months' follow-up, 19.3% patients died and 33.4% were re-hospitalized. The mortality was higher in the HFrEF group (27.1%) as compared with HFmrEF (20,6%) and HFpEF (14,2%) respectively, p= 0.03. Also, the mortality rate was significantly higher in the re-hospitalized group as compared with the group that did not require hospital readmission (25.4% vs 16.2%, p= 0.04). We found significantly more anemia (p<0.001) and atrial fibrillation at admission (p= 0,04) in the group of patients who died. The ischemic heart disease was the principal cardiopathy (65% of patients), in the surviving group we found significantly higher serum levels of lipids (p< 0.01). The body mass index was also significantly increased in the surviving group (p= 0.03), the obesity paradox? A cut-off value <46% for LVEF, a systolic blood pressure < 125 mm Hg and diastolic blood pressure <80 mmHg were associated with severe prognosis and increased mortality.
Conclusion: A cut-off value < 46% for LVEF, including patients with HFrEF and most of patients with HFmrEF, was associated with increased mortality suggesting that to a large extent, they have the same prognosis.

P1578

Influence of left ventricular ejection fraction category in patients with stenosis aortic undergoing with transcatheter aortic valve replacement

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European Society of Cardiology heart failure guidelines include a new patient category with mid-range (40%-49%) left ventricular ejection fraction (HFmrEF). HFmrEF patient characteristics and prognosis are poorly defined. The aim of this study was to analyze the clinical results in according to category of LVEF in a cohort of hospitalized heart failure patients

Methods: A prospective observational study was conducted with 667 patients undergoing TAVR with balloon-expandable or self-expanding valves were included. The patients were classified according to ejection fraction as follows: HFrEF, < 40%; HFmrEF, 40%-49%; and HFpEF ≥50%. Baseline patient characteristics were examined, and outcome measures were mortality and readmission for heart failure
Results: Among the study participants, 87 (13%) had HFrEF, 69 (10.3%) HFmrEF, and 511 (76.6%) HFpEF. The patients had a different clinical profile depending the category of EF (HFrEF, HFmrEF and HFpEF) in terms of age (76.4 ±10 vs. 78.8±6 vs. 79.2±6 years, p=0.001); gender (male) 60.9% vs. 55.1% vs. 35.6%, p< 0.001; ischemic etiology 64.4% vs. 50.7% vs. 39.9%, p<0.001) and use of blockers agents 65.5% vs. 55.1% vs. 47.2%, p 0.026). There was a good evolution of LVEF over time (baseline, post-TAVR and 1 year) on all categories, HFrEF: 32.09±4.9 to 42.7±11 to 50.02±12%; HFmrEF: 44.18 ±3.3 to 54.8±10 to 56.5±10%, HFpEF: 67.4±7 to 68.6±7 to 65.2±7%. There were no significant differences in three groups (HFrEF, HFmrEF and HFpEF) in all-cause in-hospital mortality (5.7% vs. 1.4% vs. 3.3%, p= 0.428); late mortality (35.4% vs. 44.1% vs. 40.9%, p= 0.448) or heart failure readmission (13.1% vs. 11.8% vs. 9.6%, p=0.289). The survival was similar among the 3 groups at 1-year and 3-years during follow-up (87.4% vs. 92.8% vs. 88.3% and 72.4% vs. 77.2% vs. 75.4%) respectively, log Rank=0.283, p= 0.808.

Conclusions: The HFmrEF patient group has characteristics between the HFrEF and HFpEF groups, with similarities to both groups. No between-group differences were observed in total mortality, or heart failure readmission.

P1579

Mid range ejection fraction: a continuum or a self clinical entity?

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Background: From the use of the terms Heart failure (HF) with preserved ejection fraction (EF) and reduced ejection fraction, a group of undefined patients remains in the middle of these values (between 40 - 49 of EF), a true grey area. The European Guidelines incorporated this group as mid-range EF. Neither the behavior of this group nor the therapeutic strategy to be implemented are entirely clear.Objectives: To evaluate in a population hospitalized for HF if the patients with mid-range EF evolve as the reduced EF group or as the preserved ones. For this, we took death during hospitalization; CHF-related hospitalization and death during follow-up as end points.Materials and methods. We retrospectively evaluated 818 patients hospitalized for CHF in two centers in the city of Buenos Aires, Argentina, between 2008 and 2016. The hospitalizations were consecutive and for the first time. All the patients were followed up by telephone for at least one year. The population was divided in three groups, group A, n = 301 patients with preserved EF (> 50%), group B, n = 385 patients with reduced EF (<39%) and group C, n = 132 patients with mid-range EF (from 40 to 49%)The Wilcoxon test was performed for the analysis of the variables. For the comparison between EF groups, the chi2 test was carried out and later logistic regression was conducted.
Results. There was no statistically difference in mortality during hospitalization . (3.9% for group A, 6.4% for group B and 3.7% for group C.)
There was a statistically significant association between groups B and C in the end points of death and CHF-related hospitalization during follow-up of patients ($p < 0.05$) in comparison with A group.
During follow up, death was 29% for A, 31.4% for B and 34.8% for C. CHF-related hospitalization were 23.2 % for A, 30.3% for B and 22.7% for C.
In the logistic regression analysis we found a relation between groups B and C ($p < 0.005$) in terms of CHF-related hospitalization during follow-up in contrast with A group.
Between the baseline characteristics of each group, the presence of atrial fibrillation between groups A and B was statistically significant ($p = 0.004$).Conclusions- There was no difference in mortality during hospitalization among groups
- Patients with intermediate EF have a statistically significant association with the group of reduced EF in terms of death ($p = 0.03$) and CHF-related hospitalization ($p = 0.01$) in the follow-up. This could suggest that the mid-range EF group behaves, in this population, similarly to the reduced EF group. Considering this, we could propose a similar therapeutic strategy for this group

P1580

Sexual differences in heart failure with mid-range ejection fraction patients

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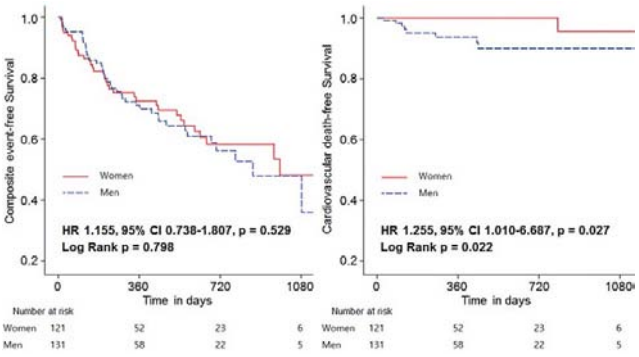
Background: Little is known on the gender differences in patients with heart failure (HF) with mid-range ejection fraction (EF) (HFmrEF).
Objectives: We aimed to investigate the gender differences in patients with HFmrEF.
Methods: Among 252 consecutive patients with primary diagnosis of HFmrEF (EF 40-49%) and baseline and follow-up echocardiogram in an urban tertiary referral center from October 2013 to March 2017, 131 (52.0%) were in men and 121 (48.0%) were in women. We compared the characteristics and composite event (cardiovascular death and HF readmission).
Results: Compared with women, men had significantly higher rates of prior ischemic heart disease, chronic kidney disease, and peripheral arterial disease. No significant differences were found in other baseline characteristics between men and women. At baseline, LVEF was not significantly different between men and women. At follow-up, LVEF in women significantly improved from the baseline levels (48.9% vs. 45.3%, $p<0.001$), whereas no significant changes in LVEF were observed in men. In women, the use of inhibitor of the renin angiotensin system (odds ratio 0.386, 95% confidence interval [CI] 0.181-0.822, p=0.014) was contributed to the improvement of LVEF. Composite event occurred in 80 patients (31.7%). There were no significant differences in the composite event between men and women (32.1% vs. 31.4%, hazard ratio [HR] 1.155, 95% CI 0.738-1.807, p=0.529). Additionally, significant contributors for composite event were age (HR 1.035, 95% CI 1.012-1.058, p=0.002), the presence of atrial fibrillation (HR 1.781, 95% CI 1.148-2.764, p=0.010), spironolactone use (HR 0.556, 95% CI 0.358-0.865, p=0.009). Cardiac death occurred in 9 patients (3.6%). Men had a significantly higher rate of cardiac death than women (6.1% vs. 0.8%, HR 1.255, 95% CI 1.010-6.687, p=0.027). In men, age (HR 1.118, 95% CI 1.022-1.223, p=0.015) and chronic kidney disease (HR 3.142, 95% CI 1.034-6.581, p=0.042) were independently predictive for increased risk of cardiac death.
Conclusions: This study showed that in patients with HFmrEF, women might be associated with improved LVEF and lower risk of cardiac death compared with men. To establish the expected advantage of women, further prospective studies are needed.



Kaplan-Meier estimation

P1581

Comparative study of patients with heart failure with ejection fraction in the mid range and patients with preserved ejection fraction: management and prognosis

D Daniel Enriquez Vazquez[1]; CN Perez Garcia[1]; M Ferrandez Escarabajal[1]; A Travieso Gonzalez[1]; TS Luque Diaz[1]; C Olmos Blanco[1]; D Vivas Balcones[1]; P Mahia Casado[1]; J Higueras Nafria[1]; J Goirigolzarri[1]; R Bover Freire[1]; I Vilacostai[1]; C Macaya[1]
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Introduction In recent years, the study of heart failure (HF) with ejection fraction in the middle range (EFmr) has been enhanced as a group with differential characteristics.
The aim of this study is to analyze the differences between patients with EFmr and preserved ejection fraction (EFp), as well as its long-term follow-up.
Methods Prospective and consecutive patients with HF admission in the Cardiology Service between July 2016 and March 2017 were collected, collecting the data referring to them, to the management, and to the follow-up performed until April 2018.
Results Of the total of 341 patients with HF, 49 had EFmr and 153 patients had EFp. The baseline characteristics of these are shown in Table 1. No significant differences were found regarding the main trigger. The patient with HF EFmr presents in general a profile of greater cardiovascular risk. The clinical presentation regarding the physical examination showed no differences.
The patients with EFmr received in a higher percentage treatment with beta-blockers (73.5% vs 64.7%, NS), ACEi or ARA2 (65.3% vs 55.6%, p 0.299) as well as ARM. No differences were found regarding the diuretic treatment at discharge. There were no significant differences in the patient's referral to the HF Unit after discharge.

Characteristic	Midrange EF	Preserved EF	p value
Mean age	77,0	78,24	0,459
Sex female	36,7%	68%	<0,001
Hypertension	87,7%	83%	0,428
Diabetes Mellitus	49%	50,4%	0,824
Mean EF	44,8%	61,2%	<0,001
Atrial fibrillation	53,1%	62,7%	0,228
COPD	18,4%	9,2%	0,077

Table 1

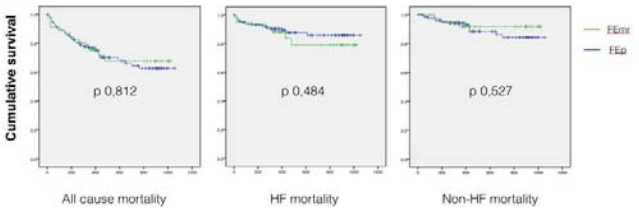

Figure 1

A median follow-up of 403 days was performed. No significant differences were found in terms of readmission due to HF or other causes. Regarding mortality, there were no differences (27.7% vs. 29.9%, p = 0.766), nor in their analysis due to causes.
Conclusions HF EFmr presents a phenotype similar to that of EFp in terms of presentation, patient profile and clinical management. It is similar in terms of readmissions and mortality due to heart failure and other causes.

P1582
The role of inflammation and fibrosis in the occurrence of atrial fibrillation in heart failure patients with mid-range ejection fraction

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Heart failure (HF) is frequently accompanied by atrial fibrillation (AF). As HF is more severe, the prevalence of AF increases markedly. Such patients are at increased risk of both hospitalization due to HF decompensating and mortality. While HF with preserved and reduce ejection fraction (EF) are well described, determinants and outcome of HF with mid-range EF and AF remain unclear. The aim of this study is to examine clinical and biochemical predictors of AF incident in patients with HF mid-range EF (mrHF).
Methods: 56 patients (age 61± 6, 8) with mrHF and non-rheumatic AF after successful cardioversion were enrolled in this study. As a control group 42 patients with mrHF without AF were also enrolled. After the enrollment the echocardiography examination and 24-hour ambulatory Holter monitoring ECG were registered in each patient. We measured plasma indexes of inflammation such as highly sensitive C-reactive protein (hs-CRP) and interleukin-6 IL-6 (IL-6) as well as fibrosis marker (transforming growth factor TGF-β1) in all the observed patients. All of blood tests in plasma were determined by ELISA on the analyzer "Stat Fax 303 Plus" using commercial kits "Bio Source'. Studies were conducted on the basis of simple randomized protocols, using the universal statistical packages SPSS 13.0 and EXCEL-2007.
Results: The obtained results showed that mrHF patients with AF had higher levels of inflammation markers (hs-CRP p = 0.002, IL-6 p = 0.019) compared with mrHF patients without AF. There is the evidence linking inflammation to the initiation and perpetuation of AF. Plasma TGF-β1 level is also were higher among mrHF patients compared with controls group (p = 0.001). TGF-β1 is a key cytokine involved in the pathogenesis of fibrosis, whereas IL-6 plays an important role in the regulation of inflammation. Besides the levels of inflammation and fibrosis markers were markedly elevated in patients with dilated left atrium, poorly functioning left atrial appendage and longer duration of AF.
Conclusion: Increased inflammation and fibrosis markers in mrHF patients are related to the initiation and perpetuation of AF and may contribute to structural remodeling of left atrium in patients with mrHF and AF.

P1583
The significance of blood pressure control in heart failure with mid-range ejection fraction

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Purpose: Heart failure (HF) with mid-range ejection fraction (HFmrEF) is a newly suggested entity in HF. Since it has been inadequately addressed, there is an urgent need to determine the profile of HFmrEF patients and the optimal approach to their management. The present study aimed to assess the long-term clinical outcomes of hypertensive patients with HFmrEF and the impact of blood pressure (BP) on their mortality and cardiovascular outcome.
Methods: We performed a retrospective observational study that included 121 hypertensive patients with HFmrEF and 149 hypertensives with heart failure and preserved ejection fraction (HFpEF). The median follow up was 84 months (22–122).
Results: Our analysis did not reveal any statistically significant difference between the two groups in total mortality (p=0.34) or cardiovascular mortality (p = 0.54). The total mean survival time was 102.9 months (100.5–110.1), while the mean survival time was 105.3 months (80.4–90.2) in HFpEF and 97.6 months (92.7–102.6) in HFmrEF. An office systolic BP > 138 mmHg and diastolic BP>89 mmHg were significantly associated with both all-cause mortality (p=0.02 and p=0.013, respectively) and cardiovascular mortality (p=0.02 for both) in HFmrEF. In HFpEF patients no significant association was found between outcome and office BP.
Conclusions: HFpEF and HFmrEF have similar long-term outcomes. Suboptimal BP levels are a significant risk factor for an adverse outcome in HFmrEF. Our results emphasize the importance of good BP control in order to achieve better outcomes in hypertensives with impaired EF and HF symptomatology.

P1584
Adherence to therapy in patients with heart failure with mid-range ejection fraction: a problem to solve

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Background Heart failure with mid-range ejection fraction (HFmrEF) was for the first time described by Lam and Solomon in 2014 and, in 2016, the Task Force for the Diagnosis and Treatment of Acute and Chronic Heart Failure of the European Society of Cardiology introduced in guidelines HFmrEF as a distinct phenotype. In terms of left ventricular ejection fraction (LVEF) HFmrEF (LVEF 40-49%) occupies an intermediate position between HF with reduced ejection fraction (HFrEF) (LVEF<40%) and HF with preserved ejection fraction (HFpEF) (LVEF>50%) and the question is if patients with HFmrEF represents a distinct pathophysiological entity or a transitional phenotype. Suboptimal adherence to treatment is considered to be the main impediment in controlling chronic diseases and the most common precipitating factors for hospitalization among HF patients are respiratory infections, arrhythmias, myocardial ischaemia and medication noncompliance.
Purpose The aim of our study was to assess the adherence to treatment of patients with HFmrEF admitted in an Internal Medicine Department.
Methods We enrolled 84 consecutive patients with HFmrEF medium age 69±7 years old. We assessed demographic, clinical and laboratory features from the patient admission charts. All patients completed the Morisky questionnaire for adherence to treatment.
Results 51 patients (60.72%) were males and 33 (39.28%) females. 65.47% of the patients were active smoker. 35.71% were in NYHA III/IV class. When we assessed comorbidities, history of coronary artery disease was recorded in 57.14% of them, and ACS in 9.52%. Other comorbidities recorded were: hypertension 58.33%, diabetes mellitus 28.57%, atrial fibrillation 47.61%, COPD 26.19%, anaemia 27.38%, chronic kidney disease 44.04%. Maximum adherence (Morisky score 0) was recorded in only 10.71% of the patients, 65.47% had intermediate adherence and 23.82% low adherence. Patients with more comorbidities had the lower adherence to treatment.
Conclusions Patients with HFmrEF are mostly men, smokes, have coronary artery disease, atrial fibrillation, hypertension and chronic kidney disease in almost one half of them, and a very poor adherence to therapy. These patients need effective strategies to increase adherence to treatment, in order to reduce duration and frequencies of hospitalization and morbidity/mortality rates.

P1585
Left atrial remodeling in patients with mid-range ejection fraction heart failure with ischemic heart disease: the mirror image of systolic and diastolic dysfunction balance?

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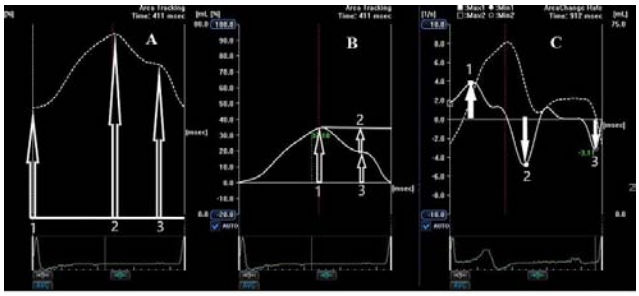
Introduction . Diagnostic algorithms and therapeutic tactics of patients with HFmrEF are not fully defined, and the pathophysiological mechanisms underlying myocardial remodeling including atrial remodeling in HF are being actively studied. Studies assessing the atrial remodeling by three-dimensional speckle tracking echocardiography (3DSTE) in patients with HF are lacking.
Purpose of the study. To study the left atrial (LA) remodeling using new 3DSTE tools in patients with HFmrEF compared to patients with HFpEF and HFrEF ischemic etiology.

Material and methods. 3 groups of patients with IHD (mean age 59.0±10.3 yrs; 85% men, over 65% of patients had AH, most patients with HF II NYHA) were compared in a cross sectional study: HFpEF (n=23; EF 59.84±6.83%), HFmrEF (n=23; EF 44.20±2.69%) and HFrEF (n=20; EF 28.14±8.19%). The diagnosis of HF was set according to the recommendations of ESC 2016. All patients had sinus rhythm, were on the optimal drug therapy. Exclution criteria: valve prostheses, valve stenosis or regurgitation more than I degree, heart surgery/percutaneous coronary intervention/valvuloplasty within 3 months before the study. LA volumes parameters, strains, S(%): longitudinal (LALS), circumferential (LACS), area tracking (LAAT); strain rates SR(-): circumferential (LACSR), area change rate (LAACR) were estimated in reservoir, conduit and contractile phases (Figure).
Results. 3D STE of the LA mechanic showed significant differences in HFmrEF vs HFrEF patients. All volumetric parameters were lower in HFmrEF as compared to HFrEF: vol max 41.78 vs 56.05 ml/m2 (p<0.001); vol min 25.90 vs 42.67 ml/m2 (p<0.001); vol-p 34.76 vs 49.61 ml/m2 (p<0.001). LA S and LA SR were higher in HFmrEF group in comparison with HFrEF one during reservoir phase: LALS 18,10 vs 9,51 (p<0,001), LACS 20,52 vs 12,54 (p<0,01), LAAT 41,8 vs 23,18 (p<0,001), pLACSR 1,10 vs 0,61(p<0,01), pLAACR 1,92 vs 1,16 (p <0,01); conduit phase: LALS 8,36 vs 4,89 (p<0,001), LACS 9,42 vs 5,25 (p<0,01), LAAT 19,78 vs 10,30 (p<0,001), pLAACR -1,60 vs -0,90(p<0,05); contractile phase: LALS 10,03 vs 4,78 (p<0,001), LACS 12,95 vs 8,35 (p<0,05), LAAT 24,19 vs 13,83 (p<0,01), pLAACR -2,55 vs -1,42 (p<0.01). No volumetric, S and SR differences were found in groups between HFpEF and HFmrEF. Conclusion. The use of 3DSTE revealed geometric and functional differences in the remodeling of LA in patients with HFmrEF compared with patients with HFrEF and the absence of divergencies in the parameters studied compared with the group of patients with HFpEF of ischemic etiology. The severity of LV diastolic dysfunction in the HFmrEF group corresponded to the HFpEF group, significantly different from that in the HFrEF group. Patterns identified using 3DSTE require further study, including aspects of molecular genetic remodeling mechanisms and prognostic value in patients with HFmrEF.



A. Functional LA volumes: 1- Vol min, 2- Vol max, 3- Vol p

B. LA strain: 1 - LASr, 2- LASed, 3- LASct

C. Strain rate: 1- pLASRr, 2 - pLASRed, 3 - pLASRct

P1586

Characteristic of sympathetic nerve activity in two subgroups of patients with heart failure (heart failure with reduced ejection fraction and mid-range ejection fraction)

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Introduction Sympathetic overactivity in severe heart failure (HF) is a well known feature. Muscle sympathetic nerve activity (MSNA) studies have been reported on subjects with reduced ejection fraction (HFrEF). The European Society of Cardiology has recently introduced a new HF category, i.e. HF with mid-range ejection fraction (HFmrEF), characterized by left ventricular EF of 40–49%. The autonomic regulation in this new category has not yet been thoroughly described.
Aims: Examination of the sympathetic and cardiovagal regulation in patients with HFmrEF compared with data obtained from HFrEF patients and healthy volunteers. Method: 7 patients in HFrEF group (3 females; age: 57±16), 18 patients in HFmrEF group (2 females; age: 62±10) and 9 healthy control subjects (3 females; age: 52±10) were enrolled. MSNA was recorded in the superficial peroneal nerve by microneurography. The signal was processed by the Nerve Traffic Analyzer System. Continuous ECG-, non-invasive blood pressure, and uncalibrated respiratory signals were also recorded. Data were digitized online (500 Hz/channel) with the Dataq/Windaq System. Offline analysis was performed with WinCPRS program. Sympathetic burst frequency (bursts/minute) and burst incidence (bursts/100 heartbeats) were determined. Cardio-vagal parameters, (HRV and BRS) were calculated by conventional methods.
Results: Burst frequency in rest was significantly different between the HFrEF and HFmrEF subgroups (50±12 bursts/min vs. 38±11 bursts/min; p=0,05). Burst frequency of the healthy control (HC) population (26±8 bursts/min) was significantly lower than in the HF subgroups, (HFrEF vs. HC: p <0,001; HFmrEF vs. HC: p=0,022). The differences were even more pronounced in the burst incidences (HFrEF: 80±16; HFmrEF: 64±15; HC: 36±11 bursts/100 heartbeats; HFrEF vs. HFmrEF p=0,035; HFrEF vs. HC: p <0,001; HFmrEF vs. HC: p <0,001). Cardio-vagal parameters were not significantly different in the three studied groups.
Conclusion: In the HFmrEF group, the sympathetic activity is abnormally increased but the elevation is less marked than in HFrEF group. Cardio-vagal parameters, on the other hand are unsuitable for similar sensitive differentiation. We have launched a follow-up study to determine the prognostic significance of our findings

P1587

Haemodynamic differences in response to physiological and pharmacological stress in heart failure with preserved ejection fraction

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Background: Heart failure with preserved ejection fraction (HFpEF) is associated with high prevalence, poor outcomes and quality of life for patients. Better understanding of the HFpEF pathophysiology is warranted. The aim of the present study was to assess differences in haemodynamic response to physiological and pharmacological stress in HFpEF.
Methods: Eighteen HFpEF patients (8 male; mean age 63±9 years of age and LVEF, 53±3), underwent blood sampling for natriuretic peptides and transthoracic echocardiography at rest and in response to different type of maximal tolerated stress testing i.e. i) physiological i.e. exercise stress test (ESS) using treadmill and modified Bruce protocol, and ii) pharmacological i.e. dobutamine stress test (DSS, with incremental dose of 5,10,15,20 ug/Kg/min in 3 minutes stages). DSS was performed within two weeks of the exercise test.
Results: The mean NTproBNP was 1821±1777 pg/ml. The duration of treadmill exercise test was 371±169 sec, and dobutamine 694±115 sec. Patients demonstrated a significant increase from baseline to peak physiological and pharmacological stress in heart rate (ESS, 42%, p<0.01; DSS, 35%, p<0.01), mean arterial pressure (ESS, 13%, p<0,01; DSS, 12%, p<0.01), stroke volume (ESS, 43%, p<0,01; DSS, 55%, p<0.01), cardiac output (ESS, 67%, p<0.01; DSS, 70%, p<0.01), cardiac power output (ESS, 76%, p<0.01; DSS, 74%, p<0.01), tricuspid regurgitation (ESS, 92%, p<0.01; DSS, 94%, p<0.01), early diastolic velocity (ESS, 21%, p<0.01; DSS, decreased by 3%%, p=0.34), left ventricular outflow tract velocity time integral(ESS, 10%, p=0.01; DSS, 20%, p=0.01), right ventricular tissue systolic wave (ESS, 20%, p<0.01; DSS, 40%, p<0.01), and global longitudinal strain (ESS, 9.5%, p=0.02, DSS, 8.75%, p=0.04). Systemic vascular resistance decreased from baseline to peak physiological and pharmacological stress (ESS, 63%, p<0,01; DSS, 69%, p<0.01). Further analysis revealed the following significant differences in cardiac response between the two stress modalities i.e. stroke volume was higher following DSS compared to ESS (127 ±24 vs 109 ±23 ml/beat, p=0.02) as was right ventricular tissue systolic wave (0.20±0.02 m/sec vs0.15 ±0.03 m/sec, p<0.01). The ESS however induced higher heart rate (128 ±12 vs 114 ±12 beats/min, p=0.08) and early diastolic velocity (1.06±0.26 vs 0.81 ±0.24 m/sec, p=0.01), whereas other echocardiography variables were not significantly different between the ESS and DSS.
Conclusions: The major findings of the present study suggest that there are differences in haemodynamic response to physiological and pharmacological stress in patients with HFpEF. Understanding differences in cardiac response to different stress modalities is important as it may improve understanding of the complex pathophysiology of HFpEF.

P1588

Hypovolemia and reduced hemoglobin mass in patients with heart failure and preserved ejection fraction

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Background/Introduction: A fundamental tenet of heart failure pathophysiology hinges on a perpetual propensity for fluid retention leading to blood volume (BV) expansion and haemodilution. Whether this can be applied to heart failure patients with preserved ejection fraction (HFpEF) remains uncertain. Purpose: The present study sought to determine BV status and key hormones regulating fluid homeostasis and erythropoiesis in HFpEF patients. Methods: BV and haemoglobin mass (Hbmass) were determined with high-precision, automated carbon-monoxide rebreathing in 20 stable HFpEF patients (71.5±7.3 years, left ventricular ejection fraction = 55.7±4%) and 15 healthy age- and sex-matched control individuals.

Additional measurements comprised key circulating BV-regulating hormones such as pro-atrial natriuretic peptide (proANP), copeptin, aldosterone and erythropoietin (EPO), as well as central haemodynamics and arterial stiffness via carotid-femoral pulse wave velocity (PWV). Results: Carotid-femoral PWV was increased (+20%) in HFpEF patients versus control individuals. With respect to haematological variables, plasma volume did not differ between groups, whereas BV was decreased (-14%) in HFpEF patients. In consonance with the hypovolemic status, Hbmass was reduced (-27%) in HFpEF patients, despite they presented more than 2-fold elevation of circulating EPO (+119%). Plasma concentrations of BV-regulating hormones including proANP (+106%), copeptin (+99%) and aldosterone (+62%) were substantially augmented in HFpEF patients.
Conclusions: In contrast with the prevailing paradigm in heart failure, HFpEF patients may present with hypovolemia and markedly reduced Hbmass, underpinned by a generalised overactivation of endocrine systems regulating fluid homeostasis and erythropoiesis. These findings provide a novel perspective on the pathophysiological basis of HFpEF.

P1589
Peak VO2 as a main determinant of health related quality of life in symptomatic patients with heart failure with preserved ejection fraction

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Background: Heart failure with preserved ejection fraction (HFpEF) is a complex and multifactorial clinical syndrome characterized by poor health related quality of life (QoL). The determinants of poor QoL in HFpEF remains not fully elucidated.
Purpose: We sought to evaluate the contribution of predicted peak oxygen uptake (pp-VO2) in QoL in symptomatic patients with HFpEF.
Methods: A total of 74 stable symptomatic patients with HFpEF underwent a cardiopulmonary exercise test, echocardiography, physical examination, laboratory test, and assessment of QoL by Minnesota Living with Heart Failure Questionnaire (MLHFQ). Pearson correlation coefficient and multivariate linear regression analysis were performed to identify clinical covariates associated with MLHFQ.
Results: Mean age was 72.5±9.1 years, 53% were women and all patients displayed NYHA II-III. Mean MLHFQ and percent of predicted peak oxygen uptake (pp-VO2) were 42±19.8 and 57.3±13.8 %, respectively. MLHFQ showed negative and significant correlation with pp-VO2 ($r = -0.35$, $p < 0.01$). In a multivariate analysis, pp-VO2 was significantly associated with MLHFQ (β coefficient=-0.52, CI 95%: -0.87–0.18; p=0.004). Ranked in the order of importance (drop in R2), pp-VO2 (44%), ventilatory efficiency (26%), gender (20%) and systolic blood pressure at rest (10%) were the most important covariates predicting the MLHFQ (R-squared=28.3%). Interestingly, echocardiographic parameters of diastolic dysfunction and biomarkers surrogates of severity (NT-proBNP) were not associated with QoL.
Conclusions: In symptomatic patients with HFpEF, pp-VO2 emerges as a crucial determinant of QoL.

P1590
Characteristics and outcomes of HFpEF with declining ejection fraction

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On behalf of: KorAHF investigators
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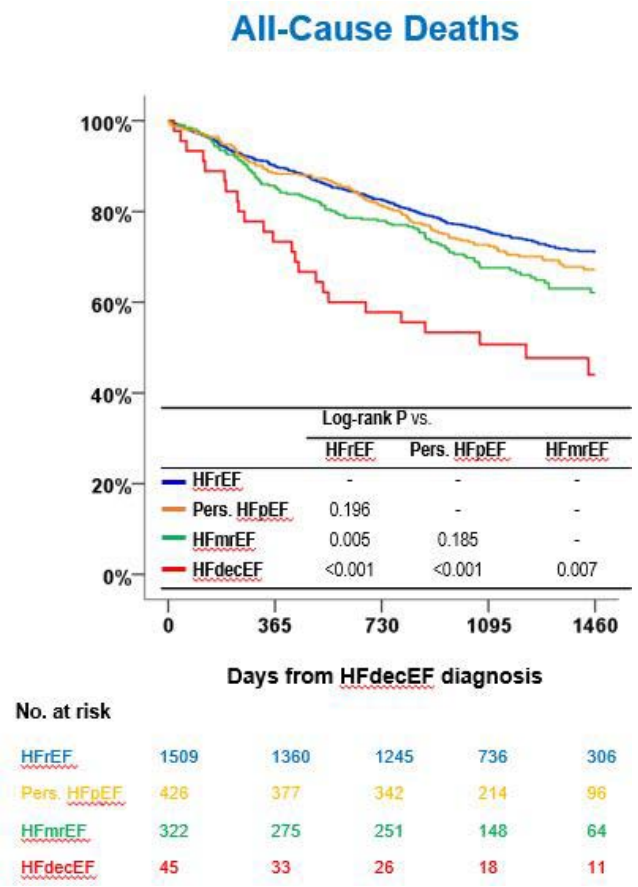
Background Some patients with heart failure with preserved ejection fraction (HFpEF) experience declining of left ventricular ejection fraction (LVEF) during follow-up.
Purpose We aim to investigate the characteristics and outcomes of patients with HF with declining ejection fraction (HFdEF).
Methods We analyzed a prospective, nationwide multicenter cohort with consecutive patients with acute HF enrolled from March 2011 to December 2014. HFpEF was defined as LVEF ≥ 50% at index admission. After 1 year, HFpEF patients were further classified as HFdEF (LVEF ≥ 50% at admission and <50% at 1 year), and persistent HFpEF (LVEF ≥ 50% both at admission and 1 year). Primary outcome was 4-year all-cause mortality according HF type from HFdEF diagnosis.
Results Of patients with HFpEF, 426 (90.4%) were diagnosed as having persistent HFpEF and 45 (9.6%) as having HFdEF. Natriuretic peptide level was an independent predictor of HFdEF (natriuretic peptide level > median: odds ratio: 3.20, 95% confidence interval [CI]: 1.42-7.25, P=0.005).
During 4-year follow-up, patients with HFdEF had higher mortality than those with persistent HFpEF (Log-rank P<0.001). After adjustment, HFdEF was associated with an almost 2-fold increased risk for mortality (hazard ratio 1.82, 95% CI 1.13-2.96, P=0.015). The use of beta-blockers, renin-angiotensin system inhibitors and mineralocorticoid receptor antagonists was not associated with improved prognosis of patients with HFdEF.
Conclusions HFdEF is a distinct HF type with grave outcomes. Further investigations that focus on HFdEF are warranted to better understand and develop treatment strategies for these high-risk patients.



Outcomes according to HF types

P1591
Incidence and probability of heart failure with preserved ejection fraction among high risk hypertensive patients.

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Background: Diagnosis of heart failure with preserved ejection fraction (HFpEF) is still challenging in clinical practice. We aimed to assess HFpEF probability and incidence in high risk patients with hypertension using different diagnostic algorithms.
Methods: Study included 39 high risk hypertensive patients with at least one symptom or sign of HF and left ventricular ejection fraction (EF) ≥50% (71.4% female, 70±11 years (M±SD), obesity 48.6%, diabetes mellitus 40%, atrial fibrillation 28.6%, chronic kidney disease 43%, estimated glomerular filtration rate (eGFR) 65 [48.3;72.8] ml/min/1.73 m2, NT-proBNP level 120 [50; 195] pg/ml). Patients with significant valvular heart disease, acute coronary syndrome, acute infections, pulmonary embolism, neoplasm, eGFR <30 ml/min/1.73 m2, body mass index >40 kg/m2 were not included.HFpEF was assessed by 2016 ESC Heart Failure (HF) Guidelines and recently proposed ESC HFA-PEF2 and H2FPEF scores. Stress-echo

with passive leg raising was used to detect impaired LV diastolic function reserve and the increase in LV filling pressure.
Results: The most common HF symptoms and signs were: dyspnea at exertion 90%, fatigue 67.4%, tachycardia at rest 35%, peripheral edema 32%. 43% of patients had increased NT-proBNP ≥ 125 pg/ml.In 41% of cases that fulfilled criteria for HFpEF diagnosis according to 2016 ESC HF Guidelines, with median NT-proBNP level of 220 [150;562] pg/ml, only structural heart abnormalities, only diastolic dysfunction and both were identified in 31.2, 0 and 68.8% cases, respectively.
Low (<2 points), intermediate (2-5 points) and high probability (>5 points) of HFpEF was identified in 8.6, 65.7 and 25.7% of patients according to H2FPEF score.Using ESC HFA-PEF2 score HF was not detected in 8.6% of cases (<2 points), 57% of patients had intermediate risk of HF and required for stress echocardiography (2-4 points), and 34.4% of patients had confirmed HF (≥ 5 points). In intermediate risk patients echo-stress test additionally confirmed HFpEF in 25% cases. Thus, HFpEF was verified in 48.5 % of patients by HFA-PEF2 score. There was no agreement in verification of low HF probability between ESC HFA-PEF2 score and H2FPEF score in same patients, it was accounted for 37.1% and 15.4% of intermediate and high HF probability groups.Among patients with HFpEF diagnosed by 2016 ESC HF Guidelines, ESC HFA-PEF2 score identified 68.7% of patients with high HFpEF probability, H2FPEF score – 50% of patients. Results of 3 diagnostic algorithms were consistent in 22.8% patients.
Conclusion: HFpEF was diagnosed in 41% of patients using 2016 ESC HF Guidelines, in 48.5 % of cases by ESC HFA-PEF2 score and its high probability in 25.7 % by H2FPEF score. Disagreement between different HFpEF diagnostic algorithms was found with the consistency of the results only in 22.8% patients. According to this, additional analyses and future researches are needed to verify reasons of this heterogeneous data.

P1592
The prevalence of diastolic heart failure among patients with hypertension, suffering from atrial fibrillation and role of hypertension in the remodeling of left atrium after pulmonary vein isolation

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Introduction: It is known that an increase of systolic blood pressure leads to higher diastolic pressure in left ventricle and to growth of average pressure in left atrium (LA), which, in turn, leads to impairment left ventricular diastolic function (LVDF), remodeling of LA, fibrosis and the development of atrial fibrillation (AF). AF causes structural changes in LA, which plays an important role in the progression of arrhythmia. Pulmonary vein isolation (PVI) is one of the methods to treat AF. LA structural changes and the chance of LVDF recovery in group of patients with hypertension (HTN) remains unresolved after such procedures.
Purpose: To assess the effect of long-term maintenance of sinus rhythm after PVI on the LVDF and the size of the LA in patients with HTN.
Materials and Methods: The study included 108 patients aged 32-72 years (female patients - 53 (49,1%)). Median age was 59 years, interquartile range – 54-65 years. Patients were suffering from paroxysmal (n=90; 83%) and persistent (n=18; 17%) form of AF. All patients underwent PVI and were divided in two groups depending on the presence of HTN in history. Group I: patients with HTN (n=87; 80%), group II: patients without HTN (n=21; 20%). All patients had pre- and post-procedural (after 12 months) detailed echocardiographic measurements of LVDF and LA during sinus rhythm.
Results: Patients with HTN were older (p<0.001), with a higher body mass index (p<0.001). Within 12 months after surgery, 61 patients (56.5%) held sinus rhythm. In the group I before PVI, dysfunction of LVDF was detected in 47 patients (54%), after PVI - in 25 patients (28,7%) (OR 7,3; 95% CI 2,2 – 23,7; p<0,001); after PVI the following parameters characterizing LVDF were observed: increase of early diastolic velocity (E peak) (p<0,001); normalization E/A ratio (p<0,001); increase of early diastolic septal velocity (e') (p=0,009). In group II before PVI, dysfunction of LVDF was detected in 6 patients (28,6%), after PVI - in 2 patients (9,5%) (p=0,07); significant changes in the parameters characterizing LVDF were not detected. The dynamics of LA size changing was analyzed after 12 months in patients keeping sinus rhythm, with the presence and absence of HTN. It was revealed that the remodeling of LA continued in the background of sinus rhythm retention in patients with HTN in history (increase in indexed (p=0.026) and presystolic volume of LA (p=0.027)), while in patients without HTN an enlargement of LA was not recorded.
Conclusions: Diastolic heart failure occurs in more than half of hypertensive patients with AF. Patients with HTN, preserving sinus rhythm after PVI, have the chance of LVDF recovery. Enhancement of the left ventricular relaxation can be explained by early filling velocity improvement and the increase of early diastolic septal velocity. On the other hand, only in the group of patients with HTN in the history, continued remodeling of the LA was noted despite the long-term retention of sinus rhythm.

Chronic Heart Failure-Epidemiology, Prognosis, Outcome

P1594
High frequency of left ventricular recovery in a national cohort of patients with advanced heart failure

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Background Following an index presentation with heart failure and reduced ejection fraction (HFrEF), it is increasingly recognised that a subset of patients experience left ventricular (LV) recovery. However, the frequency of LV recovery (and the predictors of LV recovery) are uncertain.
Purpose To determine the rates of LV recovery in a consecutive cohort of patients assessed within a single, quaternary, national advanced HF service, and to describe the differentiating baseline characteristics and subsequent clinical trajectories of patients experiencing LV recovery.
Methods We analysed the medical records of consecutive new patients (inpatients and outpatients) referred to an advanced heart failure service unit between 01/12/2014 and 01/12/2016. This unit is the single, national cardiac transplant and left ventricular assist device centre serving a Western European nation with a population of 5.4 million people. Eligible patients were required to have HFrEF with an LVEF ≤40% at baseline and at least one further measurement of LVEF during study follow-up. All patients were followed until 31/01/2018 by electronic record linkage. LV recovery was defined as an increase in LVEF to >40% at any time during follow-up.
Results 153 patients were included. Mean age (± SD) was 47 (±11) years and 38 (25%) were female. Aetiology was ischaemic in 40 patients (26%), and non-ischaemic in the remainder. At baseline, mean LVEF (±SD) was 23% (±7); median NT-proBNP (IQR) was 1654 pg/ml (744-3253 pg/ml). 74 patients (48%) were inpatients and 52% were outpatients. LV recovery occurred in 69 patients (45%) during follow-up, with an increase in mean LVEF from 22±8% to 49±9%. LV recovery occurred within 12 months of index assessment in 76%, and within 13-24 months in 24%. Compared to patients without subsequent LV recovery, patients with LV recovery were more likely to be female (p=0.001), have non-ischaemic aetiology (p=0.001) and have a relatively shorter duration of HF (p<0.001). The incidence of all-cause mortality was significantly lower amongst patients who experienced LV recovery when compared to those without LV recovery (3% vs 14%; p=0.015) during a median follow-up period of 23 months.
Conclusion In this retrospective cohort study of young patients referred to an advanced HF service, LV recovery occurred in almost half of patients. LV recovery was more common in women, and in those with a non-ischaemic aetiology, and was associated with a lower all-cause mortality.

P1595
Significance of sST2 concentration last measurement in serial determination in patients risk stratification after acute heart failure decompensation

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Background: sST2 concentrations are strong predictors for of adverse long-term prognosis in pts with ADHF.Purpose: to evaluate the significance of the last measurement of sST2 concentrations in risk stratification in patients (pts) with ADHF.Methods: In our study were included 159 pts with ADHF III-IV FC NYHA. Blood samples to determine NT-proBNP and sST2 concentrations were collected at the admission and at discharge from the hospital, and after 3, 6 and 12 months of follow-up. The primary end point was combined end point that included cardiovascular (CV) death and hospitalization due to HF.Results: During the 1-year of observation 56 (35.2%) pts reached the combined end point. 78 (49.1%) CV events were registered, of them 26 (16.4%) CVdeath, 47 (29.6%) episodes of hospitalization due to HF and 10 (6.2%) episodes of HF deterioration needed additional i/v diuretics. In high risk pts (with CV evets) sST2 and NT-proBNP concentrations at the last measurement before the CV episode were significantly higher than previous: 51.79 (41.32, 87.45) vs 34.50 (27.59, 48.40) ng/ml (%Δ = 35.65%, p = 0.02); and 3328.0 (1583.0, 5082.0) vs 2396.5 (1820.75, 4767.0) pg / ml, (% Δ = 21.0%, p = 0.01) respectively, and also compared with the low risk pts (without CV events): 30.36 (21.21, 39.98) ng / ml and 1165.75 (792.47, 1785.75), respectively, p <0.0001. In the ROC analysis sST2 and NT-proBNP concentrations had predictive significance, AUC = 0.814 (95% CI 0.736-0.893), Se 79.6%, Sp 70.8%, and AUC = 0.822 (95% CI 0.746-0.898) Se 78.2%, Sp 73.0%, respectively, p <0.0001. Pts

with sST2 concentration above the cut-off value of ≤37.8 ng / ml and NT-proBNP ≤1553.8 pg/ml in the last measurement before end point had higher risk of CV events [95CI] = 5.79 [2 , 97-11.28] and OR [95CI] = 4.81 [2.61-8.87], respectively, p <0.0001.Conclusion:Increase of sST2 concentration as the NT-proBNP value in serial determination is the strong predictor of CV events and hospitalization due to HF in pts after ADHF during long-term follow-up.

P1596

Investigation on patient knowledge about heart failure in China

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On behalf of: emergency and critical care center, FuWai hospital

Purpose: to know about illness knowledge level of patients with heart failure(HF); to probe into factors influencing patients' illness knowledge levelso as to provide a theoretical foundation for carrying out appropriate clinical interventions. Methods: A total of 983 patients with HF from different regions in China were investigated using the knowledge scale questionnaire, which included awareness, lifestyle, drug adherence, convenience to medical treatment , economic burden and health education of HF. Results: The rates of awareness, drug adherence and disease education of HF in Chinese patients were 75.2%83.2% and 41.1% respectively. There was a significant difference in awareness rates between people with different levels of hospital classes, education, functional grading or marital status. Rural patients had lower rates of awareness, drug adherence and disease education than urban patients. Second and third level hospitals outperform first level hospitals both in drug adherence and disease education. Conclusion: In general, the cognition of HF in China is unsatisfactory, which is characterized by low rates of awareness, drug adherence, disease education and lack of self-management. Medical staff should fulfill informing obligation, in the meantime, enhance HF education by different strategies in order to improve patients' self-management. It's helpful to teach patients' relatives about HF knowledge too. As they can play a role as supervisors in reminding and changing lifestyles. It is beneficial to promote the hierarchical medical system especially the community health service institutions.

HF knowledge in different characteristic

variable	awareness rates	drug adherence		
	χ^2	P	χ^2	P
gender	1.425	0.233	3.390	0.066
age	0.699	0.705	4.324	0.155
Education	32.512	0.01	9.028	0.059
NYHA class	32.524	0.01	2.361	0.501
marital status	17.354	0.01	1.070	0.784
live location	24.481	0.01	48.123	0.01
hospital class	42.256	0.01	45.583	0.01

P1597

Long-term prognosis of dilated cardiomyopathy in women

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Background. Dilated Cardiomyopathy (DCM) represents a specific phenotype of heart failure (HF). The impact of gender on DCM patients is largely unknown.
Purpose. The aim of the study is to investigate the long-term prognosis in a large cohort DCM of patients.
Methods and Results. 1113 DCM patients (>90% on renin-angiotensin-aldosterone system inhibitors and beta-blockers) have been prospectively enrolled. To investigate the impact of gender, a propensity score matching analysis was performed on a sample of 586 patients. Moreover, univariable and multivariable Cox models were estimated both on the total and on the matched cohort for the following outcomes: all-cause mortality/heart transplantation (HTx)/ventricular assist device (VAD); cardiovascular mortality/HTx/VAD; sudden cardiac death (SCD) or malignant ventricular arrhythmias (MVA).Women were older than men (50±15 vs 47±15 years respectively, p=0.004) and presented more frequently moderate to severe left ventricular dilation (p<0.001) and left bundle branch block (p=0.019). Over a median follow-up of 126 months, in the matched population, 96 men (33%) vs. 66 women (22%) experienced all-cause mortality/HTx/VAD (p=0.03), 95 men (32%) vs. 57 women (20%) experienced cardiovascular mortality/HTx/VAD (p=0.025), 46 men (16%) vs. 28 women (10%) experienced SCD/MVA (p=0.07). At multivariable analyses, male gender turned out as independently associated to the three considered outcome measures in the total cohort and for cardiovascular death/HTx/VAD (hazard ratio 1.58, 95% confidence interval 1.06–2.36, p=0.025) in the matched cohort.
Conclusions. Long-term outcomes of women affected by DCM are more favourable than men and gender emerged as an important independent factor mostly for cardiovascular outcomes.

P1598

Prevalence and long-term evolution of pulmonary hypertension and right ventricular dysfunction in heart failure outpatients

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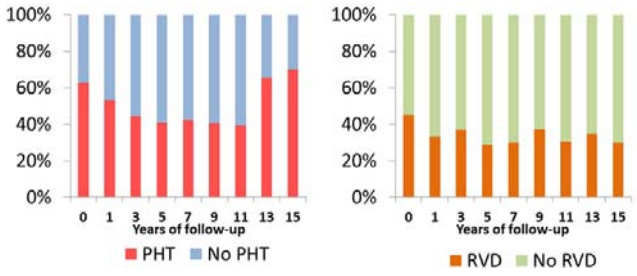
Background: Heart failure (HF) patients with pulmonary hypertension (PHT) and/or right ventricular dysfunction (RVD) have a worse prognosis. How these two entities evolve in the long-term is not completely elucidated.
Purpose: 1) To assess long-term (up to 15 years) trajectories of systolic pulmonary artery pressure (SPAP) and right ventricular function based on tricuspid annular plane systolic excursion (TAPSE); 2) To describe the prevalence of PHT and RVD longitudinally through this long follow-up period; and 3) To analyse the relationship of these two later entities with mortality and number of HF admissions.
Methods: Retrospective analysis of a prospectively studied cohort of HF outpatients of different aetiologies attended in a multidisciplinary HF Unit. Prospectively scheduled echo-Doppler studies were performed at first visit (baseline), 1, 3, 5, 7, 9, 11, 13 and 15 years. PHT was defined as SPAP ≥40mmHg and RVD as TAPSE ≤16mm.
Results: Form August 2001 to July 2017, 1421 patients with SPAP (85%) and TAPSE (46%) data in the initial visit were included. Mean follow-up time was 4.6 ± 3.7 years. In survivors SPAP trajectories showedsignificant changes (p<0.001, both for the linear and for the quadratic term of time). An initial trend to decrease in the firsts years and to increase beyond 7 years observed, showing the global trajectory a clear U shape. Although trajectories of TAPSE showed statistically significant changes along follow-up (p- values also <0.001) no definite pattern was observed and changes seemed of clinically not relevant magnitude. The initial prevalence of PHT was 62.5% and of RVD 45.1%. Indeed the prevalence of PHT tended to decrease in the first 11 years and to increase later, while RVD initially decreased and remained stable thereafter (Figure). Both PHT and RVD were significantly associated with mortality at baseline: PHT (HR 1.7 [1.4-2], p<0.001), RVD (HR 1.6 [1.2-2.1]; p= 0.001). The combination of both entities (PHT + RVD) showed worse prognosis (HR 1.8 [1.3-2.3], p <0.001). When the analyses were repeated with 1 year SPAP and TAPSE values, the association with mortality was even higher: PHT (HR 2.7 [2.1-3.5]; p <0.001); RVD (HR 2 [1.3-2.8], p <0.001); PHT + RVD (HR 4.4 [2.9-6.6], p <0.001). Remarkably decedents always had higher SPAP in the immediately precedent study period. On the other hand, the presence of PHT (p=0.04) and RVD (p<0.001) at baseline were related to the number of recurrent HF admissions during follow-up.
Conclusions: SPAP showed a U shapetrajectory in the long-term follow-up in HF outpatients, while TAPSE improved mildly initially and remained stable afterwards. The presence of PHT and/or RVD was related to an increase in mortality and HF admissions.



P1599

Heart Failure in Internal Medicine and Cardiology: same entity, different patterns.

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On behalf of: Canary Registry of Heart Failure (RECANIC)

OBJECTIVE: To analyze the differences between patients hospitalized for heart failure in Internal Medicine (IM) and Cardiology (CAR) in terms of sociodemographic characteristics, comorbidity, type of heart disease, hospital stay and mortality.
MATERIAL AND METHODS: Observational and prospective study in which consecutively included patients admitted for heart failure in the IM and CAR Services from January 2017 to February 2018. Parameters recorded included demographic data, comorbidities, functional situation estimated by Barthel index, etiology of heart disease and triggers, analytical and echocardiographic parameters, treatment received and in-hospital evolution. A comparison was made between patients depending on the Admission Service (CAR or IM). The qualitative variables were analyzed by the chi-square test and the quantitative ones by t-Student test.
RESULTS: Data from 2115 patients were included, 48.7 % were females. The average age was 75.7 (range 24-103) years. Overall, 1214 (57.4%) were enrolled in IM Services. A higher percentage of women (57.3% vs. 37.1%, p <0.001) of older age (80 ± 9.3 years vs 69 ± 12.1, p <0.001) were admitted to IM compared to CAR. In general, the patients admitted to Internal Medicine presented a worse functional situation as measured by the Barthel index (75.8 vs 93.3, p <0.001). With the exception of myocardiopathy (11.2% vs 15.3%, p <0.001) and coronary disease (29.3% vs 33.5%, p = 0.08), the rest of comorbidities analyzed were significantly more prevalent in IM patients: HBP (92.8% vs 70.6%, p> 0.001), dyslipidemia, (67.1% vs 57.8, p <0.001), diabetes (57% vs 46.5%, p < 0.001), renal failure (68% vs 52%, p <0.001), anemia (56.1% vs 40.5%, p <0.001), peripheral arterial disease (11.8% vs 9.1%; p < 0.001), cerebrovascular disease (13.8% vs 10%, p <0.001), atrial fibrillation (54% vs 40.6%, p <0.001), cognitive impairment (18.6% vs 5.7%; p < 0.001) and COPD (39.1% vs 18.6%, p <0.001). In IM, heart failure with preserved ejection fraction predominated (49.2% vs 36.5%, p <0.001). In CAR, de novo heart failure was more prevalent (19.9% vs 67.1%; p <0.001). The presence of valvular heart disease was more frequent in IM (32.1% vs 27.1%, p <0.001). We did not find statistical differences in terms of average stay (15.0 days vs 15.4 days, p = 0.765) or in-hospital mortality (5.9% vs 4.6%, p = 0.16).
CONCLUSIONS: 1. In The Canary Islands , patients hospitalized for heart failure via Internal Medicine compared to entering via CAR are predominantly women, octagenarias and with preserved ejection fraction. 2.- They present greater comorbidity and worse functional deterioration. 3.- Despite this, there are no differences in terms of average hospital stay and mortality between services.

P1600

Heart failure: the great unknown

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Introduction: Heart Failure (HF) is a prevalent condition that frequently leads to hospitalizations and has a negative impact on quality of life and prognosis. General public and patients' HF awareness may promote adherence to healthier lifestyle and to therapy, leading to lower HF incidence, hospitalizations and mortality.
Aim: To have an insight on general population's knowledge on HF manifestations and treatment.
Methods: in May 2018 we performed a general public survey to those attending HF Awareness Days activities in the country. This survey included epidemiological data (age, gender, living conditions, level of education), and questions on HF symptoms, comorbidities, exercise, and treatment.
Results: 732 participants answered the survey (50.3% female), age 58 ±18 y. 33% had only elementary school level of education, however 23% had a graduation. 438(59,8%) declared they were acquainted with HF symptoms. Fatigue was the most commonly recognized (66,4%) symptom, followed by dyspnea (52,4%) and peripheral edema (39,75%). However vomiting and chest pain were also symptoms participants frequently associated with HF (37,7% both). 221 (30%) of the participants were unable to recognize any of the most common listed HF signs and symptoms.
327(44,6%) believed that HF was normal at a higher age; 486 (66,4%) knew that HF can affect other organs. 153 (21%) answered that exercise should be avoided in HF.
Only 420 (57%) identified pharmacotherapy as relevant for HF treatment, followed by devices, surgery and diet (36%, 35% and 32%, respectively). For 24% of the participants none of the mentioned listed options was a valid HF treatment.
Putting these results in perspective, one can mention that in the UK´s "Cancer Awareness Measure 2017 "a prompted recognition of signs/symptoms was achieved in 75-95%.
Conclusion: Comparing to other conditions, HF is poorly known by the population. Additional to being conceived as normal at higher ages, other misconceptions are common such as exercise being detrimental and no form of treatment being valid. Education and awareness campaigns are an unmet need and can have a significant impact in the prevention and better treatment of HF. With a contribution of the Competence Network Heart Failure Germany and Comprehensive Heart Failure Center Würzburg.

P1601

Diabetes mellitus in acute heart Failure: dangerous friendships

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On behalf of: RECANIC Group
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Introduction and objectives: Patients with Diabetes Mellitus (DM) have an increased risk of developing acute heart failure (AHF) and it is considered a severe prognostic marker associated with mortality. We aim to review the prevalence of DM in patients with AHF in our environment and characterize AHF in diabetic patients.Method: A diabetic-non diabetic based analysis of the patients in the RECANIC registry was performed. This is an observational, prospective, multicenter, consecutive recruiting study that included patients admitted to the Cardiology and Internal Medicine wards with the primary diagnosis of AHF between JAN2017 and JAN2018.
Results: Of a total of 2200 patients included in the RECANIC study, 1154 patients (52%) were diabetics, 49,3% of them women, and mean HbA1c of 7,47±0,129%. Baseline characteristics are shown in table 1. Diabetics had a higher prevalence of HBP, dyslipidemia, IHD and PVD. Lower hemoglobin and creatinine levels and no differences in NT-proBNP levels were observed. HF with preserved ejection fraction

Basal characteristics				
	Total (N=2200)	Diabetic(n= 1154, 52%)	Non-Diabetic (n=1046, 48%)	p-value (diabetic Vs non diabetic)
Age (years)	75,97±12,0	76.178±0,59	75.74±0.83	0.389
Barthel Index	81,66	81.172	82.298	0.338
HBP / Dyslipidemia(%)	84/52	91/73	76/53	<0,001
IHD/PVD/AF (%)	31/10/49	39/14/47	22/6/50	<0,001/ <0,001/0.58
Decompensation/de Novo (%)	61/39	56/46	43/54	<0.001
FEVI:<40%, 40-50%, >50% (%), not determined (%)	27/11/43/19	24/12/44/20	29/10/42/19	p=ns
Hb g/dLCreatinine mg/dL	12.07±0.09 1.38±0.03	11.71±0.12/ 1.46±0.05	12.48±0.13 1.30±0.05	P<0,001 p<0.001
Nt-proBNP	7076±7548	6950±518.26	7250.61±569.47	P=0.44
Hospital Stay (days)	14.09	14.59	13.54	0.164
In-hospital mortality (%)	8,3	7,6	7.5	P=592

IHD: Ischemic heart disease; PVD: Peripheral vascular disease; High Blood Pressure

predominated in both groups (44,0 vs 41,9 %). Treatment in diabetic patients was: Metformine (34,7%), Insulin (32,1%), iDPP4 (13.8%), sulfonilurea (6,1%), iSGLT2 (2,6%), GLP1 (1%). No differences in average hospital stay or in in-hospital mortality rates for diabetic and non-diabetic patients. No differences in terms of HbA1c of patients exitus in-hospital vs discharged (7.62±0.61 vs 7.46±0.13, p=0.592).
Conclusion: DM is higly prevalent amonst patients with AHF (52%). Despite having DM and being more comorbid, in-hospital mortality rates did not vary in diabetic vs non-diabetic patients with AHF. The analysis of these data should serve to develop health management and planning strategies specifically tailored to patients with AHF and DM.

P1602

Predictors of mortality in patients with heart failure with mid-range ejection fraction (HFmrEF)

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Background: The current ESC guideline for the diagnosis and treatment of acute and chronic heart failure (HF) introduced the terminology of HF with mid-range ejection fraction (40%≤LVEF<50%; HFmrEF) beyond HF with reduced EF (LVEF <40%; HFrEF) and HF with preserved EF (LVEF ≥50%; HFpEF). There are limited data on morbidity, mortality and prognostic factors for mortality in HFmrEF patients (pts).
Aim: The aim of our study was to investigate the predictors of all-cause mortality in a real-life HFmrEF patient cohort.
Methods: We analysed the data of 105 HFmrEF pts who had referred to our heart failure outpatient clinic (mean age: 64.2±11.7 years, male: 76.2%, NYHA: 2.7±1.0, LVEF: 42.5±2.6%). We assessed the prognostic value of age, sex, ischemic etiology, systolic blood pressure (SBP), heart rate, NYHA functional class (fc), PQ and QRS interval, LVEF, left atrial (LA) diameter, left ventricular hypertrophy (LVH), mitral regurgitation (MR), pulmonary artery systolic pressure (PASP), eGFR, hypertension and diabetes (DM). The possible prognostic factors were evaluated by univariate and multivariate Cox regression analysis. The average follow-up period was 93.4±53.0 months.
Results: During the follow-up period 55.3% of patients died (all-cause mortality at 5 years was 31.7% and at 10 years was 49.6%). With univariate Cox-regression analysis the NYHA fc, LA, PASP, MR, PQ, eGFR, DM and LVH were proved to be significant prognostic factors (p<0,05). With multivariate Cox-regression analysis NYHA fc (HR: 2.01; CI: 1.39-2.90; p<0.001), LA diameter over 57 mm (HR: 2.30; CI: 1.15-4.60; p<0.05) and LVH (HR: 2.39; CI: 1.23-4.63; p<0.05) were found significant, independent prognostic factors.
Conclusion: Based on our results, the predictors of all-cause mortality indicate a close relationship between mortality and diastolic left ventricular dysfunction as well as the clinical severity of HFmrEF patients.

P1603

Drug utilization patterns and its impact on health resource utilization and outcomes among patients with heart failure at a tertiary care hospital in southern india

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On behalf of: Manipal Heart Failure Registry [MHFR]
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Background Drugs are the mainstay of heart failure (HF) therapy. Although several guidelines are available in this regard, optimal implementation of guideline-directed medical therapy (GDMT) still remains a challenge.
Purpose Assessment of drug prescription patterns and its effect on clinical outcomes among patients with heart failure enrolled in Manipal Heart Failure Registry (MHFR).
Methods MHFR is a prospective, observational cohort of patients with heart failure in a tertiary health centre in southern India. From this registry, we analysed drug utilization patterns over a period of one year from index admission. Clinical outcome was a composite of unscheduled visits, rehospitalization to intensive care unit or emergency wards, and all-cause mortality rate.
Results A total of 1354 patients with a mean age of 65 ± 13.6 years were enrolled in MHFR from September 2015 to September 2017. Average duration of index hospitalization was 5.3 days and 40.2% were females. Heart failure with reduced ejection fraction (<40%) was seen in 51.1% of patients. Ischemic heart disease was the most common underlying cause (38.9%).
Patients received disease-modifying drugs like beta-blockers (BBs), angiotensin converting enzyme inhibitors (ACEIs) or angiotensin receptor blockers (ARBs) and aldosterone receptor antagonists (ARAs) at rates of 43.6%, 49.3%, and 34.3% respectively. Isosorbide dinitrate/hydralazine, diuretics, and ivabradine were prescribed at rates of 54.3%, 74.2%, and 40.0% respectively. Dual therapy (BB and ACE or ARB) was used in 36.7 % and triple therapy (BB, ACE or ARB and ARA) in 31.2%.
Unscheduled visits and re-hospitalization rates were 34.8% and 11.2% respectively. Most of the rehospitalizations were to the emergency room (54%) followed by ICU (85%). All-cause mortality during index hospitalization and at one-year mortality was 8.8% and 16.5% respectively. The composite clinical outcome occurred in 32.1%. Patients who received monotherapy (BB or ACEI/ARB or ARA) had a better outcome compared to those who did not (p=0.021). Dual and triple therapy was associated with better outcomes compared to monotherapy (p=0.002).
Conclusion: GDMT improves outcomes in patients with HF but is underutilized in patients with HF. Steps to improve use of GDMT need to address the factors associated with underutilization.

P1604

HFpEF, HFmEF and HFrEF : clinical characteristics and prognosis: a retrospective cohort (cross sectional) study in a population from Colombia

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Heart failure is a growing epidemic in the world, specially in developing countries like Colombia were there is a high burden of cardiovascular risk factors. There is huge need to generate data about this disease in our country in order to establish more effective health care policies.
Objective: The aim of this study is to identify the clinical characteristics and prognosis of patients with HFrEF , HFmEF and HFpEF in a population of patients that had been followed in a disease management heart failure program.
Methods: A retrospective cohort cross sectional study was performed.
Results: 1011 patients were included, 89.9% had HFrEF, 8.7% HFmEF and 1.3% HFpEF. The differences in clinical characteristics and prognosis are presented in table 1.
CONCLUSION: In this population of heart failure patients from Colombia, Patients with HFrEF and HFmREF were younger males, with more ischemic heart disease and presented more cardiovascular deaths. Patients with HFpEF were elderly women with less ischemic heart disease and presented more non cardiovascular deaths.

Clinical Characteristics and prognosis

	HFrEF	HFmEF	HFpEF
Age *	66.9 ±16.2	78.7 ±19.6	75.9 ±13.6
Male	65.7%	57.7%	35.7%
Female	34.3%	42.3%	64.3%
Ischemic heart disease	44.1%	39.8%	28.6%
Ejection fraction*	23.6%±8.7%	45.7 ±1.6%	55.2 ±5.0%.
Death	8.7%	9.1%	7.5%
Cardiovascular death	79.0%	85.7%	0.0
Non cardiovascular death	21.0%	14.3%	100.0%

*Mean- standard deviation

P1605

Long-term survival in contemporary patients with dilated cardiomyopathy

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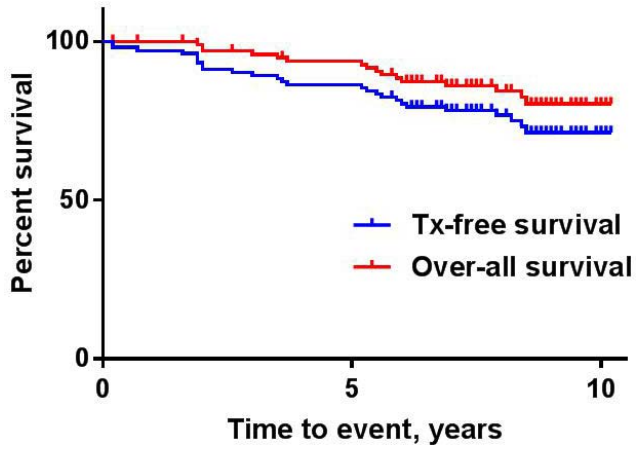
Purpose: Historically, the prognosis in patients with dilated cardiomyopathy has been poor. Outcomes have improved substantially over the last decades due to advances in medical therapy and the development of implantable devices for the

treatment of heart failure. We report long-term survival data from a prospective cohort of contemporary patients with dilated cardiomyopathy.
Methods: Between October, 2008 and December, 2012, we recruited 102 patients referred to our tertiary care hospital with a left ventricular ejection fraction (LVEF) < 40 % and a diagnosis of idiopathic DCM based on patient history, echocardiography and coronary angiography. We performed an extensive baseline evaluation, and the patients were included in a prospective cohort study. During follow-up, vital status, device implantation and heart transplantations were recorded.
Results: Baseline characteristics are provided in the Table. After a median follow-up of 7.8 (IQR 6.3 – 9.0) years, 12 patients had received cardiac allografts. One of these patients later died from acute allograft rejection. In addition, 15 patients died. Transplant-free survival was 74 %, and over-all survival was 84 % (Figure). At follow-up after 7.8 years, the average LVEF in the long-term, transplant-free survivors was 41 ± 10 %. Baseline age and left ventricular size and ejection fraction did not differ between survivors and non-survivors. The longer the duration of symptomatic heart failure prior to inclusion, the higher the risk of heart transplantation or death (Cox regression p < 0.001), suggesting that late initiation of therapy or a lack of response to therapy for heart failure predicts a poor outcome.
Conclusion: In contemporary patients with dilated cardiomyopathy, survival is better than previously reported.

Baseline characteristics	
Age - years	51 ± 14
Male gender - no (%)	74 (73)
Duration of symptoms - months	7 (3 - 16)
NYHA class prior to inclusion - no I/II/III/IV	4/15/25/58
Systolic blood pressure - mm Hg	116 ± 20
Left ventricular ejection fraction - %	26 ± 10
Peak oxygen consumption - ml/kg/min	19.7 ± 7
N-terminal pro-B-type natriuretic peptide - pg/ml	1332 (584 - 2903)
Pulmonary capillary wedge pressure - mmHg	15 ± 8

NYHA = New York Heart Association



Transplant-free and over-all survival

P1606
The association of serum HbA1c level with heart failure severity in systolic heart failure patients with diabetes mellitus

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Introduction Heart failure, a major public health problem, causes poor quality of life and increases hospitalization rate. The role of diabetes mellitus (DM) in both development and progression of heart failure has been well documented. However, the evidence for a benefit of HbA1c measurement in the severity of heart failure is understudied.
Purpose: In this study, we sought to determine the relationship between serum HbA1c level and severity of heart failure in diabetic patients with systolic heart failure.
Methods This cross-sectional study was performed on 203 patients with heart failure and DM. Demographic data, clinical symptoms and NYHA class were obtained using a questionnaire. Serum HbA1c level was measured and Echocardiography was performed for all the participants to record ejection fraction (EF).
Results: The mean age of the population was 62.33 ± 9.73 years and 55.7% of patients were men. The mean duration of diabetes and heart failure was 9.54 ± 9.25 and 7.82 ± 6.43 years, respectively. The patients had a mean EF of 30.15 ± 7.58 and a mean HbA1c level of 8.40 ± 1.93.
The HbA1c level was not associated with EF among all the participants and within subgroups based on age, sex, duration of heart failure, heart failure etiology, number and etiology of hospitalization; However, when patients were subdivided based on NYHA class, there was a significant association between HbA1c and EF in patients with NYHA class ≥ 2 ($p<0.05$) with the highest HbA1c level in patients with NYHA class 4 and EF<25%.
In patients with the duration of DM more than 10 years, HbA1c level was significantly associated with EF, with the maximum level among patients with EF<25% and the minimum level among patients with EF>35% ($p=0.002$). Moreover, HbA1c levels were higher in patients with EF 25-30% who did not have a history of insulin therapy ($p<0.05$).
Conclusion(s): In diabetic patients with more severe symptoms of heart failure there was an inverse association between HbA1c and severity of heart failure. In long standing DM, poor blood glucose control, as measured by HbA1c, is associated with severity of heart failure. Therefore, it is necessary to perform preventive measures in patients with heart failure and DM.

P1607
Sex differences in hospital referrals of patients with heart failure

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Background: There is limited data on referral patterns for heart failure (HF) despite increasing incidence of HF with preserved ejection fraction (HFpEF) in the population, mainly affecting women, and important developments in multidisciplinary HF care.
Purpose: To obtain an impression of referral patterns for HF and it's subtypes based on shifts in prevalence rates in three pre-hospital domains: high-risk community patients, routine primary care, and outpatient cardiology clinics.
Methods: Age and sex-specific prevalences of HF subtypes (with reduced ejection fraction (HFrEF) and HFpEF) were retrieved from studies in the three pre-clinical domains conducted in the Netherlands. Due to availability of information, we restricted our analyses to people aged 65 to 79 years.
Results: In community patients, 55% of 223 HF patients between 65 and 79 years detected by screening in a high risk older population were women. HFpEF was present in 70% of men and in 88% of women. In primary care, 43% of 167 confirmed HF cases between 65 and 79 years were women. HFpEF was present in 41% of men and in 55% of women. In outpatient cardiology clinics, 36% of 4742 HF patients between 65 and 79 years were women. HFpEF was present in 15% of men and in 28% of women.
Conclusion: The current study shows that prevalence of HF among men and women vary largely across the pre-hospital domains. Especially women are underdiagnosed with HF, particularly HFpEF at older age. From the changes in prevalence pattern from screening to diagnosis it becomes clear that women with HF are less likely to be referred to the cardiologist, notably those with HFpEF, as compared to men.

P1608

Clinical characteristics of heart failure patients admitted to internal medicine vs. cardiology units: the VASCO study

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As known majority of patients with Heart Failure (HF) are admitted to internal medicine (M) units instead to cardiology units (C),but few studies have investigated the specific characteristics of these two populations.

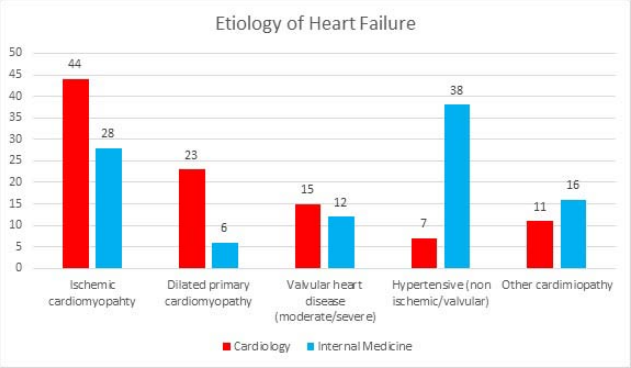
The aim of our study was to compare the main characteristics of patients with HF at their admission in six M units vs. one C unit. Criteria inclusion were: I) symptoms/signs of HF, II) NTproBNP value>600 ng/L in hospital, III) i.v. diuretics and/or nitrates and/or inotropic therapy.

From April to July 2018 we enrolled 257 patients (M 202,C 55).M patients were older and more frequently female. The leading cause of admission in both groups was acute worsening of HF,most of patients had a known HF.Left ventricular ejection fraction (EF) available at admission was 96% in C, only 56% in M (25% unknown at discharge).

We obtained a "picture" in which M patients were frequently managed "blindly" .In this evolving epidemiological framework,M physicians could be more involved in diagnostic/therapeutic strategies developing.

Therapy at hospital admission

	Cardiology	Internal Medicine	p value
Oxygen therapy	25	57	< 0,001
Diuretic i.v.	45	60	0,055
Inotropic agents i.v.	2	2	0,931
Nitrates i.v.	0	3	0,196
Antibiotics	23	58	< 0,001
Nitrates	5	30	< 0,001
Diuretics	65	33	< 0,001
ACE-inhibitors/ARB	56	29	< 0,001
Beta-blockers	65	62	0,657
Anti-aldosterone drugs	56	34	0,002
Calcium-antagonists	9	13	0,382
Other anti-hypertensive drugs	13	5	0,042
Antiarrhythmic drugs	22	12	0,064
Anticoagulants	60	67	0,310
Antiplatelet	45	35	0,186
Statins	45	25	0,003
Antidiabetic drugs	24	31	0,311
Steroids	5	16	0,037
Hypouricemic agents	16	23	0,265



Etiology of heart failure

P1609

Prognosis and completion of the advance directive survey among patients with chronic heart failure

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Background: Early discussion with advance directive (AD) documentation is one approach to improve quality of heart failure (HF) management and reduce socioeconomic burden. However, ADs have been underutilized among patients with HF.
Purpose: To explore an advance directive (AD) of patients with HF and examine the association of the completion of an AD survey with HF prognosis.
Methods and Materials: In a descriptive, correlational study, data on the Korean-Advance Directive (K-AD) survey (values, treatment directives, and proxy) and HF prognosis were collected during the outpatient visit.
Results: Of 67 patients (age, 67 years; male, 61.2%), 52.2% provided all or part of the K-AD. "Comfortable death" was highly valued (n = 15), followed by avoiding family burden (n = 6). Preferences for hospice care, cardiopulmonary resuscitation, ventilation support, and hemodialysis were 68.6%, 42.9%, 28.6%, and 28.6%, respectively. Children (n = 12) and spouse (n = 10) were the most common proxies. Older age (odds ratio [OR] = 1.23) and more functional limitation (NYHA class III) (OR = 137.37) were associated with more likelihood of poor HF prognosis (SHFM score $\geq$ 1), while K-AD completion (OR = 0.06) was associated with better prognosis (SHFM score $\leq$ 0), after controlling for covariates. Conclusion: Independent of older age and worse functional limitation, K-AD completers had better HF prognosis, implying ADs be more likely acceptable in better prognostic state. Future research should investigate whether early prognostic discussion as part of the advance care planning with integration into the standard care of HF facilitates the documentation of ADs.

P1611

The role of NT-proBNP, MPO, HS troponin, sST2 in predicting systolic heart failure

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Prediction of systolic heart failure is necessary for the timely provision of high-tech medical care.
Objective: To evaluate the contribution of NT-proBNP, MPO, HS troponin, sST2 to one-year prediction of heart failure and compare their significance with other indicators.
Materials and methods: A prospective study of 212 II-IVF patients with "non-valvular etiology" of HF with an LV ejection fraction (Simpson) $\leq$ 35% at the age of 18-70 years. Of these, 176 men (83%) and 36 women (17%). Design work: hospitalization of patients in the treatment of heart failure; selection of therapy and stabilization of patients; assessment of status, performance of laboratory and instrumental studies; observation, telephone contacts, correction of therapy and hospitalization during decompensation; filling the database of 200 indicators. After 12 months, the endpoints were recorded.
Results: Within 12 months, 64% of patients (135 people) survived, 2% (5 people) had an implant system EXCOR, 10% (21 people) had cardiac transplantation, 24% of cases (51 people) were lethal. The end points reached 77 people. High prognostic MPO (p = 0.008), sST2 (p = 0.018), NT-proBNP (p <0.001) were significant.

The prognostic significance of the serum level of HS troponin in serum was not confirmed. (p = 0.338). With the traditional "gold standard" VO2 peak closest correlations were traced with NT-proBNP (r = | −0.44 |), sST2 (r = | −0.56 |), and% RDW (r = | −0.44 |); moderate correlation - with heart rate, urea and creatinine concentration, high troponin content, VE / VCO2, blood pressure level, relative lymphocyte content.
Conclusions: 1. NT-proBNP, myeloperoxidase, sST2.2 have high prognostic significance. With stabilized heart failure. 2. HS troponin in the blood has no prognostic value.

P1612
Do women with heart failure get the best treatment possible?

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Introduction: Heart failure is a global pandemic with an increasing incidence and a great impact on the quality of patients life as well as public health. To improve treatment results it is mandatory to give patients optimal medical treatment with the use of disease modifying drugs and comorbidities management. There is a growing number of evidence about gender specific differences in heart diseases in general and heart failure in particular, with women being often times underdiagnosed and undertreated.
Purpose: We therefore aimed to investigate gender specific differences in our heart failure patients population.
Methods We retrospectively reviewed consecutive patients at the heart failure outpatient clinic at our Hospital from January 2017 to December 2018. We included all patients that had at least two consultations and excluded patients with lacking data. We performed a comparison analysis with student's t-test for normally distributed variables and chi-squared test for percentages using Microsoft Office Excel 2010 and SPSS Statistics v. 22.
Results: We enrolled a total of 215 patients, mean age was 76.5 ± 10.8 years; 84 (39.1%) had heart failure with reduced ejection fraction – HFrEF, 35 (16.3%) had heart failure with mid-range ejection fraction – HFmrEF, 96 (44.7%), had heart failure with preserved ejection fraction – HFpEF; 109 (50.7%) were women. Women were older (79.8 ± 9.3 vs 73.1 ± 11.1 years, p <0.001), had a lower BMI (28.9 ± 5.9 vs 30.5 ± 5.8 kg/m^2, p 0.027) and a lower median troponin level (23 (interquartile range 23) vs 30 (interquartile range 29) ng/L, p 0.004). They were more present in the HFpEF group (64.6%, p <0.001), had less comorbidities (p 0.010) and a lower prevalence of ischemic heart disease (24 (22.0%) vs 59 (55.7%), p <0.001). Women were less likely to receive optimal medical treatment with a lower percentage of disease modifying antihypertensive drugs (angiotensin-converting-enzyme inhibitors / angiotensin II receptor blockers / angiotensin receptor-neprilysin inhibitor) used in this group (88 (80.7%) vs 96 (90.6%), p 0.040), while there were no differences in the percentage of other heart failure medications.
Conclusion Our study show gender specific differences between women and men that are expected due to the different course of the disease and etiologic pathologies in those groups. According to our results women get less than optimal medical treatment compared to men. However since the prognosis of heart failure is similar in women and men, it is mandatory to improve and optimize the treatment for all patients regardless of their gender.

P1613
HLM classification for prognostic stratification of patients with heart failure undergoing transcatheter valve intervention

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Introduction: Severe valvulopathy as aortic stenosis (AS) and mitral insufficiency (MI) usually worsen the prognosis of patients affected by Heart failure (HF), with higher rehospitalization and mortality rates. New transcatheter approaches have been introduced for patients with a very high surgical risk. To better classify HF patients in term of prognosis, we recently proposed the HLM staging system, analogous to TNM used in Oncology, which evaluates heart damage (H), lung involvement (L) and malfunction (M) of peripheral organs (JACC 2014;20;63(19):1959-60).
Purpose: The aim of this study is to compare HLM and NHYA classification in order to assess the most accurate prognosis of HF patients candidates for transcatheter valve implantation/repair in term of rehospitalization for major cardiovascular and cerebrovascular events (MACCE) and cardiovascular mortality.
Methods: We enrolled patients suffering from HF due to severe AS or MI candidates to transcatheter valve intervention according to guidelines. Each patient was classified according to NYHA and HLM, at the entrance and at the discharge. Clinical follow-up was performed at 6 and 12 months to verify re-hospitalization for MACCE and cardiovascular mortality.
Results: 152 patients with HF and severe valvulopathy were enrolled (50% male, mean age 79.6 ± 9.3 years). The percentage related to severe aortic stenosis were: 72,37%, severe mitral regurgitation: 27,63%. At 6 months of follow-up after transcatheter valve implantation/repair, the HLM showed a greater area under the ROC curve (AUC) than NYHA, in terms of rehospitalization (HLM = 0.799 vs NYHA = 0.518) and mortality (HLM = 0.808 vs NYHA = 0.522); similar results were observed at 12 months of follow-up, for rehospitalization (AUC for HLM = 0.846 vs NYHA = 0.509) and mortality (AUC for HLM = 0.866 vs NYHA = 0.517).
Conclusions: According to our preliminary results, HLM classification has a greater prognostic power compared to NYHA in terms of re-hospitalization and cardiovascular mortality in patients with HF undergone transcatheter valve intervention. HLM provides a more comprehensive assessment of cardiac, pulmonary and peripheral organs involvement, rather than only cardio-pulmonary symptoms evaluation. HLM might be extremely useful in patients with HF and severe valvopathy in order to better identify the right patient at the right moment to undergo intervention.

P1615
Profile of diabetic heart failure in a latin-american country. A national registry in Colombia

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On behalf of: RECOLFACA Investigators
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Background: Heart failure (HF) and Diabetes mellitus (DM) are complex entities characterized by high morbi-mortality. Epidemiological and prospective studies have observed high frequency of co-existence among both conditions. Therefore, the aim of this study was to determine of prevalence of DM in patients with HF in the Colombian Registry and to characterize sociodemographically and clinically this population according to DM.
Methods: This a cross-sectional analysis of HF in the Colombian Registry. Continuous variables are expressed as mean (standard deviation) and categorical variables such as absolute values and proportions. T-student and Chi-square or Fisher test were used to identify differences between groups (HFDM vs. HF non-DM).
Results: A total 2087 patients were included from 2016 to 2018. Prevalence of DM was 29.18% (CI95%: 27.24% to 31.18%). Diabetic patients were older than non-DM (mean age 69.4±11.1 vs. 66.8±14.3 years; p=0.000); there was also a greater proportion of men diabetics than women (62.56% vs. 37.44%; p=0.003). Statistically significant difference was not found in the NYHA functional class between DM vs. non-DM: I: 12.42% vs. 11.00%, II: 54.80% vs. 53.04%, III: 28.15% vs. 31.24%, IV: 4.64% vs. 4.72%; p=0.500), but diabetic patients had a higher proportion of HFrEF and a lower HFpEF than non-DM (72.29% vs. 70.25% HFrEF; 19.18% vs. 16.79% HFmEF and 8.53% vs. 12.97% HFpEF; p=0.015). There was not difference in number of hospitalizations secondary to HF in the last year (p=0.879), however 73.15% DM vs. 72.73% non-DM patients was at least one hospitalization in the last year, with a mean length of stay of 11.4±12.8 days. Percentage of use of medications was similar in both groups: ACE inhibitors: 33.6% vs. 34.3%, p=0.753; ARB 43.02% vs. 41.27%: p=0.576; diuretics: 66.83% vs. 67.93%: p=0.505; MRA: 54.84% vs. 56.16%: p=0.412%; ARNI: 10.84% vs. 8.86: p=0.193. Except for beta blockers: 91.30% vs. 85.45%: p=0.001.
Conclusions: Diabetes is a common comorbidity in our population, this patients tend to be older, male and with HFrEF. Diabetic and non diabetic patients had a similar rate of hospitalizations due to heart failure but were less treated with beta-blockers.

P1616
Left ventricular functional recovery and prognosis in chronic heart failure

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BACKGROUND: The prognostic impact of left ventricular functional recovery is still unclear. We aimed to study the prognostic impact of total and partial functional recovery in a cohort of chronic ambulatory heart failure (HF) patients.
METHODS: We analysed patients followed in our HF clinic from 2002 to 2015 who had 2 echocardiograms performed during the follow-up period. A total of 334 patients with initial left ventricular systolic dysfunction (left ventricular ejection fraction (LVEF) <50%) and an echocardiographic re-evaluation were included. Partial recovery was considered when patients presented ejection fraction recovery without attaining ejection fraction of at least 50% and total recovery was considered when patients reached a normal ejection fraction (LVEF ≥ 50%). Patients were

followed for a median follow up of 69 months from the first echocardiogram. A multivariate Cox-regression analysis was used to determine the independent association of total and partial recovery with survival benefit. Adjustments were made taking into consideration age, ischemic aetiology, severe dysfunction upon admission to the HF clinic, B- type natriuretic peptide, evidence-based therapy and surgical or percutaneous intervention between echocardiograms. Kaplan-Meier curves according to functional recovery are shown.

RESULTS: Mean patients' age was 66 years and 72.5% were male. HF was ischemic in almost 40% of the patients and 69.8% had severe systolic dysfunction upon admission. More than 95% of the patients were on beta-blockers and angiotensin converting enzyme inhibitors or angiotensin receptor antagonists and 54% of the patients were on mineralocorticoid receptor antagonists. During a median 34 months period between echocardiograms 111 patients (33.2%) showed total recovery, 58 (17.4%) partial recovery and 165 (49.4%) showed no recovery. During follow-up, 156 patients (46.7%) died. Patients with total recovery had a multivariate adjusted 52 (95% CI: 27-68) % lower risk of dying during follow-up when compared to non-recovered patients. Patients with partial functional recovery showed a non-significant multivariate adjusted mortality reduction of 12% when compared with non-recovered.Figure 1 shows the survival curves according to functional recovery.

CONCLUSIONS: Non-recovered and only partially recovered HF patients have approximately 2-fold higher all-cause mortality in long term follow-up when compared with those with full recovered left ventricular function. Mortality benefit of fully recovered was independent of age, ischemia, BNP and evidence based-therapy. Recovery should be a goal when treating HF patients.

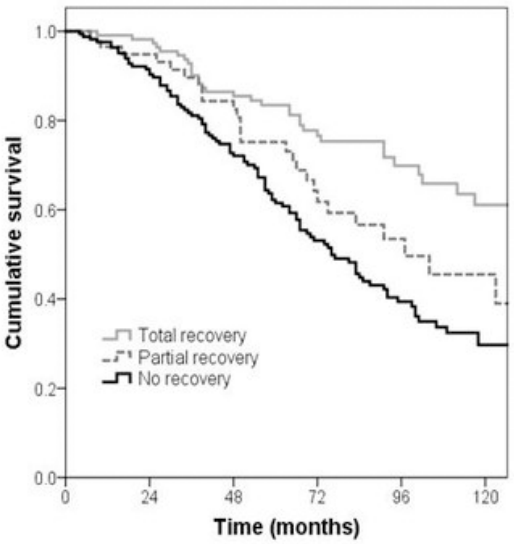

Figure 1: Kaplan-meier survival curves according to functional recovery .

Kaplan-meier survival curves

P1617

Use of loop diuretics identifies patients with a poor prognosis regardless of a diagnostic label of heart failure

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Background: Lack of a robust, practical definition of heart failure not only creates diagnostic uncertainty but limits the utility of epidemiological estimates of incidence, prevalence and prognosis on which health-care planning (both diagnosis and management) depends. Moreover, because of these uncertainties, heart failure research often focuses on patients in whom there is a high degree of certainty about the diagnosis, which may be a small fraction of the total disease-burden. One important feature of heart failure is congestion and one class of pharmacological agents is used almost exclusively (at least in the UK) for the treatment of congestion, namely loop diuretics.

Purpose We sought to describe the prevalence and three-year mortality of patients with a diagnosis of failure and/or prescribed loop diuretic therapy in a substantial regional population.

Methods The Greater Glasgow & Clyde Health Board provides healthcare for approximately one million people. We obtained and linked records for primary and secondary health-care, prescriptions and deaths between 2010 and 2017.

Results An initial search of all patients alive on January 1st 2010 identified approximately 360,000 who had a current or prior history of cardiovascular disease (including heart failure) or who had been prescribed angiotensin converting enzyme inhibitors, angiotensin receptor blockers, beta-blockers, mineralocorticoid receptor antagonists or loop diuretics between 2010-17. Within this population, 34,440 patients (55% women) with a record of heart failure were identified of whom 22,240 (57%) were treated with loop diuretics at some time during the study period. A further 41,442 patients (67% women) received repeat prescriptions of loop diuretics (or died within 90 days of first prescription) but never received a diagnosis of heart failure. Three-year mortality for patients with a diagnosis of heart failure and prescribed loop diuretics was 31%, for those with a diagnosis of heart failure but not prescribed a diuretic, it was 29% and for patients prescribed a loop diuretic but without a diagnosis of heart failure, it was 25%.

Conclusion Many more patients receive a prescription for loop diuretics than are diagnosed with heart failure. However, the prognosis of patients prescribed a loop diuretic is similar whether or not they receive a diagnosis of heart failure. In absolute terms, a similar number of deaths occur in those treated with loop diuretics with and without an associated diagnosis of heart failure.

P1618

Impact of geriatric nutritional risk index on mortality in patients with heart failure with preserved ejection fraction compared with HFmrEF and HFrEF

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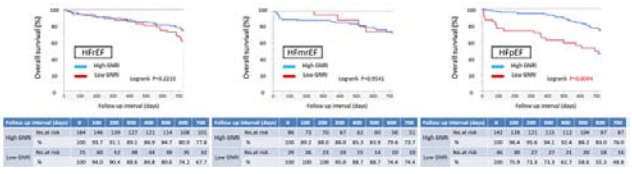
Background: It has been shown that malnutrition is a risk factor for the development of heart failure and risk factors for the occurrence of an event after the onset of heart failure. However, it is not clear that malnutrition can strongly influence which heart failure subset of 'heart failure with reduced ejection fraction (HFrEF)', 'heart failure with mid-range ejection fraction (HFmrEF)' and 'heart failure with preserved ejection fraction (HFpEF)'.

Purpose: Geriatric Nutritional Risk Index (GNRI) is a simple nutritional assessment tool for elderly subjects. We investigated the effect of GNRI on prognosis in HFrEF, HFmrEF, and HFpEF.

Methods: This study was a single center study. We retrospectively analyzed 538 patients hospitalized for heart failure at our Hospital in 2015. Among these patients, there were 235 patients (43.7%) with HFrEF, 115 patients (21.4%) with HFmrEF, and 188 patients (34.9%) with HFpEF. GNRI on admission was calculated as follows: 14.89 × serum albumin (g/dl) + 41.7 × body mass index/22. In each of HFrEF, HFmrEF, HFpEF, mortality of the low GNRI group (<92 : with moderate or severe nutritional risk) and the high GNRI group (≥92 : with no or low nutritional risk) were compared by the Kaplan Meier method and the log-rank test.

Results: At 2 years, there was no significant difference in the survival rate between the low GNRI group and the high GNRI group in the HFrEF (P=0.2215) and HFmrEF (P=0.9541), but in the HFpEF, the survival rate was remarkably low in the low GNRI group (P=0.0044).

Conclusion: GNRI may be more useful for predicting HFpEF prognosis rather than HFrEF.



GNRI:HFpEF/HFmrEF/HFrEF(Kaplan Meier)

P1619

Prognostic significance of left ventricular function alteration after acute myocardial infarction

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Background: The long-term clinical outcomes after acute myocardial infarction (AMI) according to baseline left ventricular ejection fraction (LVEF) is lacking, especially in large population. Also, little is known about the prognosis of LVEF alteration after AMI event in such patients.
Objective: We evaluated the prognostic impact of baseline left ventricular function on 3-year composite clinical outcomes after AMI. In addition, we compared baseline and 12 months LVEF after AMI to investigate the effect of LVEF change (recovered, deteriorated, and unchanged) on clinical outcomes.
Method: We analyzed the data from Korea Acute Myocardial Infarction Registry (KAMIR) between 2011 to 2015. A total of 11,782 AMI patients were grouped into preserved EF (LVEF ≥50%), mid-range (40 ≤ EF < 50%), and reduced EF (EF < 40%) at baseline and 12 months after AMI.
Result: Compared to patients with preserved and mid-range LV function, those with reduced LVEF at baseline had higher 3-year cumulative rates of major adverse cardiovascular events (MACE) (6.8 vs. 8.1 vs. 12.1%, p<0.0001), cardiac death (1.6 vs. 3.3 vs. 11.1%, p<0.0001), non-cardiac death (1.3 vs. 2.1 vs. 4.0%, p<0.0001), and re-hospitalization (1.6 vs. 2.3 vs. 5.5%, p<0.0001), differences which persisted after adjustment for baseline characteristics. However, there was no significant difference in the 3-year cerebrovascular event between the groups (0.9 vs. 0.9 vs. 1.1%, p=0.29). Intriguingly, patients who had shown deteriorated LVEF at 12 months showed poor clinical outcomes as compared to patients whose LVEF recovered or unchanged (MACE; 27.6 vs 10.9 vs 12.7%, p<0.0001).
Conclusion: Among patients with reduced LVEF (< 40%) at baseline after AMI, adverse events including MACE, cardiac death, non-cardiac death, and re-hospitalization were markedly increased. In patients whose follow-up LVEF deteriorated at 12 months after AMI had worse 3-year clinical outcomes.

P1620

Influence of gender on clinical results and predictor of long-term mortality after transcatheter aortic valve replacement

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Although it is well known, the differences between both sexes in cardiovascular disease, however, there is a lack of data in aortic valve, treated with Transcatheter Aortic Valve Replacement (TAVR). The purpose of our study was to analyze the long-term clinical results of patients treated with TAVR in the female and male population.
Material: Between April 2008 and December 2017, 647 patients with aortic stenosis and 20 patients with aortic prosthesis dysfunction, were treated with TAVR consecutively in our center. The primary objective was to analyze, by Cox regression, the predictors of long-term mortality in both sexes.
Results: 59.1% were women. Males had a higher number of comorbidities and after a mean follow-up of 2.87 ± 2.2 years (range between 0 and 9 years), mortality was higher for male patients 40.7% vs. 32% (HR = 1.447 [95% CI 1.057-2.009], p = 0.022) and there were no differences for the presence of threatening bleeding (HR = 1.654 [IC95% 0.719-3.808], p = 0.237), myocardial infarction (HR = 1,768 [IC95% 0.753-4.132], p = 0.191), stroke (HR = 0.992 [IC95% 0.564-1.743], p = 0.976) and hospitalizations for heart failure (HR = 1.388 [IC95% 0.811-2.376], p = 0.231). Among the predictors of long-term mortality, common to both sexes were: threatening bleeding, heart failure, Charlson index, Karnofsky, and STS score.

Conclusion: In our series, there was clinical differences between both sexes, which has an impact on survival, being worse for men due to comorbidities, however, in the population of patients with aortic stenosis treated with TAVI, we found predictors of late mortality similarities between in female and male.

P1621

Stress-induced growing prevalence of secondary aldosteronism among patients with coronary artery disease and chronic heart failure

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Background/Introduction: Numerous studies have shown that aldosterone plasma level is an independent predictor of cardiovascular complications in patients with coronary artery disease (CAD) and chronic heart failure (CHF). It is well known that chronic stress unfavorably affects hormonal secretion and can lead to increase in cortisol one, but its effect on aldosterone level remain unclear.
Purpose: We evaluated the impact of chronic stress on the prevalence of hyperaldosteronism among CHF patients and assessed the relationship between aldosterone plasma level and the risk of major cardiovascular complications.
Methods: The study included 286 patients with stable CAD and CHF undergoing inpatient treatment in cardiology department at V. K. Gusak Institute of emergency and reconstructive surgery the from January 1, 2015 to December 31, 2017, in the period of military conflict in war-zone of Donbass region. Clinical characteristics and plasma aldosterone level of this group were compared with those of 218 CHF patients comparable for age and gender treated in the same hospital in previous peacetime 2012-2013 years. The primary endpoint consists of major cardiovascular events during 12 month after discharge.
Results: High plasma aldosterone level (>160 pg/ml) was found in 27.6 % of wartime patients and 15.6 % of peacetime patients (odds ratio (OR) = 2.1; 95% confidence interval (CI) 1.3 to 3.2). Primary aldosteronism was diagnosed in 2.6 % and 0.9 % of wartime and peacetime patients, respectively (OR = 2.7; 95% CI 0.6 to 13.2). The occurrence of major cardiovascular events (non-fatal myocardial infarction, percutaneous coronary intervention, stroke, new-onset or recurrence of atrial fibrillation, acute heart failure) during 12-months follow-up period was significantly higher during wartime compared to peacetime (OR = 2.6; 95% CI 1.7 to 4.3). The rate of fatal cardiovascular complications was comparable in both groups. High aldosterone plasma level was the independent risk factor of cardiovascular events in Cox regression models adjusted for covariates (OR = 3.2, 95 % CI 2.1 to 5.8 for aldosterone > 160 pg/ml).
Conclusions: Chronic stress leads to growing prevalence of secondary aldosteronism among patients with CAD and CHF. High plasma aldosterone level is associated with increased frequency of cardiovascular events independent of major established risk factors.

P1622

The utility of the MAGGIC heart failure risk score in predicting response to spironolactone: validation and results from the TOPCAT trial

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Background/Introduction: A primary challenge facing the implementation of heart failure with preserved ejection fraction (HFpEF) clinical trials is the optimal selection of patients with an appropriate risk profile from an otherwise heterogeneous population. Assessing those patients at sufficient risk of experiencing outcomes but who are not too ill to derive benefit from a therapy remains dependent on currently available risk models, though previously available heart failure risk models were primarily derived from heart failure with reduced ejection fraction (HFrEF) cohorts. The Meta-Analysis Global Group in Chronic (MAGGIC) Heart Failure Risk Score, however, is derived from a large and diverse cohort of patients equally representing heart failure with reduced and preserved ejection fractions and has been externally validated for its ability to predict time to mortality. We examined whether stratification of patient risk by MAGGIC risk score could predict response to Spironolactone in a contemporary HFpEF clinical trial population.
Purpose: To validate the MAGGIC risk score in a HFpEF clinical trial population for the first time and to test whether the MAGGIC risk score could be used to predict response to Spironolactone in the Spironolactone for Heart Failure with Preserved Ejection Fraction (TOPCAT) trial with regards to survival.
Methods: The MAGGIC risk score was calculated from input of its 13 variables in the 3,445 subjects enrolled in the multi-center, international, randomized, double blind placebo-controlled TOPCAT trial. Data for outcomes as well as a composite of time to the primary outcome were compared with the predicted MAGGIC risk in order to assess performance in the trial cohort. The odds of experiencing the primary outcome in TOPCAT were modeled through logistic regression of treatment alone, MAGGIC risk score alone, in a model of treatment adjusted for MAGGIC risk score, and through a model with an interaction term between treatment and MAGGIC risk score.
Results: The MAGGIC risk score was strongly associated (OR=1.06, 95% CI, 1.04-1.8) with incidence of the study's primary outcome. When stratified by MAGGIC risk score (increments of 10, from zero to 40), there was a statistically significant association between MAGGIC risk score quartile and survival (X2= 168.02, p<0.0001). Treatment effect on outcome when stratified by quartile increased with each quartile of increasing MAGGIC risk scores. There was a trend towards reduced incidence of the primary outcome in the treatment groups with lower MAGGIC risk scores.
Conclusion: The MAGGIC risk score performed well in predicting the incidence of the primary outcome in a large HFpEF clinical trial population and was further able to

stratify patients – those at lower calculated risk - more likely to experience treatment benefit. Use of such a risk score should be considered as part of patient selection for future HFpEF clinical trials.

P1623

heart failure awareness status of the general population in Korea: results from the KNOW-HF 2018 survey

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Background: For a better heart failure outcome, it is fundamental to improve the awareness of heart failure at the general population level.
Purpose: We conducted this study to identify the current status of awareness of heart failure in Korea.
Methods: A total of 1,032 participants were selected based on a stratification systematic sampling method to represent the Korean adult population (≥30 yrs old). Twenty-three question questionnaire were surveyed through a telephone interview.
Results: Although 80% of participants had heard of heart failure, only 21% accurately recognized the lifetime risk of developing heart failure and only 25% thought that heart failure has a higher mortality than other chronic diseases. Twenty-eight percent answered correctly about the cost of hospitalization. Regarding preferred treatment option, 71% chose a treatment that could improve the quality of life and 17.6% that allowed one to live longer. More participants believed that diabetes adversely affects the quality of life more than heart failure. Approximately two-thirds of participants agreed that recent medical treatment could reduce mortality and improve the quality of life, while the rest did not.
Conclusion: Despite the widely available sources, the current awareness status of heart failure is still low in Korea. Proactive educational efforts to improve public awareness are needed.

Chronic Heart Failure - Diagnostic Methods

P1624

Myocardial fibrosis assessed with cardiac magnetic resonance imaging predicts mortality in heart failure with mid-range and preserved ejection fraction

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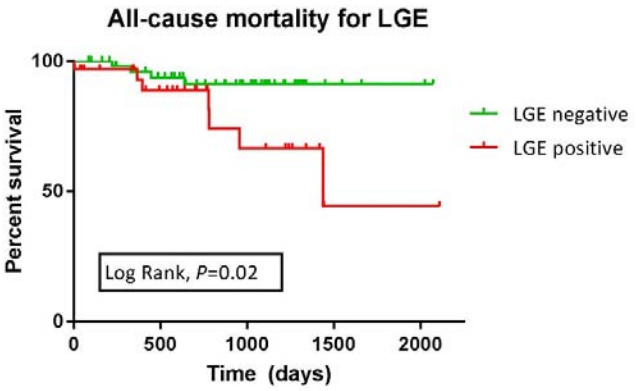
Introduction: Heart failure (HF) with mildly reduced or preserved ejection fraction (EF) (left ventricular ejection fraction; LVEF >40%) is a highly heterogenic disorder which limits therapeutic progress. There is an urgent need to identify subpopulations at increased risk. Myocardial fibrosis assessed by late gadolinium enhancement (LGE) imaging on cardiac magnetic resonance (CMR) may provide new insights.
Purpose: We sought to determine whether the presence of LGE on CMR could mark a distinct subpopulation in patients with HF with mid-range EF (HFmrEF) and HF with preserved EF (HFpEF).
Methods: Symptomatic HF patients with left ventricular ejection fraction >40% that complied with the 2016 European Society of Cardiology criteria for HFmrEF and HFpEF, who underwent CMR including LGE imaging were included. The frequency and pattern of LGE (i.e. ischaemic versus non-ischaemic) was assessed and we determined associations between clinical characteristics and all-cause mortality with logistic and cox-regression analysis.
Results: A total of 90 patients were included (mean age 70 years, 49% female). LGE was present in 32 out of 90 (36%) HF patients, of whom 14 (44%) had a non-ischemic LGE pattern. The presence of LGE was associated with previous myocardial infarction (Odds Ratio 7.8, 95% confidence interval (CI) 2.7 -22.4, P<0.001), higher left ventricular mass index (OR 1.04,95% CI 1.009 – 1.07 P=0.009), and male sex (OR 3.9, 95% CI 1.5 – 9.9, P=0.004). The presence of LGE was associated with all-cause mortality in multivariate analysis (independent from age, sex, NT-proBNP, left ventricular mass index and myocardial infarction, adjusted Hazard Ratio 8.9, 95% CI 1.86 – 43.0, p=0.006).
Conclusion: Focal fibrosis as measured by LGE on CMR is common in patients with HFpEF and HFmrEF, and approximately half of these patients have a non-ischemic LGE pattern. In addition, the presence of focal fibrosis is independently associated with all-cause mortality.



Survival LGE

P1625

Evaluation of the predictive capabilites of LV wall motion pattern and other strain characteristics in LV noncompaction patients' first degree relatives for early diagnosis of cardiomyopathy

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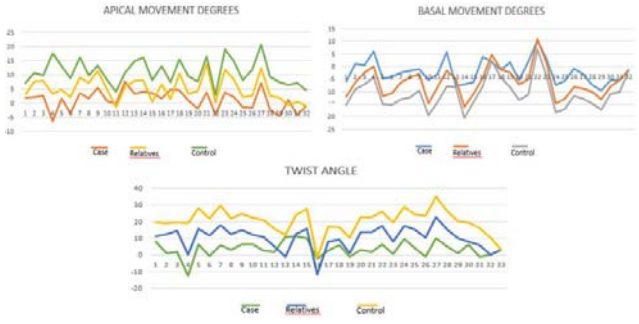
BACKGROUND AND AIM: None of the diagnostic indices present in noncompaction cardiomyopathy involve left ventricular dysfunction. Left ventricular function and hemodynamics can be normal in these patients. For demonstrating regional deformation Tissue Doppler imaging studies, two and three dimensional 'speckle-tracking' and 'strain' echocardiography studies are available. The aim of this study is to evaluate 'Left ventricular noncompaction' patients and first degree relatives of these patients with respect to ventricular motion pattern and other strain characteristics, and demonstrate the predictive capabilities of these features for early diagnosis of cardiomyopathy.
METHODS: This cross-sectional, case-control study included 32 noncompaction cardiomyopathy patients, 30 first-degree relatives and 31 healthy volunteers. All patients were evaluated for baseline echocardiography, strain measurements, and ventricular wall motion pattern. Student t test, chi square test and ce fisher tests were used for statistical analysis. In all analyzes, p <0.05 was considered significant.
RESULTS: There was no difference between the case and control groups in terms of age, weight and body surface area. There was a statistically significant decrease in EF, FS, E / E ', GLS, GLSr, GCS, GCSr, GRS and GRSr values from the control group to the patient relatives and the patient group, respectively(patient relatives and control EF p = 0,023, for all other groups p <0.01). There was a significant correlation between EF and strain values in all groups (p <0.001). When the rotation values were examined, the decrease was observed from the control group to the patient relatives and the patient group, respectively, but significant difference was observed between the patient and the other groups and not between the patient relatives and control groups. In the case group, 'Rigid Body Rotation(RBR)' movement pattern was observed in 17 patients and the present pattern was observed in 9 patients in the patient relatives group. EF, GLS, GLSr and basal rotation values were significantly lower and GRS and GRSr values were higher in the group with RBR after comparison of patients with and without RBR pattern.



Rotation and twist parameters

CONCLUSIONS: It may be considered that the evaluation of the strain characteristics of all three study groups, observations of significant differences and findings in terms of RBR motion pattern contribute to reveal the genotype - phenotype relation of disease and to suggest that these features are predictive of early diagnosis of cardiomyopathy

P1626

Relationship between congestion by ultrasound, body mass index and cardiac rhythm in ambulatory patients with heart failure

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Aims: Sub-clinical congestion is common in patients with chronic heart failure, associated with an adverse prognosis and a possible therapeutic target.
Methods: We measured ultrasound markers of congestion (including lung B-lines (interstitial oedema); inferior vena cava (IVC) diameter; and internal jugular vein diameter before and after Valsalva (JVD ratio)) in patients with heart failure during a routine out-patient clinic visit, and assessed their relationship with body mass index (BMI), cardiac rhythm, and outcome.
Results: Amongst 342 patients (mean age 73 years; mean left ventricular ejection fraction 45%, median (inter-quartile [IQR] range) NT-proBNP 1,275 (461-2,659) ng/l), the median number of B-lines was 7 (IQR: 2-17), median IVC diameter was 2.0 (1.6-2.4) cm and median JVD ratio 5.3 (3.1-7.1).
Compared to patients in sinus rhythm (SR; n=178, 52%), those in atrial fibrillation (AF; n=164, 48%) had higher NT-proBNP (median (IQR)) [AF: 1,915 (1,170-3,504) ng/l vs SR: 567 (256-1,614) ng/l; p <0.001], more B-lines [AF: 10 (3-25) vs SR: 4 (1-11); p<0.001)], larger IVC diameter [AF: 2.3 (2.0-2.6) cm vs SR: 1.7 (1.5-2.0) cm; p<0.001)] and smaller JVD ratio [AF: 4.0 (2.4-6.0) vs SR: 6.2 (4.6-7.9); p<0.001].
NT-proBNP was higher in patients with a normal BMI [(<25 kg/m2; n=76, 22%); 1,543 (618-3,783) ng/l], or overweight [(BMI 25-29.9 kg/m2; n=112, 33%); 1,579 (504-3,002) ng/L] compared to those who were obese [(BMI>30 kg/m2; n=154, 45%); 1,007 (363-1,884) ng/L, p<0.001]. There was no relation between BMI and either IVC diameter or JVD ratio, but obese patients had fewer B lines (4 (1-11)) than either those who were overweight (10 (3-21)) or with a normal BMI (9 (3-27)).
During a median follow-up of 600 (IQR: 363-749) days, 127 patients (37%) died or were hospitalized for heart failure. AF (HR: 1.44 (95% CI: 1.01-2.04), p=0.041), but not BMI either as a continuous or a categorical variable, was associated with outcome. Each ultrasound measure of congestion was associated with increased risk. The strength of the relations between NT-proBNP, IVC, JVD ratio and prognosis was unaffected by the presence of AF or obesity. However, the relation between B-lines and prognosis was lost for patients with a BMI<25 kg/m2 or > BMI>30 kg/m2.
Conclusions: In patients with chronic heart failure, AF is associated with a higher NTproBNP, more evidence of congestion on ultrasound and a worse prognosis. Obesity is associated with lower NT-proBNP, fewer B-lines but not with a better outcome. B-lines might be influenced by BMI and may be a less reliable ultrasound measure of congestion than IVC or JVD ratio.

P1627

Value of combined cardiopulmonary and echocardiography stress test to characterize the hemodynamic and metabolic responses of patients with heart failure and mid-range ejection fraction

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AIMS. To characterise heart failure with mid-range ejection fraction (HFmrEF), combining cardiopulmonary exercise test (CPET) and exercise stress echocardiography (ESE).
METHODS. We studied 169 consecutive subjects (age 62.3±11 years; 74% male): 30 healthy controls, 45 patients with HF and preserved EF (HFpEF), 40 HFmrEF and 54 with HF and reduced EF (HFrEF). Left ventricular (LV) stroke volume (SV), ejection fraction (EF), elastance, global longitudinal strain (GLS), E/E', oxygen consumption (VO2), and arterial-venous oxygen content difference (AVO2diff) were measured in all exercise stages.
RESULTS. HFmrEF revealed baseline features intermediate between HFrEF and HFpEF, except for B-type natriuretic peptide levels, which was similar to HFpEF and significantly lower than HFrEF. Peak VO2 was not significantly different between HF groups. HFrEF exhibited a significantly lower peak SV as compared to either HFpEF or HFmrEF (74.3±21.8 ml vs 88.0±17.4 ml and 96.5±25.1 ml; p<0.01), while peak heart rate (HR) was not significantly different between HF groups. A significantly reduced AVO2diff at peak exercise was apparent in HFpEF and HFmrEF (15.2±3.3 mL/dL and 13.3±4.2 mL/dL) vs HFrEF (17.±6.6 mL/dL; p<0.01), whereas no significant difference was reported between HFpEF and HFmrEF. Peak SVR was significantly higher in HFrEF (1288±648 dynes/cm) than in HFpEF (977±303 dynes/cm), HFmrEF (929±234 dynes/cm) and controls (1016±300 dynes/cm; p=0.009). HFmrEF demonstrated peak values of LV GLS (13.7±4.6%) and elastance (2.52±0.82 mmHg/mL) higher than HFrEF (8.3±3.1% and 1.25±0.56 mmHg/mL, respectively) and lower than HFpEF (17.1±4.6% and 4.40±2.32 mmHg/mL, respectively), with the highest values observed in controls (22.0±3.5% and 6.25±1.96 mmHg/mL, respectively; p<0.0001) (Figure 1). Multivariate analysis in the overall population and all groups revealed peak parameters as independent predictors of peak VO2 (R2=0.90, p<0.0001); AVO2diff showed the largest standardised regression coefficient.
CONCLUSIONS. In HFpEF and HFmrEF, effort intolerance is predominantly due to peripheral factors (AVO2diff), while in HFrEF peak VO2 is restricted by low increases in SV. Individual therapy according to which component of VO2 is more impaired is advisable.

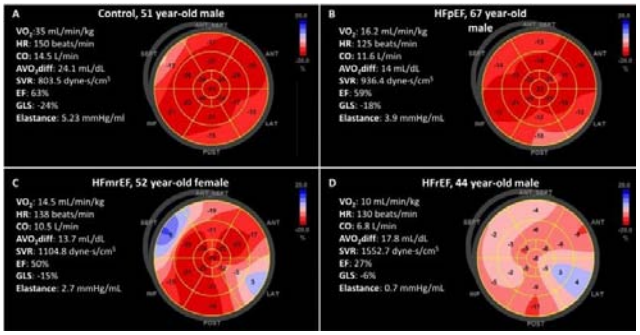

Figure 1

P1628

Clinical and prognostic correlates of volume/time curve at cardiac magnetic resonance in patients with non-ischaemic dilated cardiomyopathy and left bundle branch block

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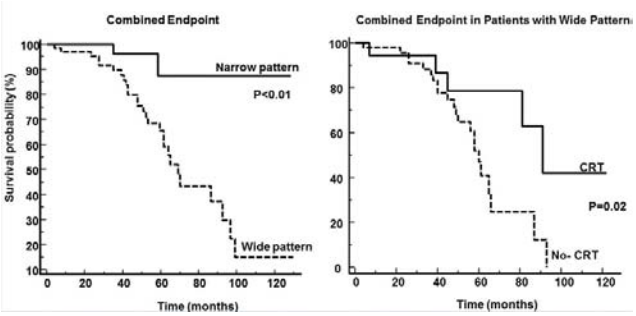
Background: In patients with non-ischaemic dilated cardiomyopathy (NIDCM) and left bundle branch block (LBBB), the systolic phase of the left ventricular (LV) volume/time (V/t) curve at cardiac magnetic resonance (CMR) can display a wide pattern (WP) and a narrow pattern (NP). Their clinical and prognostic correlates are currently unknown.
Methods: Consecutive patients with NIDCM (LV ejection fraction <50%) and LBBB were enrolled. They underwent a baseline evaluation including CMR, and were periodically re-evaluated during follow-up. The endpoint was a composite of cardiovascular death, heart failure (HF)-related event, and ventricular arrhythmias requiring defibrillator shock.
Results: Out of 101 patients (mean age 64±11 years, males 50%), NP was found in 29 and WP in 72, with no difference in QRS duration. Patients with WP had worse clinical presentation, and greater LV volumes, but similar LGE prevalence, extent or distribution. The WP subgroup displayed a greater maximal dyssynchrony time, expressed both as absolute duration (192±80 vs. 143±65 ms, P<0.001), and as percentage of the RR interval (25±11% vs. 8±4%, P<0.001). Even the systolic dyssynchrony index was higher in patients with WP (13±4 vs. 7±3%, P <0.001). The contractility index was lower in patients with the WP (2.6±1.2 vs 3.2±1.7, P<0.05). Over a median follow-up duration of 44 months (interquartile range 23-59), only WP (P=0.029) and NT-proBNP (P=0.004) demonstrated an independent prognostic value for cardiac events.
Conclusions: In patients with NIDCM and LBBB, the WP of V/t curves identifies a subgroup of patients with greater LV dyssynchrony, worse clinical conditions and prognosis.



P1630

Using cardiovascular magnetic resonance imaging to improve classification of ejection fraction

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Background: Patients with heart failure (HF) with mid-range ejection fraction (HFmrEF) have poor clinical outcomes but no treatment convincingly reduces morbidity or mortality in this cohort. Studies of HF therapy are typically based on LVEF on transthoracic 2D echocardiography (echo). Echo has been shown to consistently underestimate LVEF when compared to CMR, which is the gold standard for calculating LVEF.
Purpose: We aimed to quantify the degree of reclassification achieved with CMR over echo, with respect to a preserved, mid-range or reduced LVEF status, and to investigate whether this reclassification associated with outcomes.
Methods: This was an observational study of consecutive patients with both CMR and echo studies performed within 90 days of each other from May 2017 to October 2017. EF categories were preserved (≥50%), mid-range (40-49%), or impaired (<40%). CMR and echo LVEF were compared with respect to their ability to discriminate a composite endpoint of all-cause mortality, HF admission or stroke after adjustment for age and gender.
Results: 141 cases were included. Echo underestimated LVEF compared to CMR (CMR: 42.0 [30.0-59.5%] vs. echo 34.0 [25.0-48.5%], P<0.0001). Subgroup analyses according to echo technique (Simpson's vs. 3D) and underlying diagnosis did not alter this trend. Importantly, echo underestimated LVEF compared to CMR for all categories of LVEF (preserved, mid-range and reduced). Overall, if a patient's LVEF was mid-range on echo, there was a 78% chance of being normal on CMR. In contrast, 87% of patients with reduced LVEF on echo had systolic impairment on CMR. On regression analysis, an echo LVEF<40%, which is relevant for treatment, corresponded to a CMR EF<47%, after adjustment for systematic differences in the two modalities and the interval between scans. On Cox analysis, an echo LVEF<40% was not associated with an increased hazard of the composite endpoint, whereas a CMR LVEF<47% was (Fig 1). Compared to an echo LVEF<40%, a CMR LVEF<47% enabled 3% of patients who had an event to be correctly reclassified as higher risk, and 18% of patients without an event to be reclassified as lower risk.
Conclusion: Echo underestimates LVEF compared to CMR across all LVEF subgroups. Misclassification may explain some of the lack of evidence for treatment benefit in mid-range patients. Large cohort studies are necessary to define cut-points for different, more reproducible imaging modalities. This may facilitate more targeted research and therapy in mid-range patients.

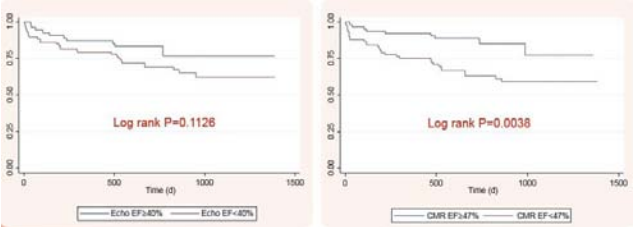

Figure 1

P1631

Choosing an effective methods for assessing the results of percutaneous coronary interventions in post-myocardial infarction patients

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Funding Acknowledgements: Russian Academic Excellence Project 5-100

Aim: to evaluate the effectiveness of cardiac magnetic resonance (CMR) and stress-echocardiography in the assessment of long-term results of percutaneous coronary interventions (PCI) in post-MI patients with dysfunctional myocardium.
Methods: 112 patients were participated in the study. Inclusion criteria: myocardial infarction in previously; angina II-III functional class (CCS); multivessel coronary disease (SYNTAXscore I <32); the presence of segments with abnormality left ventricular local contractility; chronic heart failure I-III functional class (NYHA); left ventricular ejection fraction (LVEF) is less than 45%. All patients underwent stenting of the coronary arteries in the zone of viable myocardium. Only drug-eluting stents were implanted in coronary arteries. Long-term results were followed up 18 months after PCI in all patients. All patients underwent stress-echocardiography and CMR for visualization of myocardium after PCI.
Results: on average, initially accounted for 2.12 ± 0.74 segments with abnormality kinetic per patient according CMR, whereas, according to stress echocardiography, the average number of segments was 1.96±0.42. The average difference was 0.16 segment [0.11-0.18; 95% CI, p=0.003]. In the postoperative period, after 18 months, there was a significant decrease a segments with abnormality kinetics in the zone of hibernated myocardium, from 2.12 to 1.08, according to CMR (the average difference was 1.04 segment) [0.98-1.1; 95% CI, p <0.01], and from 1.96 to 0.98 according to stress-echocardiography (the average difference was 0.98 segments) [0.94–0.99; 95% CI, p = 0.023]. There is a significant discrepancy between the number of identified segments with abnormality kinetics using CMR and stress-echocardiography. There was a significant decrease in the transmurality index from 0.42 to 0.31 (according to CMR). The difference was 0.11 [0.09-0.14; 95% CI, p <0.05]. At the same time, recovery of myocardial function was clearly manifested in patients with a trasmurality index of 0.3–0.5, whereas with a transmurality index of more than 0.5, reliable recovery of myocardial function was not observed.
Conclusion: CMR allows a more objective analysis of the results of PCI in patients with dysfunctional myocardium, as compared with the stress-echocardiography method.

P1632

Variability in LVEF measured by echocardiography, gated SPECT and cardiac magnetic resonance: a real world analysis

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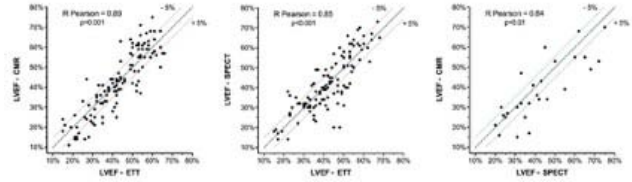
Introduction Left ventricular ejection fraction (LVEF) plays a decisive role in many important clinical decisions. The purpose of this study was to assess the variability in LVEF measured by commonly used imaging modalities in a real-world setting.
Methods Single-center retrospective study including patients, with or without known coronary artery disease, undergoing any two of the following imaging modalities where LVEF was measured: non-contrast enhanced transthoracic echocardiography (TTE), gated single-photon emission computed tomography (SPECT), and cardiac magnetic resonance (CMR). Exclusion criteria were: difference between tests >90 days, performance of an exam within the 1st month of an acute cardiac event, and the occurrence of any cardiac event between tests. A separate analysis was conducted excluding patients with LVEF >55% by all modalities and those with >30 days between tests.
Results A total of 260 patients were assessed: 117 patients underwent both TTE and CMR, 115 TTE and SPECT, and 28 SPECT and CMR, with a median time interval between exams of 20 days (IQR 5-50). The mean absolute difference of LVEF between tests was 6±5%. Bland-Altman analysis showed no systematic overestimation or underestimation of LVEF by any of the modalities. Overall, the correlation between different methods was good (Pearson's r >0.8) - Figure. Nevertheless, the proportion of cases where the absolute LVEF difference was >10% ranged from 15-30%. Among patients with LVEF < 55% by one or more of the modalities, there was disagreement in the categorization LVEF ≤35% vs. >35% in 13% of the cases (n=34). Subgroup analyses including only those patients with <30 days between tests and those with LVEF <55% yielded similar results.
Conclusions Among patients with all types of cardiac disease assessed in a "real world" setting, the agreement between LVEF measurements using different imaging modalities was relatively good. Nevertheless, clinically meaningful discordance subsists in a small but significant proportion of patients.



P1633

Classifying heart failure patients based on objective Fast-SENC cardiac MRI measurements instead of subjective NYHA symptomatic criteria

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Background: The New York Heart Association (NYHA) classification of severity of symptoms is the most common system for evaluating function based on the patient's ability to withstand physical activity. This subjective criteria is based on the patient's perception of activity that may be confounded by pharmacological therapies, unrelated injuries, or mental condition. Alternative metrics that classify function based on objective, measurable criteria are needed to evaluate heart function status and improve detection of disease progression and impact of pharmacologic therapies and device interventions. LVEF is an insensitive quantitative metric and identifies reduction in function once damage has occurred. Fast-SENC segmental intramyocardial strain (fSENC) is a unique cardiac magnetic resonance imaging (CMR) modality that measures myocardial contraction in 1 heartbeat per image plane. The ability to quantify subtle changes in regional myocardial contraction allows detection of subclinical dysfunction before cardiac remodeling results in systemic damage and decline in LVEF. This prospective registry compares fSENC and LVEF in patients with varying degrees of progressive dysfunction based on NYHA classification.
Methods: A single center, prospective registry of CMR scans acquired with a 1.5T scanner were evaluated for conventional CMR diagnostics including LVEF, Volumes, Mass, T1/T2 mapping, and LGE. In addition, fSENC scans were acquired and processed with the MyoStrain software to quantify intramyocardial strain. Three short axis scans (basal, midventricular, & apical) were used to calculate strain in 16 longitudinal segments while three long axis scans (2-chamber, 3-chamber, & 4-chamber) were used to calculate 21 circumferential segments. fSENC and CMR LVEF were evaluated based on NYHA classification.
Results: A total of 792 scans in 619 patients were included in the study. Patients had an average (± stdev) age of 54 (17) yrs and BMI of 26 (5) kg/m2; 45% had arterial hypertension, 12% diabetes mellitus, 30% valvular heart disease, 27% cancer, 7% atrial fibrillation, and 22% coronary artery disease. Figure 1 shows a Box and Whiskers plot between NYHA classification in the x-axis versus the amount of normal myocardium (fSENC < -17%) in the y-axis respectively.
Conclusion: fSENC quantified subclinical dysfunction irrespective of symptom perception according to NYHA classification and before changes in LVEF and other global measures. The ability to monitor progressive dysfunction with an objective quantitative metric enables detection of subclinical dysfunction before symptoms or potentially irreversible damage and remodeling commonly seen with subjective and insensitive diagnostics. Even in "asymptomatic" patients with normal LVEF, fSENC quantified dysfunction due to structural heart disease to enable monitoring of disease progression and impact of drug and device therapies.

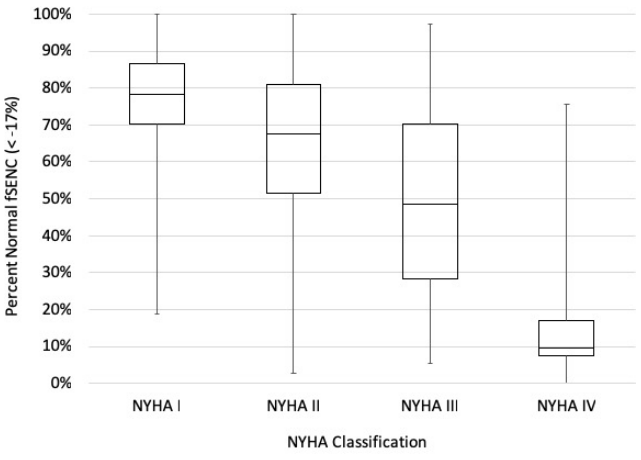

Figure 1

P1634

Limited diagnostic accuracy of the new ASE/EACVI algorithm for heart failure with preserved ejection fraction (VEEDia-study I)

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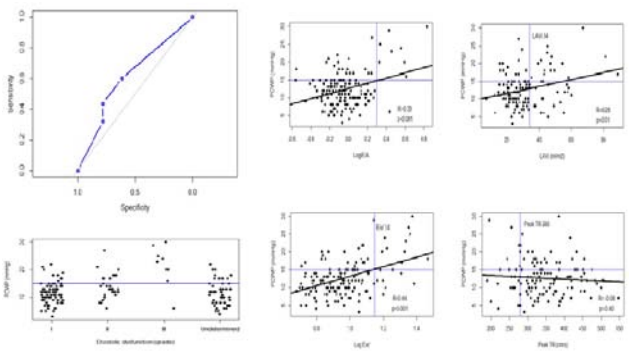
In 2016 the ASE/EACVI published a new and simplified algorithm to evaluate LV diastology. Grading of diastolic dysfunction is now based on the E/A-ratio and the presence of elevated E/e', indexed left atrial volume (LAVi) and/or peak tricuspid regurgitation velocity (TRV) only. Diastolic dysfunction grade I suggests normal LV filling pressures at rest and grade II or III elevated LV filling pressures. Thus far, validation of this algorithm has been limited. We evaluated the new algorithm and used invasively measured pulmonary capillary wedge pressure (PCWP) as the gold standard.
188 patients with a preserved LVEF (>50%) were included in the analysis (2015-2017; age: 62±14 years, 39% female; 15% had diabetes, 44% hypertension, 29% dyslipidaemia, 40% obesity). Right heart catheterization (RHC) and echocardiography were performed concomitantly for unexplained dyspnea or pulmonary hypertension (PH). Patients with reduced LVEF, significant valvular disease or congenital heart disease were excluded.
There was a fair correlation between E/e', E/A or LAVi and PCWP (R=0.44, 0.33 and 0.28 respectively, all p < .01). However no correlation was found between peak TRV and PCWP (R=-0.08, p=.40), even after exclusion of patients finally diagnosed with pre-capillary PH (R=-0.09, p=0.68). With PCWP=15mmHg as cut-off, ROC-analysis of the new algorithm revealed an AUC of 0.61, and sensitivity and specificity were 0.45 and 0.78 respectively. Overall diagnostic accuracy was 75% and it was particularly poor for diastolic dysfunction grade II (33%). PCWP did not statistically differ between diastolic dysfunction grade I (10±4 mmHg) or II (14±4 mmHg) (see Figure). Also there was a small, but significant correlation between PCWP and NT-proBNP (R=0.31 p<.001).
Conclusion: The new algorithm to evaluate LV diastology had insufficient accuracy to predict LV filling pressures at rest and is thus of limited value to non-invasively evaluate patients suspected of heart failure with preserved ejection fraction (HFpEF). RHC deserves a more central role in the diagnostic evaluation of HFpEF.



ROC_curves

P1635

Role of 123-Iodine metaiodobenzylguanitidine imaging and cardiac MRI in ICD implantation decision making in heart failure patients

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Background: According to guidelines, implantable cardioverter defibrillator (ICD) is recommended in prevention of sudden cardiac death (SCD) in heart failure (HF) patients (pts). Guidelines have several limitations because ICD indication is based mainly on left ventricular ejection fraction (LVEF). Recently, 123-iodine

metaiodobenzylguanidine imaging (123-I MIBG) seems to identify, independently from LVEF, pts at high risk of SCD: heart/mediastinum (H/M) ratio<1.6 and summed score (SS)>26.
Purpose: The aim is to assess the role of 123-I MIBG combined with cardiac MRI to predict malignant ventricular arrhythmias (VA) in HF pts
Methods: We enrolled 97 pts admitted to our hospital with diagnosis of HF and EF≤35%, NYHA class II-III, who underwent 123-I MIBG imaging and cardiac MRI. SS of 26 was used as cut-off to identify high risk (G1) versus low risk pts (G2). Late gadolinium enhancement (LGE) was evaluated in the two groups. All pts underwent ICD implantation. Follow up was performed at 24 months.
Results: 47 pts were included in G1 and 50 pts in G2. All baseline characteristics were similar in the two groups. The percentage of pts with LGE was 85% in G1 vs 60% in G2 (p=0.007). At 24 months follow-up VA events in G1 were 19.05% vs 4.17% in G2 (p=0.037). Moreover VA events were recorded greater in pts with both SS>26 and LGE compared to pts with only SS>26 (46.7% vs 19.6%, p=0.046).
Conclusion: Our results seem to confirm that 123-I MIBG uptake and LGE are associated with the occurrence of life-threatening VA in HF pts independently from LVEF. The use of integrated imaging could be a useful tool in the future to increase the specificity of the pts selection for ICD therapy.

Table 1

	G1SS > 26(n= 47)	G2SS ≤ 26(n=50)	P value
H/M	1.47 ± 0.24	1.63 ± 0.27	0.015
HypertensionN (%)	34(72)	34(68)	-
Diabetes mellitus type IIN (%)	14(29)	9(18)	-
Ischaemic CM N (%)	34(72)	21(42)	0.004
Idiopathic DCMN (%)	13(27)	25(50)	0.037
LVEF (%)	27.01 ± 5.51	28.68 ± 6.20	-
LGEN (%)	40(85)	30(60)	0.007
MalignantVA N(%)	9 (19.14)	2 (4.17)	0.037

SS: summed score; H/M: heart mediastinum ratio; CM: cardiomyopathy; DCM: dilated cardiomyopathy; LVEF: left ventricular ejection fraction; LGE: late gadolinium enhancement; VA: Ventricular Arrhythmias

P1637
Impact of N-terminal pro-brain natriuretic peptide and 2D strain on development of cardiac events in patients with chronic kidney disease

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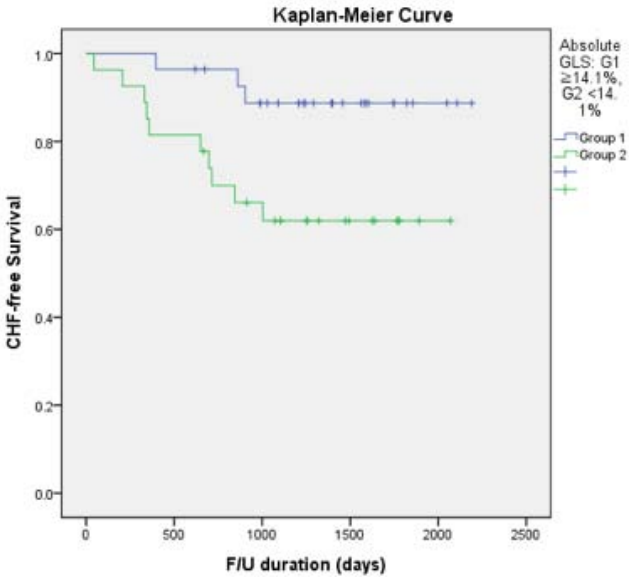
Background: In patients with chronic kidney disease (CKD), cardiovascular morbidity and mortality are significantly associated with their outcome. This study was designed to investigate the usefulness of N-terminal pro-brain natriuretic peptide (NT-proBNP) and global longitudinal strain (GLS) measured by 2-dimensional speckle tracking echocardiography (2D STE) in predicting development of cardiovascular events in patients with CKD.
Methods: A total of 124 patients with CKD who had no cardiovascular symptoms were enrolled. All patients had analyzable 2D STE data and NT-proBNP levels.
Results: Mean age was 59±12 years and male was 46.8%. Mean GLS measured by 2D STE was −14.11±3.59% and mean NT-proBNP level was 23,448±13,464 pg/mL, in which showed significant correlation (r=0.553). Symptomatic heart failure (HF) developed in 24.2%, all-cause death in 16.1% and composite of HF and all-cause death in 37.1% during mean follow-up of 104.3±48.9 months. GLS showed significant difference between patients with and without HF during follow-up (−11.59±2.81% vs. −14.88±3.46 %, p=0.003) but NT-proBNP levels did not (26,528±12,268 vs. 22,464±13,803 pg/mL, p=0.313). GLS was not significantly different between patients with or without all-cause death (−14.45±4.35% vs. −14.03±3.44%, p=0.740). Patients were divided into two groups by the median value of GLS of −14.1%: Group 1 (n=56), absolute GLS ≥14.1%; Group 2 (n=54), absolute GLS <14.1%. Two groups were comparable in age and sex, risk factors and residual renal function but showed significant differences in the level of NT-proBNP (16,224±14,260 vs. 31,364±7,323 pg/mL, p<0.001), past history of HF (7.1% vs. 33.3%, p=0.015) and development of HF event during follow-up (10.7% vs. 37.0%, p=0.022) (Fig. Kaplan-Meier log rank p=0.019).
Conclusion: In patients with CKD, NT-proBNP levels were markedly elevated and GLS was depressed in spite of no clinical symptoms. GLS was more useful than NT-proBNP in prediction of future HF in patients with clinically silent CKD.



Symptomatic HF-free survival

P1638
The prognostic value of stress gated blood pool SPECT in early postoperative period prognosis in patients with ischemic cardiomyopathy

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On behalf of: Shipulin V., Zavadovsky K., Andreev S, Pryakhin A., Saushkin V., Shipulin V.M.

Purpose. The purpose of the study was to assess the severity of early postoperative status in patients with ischemic cardiomyopathy (ICM) based on preoperative gated blood pool SPECT results.
Methods. A total of 31 patients (29 male, 2 female) with ICM were enrolled in this study in the period from March 2017 to November 2018. The average age of patients was 60.4± 6.3 years. The inclusion criteria for the study were the following: left ventricular (LV) ejection fraction (EF) equal or less than 40%; LV end diastolic index (EDVI) equal or more than 60 ml/m2 (based on echocardiography). Prior to surgical intervention all patients underwent gated blood-pool SPECT (GBPS) at rest and during stress-test with intravenous administration of dopamine. A total of 4 gated BPS SPECT were performed: 1) at rest; 2)during 5 μg/ kg/min dopamine infusion (1step); 3) during 10 μg/kg/min dopamine infusion (2step); 4) during 15 μg/kg/min dopamine infusion (3step). GBPS data was processed using Quantitative Blood Pool SPECT (QBS, Cedars-Sinai Medical Center, Los Angeles, CA, USA) and the following parameters were calculated: left and right ventricular end-systolic (ESV) and end-diastolic (EDV) volumes, ejection fraction (EF), peak ejection and filling rates as well as dyssynchrony indices (Phase Standard Deviation, Histogram Bandwidth, Entropy). The patients were divided into 2 groups. Group 1 (n=11) with a complicated course of early postoperative period (death, the usage of intra-aortic balloon pump, inotropic support for more than 5 days with the need to stay in the UAR was considered a complication) and group 2 with uncomplicated postoperative course (n=20).
Results. The values of preoperative GBPS parameters which were significantly different between (by univariate U-test) two groups are presented in a table 1. An observed difference was considered significant at a p value <0,05. Logistic regression analysis showed that the majority of these parameters allow predicting the severity of early postoperative period. The right ventricle parameters showed their prognostic significance only measured at rest examination. At the same time stress examination revealed a significant prognostic importance of LV volumes and indices in comparison to rest.
Conclusion. Left and right ventricular volumes and contractility parameters obtained from GBPS are associated with the course of an early postoperative period in patients with ischemic cardiomyopathy. Thus, GBPS could be useful in the preoperative evaluation of such patients.

Table1

	1 gr	2gr	p (U-test)	OR	CI		Chi2	p
LV EF rest (%)	22(16; 33)	28 (26; 32)	**0,013**	0,851	0,759	0,953	9,48	**0,005**
RV EDV rest (ml)	197 (158; 285)	146 (123; 220)	**0,030**	1,007	0,999	1,015	3,72	0,060
RV ESV rest (ml)	128(69; 211)	79 (47; 117)	**0,020**	1,010	1.001	1,019	5,73	**0,022**
RV EF rest (%)	38 (27; 52)	44 (36; 64)	**0,025**	0,962	0,926	0,998	4,54	**0,042**
RV PFR rest (EDV/s)	1,14 (0,63; 1,48)	1,24 (0,92; 1,76)	**0,029**	0,257	0,077	0,850	5,92	**0,027**
RV MFR/3 rest (EDV/s)	0,59 (0,39; 1,02)	0,8 (0,62; 1,24)	**0,004**	0,110	0,020	0,630	7,99	0,130
LV ESVI rest (mL/m2)	114 (102; 140)	102 (80; 122)	**0,047**	1,023	1,002	1,045	5,70	**0,026**
LV SD rest (deg)	54 (51; 63)	48 (31; 60)	**0,037**	1,042	1,004	1,082	5,45	**0,029**
RV Mean rest (deg)	148 (140; 161)	137 (131; 146)	**0,012**	1,027	0,992	1,063	2,66	0,123
LV Bandwidth rest (deg)	222 (192;246)	192 (129; 222)	**0,022**	1,011	1,000	1,022	4,96	**0,039**
LV EF 3 step (%)	29 (21; 34)	33 (30; 35)	**0,047**	0,918	0,844	0,998	4,31	**0,046**
RV EDV 3 step (ml)	197 (173; 278)	157 (124; 219)	**0,017**	1,010	1,001	1,019	5,51	**0,025**
LV EDVI 3 step(mL/m2)	161 (139; 181)	139 (115; 163)	**0,047**	1,018	1,003	1,045	4,94	**0,034**
LV ESVI 3 step(mL/m2)	106 (94; 143)	92 (75; 114)	**0,013**	1,024	1,003	1,045	6,58	**0,019**
LV SVI 3 step(mL/m2)	1,2 (1,0; 1,3)	1,4 (1,1; 1,7)	**0,006**	0,070	0,010	0,520	8,28	**0,009**

LV - left ventricular, RV – right ventricular, EF – ejection fraction, EDV – end diastolic volume, EDVI – end diastolic volume index, ESV – end systolic volume, ESVI – end systolic volume index, SVI – stroke volume index, PFR – peak filling rate, MFR/3 – mean filling rate over the first third of the ED to ES phase, Mean – mean value of ventricular dyssynchrony, Bandwidth – histogram bandwidth.

Table 1

P1639

Electrocardiographic predictors of ventricular tachyarrhythmias in patients with ischemic vs non-ischemic heart failure

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Identification of patients (pts) at increased risk of arrhythmic death is a multifactorial process. Successful risk assessment based on electrocardiography (ECG) records is greatly improved by the combination of different indices reflecting not only the pathological substrate but also the autonomic regulation of cardiac electrophysiology. This study assesses the arrhythmic risk stratification capacity of heart rate turbulence (HRT) parameters, microvolt T-wave alternans (mTWA), deceleration capacity (DC), and fragmented QRS complex (frQRS).
The aim of the study was to comparatively evaluate ECG predictors of life-threatening ventricular tachyarrhythmias (ltVTA) in pts with ischemic vs non-ischemic heart failure (iF vs niHF).
Materials and methods. The study enrolled and followed up 57,4±15,9 months 357 pts (NYHA 2,3±0,68; LVEF≥35%): 160 pts with iF (aged 52,4±17,9; 117/73,1% male; LVEF 44,7±7,12%) due to coronary artery disease and 197 pts with niHF (aged 48,7±11,2; 127/64,5% male; LVEF 41,3±5,5%) due to dilated cardiomyopathy. For analysis as primary endpoints the following ltVTA events were taken: SCD, successful resuscitation, sustVT/VF with syncope, appropriated ICD discharges.
Results. In the iHF pts positive correlations of ltVTAs with frQRS (k=0.91; p=0.0001), gender male (k=0.58; =0.005), and HRT\ (k=0.87; p=0.0001) were revealed. As a result of ROC analysis only frQRS (AUC=0.96; 95% CI: 0.921-0.999; p=0.0001; sensitivity 89%, specificity 83%) confirmed prognostic value. In the niHF group significant correlations of ltVTAs with pathological test mTWA (k=0.49; p=0.0001), QRS width and fragmentation (k≥0.24; p≤0.001), and DC (k=0.14; p=0.045) were found. As a result of ROC analysis, cut-off 25% index of pathologic mTWA (AUC=0.772; 95% CI: 0,769-0,885; p=0,0001; sensitivity 79%; specificity 77%) retained prognostic significance.
Conclusion. Risk stratification for arrhythmic events in HF pts differs substantially depending on whether the underlying cardiomyopathy is ischemic or non-ischemic. Thus, for iHF pts presence of frQRS shows high sensitivity and specificity to predict ltVTA events. Pathological test mTWA can also help identify high-risk in niHF pts.

P1640

An analysis of right ventricular failure in isolated left ventricular noncompaction and idiopathic dilated cardiomyopathy

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Background: Despite recent cardiac magnetic resonance imaging (CMR) studies suggesting that significant right ventricular (RV) systolic dysfunction is a marker of advanced isolated left ventricular noncompaction (ILVNC), the prevalence and predictors of RV dysfunction among patients with ILVNC and idiopathic dilated cardiomyopathy (IDCMO) remains unknown. Although technically challenging, assessment and diagnosis of RV function using echocardiography is an important prognostic factor in heart failure. Unlike CMR, echocardiography has the advantage of evaluating important contributors to right-sided abnormality, namely diastolic dysfunction, mitral regurgitation and pulmonary hypertension. Echocardiography enables these key factors to be accurately studied to determine whether LV dysfunction is the sole independent predictor of RV dysfunction or do these additional functional abnormalities predispose ILVNC patients to RV dysfunction. Purpose: The aims of this study were to estimate the prevalence and predictors of RV dysfunction, using echocardiography, in ILVNC, and IDCMO patients.Methods: In a prospective cross-sectional study 49 patients with ILVNC and 49 with IDCMO were enrolled at the cardiomyopathy clinic in Chris Hani Baragwanath Academic Hospital with the approval from the Health Sciences Research Ethics Committee, University of the Witwatersrand. Baseline clinical features and echocardiographic findings of the ILVNC and IDCMO patients were compared. RV function was evaluated by tricuspid annular peak systolic velocity (S'). Results: Between both groups of patients, 58.2% had RV dysfunction, indicated by a RV S' <10. The prevalence of RV dysfunction was 49%, in ILVNC, and 67%, in IDCMO. A univariate linear regression analysis, and a stepwise multiple linear regression analysis, of ILVNC patients, indicated the most important echocardiographic parameters associated with RV dysfunction were left ventricular ejection fraction (LVEF) (p < 0.0001), in both analyses. LV sphericity indices, LV end diastolic diameter (p = 0.003), and end systolic diameter (p < 0.0001) were also independent predictors of RV dysfunction.
Conclusions: RV dysfunction is frequent among patients with ILVNC, the best predictor of which is LVEF, not dissimilar to what occurs in IDCMO. In the presence of RV dysfunction these patients develop a more adverse clinical profile, worse LV remodeling and a greater degree of mitral regurgitation when compared to those with normal RV function. Identifying LV dysfunction as a major contributing factor to the development of RV dysfunction in ILVNC or IDCMO provides insight into the hemodynamic manifestations of reduced LV systolic function.

P1641

Subclinical right ventricular dysfunction in gestational hypertension as compared to a normotensive pregnancy group

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Background. Gestational hypertension (GHT) and preeclampsia (PE) are associated with a significant short and long term cardiovascular risk, few data indicating a subtle deleterious effect on left cardiac and vascular function that maintains after delivery. However, right cardiac structural and functional changes, as compared to normal pregnancy physiological adaptation are scarcely studied. Aim. To assess right cardiac geometry and function in a group of pregnant women with GHT and/or PE by comparison to a normotensive control group. Methods. We studied 58 pregnant women: 31 with GHT/PE (no cardiovascular or medical history) and 27 normotensives as control, using color 2D, spectral and tissue Doppler and 2D speckle tracking. Right heart geometry was assessed by indexed right atrial (RA) maximal volume and right ventricle (RV) basal and mid-diastolic diameters; global function and hemodynamics by pulmonary flow VTI, RV fractional area change (FAC) and RV Tei index; and regional RV function by TDI tricuspid annular S, E' and A' wave velocities and free RV wall longitudinal strain (as septal strain considered part of global longitudinal left ventricle function). Results. GHT/PE and control groups were similar in terms of age (32.2±5 vs. 31.7±4), pregnancy weeks (31.3±6 vs. 30.7±4), primi-/multiparity status and heart rate (89.1±12 vs. 84.4±10), with hypertensive group having higher pre-pregnancy and actual body mass index (25.8±5 vs. 22.3±2 and 29.7±4 vs. 25.4±2 respectively, both p<0.05). Indexed RV mid-diastolic diameter was higher in GHT/PE group (18.9±7 vs. 14.6±2, p=0.008) but there were no significant differences in other structural parameters or global function and all in normal range values. As for RV regional function, GHT/PE group had a decreased E' wave velocity (14.8±3 vs. 17.5±4, p=0.02) and RV free wall longitudinal strain (18.4±7 vs. 25.6±4, p=0.001).
Conclusions. While right cardiac global function and loading features were almost similar, hypertensive pregnant group showed subtle regional systolic and diastolic dysfunction. Along with left cardiac function, further studies should establish whether this condition is transitory or persistent after delivery, increasing the risk for progression to heart failure in these young patients.

P1642

Relation between left ventricular filling pressure and change of left ventricular wall intensity

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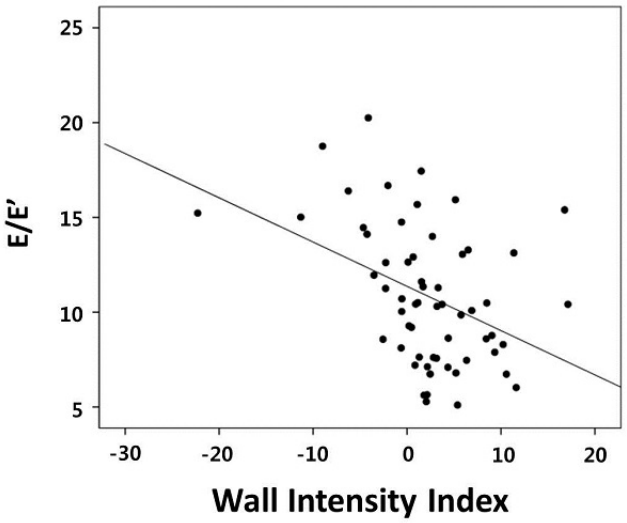
Background: The left ventricular (LV) filling pressure has been documented an important factor for expression of LV diastolic dysfunction. Coronary flow reserve (CFR), which reflects coronary microvascular function, was associated with LV filling pressure. The blood flow of the coronary microvessels was mainly in the diastolic period. The contrast medium will be mainly filled in the diastolic phase in coronary computed tomography angiography (CCTA). Therefore, the hypothesis of this study is that the change in wall intensity of LV between the diastolic and systolic phases in

CCTA(wall intensity index, WII) is related to the LV filling pressure and microvascular function.
Methods: Transthoracic Doppler echocardiography was performed that included pulsed tissue Doppler of the mitral annulus. The ratio of mitral velocity to early diastolic velocity of the mitral annulus (E/e') was used as a surrogate marker of the LV filling pressure. The average of LV wall intensities were obtained from the diastolic and systolic phase in 17 segments using CCTA. WII was defined as Hounsfield unit scale of (diastolic phase−systolic phase)/diastolic phase. Patients with aortic valve stenosis, congenital heart disease, hypertrophic cardiomyopathy, dilated cardiomyopathy, previous revascularization due to ischemic heart disease and permanent pacemaker implantation were excluded.
Results: Total 60 patients were included and mean age of patients was 59.8 years. WII was significantly low in patients with E/e' over 14 than those with E/e' less than 14 (-3.07±9.10 vs. 3.76±4.35; p<0.05). In univariate analysis, age, a velocity and E/e' were significantly associated with WII. In multivariate analysis, E/e' was independently associated with WII (β = -0.405, R^2 = 0.149, p = 0.001).
Conclusions: WII was associated with LV filling pressure and diastolic function. And we can suggest that WII can be used to evaluate microvascular function of LV.



Wall intensity index

P1643
Electrocardiography and echocardiography dyssynchrony correlation with left ventricular function in long term permanent pacemaker implantation

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Background: Right ventricular pacing(RV) creates electrical dyssynchrony similar to a left-bundle branch block which may have detrimental effects on cardiac structure and function, leading to heart failure in some patients(pts). Several echocardiographic techniques are available for the assessment of cardiac mechanical dyssynchrony. Previous studies had demonstrated using simple ECG parameter as a predictor of pacing-induced left ventricular dysfunction.
Purpose: To evaluate ECG parameter and echocardiographic(echo) dyssynchrony correlation with left ventricular(LV) dysfunction in pts with permanent pacemaker implantation(PPM)
Method: We evaluated 151 pts who had received PPM and were dependent on RV pacing. The survey included clinical basic data, ECG parameters (pacing axis, QRS duration, QTc interval) and echo studies (LV ejection fraction[EF], LV end systolic dimension[ESD], septal flash, inter-ventricular mechanical delay[IVD], and septal-to-posterior wall motion delay [SPWMD]). Dyssynchrony was assessed by speckle-tracking strain using off-line software.
Results: Pts mean age was 75±13 years old and pacing duration was 79±61 months. Most (94%) RV lead located over apex. Mean LVEF was 61±12%. 11%(17/151) pts had EF below 40%. For ECG parameters, longer QRS and QTc are related with worse LVEF while more negative QRS axis with better EF. For echo parameters, longer SPWMD correlated with worse EF. The finding of septal flash, IVD and speckle tracking dyssynchrony had no significant relation. Duration of QRS also found to have high correlation to SPWMD(P<0.01).
Conclusion: Compared with more time consuming speckle tracking dyssnchrony, echo SPWMD and ECG parameter correlate better with LVEF in PPM pts.

P1644
Coronary venous anatomy in patients with heart failure

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We hypothesized that heart failure (HF) during longer period of time can influence the anatomy of coronary venous system (e.g. expansion of veins). We try to research it using multi slice computed tomography.
METHODS: 110 patients (38W) were included into the research. In 67,3% ejection fraction (EF) was correct, in 17,3% it was preserved EF and in 18,46% it was reduced EF. In the last one subgroup heart failure symptoms was presented at least one year. In all, multi slice computed tomography was done. Scanning with retrospective ECG-gating was performed during a breath hold using 64 slices with a collimated slice thickness of 0.5 mm using the standard protocol for coronary arteries. We used the best mode option, the helical pitch was 12.8 and the rotation time was 0.4 s. An average of about 80-100 ml of contrast agent was used in each case. The coronary veins analysis was performed by the Vitrea 2 workstations using multi-planar reformatted (MPR) and 3D reconstructions. The analyses were performed by two experienced researchers. A dedicated Likert-based scale that was created earlier was used to evaluate the quality of the veins visualizations.
RESULTS: Quality of visualization of coronary veins was described as more then good, there was no statistical differences between groups observed (A: 4,2 ± 0,89; B: 4,11 ± 0,87; C: 4,00 ± 1,12; p=0,7821). Number of visible veins was statistically the biggest (p=0,0497) in group B (5,05 ± 1,51) if compare to the group A (4,56 ± 1,08) and C (4,64 ± 1,23). There was no statistical differences (p=07131) in vein of Marshall (oblique vein of the left atrium) presence A: 27,03%; B: 15,79%; C: 17,65%. After analysis of coronary veins variants we found that in group A variant II(B) (anterior, anterolateral, lateral, posterolateral veins present, lack of posterior vein) was the most frequent (37,84%), meanwhile in heart failure groups (B and C) it was variant I(A) (anterior, anterolateral, lateral, posterolateral and posterior veins present) 84,21% and 58,82% respectively – difference was highly statistical (p=0,0000). Variant II was absent in all heart failure affected patients.
CONCLUSIONS: The biggest number of coronary veins was found in patients with heart failure with preserved ejection fraction diagnosed. In our population, posterior coronary vein was always present in heart failure patients.

P1645
Left ventricular ejection fraction remains the best echocardiographic predictor of long-term cardiovascular mortality in heart failure with reduced ejection fraction

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Objectives: in recent years left ventricular ejection fraction (LVEF) has been much criticized while "new" echocardiographic measures such as myocardial strain or tissue doppler diastolic velocities demonstrated good performance as markers of disease severity and prognosis in various clinical settings. The aim of the study was to assess and compare the value of current echocardiographic measures for prediction of long-term mortality in heart failure patients with reduced ejection fraction (HFrEF)
Methods: 58 patients with HFrEF, NYHA classes II-III (45 male, mean age 57,0±13,3 years) were enrolled in the prospective observational study. At baseline the patients underwent standard two-dimensional transthoracic echocardiography with tissue Doppler and speckle tracking imaging. Mean LVEF amounted 26,7±7,9%. Average follow-up amounted 56,1±29,7 months. Cardiovascular mortality was considered as primary end-point.
Results: Cardiovascular death was registered in 26 patients (44,8%). Stepwise Cox regression analysis demonstrated statistically significant prognostic value of LVEF, velocity time integral (VTI), peak systolic annular velocity (s'), early diastolic and late septal mitral annular velocities (septal e' and a' accordingly) and LV global longitudinal peak systolic strain (GLPSS). Comparison of ROC curves showed the largest area under curve (AUC) for LVEF (AUC=0,871; 95%CI=0,722 to 0,957; p<0,0001) and GLPSS (for average GLPSS AUC=0,806; 95%CI=0,645 to 0,916; p=0.001) with the best cut-off = -7,0. Other parameters listed above had AUC between 0,7 and 0,8.
Conclusions: among the variety of currently used echocardiographic parameters only LVEF, VTI, s', septal e' and a' and GLPSS demonstrated prognostic value as long-term cardiovascular mortality predictors in HFrEF patients with LVEF being the best of them.

P1646

Comparison of right ventricular free wall regional deformation in patients with pulmonary hypertension of different aetiologies

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Right ventricular (RV) longitudinal deformation has not been fully investigated in variety of clinical conditions.
Purpose The purpose of this study was to compare RV regional function deformation measured by strain and strain rate (SR) in patients with pulmonary hypertension (PH) of different aetiologies and establish whether RV free wall strain and SR were related to aetiology of PH or hemodynamic variables.
Methods We retrospectively reviewed echocardiographic studies of patients with PH confirmed by cardiac catheterization. Study sample consisted of 25 pts: 13 pts (age: 46,2±13,5) with precapillary PH associated with atrial/ventricular septal defect and 12 pts (age: 45,9±11,5) with postcapillary PH due to dilated cardiomyopathy (DCM).
Echocardiographic parameters of RV function (TAPSE, tissue-Doppler imaging derived free RV wall systolic velocity S', RV inflow tract diameter, RV area) and RV free wall deformation imaging parameters were assessed. Regional systolic and diastolic strain rates and regional strain were acquired from the basal, mid and apical segments of RV free wall.
Results Mean pulmonary arterial pressure (75±18 mm Hg vs. 42±8 mm Hg; p<0,05) and pulmonary vascular resistance (16±7 WU vs. 5±3 WU; p<0,05) were higher in pts with precapillary PH.
TAPSE were decreased in group with postapillary PH (16±5 mm vs. 19±4 mm; p<0,05). Other echocardiographic parameters of RV global function did no differ significantly between pts with PH of different aetiologies.
There was an statistically significant difference between pre- and postcapillary PH patients' strain in apical and mid myocardial segments. Early diastolic SR in apical RV segment in precapillary PH patients was significantly higher than in patients with postcapillary PH. In other myocardial segments there were no differences between systolic, early diastolic and late diastolic SR.
Conclusion Our study suggests that RV free wall strain in patients with PH moderately correlate with aetiology of PH. Strain and strain rates were significantly decreased in patients with postcapillary PH due to DCM, despite lower pulmonary arterial pressure and PVR.

RV free wall strain and strain rate

	RV Segment	Precapillary PH	Postcapillary PH	p value
Strain(%)	basal	-16±7	-17±5	NS
mid	-18±8	-15±4	<0,05	
apical	-19±9	-14±5	<0,05	
SRe(1/s)	basal	1,51±0,91	1,50±0,61	NS
mid	1,23±0,94	1,19±0,52	NS	
apical	1,18±1,07	1,08±0,49	<0,05	

SRe- early diastolic SR

P1647

Does metabolic syndrome influence right ventricular diastolic function in patients with preserved left ventricular systolic function?

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Introduction . Metabolic syndrome (MetS) is commonly associated with left ventricular (LV) diastolic dysfunction and LV hypertrophy. However, the role of MetS in right ventricular (RV) diastolic function is not completely elucidated.
Purpose. Evaluation of diastolic function of RV in patients with metabolic syndrome and preserved left ventricular systolic function.
Methods. Our study included 44 subjects with MetS and 44 controls adjusted by age. MetS was defined by the presence of 3 or more criteria of International Diabetes Federation and American Heart Association/National Heart, Lung, and Blood Institute. All subjects underwent careful clinical and physical examination, laboratory blood tests, complete two-dimensional, pulsed and tissue Doppler echocardiography. For the evaluation of diastolic function we determined tricuspid inflow peak velocity during early (Et) and late (At) filling, their ratio Et/At, early diastolic tissue Doppler velocity of the tricuspid annulus (e't), the ratio Et/e't and Et wave deceleration time (DTt).
Results. Mean values of waist circumference (WC), systolic blood pressure (SBP), diastolic blood pressure (DBP), fasting glucose (GLU), HDL-cholesterol (HDL), triglicerides (TG) were significantly higher in the group with MetS (for all parameters p<0.01). RV diastolic function parameters were also significantly changed in the group with MetS (tab.1). In patients with MetS Et/At ratio was negatively related to WC (r=-0.506), SBP (r=-0.275), DBP (r=-0.320), GLU (r=-0.454), TG (r=-0.230), HDL (r=-0.110). Also, in subjects with MetS Et/e't ratio was positively correlated with WC (r=0.420), SBP (r=0.507), DBP (r=0.450), GLU (r=0.256), TG (r=0.167), and there were no positive association with HDL (r=0.000). Multivariate analysis revealed that SBP, fasting glucose level and WC were independently associated with Et/e't ratio.
Conclusions. MetS has an important impact on RV diastolic function. Among all components of MetS WC, SBP and serum glucose level were independently associated with RV diastolic dysfunction.

Tab.1. RV diastolic function

Variables	MetS	Controls	p
Et (cm/s)	47.78±8.11	55.77±9.45	0.0009
At (cm/s)	64.62±11.97	47.6±11.39	<0.0001
Et/At	0.61±0.04	1.21±0.36	<0.0001
e't (cm/s)	10.23±2.29	13.89±3.89	0.0002
Et/e't	4.93±1.26	4.25±0.77	0.0251
DTt (ms)	233.29±8.68	206.31±15.66	< 0.0001

P1648

Risk prediction in patients with mild dilated cardiomyopathy by cardiovascular magnetic resonance: integrating assessment of myocardial mechanics with tissue characterisation

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Background: Many patients with non-ischaemic dilated cardiomyopathy (DCM) have only mild LV dilatation and mildly reduced LV ejection fraction (LVEF). Whilst the risk of adverse events is lower than for those with severely reduced LVEF, this represents a large patient cohort and their long-term burden of disease remains high. Current guidelines only recommend implanting cardioverter-defibrillators (ICDs) for primary prevention in patients with LVEF<35%. Presence of mid-wall myocardial fibrosis by late-gadolinium enhancement (LGE) predicts SCD in mild DCM. We sought to evaluate the association between LGE, myocardial strain by CMR and clinical outcome.
Methods: We prospectively recruited patients with DCM and LVEF≥40% referred for CMR. The primary outcome was all-cause mortality. Secondary composite outcomes were major arrhythmia (SCD or aborted SCD) and major heart failure events (HF death, HF hospitalisation or transplant). All outcome events were adjudicated by a panel of physicians blinded to CMR results. Myocardial strain was measured by feature tracking (Circle42) by a blinded expert operator. Mid-wall fibrosis was assessed by a separate blinded operator.
Results: Of 315 patients (208 men, median age 50 years, median LVEF 50%, 24.4% with LGE) followed for a median of 1588 days, 24 (7.6%) patients reached the primary end-point. On univariable analysis, global longitudinal strain (GLS by CMR: HR 0.83; 95% CI 0.72-0.95; p=0.006), radial strain (HR 0.90; 95% CI 0.83-0.97; p=0.006) and circumferential strain (HR 0.82; 95% CI 0.70-0.95; p=0.008) were all associated with the primary outcome, whereas LGE was not (HR 2.16; 95% CI 0.85-5.53; p=0.11). Following adjustment for LGE, GLS was associated with major heart failure events (HR 0.83; 95% CI 0.72-0.97; p=0.02) and all-cause mortality (HR 0.83; 95% CI 0.73-0.96; p=0.009), but not major arrhythmic events (HR 1.08; 95% CI 0.94-1.26; p=0.28). LGE was associated with major arrhythmia (HR 10.91; 95% CI 3.86-29.57; p<0.0001), but not major heart failure events (HR 2.22; 95% CI 0.90-5.48; p=0.08) or all-cause mortality (HR 1.68; 95% CI 0.71-3.97; p=0.23).
Conclusion: These findings suggest that myocardial strain measured by CMR identifies patients with non-ischaemic DCM at greatest risk of heart failure and

all-cause mortality, independent of LGE, with a 17% increase in risk for every 1 unit decrease in GLS. Despite potential limitations within a single-centre, feature tracking combined with LGE may be useful in identifying patients at greatest risk of SCD with a low competing risk of death from heart failure. Such patients might derive greater benefit from an ICD.

Chronic Heart Failure - Treatment

P1649

Effects of mineralocorticoid ceceptor antagonists (MRA) in heart failure patients after up to 12 months of follow-up.

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Background: Studies have shown that Mineralocorticoid receptor antagonists (MRAs) have beneficial prognostic effects in patients with heart failure. However, in clinical practice, MRAs are eventually stopped due to several reasons.
Purpose: To assess the effect of MRAs in heart failure patients after 12 months of follow-up.
Method: Data collection was done using IT systems used in the Department of Cardiology (CVIS). Patients who attended heart failure clinic (HFC) between January and June 2017, who were started or were already on a MRA were followed up after 12 months. Patients who were lost to follow up and patients who passed away were excluded from the study.
Results: There were 220 patients who attended HFC between January and June 2017 who were already on or started on MRA. 73% were males and 27% females. Mean age was 67 years. 24.5% (n=54) stopped MRA after 12 months of which 35% (n=19) did not tolerate the drug due to side effects (including gynaecomastia and hypotension) and 65% (n=35) had to stop the drug due to a significant rise in creatinine and/or hyperkalaemia. Baseline (estimated glomerular filtration rate) eGFR was noted to be a predictor for stopping MRA after 12 months (p value 0.013) using multivariate logistic regression for confounders including age, gender and baseline potassium. Mean eGFR in patients stopping MRA was 58.7mls/min/1.73m2 and mean eGFR in patients who continued MRA was 70.5mls/min/1.73m2.
Conclusion: In this study we found that baseline eGFR is a predictor for stopping or continuing MRA after 12 months of follow-up. Age, gender and baseline potassium were not shown to be predictors in stopping or continuing MRA after 12 months.

P1650

Sacubitril valsartan, a multicentric experience

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Introduction: In the years following the publication of PARADIGM-HF trial in 2014, a growing evidence supports the safety and efficacy of sacubitril/valsartan in patients with HFrEF. The purpose of this study is to analyse the impact of sacubitril/valsartan on real world heart failure cohort.
Material and methods: We performed a prospective observational study with patients with HFrEF pick out in outpatient clinic, who started treatment with Sacubitril/Valsartan between January 2016-January 2018. We analysed their baseline characteristics and the functional class, renal function and drug tolerance in one year follow-up.
Results: 336 patients were included during the observed time period, with a mean age of 67,55 ± 10,93 years, being 24,5% female. The main basaline ejection fraction was 30,1 ± 6,8. The main cause of heart failure was ischemic heart disease (42,7%). Initially, the majority were in FC II-III (87%). In a review at 12 months follow-up, ARNI was at low doses in 23%, at medium doses 32% and the rest at high doses. Only a small proportion of patients (11%) have been down-titrated after achieving the maximal target dose of sacubitril/valsartan by sintomatic hipotension. Concerning analytical parameters, we did not find significant differences in renal function or in potassium levels during follow-up.
Conclusions: The treatment with sacubitril/valsartan in a group of patients in real-life was generally well tolerated with a significant decrease in blood pressure, being able to optimize the dose of sacubitril/valsartan. It was also related to improvement in the functional class without find significant differences in renal function during follow-up.

P1651

Reduction of NT-proBNP in patients with type 2 diabetes mellitus and heart failure with preserved ejection fraction in short-term treatment with empagliflozin on top of existing therapy

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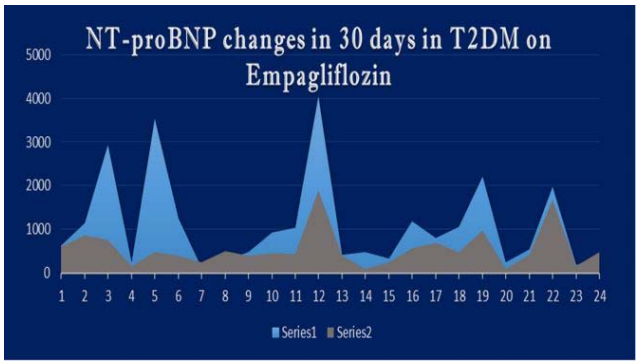
Objective: To investigate effect of SGLT-2 inhibitor on NT-pro-BNP levels, physical capacity and selected echocardiographic parameters in patients with type 2 diabetes (T2 DM) and heart failure with preserved ejection fraction (HFpEF)
Materials and Methods: Empagliflozin 10 mg/daily was administered to 24 T2DM and HFpEF patients (64.3±7.7) on top of pre-existing standard therapy. NT-proBNP, glomerular filtration rate (GFR), 6-minute test (6MWT), left atrial area (LAA), left ventricular ejection fraction (LVEF) and systolic blood pressure(SBP) were investigated on day 30.
Results: NT-proBNP decreased after 30 days of treatment with Empagliflozin added to standard patient therapy. 6MT, LVEF and LAA and SBP show a tendency for improvement and the GFR decreased insignificantly.

Changes in NT-proBNP, GFR, 6MWT, LAA, LV

	NT-pro BNP	GFR	6W	LAA	LVEF	SBP
Before	1104±1078*	76±13**	266±88**	23.9±5.9**	57.2±5.5**	135±15**
Day 30	565±439	73±12	311±123	22.6±4.7	60.8±5.9	132±13

*p=0.0039 **p>0.05



Changes in NT-proBNP in patients with T2

P1652

Effects of sacubitril/valsartan on real-world patients with heart failure due to non-ischemic cardiomyopathy

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BACKGROUND: Sacubitril/valsartan significantly reduced heart failure hospitalizations and mortality in the PARADIGM-HF-trial. However, little is known about the dosing, tolerability, efficacy and safety of sacubitril/valsartan in a non-clinical trial real-world population with non-ischemic cardiomyopathy.
METHODS: Between March 2017 and December 2018 , we retrospectively collected baseline and follow-up data of all consecutive patients with heart failure with reduced ejection fraction (HFrEF) due to non-ischemic etiology (non-ischemic cardiomyopathy) receiving therapy with sacubitril/valsartan. Doses of sacubitril/valsartan were optimized to individual tolerance. In addition to clinical and echocardiographic assessment, plasma N-terminal pro-B-type natriuretic peptide (NT-pro-BNP), serum creatinine and estimated glomerular filtration rate (eGFR) levels were measured and compared between baseline and 3-18 months after treatment.
RESULTS: A total of 129 patients (70% males) were identified. At baseline, median age was 65 years, median left ventricular ejection fraction (LVEF) was 30%, and all patients had symptoms of NYHA functional class ≥II. A total of 45% of patients received dose adjustment. They received a much lower dose of sacubitril/valsartan in comparison with those in the PARADIGM-HF (113 ± 60 vs. 375 ± 75 mg). Within 6 months of being transitioned into sacubitril/valsartan therapy, only 1.6% achieved maximal dose (400 mg/day), 18.6% achieved 200 mg/day, 59.7% achieved 100

mg/day, and 20.2% achieved 50mg/day. The main reason for not achieving maximal dose was because a decrease in blood pressure (49%). However, symptomatic hypotension leading to medication discontinuation only occurred in 5 patients (4%). Over a median(IQR) follow-up of 354 (135-453) days after initiation of sacubitril/valsartan, LVEF improved (31.0 ± 9 vs 42.6 ± 11%; P = .002) and NT pro-BNP levels decreased (15375 ± 4041 vs 10443 ± 3267 pg/ml; P < .001). However, a modest but significant decrease in eGFR (61.9 ± 35 vs 51.8 ± 33 ml/min/1.73m2; P < .001) was also observed.
CONCLUSION: Real-world patients with HFrEF due to non-ischemic cardiomyopathy exhibit significant cardiac function improvement following the initiation of sacubitril/valsartan. However, the optimal target dose of sacubitril/valsartan for Asian population, who are tend to be associated with lower body mass index, lower blood pressure and less tolerable doses of ACE-inhibitors/ARBs, should be observed in larger scale real-world clinical studies.

P1653

Effects of ivabradine on patients with depressed left ventricular ejection fraction after cardiac resynchronization therapy

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Introduction: Cardiac resynchronization therapy (CRT) and ivabradine therapy should be considered for appropriately selected heart failure (HF) patients with reduced ejection fraction after optimized medical therapy. However, ivabradine might increase atrial fibrillation (AF) burden and decrease the percentage of biventricular pacing in CRT recipients. We aimed to evaluate clinical effects of ivabradine on patients with left ventricular ejection fraction (LVEF) less than 40% after CRT implantation.
Methods: We consecutively examined 115 CRT recipients between 2014 and 2016. After exclusion of those with improvement of LVEF more than 40%; permanent AF; or concomitant sick sinus syndrome, 65 patients with LVEF less than 40% 6 months after CRT implantation and resting sinus rates greater than 70 beats per minute were studied. Eighteen patients received ivabradine treatment in addition to other guideline-recommended medical therapy, and 47 patients continued to receive standard treatment. Clinical endpoints and relevant CRT parameters were collected till December 2018.
Results: Baseline characteristics were not significantly different in the Ivabradine versus Control groups. During a mean follow-up period of 587 days, patients in Ivabradine group had significantly lower resting heart rate (71.7±11.2 vs. 78.7±10.5 bpm, p=0.021) and numerically higher LVEF improvement (+9.6±13.7% vs. +4.4±8.2%, p=0.064) than those in Control group. Two patients (11.1%) in Ivabradine group developed new-onset AF, requiring electrical and/or pharmacological cardioversion, whereas new-onset AF occurred in 5 patients (10.6%) in Control group (p=0.956). Biventricular pacing were 99.3±0.7% and 98.6±1.2% before and after the prescription of ivabradine (p=0.111). Mortality rates were numerically higher in the Control group than the Ivabradine group (22.2% vs. 5.6%, p=0.155).
Conclusion: In patients with prior CRT implantation and depressed LVEF, ivabradine therapy effectively reduced resting heart rate, and showed trends in improving LVEF and reducing mortality. Moreover, usage of ivabradine did not significantly affect biventricular pacing percentage in CRT recipients.

P1654

Benefits of early administration of ivabradine in stabilized patients hospitalized due to worsening heart failure: insights from the Optimize Heart Failure Care Program

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On behalf of: Optimize Heart Failure Care Program

Heart failure (HF) affects quality of life (QoL). High heart rate (HR) is an important prognostic factor and worsens further the QoL in patients with HF.
Aim: to assess the benefits of early administration of Ivabradine (Iv) on QoL in patients with HF.
Subjects and methods: Overall, 156 patients at a mean age 68 years, 69% males, were actively followed for 6 months. All patients were evaluated for their demographic data and etiology and by echocardiography at baseline before dehospitalization from the Clinic and lab tests including NTproBNP, quality of life measures, 6-minute walking test (6MWT), NYHA class, and clinical examination at follow-up visits were done.
Results: Iv was administered in 18.4% of all patients, 27% of the patients in sinus rhythm. The administration of Iv improved all measures of QoL (Table1). The distance covered at 6MWT increased more with 53.9 m in Iv group.
Conclusions: The early administration of HR reducing therapy including Iv improve the QoL in all dimensions.

Table 1.

	Ivabradine +	Ivabradine -	P
EF %	+3.4	-0.89	NS
% NYHA IIafter 6 mo	77	44	0.023
KCCQ units	+21.65	+15.7	NS
VAS %	+15	+12	NS
EQ5 units	+0.13	+0.14	NS

P1655

Series of patients treated with sacubitril-valsartan in a cardiology day clinic: efficacy and safety after 6 months of follow-up

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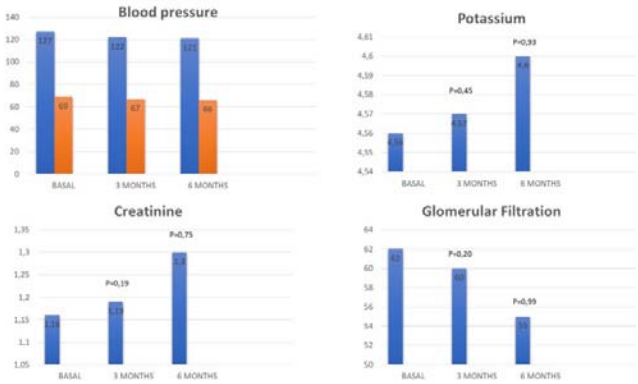
Introduction Sacubitril-valsartan (ARNI) has demonstrated to improve functional class (FC) by NYHA in patients (pts) with heart failure (HF) compared to ACEI with no higher complications rate. Our objective is to describe FC and real-life complications in pts treated with ARNI .Methods We analyzed 63 pts, we evaluated FC by NYHA and complications (hypotension, impaired renal function and hyperkalemia) 3 and 6 months after ARNI. HF decompensations and drug withdrawals were evaluated after 6 months. Results:ARNI improves FC by NYHA at 3 and 6 months. There is no hypotension, impaired renal function or significant hyperkalemia at 3 and 6 months. 31.7% had history of HF in the 12 months before ARNI. At 6 months there were only 5 HF, 2 with severe anemia as a trigger, 3 required admission and 2 were resolved on an outpatient basis. 2 drug withdrawals due to symptomatic hypotension and impaired renal function (Cr> 2.5 mg / dl) Conclusions:ARNI improves FC by NYHA without significant complications.There were a very small number of decompensations and drug withdrawals at 6 months.

Baseline characteristics and treatment	
MALES	51(81%)
AGE	70.52 (35–88)
HYPERTENSION	45 (71.4%)
DIABETES	32 (50.8%)
EF	30% (18-39)
Atrial Fibrilation	23 (36.5%)
Ischemic C.	34(54%)
DEVICES	
DAI	20 (31.7%)
CRT	5 (7.9%)
DAI-CRT	21 (33.3%)
TREATMENT	
BETABLOCKERS	60 (95.2%)
ACEI	46 (73%)
ARA-II	15 (23.8%)
MRA	40 (63.5%)
DIURETICS	43 (68.3%)
IVABRADINE	9 (14.3%)
DIGOXINE	5 (7.9%)



P1656

Effects of empagliflozin on exercise capacity and LV diastolic function in HFpEF and type-2 diabetes mellitus: rationale and design of prospective intervention study

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Funding Acknowledgements: Ministry of Health of the Russian Federation

Background: To date, no specific treatment has been shown to improve outcomes in heart failure with preserved left ventricular ejection fraction (HFpEF). Type-2 diabetes mellitus (T2DM) has been identified as a major cause of HFpEF. EMPA-REG OUTCOME trial showed that empagliflozin is associated with reduction in heart failure death and hospitalization, making empagliflozin a new promising agent that could potentially improve outcomes in patients with HFpEF.
Purpose: to assess whether sodium glucose cotransporter 2 (SGLT2) inhibitor empagliflozin improves exercise capacity and left ventricular diastolic function in patients with HFpEF and T2DM.
Methods/Design: A total of 100 patients with stable HFpEF, NYHA functional class II-III and T2DM will be randomly allocated either to empagliflozin (10 mg o.d.; n=50) or control (n=50) group. In both groups patients will be receiving standard treatment for HF and T2DM. Echocardiography at rest and during exercise (diastolic stress-test, DST), 6-minute walk test (6MWT), Minnesota Living with Heart Failure Questionnaire (MLHFQ) score assessment, complete blood count, urinalysis, and biomarker blood tests (N-terminal pro b-type natriuretic peptide, endothelin 1, growth/differentiation factor 15, soluble ST2, galectin-3, interleukin-6, high-sensitivity C-reactive protein, carboxyterminal propeptide of type I collagen, pentraxin 3) will be performed at baseline and 24 weeks after randomization. DST will be performed as a supine bicycle test at 60 rpm starting at a 3-min period of low-level 25-W workload followed by 25-W increments every 3-min to maximum tolerated levels. During DST, mitral inflow velocities, mitral annulus tissue Doppler velocities, and peak tricuspid regurgitation velocity by continuous wave Doppler will be analyzed at baseline, during each stage including peak exercise and in recovery. Outcome measures: Timeframe for all outcome measures is 24 weeks. The primary outcome measure is change from baseline in 6-minute walk distance (6MWD). Secondary outcome measures include change from baseline in DST exercise time, NYHA functional class, MLHFQ score, pulmonary capillary wedge pressure and pulmonary artery systolic pressure (assessed by echocardiography) both at rest and during DST, LV mass index, LA volume index, LA stiffness (assessed as a ratio of mitral E/e′ ratio to LA strains), and biomarker blood levels.

P1657

Acute Effect of Sacubitril/Valsartan on Depression Score in patients with Acute Decompansed Heart Failure on the First Day of Theraphy:A Prospective Analysis from Our Center Experiences

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Background: Angiotensin receptor neprilysin inhibitor(ARNi)enhances beneficial natriuretic peptides by inhibiting their break down through neprilysin. Although the first-in-class ARNi sacubitril/valsartan (LCZ696)reduced mortality and morbidity in heart failure(HF)with reduced ejection fraction(EF) compared to angiotensin-converting enzyme inhibitor(ACEi), psychiatric desirable effects of sacubitril/valsartan in acute decompensated heart failure are unknown such as depression.
Purpose: The aim of our study is to investigate the effect of valsartan-sacubitril on depression in acute decompensated heart failure.
Methods: We characterized patients by whether they received the mid-dose (49/51 mg sacubitril/valsartan twice dose and optimal medical therapy or 5 mg ramipril once dose and optimal medical therapy).70 patients with acute decompensated heart failure in patients with reduced ejection fraction had repeated assessments with the hospital depression scale in the first 24 hours. The difference between the two groups was compared.
Results: The depression score reduction was significantly greater in the sacubitril–valsartan group than in the ramipril group. Changes of before and after valsartan-sacubitril treatment in depression score of patients was showed significantly (before value: 23.43 ± 8.527; after value: 21.34 ± 7.74, p < 0.001).There was no change in ramipril group(before value:22.45±7.75;after value:22.01±6.67, p=0.78)(Table 1).
Conclusions: Depression increased mortality and hospitalization in patients with acute decompensated heart failure. Our trial is an essential trial because of ARNi improve depression score in patients with acute decompensated heart failure in the early term. We think that ARNi may be more effective on depression in long-term.

Variation of Depression Score

	Before	After	Mean	Standard Deviation	Confidence Interval	p value
Valsartan Sacubitril	23.43±8.527	21.34±7.74	2.086	2.769	1.034≈3.037	0.000086
Ramipril	22.45±7.75	22.01±6.67	0.877	1.235	2.661±4.045	0.78

P1658

Titration process and predictors of achieving target dose of sacubitril/valsartan in patients with chronic heart failure and reduced ejection fraction attending to an outpatient heart failure clinic.

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Background Data from recent clinical trials indicate that sacubitril/valsartan can be successfully initiated and uptitrated to the maximum target dose in most patients with stable chronic heart failure. However, there is relatively little information about the titration process in real-world heart failure patients.
Purpose To assess the characteristics and clinical outcome of unselected patients with stable chronic heart failure during the titration period of sacubitril/valsartan and to identify predictors of achieving maximum target dose.
Methods We collected data from 64 consecutive patients attending to our outpatient heart failure clinic who started sacubitril/valsartan between May 2018 and November 2018. Patients were uptitrated based on the attending physician judgment with the goal of achieving sacubitril/valsartan 200 mg twice daily. Variables were collected baseline and at the end of the titration period.
Results At baseline, mean age was 63±10 and 76,6% men. Mean LVEF 28±6%. 39% had ischemic etiology. Mean NYHA class 2,3±0,4. Median NT-proBNP level 1176 pg/ml (IQR 364-3945), mean glomerular filtration rate (GFR CKD-EPI) 71,7±20,6 mL/min, serum potassium 4,4±0,4 mEq/L. 84% of patients received ACE inhibitors (median enalapril equivalent dose 7,5 mg/day, IQR 5-13.7) or angiotensin receptor blockers (median equivalent valsartan dose 80 mg/day, IQR 60-160). 95% received beta-blockers and 86% mineralocorticoid receptor antagonists (MRA). The median time between starting medication and the end of the titration (titration period) was 6,5 weeks (IQR 3-13,2). 10 patients (15.6%) discontinued therapy due to adverse events. Among patients tolerating therapy, 23 (42,6%) achieved the maximum target dose. At the end of the titration period 18 patients (33,3%) improved at least one stage in NYHA class. A reduction in furosemide equivalent dose (52,3±39,2 mg vs 45,5±41,4 mg, p=0.005) was observed. Before starting sacubitril/valsartan, lower systolic blood pressure (SBP), lower GFR CKD-EPI and previous treatment with MRA were associated with not achieving maximum target dose (all p<0.05). In a multivariate analysis adjusted by age, GFR CKD-EPI, SBP, kalaemia and previous treatment with MRA, a lower GFR CKD-EPI before starting titration (OR 0,95 95% CI 0,91-0,99 p=0.01) and previous treatment with MRA (OR 16,4 95% CI 1,6-164 p=0.01) were independently associated with not achieving maximum target dose.
Conclusions In this cohort of unselected patients with stable chronic heart failure, the proportion who achieved maximum target dose of sacubitril/valsartan was lower than the reported in controlled clinical trials, despite a longer titration time. However, clinical benefit was observed at the end of the titration period. The difficulty to achieve maximum doses in patients treated with MRA could suggest a subgroup

with a higher degree of neurohormonal blockade, needing a more careful adjustment of concomitant treatment, mainly diuretics and vasodilators.

P1659

Nitrates in female patients with diabetes mellitus and without diabetes mellitus in reduced ejection fraction heart failure

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Back Ground: Although sex-specific differences in cardiovascular medicine are well known, the exact influences of sex on the effect of cardiovascular drugs remain unclear. Women and men differ in body composition and physiology and pharmacodynamics, so that is not rare that they may respond differently to cardiovascular drugs. Patients may also have multiple comorbidities at the same time. Clinical guidelines for the management of type 2 diabetes (DMII) recommend individual therapy. If treatment is individualized for every patients the prognosis could be better in patients with multiple comorbidities. Organic nitrates remain among the oldest and most commonly employed drugs in cardiology. This study aims to evaluate the effects of oral nitrates on all-cause mortality in reduced ejection fraction heart failure (HFrEF) patients according to their genders and the presence or the absence of DM using GDMT.
Method: 399 male patients and 231 female patients with HFreF were recruited into the study. There was no age differences between the groups, the male patients' ejection fraction was lower than the female patients' EF. Almost 40% of the males and the females had DM. There was no difference for the treatment of oral nitrates between the female group and the male group (Table 1). 66 patients (44%) who had DM were on the nitrates in the male group, 33 patients (33%) who had DM were on the nitrates in the female group, p=Not significant (NS).
Results: 207 male patients (52 %) and 106 female patients (46%) of the cohort died during a median follow-up duration of 54 months, p=NS. While 24 of female patients (62%) without DM who were on the oral nitrate treatment died, 36 of female patients (39%) without DM who weren't on the oral nitrate treatment died p=0.016 during follow-up. There was no statistical difference for all-cause mortality between the females with the oral nitrate treatment and the females without the oral nitrate treatment in patients with DM. We did not determine any difference among the males with or without DM who were on the nitrate or were not on the nitrate in the patients with HFreF in this study.
Conclusion: We determined that there was more all-cause mortality in the female patients without DM who was on the nitrate treatment in the study.

Table 1. General characteristics of pat

	Male (n=399)	Female (n=231)	p
Age (years)	66± 11	66± 13	NS
Ejection fraction (%)	24 ± 9	27± 10	0.001
Diabetes	151 (38%)	99 (43%)	NS
Nitrate treatment	72 (31%)	154 (39%)	NS

P1660

Microcirculation changes in combination therapy in patients with heart failure with preserved ejection fraction.

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Introduction Nowadays, heart failure (HF) with preserved ejection fraction (EF) (HFpEF) is an increasing public health problem and accounts for almost 50% of the total number of patients with HF.
Considering diversity of factors affecting the development of HFpEF, the main of which are age and arterial hypertension (AH), and the heterogeneity of the pathophysiology, it is necessary to consider the role of the combined treatment of this syndrome to prevent further microcirculation rarefication.
Aim: To assess the effect of triple combination therapy on vascular reactivity and microcirculation changes in patients with HFpEF.
Methods: The study includes 26 patients (3 males and 23 females), aged from 55 to 81 yrs (mean age 65,1±7,6 yrs), with preliminarily diagnosed HFpEF in previous hospitalizations during 2017 using ESC criteria for diagnosing chronic HF. All patients suffered from AH and class I-III obesity, in some patients had diabetes melitus, the level of NT-proBNP ranged from 192 to 276 pg/ml in the group. The echocardiography showed the EF 61±2,5% and the ratio of early left ventricular diastolic filling and diastolic mitral annulus velocity ($E/^{'}$) 14,2±2,0 in the group.
Patients were examined before and 3 months after administration a triple combination of drugs, including perindopril 10 mg, indapamide 2,5 mg and amlodipine 5 mg.
The peripheral hemodynamics and vascular reactivity was estimated using a photoplethysmographic method on a PulseTrace device with determination of vascular stiffness index (SI) and pulse wave reflection index (RI). Oscillometry was perfomed to evaluate systemic vascular resistance (SVR), specific peripheral resistance (SPR), reflecting the condition of the arterioles, and brachial artery compliance.
Results: The data obtained during therapy shows a significant decrease in SVR from 2667 ± 356 dyn*cm-5 to 2195 ± 247 dyn*cm-5 (p <0,001) and in SPR from 33,2 ± 5,05 dyn/sec/cm-5 to 27,9 ± 3,03 dyn/sec/cm-5 (p <0,001).
In assessing the stiffness of the muscular arteries, there was a decrease in RI from 71,6 ± 5,05% to 58 ± 11,1% (p <0,001), and a significant decrease in SI from 11 ± 0,46 m/sec to 7,6 ± 1,5 m/sec (p <0,001), indicating a decrease in the vascular tone of the major branches of the aorta.
At the same time, the brachial artery compliance increased from 1,025 ± 0,25*106/mmHg to 1,243 ± 0,35*106/mmHg (p <0,001).
Conclusions: Preliminary data suggest a positive effect of triple combination therapy on the vascular system, with a predominant influence on its microcirculatory section.

P1661

Effects of perindopril on levels of endothelial dysfunction biomarkers in chronic heart failure patients with mid-range ejection fraction after 12-month therapy

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Background. The pathogenesis and progression of chronic heart failure is associated with endothelial dysfunction and severe cardiovascular remodeling. Thus, correction of these important processes may improve the course of the disease and long-term outcomes.
Purpose. To evaluate effects of perindopril A long-term therapy on endothelial dysfunction biomarkers in patients with chronic heart failure with mid-range ejection fraction (HFmrEF).
Methods. Thirty patients with HFmrEF of II-III functional class (NYHA) were enrolled in the study (men/women = 20/10; average age 65 (61;72) years old; duration of HF – 6 (3; 9) years; average body mass index 27.7 (25.3;30.8) kg/sqm) of ischemic etiology (coronary artery disease duration – 10 (5; 17) years; myocardial infarction - 20 patients (64%)). HFmrEF was verified by transthoracic echocardiography (average EF 46% (44; 49); average NT-proBNP levels 215 (135;256) pg/ml). The cohort was represented by patients with II NYHA class (n=18, 60%) and III NYHA class (n=12, 40%). All patients underwent specific laboratory testing by ELISA for identification of biomarkers of endothelial dysfunction and vessel remodeling (metalloproteinase-9 (MMP-9), tissue inhibitor of metalloproteinase 1 (TIMP-1), E-selectin, endothelin-1 (ET-1), transforming growth factor β1 (TGF-β1), vessel endothelial growth factor A (VEGF A)) before and after 12-month treatment with perindopril A 10 mg/d.
Results. After 12-month treatment of HFmrEF patients with perindopril A in the maximum tolerated dose of 5 mg/day (n=19) and 10 mg/day (n=11) a significant decrease of MMP-9 level was observed: from 209.5 ng/ml (145.75;266.75) to 157 ng/ml (116.5;221.75) (p<0.05), N up to 134 ng/ml; while the level of TIMP-1 did not significantly change. A significant decrease also was noted in the level of E-selectin from 42.7 ng/ml (30.2;62.88) to 35.7 ng/ml (24.1;47.95) (p<0.05), N 21-186 ng/ml; as well as the level of growth factors: VEGF-A from 156 ng/ml (9.05;271,7) to 34,85 ng/ml (8.05;142.28) (p<0.05), N up to 128 ng/ml, TGF- β1 from 24665 pg/ml (5136.5;5300.25) to 14637 pg/ml (5300.25; 29354) (p<0.05), N 5222-13731 pg/ml. The level of ET-1 decreased from 0.845 ng/ml (0.43;1.45) to 0.735 ng/ml (0.4125;1.3775), (p <0.05), N less than 0.26 ng/ml. The change in the level of these indicators was associated with a significant increase in the left ventricular EF from 46% (44;49) to 49.5% (48;54) (p <0.05).
Conclusion. 12-month therapy with perindopril A 5-10 mg/day was associated with significant decrease of the analyzed biomarkers, thus improving endothelial function, vessel remodeling and myocardial contractility in HFmrEF patients.

P1662

Sacubitril/valsartan in chronic symptomatic heart failure: a real world experience of delivery and outcomes.

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Introduction: The PARADIGM-HF trial demonstrated a reduction in cardiovascular mortality and heart failure hospitalisation with sacubitril/valsartan compared to standard therapy in patients with chronic heart failure with reduced ejection fraction. Sacubitril/valsartan is recommended by NICE in patients with left ventricular ejection fraction ≤35% and NYHA class II-IV symptoms who are established on ACE-inhibitors (ACE-I) or angiotensin II receptor blockers (ARB).
Purpose: We report our clinical experience of sacubitril/valsartan use in a real world heart failure cohort.
Methods: Eligible patients were identified from our electronic database and initiated on low dose sacubitril/valsartan. Patients were reviewed and uptitrated at 4 weekly intervals until the maximum tolerated dose was achieved. Data on New York Heart Association (NYHA) class, maximum tolerated dose, heart failure hospitalisation, mortality and discontinuation rates were collected and analysed on all patients who started sacubitril/valsartan between June 2016 and January 2018.
Results: A total of 86 patients (mean age 65.3 ± 11.4 years) were commenced on sacubitril/valsartan. The mean length of follow-up was 11.4 months at the time of data collection. All patients were receiving stable doses of ACE-I or ARB prior to initiating sacubitril/valsartan with 94% and 85% established on beta-blockers and mineralocorticoid receptor antagonists respectively. 4 patients (4.7%) were admitted to hospital with decompensated heart failure and 4 patients (4.7%) died during the follow-up period of which 2 deaths occurred due to progressive heart failure, 1 due to myocardial infarction and 1 non-cardiovascular related death. 19 patients (22.1%) discontinued sacubitril/valsartan due to adverse side effects during the follow-up period. Reasons for discontinuation of therapy included symptomatic hypotension (n=5), deterioration in renal function (n=5), hyperkalaemia (n=3), gastrointestinal disturbance (n=3), rash (n=2) and cough (n=1). Of those who tolerated therapy 22 patients (32.8%) achieved and maintained titration to the maximum dose of 97/103mg twice daily whereas 24 patients (35.8%) tolerated the lowest dose of 24/26mg twice daily. 18 patients (26.9%) had an improvement in NYHA class compared to 1 patient (1.5%) who had a deterioration in NYHA class. 19 patients (28.4%) had a reduction in loop diuretic dose compared with 2 patients (3%) requiring higher loop diuretic dose.
Conclusions: These results support the efficacy of sacubitril/valsartan in a well-treated real world heart failure cohort. A large proportion of patients did not achieve the maximum dose mainly because of symptomatic hypotension, deteriorating renal function and hyperkalaemia. This highlights the requirement for close monitoring of symptoms and renal function when initiating therapy and with dose titration. This can be achieved through a nurse-led heart failure clinic.

P1663

Outpatient inotrope administration in advanced heart failure patients: a single centre experience.

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Background: Inotropic agents are used in the treatment of advanced heart failure patients. Inotrope dependency is one of the indications for cardiac transplantation. Inotropes may have side effects, including arrhythmia and hypotension, so their use is mostly restricted to specialist units. Transplant candidate patients often have prolonged coronary care unit (CCU) admissions receiving inotropes. Opportunities for outpatient leave may provide psychological support for long-term inpatients.
Aim: We assessed the feasibility and safety of outpatient administration of inotropes in patients in a cardiac transplant centre.
Methods: A retrospective analysis of advanced heart failure patient records from 2010 – 2018 was conducted. Data was obtained on the type and dose of inotrope and diuretics used, venous access, right heart catheterisation (RHC) results, history of implantable cardiac defibrillator (ICD), renal function, blood pressure, heart rate, duration of outpatient leave, time from admission until first outpatient leave, time from admission until transplant or left ventricular assist device (LVAD), patient's county of residence and complications during outpatient leave.
Results: 5 patients received outpatient inotropes. 3 patients received milirone, 1 patient received dobutamine. 1 patient received both milirone and dobutamine at different stages during their admission. All patients had PICC line central venous access with pump devices for drug administration. All patients had an ICD. Mean time until first outpatient leave from admission was 66 days (17-150). Mean time on inotropes to transplant or LVAD was 418 days (375-489). Mean blood pressure was 100/60 mmHg (90-122 / 56–79). Mean heart rate was 78 bpm (64–90). Mean cardiac output was 4.2L/min (3.6-4.7). Mean pulmonary capillary wedge pressure was 12mmHg (7-24). 2 patients received outpatient inotropes while on full weekend leave. 2 patients were administered inotropes during day leave. 1 patient was discharged home on dobutamine as part of a palliative care process. 3 patients lived in Dublin.
No changes to inotrope or diuretic therapy were made within one week of outpatient leave. No changes to therapy were made following the most recent RHC prior to outpatient leave. A planned dobutamine weaning process had been started in the palliative care patient prior to discharge. One patient had an unscheduled return to CCU for a PICC line occlusion. All 4 transplant candidate patients had anticipated leave postponed for clinical reasons. One patient had documented non-sustained ventricular tachycardia in the week prior to leave. No ICD therapies were documented during the outpatient periods. Improvement in mood was documented following a leave period in all returning patients.
Conclusions: Outpatient inotrope administration can be safely provided to selected patients, in diverse settings, including as bridge to transplant or as part of an end-stage palliative process.

P1664

Atrial fibrillation in Dutch chronic heart failure with reduced ejection fraction patients: the CHECK-HF registry

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On behalf of: CHECK-HF investigators
Funding Acknowledgements: Servier, the Netherlands, funded data inclusion and software programme. Analysis was conducted, interpreted, and reported independently of the sponsor

Background/introduction: Atrial fibrillation (AF) is a common finding in chronic heart failure (HF) patients, associated with an increased risk of mortality and thromboembolic events. The ESC provides guidelines for both AF and HF, however information on the adherence to these guidelines in patients with both AF and HF is scarce.
Purpose: Evaluation of current HF therapy and adherence to the ESC HF Guidelines in patients with and without AF in the Netherlands.
Methods: The current analysis is part of a cross-sectional registry of 10,910 chronic HF patients at 34 Dutch outpatient clinics in the period of 2013 until 2016 (CHECK-HF). Demographic parameters, laboratory and echocardiographic values as well as medication use (type, dosage and frequency and total daily dose) were recorded.

Table 1. AF and HF therapy in HFrEF

	Unadjusted analysis	Age and gender adjusted analysis (OR [95% CI])	Multivariate analysis (OR [95% CI])*			
Pharmaco-therapy (n=8,120)	With AF	Without AF	p-value			
	Beta-blocker,%	81.7	79.7	0.04	1.26 [1.11-1.44]	1.33 [1.16-1.52]
	RAS-inhibitors, %	76.1	83.1	<0.01	0.79 [0.70-0.90]	0.87 [0.77-0.99]
	MRA, %	57.1	51.7	<0.01	1.33 [1.20-1.48]	1.37 [1.23-1.53]
	Diuretics, %	89.7	80.6	<0.01	1.72 [1.47-2.01]	1.65 [1.40-1.95]
Device therapy (n=6,591)						
	ICD	15.4	35.7	<0.01	0.40 [0.34-0.46]	0.42 [0.36-0.49]
	CRT	7.3	20.2	<0.01	0.32 [0.26-0.39]	0.31 [0.26-0.39]
	Pacemaker	8.5	8.3	0.77	0.69 [0.56-0.85]	0.60 [0.49-0.75]

* Adjusted for age, gender, NYHA classification, LVEF, HR>70, hypertension, diabetes and renal insufficiency

Results: We studied 8,253 patients with HF with reduced ejection fraction (HFrEF), of which 2,109 (25.6%) had AF. Patients with AF were significantly older (76.8±9.2 vs. 70.7±12.2 years, p<0.01), were more often in NYHA III/IV (33.4% vs. 25.2% resp., p<0.01), and had more hypertension (44.3% vs. 38.3, p<0.01), diabetes (31.0% vs. 28.4%, p<0.01) and renal insufficiency (63.3% vs. 53.8%, p<0.01) compared to HFrEF patients without AF.HF medication use is presented in Table 1. HFrEF patients with AF receive more often beta-blockers, MRA and diuretics, and less often RAS-inhibitor. We observed a lower percentage of ICD, CRT and pacemaker in patients with AF.
Conclusion: In this large registry, we observed a lower prescription of RAS-inhibitors, and implantation of ICD, CRT and pacemaker, but a higher prescription of beta-blocker, MRA and diuretics in HFrEF patients with AF, compared to those without AF.

P1665
Reduced diuretic requirements in HFreF patients taking Entresto (ARNI)

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Background: Post hoc analysis of PARADIGM-HF has shown treatment with Entresto was associated with greater diuretic dose reductions compared to Enalapril.
Purpose:To examine clinical & medication changes in HFrEF patients following treatment with ARNI.
Methods: Employing a One-Group Pre-Test Post-Test Design, data was collected on 90 HFrEF patients (74 male: 16 female) prior to initiating ARNI therapy & 12 months post achieving maximum tolerated dose. Indices of cardiac function were recorded (LVEF, LVIDd), biochemical measures (NTproBNP, potassium and creatinine), while medications were recorded & functional capacity was assessed using NYHA Classification. Paired sample t-test was completed to assess for significant changes.
Results: Dose reductions of both loop and thiazide diuretics- mean dose reduction for each diuretic drug (see figure 1). A statistically significant increase in LVEF of 7.9% (p0.00) and reduction in LVIDd of 0.4cm (p0.04) over the 12-month period. Also, a significant reduction in NYHA Classification (p 0.00) and NTproBNP levels (p0.01), with systolic BP reducing by mean 3.9 mmHg (p0.04). Serum Creatinine levels increased (p0.03), however there was no significant change in EGFR or serum potassium over time (see table 1).
Conclusion(s):Diuretics are frequently used in HFrEF patients but are associated with electrolyte abnormalities and renal dysfunction. In this small investigation, treatment with ARNI was associated with more loop & thiazide diuretic dose reductions. This data suggests that treatment with ARNI results in reduced diuretic requirement. Additionally, a modest increase in LVEF with reduced LVIDd as measured by echo and a reduction in NYHA Classification was revealed.

Table 1

	pre	post	p
LVEF	25.9 ± 6.2	33.9 ± 9.5	0.00*
LVIDd	6.1 ± 1.3	5.7 ± 1.3	0.04*
NTproBNP	2252 ± 3486	1560 ± 1773	0.01*
NYHA Class (mean)	2.3	1.9	0.00*
Systolic BP mmHg	122.9 ± 17.8	119 ± 15.4	0.04*
Diastolic BP mmHg	72.1 ± 9.3	70.6 ± 8.7	0.21
Heart rate (bpm)	70.5 ± 10.4	70.9 ± 9.1	0.75
Weight (kg)	88.5 ± 23.9	88.9 ± 24.5	0.61
Serum Creatinine	105.5 ± 31.9	112.4 ± 36.1	0.03*
MDRD eGFR	76.1 ± 91.9	62.3 ± 25.1	0.12
Serum Potassium	4 ± 0.3	4.1 ± 0.4	0.15

Table 1

Figure 1.

Figure 1

P1666
Sacubitril/Valsartan in real world heart failure proctice in Asia

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Funding Acknowledgements: Chang Gung Medical Foundation

Background: Sacubitril/valsartan was recommended by major guidelines as the frontline therapy for heart failure with reduced ejection fraction (HFrEF) since its clinical benefit was proved by the PARADIGM-HF trial. However, little is known about its safety and effectiveness in real-world practice, often with sicker and more fragile patients. In addition, east Asia population is underrepresented in PARADIGM-HF trial.
Methods: We performed a retrospective analysis of patients received sacubitril/valsartan in Chang Gung Resaerch database (CGRD). CGRD is a de-identified database derived from original medical records of our Memorial Hospital, which include three medical institutes located in northern Taiwan. Patients received a prescription of a least 30 days of sacubitril/valsartan were enrolled. The date of first prescription was defined as the index date, and a period of 12 months preceding the index date was defined as the baseline period.
Results: A total of 440 patients were identified (age 61.58±15.07, male 78%, LVEF 31.32±9.66%). Comparing to PARADIGM-HF trial, our patients had higher baseline serum creatinine (mean 1.52 mg/dl) and BNP (mean 956.9 pg/ml) level. In addition, 75.9% of the patients had been hospitalized for heart failure during the baseline period. After a mean duration of 234 days, overall readmission rate was 21.1% and mortality rate was 2.93%. LVEF significantly improved from baseline to 6 months (31.32 vs. 38.46 p<0.001). After 1:1 propensity score matching to patients treated with ACEi/ARB, sacubitril/valsartan significantly reduce mortality (4.78% vs. 11.5%, p=0.02). 139 patients (31.7%) had moderate to severe chronic kidney disease (CKD) (eGFR< 60ml/min/1.73m2). Patient had stage 3 CKD (eGFR 30-59) had similar all cause readmission and death rate to patient with normal to mild CKD. However, patients with stage 4 to 5 CKD (eGFR<30) had higher all cause readmission rate than mortality. In addition, patients who received daily dose over 200mg had lower mortality rate.
Conclusion: Sacubitril/valsartan improved LV systolic function in 6 months. Real-world sicker patient also demonstrates survival benefit of Sacubitril/valsartan. The efficacy was comparable between patients with stage 3 CKD to those with normal to mild CKD. However, its safety and efficacy in stage 4 to 5 CKD warrant further investigation.

P1667
Reduction of loop diuretic requirements in HFrEF patients treated with Sacubitril/Valsartan

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Introduction: The requirement and dose of loop diuretics is a functional and useful marker in HFrEF symptom control. Sacubitril/Valsartan (SV) decreases mortality in HFrEF patients. In addition, it exists certain evidence supporting that SV improves the functional situation and diminishes the need for loop diuretics in these patients; however, there was no difference in the mean daily dose of furosemide in the PARADIGM-HF trial.
Purpose: To analyze the percentage of change in loop diuretic doses three months after having reached the maximum tolerated dose of SV in a real-life population.
Methods: Retrospective multicenter study of HFrEF outpatients (NYHA≥II and LVEF<40%) with optimized medical/devices treatment starting on SV initiation. Data was recorded at baseline and three months after having reached the maximum tolerated SV dose (three SV dose categories were defined: low <150 mg/24h, medium 150-200 mg/24h and high ≥300 mg/24h). Admissions, diuretic dose adjustments and pre-renal events were recorded during follow-up.
Results: The study population was made up of 260 patients: 75% men, 69±10 years and NYHA class II: N=120 (44%); II-III: N=95 (35%); III: N=58 (21%). Main comorbidities were: hypertension (64.5%), diabetes (35%), ischemic cardiomyopathy (IC) (49.4%) and severe myocardial infarction (13.5%). Most frequent baseline medications were: BB (89%), MRA (76%) and ACEI/ARB (86.7%). The number of patients that reached the different SV dose categories were: low: N=65 (25%), medium: N=100 (38.46%) and high: N=95 (36.53%). Final SV doses were higher in men (p=0.003), IC (p=0.02), use of BB (p=0.03) and previous intake of ACEI/ARB (p=0.006). Most common adverse events were: HF hospitalization (13%), non-HF

hospitalization (9%), diuretic adjustment (27%) and pre-renal events (12.5%). At the end of the monitoring, a reduction in loop diuretic doses was observed in 32% (N=84; p<0.0001) of patients treated with furosemide; whereas, no change was observed in patients treated with torasemide (N=11; non-significant). An increase in loop diuretic doses was observed in 7% of the patients (N=18); the rest of the population did not experience any change. Furosemide withdrawal was achieved by 16.5% (N=43) of the population. Patients receiving higher doses of SV were more likely to reduce diuretic dose when compared to the low-dose group (p=0.012). Furthermore, these findings were associated with an improvement in NYHA class.
Conclusions: This study shows that the use of SV is associated with a clinically-relevant loop diuretic dose reduction (exceeding 30%) in a short period of time; in addition, it shows that this reduction occurs more frequently in patients who tolerate higher doses of SV. The reduction of the daily needs for loop diuretics is an objective parameter that allows clinicians to corroborate the benefit in the functional situation of a patient treated with SV.

P1669

Recovery of left ventricular dysfunction after Sacubitril/valsartan: predictors and managements

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Introduction: Current heart failure (HF) guidelines give class I, level of evidence B recommendation to replace renin-angiotensin system (RAS) blockers with sacubitril/valsartan in patients with chronic symptomatic HF with reduced ejection fraction (HFrEF) despite optimal treatment. However, data regarding recovery of left ventricular function after sacubitril/valsartan treatment and how to manage these patients remained sparse.
Methods: We consecutively enrolled 432 HFrEF patients treated with sacubitril/valsartan between January and December 2017. All patients underwent routine echocardiographic measurement. Baseline characteristics were collected and compared between patients with had recovery of LVEF ≥ 50% (HFrecEF) and patients without recovery of LVEF. Among patients with HFrecEF, serial echocardiographic studies and clinical outcomes were compared between patients with different treatment strategies (Maintenance and Taper Group).
Results: During treatment period, 68 (15.7%) patients had LVEF ≥ 50%. After multivariate analysis, recovery of left ventricular dysfunction after sacubitril/valsartan treatment was associated with non-ischemic etiology of HF (odds ratio 3.05; 95% CI 1.63 to 5.70; p<0.001), smaller baseline left ventricular end-diastolic diameter (odds ratio 0.92 per decrease of 1 mm; 95% CI 0.89 to 0.95; p<0.001) and initial daily dosage of sacubitril/valsartan ≥ 100mg (odds ratio 2.70; 95% CI 1.30 to 5.62; p=0.008). Among these 68 HFrecEF patients, 42 patients continued to receive the same dosage of sacubitril/valsartan, whereas 26 patients received either tapering dose of sacubitril/valsartan or switched from sacubitril/valsartan to RAS blockers. Follow-up echocardiography showed that patients in the Maintenance Group had higher LVEF and less likely to have deterioration of LVEF than those in the Taper Group (LVEF 55.4±6.3% vs. 47.3±13.6%, p=0.007; ΔLVEF 0.5±5.8% vs. -5.9±11.4%, p=0.013). Unplanned hospitalization for HF tends to occur in the Taper group than the Maintenance group (15.4% vs. 2.4%, p=0.067).
Conclusion: Non-ischemic etiology of HF, smaller baseline left ventricular end-diastolic diameter and higher initial dosage of sacubitril/valsartan could predict a better recovery of left ventricular dysfunction. In HFrecEF patients, decreasing dosage of sacubitril/valsartan or switching from sacubitril/valsartan to RAS blockers were associated with re-deterioration of heart function.

P1671

Safety, tolerability and discontinuation causes of sacubitril/valsartan treatment in patients with heart failure and reduced ejection fraction attending to an outpatient heart failure clinic.

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Background Data from controlled clinical trials indicate that sacubitril/valsartan is an effective treatment for heart failure with reduced ejection fraction (HFrEF) with an acceptable safety and tolerability profile. However, more information is needed in real world HFrEF patients.
Purpose To describe the clinical characteristics, the safety and tolerability profile, and the discontinuation causes of the sacubitril/valsartan treatment in patients with HFrEF followed in an outpatient heart failure clinic.
Methods We collected data from 119 consecutive patients attending to our heart failure outpatient clinic between May 2018 and November 2018. 64 (53,8%) were treated with sacubitril/valsartan. Patients were uptitrated with the goal of achieving sacubitril/valsartan 200 mg twice daily. Clinical and neurohormonal variables including those related with adverse effects and discontinuation were collected baseline and at the end of the titration period.
Results At baseline, mean age was 63±10 and 76,6% men. Mean LVEF 28±6%. 39% ischemic etiology. 67,2% were in NYHA class II. Median NT-proBNP level 1176 pg/ml (IQR 364-3945). Mean glomerular filtration rate (GFR CKD-EPI) 71,7±20,6 mL/min and serum potassium 4,4±0,4 mEq/L. 84% received ACE inhibitors (median enalapril equivalent dose 7,5 mg/day, IQR 5-13.7) or angiotensin receptor blockers (median equivalent valsartan dose 80 mg/day, IQR 60-160). 95% received beta-blockers and 86% mineralocorticoid receptor antagonists. At the end of the titration period (6,5 weeks, IQR 3-13,2), target dose was achieved in 23 patients (40%). 24 (37,5%) needed any dose reduction. The main cause of dose reduction was hypotension, defined as systolic blood pressure (SBP) <90 mmHg (n=12, 18,8%), followed by dizziness (n=6, 9,4%), worsening of renal function, defined as serum creatinine >3.0 mg/dL (n=4, 6,3%) and diarrhea (n=2, 3,1%). 10 patients (15.6%) discontinued therapy due to adverse events. Causes for therapy discontinuation were hypotension (n=4, 6,2%), cost of medication (n=4, 6,3%), hyperkalaemia, defined as serum potassium >5,5 meq/L (n=2, 3,1%) and diarrhea (n=1, 1,6%). Angioedema was not detected. Patients with at least one adverse event were older, and with lower SBP and GFR (all p<0.05). In a multivariate analysis adjusted by age, levels of creatinine and NT-proBNP, a lower SBP (OR 0,94 95% CI 0.90-0,99) was the only variable independently associated with adverse events.
Conclusion The treatment with sacubitril/valsartan has a tolerability profile in line with other recommended HFrEF treatments. In our cohort, hypotension remains as the main cause of reduction or discontinuation of sacubitril/valsartan. In this population of relatively young patients the cost of medication was a major cause of discontinuation. In countries with co-payment system, like ours, the non-pensioners have to pay between 40 to 60% towards the cost of medication. This aspect could be a barrier to equitable access to novel treatments.

P1672

Outcomes of adherence to guideline in heart failure management: the role of heart failure specialist

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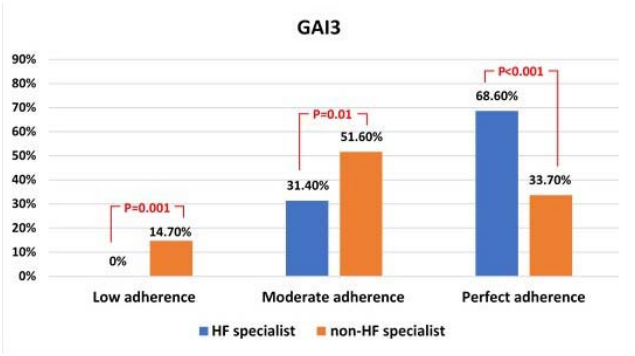
Background: Heart failure (HF) is a chronic disease that affects millions of people every year and associated with high levels of mortality and morbidity worldwide. The adherence to guidelines in treating HF patients is an important predictor of their clinical worsening.
Purpose: is to evaluate the level of adherence to ESC guidelines in the management of HF patients in a tertiary care center in Lebanon, as well as assessing the impact of poor adherence on mortality and readmission after a 1-year follow-up period. This study also aims to evaluate the role of a HF-specialist in implementing these guidelines.
Methods: This study is using a prospective longitudinal design, targeting 165 adult HF patients, with ejection fraction <40%, who are being recruited from a tertiary care center. Therapeutic data were collected at discharge and then after 1 year for readmission and death. We computed a Guideline Adherence Indicator-3 (GAI3) for the three evidence-based HF medications; angiotensin converting enzyme inhibitor (ACEI)/angiotensin receptor blocker (ARB)/ angiotensin receptor neplirysin inhibitor (ARNI), beta-blocker (BB), and mineralocorticoid receptor antagonist (MRA). Subjects were divided into three groups; those with low adherence (GAI3=0/3 or 1/3), moderate adherence (GAI3=2/3), or perfect adherence (GAI3=3/3), and then divided based on their treating physician into HF-specialist versus non-HF specialist. Survival analyses were used to compare between endpoints and guideline adherence levels.
Results: The mean age of our sample was 64.62±15.32. In total, 73.5% were males, 55.8% had moderate ejection fraction (30-39%), and 54.5% had a history of coronary artery disease. The adherence to drugs at discharge was 90.3% for ACEI/ARB/ARNI, 89.7% for BB, and 58.2% for MRA. The overall baseline adherence GAI3 was 48.5%. The level of adherence was perfect in 48.5% of patients, but moderate and low in 43.0% and 8.5% respectively. Log rank test showed a significant difference in event-free survival rate of mortality after 1 year (95.2% versus 60.0%, log rank p=0.048) and readmission for HF exacerbation (76.2% versus 40.0%, log rank p=0.038) between perfect and low adherence levels. After comparing patients followed up by a HF specialist versus a non-HF specialist, we found a significant difference in adherence to ACEI/ARB/ARNI (97.1% versus 86.3%, p=0.017) and to MRA (77.1% versus 44.2%, p<0.001), but not for BB (94.3% versus 86.3%, p=0.096). Similarly, for the GAI3 levels, there was a significant difference in the guideline adherence levels between HF-specialist and non-HF specialist (p<0.001).

Conclusion: The more adherence to guidelines in HF management is associated with better patients' clinical outcomes. There is a major need for referring patients to a HF specialist before reaching the advanced HF stage.



Difference in GAI3 adherence levels

P1673

Valsartan improves ventriculo-vascular coupling index dose-dependently in heart failure with reduced left ventricular ejection fraction

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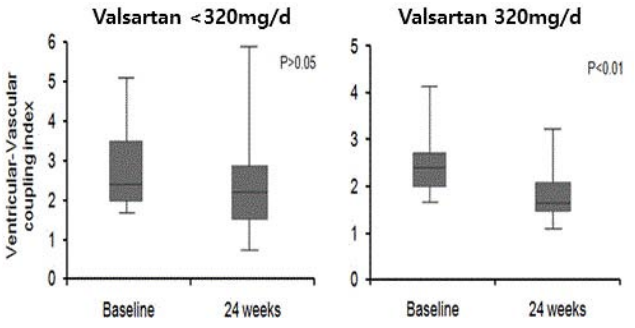
Objectives: We evaluated the effect of forced titration of valsartan in patients with HF.
Backgrounds: Heart failure is a clinical syndrome that causes significant morbidity and mortality. Recently, the ventriculo-vascular coupling index (VVI) was introduced as an independent prognostic factor that reflects the overall cardiovascular performance index in HF. However, it is not well elucidated whether forced titration of valsartan is effective or not on VVI in patients with HFrEF.
Methods: We evaluated the effect of valsartan stratified by dosage (non-ceiling dose vs ceiling dose). One-hundred-thirty-eight patients (59.3 ± 12.4 years old; 66% male) were force-titrated to the ceiling dose (n=81), but 57 patients did not reach the ceiling dose (non-ceiling dose; n=57). Biochemical studies including NT-proBNP, echocardiography including VVI, the treadmill test and the activity scale index (KASI) were assessed at baseline and after 24-weeks of therapy.
Results: The six month follow up showed significant improvement in NT-proBNP, LVEF, E/E' ratio, and activity scale index in both groups. LVMI was significantly improved in the ceiling dose group but not in the non-ceiling dose group. Interestingly, a significant improvement in VVI was only observed in the ceiling dose group (from 2.4 ± 0.6 to 1.8±0.5, p<0.01).
Conclusions: The ceiling dose of valsartan for six months showed better improvement of VVI in patients with HFrEF compared with non-ceiling doses. We may need to consider escalating valsartan to the ceiling dose for the overall cardiovascular performance index in patients with HFrEF.



VVI on cieling dose of valsartan

P1674

Factors that influence Heart Failure treatment titration in a Heart Failure Unit

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Background Heart Failure (HF) treatment titration remain one of HF Units (HFU) main problems as showed in national and European latest registries. This study aims to identify the factors that lead to an unsuccessful treatment titration.
Methods and Results: Patients seen in a HFU were consecutively included in a prospective registry from November 18 to January 19. Clinical, echocardiographic, analytic and treatment data were recorded.
A total of 114 patients were consecutively included. Mean age was 71.6±12.8 years, 26 (22.8%) patients were female, 19 (16.7%) were frail and 24 (42.1%) had Chronic Kidney Disease (CKD) (GFR < 60ml/min/1.73m2).
Table 1 shows treatment titration differentiation according age ≥ 75-years (elderly population), female sex, frailty and CKD among depressed LVEF patients.
Conclusions Age, female sex, frailty and CKD constitute factors that may influence HF treatment titration. Larger and longer studies should confirm these data

	Elderly Population (n=19)	Non-Elderly Population (n=38)	P
MRA use	12, 63.2%	32, 84.2%	0.074
BB titration at target dose	7, 41.2%	17, 48.6%	0.616
IECA/ARAII/ARNI titration at target dose	3, 17.7%	18, 51.4%	0.020
	Female Sex (n=11)	Male Sex (n=46)	P
MRA use	6, 54.6%	38, 82.6%	0.046
BB titration at target dose	2, 22.2%	22, 51.2%	0.113
IECA/ARAII/ARNI titration at target dose	2, 22.2%	19, 44.2%	0.222
	Frail Population (n=8)	Non-Frail Population (n=49)	P
MRA use	6, 75%	38, 77.6%	0.873
BB titration at target dose	4, 57.1%	20, 44.4%	0.531
IECA/ARAII/ARNI titration at target dose	1, 14.3%	20, 44.4%	0.130
	CKD Population (n=24)	Non-CKD Population (n=33)	P
MRA use	15, 62.5%	29, 87.9%	0.024
BB titration at target dose	8, 36.4%	16, 53.3%	0.225
IECA/ARAII/ARNI titration at target dose	5, 22.7%	16, 53.3%	0.026

P1675

Effectiveness of early administration of tolvaptan after admission of heart failure for cardiac prognosis

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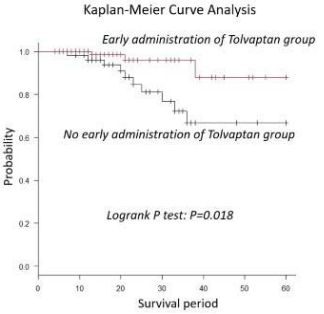
Backgrounds: Tolvaptan is recognized to have effects on congestive heart failure (CHF). However, the prognostic value of the timing of Tolvaptan administration for prognosis was not elucidated.
Methods: We enrolled consecutive 155patients with CHF (81.7±10.5years, 83males) who took Tolvaptan treatment, and observed them for max 60days retrospectively (median 19days) [25%:13days, 75%:31days]). After 5days observation, 6 drop-out cases were excluded, and finally 149 patients were enrolled. Cardiac

death was set as primary endpoint. The patients were assigned into two groups: patients taking Tolvaptan within 48hours after hospitalization (Early group) or over 2 days (Non-early group).
Results: Twenty-one patients died for observation period. The mortality rate was significantly lower in Early groups (Early:3, Non-early:10, P=0.002). Multivariate Cox regression analysis showed the early administration was a significant negative predictor of cardiac death (hazard ratio:0.237, P=0.029). Kaplan-Meier curve analysis revealed the survival curve was significantly better in Early group (logrank P=0.018)
Conclusion: Early administration (within 48hours) of Tolvaptan was a significant negative predictor of cardiac death in patients with CHF hospitalization.

		Early group (N=97)	No early group (N=52)	P
Age		81.5±10.2	82.0±11.0	0.759
Male		55	47	1.000
NYHA	II	7	4	0.864
	III	39	18	
	IV	58	31	
Cardiac death in 60days		3	10	0.002

Cox Hazard Regression Analysis for Cardiac Death

	HR	95% CI	P
Age	0.997	0.94-1.05	0.918
Male	0.943	0.32-2.81	0.915
Early admin	0.237	0.06-0.86	0.029



P1676

Potentially inappropriate medication use in elderly patients with heart failure: beers criteria-based review

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Background: Elderly heart failure (HF) patients are considered among the highest consumers of drugs. Their complex drug regimens and various comorbidities predispose them to inappropriate prescribing of medications. "Beers criteria" is among the most widely used criteria for the evaluation of potentially inappropriate medications (PIMs) use in elderly patients.Purposes: The aim of this study is to evaluate the proportion of PIMs in elderly HF patients as well as the factors associated with the number of PIMs. Also, to test for the correlation between PIMs and the impairment in quality of life and depression in this vulnerable population.
Methods: This study is using an observational cross-sectional design, targeting 120 consecutive HF outpatients ≥65 years, with ejection fraction <50%, who are being recruited from a tertiary care center. Patients with history of acute coronary event in the preceding 3 months and patients with severe cognitive impairments are excluded. Data for medications, doses, clinical data, and demographics are collected at discharge from the clinic. Patient is interviewed with the Minnesota Living with Heart Failure Questionnaire (MLHFQ) for measuring quality of life and the patient health questionnaire (PHQ9) for depression. Data are then evaluated for the use of PIMs using the updated Beer's criteria 2015.
Results: In total, 74.8% of our sample are males, 58.9% are young-old patients (65-74 years), and 68.2% had a history of hypertension. The total number of medications taken by our sample is 924 with an average of 8.64±2.82 medication per prescription. Preliminary results showed that the percentage of patients receiving at least one PIM is 80.4%, with an average of 1.70 ± 1.26 PIM per prescription, and 29.0% of HF patients are having 2 PIM in their prescription. Most of the PIMs are from the category of medications to use with caution (63.6%) and to be avoided in many or most older adults (53.3%). Diuretics (57.0%), proton pump inhibitors (41.1%), aspirin (14.0%), and benzodiazepines (9.3%) are the most commonly prescribed PIMs. Significant correlation is found between number of PIMs per patient with the MLHFQ score (pearson's coefficient r= 0.28, p=0.003), PHQ9 score (r=0.23, p=0.017), and number of medications per prescription (r=0.49, p<0.001). Multivariate Linear regression showed a significant association between the number of PIMs per prescription with the number of medications (regression coefficient beta=0.190, p<0.001), oldest-old age (beta=1.136, p=0.006), and having a chronic kidney disease (beta=0.588, p=0.031).
Conclusions: Elderly HF patients are having a high percentage of PIMs. An excessive unnecessary use of proton pump inhibitors is observed in this population. The PIMs are affecting negatively the quality of life of HF patients and associated with more depression. There is a need for a multidisciplinary team to help in controlling the prescription of PIMs in this vulnerable population.

P1677

Baseline characteristics, treatment dosage, and clinical outcomes of post-acute HFrEF patients initiated with Sacubitril/Valsartan

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Purpose: Current study focused on a retrospective cohort; we characterize the real-world timing of S/V initiation.
Method: This is a single center retrospective cohort study from January 2017 to December 2018 in our hospital, focusing on patients switched to S/V. Patients were divided into three groups: Group 1. Patients switched to S/V at outpatient clinic without recent heart failure admission; Group 2. Switched at outpatient clinic with recent (within 1 month) heart failure admission; and Group 3. Switched during heart failure hospitalization after hemodynamic stabilization.
Result: A total number of 162 patients switched to S/V during January 2017 to December 2018 in our hospital. There were 91 patients in Group 1, 29 in Group 2, and 42 in Group3. Among these three group patients, there is no significant difference between baseline characteristics on factors such as age, gender, diabetes, atrial fibrillation, history of stroke, ischemic etiology of heart failure, prior hospitalization rate and baseline LVEF. However, heart failure status for patients in Group 3 were much severe(NYHA class P< 0.05) and the length of index hospitalization was longer in Group 3 than Group 2 (13.5 ± 7.7 vs 7.9 ± 6.5 days, P<0.05).
Initiation dose and titration pattern were similar between these three groups.
At 1 year follow-up, there were 7 cases discontinue S/V(2 hypotension, 2 acute kidney injury, 1 cough and 2 physician choice) in Group 1(N=53), 3(1 hypotension and 2 physician choice) in Group 2(N=17) and 5(2 hypotension and 3 physician choice) in Group 3(N=26). Although compared with Group 1, baseline characteristics of Group 2 and 3 showed higher BNP level and much severe NYHA class, treatment withdraw due to side effect of drug were all rare.
At 1 year follow-up, 2 cases died in Group 1, 1 in Group 2, and 3 in Group 3.
Among these three groups, there were 9 patient heart failure rehospitalization within 1 year at Group 1(N=53), 6 in Group 2(N=17), and 14 in Group 3(N=26). In Group 3, there are 14 cases readmitted within 1 year after S/V treatment. Mean length of heart failure hospitalization(LOH) in these 14 patients was 17 days before treatment and 14 days after treatment. 6 patients readmitted in Group 2, and decreased LOH from 8(before treatment) to 5.3(after treatment) days.
Among these three groups, the LVEF presented at baseline characteristics were indicated as 32 ± 8, 32 ± 8 and 34 ± 10% (P=0.352639). After S/V treatment, all three groups presented improvement in LVEF, with 37.4 ± 13.6% in Group 1, 48.7 ± 16.3% in Group 2, and 34.4 ± 12% in Group 3. Notably, a 16.3 % improvement was observed in Group 2.
Conclusions: Initiation of S/V in stabilized post-acute HFrEF patients seemed to be safe in real-world setting. Treatment withdraw due to side effect was rare. A reduced length of stay for heart failure re-hospitalization were observed within 3 month in both Group 2 and Group 3.

P1678

Central sleep apnea in patients with chronic heart failure and its treatment with acetazolamide

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Introduction . Central sleep apnea (CSA) is a specific respiratory abnormality during sleep, defined as periodical cessation of breathing with the absence of respiratory flow as well as thoracic and abdominal breathing efforts. Cardiovascular prognosis for individuals with chronic heart failure (CHF) and CSA can be potentially worse.
Purpose. The aim of our study was to assess the incidence and risk factors for CSA in patients with CHF and to assess the effect of acetazolamide in such patients.
Methods. We have studied 37 consecutive adult patients (35 males and 2 females) with CHF ranged from II to III New York Heart Association (NYHA) functional classes. All patients got standard medication. Patients with chronic respiratory failure, renal failure, previous stroke, anemia and obesity were not included. All patients underwent echocardiographic investigation, 6-minute walking test, arterial blood gases test and cardio-respiratory monitoring during sleep. Sleep and life quality questionnaires were also obtained. Patients with apnea-hypopnea index (AHI) more than 15 events per hour were considered as suffering from CSA.
Results. CSA was found in 62% of observed patients (23/37). There were no significant differences between the groups in age, gender, heart rate or blood pressure. Mean SpO2 during sleep was 91.8±0.8% among the patients with CSA, and 94±0.8% in the control group (p>0.05). Mean pCO2 in arterial blood in patients with or without CSA were 35.2±0.5 mm Hg and 35.0±0.9 mm Hg, respectively (p>0.05). Mean distance walked in 6 minutes was 297.1±23.2 meters in group with CSA and 310.1±32.6 meters among the other patients (p>0.05). According to the

questionnaires there was no significant difference in sleep and life quality in both groups.
18 patients with CSA were randomized into two groups. In group I patients received acetazolamide and standard medical treatment (8 patients). Control group without acetazolamide admission consisted of 10 persons. In 6 month patients in group I showed significant decrease in AHI (from 33.14±3.9 to 14.7±4.0). In the control group there was no significant change in AHI (22.84±1.1 and 21.68±3.9). In a 12-month period was revealed a decreasing tendency in cardiovascular mortality among patients receiving acetazolamide (1 patient in group I and 4 patients in group II) (>0.05).
Conclusions. Considering the results of the study we can conclude that the prevalence of CSA in CHF patients is up to 60%. Patients with CSA showed no tendency to lower exercise tolerance or lower levels of CO2 in arterial blood. Taking into account that patients in both groups did not differ by heart failure severity, received data contradict the idea that lower left ventricular ejection fraction and lower pCO2 levels lead to CSA in patients with CHF. Administration of acetazolamide result in decrease of respiratory disorders during sleep and probably decrease cardiovascular mortality in such patients.

P1679

The investigation of efficacy and safety about the clinical pathway for congestive heart failure specified immediate use of tolvaptan after admission in super-elderly patients.

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Background: In Japan, for congestive heart failure(CHF) cases we had been able to prescribe new and strong diuretic, Tolvaptan from 2010. We introduced original clinical pathway with immediate use of Tolvaptan after admission for chronic heart failure cases(CHF-PATH) from August 2015, and confirmed its large shortening effect of hospitalization period by efficient medical treatment. We often apply CHF-PATH even in super-elder patients with CHF.
Purpose: we verified the usefulness and safety of CHF-PATH use in super-elder patients with CHF.
Method: We enrolled 376 CHF patients, with clear pulmonary congestion findings in their chest X-ray, who admitted in our hospital and applied CHF-PATH for the first time between August 2015 to November 2018 (mean age:80.6+/-10.8 years old, male/female:193/183). We divided them into two groups, 73 cases who were 90 years old or older(E-group; mean age: 92.8+/-2.5 years old, male/female: 33/39), and 303 cases who are less than 89 years old(Y-group; mean age: 77.7+/-10.0 years old, male/female: 160/143). We examined their clinical characteristics, various situation of their medical care and incidence of adverse events that might influence use continuation of Tolvaptan such as more worsening of renal function or hypernatremia after admission.
Results: In E-group the ejection fraction of left ventricle by echocardiography was higher(56+/-15 vs 48+/-19%; p<0.01), the mean renal function(eGFR) on admission was lower(39+/-18 vs 48+/-20 mL/min; p<0.01) and the prevalence of dementia was higher(81 vs 56%; p<0.001) than that in Y-group. In E-group and Y-group, the performance rate of continuous venous infusion(71 vs 66%; NS) and its mean performance duration(5.5+/-7.5 vs 4.7+/-5.4 days; NS), the performance rate of urethral catheterization(45 vs 47%; NS) and its mean duration(6.6+/-6.7 vs 5.9+/-7.97 days; NS) and mean starting time of cardiac rehabilitation after admission(3.1+/-1.6th vs 2.9+/-1.5th day; NS) were not different. The mean hospitalization period was longer in E-group (20.6+/-19.1 vs 15.5+/-11.6days; p<0.05). In E-group the serious worsening of renal function or hypernatremia which needed to stop use of Tolvaptan occurred more often(15.1 vs 3.0 %; p<0.001). The CHF re-admission rate within 1 year after discharge was not different in E-group and Y-group(32 vs 26%; NS).
CONCLUSION: Even in Super-elderly patients with congestive heart failure, each medical care was performed efficiently by our original clinical pathway and there was not significant difference about re-admission rate with the worsening of heart failure between two groups. But we thought that considering peculiar factors of elderly patients such as existence of renal dysfunction or dementia, we should be careful to occurrence of adverse events related to use of Tolvaptan in super-elderly cases introduced our original clinical pathway.

P1680

Sacubitril/valsartan in heart failure with reduced ejection fraction patients: real world experience on advanced chronic kidney disease, hypotension and dose titration

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Introduction: The angiotensin-receptor and neprilysin inhibition (ARNI) with a combination of sacubitril and valsartan had been shown to reduce cardiovascular mortality by 20% and all-cause mortality by 16% as compared with enalapril in the randomized controlled PARADIGM-HF trial. However, there is a paucity of real-world data on the effects of ARNI in heart failure patients with reduced ejection fraction (HFrEF), especially with concurrent renal impairment or hypotension.
Methods: Between January and December 2017, 466 HFrEF patients treated with sacubitril/valsartan (Group A) in a heart failure referral center were recruited consecutively. Between 2015 and 2016, another 466 HFrEF patients acting as control, who were managed with standard HF treatment without ARNI (Group B) were recruited. Baseline characteristics and clinical outcomes were collected and compared between both groups.
Results: Baseline characteristics were comparable between the two groups. During a mean follow-up period of 567 days, death from cardiovascular causes or first unplanned hospitalization for HF occurred in 106 patients in Group A (22.7%) and 175 patients in Group B (37.6%, hazard ratio 0.65; 95% CI 0.51 to 0.83; p=0.001). The incidences of deaths from any causes, cardiovascular death, sudden death, and HF re-hospitalization were all significantly lower in Group A than Group B patients. Among patients with different chronic kidney disease stages and normotensive patients, treatment with sacubitril/valsartan showed favorable outcomes than treatment with standard HF care without ARNI. However, in patients with baseline systolic blood pressure lower than 100mmHg, there were no significant differences of outcomes in both groups. Among Group A patients, de-escalation of sacubitril/valsartan was associated with poorer outcomes.
Conclusion: Our study demonstrated the effectiveness of sacubitril/valsartan on HFrEF patients in the real world practice, including those with advanced renal impairment.

P1681

Sacubitril-valsartan treatment furtherly improves response to intermittent parenteral levosimendan in ambulatory patients with advanced heart failure with reduced ejection fraction

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BACKGROUND: : Intravenous intermittent administration of levosimendan (IALEVO) to ambulatory patients with advanced chronic heart failure (ACHF) with severely reduced (<35%) ejection fraction (EF) has been shown in several randomized trials (LAICA, LION-HEART, Levo-Rep) to improve their clinical status and to reduce NT-proBNP plasma levels and rehospitalizations. However, recruitment of patients in these trials were conducted in the pre-ARNI era, so the impact of simultaneous treatment with sacubitril-valsartan (SAV) on IALEVO strategy is unknown.
AIMS: To assess whether SAV treatment may affect the results of IALEVO in patients with ACHF.
METHODS AND RESULTS: we conducted an observational, non-randomized study on 36 patients with ACHF of a similar profile with SAV treatment for at least the previous 12 months. Patients were randomly assigned at a 1:1 ratio to IALEVO or non-intervention groups; those receiving IALEVO were given a 6-hour intravenous infusion (0.2 μg/kg/min without bolus) every 2 weeks for 12 weeks. The primary endpoint was the effect on serum concentrations of NT-proBNP throughout the treatment period. Secondary endpoints included evaluation of 18-months rehospitalizations due to HF decompensation and score at the Kansas City Cardiomyopathy test. The area under the curve of the levels of NT-proBNP for patients who received IALEVO was significantly lower than for the non-intervened group (259 × 103 [95% Confidence Interval (CI) 189 × 103–395 × 103] vs. 328 × 103 [240 × 103–517 × 103], p = 0.004). In comparison with non-intervened group, the patients on IALEVO experienced a reduction in the rate of heart failure hospitalisation (hazard ratio 0.20; 95% CI 0.10–0.49; P = 0.001). Patients on IALEVO were less likely to experience a significant reduction in KCC score (P = 0.04). Adverse effects were similar in both groups.
Conclusions: In this small non-randomized, non controlled study, IALEVO to ambulatory patients with ACHF with EF < 35% already treated with SAV reduced plasma concentrations of NT-proBNP and hospitalization for HF decompensation. As with other patients in the pre-ARNI era, IALEVO seems to furtherly improve clinical and functional benefits provided by SAV in ACHF.

P1682

Significant underutilization of angiotensin receptor neprolysin inhibitor (ARNI) and other evidence-based heart failure (HF) therapies in an outpatient clinic setting

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On behalf of: Atlanta Heart Specialists

Background: Multiple guidelines since 2016 have endorsed as a Class 1 recommendation, the use of an ARNI in pts with heart failure (HF) and reduced ejection fraction (HFrEF).
Methods: Retrospective chart review of all pts being treated for HF in a single, multi-site suburban, outpatient cardiology practice for the calendar year 2016.
Results: Of the 1607 pts identified 560 (35%) had HFrEF, 218 (14%) had mid range EF (HFmEF) and 819 (51%) had preserved EF (HFpEF). In comparison to the HFpEF group, HFrEF pts had a lower EF (26.9% vs 58.9%) were significantly younger (64.4 yrs vs 68.2 yrs, $p < 0.0001$) and more likely to have ischemic cardiomyopathy (37% vs 19.2%, $p < 0.00001$). Table 1 looks at evidence based therapy use at the first and last visit of 2016.In the HFrEF pts, the greatest % change in drug therapy was ARNI use with an appropriate decrease in ACEI/ARB use. There was however substantial overall underutilization of spironolactone, ARNI and device therapy in the HFrEF group. EF improved significantly in the HFrEF group (26.9% vs 32.4%, $p < 0.0001$) while decreased in HFpEF group (58.4% vs 56.3%, $p < 0.0005$). In comparison to the HFpEF group, HFrEF pts were more often hospitalized for HF (17% vs 11.5%, $p < 0.004$) and had a higher 1 year mortality rate (11.1% vs 6.2%, $p < 0.002$).
Conclusions: Our findings suggest that there is significant underutilization of ARNI therapy in contemporary cardiology practice. There is also some inappropriate use of ARNI in HFpEF pts. Even more concerning is the underutilization of spironolactone and device therapy in HFrEF pts despite longstanding national guidelines and a high 1-yr HF hospitalization and mortality rate.

Table 1.

Therapy		HFrEF				HFpEF		
% use	1st visit	Last visit	% change	P	1st visit	Last visit	% change	P
B-Blocker	81.7	87.2	5.5	< 0.0002	73.2	76.7	3.5	0.11
ACEI/ARB	66.0	60.3	-5.7	0.04	55.6	58.6	3.0	0.21
Spirono-lactone	22.1	26.3	4.2	0.09	12.7	14.3	2.7	0.34
ARNI	3.6	16.5	12.9	< 0.00001	0.6	1.3	0.7	0.13
ICD/CRT	37.3	51.1	13.8	< 0.00001	6.1	6.7	0.6	0.61

P1683

Effectiveness of early administration of Tolvaptan for cardiac prognosis in acute decompensated heart failure

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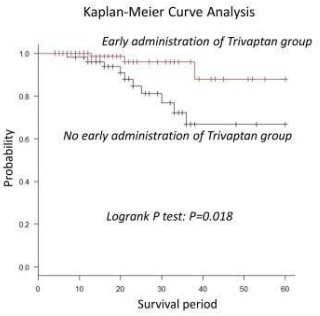
Backgrounds: Tolvaptan is recognized to have effects on acute decompensated heart failure (ADHF). However, the prognostic value of the timing of Tolvaptan administration in hospitalization was not elucidated.
Methods: We enrolled consecutive 155 patients with ADHF (81.7±10.5 years, 83 males) who took Tolvaptan treatment in hospitalization, and observed them for max 60 days retrospectively. The patients were assigned into two groups: patients taking Tolvaptan within 48 hours or over after hospitalization (Early group vs Non-early group). Cardiac death was set as primary endpoint.
Results: Twenty-one patients died for observation period. The mortality rate was better in Early groups (Early:3, Non-early:10, P=0.002). Multivariate Cox regression analysis showed the early administration was a significant negative predictor of cardiac death (hazard ratio:0.237, P=0.029). Kaplan-Meier curve analysis revealed the survival curve was significantly better in Early group (log rank P=0.018)
Conclusion: Early administration (within 48 hours) of Tolvaptan after hospitalization was a significant negative predictor of cardiac death in patients with ADHF.

		Early group (N=97)	No early group (N=52)	P
Age		81.5±10.2	82.0±11.0	0.759
Male		55	47	1.000
NYHA	II	7	4	0.864
	III	39	18	
	IV	58	31	
Cardiac death in 60days		3	10	0.002

Cox Hazard Regression Analysis for Cardiac Death

	HR	95% CI	P
Age	0.997	0.94-1.05	0.918
Male	0.943	0.32-2.81	0.915
Early admin	0.237	0.06-0.86	0.029



P1684

Sacubitril/Valsartan: for all patients?

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Heart failure (HF) presents high morbimortality and high consumption of care resources conditioned by acute exacerbations. Therefore, it is defensible to approach these patients by differentiated teams in the treatment of HF with experience in the management of prognostic modifying factors, including immunomodulatory drugs. Sacubitril/valsartan (ARNI) was shown a significant reduction of cardiovascular events and mortality without worsening renal function or hyperkalaemia but higher proportions of patients with hypotension and angioedema.
The objective of this study is to characterize a population of patients oriented in consultation of HF and to evaluate limiting factors of the use of sacubitril/valsartan (ARNI).
A retrospective cohort study that included all patients observed at the IC consultation between January 2 and December 5, 2018. Clinical and analytical data were collected.
A total of 128 patients were observed, 82.8% males, mean age 64 years; 82% of patients had HF with reduced FE, FE intermediate 15% and FE preserved 3%. The mean value of LVEF was 30.4 ± 9.9%. The most frequent HF etiology was dilated cardiomyopathy (44.5%) followed by ischemic heart disease (43.8%). 38% of patients were in NYHA class II, 29% in NYHA III and 4% in NYHA IV.
Regarding pharmacological therapy, 93% of patients had ACEI/ARA (prior to ARNI), 95.3% beta-blocker (BB), 88.3% mineralocorticoid receptor antagonists (ARM) and 15.6% ivabradine. However, only 23% of the patients under ACEI/ARA, 25% of the patients under BB and 16% of the patients under MRA were at the recommended maximum dose of drugs.
Of the total of patients evaluated with LVEF ≤35% and symptomatic (n = 69), 35% were medicated with ARNI (n=24). It was possible to titrate ARNI to a higher dose than ACEI/ARA in 44% of patients and 45% maintained equipotent dose, with titration mean time up to the maximum tolerated dose of 48 days.
During follow-up 2 patients discontinued ARNI due to itch and 3 reduced dose (1 for symptomatic hypotension, 1 for worsening renal function, and 1 due to hyperkalemia). No patient had angioedema. After onset ARNI there was a significant increase in creatinine (p=0.031), however, only 5 patients had increase of more than 25% of the baseline value. No significant increase was observed in the plasma levels of potassium, only 2 patients presented hyperkalaemia, 1 of the cases requiring hospitalization.
With regard to the 45 patients who would have indicated, but did not initiate ARNI the main reasons were: 34% for economic failure, 27% for hemodynamic profile and 15% for severe chronic kidney disease.
In conclusion, there is also a low prevalence of ARNI use (35%) and one of the main reasons is its high cost. The majority of patients tolerated the drug and in 44% of cases it was possible to titrate to a dose higher than the dose of ACEI/ARA.

P1685

Effects of statins on major adverse cardiovascular events in patients with ischemic chronic heart failure with reduced ejection fraction and renal dysfunction

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The aim of the study to investigate the effect of different doses of statins on long-term prognosis in patients with ischemic chronic heart failure (CHF) with reduced ejection fraction (EF) and renal dysfunction (RD).
Materials and methods. The study involved 140 patients (114 (81.4 %) men) with ischemic CHF, mean age 60 [54-68] years. 2 functional class (FC) of chronic heart failure was diagnosed in 27 (19.3 %) patients, 3 FC - in 98 (70 %) patients. Prior myocardial infarction was in 106 (75,7 %) patients. The glomerular filtration rate (eGFR) was calculated using the formula MDRD (Modification of Diet in Renal Disease). Mean GFR was 70.2±15.5 ml/min/1.73cm2, mean ejection fraction 34.7±7.2 %. Therapy included: ACE inhibitors/ARBs (90 %), beta blockers (94.3 %), diuretics (87.8 %), antagonists mineralocorticoid receptor (75 %), antiplatelet agents (70.7 %), calcium antagonists (14.3 %), amiodarone (18.6 %), ivabradine (15 %). Statins received 118 (84.3 %) patients in doses that meet mild and moderate intensity lowering low-density lipoprotein cholesterol (mean dose of atorvastatin amounted to 21.9 mg, rosuvastatin - 12.9 mg). The period of follow-up was 3 years. As clinical endpoints were considered all fatal and non-fatal atherothrombotic events, including re-infarction, ischemic stroke, sudden cardiac death, heart failure and all cases of hospitalization due to this reason, registered within 3 years after signing informed consent. The cumulative survival curves were constructed with the use of the Kaplan-Meier method and groups were compared with the log-rank test.
Results. Analysis of the observations showed that adverse cardiovascular events during the observation period occurred in 92 (65.7 %) patients, among them - the fatal re-infarction in 8 (8.7 %), sudden cardiac death in 25 (27.2 %) patients, 53 patients (57.6 %) was hospitalized due to HF decompensation, 4 patients (4.3 %) reported non-fatal re-infarction, 2 (2.2 %) patients non-fatal stroke. Found that inclusion statins in the standard pharmacological therapy of ischemic CHF patients with reduced EF and RD reduces the risk of a cumulative endpoint by 51% (HR 0.49; 95 % CI 0.26-0.91; p=0.02), mainly due to reduction of episodes of hospitalization due to decompensation of HF (HR 0.32; 95 % CI 0.14-0.72; <0.01). The positive effect was independent of the intensity statin therapy (HR 0.96; 95 % CI 0.52-1.78; p=0.91), but among the statins atorvastatin had the advantage (HR 0.37; 95 % C 0.21-0.69; <0.001).
Conclusions. The inclusion of statins in the standard pharmacological therapy of patients with ischemic CHF with reduced left ventricular EF and renal dysfunction significantly reduces the risk of cumulative endpoint, mainly due to the prevention of hospitalizations regarding decompensation of HF. Regimen of administration of statins (mild and moderate intensity) did not significantly affect the risk of cardiovascular events.

P1686

Statins improves functional capacity and restores LV diastolic reserve in patients with heart failure with preserved left ventricular ejection fraction

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Background. The novel heart failure with preserved left ventricular ejection fraction (HFpEF) pathophysiologic paradigm proposes that coronary microvascular endothelial inflammation promotes LV diastolic dysfunction. It remains to be explored whether approaches to treat systemic inflammation might be effective in HFpEF.
Purpose. We aimed to investigate whether therapy with statins improves exercise tolerability and exercise hemodynamics in patients with HFpEF.
Methods. In present randomized, open single-center 6-month study we enrolled 52 patients with stable HF in NYHA functional class IIIII, preserved EF (>50%), and increased LV filling pressures at rest and/or during exercise. All patients have never taken statins before and were randomly assigned to atorvastatin (40-80 mg; n=26) or rosuvastatin (20-40 mg; n=25) for 24 weeks. Echocardiography, 6-minute walk test (6MWT), diastolic stress-test (DST), and biomarker blood level analysis (N-terminal pro-B-type natriuretic peptide [NT-proBNP], high-sensitivity C-reactive protein [hsCRP], monocyte chemoattractant protein [MCP]-1) were performed at baseline and 24 weeks after randomization. The primary endpoint was change in 6MWT after 24 weeks of treatment. Secondary objectives included changes in DST-exercise time, transmitral inflow velocity to early mitral annulus velocity ratio at rest and peak exercise (E/e′ ratio). Mean age was 68 years and 63% were women. Study subjects were mainly obese (67%) with multiple comorbidities including long-standing hypertension (100%), ischemic heart disease (31%), impaired glucose metabolism (67%) and chronic renal failure (45%).
Results. Both distance during 6MWT and exercise time during DST were increased after 6 month of statin therapy (+ 31 [95% CI 16 to 46] m, P=0.0001 and + 51 [95% CI 18 to 84] s, P=0.0004 vs. baseline, respectively). Therapy with statins was associated with LV diastolic reserve restoration, as evidenced by increase in exercise e′ velocity elevation (by 0.59 [95% CI 0.29 to 0.89] sm/s, P=0.0003), and lower level of E/e′ ratio both at rest (by 0.7 [95% CI −1.2 to −0.2], P=0.011) and during DST (by 1.0 [95% CI −1.6 to −0.3], P=0.005 vs. baseline). Plasma level of NT-proBNP, hsCRP, and MCP-1 remained unchanged, however there was a significant decrease in NT-proBNP level in patients with baseline level >220 pg/ml (-125 [95% CI -241 to -6] pg/ml), hsCRP level in those with baseline level >2 mg/l (-1.26 [95% CI -2.59 to -0.17] pg/ml), and MCP-1 level in those with baseline level >100 pg/ml (-20 [95% CI -31 to -1] pg/ml, P<0.05 for all vs. baseline values). There were no significant differences between atorvastatin and rosuvastatin, except more marked increase in 6MWT distance in atorvastatin group (p=0.052 vs. rosuvastatin group).
Conclusion. In patients with HFpEF, 6-month therapy with statins improved exercise capacity and was associated with the restoration of LV diastolic reserve, presumably via anti-inflammatory effect.

P1687

An evaluation of consultant and registrar prescribing in the outpatient setting

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Background Despite the presence of national and European guidelines, prescribing for heart failure with a reduced ejection fraction remains sub-optimal. The UK National Heart Failure Audit (2016-17) shows that only 44% of patients are discharged on a combination of ACE-inhibitor, beta blocker and aldosterone antagonist. A local audit in 2016 has shown that at 6 months post-discharge, only 25% patients are on maximal therapy, despite attending out-patient appointments.
Purpose This study looked at clinical documentation in out-patient appointments to review whether changes were made to medication. The main aim was to determine current prescribing practice and impact on medicines optimisation.
Methods This study looked at all heart failure out-patient appointments in January and February 2018. Patients were reviewed by a registrar or consultant.
A range of clinical and demographic information was collected, including medication changes made and drug class. The letters were checked for clarity of documentation of medication, allergy status and patients' adherence with prescribed medicines for heart failure.
Any recommendations were categorised and then reviewed whether change had occurred at the next out-patient appointment. Patients were excluded if they did not have a follow-up appointment, had passed away before their appointment, or did not attend.
Results 694 patients attended an out-patient appointment in January and February 2018 and 50% (n=347) had a change to their medication recommended.The majority of patients (67.4%) had their current medications only partly documented. Very few patients had their allergy status (1.6%) or adherence (5.3%) documented. 3.5% of patients had none of their current medications documented.
A total of 485 medication changes were recommended with half (50.5%) requiring the patient's community general practitioner to action the change. 21.0% of patients were issued a prescription. The most commonly prescribed class of medication were beta blockers (22.7%), ACE-inhibitors (17.7%) and diuretics (16.9%).
Of the 214 patients who had a change recommended and attended a follow-up appointment, adherence to medication changes was 77.4%. Asking the general practitioner to action the change made up the highest proportion of medication changes (41.5%) but the lowest rate of advice followed (68.1%).
Conclusion Prescribing for patients at heart failure outpatient appointments is low and general documentation of medication and adherence is poor.
Half of medication changes are recommended for the general practitioner to action, which can incur a delay in medicines optimisation, as only 68.1% of these changes had been made when the patient attended for follow-up. The lowest percentage was when a change was recommended by a registrar.
Further extension of this study is needed to understand the barriers to prescribing and review the current processes to reduce the delay in medicines optimisation.

P1688

Frailty quick test, effective for risk stratification of inadequate treatment of heart failure

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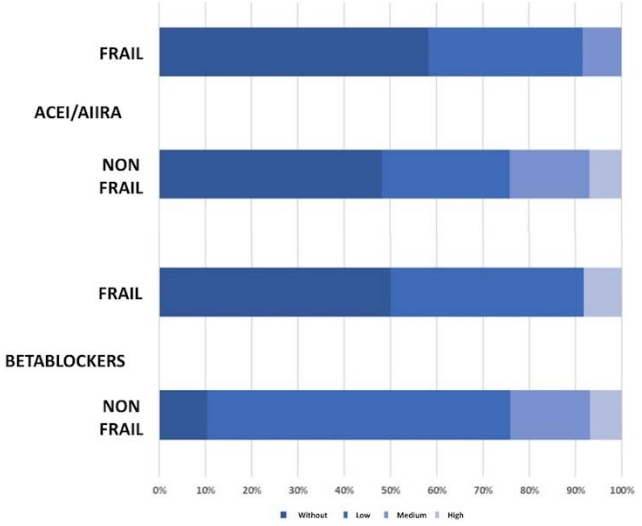
Backgroung: In the treatment of heart failure, the adequate titration of effective therapies that change the natural evolution of this disease are necessary to improve

the clinical status of our patients. Despite this, the extended under dosage of these treatments are acknowledge. It appears necessary to develop the proper tools to alert this risk population, especially in the most advanced stages of heart failure.
The FRAIL scale, which can be administrated in less than 5 minutes in a consult setting, can be a useful to detect frailty, a known risk factor for under dosage.
Material and methods: We designed a transversal study, including 42 consecutive patients from the Advanced Heart Failure consult. Participants complete the FRAIL questionnaire, self administered in the waiting room before their consult. We analyzed the percentage of patients who were under different dosage (high, medium, low) of betablockers (BB), angiotensin converter enzyme inhibitors (ACEI) or angiotensin II receptor antagonists (AIIRA), and aldosterone antagonists. The patients were divided in two groups: frail (≥ 3 points in the FRAIL scale) and non-frail patients.
Results The results obtained are included in Table 1. Frail patients received lower treatment with ACEI/AIIRA, BB and aldosterone antagonist, statistically significant in the last two drugs. In Figure 1 we observed how the dosage of BB and ACEI/AIIRA are lower in frail patients. Specific for ACEI, despite the absence of statistically significant differences, the dosage showed a trend for being lower, compared to non-frail patients.
Conclusion The diagnosis of frailty through a quick and self-administered questionnaire (FRAIL) is useful to detect under dosage in effective medications in patients with heart failure.

Table 1 Titration of drugs

	NONFRAIL(n=29)	FRAIL(n=12)	p
Betablockers	26 (89,7%)	6 (50%)	0,005
ACEI/AIIRA	18 (62,1%)	6 (50%)	0,475
AldosteroneAntagonistas	25 (86,2%)	6 (50%)	0,014



Dosage of drugs in both groups

P1689

Effect of sacubitril/valsartan in real-world patients in South London

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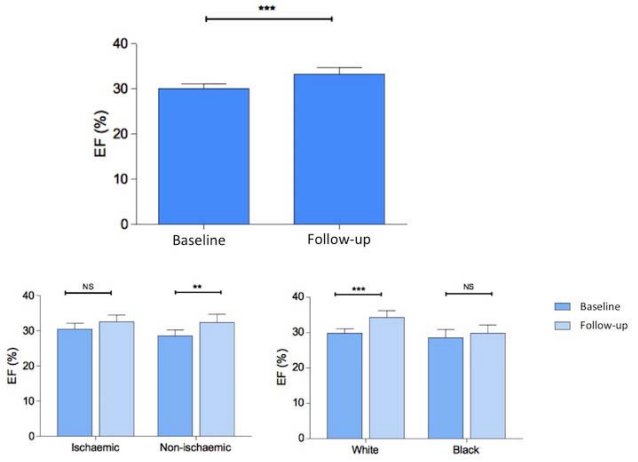
Introduction Our Heart Failure Unit in South London provides specialist care for a socially and economically diverse community. We present our experience with sacubitril/valsartan in this cohort.
Purpose: There is limited real-world data of sacubitril/valsartan, especially in black patients. Therefore we investigated the efficacy of this drug in a diverse patient population, which included a significant proportion of black patients.
Methods This is a retrospective, observational, single-centre study of patients with symptomatic heart failure (LVEF <35%) on optimal medical therapy, who were transitioned to sacubitril/valsartan. Data were collected manually from our electronic patient records. Statistical analysis was performed with GraphPad Prism 7.04.
Results: A total of 87 patients were analysed (mean age 58 years, 39% female, 44% of black ethnicity, 59% with non-ischaemic cardiomyopathy, 80% on target dose of 200mg BD). Sacubitril/valsartan lead to an improvement of LVEF. This effect was significant only in patients with non-ischaemic cardiomyopathy, in white individuals, and in males.
Sacubitril/valsartan had no impact on heart rate, while reducing blood pressure in white, but not black patients. After 3 months of treatment, there was clinical improvement assessed by NYHA class, independent of ethnicity, and by Minnesota living with heart failure questionnaire, but only in white patients. In addition, NT-proBNP levels dropped significantly after 3 months of treatment.
Conclusion Sacubitril/valsartan improves LVEF, but there may be individual factors leading to non-response, such as black ethnicity, ischaemic cardiomyopathy, and female gender. Improvement of LVEF to >35% was observed in 18% of patients, most of whom had non-ischaemic cardiomyopathy. This could be clinically relevant considering the current criteria for primary prevention ICD implantation. In our cohort, the positive effect of sacubitril/valsartan is mainly seen in white, but not in black patients. It remains unclear if there is reduced efficacy of the drug in black patients, or whether there are other explanations.

Results

	Baseline	Follow-up	p-value
LVEF (n = 38)	30.3 ± 1.1%	33.3 ± 1.4 %	0.004
NT-proBNP (n = 81)	3657 ± 619 ng/l	3044 ± 782 ng/l	0.0012
Heart rate (n = 38)	67.9 ± 1.9 bpm	63.1 ± 1.9 bpm	ns
Systolic BP (n = 87)	120 ± 1.8 mmHg	114 ± 2.0 mmHg	0.0018
NYHA class (n = 87)	2.5 ± 0.1	1.9 ± 0.1	< 0.001
MLWHF Score (n = 64)	43.0 ± 3.4	32 ± 3.0	0.001

Results are presented as mean ± SEM.



LVEF improves with sacubitril/valsartan

P1691

Impact of beta blockers therapy on right ventricular function in heart failure patients with reduced ejection fraction a prospective evaluation

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Background. ß-Blocker Therapy has been shown to improve mortality and reduce hospitalizations in patients with heart failure (HF) with reduced ejection fraction (HFrEF). Although the physiological action mechanisms of ß-Blocker Therapy are well described, its effects on rigth ventricular (RV) function have not been prospectively well studied. Objective. The aim of this prospective study was to: (1) evaluate if ß-Blocker Therapy impacts RV remodellingbased on echo parameters; (2) sought the echo predictive factors of ß-Blocker therapy response.Methods. From

september 2017 to September 2018, HF patients were prospectively enrolled using CIBIS criteria: Class II, III, or IV HF; left ventricular ejection fraction (LVEF) of 40% or less; hospitalized for HF within the previous 12 months. Echo evaluation was performed before initiating ß-Blocker therapy and 3 months after optimal dose adjustment. Based on previous studies, patients with (absolute) improvement in LVEF ≥5% were considered significant ß-Blocker therapy responders. Results. Forty patients completing the study were characterized by age: 70±10 years; gender: 10 women; cardiomyopathy aetiology: idiopathic in 24 and ischaemic in 16; NYHA Class: II in 22 and III in 10; LVEF: 32±5%; NTProBNP: 2665±2400pg/ml.The final population comprised 32 pts (79%), given that 8 pts (21%) were excluded: 2 did not tolerate ß-Blocker therapy, 1 was lost of follow-up, 5 did not pursue the protocol. Under ß-Blocker therapy, several echo parameters significantly improved: LVEF from 31.7±9to 40.5±9 (p<0.0001); LV end-diastolic volume (EDV) from 154±54 to 143±45 ml (p=0.06); LV end-systolic volume (ESV) from 107±49 to 88±37 ml (p=0.0006); LV ES from 46±11to 64±13 ml (p=0.008); LV end-diastolic diameter (EDD) (57±9 to 54±6 mm; p=0.04); LV end-systolic diameter (ESD) (48±10 to 44±7 mm; p=0.007); right ventricular systolic pressure (RV SP) from 39±10 to 32±8 (p=0.0001). Significant modifications were observed in terms of RV echo parameters: right ventricular size decreased (30±4 vs. 27±5; p=0.03) and right ventricular systolic function improved significantly based on the tricuspid annular plane systolic excursion (TAPSE) (16.5±4 vs. 19±4 mm; .0006); DTI-derived tricuspid lateral annular systolic velocity wave (S')(10±2 vs. 11.3±3 cm/s; p=0.03); RIMP (Tei index) (0.5±.1 vs. 0.46±.1; p=0.04) (Table II). RV 2D FAC (fractional area change) was not significantly different despite a clear improvement tendency (35±6 vs. 37±4 %; p=0.1). No significant modifications were observed concerning LV diastolic parameters. ß-Blocker echo responders (n=23/32; 72%) exhibited the same left and right echo parameters. No echo variables predicted the ß-Blocker response. Conclusions. In HFrEFpatients, ß-Blocker therapy significantly improves significantly LV and RV systolic remodelling. Accordingly, ß-Blocker therapy could be used as soon as possible in HFrEF patients associated with right ventricular dysfunction in order to limit RV remodelling.

P1692

Clinical experience with ambulatory perfusion of levosimendan in an advanced heart failure unit

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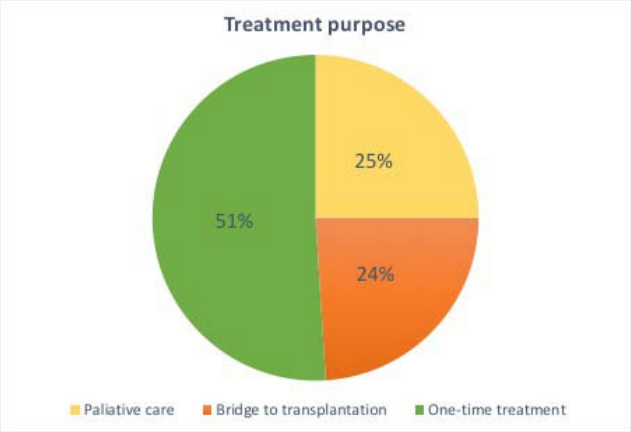
Introduction: ambulatory inotropic treatment in patients with advanced heart failure has been associated with clinical benefits and with a reduction in the hospitalization rate.
Purpose: To analyse the clinical benefit of ambulatory levosimendan perfusion in an advanced heart failure unit.
Methods: retrospective, unicentric study involving patients with chronic heart failure in NYHA III-IV with low cardiac output symptoms who received ambulatory levosimendan infusions between December 2015 and April 2018. We analysed baseline characteristics, the indication of inotropic treatment, the number of infusions, the number of hospitalizations 6 months before and after the infusions and mortality and transplant follow-up.
Results: During the study 149 ambulatory infusions were performed in 61 patients, aged 66±12 years old and 82% men, with LVEF of 26 ±7% and glomerular filtration rate of 52±21 ml/min. Baseline treatment is registered in Table 1 and the underlying disease in figure 1. 46% of all patients received ≥ 2 infusions and 23% received ≥3. We found a non-significant (p=0,06) decrease in hospitalisation rate (RRR 35%) and a clinical improvement.

Baseline farmacological treatment

Drug	% treated patients	Dose≥50%
BB	89	26
ACEI/ARB	74	21
MRA	77	53
ARNI	8	7
Ivabradine	18	17
Diuretic	95	
Amiodarone	15	
Digoxin	23	

BB- BetablockerACEI- Angiotensin Converter Enzime InhibitorARB- Angiotensin II Receptor BlockerMRA- Mineralocorticoid Receptor AntagonistARNI- Angiotensin Receptor Neprilisine Inhibitor



Treatment purpose

In a follow-up over a period of 9,6±6 months 18 patients died (30%), 15 due to a cardiovascular event. Death was associated with worse renal function (p=0,02). Out of 14 patients in list for heart transplant, none died, 10 (71%) reached transplant and 1 underwent ventricular assist device (Heart-Mate III) implantation.
Conclusions: Ambulatory infusion of levosimendan was related with a clinical improvement and a non-significant decrease in hospitalisation for acute heart failure. In 23% of cases, the indication was a bridge to transplant.

P1693

Treatment of patients with chronic heart failure: does management in heart failure clinic improve adherence to guidelines for the treatment of heart failure?

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Background. Despite major advances in treatment options for heart failure patients, studies show that they remain undertreated.
Purpose. The aim of our study was to evaluate the therapeutic management of heart failure in our outpatient heart failure clinic.
Methods. We retrospectively evaluated all patients that were treated in our outpatient heart failure clinic between January 2017 and December 2018. We compared the number of patients receiving angiotensin receptor-neprilysin inhibitors (ARNI), angiotensin-converting enzyme inhibitors (ACEi), angiotensin receptor blockers (ARB), beta blockers and mineralocorticoid receptor antagonists (MRA) before being managed in the heart failure clinic and at last clinic follow-up with independent samples t-test.
Results. We evaluated 215 patients with heart failure; 84 patients (39%) had heart failure with reduced ejection fraction (HFrEF), 35 patients (16%) had heart failure with mid-range ejection fraction (HFmrEF) and 96 patients (45%) had heart failure with preserved ejection fraction (HFpEF).
In HFrEF group, 14% of patients were treated with ARNI (4% were receiving target doses), 65% with ACEi/ARB (26% on target doses), 92% with beta blockers (45% on target doses) and 51% with MRA (2% on target doses). After a mean period of 8.5±6.7 months, 29% of HFrEF patients were treated with ARNI (p=0.000; target dose 23%, p=0.001), 61% with ACEi/ARB (p=0.397; target dose 36%, p=0.073), 96% with beta blockers (p=0.103; target dose 60%, p=0.01), 54% with MRA (p=0.47; target dose 11%, p=0.708).
In HFmrEF group 69% of patients were treated with ACEi/ARB (31% on target doses) and 83% with beta blockers (40% on target doses). After a mean period of 7.1±5.4 months, 83% of patients with HFmrEF were treated with ACEi/ARB (p=0.023; target dose 43%, p=0.044) and 89% with beta blockers (p=0.16; target dose 51%, p=0.044).
In HFpEF group 77% of patients were treated with ACEi/ARB (45% on target doses) and 89% with beta blockers (35% on target doses). After a mean period of 8.6±5.7 months, 83% of patients with HFpEF were treated with ACEi/ARB (p=0.134; target dose 55%, p=0.041) and 89% with beta blockers (p=0.16; target dose 51%, p=0.044).
Conclusions. Our data suggests that current guidelines for the treatment of heart failure are still not being reflected in clinical practice, especially if patients are not managed in heart failure clinic. With outpatient management in a dedicated heart failure clinic, medication can be titrated in a relatively short period of time and better adherence to the guidelines can be achieved despite possible side effects that can be overcome with frequent patient monitoring.

P1694

Intermittent infusions of levosimendan in advanced heart failure: last but not least; a single-centre clinical experience on the efficacy of repeated levosimendan infusions.

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Background: Advanced Heart Failure(AdHF)is a therapeutic challenge.AdHF patients progressively face worsening functional capacity and quality of life, recurrent episodes of congestion and related hospitalizations, in spite of maximal optimized therapy.While few are candidates for life-saving therapies such as left ventricular assist devices and heart transplant, most AdHF patients are treated with a symptom palliation strategy.Levosimendan(Levo)is a calcium sensitizer inodilator whose effects in AdHF have been evaluated in 3 trials and one registry with encouraging results.Publications in this area are limited, further trials and real-world data are needed to fully elucidate the effects of Levo.
Purpose:To retrospectively investigate the clinical, echo, lab and arrhythmic effects of intermittent Levo infusions in AdHF patients treated for at least 6 months in a real-world setting.
Methods:This is an observational retrospective study.We retrospectively collected the data of patients(29)treated with repeated Levo infusions for at least 6 months in our unit from 2006 to 2018.Most patients were treated for symptoms relief(76%), the others as a bridge to transplant/LVAD or decision(34%).Clinical, echo and lab data were recorded from medical records.Data regarding arrhythmias and ICD shocks were retrieved from device ambulatory control reports.The outcomes of the same population of patients was compared for the 6 months before levosimendan initiation and for the 6 months thereafter.
Results: Male were 73%, average age was 69 years, mean Charlson Comorbidity score was>7, cardiomyopathy was ischemic in 45% and dilatative in 35%.Levo determined an improvement in NYHA class(p=0.012), ejection fraction(28.6%±7.1 vs 22.6%±6.7,p=0.006) and pulmonary artery systolic pressure(42.2±13mmHg vs 51.5±9mmHg,p=0.017), and reduced BNP levels(1054±812 vs 1779±1280,p=0.003).Creatinine levels remained stable (1.96±0.8 mg/dl vs 1.88±0.8 mg/dl,p=0.593). No differences were found in sustained ventricular arrhythmias or defibrillator therapies before and after Levo (0.4 vs 0.7, p=0.5). Mitral regurgitation was >moderate in 16 patients before Levo and in 6 patients after 6 months of infusions(not significant, p=0.7).Levo significantly reduced emergency room visits (0.1+0.4 vs 1.1+1.6,p=0.02).When considering only the patients treated after 2013(when the Italian palliative care network became operational),the in-hospital-days were significantly reduced(2.8±5.3 vs 10.7±9.4,p=0.012).
Conclusions: Intermittent Levo appears to be an effective and safe option in AdHF.It improves NYHA class and ejection fraction, reduces pulmonary systolic pressure, BNP levels, HF hospitalizations and emergency room visits. Furthermore, it seems to stabilize renal function.Reassuringly, these benefits are reached without an increase in the arrhythmic burden.In this regard, it is noteworthy that this is the first registry to use the ICD reports to investigate the arrhythmic safety of Levo.

P1695

Study of effect of therapy of chronic obstructive pulmonary disease on coexistent chronic heart failure

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The aim of this study was to determine the impact of chronic obstructive pulmonary disease treatment on the clinical condition of patients with heart failure. Forty Patients were enrolled in this study with co-existent heart failure (EF < 50%) with chronic obstructive pulmonary disease. Most of the studied patients (40%) were aged between 61 &70 years old. Smoking cessation: 25 patients stopped smoking (62.5%), and 15 patients didn't stop smoking (37.5%). Risk factors: Among studied cases, 34 cases (85%) suffered from systolic hypertension, 18 cases (45%) suffered from diabetes, and 28 cases (70%) had dyslipidemia. All patients were smoker (97.5%) except 1 patient was passively smoking and 17 patients were NYHA class III (42.5%), 23 patients were NYHA class II. Mean body mass index was 29.2 ± 6 kg/m2. ECG findings: Among studied patients, ischemic changes in ECG were present in 37 cases (92.5%).
Methods: Spirometry: The following results were obtained: FEV: (Forced Expiratory Volume in one second), FVC: (Forced Vital Capacity), FEV/FVC ratio, FEF 25-75%: (Forced Expiratory Flow between 25-75% of vital capacity), PEF (peak expiratory flow). Echocardiography was done. All patients were on treatment for heart failure and for COPD. Patients were followed for two months, and then echocardiography and spirometry were repeated for assessment of LV function and respiratory functions. Drugs given angiotensin blockers in 90%, beta-blockers (selective) in 94%, Sympathomimetics (long-acting β2-agonist LABA) in 100%, long-acting muscarinic antagonist (LAMA) in 55%; Figure. Results: Echo data Baseline EF ranged from19 to 50 % with a mean 32.7 ± 9.1. Two months later, EF ranged from 19.3 – 56.6% with a mean 36.18 ± 10 showing obvious improvement after addition of COPD treatment to patients on anti-failure treatment. Right ventricular systolic pressure (RVSP) ranged from 18.0 – 86.0 mmHg in baseline echocardiography assessment with a mean 47.9 ± 18.7. Two months later, follow up echo showed (RVSP) ranged from 16 – 81 mmHg with a mean 45.40 ± 18.0 showing obvious improvement after addition of COPD treatment to patients on anti-failure treatment. Spirometry Data: FVC ranged from 0.55 – 2.60 liters in pre-treatment of COPD with a mean 1.31 ± 0.52. Two months later, F VC ranged from 0.36 – 2.84 liters with a mean 1.62 ± 0.59 showing obvious improvement after addition of COPD treatment to patients on anti-failure treatment.
EF improved in 25 patients in whom COPD improved in all, EF did not improve in 15, in whom COPD did not improve also. All patients who stopped smoking had improvement in EF and COPD; all who did not stop smoking had no improvement in both parameters.
Conclusions: Improvement of COPD is associated with improvement of heart failure. Cessation of smoking is the best marker of possible improvement of both diseases. The use of sympathomimetics as inhalers or tablets had no deleterious effect on cardiac function.

P1696

Polypharmacy in patients with chronic heart failure

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Background: Ageing is associated with an increased number of comorbidities that frequently require medical treatment. Since the incidence of chronic heart failure (HF) is age-related, it is more likely that HF patients will be subjected to polypharmacy. However, polypharmacy often involves potentially dangerous drug-drug and food-drug interactions that complicate the management of both HF and other possible afflictions. Purpose: Our aim was to investigate the use of polypharmacy in HF patients. Methods: We conducted a retrospective, observational study on patients referred between January and February 2018 to the Internal Medicine Department of an emergency hospital in Romania. Patients were identified by a database search of diagnostic codes of discharge diagnoses. Patient characteristics and medical prescriptions were retrieved from medical records. Student t-test was used to assess differences between groups. Results: The study group (74.02±10.62 years, range 46-92 years) included 55 heart failure patients: 26 women (47.30%) and 29 men (52.70%). The control group (64.48±13.62 years, range 22-93 years) included 153 non-HF patients: 75 women (49.02%) and 78 men (50.98%). In HF patients, the number of comorbidities per-patient was 10.69±3.26 (vs. 7.88±3.27 in controls), the number of prescribed drugs at discharge was 7.93±1.97 per-patient (vs. 5.83±2.80 in controls) and the number of drug-to-drug interactions was 9.15±5.41 per-patient (vs. 4.80±5.02 in controls). 98.18% (54 patients) of the study group was at risk for at least one potentially harmful interaction vs. 79.08% (121 patients) in the control group. In HF patients, age correlated positively with the number of comorbidities, but negatively with the number of drugs, drug-drug and food-drug interactions.

Table 1	*HF patients*	*range*	*Controls*	*range*	*p-value*
Comorbidities	10.69±3.26	5-21	7.88±3.27	0-16	<0.001
Prescribed drugs	7.93±1.97	4-13	5.83±2.80	1-15	<0.001
Drug-drug interactions	9.15±5.41	0-22	4.80±5.02	0-23	<0.001
Minor drug-drug interactions	1.67±1.83	0-9	0.99±1.43	0-9	<0.02
Moderate drug-drug interactions	6.64±4.65	0-20	3.65±3.94	0-16	<0.001
Major drug-drug interactions	0.89±0.93	0-4	0.24±0.64	0-4	<0.001
Food-drug interactions	2.71±1.20	0-6	2.21±1.48	0-8	<0.02

Variable 1	Variable 2	Pearson's correlation coefficient (r)	
		HF patients	Controls
Age	Comorbidities	+ 0.29	+ 0.32
Age	No. drugs	– 0.40	+ 0.22
Age	No. interactions	– 0.35	+ 0.21
Age	No. minor interactions	– 0.33	+ 0.10
Age	No. moderate interactions	– 0.24	+ 0.24
Age	No. major interactions	– 0.38	+ 0.08
Age	Food-drug interactions	– 0.06	+ 0.18
Comorbidities	No. drugs	+ 0.10	+ 0.52
Comorbidities	No. interactions	– 0.04	+ 0.45
Comorbidities	No. minor interactions	– 0.04	+ 0.23
Comorbidities	No. moderate interactions	– 0.07	+ 0.46
Comorbidities	No. major interactions	+ 0.27	+ 0.28
Comorbidities	No. food-drug interactions	+ 0.20	+ 0.42
No. drugs	No. drug-drug interactions	+ 0.57	+ 0.82
No. drugs	No. minor interactions	+ 0.10	+ 0.47
No. drugs	No. moderate interactions	+ 0.55	+ 0.81
No. drugs	No. major interactions	+ 0.51	+ 0.40
No. drugs	No. food-drug interactions	+ 0.16	+ 0.67

Results

Conclusions: Chronic HF patients were prescribed more drugs at discharge and had a higher number of potentially harmful drug-drug or food-drug interactions vs. non-HF patients, as reinforced by our data. Chronic HF patients also had more comorbidities vs. non-HF subjects. Polypharmacy management must be taken into consideration by the clinician when treating chronic HF patients in order reduce drug burden and avoid unnecessary medication.

P1697

Changes in hemodynamic profile in patients with severe systolic dysfunction treated with sacubitril-valsartan

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Background. Post-capillary pulmonary hypertension (PC-PH) is a frequent complication and prognostic marker in patients with advanced heart failure (HF). No specific treatments are available for PC-PH other than optimal HF therapy. In this context, we tested the hypothesis that therapy optimization with sacubitril-valsartan (LCZ), known to reduce the risk of death and hospitalizations for HF, could improve the hemodynamic profile of patients with HF and PC-PH.
Methods. Among the patients included in our institutional prospective HF Registry, we included in this analysis those who underwent two right heart catheterizations (RHC) and started LCZ in between, in the period July 2017 to December 2018. All patients were evaluated for heart transplantation and RHC is part of our routine clinical practice as follow-up strategy in these patients. Baseline and follow-up RHC were compared by paired T-test. Changes in guideline directed therapy (GDT) were also assessed.
Results. 35 patients (86% males; aged 53.3 ± 8.4y, 10(29%) with ischemic etiology, and 12 (34%) in NYHA class III-IV) with severe left ventricular dysfunction (ejection fraction: 25.6±7.5%) underwent two RHC at 187±85 days interval. All patients were receiving therapy with diuretics (187±85mg/day), ACE-i/ARBs (43±27% of GDT dose), and beta-blockers (57±33% of GDT dose) at the time of baseline RHC. LCZ was started at a median of 21(0-116) days after the baseline RHC. By comparing baseline with follow-up RHC in a matched paired fashion, we observed significant reduction of mean pulmonary artery pressure (from 31±11 to 26±9 mmHg; P<0.01), pulmonary capillary wedge pressure (from 21±7 to 18±8 mmHg; P<0.01) and pulmonary vascular resistances (from 2.8±1.7 to 2.0±1.0 WU; P<0.01), associated with a significant increased of cardiac index (from 2.1±0.4 to 2.3±0.6 l/min/m2; P=0.03). Conversely, systolic systemic pressure did not change significantly (from 110±12 to 107±12 mmHg; P=0.16). Of note, diuretics and beta-blockers dose did not change significantly between the two RHC.
Conclusions. In the context of stable and optimized at the maximal tolerated dose of GDT, this pilot experience suggests that LCZ may improve the management of PC-PH in patients with severe LV dysfunction. The changes in hemodynamic profile, including the increase in cardiac index, provide a pathophysiological background of the clinical benefits observed in the LCZ randomized trial.

P1698

Sacubitril/valsartan inverse remodeling - a prospective echocardiographic study

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Background. Sacubitril/valsartan has been shown to improve mortality and reduce hospitalizations in patients with heart failure (HF) with reduced ejection fraction (HFrEF). Although the physiological action mechanisms of sacubitril/valsartan are well described, its effects on left ventricular (LV) remodelling and other echocardiographic (echo) parameters have not been prospectively studied. Objective. The aim of this prospective study was to: (1) evaluate if sacubitril/valsartan impacts LV remodelling based on echo parameters; (2) identify the predictive factors of sacubitril/valsartan response or intolerance. Methods. From May 2017 to September 2018, 52 HF patients were prospectively enrolled using Paradigm-HF criteria: Class II, III, or IV HF; ejection fraction (EF) of 40% or less; hospitalized for HF within the previous 12 months. Echo evaluation was performed before initiating sacubitril/valsartan and 3 months after optimal dose adjustment. Based on previous studies, patients with (absolute) improvement in left ventricular ejection fraction (LVEF) ≥5% were considered significant sacubitril/valsartan responders. Results. The 52 patients completing the study were characterized by age: 70±10 years; gender: 11 women; aetiology: idiopathic in 20 and ischaemic in 32; NYHA Class: II in 17 and III in 35; LVEF: 32±5%; NTProBNP: 1805±1914pg/mL. The final population comprised 41 pts (79%), as 11 (21%) did not tolerate sacubitril/valsartan therapy. Under sacubitril/valsartan, several echo parameters significantly improved: LVEF from 32.6±5 to 36±6% (p<0.0001); LVES volume from 117±40 to 108±46mL (p=0.0051; LVEDD from 60±4 to 57±5mm (p=0.0002); mean right ventricular systolic pressure (RVSP) from 39±10 to 32±8 (p=0.0001). No significant modifications were observed concerning LV diastolic parameters or RV echo parameters. Sacubitril/valsartan echo responders (n=18/41; 42%) had less severe LV remodelling, as shown by LVEDV: 144±37 vs. 193±47mL, p=0.0009; LVESV: 96±28 vs. 133±42mL; p=0.003; LVTDD: 61±4 vs. 57±5mm; p=0.02; significant mitral regurgitation: 6/18 (33%) vs. 16/23 (69%), p=0.02; no diastolic LV or RV parameters impacted sacubitril/valsartan response. Predictors of sacubitril/valsartan intolerance were baseline creatinine level: 137±99 vs. 100±24, p=0.03; LVEF: 29±6 vs. 33±5%; p=0.04. Conclusions. In HFrEF patients, sacubitril/valsartan significantly improves LV systolic remodelling, without any significant effects on LV diastolic or RV systolic echo parameters. Sacubitril/valsartan responders exhibit both less severe LV remodelling and less significant mitral regurgitation. Accordingly, sacubitril/valsartan could be used as soon as possible in HFrEF patients in order to limit LV remodelling, while precluding non-response or intolerance.

P1699

Initial clinical experience with the first drug (sacubitril/valsartan) in a new class -arni- in afro-caribbean patients with heart failure and reduced ejection fraction

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Background: Among Afro-Caribbean patients with heart failure and reduced ejection fraction (HFrEF), non-ischemic dilated cardiomyopathy is the most frequent etiology. There are no studies on the use of the Angiotensin II Receptor Blocker Neprilysin Inhibitor (ARNI), Sacubitril/Valsartan in this population. We present the initial experience concerning the tolerance, safety, adverse effects and efficacy of ARNI among Afro-Caribbean. Methods: An observational, non-interventional, real-world study was done based on 44 patients with HFrEF, in Jamaica between October, 2017, and June , 2018. Clinical characteristics, features of heart failure and adverse events (AE) were documented. Eligible patients were prescribed Sacubitril/Valsartan, titrating the dose up to 200 mg twice daily over 4 to 8 weeks. Subsequently, echocardiographic Ejection Fraction (EF) at baseline and post intervention were reviewed. Wilcoxon signed-rank test and paired sample t-test were used to compare groups. Results: The most frequent AE were symptomatic hypotension 11.36%, cough 6.81%, and renal dysfunction 2.27%. None developed angioedema. Post-treatment echocardiograms of 26 patients, demonstrated an average of 14.7% (±2) increase in EF, from 29.4% to 44.1% (p<0.001) over a median of 3.15 months of therapy. Conclusion: Sacubitril/Valsartan was demonstrated to be safe, well tolerated and associated with significant functional improvement among Afro-Caribbean patients with HFrEF.

P1700

Empagliflozin in heart failure: beyond clinical endpoints

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Introduction: Since publication of the EMPAREG trial demonstrated a beneficial prognostic impact, reducing death from cardiovascular causes and hospitalization for heart failure, the use of inhibitors of the sodium-glucose transport protein 2 has raised. Left ventricular ejection fraction (LVEF) and other echocardiographic parameters are independent prognostic factors in heart failure. Does empagliflozin improve ventricular remodeling? Does it improve diastolic function?
Methods: To answer these questions, a series of patients with heart failure who initiated empagliflozin between December 2016-June 2017 was prospectively assessed. Aetiology and baseline characteristics were collected. LVEF, ventricular volumes and diastolic function parameters were evaluated by transthoracic echocardiogram before and after 6-month treatment. Patients with reversible aetiologies, and those with modified treatment during follow-up were excluded. Patients without echocardiogram before and 6 months after therapy were also excluded. Wilcoxon test was conducted.
Results: Twenty patients were included; mean age was 72 years old; 14 (70%) patients were men and 60% had ischaemic aetiology. Mean LVEF was 36,7% and median estimated glomerular filtration rate was 70 ml/min. Regarding to optimal medical treatment: 79% were on angiotensin-converting-enzyme inhibitor, 21% sacubitril-valsartan, 84% beta-blocker and 75% were receiving a mineralocorticoid-receptor antagonist. Empagliflozin was discontinued in 1 patient because of persistent genital candidiasis.
LVEF did not show significant changes 6 months after treatment (36,7±13,5 vs 39,9±12,6; p=0,16). However, lower left ventricular end systolic (111,6±62,2 vs

92,7±56,5; p=0,022) and left ventricular end diastolic volumes (170,5±72,5 vs 153,1±73,3; p=0,028) were described. The study of diastolic function showed no differences in E/e'(15,5±4,6 vs 9,5±2,6; p=0,138), tricuspid regurgitation velocity (3,0±0,4 vs 3,0±0,3; p=0,462) nor left atrium volume (94,8±26,2 vs 76,3±33,1; p=0,059).
Conclusion: Empagliflozin significantly improves left ventricular end diastolic and end systolic volumes. In our small sample, its beneficial effect does not show an important difference in LVEF or diastolic function. Studies with larger number of patients included and longer follow-up periods are needed to characterise the influence of empagliflozin on heart structural remodeling.

P1701
ARNI use in clinical practice: PARADIGM-HF trial results applied to the real world

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On behalf of: RICA-HFTeam

Introduction: The PARADIGM-HF trial showed the clinical benefits of the addition of sacubitril to the conventional neurohormonal antagonist therapy regimen for heart failure (HF) with reduced ejection fraction (rEF). However, national data on the effects of sacubitril/valsartan (S/V) introduction in real-life patients (pts) is scarce.
Objective: To evaluate the clinical effects of S/V introduction in a population of pts with HFrEF followed in a tertiary hospital HF Clinic.
Methods: Prospective study of consecutive pts with HFrEF treated with S/V. Clinical, echocardiographic and laboratorial data were collected before and after the introduction of the drug. Episodes of HF decompensation (defined as the need to increase oral dose of diuretics or intravenous administration of diuretics) and hospitalizations during the follow-up period were registered.
The number of decompensation episodes or hospitalization were compared with the number of similar events that occurred in a period with exactly the same time duration but preceding the first dose of S/V. Comparative statistical analysis was performed using Wilcoxon test.
Results: One hundred and two pts were included. The median follow-up time was 6 (4-10) months. There was a significant improvement in NYHA functional class (FC), mainly due to a marked decrease in the number of pts in FC III (15.7 vs. 2%, P <0.001) (Table 1). Mean left ventricle ejection fraction (29.5±3.2 vs. 34±5.8%, P =0.005) also improved, and NTproBNP was significantly reduced (3107±2128 vs. 2619±1437pg/mL, P <0.001) after S/V prescription.
There was no significant change in serum creatinine (1.24±0.49 vs. 1.26±0.46 mg/dL, P =NS) or systolic blood pressure (120.2±18.8 vs. 119.2 ± 18.8mmHg, P =NS).
Importantly, there was a significant reduction in the number of HF decompensations (49 episodes in 37 pts vs. 10 episodes in 8 pts, P <0.001) and hospitalizations (31 episodes in 23 pts vs. 10 events in 7 pts, P <0.001) after initiation of the drug.
Conclusion: Starting sacubitril/valsartan in a population of patients followed in a HF Clinic was associated with significant clinical improvement, marginal echocardiographic improvement, and NTproBNP reduction. In parallel, the introduction of the drug led to a significant reduction of HF decompensation episodes and hospitalizations. These data derived from a real-lifepopulation confirm the benefits of sacubitril/valsartan firstly demonstrated in the PARADIGM-HF Trial.

	Pre Sacubitril/Valsartan	Post Sacubitril/Valsartan	*P*
NYHA Functional Class			<0.001
I – Nº of patients (%)	10 (9.8)	27 (26.5)	<0.001
II – Nº of patients (%)	76 (74.5)	73 (71.6)	0.71
III – Nº of patients (%)	16 (15.7)	2 (2)	<0.001
IV – Nº of patients (%)	0 (0)	0 (0)	1.0
Left Ventricle Ejection Fraction (%)	29.5 ± 3.2	34.0 ± 5.8	0.005
Systolic blood pressure (mmHg)	120.2 ± 18.8	119.2 ± 18.8	0.361
NTproBNP (pg/mL)	3107 ± 2128	2619 ± 1437	<0.001
Serum Creatinine (mg/dL)	1.24 ± 0.49	1.26 ± 0.46	0.62
Potassium (mmol/L)	4.5 ± 0.8	4.66 ± 0.7	0.034
HF decompensation – Nº of episodes	49	10	<0.001
HF decompensation – Nº of patients (%)	37 (36.2)	8 (7.8)	
Hospitalization – Nº of episodes	31	10	<0.001
Hospitalization – Nº of patients (%)	23 (22.5)	7 (6.8)	

Table 1

P1702
MYK-491, a novel cardiac myosin activator, increases cardiac contractility in healthy volunteers

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Funding Acknowledgements: MyoKardia, Inc.

Background: MYK-491 is a novel small-molecule selective cardiac myosin activator, in clinical development for the treatment of heart failure with reduced ejection fraction. In non-clinical studies, MYK-491 increased myocardial contraction, with minimal impact on relaxation and without perturbing calcium homeostasis. We report results of the first-in-human study.
Methods: The effects of oral MYK-491 were evaluated in a single ascending dose study conducted in healthy volunteers across 8 sequential dose cohorts (6 active and 2 placebo subjects per cohort). Assessments included evaluation of clinical safety and tolerability, serial plasma drug concentrations, cardiac echo-doppler, ECG and clinical laboratory values.
Results: 64 healthy volunteers were studied (40 male, 24 female, median age 27 years).
MYK-491 was safe and well tolerated. One subject experienced a serious adverse event (brief asymptomatic episodes of heart block lasting 4-8 sec during sleep that resolved spontaneously and led to prolongation of monitoring). Dose-proportional increases in drug exposure (Cmax, AUC) were observed up to dose cohort 7. Echocardiography parameters by MYK-491 Plasma Concentration Groups (6h post dose) are shown in Table (placebo-corrected LS mean changes from baseline) are shown
Conclusions: MYK-491 administration in healthy volunteers was safe and led to an increase in echocardiographic measures of cardiac contractility which were associated with a modest increase in SET and no discernable effect on diastolic function.

Changes in Echo Measures (6h post-dose)

	Baseline (n=48)	MYK-491 Concentration Group		
	Lower (n=29)	Medium (n=9)	Higher (n=10)	
Ejection Fraction (%)	63	0.3	2.2	3.2*
Fractional Shortening (%)	32	-0.6	3.5*	6.3*
Global Longitudinal Strain (%)	-20.4	-0.5	-1.3	-1.8*
Stroke Volume (mL)	70	2.6	2.5	8.2*
End Systolic Diameter (cm)	3.2	0.03	-0.16*	-0.31*
End Systolic Volume (mL)	34	-1.2	-4.1*	-6.0*
End Diastolic Diameter (cm)	4.7	-0.01	-0.04	-0.12*
End Diastolic Volume (mL)	93	-2.2	-6.1	-9.7*
Systolic Ejection Time (SET, msec)	328	11	23*	26*
E/e' Ratio	6.1	-0.24	0.14	-0.06
E/A Ratio	1.9	0.15	0.18	-0.05

* p < 0.05 (change from baseline, MYK-491 concentration group versus placebo)

P1703
Comparative effectiveness of loop diuretics on mortality in the treatment of patients with chronic heart failure - A multicenter propensity score matched analysis

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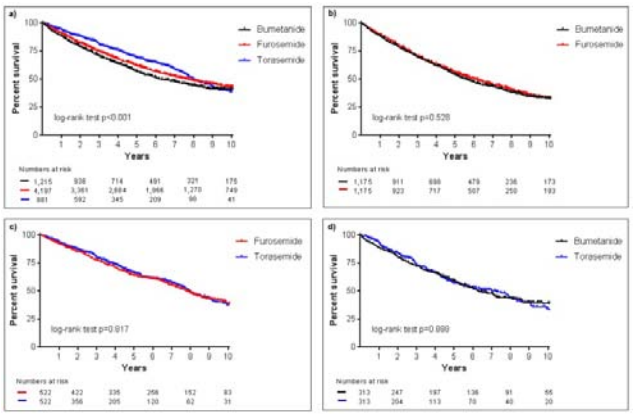
Background: Loop diuretics are given to the majority of patients with chronic heart failure (HF). Whether the different pharmacological properties of the three guideline-recommended loop diuretics result in differential effects on survival is unknown.
Methods: 6,293 patients with chronic HF using either bumetanide, furosemide or torasemide were identified in three European HF registries. Patients were individually matched on both the respective propensity scores for receipt of either drug and dose-equivalents thereof.
Results: During a follow-up of 35,038 patient-years, 652 (53.7%), 2,179 (51.9%), and 268 (30.4%) patients died amongst those prescribed bumetanide, furosemide, and torasemide, respectively. In univariable analyses of the general sample, bumetanide and furosemide were both associated with higher mortality as compared with torasemide treatment (HR 1.50, 95% CI 1.31-1.73, p<0.001, and HR 1.34, CI 1.18-1.52, p<0.001, respectively). Mortality was higher in bumetanide users when compared to furosemide users (HR 1.11, 95% CI 1.02-1.20, p=0.01). However, there was no significant association between loop diuretic choice and all-cause mortality in any of the matched samples (bumetanide vs. furosemide, HR 1.03, 95% CI 0.93-1.14, p=0.53; bumetanide vs. torasemide, HR 0.98, 95% CI 0.78-1.24, p=0.89; furosemide vs. torasemide, HR 1.02, 95% CI 0.84-1.24, p=0.82). The results were confirmed in subgroup analyses with respect to age, sex, left ventricular ejection fraction, NYHA functional class, cause of HF, rhythm, and systolic blood pressure.
Conclusions: In patients with HF, after adjustment for potential prescribing-biases, mortality does not appear to be affected by choice of loop diuretic in clinical practice. The results of randomised trials comparing diuretic agents are awaited.



Kaplan–Meier curves 10-year survival

P1704

A low dose Pimobendan was observed to prolong the period until re-hospitalization for Japanese patients with advanced heart failure, especially in the vulnerable post-discharge period.

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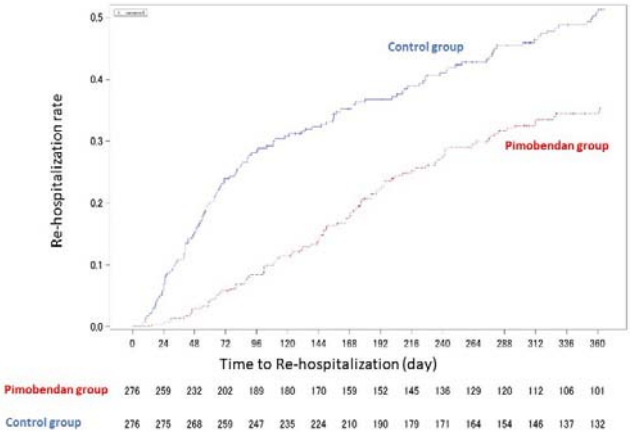
On behalf of: PREFER study
Funding Acknowledgements: TOA EIYO LTD.

Background One of the therapeutic goals in treatment of patients with advanced heart failure is prevention of re-hospitalization. The oral calcium sensitizer Pimobendan is one of the drugs expected to show efficacy in this situation.
Purpose: We investigated whether Pimobendan could contribute to prolongation of the period until re-hospitalization for heart failure and decrease the frequency of hospitalization. (UMIN 000034228)
Methods This retrospective cohort study is based on anonymized electronic health records from acute-care hospitals in Japan as gathered during the period April 2008 – February 2018.Patients who experienced two or more hospitalizations for heart failure during the observation period were enrolled. Patients were allocated to one of two groups. In one of the groups patients continued to receive Pimobendan on an outpatient basis, whereas patients in the other group were not prescribed Pimobendan upon discharge from hospital. The one-to-one propensity-score matching and IPTW methods were used to balance patient characteristics in these 2 groups.
Results: We identified 10,258 patients who satisfied our inclusion and exclusion criteria. Out of those 473 patients were prescribed Pimobendan during the follow-up period, whereas Pimobendan was not prescribed for 9,785 patients, who constitute the control group.276 propensity score matched pairs were identified for Pimobendan group versus control group. Mean age ± standard deviation [SD] was 74.3 ± 10.9 and 74.4 ± 11.3 years, Male was 65.2 and 67.8 %, NYHA class 3 or 4 was 68.1 and 66.0 %, atrial fibrillation observed 60.5 and 62.0 % for Pimobendan group and control group, respectively. The cumulative incidence of heart failure hospitalization at 1 year was 0.35 (95% confidence interval [CI] 0.30 - 0.42) in Pimobendan group, and it was significantly lower than the control group (0.51, 95% CI 0.45 - 0.58) (p <0.002). Similar result about prolongation of period to rehospitalization for heart failure by Pimobendan observed by IPTW method.
The number of hospitalizations due to heart failure at 1 year was 0.5 ± 1.0 for the Pimobendan group, which was significantly less than for the control group (0.8 ± 1.3, p=0.021) as revealed by the Propensity score match method. No significant difference, however, was observed by the IPTW method0.5±1.0 vs 0.6±1.0, p=0.532. Accordingly, it is a controversial issue whether Pimobendan can decrease hospitalization frequency.
The cumulative incidence of hospitalizations due to life-threatening arrhythmia was 6.41 (95%CI 1.45 – 11.37] and 2.41 (95% CI -0.63 – 5.45) /1000 person-year for the Pimobendan group and the control group, respectively. There was no difference between the 2 groups (p=0.315) when analyzing for life-threatening arrhythmia.
Conclusion: Pimobendan might safely contributes to prolonging the period until re-hospitalization in Japanese patients with advanced heart failure, especially in the post-discharge vulnerable phase.



P1705

microRNA-21 as a prognostic biomarker of sacubitril/valsartan treatment response in heart failure with reduced ejection fraction

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Purpose: MicroRNAs (miRs) modulate cardiovascular development and disease by post-transcriptional gene expression regulation and thus they are emerging as potential biomarkers and promising therapeutic targets in cardiovascular disease. Although sacubitril/valsartan, a first in class angiotensin-receptor-neprylisin inhibitor (ARNI), has recently shown its benefits and safety in symptomatic patients with chronic heart failure with reduced ejection fraction (HFrEF), there is no evidence yet on predicted markers for its efficacy. The aim of this study is to evaluate miR-208b, miR-499, miR-21, miR-1, miR-133a and miR-26b gene expression levels as prognostic markers of sacubitril/valsartan treatment response in patients with HFrEF
Methods: We included 26 symptomatic patients (aged 68 ± 12 years) with chronic HFrEF (LVEF <35%) and New York Heart Association (NYHA) class II/III, who received sacubitril/valsartan (mean dose of 94 ± 43 mg/day) on optimal medical treatment. All patients underwent a serial assessment with standard conventional transthoracic and a two-dimensional speckle tracking echocardiography at baseline and at 6 months follow-up. MiRs expression levels in peripheral blood mononuclear cells were quantified by real-time reverse transcription polymerase chain reaction.

Results: Blood pressure 114/70 ± 9/6 mmHg did not show any significant change (from 114/72 ± 9/6 mmHg to 111/69 ± 10/5 mmHg, p=NS). Left ventricular global longitudinal peak strain (GLPS) showed a significant improvement during the 6 months follow-up (from -7.22 ± -1.2 % at baseline to -8.2 ± -0.9 %, p= 0.01). miR-21 gene expression levels at baseline revealed a significant positive correlation with the reduction of GLPS ($r = 0.5$, $p < 0.001$) which was independent of the patients' clinical parameters.
Conclusions: Our data reveal that miR-21 is a strong prognostic marker of GLPS improvement following sacubitril/valsartan initiation and may discriminate patients with HFrEF at high likelihood of responding in sacubitril/valsartan therapy.

P1706

Metabolism and pharmacokinetic drug interaction profile of vericiguat, a soluble guanylate cyclase stimulator

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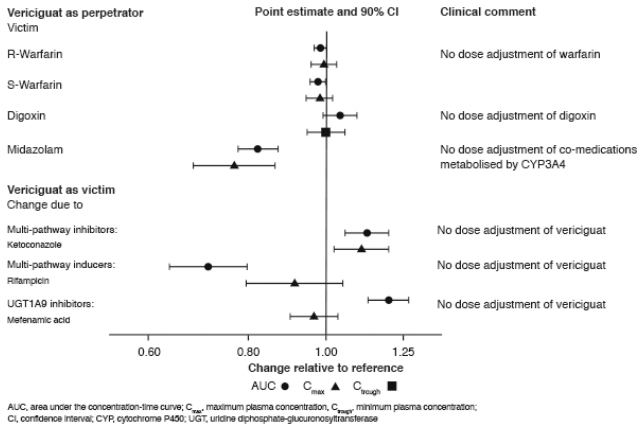
Background/Introduction: Vericiguat is under investigation in patients with heart failure (HF; NCT02861534). This patient population is characterised by multiple comorbidities and concomitant medications.
Purpose: An understanding of the clearance mechanisms, elimination and potential for drug–drug interactions (DDIs) of vericiguat is a pre-requisite for dose recommendations.
Methods: Biotransformation of vericiguat was characterised in vitro using hepatocytes, liver microsomes, recombinant uridine diphosphate-glucuronosyltransferase (UGT) isoforms and with selective UGT inhibitors in liver microsomes. These were complemented by a human mass balance study with a single dose of 14C-labelled vericiguat 5 mg and six DDI studies in healthy volunteers (Table 1). The perpetrator DDI potential of vericiguat was investigated in vitro.

Table 1

Healthy volunteer study	Design	Vericiguat treatment	Co-medication
Mass balance	Open-label, non-randomised, non-placebo-controlled	5 mg radiolabelled [^{14}C] SD	Not applicable
DDI with warfarin	Randomised, double-blind, 2-fold crossover	10 mg OD for 9 days	Warfarin 25 mg SD
DDI with digoxin	Randomised, open-label, 2-fold crossover with additional fixed treatment period	10 mg OD for 10 days; 10 mg SD	Digoxin 0.375 mg OD for 14 days
DDI with CYP3A4 index substrate	Randomised, open-label, 2-fold crossover	10 mg OD for 4 days	Midazolam 7.5 mg SD
DDI with multi-pathway inhibitor	Randomised, open-label, 2-fold crossover	1.25 mg SD	Pre- and co-administration of ketoconazole 200 mg BID for 3 days
DDI with multi-pathway inducer	Non-randomised, open-label, fixed sequence	10 mg SD	Pre- and co-administration of rifampicin 600 mg OD for 9 days
DDI with UGT1A9 inhibitor	Randomised, open-label, 2-fold crossover	2.5 mg SD	Pre- and co-administration of mefenamic acid 500 mg followed by MDs of mefenamic acid 250 mg every 6 hours for 3 days

BID, twice-daily; CYP, cytochrome P450; DDI, drug–drug interaction; MD, multiple dose; OD, once-daily; SD, single dose; UGT uridine diphosphate-glucuronosyltransferase



AUC, area under the concentration-time curve; C_{max}, maximum plasma concentration, C_{trough}, minimum plasma concentration; CI, confidence interval; CYP, cytochrome P450; UGT, uridine diphosphate-glucuronosyltransferase

Clinically, the perpetrator DDI potential was assessed with the narrow-therapeutic index drugs digoxin and warfarin, and the cytochrome P450 (CYP) 3A4 index substrate midazolam. Vericiguat was administered as a victim drug with ketoconazole, rifampicin and mefenamic acid.
Results: After administration of 14C-labelled vericiguat, 53.1% and 45.2% of the dose was excreted via urine and faeces, respectively. The main metabolic pathway of vericiguat is glucuronidation via UGT1A9 and UGT1A1.
In vitro studies revealed that the risk of pharmacokinetic (PK) DDIs with substrates of CYP and UGT isoforms, as well as major transport proteins, is low. These were confirmed by the clinical studies (Figure 1).
Conclusion(s): A low PK interaction potential of vericiguat was estimated from in vitro data and confirmed in six studies. Maximum changes in vericiguat exposure (˜30%) were within the range of overall PK vericiguat variability. These results indicate that the PK DDI profile of vericiguat is suited to the treatment of a HF population.

P1707

Are we optimizing medical therapy during a heart failure hospitalisation ?

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Funding Acknowledgements: Société Québécoise d'Insuffisance Cardiaque (SQIC)

Background Over the past 20 years, number of guideline recommended medical therapies have been added to our therapeutic arsenal for heart failure with reduced ejection fraction (HFrEF). Despite their proven efficacy, prescription rates of such medications are still less than optimal and every opportunity should be taken to improve them.
Purpose: This study aim to establish if clinicians take an acute decompensated heart failure (ADHF) hospitalisation as an opportunity to optimise the patient's heart failure medication.
Methods Consecutive patients hospitalized for ADHF with LVEF ≤ 40% between January 1st and December 31st 2015 (n=124) were identified using our institution's database. All of their files were reviewed for their baselines characteristics and their heart failure treatment at admission and at discharge.
Results: Most of our patients were male (61%) with a mean age of 77 ± 11 years old. The mean LVEF was 28% ± 9% and the underling cause being ischemic cardiopathy in the majority (65%) of patients. 32% of them ad a new diagnosis of HFrEF and the median length of hospital stay was 10 days. At admission, the prescription rate of beta blockers (β-blockers), angiotensin-converting enzyme inhibitors/angiotensin II receptor blockers (ACEI/ARB) and mineralocorticoid receptor antagonists (MRA) were 71%, 54% and 21% respectively vs 87% for β-blockers, 63% for ACEI/ARB and 44% for MRA at hospital discharge. Only 10% of the patient had all three medication classes prescribed at admission vs 27% at discharge. Figure 1 show the prescription rate of the different heart failure medication. Only a small proportion of patients were prescribed the guideline recommended dose of β-blockers (23%) and MRA (2%) at admission and this proportion only slightly increased at discharge (27% and 8% respectively).
Conclusion: Although an episode of ADHF is an important moment to try to optimise disease modifying drug for our patients it is seldom the case. Prescription rate of guideline directed medical therapies significantly increased but was still less than optimal and dosage optimisation of already prescribed heart failure medication was low. To improve cardiovascular morbidity and mortality this gap should be address.

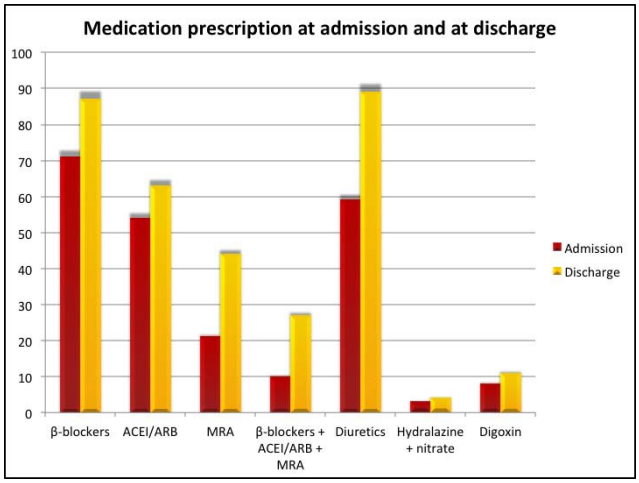

Figure 1

P1708

Sacubitril/Valsartan in clinical practice, how does it work?

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Background Sacubitril/Valsartan (Sac/Val) an angiotensin receptor blocker–neprilysin inhibitor (ARNI) has been proven to be more effective than enalapril for symptomatic patients with heart failure (HF) with reduced ejection fraction (HFrEF) despite optimal therapy. It was introduced in ESC guidelines and in Swedish guidelines in 2016. However, the real world HF population differ from patients in randomized controlled trials in many clinical aspects.

Aim This study was aimed to investigate eligibility, titration and tolerability for Sac/Val in a real-world clinical setting.

Methods This retrospective cohort study consisted of two parts; part 1 (eligibility study): consecutive inclusion of all patients discharged from a hospital due to HF (ICD10 I50) from 2016-11-01 until 2017-10-31. Patients were judged to be eligible to Sac/Val based on ESC criteria (EF ≤40%, NT-proBNP >400 ng/L, target dose of ACE-inhibitor/angiotensin receptor blocker (ARB), GFR>30 ml/h/1,73m2, S-Potassium<5.2 mmol/L, treatment with beta blocker and MRA) or Swedish criteria (EF ≤35%, highest tolerable dose of ACE-inhibitor/ARB + Beta blocker and MRA, GFR>30, S-potassium <5,2).

Part 2 (tolerability study): from patients who received Sac/Val during the same study period data regarding initial dose, up-titration, adverse events, hospitalisation and mortality during follow-up (from 6 months to one year) were collected.

Results During one year, 1355 patients (mean age 78±13 yrs) were hospitalized due to HF. Among them, 562 patients had ejection fraction ≤40% in which 10.9% of the patients were eligible for initiation of Sac/Val based on ESC criteria, and additionally 15.9% were eligible according to Swedish recommendations. During the same period, 96 patients (mean age 66±12 yrs) were initiated with Sac/Val, 18 % discontinued, 15.6% developed S-K≥5.5 mmol/L, 13.5% S-creatinine>221 µmol/L and 7.3% hypotension. During follow-up 24.0% were readmitted for HF and 13.8% died (fig1). Logistic regression analysis showed lower starting dose, renal disease and higher NTpro-BNP level as predictors for worsening of renal function and higher number of comorbidities as predictors for readmission due to HF. Analysis also showed renal disease as predictor for hypotension and further, high age, elevated NTpro-BNP and more comorbidities as predictors for death.

Conclusions In our consecutive hospital HF cohort, 26.8% of patients with reduced EF were eligible for Sac/Val. Those who received Sac/Val were younger. Side effects and discontinuation rates were comparable to those observed in the PARADIGM trial except a higher percentage of hypotension, worsening of renal function and HF readmission.

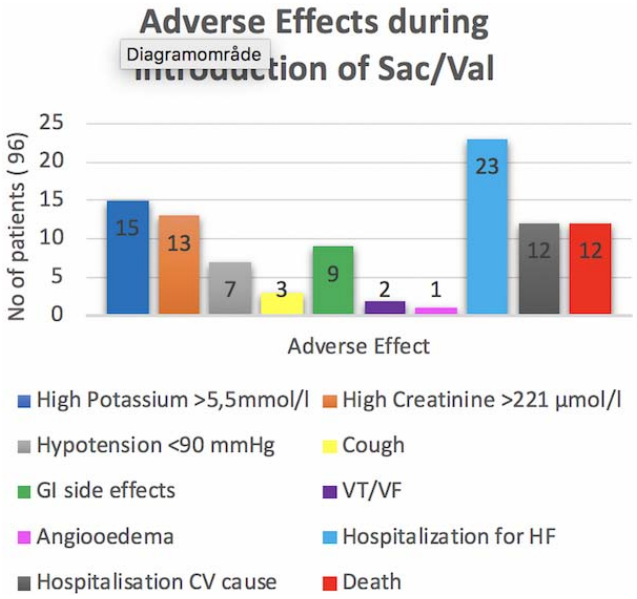

figure1

Chronic Heart Failure - Clinical

P1710

Evaluation of the effectiveness of lisinicore and losartan in patients with chronic heart failure

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Purpose. To study the effect of lisinopril and losartan on the functional state of the kidneys of patients with I-III functional class (FC) of chronic heart failure (CHF), depending on the degree of renal dysfunction (RD).

Methods. A total of 223 patients with ischemic heart disease with I-III FC of CHF were examined, initially and after 6 months of treatment. The first group (I) consisted of 118 patients taking lisinopril as part of standard therapy; the second group (II) - 105 patients taking losartan. Also, all patients were divided into 2 groups depending on the estimated glomerular filtration rate (eGFR): 30 <eGFR ≤60 ml / min / 1,73 m2 - 67 patients (29 patients in the I group, 38 - in the II group), and eGFR > 60 ml / min / 1,73m2 -156 patients (89 patients in group 1,67 patients in group 2).

Results. The nephroprotective effect of standard therapy with the inclusion of lisinopril or losartan was noted, with a significant decrease in the level of enzymes in the urine, as a sign of dysfunction of the tubular kidney apparatus, a decrease in creatinine, and an increase in GFR. In patients with CHF with a preserved eGFR> 60 ml / min / 1,73 m2 and moderate RD with eGFR = 59-45 ml / min / 1,73 m2, the use of standard lisinopril or losartan showed reliable nephroprotection. In patients with CHF with kidney dysfunction with 30> eGFR <45 ml / min / 1,73 m2, a significant improvement in renal dysfunction was observed in the group of patients taking standard therapy - losartan.

Conclusion. The results of our studies in patients with CHF showed that RD appeared at the subclinical stage, when the majority of patients do not have clinical signs of renal failure, which is also correlated with the findings of other researchers. According to many studies, the positive effect of ACE I and ARA is due to the fact that they reduce the initially high blood pressure in glomeruli of the kidneys, which stops the development of glomerulosclerosis

P1711

Profile and follow up of the elderly patient with heart failure

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Introduction The prevalence of heart failure (HF) has increased, due to the increased survival of these patients. The elderly patient sometimes presents multiple comorbidities.Therefore, the objective of this study is to know this subgroup more and more frequent, and its follow-up.
Methods Patients with a diagnosis of HF admitted to a Cardiology Service of a tertiary hospital between July 2016 and March 2017 have been collected prospectively and consecutively, recording their characteristics and management, and their follow up.
Results Of the total of 336 patients analyzed, 150 patients were 80 years old or older, with a median follow-up of 403 days. Baseline characteristics of these patients are in Table 1. Less impact has been placed on the control of heart rate (HR) in these patients, presenting at discharge an average HR at discharge of 81.65 vs 69.85 bpm in those under 80 years of age. (p 0.024). Within depressed LVEF patients, a lower percentage of beta-blockers was used in elderly patients (70.97% vs 84.26%, p 0.039) as well as ACEi or ARA2 (56.45% vs 72, 22%; p 0.036) and mineralocorticoid receptor antagonists (38.71% vs 62.04%; p 0.003). The use of devices has been significantly lower, with a percentage of 0% DAI vs 4.9% in the younger age group (p 0.007). The profile of diuretics used was different, with greater use of thiazides in elderly patients (6.35% vs. 1.83%, p 0.014). In the follow-up, the group of elderly patients presented higher mortality (p 0.05), the main cause being the HF.
Conclusion Elderly patient admitted with HF are mostly women, predominantly with preserved EF, hypertension, and worse baseline. Indicated drugs were used in a lower percentage. Mortality is higher in this subgroup, mainly due to HF.

Table 1. Baseline Characteristics

Characteristics	80 years or older	Younger patients	p value
Mean age (years)	84,69	68,76	<0,001
Sex women	59,3%	38,2%	<0,001
Hypertension	89,3%	75,8%	0,001
Diabetes Mellitus	43,3%	48,9%	0,307
Dyslipemia	68%	59,1%	0,094
Smoker	4%	14,5%	0,001
Atrial fibrillation	62,7%	48,4%	0,009
Dependiente o parcialmente dependiente	22%	10,8%	0,019
Mean EF	44,306	49,989	0,004
Preserved EF	60,66%	44,62%	0,003

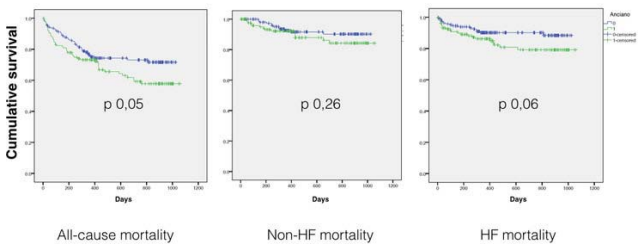

Figure 1. Mortality in follow up

P1712

Impaired filtration and tubular kidney functions in patients with chronic heart failure with a moderately reduced left ventricular ejection fraction and persistent atrial fibrillation

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Objective: To evaluate the filtration and tubular kidney functions in patients with chronic heart failure (CHF) with a moderately reduced left ventricular ejection fraction and a persistent form of atrial fibrillation (AF).
Materials and methods: The study included 48 patients with a moderately reduced left ventricular ejection fraction (mrLVEF), which were divided into 2 groups depending on a heart rhythm disorder. The first group included 28 patients with persistent AF, the second one - 20 patients with sinus rhythm. The diagnosis of CHF with a moderately reduced LV EF was confirmed by the presence of LV EF in the range of 40–49%. Diastolic dysfunction was diagnosed according to tissue visualization of diastolic velocity of the mitral valve fibrous ring and an increase in the concentration of the N-terminal fragment of brain natriuretic peptide (NT-proBNP) in the blood using ELISA.To assess the filtration function of the kidneys, serum creatinine, cystatin C concentrations in the blood, glomerular filtration rate (eGFR) were calculated using the CKD-EPI formula for creatinine and cystatin C. Serum Neutrophil gelatinase-associated lipocalin (NGAL) was determined to detect early tubular kidney damage.
Results: the groups did not differ in sex, age, comorbidity, therapy (except for anticoagulants and antiarrhythmic agents), severity of CHF. Indicators of diastolic LV function differed statistically significantly between groups: in the first group, septal e '(p = 0.007), lateral e' (p <0.001), E / e '(p = 0.001) were higher than in the second group. There were no statistically significant differences in serum creatinine and creatinine-based eGFR (p = 0.107 and p = 0.143, respectively) between the groups. Cystatin C in the blood in the first group was statistically significantly higher than in the second group: 2.7 [2.3; 3.2] ng / ml versus 1.6 [1.3; 3.0] ng / ml (p = 0.019). Cystatin-based eGFR was statistically significantly lower in the first group than in the second (p = 0.019). A statistically significantly higher level of NGAL in the 1st group was noted - 1.8 [1.0; 2.9] ng / ml compared with the 2nd group - 0.6 [0.5; 0.8] ng / ml (p <0.001). A correlation analysis revealed a direct, strong interconnection between the concentration of cystatin C in the blood and E/e'(r = 0.723, p <0.05), a direct moderate interconnection between NGAL levels and E/e' (r = 0.419, p < 0.05). Conclusion: the presence of a persistent AF in CHF patients with moderately reduced LV EF contributes negatively to the formation of cardio-renal syndrome and tubular dysfunction due to more severe LV diastolic dysfunction compared with CHF patients who have sinus rhythm.

P1713

The impact of diabetes mellitus and microvascular complications on heart failure biomarkers

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Background: The prevalence of heart failure (HF) is increased in diabetic patients. Several studies confirmed the prognostic role of ST2 and Galectin-3 (Gal-3) in HF patients, but the relationship between diabetes mellitus (DM) along with its complications and the new biomarkers is still uncertain.
Methods: 88 subjects with decompensated heart failure (NYHA classes III-IV) were enrolled, with a mean age of 69.82 ± 9.5 years, 61.7% of which were men and 47.9% of them with previous DM. All patients were evaluated both clinically and echocardiographically. The entire cohort had serum concentrations of ST2, Gal-3 and NT-proBNP measured upon admission. Patients with DM were divided into two groups: those with DM microvascular complications (retinopathy, nephropathy or polyneuropathy - 58.9%) or without- 41.1%.
Results: Mean left ventricular ejection fraction (LVEF) was 38.84 ± 11.3%, without significant differences between the two groups (p-NS).
Concerning HF biomarkers, the following mean values were obtained: ST2 - 46.32 ± 25.8 ng/ml, Gal 3-15.19 ± 6.7 ng/ml, NT-pro BNP - 3493.04 ± 3884.8 pg/ml. There were no statistically significant differences between patients with or without DM: ST2 : 47.51 ± 28.7ng/ml vs 44.89 ± 23.1 ng/ml; Gal-3: 15.25 ± 7.7ng/ml vs 15.07 ± 5.7ng/ml; NT-proBNP: 3857.42 ± 3844.2 pg/ml vs 3104.28 ± 3940.4 pg/ml.
When comparing the two groups of diabetic subjects, only Gal-3 values were found to be consistently higher in subjects with microvascular complications: 16.23 ± 4.9 ng/ml vs 13.74 ± 10.4 ng/ml (p=0.005); ST2 : 53.21 ± 31.9ng/ml vs 39.5 ± 23.3 ng/ml (p-NS); NT-proBNP : 4364.9 ± 4213.9 pg/ml vs 3188.96 ± 3350.0 pg/ml (p=NS).
ST 2 levels correlated significantly with NT-proBNP levels (r=0.24; p=0.03), hypocholesterolemia (r= 0.22; p=0.048) and GFR (r=-0.22) in both groups. There was no direct correlation between ST2 levels and the NYHA class (p=0.334). Gal-3 levels also correlated well with LVEF value (r=0.22; p=0.048), NT-pro BNP levels (r=0.40; p < 0.0001) and NYHA class (p <0.0001).
Conclusions: Biomarkers of HF used for screening the general population are also useful in patients with DM, with Galectin-3 levels being significantly higher in diabetic patients with microvascular complications than in those without.

P1714

What is the difference in clinical, instrumental characteristics and prognosis in patients with CHF and rLVEF in regard to the presence and nature of the iron deficiency state?

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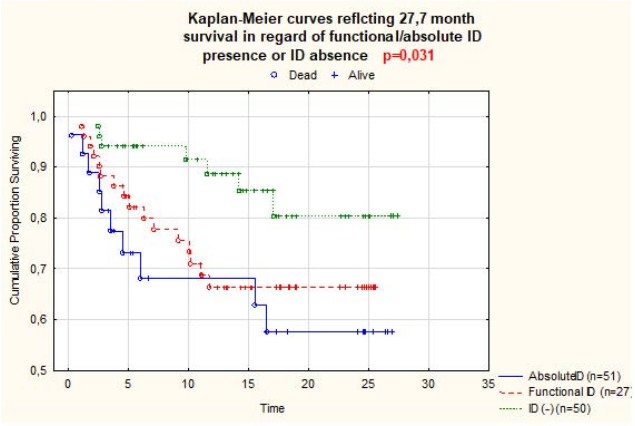
The aim is to compare chronic heart failure (CHF) and reduced left ventricular ejection fraction (rLVEF) patients with absolute and functional iron deficiency (ID) according to the main clinical, hemodynamic, laboratory parameters and clinical outcomes.
Methods. 128 stable compensated patients (pts) with CHF (111 men, 17 women), 18-75 years old, NYHA class II-IV, LVEF<40% were examined. Beside routine clinical and laboratory examination, iron panel test, 6 min walk test (6MWT), standardized endurance leg extensor test were performed. Quality of life was assessed by the Minnesota living with heart failure questionnaire (MLHFQ). Statistical calculations were made using Spearman's rank correlation coefficient, Pearson's chi-squared test and Kaplan-Meyer estimator.
Results. ID was observed in 78 pts. All pts were divided into 3 groups: group #1 – functional ID (n=27), #2 – absolute ID (n=51), #3 – without ID (n=50). Patients with both ID types were in higher (NYHA III-IV) functional class (85% pts from group #1 vs. 71% from group #2 vs. 48% #3, p=0,02; 0,001), had a poorer quality of life (MLHFQ score 56 in group #1 vs. 53 in #2 vs. 45 in #3, p=0,01; 0,03) and worse clinical and laboratory indices than patients without ID (Hb 145 g/l in group #1 vs. 136 g/l in group #2 vs. 151 g/l in #3, p<0,001. NTproBNP 637 ng/dl in #1 vs. 356 ng/dl in #2 vs. 247 in #3, p=0,007; <0,001. IL6 5 pg/ml in group #1 vs. 2,4 pg/ml in #2 vs. 1,7 pg/ml in #3, p=0,03; <0,001. Citrulline 135 mmol/L #1 vs. 107 mmol/L #2 vs. 90 mmol/L #3, p= 0,04; <0,01). Regardless of the difference in the functional and absolute ID formation mechanisms, no significant distinctions in the clinical and functional parameters, quality of life, as well as the intracardiac hemodynamics parameters were found (LVEF 26% in group #1 vs. 27% in #2, p=0,9. Leg extensor endurance test 23 times in #1 vs. 22 times in #2, p=0,6. 6MWT 265 m in #1 vs. 346 m in #2, p=0,06. MLHFQ score 56 in #1 vs. 53 in #2, p=0,57). Contrary to expectations, elevated levels of hepcidin were not detected in patients with functional ID group compared to the absolute ID group (62 ng/ml in group #1 vs. 70 ng/ml in #2, p =0,22). The reliable difference in survival (p=0,031) / hospitalization (p=0,04) rate between patients without ID and both groups with ID allows us to recommend the ID screening in all pts with CHF and rLVEF.
Conclusions. ID was found in 61% of patients. 27 pts (21%) had functional ID, 51 pts (39.6%) had absolute ID. There were no differences between groups with absolute and functional ID in regard to age, functional class, LVEF, aneamic patients percentage, 6MWT distance, thigh quadriceps endurance, quality of life, physical activity index, NTproBNP, citrulline and hepcidin levels. Compared to patients with absolute ID, patients with functional ID had higher levels of hemoglobin, MCV, MCH, interleukin 6. Presence of both ID types was associated with worse survival rate and more frequent hospitalization.



Kaplan-Meier survival curves

P1715

Left ventricular systolic dysfunction in asymptomatic patients with diabetes mellitus type 1 is associated with duration of disease, obesity and poor glycemic control

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Background: Diabetes mellitus type 1 (DM1) primarily affects children and young, otherwise healthy, individuals. Cardiomyopathy presenting in these patients is mainly attributed to the direct effect of hyperglycemia. Pre-symptomatic diagnosis of myocardial dysfunction could facilitate timely and effective implementation of therapeutic interventions. However, the prevalence and risk factors of pre-symptomatic left ventricular systolic dysfunction (LVSD) in individuals with DM1 have not been systematically studied.
Purpose: To investigate the prevalence and risk factors for LVSD in asymptomatic patients with DM1.
Methods: We studied the association between presence of LVSD, assessed by abnormal values of global longitudinal strain (GLS), and a) patient history, b) demographic and clinical characteristics, c) autonomic nervous system function, measured using the battery of the 4 standardized tests proposed by Ewing, d) arterial stiffness, assessed by calculation of pulse wave velocity between the carotid and common femoral artery, e) body lipometry and f) prevalence and severity of diabetic complications in patients with DM1 and no history of cardiovascular disease. Results: We prospectively enrolled one hundred and forty-one asymptomatic patients with DM1. Forty-one (29.1%) were men, while mean age, disease duration and glycated hemoglobin were 37.6 ± 13.0 years, 19.2 ± 9.8 years and 7.4 ± 1.4%, respectively. LVSD, defined as a value of GLS> -19.6%, was prevalent in 65/141 (46.1%) patients. Patients with LVSD had a longer history of DM (21.0 ± 9.3 vs. 17.6 ± 10.1 years, P=0.045), a higher body mass index (BMI) (26.9 ± 5.1 vs. 24.3 ± 4.4 kg/m2, P=0.001) and higher levels of blood glycated hemoglobin (7.8 ± 1.5 vs. 7.1 ± 1.2%, P=0.007) compared with patients without LVSD.
In multivariable analysis, glycated hemoglobin levels (OR: 1.54; 95% CI: 1.11-2.13, P=0.011), duration of DM1 (OR: 1.05; 95% CI: 1.01-1.10, P=0.035), and waist circumference (WC, OR: 1.04; 95% CI: 1.01-1.07, P=0.015) or body mass index (BMI, used interchangeably with WC, OR: 1.11; 95% CI: 1.02-1.21, P=0.023) were independently associated with the presence of LVSD.
Conclusions: Our results indicate that apart from chronic hyperglycemia, increased adiposity, possibly indicating a dysmetabolic state, as expressed by a higher BMI/WC, may be implicated in the pathogenesis of LVSD, which leads to diabetic cardiomyopathy in patients with DM1. Interventions leading to weight loss could be considered as a therapeutic target to potentially prevent or/and reverse LVSD in these patients.

P1716

Association analysis of N-terminal prohormone of B-type natriuretic peptide (NT-proBNP) and growth differentiation factor 15 (GDF-15) in cardiac and non-cardiac frailty

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Background/Introduction:
Frailty is a clinical syndrome characterised by reduced physiologic reserve including easy fatigability, skeletal muscle wasting and weight loss that overlap with attributes of chronic heart failure (HF). Whereas elevated NT-proBNP can indicate ventricular stress and cardiac dysfunction, there remains no blood biomarker to discriminate between frailty subtypes. GDF-15 is increased in inflammatory states, chronic disease, and following tissue injury, and recent animal studies support its functional role in inhibiting muscle growth and body weight.
Purpose: To elucidate cardiac and non-cardiac frailty subtypes using echocardiography in combination with NT-proBNP and GDF-15.
Methods: Participant recruitment in the Undiagnosed heart Failure in frail Older individuals (UFO) study was purposeful sampling to target approx. one-third in each of 3 frailty subgroups using the 5-point multi-domain FRAIL scale: 0, robust (R); 1–2, pre-frail (PF); 3–5, frail (F). Cardiac structure and function were assessed by echocardiography, and serum NT-proBNP and GDF-15 levels were dichotomised at

the median as 'high' or 'low' in a 2x2 matrix. Physical performance metrics including 6-minute walk distance (6MWD), gait speed (GS) and handgrip strength per body mass index (HGS) were assessed for strength of association using the method of polynomial contrasts for linear trend test; P <0.05 was considered statistically significant.

Results: FRAIL stratification of 306 individuals (mean age 74.7 y) resulted in classification of 34% R, 35% PF, and 31% F, with female-to-male ratios of 0.7, 4.4 and 5.3, respectively. The prevalence of diastolic (LVEF >50%) and systolic (≤50%) dysfunction were 67% and 4.3%, respectively. Serum NT-proBNP levels in R, PF and F older adults were 181, 239 and 361 pg/ml, respectively, and GDF-15 levels were 1667, 2220, and 3206 pg/ml, respectively. NT-proBNP was not significantly associated with GDF-15 (r=0.09, adjusted P=0.13), suggesting complementary pathways. In association with FRAIL score, log10-NT-proBNP reached borderline significance (β 0.33, adjusted P=0.046), whereas log10-GDF-15 was strongly associated (β 1.18, adjusted P=3.1 x 10e-5).

In 2x2 analysis, physical performance ranking from worst to best (">") was as follows: NT-proBNP^high GDF-15^high (cardiac frailty; 6MWD, 265 m; GS, 0.72 m/s; HGS, 0.64) > NT-proBNP^low GDF-15^high (non-cardiac frailty; 6MWD, 320 m; GS, 0.85 m/s; HGS, 0.70) > NT-proBNP^high GDF-15^low (6MWD, 360 m; GS, 0.95 m/s; HGS, 0.79) > NT-proBNP^low GDF-15^low (6MWD, 376 m; GS, 0.96 m/s; HGS, 0.88). Age- and sex-adjusted P-values of linear trend pattern among the paired biomarker subgroups for 6MWD, GS and HGS were 3 x 10e-6, 5.6 x 10e-5, and 1.1 x 10e-4, respectively.

Conclusion: In combination with echocardiography, serum NT-proBNP and GDF-15 can be used to classify cardiac and non-cardiac frailty, as supported by statistically associated metrics of physical performance.

P1717

The short term effect of parenteral iron supplementation on oxidative status in patients with chronic heart failure and iron deficiency

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Background/ Introduction: Oxidative stress is a condition in which there is an excessive production of reactive oxygen species over antioxidant defense. Reactive oxygen species plays a major role in the pathophysiology of cardiac remodelling in chronic heart failure. In addition, oxidative status may be de worsen by other comorbidities like iron deficiency (ID) which is frequent in chronic heart failure CHF). Alteration in oxidative/anti oxidative balance after parenteral iron supplementation in patient with CHF and ID was virtually unknown.

Purpose: To compare, in a double-blind three arms design, the short term effect of parenteral iron supplementation through intravenous and intramuscular route versus placebo on the oxidative status in patients with CHF and ID.

Methods: In FREERADICALS-HF study, iron-deficient CHF patients were randomized to intravenous (IV) iron Sucrose, intramuscular (IM) iron Polymaltose Hydroxide Complex (PHC) or placebo (normal Saline) in 1:1:1 ratio. The total doses required to correct the ID were calculated by using the Ganzoni's formula. These doses were divided by half and administer at day 0 and at day 14. The oxidative stress parameters were measured by using a spectrophotometric method. The antioxidant markers measured was the catalase and the peroxidase activities, glutathione (GSH) concentration and the total anti-oxidant capacity using the Ferric Reducing Antioxidant Power (FRAP) methods. Malondiadehyde (MDA) and nitric oxide (NO) were oxidant markers. Oxidative status was assessed at day 0 and at week 04.

Results: From a total cohort of 101 patients, we included 45 patients with CHF and ID. Such as 15 in IV arm, 16 in IM arm and 14 in placebo arm. Treatment with intravenous iron sucrose significantly decrease the peroxidase activity (difference iron sucrose vs placebo:1.6 UI/ml, p=0.038) and increase the nitric oxide (NO) concentration (difference iron sucrose vs placebo:-0.09 mol/l, p=0.063). Throughout the study, a decrease of catalase activity and an increase of the MDA, FRAP and GSH concentration after treated by iron sucrose was detected with no significant difference at week 04. Treatment with intramuscular polymaltose hydroxide complex decrease the peroxidase activity and MDA, FRAP and GSH concentration with no significant difference at week 04. We also observed an increase in catalase activity and NO concentration which was not significant. There was no significant difference observed when we compared the three groups.

Conclusion: Both Intravenous and intramuscular iron supplementation over a period of 04 weeks result globally in an oxidative stress by significantly reducing the activity of the peroxidase and by the increase of reactive nitrogen species by production of nitric oxide. Other effect of our intervention showed a little benefit effect in reduction of lipids peroxidation by decreasing MDA concentration in both group.

P1718

Cardiopulmonary exercise testing for assessing frailty status in stable elderly patients with heart failure

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Introduction: Frailty is a syndrome associated with aging that produces subclinical dysfunction across multiple organ systems and leads to increased risk of mortality. The Kihon Checklist (KCL) was developed by the Japanese Ministry of Health, Labor and Welfare to identify older persons in need of care; it is a reliable tool for predicting general frailty in older adults. There is little information about the relationship between frailty status and exercise capacity.

Hypothesis: Cardiopulmonary exercise testing (CPX) parameters are associated with frailty in stable elderly patients with heart failure (HF).

Methods: Ninety-two stable elderly patients with HF were evaluated by using CPX and the total KCL (t-KCL). A t-KCL score of 0–3 was classified as robust, 4–7 as pre-frail, and ≥8 as frail. Diagnostic performance (DP) -plot analysis was used to assess the utility of CPX parameters to distinguish between the presence and absence of frailty.

Results: Mean age, left ventricular ejection fraction, plasma brain natriuretic peptide, peak work rate (WR), peak VO2, and t-KCL score were 81.7 years, 57.9%, 184 pg/mL, 48.8 W, 13.2 mL/kg/min, and 13.1, respectively. t-KCL score was significantly correlated with peak VO2 (r = −0.53, p < 0.001) and peak WR (r = −0.63, p < 0.001). In the patients with frailty (n = 63), peak WR was significantly lower than that in patients without frailty (n = 29; 40.8 and 71.0 W, respectively, p 0.001). Multivariate analysis revealed that peak WR was the only significant independent predictor of frailty (β = −0.111, p 0.001). In the DP-plot analysis, a cut-off value for peak WR of 51.9 W was the best predictor of frailty (accuracy; 0.706).

Conclusions: Frailty status was significantly associated with peak WR in stable elderly patients with HF. CPX may be useful for assessing frailty status in stable elderly patients with HF.

P1719

Segmental water distribution in hospitalized patients with Chronic Obstructive Pulmonary Disease and Right Heart Failure.

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Background: Heart failure is the most common cardiovascular complication in Chronic Obstructive Pulmonary disease (COPD) with prevalence around 20.9%. Subjects with COPD and Right Heart Failure (RHF) have a major risk of death than COPD subjects without RHF. COPD and RHF patients have water alterations. However, segmental water distribution are unknow in this population.

Objective: To determine the segmental water distribution in patients with COPD and RHF

Methodos: Cross-sectional study. Patients with COPD diagnosis with and without RHF were included. Patients with asthma was excluded. Water distribution were evaluated by Bioelectrical impedance (BODYSTAT). Segmental water alterations in thorax, abdomen and trunk focous were determinated by impedance index > 0.80. total.

Results: 82 Patients were included, with RHF (n= 44) without RHF (n= 38), the median age was 68 ± 14.08, serum albumin 3.22 ± 0.85, total body water was (TBW) 54.512 ± 12.55. Patients with RHF had higher prevalent sistemic arterial hypertension (56.8% vs 34.21, p=0.05), pulmonary arterial hypertension (40.91 % vs 0 %, p < 0.01) Heart failure with preserved ejection fraction (70.45 % vs 18.42 %, p < 0.001) as well less extracellular water (24.94 ± 4.98 vs 25.38 ± 5.72 p= 0.028) and greater abdominal impedance index (0.837 ± 0.10 vs 0.7585 ± 0.146 p = 0.045) than subjects whithout RHF. There was not diferentes between the groups in TBW, impedance index of trunk and thorax.

Conclusion: Patients with COPD and RHF have more abdominal overload althougth less extrecellular water probablly due to bowel congestion without diferences in TBW.

	Alln= 82	Right Heart Failuren =44	Without Right Heart Failuren=3	value of P
Total Body water	54.512±12.55	55.89±14.58	52.93±9.69	0.31
Extracellular	24.94±4.984	25.38±5.75	24.44±3.95	0.028
Impedance index	0.854± .056	0.8613±.064	0.846±.0436	0.27
Trunk	0.829± .07	0.84±.07	0.81±.079	0.10
Thorax	0.8254±.097	0.837±.10	0.812±.09	0.38
Abdomen 1	0.799± .139	0.837±.10	0.759±.15	0.05
Abdomen 2	0.7991± .133	0.83±.10	0.75±.14	0.04
serum albumin	3.22± .85	3.15±.65	3.29±1.01	0.48

P1720

Effects of phrenic nerve stimulation in subjects with central sleep apnoea and heart failure with reduced, mid-range, and preserved ejection fraction: findings from the remede system pivotal trial

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Funding Acknowledgements: Respicardia, Inc.

Background: Patients with heart failure (HF) often have central sleep apnoea (CSA). Treating CSA with phrenic nerve stimulation (PNS) may help improve the prognosis of patients with HF. However, impact of PNS has not been elucidated in patients with HF according to left ventricular ejection fraction (LVEF).
Purpose: Investigate the effects of PNS on sleep metrics and quality of life (QoL) in patients with HF and reduced ejection fraction (HFrEF: <40%), mid-range EF (HFmrEF 40-<50%), and preserved EF (HFpEF: >50%).
Methods: A PNS system was implanted in patients with CSA and therapy delivered for 6 months. Sleep was assessed at attended in-lab polysomnograms. The Epworth Sleepiness Scale (ESS) and Patient Global Assessment (PGA) were completed by the subjects. Subjects with HF were divided by LVEF into subgroups: HFrEF, HFmrEF, HFpEF.
Results: The HFrEF, HFmrEF, and HFpEF subgroups were similar in age (mean 67, 69 and 64 years, respectively) and were primarily male (98%, 85%, 79%) with severe CSA (mean apnoea-hypopnoea index [AHI] of 44, 45 and 51 events/hour). Baseline demographics were similar including hypertension, CAD, and atrial fibrillation. Forty percent, 30% and 29% of patients were NYHA class III.
Improvements in sleep metrics, sleep quality and QoL were observed in all subgroups following 6 months of active PNS therapy. A ≥50% reduction in AHI from baseline was experienced by 48-64% of subjects in each subgroup (table). AHI improved across the subgroups, with much of the reduction driven by improvements in the central apnoea index. Improvements in PGA and ESS were seen in all subgroups. Means or percentages and 95% confidence intervals are provided in the table.
Conclusion: Despite small sample sizes in the HFmrEF and HFpEF subgroups, the results from this study suggest the improvements from phrenic nerve stimulation on sleep, daytime sleepiness and quality of life are similar for patients with central sleep apnoea and HF, regardless of LVEF.

Paired Change from Baseline by EF Level

6 Month Results	EF <40% (n=48)	EF 40-50% (n=16)	EF ≥50% (n=11)
Subjects with 50% reduction in Apnoea Hypopnoea Index (%)	48% (34%,62%)	63% (39%,82%)	64% (35%,85%)
Apnoea Hypopnoea Index (events/hr)	-19.9 (-24.9,-14.9)	-22.9 (-31.7,-14.1)	-23.8 (-40.5,-7.2)
Central Apnoea Index (events/hr)	-21.6 (-26.6,-16.7)	-24.8 (-34.3,-15.3)	-20.3 (-36.9,-3.8)
Arousal Index (events/hr)	-14.8 (-19.9,-9.6)	-24.8 (-35.3,-14.4)	-14.6 (-30.9,1.8)
% subjects with marked/moderate improved PGA	51% (37%,64%)	65% (41%,83%)	67% (39%,86%)
Epworth Sleepiness Scale (points)	-2.0 (-3.2,-0.8)	-3.4 (-5.2,-1.6)	-5.3(-9.3,-1.2)

Change from baseline at 6 months and 95% confidence interval for the change.

P1721

Sleep disordered breathing in patients with heart failure: association with biomarkers and clinical parameters

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Sleep disordered breathing (SDB) is frequent in patients with chronic heart failure (CHF). The assessment of the severity of sleep apnea is mainly based on the apnea-hypopnea index (AHI), but this event-based parameter alone may not sufficiently reflect the complex pathophysiological mechanisms underlying SDB potentially contributing to adverse outcomes in patients with heart failure.
Purpose. To assess SDB in patients with CHF with reduced ejection fraction (EF), their prognostic role and relationship with biomarkers and clinical parameters.
Methods. 117 patients (mean age 52.4 ± 4.7 years) with NYHA class II-IV were included in the prospective cohort study, follow-up period was 5 years. The left ventricular ejection fraction (LVEF) was 28.05±9.57%. All patients underwent a comprehensive clinical examination, echocardiography, polysomnography (PSG, Embla N7000, Natus, USA). The plasma level of NT-proBNP and hs-CRP were analyzed by immunoassay (ELISA). The SPSS statistical software (version 23.0) was used.
Results. PSG showed the following types of SDB in the studied cohort: obstructive sleep apnoea (OSA) was diagnosed in 48 patients (41%), central - in 20 (17%), mixed - in 26 (22%). Among them mild SDB diagnosed in 29 cases, moderate in 32 and severe in 33 patients. SDB was not found in 23 patients. The comparison of 2 groups with EF>35% and <35% demonstrated significant differences in obstructive (7.1 and 3.96 episodes per hour, respectively, p = 0.039) and central apnea indices (1.38 / 5.32 episodes per hour, p = 0.05). Moreover, in the group with EF <35% there was a significant higher concentration of plasma hs-CRP (p = 0.026) and NT-proBNP (p = 0.01). The following correlations were identified: NT-proBNP and obstructive apnea index (OAI) (r = -0.44, p = 0.007), NT-proBNP and sleep efficiency (r = -0.71, p = 0.006), AHI and body mass index (BMI) (r = 0.32, p = 0.01), OAI and BMI index (r = 0.34, p <0.001), desaturation index and BMI (r = 0.43, p <0.001), average saturation oxygen and BMI (r = -0,6, p <0,001). Patients with CHF with reduced EF (<35%) and moderate apnea showed worse survival rates (χ^2 = 3.699; p = 0.05).
Conclusion. We found very high rate of SDB (80%) in patients with systolic HF, the predominant type was OSA. AHI, OAI and indicators of oxygen saturation correlate with BMI and biomarkers. In patients with CHF with reduced EF moderate apnea is associated with adverse outcome.

P1722

Evolution of death due to cancer in heart failure ambulatory patients during 17 years follow-up

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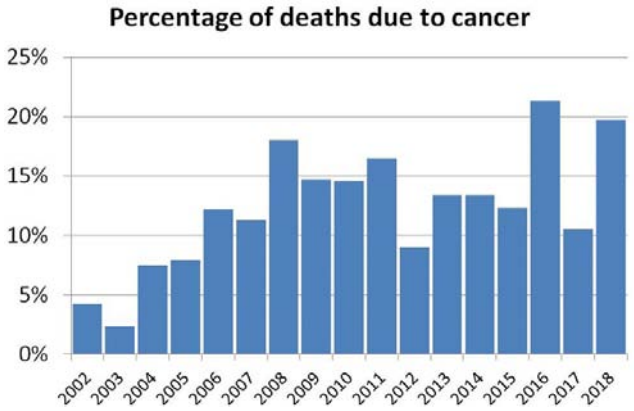
Background: Cancer is one of the main causes of death in general population in developed countries together with cardiovascular causes. A bidirectional relationship between heart failure (HF) and cancer has been suggested. Cancer survivors carry a greater burden of HF than the non-cancer population, while it increasingly appears that HF migh facilitate the development of cancer. Both entities share several risk factors which have the common pathophysiological characteristic of chronic inflammation, which is associated with both cardiomyopathic and neoplastic processes. Indeed cancer treatment might favour HF while HF might preclude cancer treatment.
Purpose: To assess the incidence of cancer as cause of death since the year 2002 up to the year 2018 in ambulatory patients attended in a HF clinic.
Methods: Patients who died of unknown cause were excluded from the analysis. Cancer and other fatal events were identified from the clinical records of patients with HF, hospital wards, the emergency room, general practitioners, or by contacting the patient's relatives. Furthermore, data were verified from the databases of the Catalan and Spanish Health Systems. Trends on cancer as cause of was were assessed by linear regression.

Results: Since August 2001 to May 2018, 2295 HF patients were admitted to the HF clinic (age 66.4 ± 12.8 years, 71% men, 49% from ischemic aetiology, mean LVEF 35.2% ± 14). During the 17 years of the study, 1201 deaths were recorded. Seventy-eight patients (6.5% of deaths) were excluded due to unknown cause of death. Out of the other 1123 deaths, 149 were due to cancer. The percentage of cancer as cause of death by years is shown in the figure. A significant trend was observed towards a progressive increase in cancer deaths over time (p=0.003).
Conclusions: During the 17 years of the study, a very significant trend towards higher percentage of cancer deaths was progressively observed.



P1723

Sleep apnea screening in heart failure: an exploratory analysis

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Background: Sleep Apnea (SA) is increasingly recognized in patients (pts) with Heart Failure (HF). Nocturnal polysomnography (PSG) is the gold-standard to diagnose SA. Currently, portable devices have been thoroughly validated in HF cohorts.
Purpose: To determine the correlation between clinical, laboratory and respiratory measurements with the presence of SA (defined as apnea-hypopnea index (AHI) >15/h) and desaturation time with SpO2 <90% (T90) ≥22 minutes, a strong mortality predictor in HF with reduced ejection fraction (HFrEF); and to compare the features of pts with HFrEF vs HF with preserved ejection fraction (HFpEF).
Methods: Our work is based on a single-center retrospective cohort of pts hospitalized for decompensated HF during 2013-2018. All pts were screened for SA with ApneaLinkTMafter compensation the night preceding discharge. HF was defined as recommended by the European Society of Cardiology guidelines. A left ventricular ejection fraction ≤45% and >45% was used to define HFrEF and HFpEF, respectively, as per SERVE-HF trial.
Results: A total of 228 pts were included in the analysis (mean age 75.3 ± 10.5 years, 48.9% male). SA was present in 135 (59.2%) pts and 41.2% had HFrEF. Mean AHI was 24.5 ± 19.2/h, mean O2 desaturation index (ODI) was 24.4 ± 21.0/h and mean T90 was 169.6 ± 151.2 minutes. In multivariate models, ODI, gender and ischemic HF were predictors of AHI >15/h (R265.8%), with ODI being the strongest predictor (standardized coefficient 64.8%). Similarly, mean SpO2 was the only predictor of T90 ≥22minutes (R265.8%) (Figure 1). HFrEF pts had more often AHI>15/h (73.4% vs 48.5%, p<0.001), more total apneas (62 ± 148 vs 16 ± 79, p<0.001), obstructive apneas (28 ± 76 vs 8 ± 43, p<0.001) and central apneas (6 ± 20 vs 0 ± 5, p<0.001) than those with HFpEF. In multivariate models, ODI (OR 1.14, CI 1.03-1.26, p=0.013 for HFrEF; OR 1.21, CI 1.11-1.33, p<0.0001 for HFpEF) and mean SpO2 (OR 0.29, CI 0.14-0.60, p=0.001 for HFrEF; OR 0.23, CI 0.10-0.52, p<0.0001 for HFpEF) were the only predictors of AHI >15/h and T90 ≥22 minutes in both groups, respectively.
Conclusions: SA was highly prevalent in HFrEF and HFpEF. ODI and mean SpO2 were highly predictive of AHI >15/h and T90 ≥22minutes, respectively, both prognostic markers validated in a population with HFrEF, and equally so in HFrEF and HFpEF. These findings hypothesize a similar pathophysiology of SA in HF, regardless of left ventricular systolic function. Also, whether simple pulse oximetry can be routinely used for SA screening, since PSG and portable devices are often not widely available, is a finding worth being prospectively assessed.

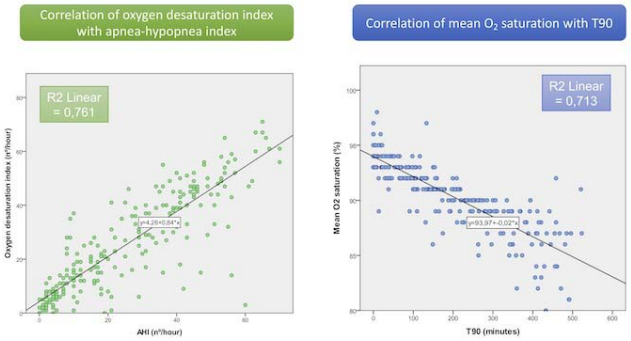

Figure 1 Linear regression

P1724

Diabetes is the strongest predictor of limited exercise capacity in patients with chronic heart failure

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Background and Aim: Heart failure is a common cardiovascular complication of diabetes mellitus (DM) and these two diseases often co-exist. The aim of this study was to prospectively examine the relationship between diabetes and functional exercise capacity assessed by by 6 min walk test (6-MWT) in patients with chronic HF.
Methods: In 344 included chronic HF patients (mean age 61 ± 10 years, 54% female), clinical, biochemical and antropometric data were registered. In all study patients an echo-Doppler study and a six-minute walk test (6-MWT) were performed in the same day. Patients were divided into two groups based on the 6-MWT distance (Group I: ≤ 300 m and Group II: >300 m).Based on the left ventricular (LV) ejection fraction (EF), patients were divided into three groups (patients with HF and preserved EF [HFpEF], patients with HF and reduced EF [HFrEF] and patients with HF and mid-range EF [HFmrEF]).
Results: Among 344 HF patients 111 (32%) had DM. Group I were older (p = 0.019), had higher prevalence of diabetes (p < 0.001) and atrial fibrillation (p = 0.001), larger left atrium - LA (p = 0.018), lower hemoglobin level (p = 0.028), lower septal mitral annular plane systolic excursion – MAPSE (p=0.001) and lower tricuspid annular plane systolic excursion - TAPSE (p = 0.027), compared with Group II.
In multivariate analysis, only age of patients [1.031 (1.001-1.061), p=0.042], presence of atrial fibrillation [2.377 (1.020 - 5.539), p=0.045] and diabetes [3.743 (1.988 – 7.048), p<0.001] independently predicted poor 6-MWT performance in HF patients.
Conclusion: Diabetes mellitus is the independent and strongest predictor of limited exercise capacity in chronic HF patients, irrespective of LV ejection fraction. This finding highlights the need for better optimization of medical therapy and regular exercise in diabetic patients with chronic HF.

P1725

Prognostic value of cognitive tests in chronic heart failure with reduced left ventricular ejection fraction

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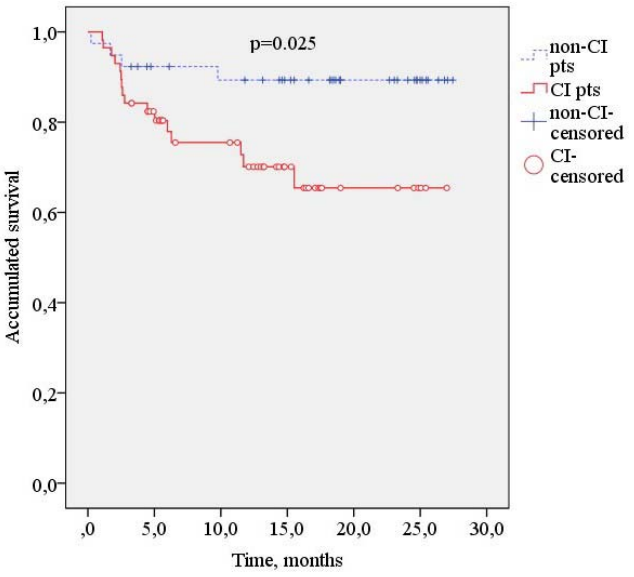
Background. Cognitive impairment (CI) is the most common co-morbidity in patients (pts) with chronic heart failure (CHF). CI is an important factor which reduces quality of life, adherence to therapy and, consequently, clinical prognosis in this pts. Nevertheless, prognostic informativity of different cognitive tests and their combination remains unclear.
Purpose. to study the prognostic meaning of different cognitive tests and their combinations in pts with CHF and reduced left ventricular ejection fraction (rLV EF).
Methods. 124 stable CHF pts aged 18 to 75 years NYHA II-IV were examined. Cognitive function was assessed by using standard MMSE, Shulte tests and the HADS questionnaire. CI was defined as MMSE≤ 26 points. The observation period was 27,5 months. All-cause mortality and combined death-or-readmission event were estimated by Kaplan-Meier curves.
Results. It was shown that the MMSE has high validity related to prediction of survival and the onset of combined death-or-readmission event in pts with CHF and rLV EF (p=0.043 and p=0.026, respectively). After adjustment the compared groups by age and NYHA class the above-mentioned statistically significant differences were

preserved (p = 0.025 and p = 0.049, respectively). Schulte test showed low predictive value related to survival and reliable validity - to combined death-or-readmission event, which, however, was reduced after age and NYHA class adjustment (p = 0.798 and p = 0.240, respectively). Inclusion in the predictive algorithm the HADS depression subscale allowed to increase the significance of differences in survival and the onset of combined death-or-readmission event (p = 0.006 and p = 0.001, respectively) between CI and non-CI pts.

Conclusion. MMSE scale is informative regarding the prediction of survival and the onset of combined death-or-readmission event in patients with CHF and rLVEF even after adjustment the compared groups by age and NYHA class. Schulte test does not have above-mentioned prognostic informativity. However, inclusion in the prognostic algorithm HADS depression subscale increases statistical confidence in the compared groups.



Survival curves

P1726

Diabetes is associated with unique pathological mechanisms in heart failure.

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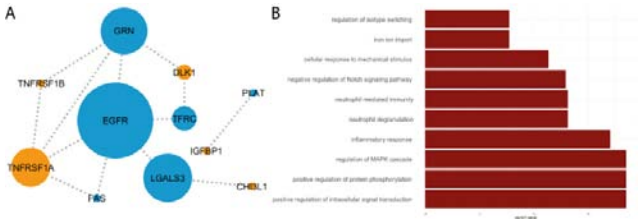
Background. Diabetes mellitus (DM) adversely affects clinical outcomes and complicates treatment in patients with heart failure (HF). A clear understanding of the pathophysiologic processes involved with DM type 2 in HF is lacking.

Methods. We performed network analyses and pathway over-representation analysis to identify unique pathological pathways in patients with HF and DM using 92 biomarkers from different pathophysiological domains measured in 1572 patients with HF (32% DM) and reduced ejection fraction (HFrEF; LVEF <40%). We validated our results in an independent cohort of 729 patients with HFrEF (30% DM). In addition, we investigated the association of DM with a composite outcome with all-cause mortality or hospitalization for HF within 2 years and whether this association was modified by biomarkers significantly related to DM.

Results. In both the index and validation cohort, 8 proteins were up-regulated and 1 protein was down-regulated in HF patients with diabetes compared to non-diabetics Network analyses identified epidermal growth factor receptor (EGFR) as a central protein in patients with DM and HF (Figure 1A). Biological pathways upregulated in patients with HF and DM were related to inflammation and protein phosphorylation (Figure 1B). DM conferred worse outcomes after correction for an establish risk model (hazard ratio [HR] 1.20; 95% CI 1.01-1.42). These differences in outcome were modified by differences in biomarker levels.

Conclusion. Concomitant DM in patients with HFrEF worsens clinical outcomes and is associated with pathological processes related to inflammation and protein phosphorylation. The role of EGFR in the relationship between DM and HF warrants further evaluation.



P1727

Safety and effectiveness of phrenic nerve stimulation in male and female patients with central sleep apnoea

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Funding Acknowledgements: Respicardia, Inc.

Background: Central sleep apnoea (CSA) is more common in men than in women. Phrenic nerve stimulation uses an implanted neurostimulator that has been shown to restore a normal breathing pattern in patients by stimulating the phrenic nerve, but little is known about sex differences in safety and effectiveness.

Purpose: The aim of this analysis was to evaluate whether response to phrenic nerve stimulation varies according to sex in patients with CSA.

Methods: All patients enrolled in the remedē System pivotal trial were included in this analysis. Therapy was activated 1-month post implant in the Treatment group and after 6 months in Control. The randomised groups were pooled based on months of active therapy for analysis. The effects of therapy are reported following 12 months of therapy.

Results: In the remedē System Pivotal Trial, 11% (16/151) of subjects were female (F) and 89% (135/151) male (M). Mean age was 66 years for F and 65 M, mean BMI was 29.5 and 31.2 kg/m2, and mean ejection fraction was 46.3% and 38.8%. Severe CSA was present at baseline in 81% of subjects for each sex (median apnea hypopnea index [AHI] 38 events/hour F and 44 M). Concomitant diseases included hypertension (69% F, 76% M), CAD (38% F, 59% M) and atrial fibrillation (50% F, 41% M). Also, 56% F had heart failure (NYHA class I/II/III in 25%/13%/19%) compared to 64% M (NYHA I/II/III in 10%/29%/25%). At the 12-month active therapy polysomnogram, 60% (6/10) F and 58% (63/109) M achieved ≥50% reduction in AHI from baseline. The mean AHI improved at 12-months by approximately 23 events/hour in each sex, driven by a reduction in the central apnoea index. Patient global assessment was markedly/moderately improved in 82% F and 57% M. The Epworth Sleepiness Scale improved by a mean of 3-4 points in each sex. While 10% M experienced a related SAE through 12 months, no F experienced an event (95% CI for the difference [-10%, 16%]). Table 1 shows the results by sex.Conclusion: Despite the lower incidence of CSA in women, both sexes benefit similarly from

Sleep and Quality of Life Results by Sex

12 Month results	Female (n=10)	Male (n=109)	Difference and 95% CI for Female-Male
Percentage of subjects with a 50% reduction in Apnoea-Hypopnoea Index from baseline	60%	58%	2% (-27%, 27%)
Apnoea-Hypopnoea Index (events/hour)	-22.7±17.7	-22.9±20.1	0.3 (-12.8, 13.3)
Central apnoea index (events/hour)	-20.3±19.5	-23.4±17.7	3.1 (-8.6, 14.8)
Percentage of subjects with Marked/Moderate improved patient global assessment	82%	57%	25% (-6%, 41%)
Epworth Sleepiness Scale (points)	-4.0±4.5	-3.6±5.0	-0.4 (-3.5, 2.8)

Percent or mean±standard deviation at 12 months.

phrenic nerve stimulation. There was no difference in adverse events between sexes. Women seemed to have greater improvements in quality of life than men.

P1728

Understanding the contemporary use of thiazolidinediones. An analysis of the Diabetes Collaborative Registry

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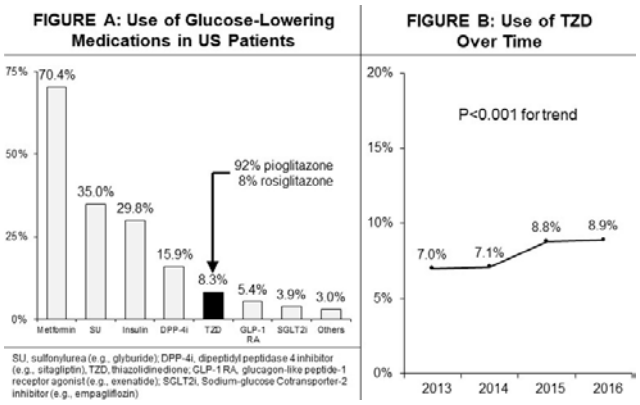
Background: Thiazolidinediones (TZDs; rosiglitazone, pioglitazone) are oral medications for type 2 diabetes (T2D) with unique benefits and risks. TZDs effectively reduce blood glucose with minimal risk of hypoglycemia and have potential beneficial effects on atherosclerosis. However, TZDs can cause fluid retention thereby increasing the risk of heart failure–a common complication of T2D.
Purpose: To examine the use of TZDs among patients in the Diabetes Collaborative Registry (DCR) according to patient characteristics and over time.
Methods: DCR is a US outpatient registry of T2D patients recruited from cardiology, endocrinology, and primary care practices and currently encompasses 203 practices and 3074 providers.
Results: Among 424,061 US adults with T2D who were taking ≥1 glucose-lowering medication, 35,018 patients (8.3%) were on a TZD, which has gradually increased over time (Figure). TZDs were most often used as a 2nd (28.4%) or 3rd drug (32.0%), with only 9.4% of patients on a TZD as monotherapy. Patients on TZDs tended to be older (mean age 69.2 ± 10.7 years), 61.9% had coronary disease, 14.8% with prior stroke, and 17.2% were morbidly obese (BMI >40 kg/m2). A clinical diagnosis of heart failure was present in 23.7% of patients on TZDs, 18.1% had left ventricular dysfunction (7.7% with EF <40%), and 29.9% were on a loop diuretic.
Discussion: Although TZDs lost significant market share in 2007-2010 when concerns arose regarding their safety, TZDs are still the 4th most used oral glucose-lowering medication in the DCR, and their use may be slightly increasing over time. It is not known if this trend relates to the low cost of these now generic drugs or emerging evidence of their cardiovascular benefits. At least a quarter of patients who are currently treated with TZDs in the DCR population have some evidence of heart failure and therefore should not be candidates for this therapy. Accordingly, heart failure concerns with TZDs may be under-recognized.



P1729

Left ventricular dysfunction in HIV infected anti-retroviral therapy naive patients

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Background Cardiovascular disease is one of the leading causes of mortality in individuals with chronic human immunodeficiency virus (HIV) infection. In particular, antiretroviral therapy (ART) naïve patients with low CD4+ counts have higher incidence of co-infections, systemic inflammation and coagulopathy which can be associated with both ischemic and non-ischemic cardiomyopathy. The prevalence of heart failure/left ventricular dysfunction in ART naïve individuals with severe CD4 lymphopenia is unknown.
Objective Identify the prevalence of left ventricular dysfunction/heart failure in patients with less than 100 CD4+ T cells/μL at the time of ART initiation and identification of immunological correlates that can guide management.
Methods 206 HIV+ ART naïve patients with CD4<100 cells/μL were included in a prospective study and followed longitudinally for 192 weeks after ART initiation. Demographic, virologic and clinical data were analyzed. Plasma cytokines were measured with ELISA and electrochemiluminescence assays. Echocardiograms were performed as clinically indicated. Statistical analyses were performed using Mann-Whitney non-parametric tests.
Results The median age at enrollment was 38 years old (yo),(range: 21-75), 75.7% of the patients were male and 57.7% were African American. The median HIV viral load (VL) was 138,005 copies/ml and the median CD4 was 24 cells/μl. Out of the 206 patients, 80 had an echocardiogram, 67 of which were performed in the first 100 days of ART (64% male, median age 41yo). 13 out of these 67 patients (19%) had reduced ejection fraction (EF <50%) and 6 out of these 13 had EF<40%. Four patients had right ventricular systolic pressure > 40 mm Hg. The median CD4 count and HIV viral load of the patients with echocardiographic abnormalities on the day of the study did not differ from those without echocardiographic abnormalities (14 cells/μl vs 32 cells/ μl, p=0.0793, and 108,444 copies/ml vs 28,279 copies/ml, p=0.3059). Patients with ventricular dysfunction had significantly higher plasma levels of D-Dimer (1719 vs 949.8 ng/ml), (p=0.0271) and IL-6 (4.288 vs 1.656 pg/ml), (p<0.0001) prior to ART. No significant differences were found in plasma levels of TNF, CRP and sCD14.From the 17 patients with evidence of ventricular dysfunction, 11 had a follow up echocardiogram, out of which 5 had ventricular function improvement (EF>50) after therapy (median follow up 9 months, range 4-24 months). Two patients died during the first 100 days of ART initiation, of whom one had heart failure with EF<40% and one did not.
Conclusions Left ventricular dysfunction is an important comorbidity in ART naïve patients with severe lymphopenia and is associated with higher levels of IL-6 and D-dimer. These data suggest that specific cardiac screening for ART-naïve HIV patients with severe lymphopenia should be further evaluated.

P1730

CMR in the evaluation of the results of percutaneous coronary interventions in patients with diabetes mellitus type 2 and chronic heart failure

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Aim: to evaluate the effectiveness of PCI in patients with multivessel coronary disease and concomitant diabetes and chronic heart failure.
Methods: 102 patients were divided into 2 groups: group 1 (n=48) - patients with diabetes, and group 2 (n=54) - patients with coronary artery disease and heart failure without diabetes. Inclusion criteria: myocardial infarction in previously; angina II-III (CCS); silent ischemia; multivessel disease (SYNTAX score I <32); segments with abnormality local kinetic of the left ventricle; chronic heart failure I-III (NYHA); left ventricular ejection fraction (LVEF) is less than 45%. Visualization of post-infarction myocardial changes was performed using CMR, both before PCI and during the evaluation of long-term results. Primary endpoints: MACE (death, MI, repeated interventions).
Results: after 24 months, MACE in groups 1 and 2 was 10.4 and 8.1%, respectively (p=0.264). After PCI, in both groups there was a significant decrease a number of segments with abnormality local kinetic, compared with baseline data (p<0.05). In patients with diabetes, as well as in patients without diabetes, there is a significant increase in LVEF by as early as 12 months after PCI, as well as a decrease in end-diasystolic volume (EDV) and end-diasystolic size (EDS) of the left ventricle. A similar steady trend continues to 24 months of observation. The average data of the transmurality index in group 1 decreased, as compared with the pre-operative values, from 0.39±0.07 to 0.32±0.02. The average difference was 0.07 [0.02-0.08; 95% CI, p = 0.01]. In patients with diabetes, the number of pathological segments in the zone of hibernated myocardium directly correlates with the index of transmurality. The lower the transmurality index, the smaller the number of pathological segments detected and the better the recovery processes of dysfunctional myocardium occur. Unlike the index of trasmurality, the index of cardiac fibrosis does not correlate with the number of pathological segments in the hibernation zone. Factors associated with the development of MACE in patients with diabetes: HbA1c ≥6.5% to PCI, fasting plasma glucose ≥6.0 mmol / l, total cholesterol ≥5.2 mmol / l, triglycerides ≥1.7 mmol / l, LDL cholesterol ≥2.5 mmol / l. In addition, performing PCI after 30 days from myocardial infarction, as well as incomplete myocardial revascularization, SYNTAX score> 25, transmural index ≥0.45, cardiac fibrosis volume ≥45%, were also unfavorable risk factors for the development of MACE. At the same time, reduced LVEF was not a predictor of an unfavorable prognosis of PCI in such patients.

Conclusion: the frequency of MACE, as well as the dynamics of recovery of hibernated myocardium function, in patients with diabetes and chronic heart failure, is comparable to that in patients without diabetes mellitus. At the same time, the smaller the value of the transmurality index, the better the recovery processes of dysfunctional myocardium occur.

P1731

Evaluation of lung ultrasound for differential diagnosis of pneumonia and heart failure decompensation

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Background: challenges of pneumonia (PN) diagnosis in presence of concomitant chronic heart failure (CHF) can be attributed to difficulties of assessment of symptoms as well as presence of pitfalls in adopted clinical diagnostic algorithms.
Purpose: study aimed to evaluate the utility of lung ultrasound (LUS) in differential diagnosis of PN and CHF decompensation.
Methods: prospective case-control study enrolled adults with CHF and suspicion for PN. All participants underwent conventional procedures including lab tests and instrumental investigations. Infiltration consistent with PN was confirmed using chest computed tomography (CT) or X-ray in case of unilateral lesions; films were reviewed by 2 radiologists. Each PN case was matched in 1:1 ratio with CHF decompensation control on the basis of age, sex, etiology, course of CHF and comorbidities. LUS was performed using Bedside Lung Ultrasound in Emergency (BLUE) protocol blindly from the result of radiographical findings. Standard statistical tools were applied, p-value <0.05 was considered statistically significant.
Results: A total of 60 patients, median age 76 years old, 57% males, were enrolled. Groups were comparable regarding the main characteristics with exception of body temperature (table). LUS patterns of PN were identified in 27/30 (90%) of cases vs 0/30 of controls, patterns of pulmonary congestion were revealed in 14/30 (47%) and 30/30 (100%) patients with PN and CHF decompensation, respectively. Diagnostic performance of LUS in PN verification was as follows: sensitivity of 90%, specificity, positive predictive value and negative predictive value of 100% for each parameter, respectively.
Conclusion: BLUE protocol is sensitive and specific method of PN verification in patients with concomitant CHF. Being rapid and noninvasive, it could have significant role in diagnostic workup of pneumonia and CHF worsening particularly in settings with limited CT access.

Table 1. Characteristics of patients

Characteristic	Group 1 (n=30)	Group 2 (n=30)
Cough,%	86,0	80,0*
Breathlessness, %	96,7	100*
Reduced exercise tolerance, %	100	100*
Fine crackles/rales on auscultation, %	96,7	90,0*
Ankle swelling, %	40,0	43,3*
Median body temperature, °C	37,8	36,4**
Median WBC, x 10^9/L	9,45	8,3*
Median NTproBNP, pg/ml	2383	2754*

*NS – non significant; ** p < 0.05

P1732

Detection of the changes in cardiac function and sleep disordered breathing can be simultaneously and automatically performed by a nocturnal polygraphy with novel algorithm.

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BackgroundSleep disordered breathing (SDB) is a common comorbid condition with cardiac patients especially those with heart failure (HF) reportedly due to the changes in chemosensitivity, stimulation of pulmonary stretch receptors or prolonged circulation time. It is well known circulation time is prolonged in those with depressed cardiac function and can be a marker of cardiac output. Previously, we developed a novel automatic algorithm to determine finger to lung circulation time (LFCT) from nocturnal cardiorespiratory polygraphy data. As we hypothesized that this technique may be applied as a simplified and simultaneous detection tool of the changes in SDB severity and cardiac function, we tried to prove the usefulness of this technique in hospitalized cardiac patients.PurposeTo determine whether a set of cardiorespiratory polygraphy data, one at just after admission and another at just before discharge after treatment, can trace the changes in SDB and cardiac function among cardiac patients including HF with preserved ejection (EF) fraction and with reduced EF.MethodsWe enrolled consecutively 118 cardiac patients with and without HF, of whom 98 patients completed nocturnal polygraphy including oxygen saturation monitoring and respiration twice before/after treatment. We measured SDB parameters and automatically detected LFCT from the data. We divided the patients into worsening HF group (n=55) and non-worsening HF group (n=35), though 8 patients were excluded because the judgements of worsening HF or not were controversial. Echocardiography data (EF, left ventricular end diastolic and end systolic diameter (LVDd/LVDs) and BNP were obtained.ResultsOn admission, 63.7% of worsening HF and 54.2% of non-worsening HF had moderate to severe SDB. Patients with worsening HF group showed higher BNP values and improvement through HF treatment (563.6 ± 513.6 to 334.7 ± 265.6 pg/ml, p<0.05). 1st and 2nd cardiopulmonary polygraphy was performed at 3.5 ± 3.5 days and 11.2 ± 6.2 days after admission respectively (mean interval: 7.7 ± 4.5 days). RDI of patients with worsening HF improved through the treatment from 25.5 ± 16.5 to 18.2±12.9 (/h) significantly but not in non-worsening HF group. We could obtain LFCT data from 100% of the patients even from those with RDI<5/h. LFCT values significantly shortened only in patients with worsening HF group with low EF (EF < 40%: 26.9 ± 7.6 to 24.2 ± 6.1 (s), p<0.05), dilated LVDd (LVDd50mm: 27.3±7.2 to 25.1±6.4 (s), p<0.05) or dilated LVDs (LVDs40mm: 26.9±7.3 to 24.9±6.7, p<0.05).
ConclusionSimple nocturnal cardiopulmonary monitor can simultaneously trace the changes in the status of SDB and cardiac output represented by LFCT during treatment. In the patients with HF with preserved EF, SDB improved though cardiac output remained at same level, while both parameters improved in HF with reduced EF, suggesting that this technique can be a useful tool for treating cardiac patients.

P1733

Short term respiratory monitoring during tilt-table testing predicts periodic breathing/Cheyne-Stokes severity in patients with heart failure with reduced ejection fraction

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Background: In patients with heart failure with reduced ejection fraction (HFrEF), periodic breathing (PB: hyperventilation/hypopneas) and Cheyne-Stokes respiration (CSR: hyperventilation/apneas) are usually thought to occur only at night in supine position.
Aim: We aimed to evaluate whether PB/CSR can be observed in patients with HFrEF in awake and orthostatic conditions.
Methods: A total of 461 patients with HFrEF on optimal guideline-recommended treatment (left ventricular ejection fraction: 29 ± 7%; age: 65 ± 12 years; 81% males) underwent echocardiography, pulmonary function test, 24-h electrocardiographic and respiratory recording and neurohormonal evaluation (natriuretic peptides, plasma norepinephrine, renin activity and aldosterone levels). Each patient also underwent a short term attended respiratory monitoring (SRM) during tilt table testing (10 minutes in clinostatism and 5 minutes in orthostatism).
A score from 0 to 2 for the SRM was created, with 0 being normal respiration, 1 being PB/CSR disappearing in orthostatism and 2 being PB/CSR persisting in orthostatism.
Results: The prevalence of scores 0-1-2 were 50%, 35% and 15%, respectively.
The score was predictive of apnea-hypopnea index (AHI) and central apnea index (CAI) severity at the 24-h recording (all p<0.001) during daytime (from 0 to 2, AHI: 4 IR 1-11 vs 11 IR 4-20 vs 22 IR 13-32 events/h; CAI: 0 IR 0-2 vs 3 IR 0-9 vs 13 IR 5-26, all p<0.001), nighttime (AHI: 12 IR 4-25 vs 23 IR 13-33 vs 36 IR 22-42 events/h; CAI: 1 IR 1-4 vs 6 IR 1-18 vs 16 IR 6-29, all p<0.001) and the 24-hour (AHI: 7 IR 2-17 vs 15 IR 9-25 vs 27 IR 18-36 events/h; CAI: 0 IR 0-4 vs 5 IR 1-14 vs 13 IR 5-26, all p<0.001). SRM score was also predictive of time spent with an oxygen saturation <90% (T90 4.0 IR 1.0-10.3 vs 6.5 IR 3.3-14.8 vs 11.0 IR 6.0-17.0 minutes, p<0.005). At univariate, logistic multinomial analysis predictors of presence of PB/CSR were left ventricular ejection fraction, moderate to severe mitral regurgitation (MR), left atrial volume, baseline atrial fibrillation (AF), right atrial diameter, systolic pulmonary artery pressure, NT-proBNP and norepinephrine levels, while at multivariate analysis only AF (OR 4.93, CI 1.30-18-57, p=0,019) resulted as independent predictor. At univariate, logistic multinomial analysis only AF was found to be predictor of PB/CSR persistence during orthostatism (OR 2.09; CI 1.16-3.77, p=0.01).
Conclusions: In HFrEF patients, a diurnal short term recording performed during tilt testing can stratify the severity of PB/CSR during daytime, nighttime and the

24-hour. Atrial fibrillation is the only independent predictor of PB/CSR presence and persistence in awake, orthostatic conditions.

P1734

Vitamin D deficiency and treatment: impact in major outcomes and functional capacity in heart failure patients

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On behalf of: GEstIC - Grupo de Estudo da Insuficiência Cardíaca

Background: Vitamin D (VD) deficiency is very common in population. Low VD status is associated with poor prognosis in heart failure (HF) patients which increases cardiovascular events and mortality. Although, despite of the well established effects of the VD in the cardiovascular system, impact of it supplementation is still uncertain with disparities in various studies. In our HF clinic, VD deficit and bone disease are systematically screened using tools like Fracture Risk Assessment Tool (FRAX) and Dual-energy X-ray absorptiometry (DEXA) and treated, under a predefined protocol.
Purpose: Evaluate the prevalence of VD deficiency and the prognostic impact of its treatment in a cohort of HF patients admitted to a HF clinic at tertiary university hospital.
Methods: Retrospective observational study recruiting patients admitted to our HF clinic from January 2013 to December 2017. All patients with HF and VD deficiency (<50nmol/L) were included after reviewing electronic medical records, performing a total of 232 patients. VD status was analyzed after oral supplementation, dividing the study population in two clusters: patients with normal and low VD levels. They were compared by functional variables: reduced ejection fraction (rEF), NYHA e Duke Activity Status Index (DASI); and vital outcomes: mortality, hospital readmission. Stage 5 kidney disease or loss of follow up excluded 68 patients.
Results: The 164 patients analyzed had a median age of 79 years old and 54.9% was female. At pre-VD supplementation, 39.6% of the population had rEF, 83.5% were symptomatic (NYHA class $\geq$ II) and median DASI was 18.95 points. In the 84 evaluated DEXA, 15.9% were normal, 19.5% had osteopenia and 15.9% had osteoporosis. Bone fractures were identified in 9.8% of patients.
VD supplementation was prescribed to 151 patients, in which 75.6% (n=124) achieved normal VD levels. Comparing these with the cluster who maintained VD deficit, respectively: 12.7% vs. 5.6% (p=0.683) maintained or improved left ventricular ejection fraction (LVFE); NYHA class improved at least one class in 32.5% vs. 33.3% (p=0.924); median DASI improved to 20.0 vs. 19.5 (p=0.725). One-year mortality and re-hospitalization for HF post VD supplementation were 9.7% vs. 17.5% (p=0.253) and 25.8 % vs. 30% (p=0.271) in HF patients with normal vs. low VD levels, respectively.
Conclusions: VD deficiency was very prevalent in our cohort of HF patients. Oral supplementation was effective in the majority. Despite of VD normal levels were associated with improved LVFE and decreased mortality and re-hospitalization for HF, we could not find any significant statistical impact in these outcomes. These results must be validated in larger studies.

Acute Heart Failure

P1735

Treatment of cardiogenic shock complicating peripartum cardiomyopathy with the calcium sensitizer, levosimendan - data from the german PPCM registry

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Background: Peripartum cardiomyopathy (PPCM) is a life-threatening heart disease, characterized by acute or subacute heart failure due to reduced left ventricular ejection fraction (LVEF). Treatment of cardiogenic shock (CS) complicating PPCM is challenging; therapeutic regimes for PPCM patients with CS seem to influence the ability of patients to recover. We could recently show that dobutamine may be associated with progression to irreversible terminal heart failure in PPCM patients with acute severe heart failure.
The calcium sensitizer levosimendan (LE) is currently considered as a beneficial therapy in selected patients with acute heart failure/CS. However, recent analyses of sarcomere physiology in cardiac biopsies from PPCM patients point to impaired PKA-cAMP signaling and already increased Ca2+ sensitivity.
This study sought to investigate the effect of administration of LE on outcome and clinical course of PPCM patients with CS.
Methods and Results: Out of 19 PPCM patients with CS 13 patients obtained LE (LE-patients) and 6 patients did not obtain this drug (no-LE-patients). Notably LE-patients had a significant lower LVEF at diagnosis (18.5±8.29 vs 27.0±5.62; p: 0.0297) and a trend to higher NT-proBNP values (12716±10196 ng/l vs 4414±5451 ng/l; p: 0.0733) compared to no-LE-patients. Both groups were comparable regarding age, parity, comorbidities and lactate levels. The Card-Shock-Score, SAPS II-Score, APACHE II-Score and initial SOFA-Score did not differ significantly between the two groups. All patients survived the acute phase of CS but more patients in the LE-group were treared with mechanical circulatory support (Impella or ECMO) compared to the no-LE group (8/13 vs. 0/6; p: 0.1358).
At follow up (FU: 20.5 [3-67] vs. 15 [1-76] months) none of the no-LE patients (0/6) had received a HTX, LVAD or had died, while 69.2% (9/13) of the LE-patients underwent LVAD implantation or HTX (p: 0.0108) and 23.1% (3/13) LE-patients had died.
In our mouse model of PPCM (mice with a cardiomyocyte specific STAT3 deficiency, CKO), we observe similar impairment of cAMP and Ca2+ signaling. Postpartum treatment (on day 1-2 and day 8-9 after delivery, 2 pregnancies and nursing periodes) of CKO mice with LE (0.012 mg/kgBW) showed a trend to a reduced cardiac function and accelerated PPCM .
Conclusion: PPCM patients treated with LE displayed a higher rate of terminal heart failure, HTX, LVAD and less LV recovery, compared to no-LE-patients. Although both groups were comparable regarding several heart failure markers and shock-scores, worse LVEF and higher NT-proBNP levels at diagnosis show that CS was more severe in LE-patients and the two groups are not statistically comparable. Therefore, these data have to be interpreted with great caution, and outcome can not be attributed directly to the treatment with LE. However, first experimental data support the notion that LE may not be beneficial in all PPCM patients.

P1737

The effect of levosimendan on the short-term outcome of cardiopulmonary bypass surgery in cardiomyopathic patients

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On behalf of: Post Cardiac Surgery ICU team, King Fahd Armed Forces Hospital

Background This study evaluated the efficacy and safety of levosimendan, given intravenously to cardiomyopathic patients during and after cardiopulmonary bypass surgery. Levosimendan improves cardiac function by a novel mechanism of action compared to currently available drugs. We hypothesized that, in patients with severely compromised ventricular function, the use of levosimendan would be associated with better postoperative cardiac function than with inotropic drugs that increase myocardial oxygen consumption.
Methods 250 patients with a preoperative ejection fraction ≤30% scheduled for elective cardiac surgery with cardiopulmonary bypass were subjected to two different inotropic protocols: group A (levosemindan goup) levosimendan started immediately after the release of the aortic cross clamp by loading dose 6 μg / kg administered in 10 minutes then 0.1 mg /kg/ min continuous intravenous infusion in addition to our standard protocol started immediately after finishing the loading dose and maintained for 48 hours infusion. And group B (usual protocol group) received our standard protocol for these cases milrinone ± dobutamine and noradrenalin, adrenalin and dopamine according to blood pressure. The treatment was masked to the observers.
We assessed Haemodynamics of patients using Flotrac, Invasive arterial pressure monitoring, blood lactate level in ABG samples.
Results Cardiac Index was similar between groups initially after surgery, but it declined 12 h after surgery in the usual inotropic group but not in the levosemindan group ($P < 0.05$ between groups) despite similar filling pressures. Total dose, duration of inotropic drug administration and norepinephrine dose were lower in the levosimendan group than in the usual inotropic group ($P < 0.05$). The duration of tracheal intubation and Intensive care length of stay were shorter in the Levosemindan group compared with the group B ($P < 005$). Three patients in the group B died within 30 days of surgery but only one in levosemindan group.
Conclusions In cardiac surgery patients with a low preoperative ejection fraction, Cardiac index and stroke volume was better maintained when adding levosimendan to our inotropic protocol. Also, ICU LOS (Intensive Care Unit Length of Stay) was decreased with no increased risk of adverse Cardiovascular events.

P1738

The efficacy of tolvaptan in acute heart failure - an updated meta-analysis

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Background Effective decongestion is important in the management of acute decompensated heart failure. Currently, guidelines recommend the use of loop diuretics. However, there are many challenges associated with it. One of them is diuretic resistance. Another is acute renal injury. At present, there are no evidenced based recommendations that target the preservation and/or restoration of renal

function in the treatment of heart failure. Tolvaptan can be a promising treatment in the management of heart failure by acting on a unique segment of the renal tubule.
Objective This paper aimed to establish the efficacy of Tolvaptan in the treatment for acute heart failure.
Methods We searched the available literature from the databases of MEDLINE, Cochrane CENTRAL and ClinicalTrials.gov for studies investigating the effects of Tolvaptan on acute heart failure published until October 30, 2018. Two reviewers independently screened studies then extracted relevant data against the pre-specified eligibility criteria. We assessed for risk for bias in the individual studies using the Cochrane Risk of Bias Tool Approach. Outcomes assessed included effects on mortality, length of hospitalization, incidence of worsening renal function (WRF), change in body weight, change in urine output and hypernatremia. We pooled data using a random effects model with Revman 5.3.
Results Eight studies with 5169 patients were included. Tolvaptan resulted to significantly decreased incidence of worsening renal function (risk ratio 0.51 (CI: 0.27, 0.96)). On subgroup analysis, relative risk of worsening renal function was 0.40 (CI: 0.21, 0.76) for studies with patients with higher mean Ejection fraction (>40). Tolvaptan could result to a small increase in creatinine in patients with reduced Ejection Fraction (Mean difference 0.05 (CI: 0.03, 0.07). Tolvaptan had significantly better effect on decreasing body weight (mean difference -0.79 (CI: -0.91, -0.68)) and increasing urine output (Mean difference 1.61 (CI 1.08, 2.13)). There was a significant increase in the incidence of hypernatremia with the use of Tolvaptan (risk ratio 3.29 (CI: 1.77, 6.12)). Assessment of other outcomes showed no significant effects when it came to long term (risk ratio 0.98 (CI: 0.88, 1.08)) and short term (risk ratio 0.69 (CI: 0.33, 1.45)) mortality and length of hospital stay (mean difference -0.22 days (CI -9.71, 9.28)).
Conclusion Tolvaptan is effective in the promotion of fluid loss. It may also be beneficial in decreasing the incidence of worsening renal function and may be an alternative option to loop diuretics in decongesting patients in acute heart failure. However, it may have more benefit for heart failure patients with preserved ejection fraction. Further studies need to be done to investigate this relationship.

P1739

Levosimendan alone or combined with inotropes in an acute heart failure unit

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Background: Levosimendan (LS) may be the used in the management of selected patients (pts) with acute Heart Failure (AHF). Given its vasodilator properties, it is not suitable to treat those with hypotension [i.e. systolic blood pressure (SBP) < 85mmHg], unless combined with other inotropes. However, such strategy is yet scarcely investigated.
Purpose: The main goals of this study were to investigate the variation of clinical and laboratory during 24-hour LS infusion and to determine the differences between patients receiving LS vs levosimendan with another inotrope or vasopressor (LSc), as well as differences in adverse events (AE) and outcomes.
Methods: This is a single-center cohort study of hospitalized pts with AHF who received LS in an AHF care Unit between 2012 and 2018.
Results: A total of 88 pts were included (70.5% male; mean age 67±12years; mean left ventricular ejection fraction 28.6±11.6%). 23 (26.1%) pts received LSc. There were no significant differences in baseline demographics between groups, except for diabetes (13.0% vs 53.8%, p=0.010). The LSc group was more likely to present with cardiogenic shock (47.6% vs 9.8%, p=0.001), lower initial mean arterial pressure (75±10 vs 81±10 mmHg, p=0.025) and minimum SBP after starting LS (82±9 vs 92±12mmHg, p=0.002). No differences were noted in maximum LS dose achieved, urinary output or laboratory evaluation between groups (table I). Likewise, there were no differences in need for LS suspension (26.1% vs 7.9%, p=0.061), supraventricular tachycardia (40.9% vs 21.0%, p=0.068) and a composite of intra-hospital death, 30-day HF hospitalization or 30-day death (30.4% vs 24.6%, p=0.585). Finally, there was no difference in intra-hospital mortality (26.1% vs 13.8%, p=0.205).
Conclusion: In a dedicated HF unit, LS was well-tolerated, with few documented AE. Nearly 1 in every 4 pts received LSc, with no in LS suspension, AE or outcomes. This strategy appears to be an useful, well-tolerated and safe option, allowing a broader LS use in the AHF population. However, this hypothesis warrants further investigation, as this analysis is limited by its single-center retrospective design, biased population, heterogeneity and small number of pts.

Table I Subpopulation demographics

	LS (n=65)	LSc (n=23)	p-value*
Maximum LS dose achieved, N (%)	48 (82,8%)	14 (82,4%)	0,978
Urinary Output (mL), mean±SD	3219±1674	2875±1756	0,424
24h eGFR, mean±SD (mL/min/1,73m2)	55,5±28,0	54,5±31,8	0,893
24h ALT, median (IQR) (U/L)	35,0 (132,0 [16,0-148,0])	30,0 (833,0 [25,5-858,5])	0,696

ALT = Alanine transaminase; eGFR = estimated glomerular filtration rate; IQR = Interquartile Range; SD = Standard Deviation.

P1740

Effects of levosimendan in patients with chagas cardiomyopathy hospitalized for acute heart failure

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Introduction: Hospitalizations for acute heart failure (AHF) are frequent in patients with Chagas cardiomyopathy (CCM). Levosimendan, a calcium sensitizer and inodilator, has shown positive clinical, functional and neurohormonal effects, but its use in patients with CCM hospitalized for AHF has not been evaluated.
Purpose: To evaluate the effect of levosimendan administration on renal function, serum B-type natriuretic peptide (BNP) levels, hospital stay and readmissions in patients with CCM hospitalized for AHF.
Methods: A retrospective cohort study was performed including hospitalized patients with AHF aged 18 years or older, with positive serological test for T. cruzi and electrocardiographic and echocardiographic findings compatible with CCM. Those with renal failure were excluded. During the hospitalization, renal function, serum BNP levels, serum sodium levels and fluid balance were evaluated. Hospital readmissions to one year were evaluated.
Results: Were evaluated 37 patients. Mean age was 69.94 ± 9.31 years, 56.76% were women. Eleven patients recibed levosimendan (29.7%). No statistically significant differences were found in BNP level change (-393.66 ± 991.15 vs. -254.20 ± 1042.8, p=0.739), percent change in creatinine level (17.09 ± 28.42% vs. 5.57 ± 52.42%, p=0.189) and hospital stay (5 [4-8] vs. 6 [5-8], p=0.322) between the the group with levosimendan and control, respectively. The group with levosimendan showed greater prevalence of readmissions (36.36% vs. 19.23%, p=0.404) and shorter time to next hospitalization (24.5 [19-55] vs. 83 16-209], p=0.538), although it was not statistically significant.
Conclusions: In patients with CCM hospitalized for AHF, the administration of levosimendan did not show benefits in hospital stay, renal function and natriuretic peptide B levels. On the other side, although it was not significant, it was associated with a greater number of readmissions and shorter time to next hospitalization.

P1741

A formula to calculate discharge furosemide dose after an acute heart failure hospitalization

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Background: Loop diuretics are symptomatic heart failure (HF) therapies, expected to control congestive symptoms. Its impact on HF prognosis is unclear but they are regarded as potentially hazardous. The dose tends to be the lowest possible to maintain euvolemic status.
Purpose: To determine a formula to calculate the discharge furosemide dose in acute HF patients.

Methods: We retrospectively studied a derivation cohort of acute HF patients that were part of a registry conducted in our Hospital between 2009-2010. Patients with preserved or reduced systolic function were studied. Linear regression analysis was used to evaluate determinants independently associated with the discharge furosemide dose. A multivariate model was built based on variables independently associated with discharge furosemide. The intercept was the constant value in the formula and β coefficients of each determinant used as the relative weight/multiplier of the corresponding variable: furosemide dose = intercept + β1 x variable 1 +...+βn x variable n. The formula was tested in a validation cohort of acute HF patients that were part of a registry conducted in the same hospital in 2006-2007. Estimated and real furosemide dose was compared: correlation coefficient and Wilcoxon test.
Results: The derivation cohort had 622 patients. Mean age 76 years, 45.2% male, and 43.4% had preserved ejection fraction. Ischemic aetiology 40%, diabetes mellitus (DM) 41.5%, median discharge B-type natriuretic peptide (BNP) 741.9pg/mL and upon discharge 67% were on beta blocker (BB), 66.2% on ACEi/ARB and 20.1% on mineralocorticoid receptor antagonists (MRA). Median discharge furosemide dose was 80mg. The validation cohort had 214 patients: mean age 70 years, 69.2% male, and 23.8% with preserved ejection fraction. Ischemic aetiology 49.1%, DM 44.9%, median BNP 760.2pg/mL; 65.4% discharged on BB, 78.5% on ACEi/ARB and 33.6% on MRA. Median discharge furosemide dose 80mg. Independent determinants of furosemide dose were male gender, DM, BNP and previous furosemide dose; R value 0.62. The formula based on this model was: 40.5 + 13.5 x gender + 4.6 x DM + 0.003 x discharge BNP + 0.46 x previous furosemide dose (gender=1 if male, DM=1 if present, discharge BNP in pg/mL and previous furosemide dose in mg/day). In the derivation cohort, Wilcoxon test comparing discharge and estimated furosemide dose was 80 (40-120) vs. 76 (59-96) mg/day, respectively, p=0.51; Correlation coefficient 0.62. In the validation cohort, discharge and estimated furosemide dose was 80 (60-120) vs. 78 (60-102) mg/day, respectively, p=0.14; Correlation coefficient 0.54.
Conclusions: Male gender, DM, higher discharge BNP and higher previous furosemide dose are independent determinants of the furosemide discharge dose. We propose the formula to calculate furosemidedose when discharging an acute HF patient: 40.5 + 13.5 x gender + 4.6 x DM + 0.003 x discharge BNP + 0.46 x previous furosemide dose.

P1742

Decrease in heart rate have more impact than up-titration of beta blocker for acute decompensated heart failure with atrial fibrillation

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Background: Beta blocker (BB) is one of the most important drugs for heart failure (HF). The effect of BB is related to decrease in heart rate (HR). However, among HF patient with atrial fibrillation (AF), the relationship between BB and decrease in HR is unknown. Method and result: We enrolled consecutive 631 patients were admitted to our hospital for acute decompensated HF in 2015. 150 patients with AF both on admission and discharge was selected. 62 (41.3%) of whom received up-titration of BB in hospitalization. 127 (84.6%) of whom decreased HR on discharge comparing with on admission. The incidence of all cause death and HF re-hospitalization was not significant different between up-titration of BB group and without up-titration group (48.3% vs. 56.8%, P=0.71). The incidence of all cause death and HF re-hospitalization was significant lower in decrease in HR group than in without decrease in HR group (50.3% vs. 69.5%, P0.01). We analyzed up-titration of BB group and without up-titration group, respectively. The incidence of all cause death and HF re-hospitalization in up-titration of BB group was significant lower in decrease in HR group than in without decrease in HR group (45.6% vs. 80.0%, P=0.03). And similar result was obtained from without up-titration of BB group (54.2% vs. 66.6%, P=0.02). Conclusion: Decrease in HR may have a better prognosis than up-titration of beta blocker for acute decompensated HF with AF.

P1743

Optimized medical therapy at admission vs the moment of discharged in patient acute heart failure

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On behalf of: EPICO - Estudo para Investigação de Causas Tratáveis e Otimização terapêutica da Insuficiência Cardíaca

BACKGROUND: The Acute Heart Failure (AHF) is the main cause of hospitalization among adults in Brazil. In the last ten years, costs attributable to hospital services a related to HF corresponded to almost 90% of the total mobilized by this pathology of the Sistema Único de Saúde (Unified Health System - SUS) and these are mostly caused by in-hospital treatment.
OBJETIVE: The objective of this study was to compare the optimized medical therapy at AHF admission with the time of discharge in patients admitted to a referral center in cardiology in Bahia - Brazil.
METHODS: This is a prospective cohort study "Study for the identification of treatable causes and therapeutic optimization of heart failure" (EPICO) consisting of people admitted to a tertiary center for cardiovascular care in Salvador between January 2016 and December 2018. The heart failure (HF) was defined according to the guidelines of the European Society of Cardiology (ESC) and only cases of systolic heart failure, defined as Left Ventricular Ejection Fraction (LVEF) <50%, were eligible. It is considered as optimized drug therapy the use drugs of the classes ACEI or ARB, Beta-blocker and spironolactone, if indicated, in optimal doses according to the individual tolerance. The patient follow up is made for Team multiprofissional in HF. The clinical, laboratory, drug and other data were collected from medical records. The statistical analysis used the SPSS® software (Statistical Package for Social Sciences)
RESULTS: The 318 patients was analyzed in relation to drug therapy prior to hospital admission at AHF and at moment of discharge. Of these, 15% (48) were pharmacologically optimized prior to hospitalization, 94% (45) of whom had ACE inhibitors or ARB, 94% (45) Beta-blocker, 98% (47) spironolactone. In patient Discharge moment 87% (276) was optimal clinical treatment, with 73% (202) receiving ACEi or ARB, 90% (249) using a beta-blocker, 75% (206) using spironolactone. It can be noticed that the clinical descompensation of HF is, for the most part, due to the lack of clinical and therapeutic optimization. The Team HF work optimized drug treatment at discharge showed a significant increase in relation to the prescription of prior pharmacological therapy for essential heart failure.
CONCLUSIONS: The adoption of a multidisciplinary care strategy with specific guidelines and measures for HF during hospitalization and at the time of hospital discharge and continuous follow-up of the patients, enables optimized attention focused on compensation of the clinical picture, self-care, recognition and prevention of HF symptoms.

P1744

Population pharmacokinetics of intravenous sufentanil in critically ill patients supported with extracorporeal membrane oxygenation therapy

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Background: Sufentanil is commonly used for analgosedation during extracorporeal membrane oxygenation (ECMO). ECMO has significant effects on the pharmacokinetics (PK) of drugs. This study aimed to develop a population PK model of sufentanil in ECMO patients and to suggest dosing recommendations.
Methods: This prospective cohort PK study included 20 patients who received sufentanil during venoarterial-ECMO (VA-ECMO). Blood samples were collected for 96 h during infusion and 72 h after cessation of sufentanil. The population PK model was developed using nonlinear mixed effects modelling. Monte Carlo simulations were performed using the final PK parameters with three standard doses.
Results: A two-compartment model best described the PK of sufentanil. Body temperature and total plasma protein were significant covariates of systemic clearance (CL) and peripheral volume of distribution (V2). The parameter estimates of the final model were as follows: CL = 36.8 × (temperature/36.8)9 L h-1, central volume of distribution (V1) = 235 L, V2 = 55.3 × (total plasma protein)2.26 L, intercompartmental clearance (Q) = 40 L h-1.
Conclusions: Compared with previous PK data from patients not undergoing ECMO, we observed increased volumes of distribution and decreased clearance values. Covariate analysis showed that body temperature and total plasma protein level correlated positively with CL and V2, respectively. We suggest that clinicians should consider a reduced dosing of sufentanil in patients with hypothermia and hypoproteinaemia. Overall, close monitoring of the body temperature and total plasma protein level and assessment of sedation and analgesia status are crucial to provide effective analgosedation and promote recovery.

P1745

Problem of 30-day readmission for Heart Failure could be improved. Results of IMPEDANCE-HF extended trial

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Readmissions for heart failure (HF) are a major burden. The aim of secondary analyses of the IMPEDANCE-HF extended trial was to find out if degree of residual congestion on discharge for HF could predict 30-day readmission.
The analysis of IMPEDANCE-HF extended trial was based on the data collected during the index hospitalization for HF. The IMPEDANCE-HF extended trial was a randomized controlled single-blinded trial of HF with reduced LVEF patients. Inclusion criteria were LVEF ≤ 45%, NYHA class II-IV and patients were hospitalized for HF within 12 months (ClinicalTrials.gov NCT01315223). Half of the patients (N=145) were assigned to the active Lung Impedance (LI)-guided treatment arm where clinicians were based therapy on LI level. The other half was assigned to the control arm where LI values were recorded but not conveyed to the clinical treatment team. In the case of hospitalization, LI was recorded in all patients at discharge. The decisions regarding discharge and choice of treatment were at the discretion of the hospital staff .
A non-invasive impedance device was used in this study to assess the lung fluid content. Unlike the existing impedance devices, the present device has the ability to differentiate a true signal from the lungs from the noise signal of surrounding chest wall. Such approach enables to measure a small change in lung fluid content. A method to determine individual "dry" baseline LI (BLI) for each HF patient has been reported. BLI for each patient was used to calculate a new parameter, the LIR= [(current LI/BLI)-1] ×100%, which determinate the degree of pulmonary congestion in time of measurement.
Method. Degree of pulmonary congestion at discharge for HF hospitalization was divided into 5 brackets. (1) LIR= 0 to – 18% - minimal interstitial edema (IE), (2) LIR= - 18.1 to -28% - mild IE, (3) LIR= -28.1 to – 38 – moderate IE, (4) LIR= -38.1 to -48% - severe IE to mild alveolar edema (AE) and (5) LIR < -48.1% - moderate AE.
Results: LI-guided patients were followed for 61.9.4±39.6 months and control patients for 46.7±33.3 months (p<0.01) accounting for 269 and 470 HF hospitalizations, respectively (p<0.01). Average ΔLIR at discharge was -33.0±14% vs. -37.3±12% in LI-guided and control groups, respectively (p<0.01). The distribution of patients at discharge according to the different levels of pulmonary congestion by brackets 1-5 were 21:19:24:19:17% in the LI-guided and 6:18:34:23:19% in the control group (p<0.01). The probability to 30-day readmission calculated for both groups together according degree of pulmonary congestion on discharge was: HR Bracket 2 to 1 = 1.8 [1.4 – 2.3, p <0.01], HR Bracket 3 to 1 = 11.0 [8.4 – 14.3, p <0.01], HR Bracket 4 to 1 = 43.5 [31.3 – 62.5, p <0.01], HR Bracket 5 to 1 = 142.9 [83.3 – 250.0, p <0.01].
Conclusion: The degree of pre-discharge pulmonary congestion as assessed by LI is a very robust and reliable predictor for 30-day readmission.

P1746

Use of non- invasive positive pressure ventilation is associated with worse short-term outcome after discharge for elderly patients with acute decompensated heart failure

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Background: Non-invasive positive pressure ventilation (NIPPV) is usually adopted as a support to medical therapy in patients with acute decompensated heart failure (ADHF). However, the effects of NIPPV on the outcome of patients with ADHF has yet to be fully investigated. Herein, we aimed to evaluate the characteristics of ADHF patients who received NIPPV and assess its impact on short-term clinical outcome. Methods and Results: WET-HF (West Tokyo Heart Failure) Registry is a multicenter prospective cohort registry enrolling all patients hospitalized for ADHF, which enrolled 4000 subjects from 2006 through 2017. Excluding 247 patients undergoing tracheal intubation or those lacking information on NIPPV use, 3753 patients (74±13 years, male 60%) were available for the present analysis. Overall, 707 (18.8%) used NIPPV (Group A) and the remaining did not (Group B). Group A had lower proportion of prior ADHF admission (A, 25%, B, 32%, P<0.001) on less anti-HF medication and severe degree of HF represented by lower oxygen saturation (A, 93% [88-97], B, 96% [94-98], P<0.0001), higher heart rate (A, 102 bpm [82-121], B, 88bpm [70-107], P<0.001), and higher BNP level (A, 897 pg/ml [495-1592], B, 691 pg/ml [353-1226], P<0.001) at the time of admission. Despite comparable cardiac function parameters such as left ventricular ejection fraction or E/e', Group A showed longer hospital stay (A, 16 days [10-26], B, 14 days [9, 22], P<0.001) and higher in-hospital mortality (A, 5%, B, 3%, P=0.02). Group A also had higher rate of the composite endpoint of all-cause death or ADHF rehospitalization within 90 days after discharge (P=0.043). Additionally, one-to-one nearest-neighbor propensity match analysis (n=550 in each group) was conducted to adjust the confounding factors such as the severity of HF and in-hospital treatment between the 2 groups. There were no significant differences regarding in-hospital or post-discharge outcome between the 2 groups in the matched cohort.
However, in the elderly (≥85 years) patients NIPPV use was still associated with higher rate of the composite endpoint of all-cause death or ADHF readmission within 90 days after discharge (HR 1.77 [1.03-3.13], P=0.038), although in the younger (<85 years) patients no such difference was observed between the patients with NIPPV and those without (HR 0.82 [0.56-1.21], P=0.33; P for interaction = 0.03).
Conclusions: Although in-hospital and early post-discharge outcomes of patients with NIPPV was comparable within the matched cohort, short-term post-discharge outcome was still worse for NIPPV users in the elderly patients (> 85 years). Although NIPPV can be a reasonable option for the treatment of ADHF patients with respiratory distress, it should be cautious in the management of elderly patients (> 85 years) who required NIPPV even after discharge.

P1747

Influence of circulatory support devices on morbidity and mortality of cardiogenic shock after acute myocardial infarction.

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Introduction: cardiogenic shock is a state of low cardiac output that results in life risk due to organic hypoperfusion and hypoxia, and acute myocardial infarction (AMI) with left ventricular dysfunction continues to be its most frequent cause. Advances in reperfusion therapy have been associated with survival improvement, but significant regional disparities in care are reported and in-hospital mortality remains very high. Objectives: to define the risk factors, epidemiological data and outcomes of patients admitted due to AMI who presented cardiogenic shock at admission or during admission to a tertiary hospital.
Methods: a longitudinal, observational study of consecutive patients admitted with acute coronary syndrome (ACS) from June 1, 2015 to October 31, 2017. Data were obtained from the medical records, as well as interviews of patients during hospitalization. We compared the demographic, clinical and outcomes data of patients with cardiogenic shock (wCC) and without cardiogenic shock (woCC) in this population.
Results: there were 216 patients analyzed and the incidence of cardiogenic shock was 9.7% and was manifested at admission in 33.3% of the cases. The characteristics in the wCC group and woCC were, respectively: mean age of 76.1±10.56 x 70.8±11.39 years (p=0.04), male (66.7% x 70.3%, p=0.75), smoking (28.6% x 52.3%, p=0.03), dyslipidemia (57.1% x 55.9%, p = 0.91), systemic arterial hypertension (66.7% x 77.9%, p=0.24) and diabetes mellitus (42.9% x 33.3%, p=0.38); ST elevation AMI (47.6% x 28.7%, p=0.07) and non-ST elevation AMI (52.4% x 71.3%, p=0.07). Other complications were renal dysfunction (14.3% x 7.7%, p=0.29), atrial fibrillation (19% x 7.2%, p=0.06), pericardial effusion (95.2% x 32.8%, p<0.001), cardiorespiratory arrest during hospitalization (42.9% x 1%, p<0.001), use of mechanical circulatory support device (57.1% x 1%, p <0.001). In the wCC group: intra-aortic balloon (58.3%), Centrimag (9.5%), extracorporeal membrane circulation (14.2%); and in woCC group: intra-aortic balloon (1%). Overall mortality were 61% in wCC group and 1% in woCC group (p<0.001).
Conclusion: cardiogenic shock occurred in older patients, that presented with more renal dysfunction, atrial fibrillation, pericardial effusion and cardiorespiratory arrest. Despite the technological advances in the treatment of AMI, the circulatory support devices did not reduce the morbidity and mortality of this entity, remaining extremely high.

P1748

Precipitants of admission in heart failure; adherence & alteration of medication by other clinical services pose a challenge even in disease management programs

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Background Identification, treatment & prevention of precipitants leading to heart failure (HF) hospitalization is of paramount importance. However, to date, precipitants have primarily been analysed retrospectively, with relatively little focus on heart failure phenotype. Furthermore, no studies have reported on precipitants within a population managed in a heart failure disease management programs(DMP), wherein, care would be anticipated to have altered the relative importance of standard causes for readmission, in particular, adherence to therapy. We sought to address the gaps identified above
Methods 135 patients, presenting with ADHF were prospectively recruited and precipitants recorded. This cohort included patients with first presentation of denovo HF (dHF) and those managed within a DMP with established HF(eHF) HF phenotype

was classified based on LVEF into HFpEF (>=50%)& HFrEF (<50%). The precipitants were defined as Infections -Diagnosed based on clinical,laboratory and imaging findings,felt to be clinically contributing Medication Adherence-assessed using Morisky 8 Point medication adherence scale, Arrhythmias-documented on ECG & clinically felt to be contributing, predominantly atrial fibrillation Ischemia-based on history, clinical and ECG findings with or without cardiac enzyme rise, Medication change by other services involved in care of HF patient-defined as a reduction in HF therapies or use of contraindicated therapies Dietary non-compliance defined as excess sodium intake, Excess alcohol intake-defined as >1iu/d for women & >2iu for men Others-precipitants not falling in the above categories The identified precipitants were analysed against variables of interest, using chi squared , independent t test & fisher exact test , a p value of <0.05 was considered significant.
Results Single Precipitant was identified in 43.7 %(n=59), multiple precipitants were identified in 29.5%(n=35), no precipitant was identified in 30.4%(n=41). In dHF (n=67) predominant precipitants were LRTI (43%), Arrhythmias(39%), non compliant diet(34%), Ischemia(21%) ,Excess Alcohol(15%) ,Medication Change(7%),Others (4%) & Low Medication Adherence (1%). In eHF(68) predominant precipitants were LRTI(27%),Non compliant diet (24%),Arrhythmias(22%),Medication change(18%) ,Low Medication Adherence(15%),Excessive alcohol (15%) Ischemia (6%) & others (1%). No statistically significant difference was observed between HFrEF & HFpEF.
Conclusion Major observations from this prospective analysis highlight no significant difference between precipitants recorded comparing HFpEF & HFrEF in the total population. In eHF these precipitants remain prevalent ,but of note, medication adjustment & medication adherence remain a significant problem despite emphasis on self care education in these programs. These findings highlight the need for improvement in patient education & communication among different services involved in care of HF patient.

P1749

Development and validation of a Portuguese questionnaire to evaluate knowledge about heart failure

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Introduction . Heart Failure (HF) has a difficult diagnosis and, once diagnosed, it is essential to give patients critical knowledge to deal with it. The greater the information patients have about their illness, the lower the chances of hospital readmission. Knowledge of the disease includes the cause, symptoms, probable duration and expected evolution of the clinical condition.
Purpose. The present research aimed to adapt the "Knowledge Questionnaire on Chronic Heart Failure" developed by De Walt et al. (2004) to the Portuguese context. Method. The Portuguese version was developed across six stages: independent translation; discussion to obtain a single version; retroversion; questionnaire evaluation by cardiologists; first amendment; pilot test; second amendment. The final version achieved was then tested across three studies. In Study 1, 57 subjects (of which 37 women), aged between 14 and 66 years (M = 40, SD = 35.3), were randomly divided by two experimental conditions: flyer-questionnaire (FQ) vs. questionnaire-flyer (QF). In the FQ condition, after a presentation of an informative flyer about on HF, participants were asked to complete the questionnaire independently. In the QF condition, the reverse procedure was followed (i.e., the questionnaire was filled in before the flyer presentation). In Study 2, 21 participants (of which 10 women), aged between 20 and 34 years (M = 25.86, SD = 3.59), were asked to fill in the HF questionnaire before and after a 5-min period to read the flyer. Finally, in Study 3, 169 subjects with HF (of which 47 women), aged between 32 and 87 years (M = 62.57, SD = 10.93), were asked to fill in the questionnaire.
Results. In Study 1, FQ participants (M = 9.31, SD = 1.81) gave more correct responses than those in the QF condition (M = 5.90, SD = 2.40), $t(55) = -5.95$, $p < .001$, $d = 1.60$. In Study 2, participants gave more correct responses after reading the flyer (M = 10.38, SD = 1.69) than before reading it (M = 6.48, SD = 2.89), $t(30) = -6.77$, $p < .001$, $d = 1.64$. Finally, Study 3 participants with HF were found to give 8.53 correct answers out of 14 (SD = 2.19). Additionally, results showed that women had more knowledge than men (M = 9.13, SD = 2.08 vs. M = 8.30, SD = 2.19), $t(167) = 2.25$, $p = .026$, $d = 0.38$, and that greater knowledge was associated with higher education ($r = .34$, $p < .001$) and younger age ($r = .17$, $p = .03$).
Conclusion. Overall, the present research showed that the Portuguese version of the HF knowledge questionnaire is valid instrument for the assessment of knowledge about HF. This seems a useful tool for doctors to assess their patients' knowledge of the disease and act accordingly. Patients who have a chronic illness, such as HF, should have an adequate awareness about their condition, as this awareness can make a make a significant difference in the treatment.

P1750

Active screening using electronic medical record system for patient recruitment in case management of heart failure with reduced ejection fraction

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Introduction Patients with heart failure (HF), especially those with reduced ejection fraction (HFrEF) usually have longer hospitalisation days and higher re-hospitalisation rate. Case management and multidisciplinary teamwork have been reported to improve these outcomes. However, the recognition of patients with HF might be missed or delayed during the hospital stay, and these interventions are traditionally initiated only after the consultation of the cardiologists.
Purpose We aimed to assess if the active screening for the HF patients with the electronic medical record (EMR) system would shorten their hospital days and decrease re-hospitalisation rate.
Methods We constructed and launched a mobile system which can connect to the EMR since 01 July 2018. The system was designed to actively identify all hospitalised patients with a diagnosis of heart failure (ICD-10: I50) and left ventricular ejection fraction (LVEF) $\leq$ 35% during admission. It notified the HF multidisciplinary team automatically, and the team will provide healthcare and the relevant education to the patients like the way before this system was launched. Regarding the outcome evaluation, we compared the length of hospitalisation and three-months re-hospitalisation rate before and after launching the system.
ResultA total of 15 patients were actively identified three months after launching the mobile system with the connection of EMR. Their mean age was 59.4 $\pm$ 14.9 years, and 80% of them are men. The mean LVEF was 26.6 $\pm$ 6.3%. Comparing to the 36 patients before using the system, the demographic characteristics are similar, except a lower prevalence of coronary artery disease and hypertension. Regarding the primary outcome, three-months re-hospitalization rate after launching mobile system significantly decreased from 12% to 0% ($p = 0.01$) and the hospitalisation days marginally decreased from 10.6 to 7.2 days ($p = 0.06$).
Conclusion The preliminary analysis showed that active screening system through the connection of the EMR system might recognise the patients with HErEF earlier. By early recognition, we could initiate interventions promptly and hence, improve the HFrEF outcomes. In the future, longer follow-up and larger cohort studies are needed to confirm the benefits of the active screening and the continuing multidisciplinary team care for patients with heart failure.

P1751

The examination about the clinical feature related to re-admission in congestive heart failure patients introduced our original clinical pathway

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Background: We had introduced original clinical pathway(PATH) in congestive heart failure(CHF) cases for efficient medical care from August 2015. Introducing PATH, the great shortening of hospitalization period was achieved. But we can not still confirm the reducing effect about re-admission with CHF exacerbation even in the cases introduced PATH.
Purpose: For finding of the clue about suppression of re-admission, we retrospectively investigated the clinical feature about the CHF cases who ware introduced PATH and re-admitted with worsening of CHF after discharge.
Methods: We enrolled 246 cases(mean age: 80$\pm$11 years old, male/female: 139/107 cases) , admitted with CHF in our hospital and introduced PATH for the first time between August 2015 and November 2017. And we divided them in two groups, Y-group consisted of the 67 cases who ware re-admitted by worsening of CHF within 1year after discharge and N-group consisted of 179 cases who ware not re-admitted within 1 year. About all cases in both groups we investigated patient characteristics, various clinical data on first admission and clinical course until discharge. And we examined the difference of each survey item between two groups.
Results: In Y-group, the mean age was significantly higher(82$\pm$9 vs 79$\pm$11 years old); $p<0.05$) and the ratio of cases with admission history by CHF within the past 3 years was higher than N-group(43 vs17%; $p<0.0001$). The ratio of cases who had the past history of any coronary heart disease as an underlying disease of CHF was higher in Y-group(40 vs 26%; $p<0.05$). About cardiac function, the mean value of brain natriuretic peptide concentration in blood and the ejection fraction

of left ventricle by echocardiography was not significantly different in both groups. About blood test data on admission, the mean blood concentration value of creatinine and urea nitrogen was higher in Y-group(1.4±0.6 vs 1.2±0.6mg/dl; p<0.05, 30±115 vs 24±12mg/dl; p<0.01 respectively). The mean blood concentration of total cholesterol(153±34 vs 168±-46mg/dl; p<0.05) and high density lipoprotein cholesterol(43±14 vs 49±17mg/dl; p<0.05) was significantly lower, and the all of another lipid data was also tended to be low in Y-group. In Y-group and N-group, the mean starting time of cardiac rehabilitation(3.0±1.3 vs 3.2±1.7th hospital day), the mean duration of continuous venous infusion(4.2±3.9 vs 4.6±5.8days) and the mean duration of urethral catheterization(6.6±7.4 vs 6.0±9.2days) were not different. As a result, the hospitalization period was not so long(19±16 vs 17±14days).
Conclusion: In this study, we confirmed the achievement of efficient medical care for congestive heart failure by original clinical pathway again. And we found residual factor that could affect to occurrence of re-admission with re-exacerbation of heart failure, such as the old age, past heart failure history, renal dysfunction or malnutrition of patients.

P1752

The examination of the clinical feature to cause the further reduction of daily life independence level after admission in elderly cases with congestive heart failure

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Background: For efficient medical care and comprehensive education in congestive heart failure(CHF) cases, we had begun to use our original clinical pathway(PATH) from August 2015. By introducing PATH, we confirmed clear effects about the shortening of mean hospitalization period and about the prevention against the reduction of daily life independence level (DLIL) during admission even in elderly CHF cases. But in some elderly cases, we still found the reduction of their DLIL and its influence to clinical course.
Purpose: For prevention against reduction of DLIL, we examined about clinical features in elderly CHF patients whose DLIL had been down during admission.
Methods: We enrolled 225 CHF cases who ware 75 years old or older, admitted in our hospital and introduced PATH from August 2015 to July 2018(mean age 85±5 years old, male/female 107/118). We evaluated their DLIL before admission and at discharge with the scale which was presented by ministry of health, labor and welfare in Japanese government. It was consisted of 4 classes(the bedridden level to the level that one can act alone outdoors). We divided them in two groups, Y-group(20 cases whose DLIL level at discharge was down compared with that before admission) and N-group(205 cases whose DLIL was not changed during admission). In all cases, we investigated patient characteristics before admission, various clinical data on admission and enforcement situation of physical therapy during admission, and examined about their difference between two groups.
Results: The mean age was higher in Y-group(89±5 vs 85±5 years old; p<0.01). But in Y-group and N-group, the prevalence of dementia(58 vs 52%; ns) and the past admission history with CHF(25 vs 22%; ns) was not different. The mean ejection fraction of left ventricle(56±19 vs 53±17%; ns) and mean blood concentration of brain natriuretic peptide on admission(1037±1089 vs 800±648pg/ml; ns) was not different. The mean serum albumin level was lower in Y-group(3.2±0.5 vs 3.5±0.7g/dl; p<0.05). In Y-group and N-group, the starting time of physical therapy after admission was not diiferent(3.0±1.5 vs 3.0±1.4th hospital days; ns). But the starting time of exercise to keep standing positionwith or without the help by physical therapist(4.3±2.1 vs 2.5±1.7th hospital day; p<0.001) and the starting time of walking exercise(13.4±21.7 vs 4.1±3.0th hospital day; p<0.001) ware more late in Y-group. As a result the mean hospitalization period widely prolonged in Y-group(40.2±26.3 vs 15.2±11.0days; p<0.001).
Conclusions: In this study we found that the starting time delay of walking exercise with or without help might cause the reduction of activity level, and furthermore it might affect later walk training in elderly cases with congestive heart failure. It seemed that we should be careful their nutritional condition on admission and make various efforts by physical therapy for early getting out of bed.

P1753

Residual congestion on discharge for Heart Failure assessed by impedance technique predicts 30-day and one-year All-cause death. Results of IMPEDANCE-HF extended trial

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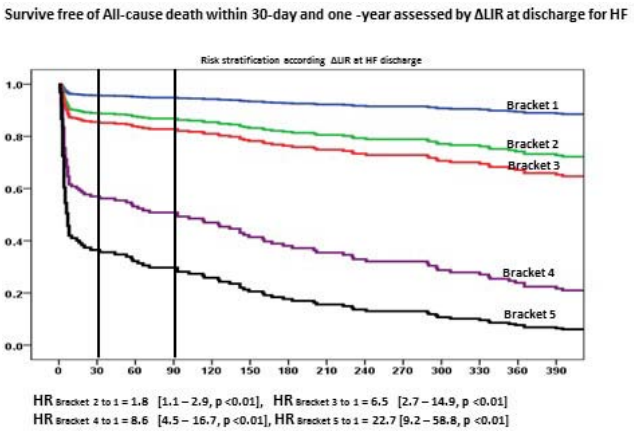
The aim of secondary analyses of the IMPEDANCE-HF extended trial was to find out if residual congestion on discharge for HF could predict 30-day and one-year Heart Failure death.
The analysis of IMPEDANCE-HF extended trial was based on the data collected during the index hospitalization for HF. The IMPEDANCE-HF extended trial was a randomized controlled single-blinded trial of HF with reduced LVEF patients. Inclusion criteria were LVEF ≤ 45%, NYHA class II-IV and patients were hospitalized for HF within 12 months (ClinicalTrials.gov NCT01315223). Half of the patients (N=145) were assigned to the active Lung Impedance (LI)-guided treatment arm where clinicians were based therapy on LI level. The other half was assigned to the control arm where LI values were recorded but not conveyed to the clinical treatment team. In the case of hospitalization, LI was recorded in all patients at discharge. The decisions regarding discharge and choice of treatment were at the discretion of the hospital staff .
A non-invasive impedance device was used in this study to assess the lung fluid content. Unlike the existing impedance devices, the present device has the ability to differentiate a true signal from the lungs from the noise signal of surrounding chest wall. Such approach enables to measure a small change in lung fluid content. A method to determine individual "dry" baseline LI (BLI) for each HF patient has been reported. BLI for each patient was used to calculate a new parameter, the LIR= [(current LI/BLI)-1] ×100%, which determinate the degree of pulmonary congestion in time of measurement.
Method. Degree of pulmonary congestion at discharge for HF hospitalization was divided into 5 brackets. (1) LIR= 0 to – 18% - minimal interstitial edema (IE), (2) LIR= - 18.1 to -28% - mild IE, (3) LIR= -28.1 to – 38 – moderate IE, (4) LIR= -38.1 to -48% - severe IE to mild alveolar edema (AE) and (5) LIR < -48.1% - moderate AE.
Results: LI-guided patients were followed for 61.9.4±39.6 months and control patients for 46.7±33.3 months (p<0.01) accounting for 269 and 470 HF hospitalizations, respectively (p<0.01). Sixty-six patients in the LI-guided group and 87 patients in control group died during follow up (p=0.28). Stated differently there were 0.09 and 0.15 deaths per patient×year follow up in the LI-guided and control groups, respectively (p=0.02). Probability of All-cause death within 30-day and one year is presented on figure. Conclusion The degree of pre-discharge pulmonary congestion as assessed by LI is a very robust and reliable predictor for 30-day and one-year All-cause death.



All-cause mortality

P1754

Heart failure digital coach: pilot findings of an avatar style application to improve symptoms, self-care and knowledge of heart failure

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Introduction Heart Failure (HF) is a clinical syndrome that affects 26 million individuals globally. It has high rates of hospital admissions, readmissions, mortality and morbidity. Effective patient education and self-care can reduce and improve the adverse effects of HF. The use of artificial intelligence to provide education with avatar figures has been previously shown to provide promising results in patients with chronic disease and could be a powerful tool in patient engagement.
Purpose This project aimed to develop and conduct a pilot experiment of a digital coaching program for patients with HF (HF-Digital Coach) for improving quality of life (QoL) and symptoms, self-care behaviours and knowledge for HF.

Methods Recently discharged HF patients living in the community and aged 75 years and over were invited to participate. Digital devices were provided to participants who did not have access to one. The HF-Digital Coach was made up of 10 sessions completed over approximately 8 weeks. Changes at the completion of the program in patients' self-care behaviours, health related QoL and knowledge of HF were analysed. Self-report questionnaires regarding QoL were assessed within the app at both the beginning and end of the program via the Kansas City Cardiomyopathy Questionnaire (KCCQ), self-care via the European Heart Failure Self-Care Behaviours Scale (EHFSCBS) and knowledge about HF via the Dutch Heart Failure Knowledge Scale (DHFKS). Daily weight recording, education, tailored management and guidance, to-do ("homework") tasks and goal setting assignments were key program features.
Results Overall 21 enrolled participants completed both baseline and the 8 weeks follow up program. Improvements in HF knowledge (13 of 21), self-care (12 of 21) and QoL (13 of 21) were observed for more than half of participants. The median of differences between pre and post scores showed no statistically significant change for overall QoL (median 68.2 [interquartile range 32.7-85.0] vs. 66.3 [44.0–78.8]; p=.702), self-care behaviours (72.2 [58.3-87.5] vs. 66.7 [54.2-90.3]; p=.834) or knowledge about HF (12 [10-13] vs. 12 [11-13];p=.052).
Conclusion Our preliminary study of a HF Digital Coach indicated improvements in QoL, self-care behaviours and knowledge for HF in a small sample of HF patients. Patient education about HF using avatar figures holds promise for improving longer term health outcomes and reducing costly hospital readmissions. However, more extensive testing and validation in larger clinical trials is required.

P1755

Early reevaluation after acute heart failure: experience from a dedicated clinic

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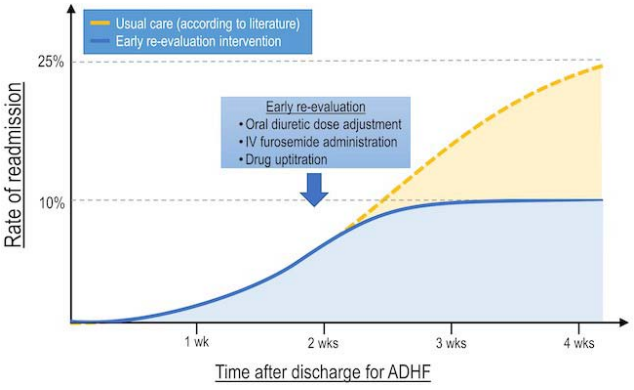
Background Heart failure (HF) is an increasingly prevalent syndrome with a 30-day re-hospitalization rate of approximately 25%. Indeed, after a 1st hospitalization, patients are at increased risk for early readmission, the so-called vulnerable phase. Early reevaluation is recommended by the ESC guidelines in order to reduce HF readmissions. However, evidence supporting its benefits is yet scarce. Therefore, we aimed to study the role of such strategy as per our HF Management Program.
Methods This was a single-center retrospective cohort study enrolling patients with acute decompensated HF patients consecutively admitted to our HF Clinic from January to September 2018.
Results Of the 138 patients, 53,6% were male, with a mean age of 77 ± 12 years. Reduced, mid-range and preserved ejection fraction was observed in 45,3%, 6,6% and 48,2% of the cases, respectively, and HF etiology was mostly ischemic (35,7%) or hypertensive (31,8%). All were euvolemic at discharge. During hospital stay, 8 (5,8%) patients were transferred and 9 (6,5%) died. Of the remaining 121 patients, 94 (79,0%) were referred to our early reevaluation HF Management Program. Eight (8,5%) patients missed this appointment and were excluded from further analysis. When assessing the remaining 86 patients, mean time to day Hospital re-evaluation was 14 ± 7 days. On the first appointment, 32 (37,2%) were congestive, of which



Re-evaluation after discharge for ADHF

16 (50%) received intravenous furosemide. Their mean weight gain from discharge to evaluation appointment was 2,6 ± 2,2Kg. Patients were again compensated after a median time of 15 ± 21 days and 2 ± 2 appointments, with a 50% median oral furosemide dose increase, i.e., 40 ± 40mg compared to the previous dose. Their rate of HF readmission at 30-days was 9,4% (3 patients). No clinical or demographic predictors of decompensation were found.
Conclusions More than one-third of recently discharged HF patients were congestive at early reevaluation, of which roughly half needed IV diuretics for compensation before definite oral dose readjustment. These findings emphasize the importance of early post discharge reevaluation for adequate HF stabilization during the vulnerable phase, thus potentially reducing re-hospitalizations.

P1757

The relation between inflammatory biomarkers, persistent congestion and kidney dysfunction in acute heart failure with reduced ejection fraction: a prognosis study.

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Funding Acknowledgements: No fundings

Background. Kidney dysfunction (KD) and persistent congestion influence heart failure (HF) prognosis, but the role of inflammation in this association is unknown.
Objectives. We assessed the relation between inflammatory biomarkers, persistent congestion and KD in patients with acute HF.
Methods. We enrolled 97 hospitalized patients (mean age: 66 ± 12 years, ejection fraction: 30±8%) with acute HF. Before discharge, congestion was assessed using HF scoring system based on Framingham criteria. Circulating levels of high-sensitivity C-reactive protein, transforming growth factor (TGF) beta-1, interleukin (IL) IL-1, IL-6, IL-10, tumour necrosis factor (TNF) alpha, soluble TNF receptor type 1 and 2 (sTNFR-1 and sTNFR-2) were measured. Patients were divided into four groups according to the presence of KD (estimated glomerular filtration rate <60 ml/min/1.73m2) and congestion (Framingham HF score ≥2). We considered a composite end-point: death and rehospitalisation for acute HF.
Results. During a median follow-up of 32 months, 37 patients died, and 14 were rehospitalized for acute HF. Patients with KD and Framingham HF score ≥2 had the poorest event-free survival compared to the groups with only KD or only persistent congestion or neither KD nor congestion (log-rank: 32.14, p<0.0001; Figure 1). Patients with KD and congestion had significantly higher TNF-alpha (p=0.037), sTNFR-1 (p=0.0042) and sTNFR-2 (p=0.001), lower TGF beta-1 (p=0.02) levels, and the worst outcome (p<0.0001). Cox regression analysis indicated KD (p=0.02), Framingham HF score ≥2 (p=0.01), NT-proBNP (p=0.002) and TNF-alpha (p=0.004) were independent predictors of the composite end-point. TNF-alpha attenuated the direct relation between KD, congestion and outcome, explaining 40% of the difference in the outcome between the groups.
Conclusion. KD and congestion at discharge portended a worse prognosis in acute HF. TNF-alpha turned out to be a causal mediator of this relationship.

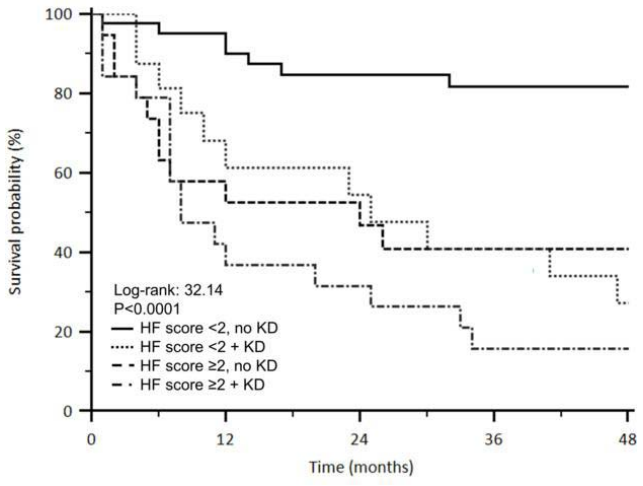

Figure 1

P1758

Impact of an integrated, patient-centred model of care for heart failure in-patients - A quality improvement initiative.

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Introduction: Heart failure (HF) is one of the most prevalent forms of chronic cardiovascular disease. It is amongst the greatest contributors to the ongoing rise in health-care costs, and recognized as a potentially avoidable hospitalization. There is a need for better models of care which can address current health care gaps.
Aim: To design and implement a model of care for HF patients admitted to a tertiary institution to maximize time patients with HF spend in the community.
Method: An integrated patient-centred model of care was designed incorporating particular components of healthcare shown to be effective in HF patients, including an electronic HF care bundle comprising guideline mandated care, a patient education pack on self-management, referral to the Hospital Admissions Risk Program (HARP) for a structured phone call within 72 hours followed by home visit if required, and a nurse-pharmacist early follow up clinic. The model of care was co-designed with key stakeholders including specialist health professionals, the National Heart Foundation and patients. The model was introduced as a quality improvement initiative to general cardiology and general medicine units, and was targeted at reducing variation in care that HF patients receive. Hospital administrative datasets and Victorian Cardiac Outcomes Registry HF Snapshot data were used. Interrupted time series analysis was performed to determine the impact of the intervention.
Results: Outcomes for patients discharged from cardiology and general medicine with a primary diagnosis of HF were compared 19 months prior to and 19 months after the introduction of the model of care. 30-day readmissions reduced but not significantly (19.5% to 17.4%, p=0.471), 90-day readmissions were significantly reduced (34.3% to 30.6%, p=0.017), emergency department presentations at 30 days were reduced but not significantly (20.2% to 17.4%, p=0.17) and at 90 days were significantly reduced (35.0% to 31.4%, p=0.019). In-patient mortality was unchanged (6.8% to 7.0%, p=0.109), and length of stay was unchanged (5.9 to 6.1 days, p=0.109). Administrative data dating from 2013 suggests the quality improvement project corrected a trend towards rising HF readmissions in the 18 months prior to its introduction.
Conclusion: Introduction of an integrated, patient-centred model of care showed no statistically significant effect on 30 day readmissions or ED presentations, but significantly reduced both at 90 days, with no change in in-patient mortality or length of stay. This model of care helped to increase the time HF patients spend in the community.

P1759

The care pathway prior to hospitalisation with acute decompensated heart failure: a comparison between two healthcare systems

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Introduction: A comprehensive analysis of the clinical care pathway in acute heart failure (HF) leading up to hospitalisation is needed to form a thorough understanding of this time period and improve HF care.
Purpose: To analyse the management of patients in the community and the patient experience during the symptomatic period prior to admission with acute decompensated heart failure (ADHF).
Methods: This analysis is from a prospective two-centre, two-country observational study evaluating care pathways in patients who had an unplanned admission with ADHF. Data were gathered via medical chart reviews and patient questionnaires. Qualitative data were also collected from patients, carers and, via postal questionnaires, general practitioners (GPs).
Results: A total of 114 patients were enrolled from the Irish centre; 57 had a new diagnosis of heart failure (dnHF) and 57 had an established history of HF (eHF). A total of 50 patients were enrolled from the English centre; 16 had dnHF and 34 had eHF. A prolonged symptom duration prior to presentation to hospital was noted with 70% of Irish and 80% of English patients experiencing symptoms for more than 72 hours. There was no significant difference in symptom duration between dnHF and eHF patients in either cohort (p= 0.165 and p= 0.707 respectively). Dyspnoea was the dominant symptom in both cohorts. However, 63% of Irish patients and 47% of English patients did not recognise this as a HF symptom with no significant difference in symptom recognition between dnHF and eHF patients (p= 0.095 and p= 0.955 respectively). More than two thirds of patients in both cohorts sought a medical assessment in the community prior to admission, predominantly at a GP practice. Of the 46% of Irish and 38% of English patients seen exclusively by GPs, the numbers prescribed diuretics or diuretic dose adjustment were low (11% and 16% respectively) and those with eHF were no more likely to receive diuretics than those with dnHF (p= 0.485 and p> 0.999 respectively). Perceived barriers to care highlighted in GP questionnaire responses (46 Irish GPs, 21 English GPs) included lack of access to basic diagnostics, specialist support or up-to-date patient information. A lack of GP comfort in managing HF was noted as a barrier to appropriate care in 49% of Irish GPs and 43% of English GPs.
Conclusion: In both healthcare systems, we noted prolonged symptom duration, lack of patient understanding of symptoms and an inadequate prehospital medical response for patients with emerging clinical deterioration of HF. These problems appeared as commonly in those with an established history of HF as in those with a new diagnosis. Lack of access to basic tests and specialist support, and a low level of GP comfort in managing heart failure were obvious barriers to optimal care. There remains much potential to improve the management of HF prior to hospitalisation or to prevent the need for hospitalisation, even in high income European countries.

Acute Heart Failure - Epidemiology, Prognosis, Outcome

P1761

Cardiogenic shock in intensive medicine care: are the old scores still useful?

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Introduction: Cardiogenic shock (CS) is a state of critical end-organ hypoperfusion due to primary cardiac dysfunction. Several clinical and biological factors have been used for prognosis assessment. Those factors have been recently regrouped into scores combining independent parameters — the Sleeper, CardShock and IABP-SHOCK II score, which aren't used daily in general ICU.
Objectives: Evaluate usefulness of SOFA, APACHE II and SAPS II scores in predicting the outcome in CS patients (P) and identify the most useful one, if applicable.
Methods: Retrospective analysis of P admitted in our ICU, with confirmed diagnosis of CS, within a period of 5 years. We analyzed common epidemiological variables, evolution during ICU stay, established therapeutics and outcome. wE estimated SOFA, APACHE II and SAPS II score at admission and discharge when applicable.
Results: 90 P were included. Mean age of 69,59 ± 12,23 years, with a predominance of males (56,7%). Admission SOFA of 10,39 ± 3,19. The main cause of CS was non-ischemic, with only 33,3% caused by acute coronary syndromes. 68,9% needed mechanical invasive ventilation in the first 24h, maximum PEEP used of 8,22±2,76. VCPVG was the most used ventilatory mode, with median weaning time of 3 days. PaO2/FiO2 ratio and lactactes at admission of 178,5 and 2,85, respectively. All the P needed aminergic support. Renal replacement therapy was used in 34,4% P. Step-up and step-down in ICU unit in 6,7 and 26,7% of the cases, respectively. Infectious intercurrence (nosocomial infection) in 35,51% cases. Limitation of the therapeutic effort in 42,22% P.
At discharge, P presented median ICU stay of 5 days (hospital stay of 10,5 days) with SOFA, APACHE II and SAPS II of 7.6±5,06, 24,5 and 56,61 ± 19,71, respectively. Hospital mortality of 45,6%.
We found a statistically significant association between outcome and: 1) admission SOFA (p=0,006), 2) APACHE II (p<0,001), 3) SAPS II (p< 0,001). We also point out that after applying a logistic regression only APACHE II (OR: 1,13; IC95%: 1,028-1,253) had relevant prediction power.
Conclusion: In our study, we found that APACHE II was the only score capable of predicting the outcome of our P. It provides an estimate of ICU mortality based on a number of laboratory values and patient signs taking both acute and chronic disease into account.

P1762

The effect of rapid evaluation and treatment units on heart failure readmission rates: a retrospective analysis

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Introduction: Heart failure affects over 6.5 million Americans with prevalence expected to increase to over 8 million within the next ten years. The hospitalization of an estimated 80–85% of patients with acute heart failure (AHF) largely contributes to

the health related expenses. Under the Affordable Care Act, a hospital's performance is quantified by the excess readmission ratio. The observation unit provides short term management for patients with AHF who do not meet criteria for inpatient admission and may be used to reduce health related expense. This study aims to compare readmission and mortality rates for patients with AHF before and after the initiation of the observation unit in late 2014.
Methods: A retrospective chart review of patients with acute heart failure from 2013-2017 was conducted. From the data, the total number of admissions, 30-day readmissions, and mortality rates for patients admitted for AHF were obtained. Statistical comparison for raw heart failure readmission rates and raw heart failure mortality rates before and after the opening of the observation unit was made using paired t-tests.
Results: The mean readmission rate in 2013-2014 was 1.23 with a standard deviation of 0.127. The mean readmission rate in 2015-2017 was 0.853 with a standard deviation of 0.145. The mean mortality rate in 2013-2014 was 0.67 with a standard deviation of 0.155. The mean mortality rate in 2015-2017 was 0.483 with a standard deviation of 0.151.The t-value for readmission rates was 3.256 (p=0.156). The t-value for mortality rates was 1.338 (p=0.136).
Conclusion: The data supports a statistically significant difference in hospital readmission rates for patients with AHF after the initiation of the observation unit in late 2014. Additionally, there was not a statistically significant difference in mortality rates. The evidence supports observation unit management for patients with AHF can help to reduce readmission rates while not affecting mortality.

P1763
Predictive factors for recovery of left ventricular systolic function in stress cardiomyopathy

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Introduction Stress cardiomyopathy is a reversible systolic dysfunction of the left ventricle that is characterized by defined wall motion abnormalities in the absence of significant coronary stenosis. It is prevalent among elderly women, and often arises following a physical or emotionally stressful event. Little is known about the prognostic factors affecting the recovery of systolic function.
Objective: The present study aimed to identify factors affecting the recovery of left ventricular systolic function.
Materials and Methods: This retrospective review analyzed the electronic medical records of 41 patients diagnosed with stress cardiomyopathy at our Medical Centre between April 2008 and March 2018.
Results: The median time to the recovery of ejection fraction (EF) was 7.0 days. Demographic and clinical factors were compared between groups with early recovery (≤ 7 days; group E) and late recovery (> 8 days; group L).
Age (75.5 ± 10.7 vs. 73.9 ± 14.6 years), physical stress (89.1% vs. 72.3%), emotional stress (10.6% vs. 27.3%) and in-hospital death (15.8% vs. 9.1%) did not differ significantly between the L and the E groups, respectively. Heart rate and the prevalence of Killip class > 2 heart failure upon admission was higher in the L, than the E group (101.1 ± 24.4 vs. 86.2 ± 24.2 bpm, $p < 0.05$ and 13% vs. 6%, $p < 0.01$), respectively.
Echocardiography revealed significantly lower left ventricular ejection fraction in the L, than the E group (38.4 ± 7.0% vs. 49.6 ± 13.0% $p < 0.001$).
Laboratory findings showed significantly higher C reactive protein (7.67 ± 6.49 vs. 4.90 ± 8.97 mg/dL, $p < 0.05$) and creatinine phosphokinase (556.1 ± 864.3 vs. 127.3 ± 162.2 IU/L, $p < 0.01$) and significantly lower hemoglobin (10.27 ± 2.23 vs. 11.51 ± 1.95 g/dL, $p < 0.05$) and LDL-cholesterol (80.5 ± 26.9 vs. 111.9 ± 41.6 mg/dL, $p < 0.05$) in the L, than in the E group.
Significantly more patients were medicated with warfarin/Directly acting oral anticoagulants (DOACs) (42.1% vs. 18.2%), β-blockers (47.4% vs. 31.8%), catecholamine (42.1% vs. 13.6%) and required non-invasive positive pressure ventilation (NIPPV)(26.3% vs. 0.0%) in the L, than the E group ($p < 0.05$ for all).
Conclusion: Severe cardiac dysfunction at onset and triggering septic or inflammatory disease were seen more commonly in the L group. Although more patients in the L group required warfarin/DOAC, β-blockers, catecholamine and even NIPPV more often than the E group, the prognosis was fairly good for both groups with stress cardiomyopathy.

P1764
Registry of Severe Acute Heart Failure. Impact of Renal Insufficiency for In-Hospital Mortality and Readmissions

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Background: There is a great variation of data regarding in-hospital mortality and readmission rate at 60 days in patients with different clinical forms of severe acute heart failure (AHF) who develop acute renal insufficiency (ARI) or aggravate a chronic renal insufficiency (ACRI).
Purpose: To assess rates of in-hospital mortality and readmission at 60 days in patients with severe forms of presentation of AHF, de novo AHF or acute decompensated chronic heart failure (ADCHF), with o without renal insufficiency (RI), stratified by left ventricle ejection fraction (LVEF) ranges.
Methods: From August 2015 to August 2018, patients with diagnosis of severe AHF who required admission to a cardiovascular intensive care unit were consecutively included. Severity of the AHF was validated by the high values of the MEESSI and the GWTG Scores. Cardiorenal insufficiency was defined according to NHLBI recommendations. Forms of AHF were classified into de novo AHF and ADCHF, renal insufficiency was classified into ARI or ACRI and LVEF was stratified by ranges in accordance with the new guidelines of the ESC. For univariate analysis, the qualitative variables were expressed in percentages and the quantitative variables by means with their standard deviations of 95%. For the bivariate analysis, chi squared was performed for qualitative variables and T test for quantitative variables. Logistic regression was performed for the independent variables.
Results: A total of 305 consecutive patients were evaluated. The mean age was 75 ± 12, 41% women, 42% hypertension, 52% dyslipidemia, 48% obesity, 42% diabetes type II and smoking 31%. De novo AHF were 31% and 70% were classified as ADCHF. RI was present in 37%. Of these, 24% had ARI and 76% had ACRI. The mean EF was 51 ± 15 %; preserved 57%, intermediate 19% and reduced 25%. Overall IH mortality was 7.9% and 60-day readmission rate was 23%. The bivariate analysis showed that the IH mortality was 13.15% in AHF patient who had RI and 4.7% en AHF patients with no RI ($p<0.001$), whereas for 60 day-readmission was 43% in AHF patients with RI and 44.2% in AHF patients without RI (p=NS), ARI was observed as an independent variable of IH mortality in patients with AHF ($p<0.001$), independently of the clinical forms of presentation of AHF and EF ranges. ACRI was observed as an independent variable ($p = 0.002$) for readmissions at 60 days, independently of the clinical forms of presentation of AHF and EF ranges. The multivariate analysis showed that only the presence of ARI remains statistically significant for IH mortality ($p<0.001$); whereas readmission was significantly higher among patients with ACRI ($p = 0.044$).
Conclusion: In patients with severe AHF, the presence of acute renal insufficiency is an independent variable of in-hospital mortality and the presence of acute on chronic renal insufficiency was associated with hospital readmissions at 60 days, in both cases independently of the clinical forms of AHF and EF ranges.

P1765
Impact of COPD on short-term mortality of patients hospitalized for treatment of acute heart failure

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On behalf of: WWL Cardiac Research Group

Introduction COPD in patients with heart failure is a common clinical condition and associated with poor survival in chronic heart failure. Yet, the effect of COPD on the outcomes of patients with acute heart failure (AHF) is not well established. We evaluated the impact of COPD on in-hospital mortality and short-term mortality of the patients hospitalized with AHF.
Methods We identified patients who were hospitalized with AHF over six-month period. Data was collected from NICOR HF UK database including demographic information, comorbidities and outcomes (re-admission and mortality). We analyzed the characteristics and outcomes of the patients according to baseline COPD status.
Results 124 patients were admitted with AHF over study period in UK district general hospital with catchment area of 320,000 people. 21.7% (27) had history of COPD at the time of hospitalization. Patients with COPD were older (mean age 78.2 vs 76.7), suffered higher heart rate at admission ($p<0.05$) and serum urea ($p<0.05$).
Patients with COPD had significantly higher mortality (44.1% vs 22.6%; p=0.02) within six-months of discharge. Similarly, patients with COPD had significantly higher re-admission rate (63% vs 27.8%; p=0.0008) within six-months of discharge.
Conclusion COPD is an important co-morbidity in patients hospitalized with acute heart failure, and significantly increases their morbidity and mortality. We suggest that this selected high-risk cohort of patients requires appropriate risk stratification, optimised transition of care to community, effective patient education and support to improve outcomes and resource allocation.

P1766
Clinical characteristics and quality of life of patients with atrial fibrillation in the Colombian Heart Failure Registry - RECOLFACA

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On behalf of: RECOLFACA Investigators

Background: The prevalence of atrial fibrillation (AF) in patients with heart failure (HF) has been reported between 13% and 27%. The explanation for this coexistence has been the presence of common risk factors. The objective of this work is to compare demographic, clinic characteristics and quality of life (QoL) of patients with and without AF in a cohort of HF patients in Colombia.
Methods: RECOLFACA registry collected data prospectively from September 2016 to September 2018, including 2,099 patients from 60 institutions: 416 patients with AF and 1683 patients without AF. Demographic, clinical characteristics and QoL (EQ5D-3L instrument) were evaluated using Chi-Square, Student T and Mann Whitney Tests. Multivariable analysis was performed through logistic regression. Significance difference was defined as 0.05.
Results: The prevalence of AF was 20%. Mean age of patients with AF was 73.87 (10.42), older than patients without AF (p<0.0001). There was no difference in sex. Multivariable analysis demonstrated that AF was associated with higher arterial hypertension (p<0.010), higher depression (p=0.015), lower type 2 diabetes mellitus (p=0.0001) and more proportion of patients in ACC/AHA stage A (p=0.022). On the follow up, AF was associated with higher non-controlled arterial hypertension (p=0.006), higher progression of the disease (p=0.001) and higher arrhythmias (p>0.0001) as factor of decompensated of HF. Mean score of QoL was 74.72 (21.49) on patients with AF and 80.04 (20.92) on patients without AF, where the domains of mobility, self-care, usual activities, and pain/discomfort showed statistically significant difference.
Conclusions: Atrial fibrillation is a common comorbidity in our HF population. AF is related to more uncontrolled arterial hypertension, depression and elderly age. QoL is lower in AF group. Arrhythmias are more frequent as a factor of HF decompensation.

P1767

Survival free of events during the vulnerable phase of heart failure

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On behalf of: OPTIMIZE COLOMBIA
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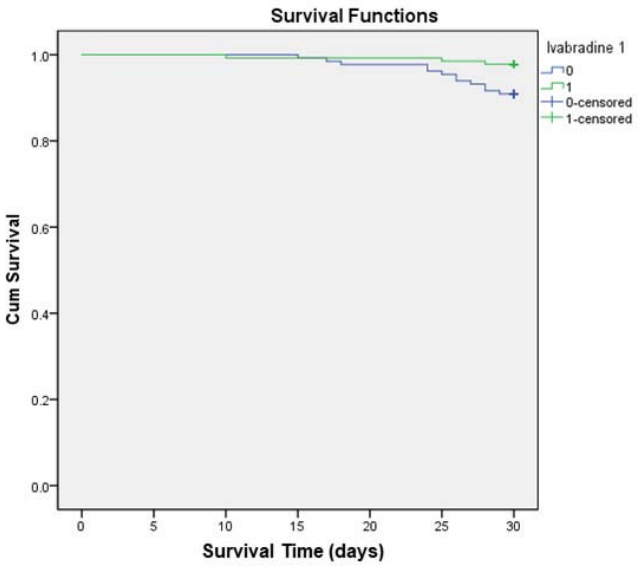
A period of vulnerability is observed after acute heart failure, there is an increased risk of death or rehospitalization , especially during the first 30 days after the initial admission. The OPTIMIZE COLOMBIA PROGRAM was a strategy implemented at hospital discharge that included: education , uptitration of medications , and early initiation of ivabradine to obtain a target heart rate of 60–70 bpm.
Objective: To identify the clinical factors related to the risk of a new event (any hospitalization, emergency room visit, or death) 30 days after the initial admission for acute heart failure and to analyze event-free survival in patients with and without ivabradine.
Methods: prospective cohort study. Correlation between variables was studied using the Chi square test. Event-free survival was calculated using the Kaplan-Meier method. (Statistical significance: $P \leq 0.05$.)
Results: 267 patients with HRrEF who completed the 30-day follow-up were included (67.8% male, mean age 66±14 years, mean LVEF 32%). Ivabradine was used by 42%. The 30-day rate of events was as follows: rehospitalization 3%, emergency room visits 4.1%, death 0.7% (5.6% had more than 1 event). The correlation between the clinical characteristics and the occurrence of a new event is presented in Table 1. The use of ivabradine was the only factor that decreased the risk of a new event (20% with ivabradine vs 52.4% without ivabradine, P = 0.015). Event-free survival was 97.6% with ivabradine vs 90.9% without ivabradine.
Conclusion: Optimization of heart failure treatment with ivabradine during the hospitalization decrease the risk of a new hospitalization, emergency room visit death during the next 30 days of the admission.

Variables related with events
30 days new event (hospitalization , emergency room visit or death)

Factor	Without an event	With an event	p		
n	%	n	%		
DIABETES	63	25.1%	5	35.7%	0.360
CKD	60	23.8%	4	26.7%	0.761
COPD	45	17.9%	1	6.7%	0.480
STROKE	12	4.8%	0	0.0%	0.980
AF	30	16.3%	5	38.5%	0.052
EF 30%	112	44.8%	9	60%	0.251
HR100	13	5.2%	0	0.0%	0.367
NYHA IV	55	22.3%	2	13.3%	0.701
Ivabradine	132	52.4%	3	20%	0.015

The correlation between the clinical characteristics and the presence of a new event



Survival free of events

P1768

Gender-related differences in patients with acute heart failure: patient characteristics and clinical outcomes

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Background: There was some evidence that women benefited less from medical advancement including various cardiovascular diseases. However, there was limited data on gender inequality in patients with acute heart failure (AHF).
Purpose: The aim of this study was to determine the effect of gender on 180-day all-cause mortality or rehospitalisation in patients admitted for AHF.
Methods: This was a prospective cohort study of consecutive patients with a diagnosis of AHF who were admitted at an academic tertiary care hospital from July 2017 to February 2018. The patients had to fulfill Framingham criteria for the diagnosis of AHF. Patient characteristics and 180-day all-cause mortality or rehospitalisation were gathered. Chi-square and multivariate analysis were used for statistical analysis.
Results: Total of 422 patients were screened and 191 patients met inclusion criteria (mean age of 68.4 years, 46.6% female). Women were significantly older (mean age of 72±13 vs. 65±12.8, p<0.001), and had lower prevalence of reduced left ventricular ejection fraction (22.1% vs. 48.9%, p=0.001). On the other hand, men significantly had more coronary artery disease (50% vs. 33%, p=0.025). All-cause mortality or rehospitalisation in 180 days was significantly higher in men (58.8% vs. 41.6%, p=0.021). With multivariate logistic regression analysis, we still found that male gender was an independent risk marker for 180-day all-cause mortality or rehospitalisation (OR 2.0, p=0.018).

Conclusion: Contrast with other cardiovascular conditions previously reported, among patients with AHF, female gender is associated with better clinical outcome.

P1769

Prevalence prognostic impact of diabetes in heart failure with preserved, mid-range and reduced ejection fraction

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On behalf of: KorAHF registry investigators
Funding Acknowledgements: Research of Korea Centers for Disease Control and Prevention

Background Diabetes is common comorbid condition in patients with heart failure and worsens the prognosis of the patients. Prevalence and prognostic impact of diabetes on the heart failure patients with preserved (HFpEF), mid-range (HFmrEF) and reduced ejection fraction (HFrEF) is not well known. This study was aimed to investigate the prevalence and clinical impact of diabetes depending on heart failure subtypes of HFpEF, HFmrEF, and HFrEF.
Methods From Korean acute heart failure registry, 5,116 in-hospital survivors were included in the present study. Prevalence and clinical impact of diabetes were evaluated according to the subgroups divided by ejection fraction (EF) <40%, 40-49%, and ≥50%. Composite event of all-cause mortality and hospitalization for heart failure was analyzed as prognosis using Cox proportional hazard model.
Results Among the study population, 25.7% had HFpEF, 16.5% had HFmrEF, and 57.8% had HFpEF. During 1-year follow-up, 50.1% of composite event were observed. Adverse event rates of each subgroup were 17.6%, 15.9%, and 19.1%, which was not significantly different among the three groups (p=0.089). Prevalence of diabetes in HFpEF, HFmrEF, and HFrEF were 33.8%, 38.8%, and 41.5%, respectively (p<0.001). Diabetes was more frequently observed in patients with lower EF. Diabetes was not significantly associated with worse outcome In HFpEF (hazard ratio [HR] 1.215 [0.996-1.482], p=0.055), whereas diabetes was significantly related to worse outcome in HFmrEF (HR 1.332 [1.032-1.718], p=0.027) and HFrEF (HR 1.368 [1.212-1.543], p<0.001). After multivariable adjustment, diabetes remained as an independent risk factor in patients with HFrEF (HR 1.199 [1.054-1.364], p=0.006). However, the relation was weak in HFpEF (HR 1.11 [0.898-1.372], p=0.335) and HFmrEF (HR 1.128 [0.852-1.492], p=0.401).
Conclusions In patients with heart failure, diabetes was more frequently observed as EF decreased. Diabetes was associated with worse clinical outcome especially in patients with HFrEF increasing adverse event risk by 20%, whereas the association was weaker in HFpEF and HFmrEF.

P1770

Clinical characteristics and long-term outcomes of patients with acute decompensated heart failure with mid-range ejection fraction

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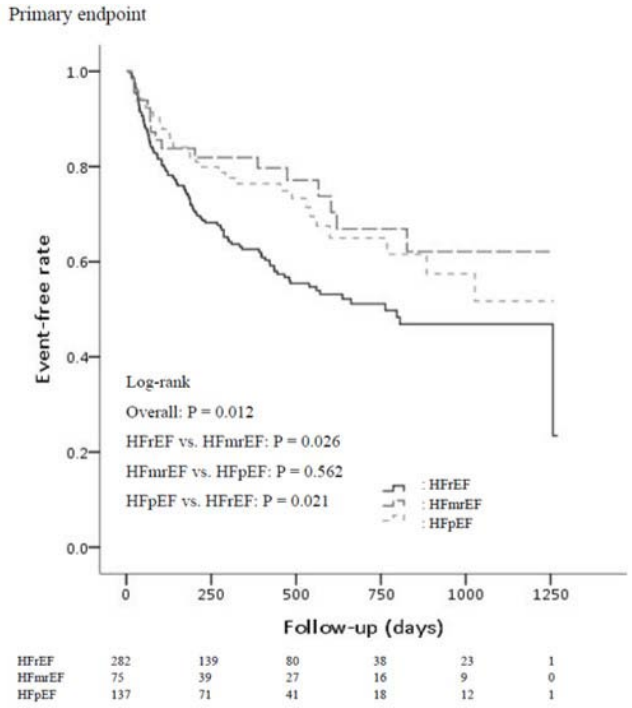
Background/Introduction: Patients with HF have been categorized to HFrEF and HFpEF. There were distinct differences in demography, etiology, comorbidities and response to therapies between HFrEF and HFpEF. In HFrEF, most of previous reports included patients with LVEF <35% to <40%. However, in HFpEF, various cutoffs of LVEF were used in previous studies (LVEF >40% to >50%). Consequently, patients with a LVEF in the range of 40-49% is considered "grey area". Recently, the clinical guidelines categorized patients with LVEF in the range of 40-49% as HF with "mid-range" ejection fraction (HFmrEF).
Purpose: The purpose of this study was to investigate the clinical characteristics and long-term outcomes of HFmrEF patients.
Methods: This was a single-center retrospective observational study. We examined the clinical characteristics and outcomes of consecutive 494 acute decompensated heart failure (ADHF) patients who admitted to our institution between January 2014 and December 2016. They were divided into three groups according to their LVEF: HFrEF (LVEF < 40%), HFmrEF (LVEF 40-49%), and HFpEF (LVEF ≥ 50%). The primary endpoint of this study was the composite of cardiovascular death and HF readmission.
Results: Of this population, 282 (57.1%), 75 (15.2%) and 137 (48.6%) patients were HFrEF, HFmrEF and HFpEF, respectively. Ischemic heart disease was the primary etiology in HFmrEF and HFrEF. At the time of discharge, beta-blockers and renin-angiotensin system inhibitors (RASI) were more frequently prescribed in HFmrEF than HFpEF. The composite outcome of cardiovascular mortality and HF readmission was significantly lower in HFmrEF than HFrEF.
Conclusions: The prevalence of ischemic etiology in HFmrEF was higher than HFpEF. The cardiovascular prognosis of HFmrEF was better compared with HFrEF. Further studies are needed to determine the effectiveness of management of coronary artery disease and cardioprotective medications for HFmrEF.



Primary endpoint

P1772

Association between length of stay and mortality or readmission in patients with acute heart failure

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Background: Length of stay (LOS) in acute heart failure (AHF) varies between patients as it reflexes the counterbalance of optimising patient's condition and avoiding intra-hospital complication. However, Its prognostic significance has not been well studied.
Purpose: We aim to assess whether LOS associates with short and long term all-cause mortality or readmission in AHF patients.
Methods: We conducted a prospective cohort study of 191 consecutive patients who were discharged with admission diagnosis of AHF between July 2017 and March 2018. The patients were categorised into 3 groups by LOS: short, intermediate and long LOS (duration of admission 1-4, 5-10 and ≥ 11 days, respectively). The outcomes were 30 and 180-day all-cause mortality or readmission rate. Pearson's chi-squared test was used to analyse.
Results: Total of 191 patients(mean age 68.4 years, 46.6% female) were included. Patient's baseline characteristics (age, gender, left ventricular ejection fraction, NYHA classification and co-morbidities) were similar in the 3 groups. The 30-day outcome (all-cause mortality or readmission) was not different between short, intermediate and long LOS group (25.8%, 19% and 21%, respectively; p= 0.637). The 180-day outcome was significantly different with the lowest rate of all-cause mortality or readmission in the intermediate LOS group (56.1%, 38.1% and 58.1%; p=0.047)
Conclusion: Compared to intermediate LOS group, short and long LOS groups have greater risk of 180-day all-cause mortality or readmission. As a consequence, the more proper intra-hospital management should be applied to these 2 groups to improve clinical outcome.

P1773

Acute heart failure in mexico. a comparison between euroheart failure survey ii versus a mexican tertiary centre.

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Background: We conducted a prospective registry of the Acute Heart Failure (AHF) patients in our Hospital during 2018 and compare with the Euro Heart Failure Survey II (n=3580).
Methods: We included 226 patients with AHF. We compared demographic data, comorbidities and underlying diseases, classification of AHF, use of diagnostic tools, in-hospital treatment and medications at discharge.
Results: The mean age in our Centre was 56+/-15.5 years vs 69.9+/-12.5 years in EHFS II. The male proportion was 75% in México vs 61% in Europe. Ischemic heart disease in Europe was 53.6% vs 39% in México, the rate of dilated cardiomyopathy in Mexico was 30.19% vs 19.3% in EHFS II. The clinical profile of AHF in México vs EHFS-II was ADCHF 87% vs 65.4, Pulmonary edema 11% vs 16.2%, Cardiogenic shock 0% vs 3.9%, Hypertensive AHF 7 % vs 11.4%, Right ventricle failure 5% vs 3.2. Clinical tools during hospitalization included (Mexican versus EHFS II): ECG 100% vs 99.9%, Chest X-ray 95% vs 97.7%, Echocardiogram 99% vs 85%, BNP/NT-proBNP 5% vs 16.3%, angiography 29.3% vs 36.5%, MRI 2.3% vs 0.8%, EP 0.9% vs 1.6%. Treatment during the hospitalization included (México vs. EHFS II): Diuretics 95% vs 92.9%, opioids 0% vs 19.4%, Nitrates 26% vs 38.7%, dobutamine 10.2% vs 15%, dopamine 12% vs 11.3%, levosimendan 10% vs 3.0%, amiodarone 6.6% vs 17.5%. The treatment at discharge is presented in Table I.
Discussion: Mexico exhibit a younger population when compared with Europe. The clinical presentation of AHF is similar in both groups, but the use of nitrates and opioids in Mexico is infrequent, the use of inotropes is a common practice in our Centre despite the lack of patients in Cardiogenic shock. The discharge treatment in both compared groups was very similar.

Table I. Medication at discharge (%)

Drug	México (n=226)	EHFS II (n=3580)
Diuretics	91.76	98.1
Betablockers	82.38	61.4
ACEIs	54.51	71.1
ARBs	26.23	10.4
Aldosterone antagonists	77.87	47.5
Nitrates	11.8	32.9
Calcium channel blockers	5.7	14.6
Digoxin	7.55	31.0
Sacubitril/valsartan	4.4	Not reported
Ivabradine	2.2	Not reported

P1774

Association of left atrial enlargement with heart failure and cardiovascular events after acute coronary syndromes

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Introduction: Acute coronary syndromes (ACS) are associated with significant morbidity and mortality not only during the acute phase, but also after the event. The occurrence of new major adverse cardiac and cerebrovascular events (MACCE) and heart failure (HF) during follow-up is difficult to predict.
Purpose: Evaluate if the presence of left atrial (LA) enlargement (LAE) in the acute phase of ACS was associated with MACCE and/or HF during follow-up.
Methods: Retrospective evaluation of 92 consecutive pts admitted to our center due to ACS, with a follow up of 2 years. Echocardiographic parameters of diastolic function (performed during the first 48h after admission) and clinical data were evaluated. LAE was defined as a body surface area indexed LA volume (ILAV) > 34 ml/m2. MACCE was defined as the composite of death, ACS, stroke, repeat revascularization (RR) and congestive heart failure requiring hospitalization (CHF) after hospital discharge.
Results: Mean age was 64.6±12.3 years, with a male predominance (73.9%). At the end of follow-up, 44.9% of pts were at NYHA class ≥ 2. These pts had significantly higher ILAV (35.60 vs 29.46 ml/m2; p=0.040) and on univariate analysis, LAE was the only significant predictor of this outcome (OR 4.22; 95% CI 1.67-10.66; p=0.002), while other classic echocardiographic parameters of diastolic function were not (peak E, A and e' wave velocities; E/A and E/e' ratios). During follow-up, MACCE occurred in 18 pts (19.6%): death in 6 (6.5%), ACS in 7 (7.6%), RR in 5 (5.4%) and CHF in 4 (4.3%). LAE was associated with significantly higher risk for MACCE (29.3% vs 6.7%; p=0.006; OR 5.79) and on univariate analysis it was a significant predictor of these events (OR 5.79.; 95% CI 1.50-22.36; p=0.011), with an area under the ROC curve of 0.70 (95% CI 0.56-0.84; p=0.018).
Conclusions: The detection of LAE during the acute phase of ACS was a significant predictor of MACCE and HF during the follow-up, while other parameters of diastolic function weren't capable to do so.

P1775

Prognostic significance of worsening blood urea nitrogen in patients with acute heart failure

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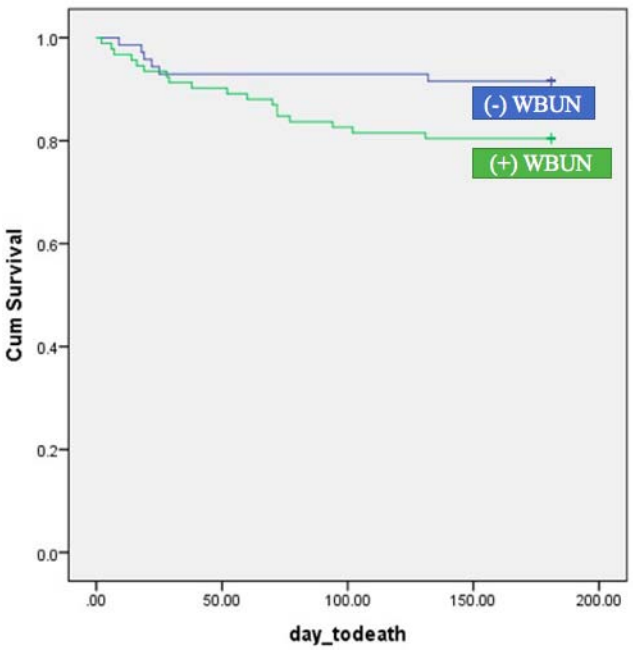
Background: Apart from worsening creatinine (Cr) during hospitalisation with acute heart failure (AHF), Blood urea nitrogen (BUN) is another predictive value of renal impairment which represents the cumulative effect of both kidney function and arterial intravascular volume, including renal perfusion. However, the effect of worsening BUN (WBUN) during hospitalisation on long-term clinical outcome is still less well-established.
Purpose: The aim of this study was to determine the effect of WBUN on 180-day day all-cause mortality after discharge in patient with AHF.
Methods: This was a retrospective cohort of consecutive patients who were diagnosed with acute HF and discharged from an academic tertiary care hospital from July 2017 to March 2018. WBUN was defined by increasing of BUN ≥ 25% from admission value. The 180-day all-cause mortality after discharge was assessed using chi-square, univariate and survival analysis.
Results: Of the 191 patients (52.9% male, mean age 68.5 ±13 years and 35% with left ventricular ejection fraction≥ 40%), the average admission BUN and serum Cr were 31.5 mg/dL and 1.8 mg/dL, respectively. WBUN occurred in 107 patients (56%). The 180-day all-cause mortality rate was higher in WBUN group compared with no WBUN group (19.6% versus 8.5%, p < 0.05). However, worsening renal function (WRF), defined by increased Cr ≥ 0.3 mg/dL or ≥ 25%, was not associated with worse outcome (18.5% versus 12.5%, p > 0.05).



Conclusion: More than half of patients admitted for AHF have WBUN during hospitalisation. This study demonstrates that WBUN, but not WRF, is a prognostic marker on long-term outcome after hospitalised with AHF.

P1776

Clinical characteristics and outcomes of cardiorenal anemia syndrome (CRAS) patients stratified by admission diagnosis: Findings from the Gulf acute heart failure registry (Gulf CARE)

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On behalf of: Gulf CARE

Funding Acknowledgements: Funded by Servier, Paris, France; and (for centers in Saudi Arabia) by the Saudi Heart Association

Objective: The purpose of this study was to describe the clinical characteristics and outcomes of the cardiorenal anemia syndrome (CRAS) patients from the Gulf acute heart failure registry (Gulf CARE) stratified by admission diagnosis.

Methods: Data was analyzed from 1,319 consecutive patients admitted to 47 hospitals in 7 Middle Eastern countries with acute heart failure (AHF) from February to November, 2012. CRAS was defined as those AHF patients with eGFR of <60 ml/min and Hb of (<13 g/dL for males or <12 g/dL for females). Analyses were performed using univariate statistics.

Results: The overall mean age of the cohort was 65±14 years, 53% (n=703) were males, 77% (n=1,022) were hypertensives, 67% (n=889) were diabetics and 66% (n=864) had coronary artery disease (CAD). A total of 66% (n=873) had acute decompensated chronic heart failure (ADCHF) while 34% (n=446) has de novo AHF. ADCHF patients were older (66 vs 63 years; p<0.001), associated more with hyperlipidemia (53 vs 41%; p<0.001), CAD (69 vs 58%; p<0.001), hypertension (80 vs 73%; p=0.006), atrial fibrillation (17 vs 8.7%; p<0.001) and lower lower ventricular ejection fraction (36 vs 41%; p<0.001) compared to those with de novo AHF. Those with ADCF were less likely to be associated with mortality at in-hospital (7.8 vs 11.4%; p=0.029) and at 3-month (15.9 vs 20.4%; p=0.042) but not at 12-month follow-up (28.1 vs 27.6%; p=0.852) compared to those with de novo AHF.

Conclusions: CRAS patients in the Middle East were older and associated with significant co-morbidity and increased mortality.

Table 1: Demographic and clinical characteristics of the cadiorenal anemia syndrome (CRAS) cohort stratified by admission diagnosis status among patients with acute heart failure.

Characteristic, n (%) unless specified otherwise	All (N=1319)	Diagnosis		*P*-value
		De *novo* AHF (n=446)	ADCHF (n=873)	
Demographic				
Age, mean±SD, years	65±14	63±14	66±14	0.001
Male gender	703 (53%)	230 (52%)	473 (54%)	0.368
BMI, mean±SD, kg/m^2	29.1±7.0	29.0±7.4	29.2±6.9	0.723
Smoking	164 (12%)	78 (17%)	86 (9.9%)	<0.001
Khatt	148 (11%)	57 (13%)	91 (10%)	0.200
Alcohol	23 (1.7%)	9 (2.0%)	14 (1.6%)	0.587
Past Medical history				
Hyperlipidemia	644 (49%)	183 (41%)	461 (53%)	<0.001
CAD	864 (66%)	258 (58%)	606 (69%)	<0.001
Hypertension	1022 (77%)	326 (73%)	696 (80%)	0.006
Diabetes mellitus	889 (67%)	297 (67%)	592 (68%)	0.655
PVD	106 (8.0%)	42 (9.4%)	64 (7.3%)	0.187
Stroke/TIA	168 (13%)	49 (11%)	119 (14%)	0.173
AF	186 (14%)	39 (8.7%)	147 (17%)	<0.001
Clinical parameters at presentation				
HR, mean±SD, bpm	76±14	77±15	76±13	0.575
SBP, mean±SD, mmHg	141±34	148±36	137±33	<0.001
DBP, mean±SD, mmHg	79±19	83±20	77±19	<0.001
Crea, mean±SD, µmol/L	207±159	224±193	198±139	0.006
LVEF, mean±SD, %	38±14	41±14	36±14	<0.001
In-hospital course				
PCI/CABG	50 (3.8%)	26 (5.8%)	24 (2.8%)	0.006
Treatment course*	795 (53%)	252 (57%)	453 (52%)	0.112
NYHA at discharge**				
I	531 (44%)	191 (48%)	340 (42%)	
II	576 (48%)	169 (43%)	407 (51%)	<0.001
III	42 (3.5%)	3 (0.8%)	39 (4.8%)	
IV	51 (4.3%)	32 (8.1%)	19 (2.4%)	

P1777

Clinical characteristics and outcomes of cardiorenal anemia syndrome (CRAS) patients stratified by left ventricular ejection fraction: Findings from the Gulf acute heart failure registry (Gulf CARE)

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On behalf of: Gulf CARE

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Objective: The purpose of this study was to describe the clinical characteristics and outcomes of the cardiorenal anemia syndrome (CRAS) patients from the Gulf acute heart failure registry (Gulf CARE) stratified by left ventricular ejection fraction (LVEF) (≤35% vs >35%).

Methods: Data was analyzed from 1,190 consecutive patients admitted to 47 hospitals in 7 Middle Eastern countries with acute heart failure (AHF) from February to November, 2012. CRAS was defined as those AHF patients with eGFR of <60 ml/min and Hb of (<13 g/dL for males or <12 g/dL for females). Analyses were performed using univariate statistics.

Table 1: Demographic and clinical characteristics of the cadiorenal anemia syndrome (CRAS) cohort stratified by left ventricular ejection fraction (LVEF) status (≤35%) among patients with acute heart failure.

Characteristic, n (%) unless specified otherwise	All (N=1,190)	LVEF		*P*-value
		>35% (n=589; 50%)	≤35% (n=601; 50%)	
Demographic				
Age, mean±SD, years	65±14	65±13	64±14	0.264
Male gender	649 (55%)	245 (42%)	404 (67%)	<0.001
BMI, mean±SD, kg/m^2	29.1±7.0	30.4±8.1	27.9±5.6	<0.001
Current smoking	152 (13%)	58 (9.9%)	94 (16%)	0.003
Khatt use	137 (12%)	54 (9.2%)	83 (14%)	0.012
Alcohol	22 (1.9%)	9 (1.5%)	13 (2.2%)	0.416
Past Medical history				
Hyperlipidemia	583 (49%)	304 (52%)	279 (46%)	0.073
CAD	790 (66%)	374 (64%)	416 (69%)	0.037
Hypertension	923 (78%)	488 (83%)	435 (72%)	<0.001
Diabetes mellitus	797 (67%)	415 (70%)	382 (64%)	0.011
PVD	92 (.77%)	39 (6.6%)	53 (8.8%)	0.256
Stroke/TIA	154 (13%)	70 (12%)	84 (14%)	0.282
AF	176 (15%)	92 (16%)	84 (14%)	0.425
Clinical parameters at presentation				
HR, mean±SD, bpm	76±13	77±13	76±14	0.678
SBP, mean±SD, mmHg	140±34	147±34	133±32	<0.001
DBP, mean±SD, mmHg	79±19	80±19	78±19	0.044
Crea, mean±SD, µmol/L	205±159	214±175	195±141	0.037
In-hospital course				
PCI/CABG	48 (4.0%)	15 (2.6%)	33 (5.5%)	0.010
Treatment course*	637 (54%)	319 (54%)	318 (53%)	0.666
Admission diagnosis				
De *novo* AHF	384 (32%)	234 (40%)	150 (25%)	<0.001
ADCHF	806 (68%)	355 (60%)	451 (75%)	
NYHA at discharge**				
I	491 (45%)	266 (48%)	225 (42%)	
II	518 (47%)	264 (48%)	254 (47%)	<0.001
III	36 (3.3%)	13 (2.4%)	23 (4.3%)	
IV	46 (4.2%)	7 (1.3%)	39 (7.2%)	

Results: The overall mean age of the cohort was 65±14 years, 55% (n=649) were males, 78% (n=923) were hypertensives, 67% (n=797) were diabetics, 66% (n=790) had coronary artery disease (CAD) and almost 68% (n=608) had acute decompensated chronic heart failure (ADCHF). A total of 50% (n=601) had LVEF ≤35%. Those patients with LVEF ≤35% were more likely to be associated with males (67 vs 42%; p<0.001), smokers (16 vs 9.9%; p=0.003), CAD (69 vs 64%; p=0.037), in-hospital course of treatment (5.5 vs 2.6%; p=0.010) and ADCHF (75 vs 60%; p<0.001). Those patients with LVEF ≤35% were also more likely to be associated with mortality at in-hospital (10 vs 6.6%; p=0.036), at 3-month (19.5 vs 13.9%; p=0.010) and at 12-month follow-up (30.1 vs 23.9%; p=0.016).
Conclusions: CRAS patients in the Middle East were older and associated with significant co-morbidity. Those with lower LVEF (≤35%) were associated with increased mortality.

P1778
Clinical phenotype and short-term outcome of acute heart failure in patients with mid-range ejection fraction: a prospective cohort study

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INTRODUCTION: Acute heart failure (AHF) has an unfavourable prognosis in both reduced (HFrEF) and preserved ejection fraction (HFpEF). Current guidelines define heart failure with mid-range ejection fraction (HFmrEF) as a new category to further investigate. Few data are yet available for patients with AHF and mid-range ejection fraction.
PURPOSE : We aimed to define the clinical and biological phenotype, the differences in therapies, the in-hospital management and outcome, and the short-term prognosis of patients hospitalized for AHF with HFmrEF compared to HFrEF and HFpEF.
METHODS: We include prospectively all consecutive patients hospitalized for AHF in our Heart Failure Unit, between February and December 2017. Clinical and biological phenotype, differences in therapies, in-hospital management and outcome of patients with HFmrEF were compared to HFrEF and HFpEF. The primary endpoint was the composite criteria of all- cause death or heart failure related hospitalization 3 months after discharge.
RESULTS: From 245 patients included, 102 (41.6%) had HFrEF, 37 (15.1%) HFmrEF, and 106 (43.3%) HFpEF. HFmrEF resembled HFrEF with more ischemic heart disease (55%), lower body mass index (26.2±5.8 kg/m2) and resembled HFpEF with older subjects (80.0±9.0 years) and more hypertension (70%). We found a decreasing gradient of BNP from HFrEF to HFpEF. First line guideline-directed therapies were similarly increased in all groups. Groups were not significantly different for the primary endpoint with 35.0%, 27.5% and 38.0% for HFrEF, HFmrEF and HFpEF respectively (p=0.49) in univariate analysis and neither for the event-free survival in multivariate analysis (p=0.62). CONCLUSION: HFmrEF patients have a distinct phenotype but a similar adverse short- term prognosis in AHF. Left ventricular ejection fraction solely might be insufficient to assess outcome in AHF. Other variables might be considered.

P1779
Lung injury, a clinical issue among patients with acute heart failure?

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Background: Pulmonary congestion in acute heart failure (AHF) is by far a much more complex phenomenon, beyond that of fluid overload. It has been pointed out the role of inflammation and lung injury that leads to blood-gas barrier dysfunction in cardiogenic pulmonary edema.
Purpose: To evaluate incidence and prognostic implications of lung injury (LI) at admission in AHF patients.
Methods: In this study we have evaluated 114 consecutive patients from our regional heart failure registry, with a primary diagnosis of AHF admitted in the intensive care unit. PaO2/FiO2 ratio was determined to all patients. Patients were divided into two groups: group 1 with a PaO2/FiO2 ratio < 200 mmHg and group 2 with a ratio > 200 mmHg. For statistical analysis we used independent t test for comparison of continuous values, Pearson x^2 test for comparison of categorical values, multivariate logistic regression, survival curves and Cox regression for predictors of in-hospital mortality.
Results: Mean age was 68 ± 58 years and 49% were female regardless of LI development. The percentage of patients with LI was 72%, with a mean of 233±119mmHg. Group 1 was associated with acute pulmonary edema AHF profile (28%, p=0.002) while group 2 was associated with acute decompensated heart failure AHF profile (26%, p=0.001). Patients with cardiogenic shock profile were more frequent seen in group 1 (10% vs 6%, p=0.6) while patients with right heart failure profile were seen more frequent in group 2 (5.3% vs. 4.4%, p=0.5). A PaO2/FiO2 < 200mmHg was correlated with respiratory acidosis (pH=7.3, pCO2=46 mmol/L, p=0.022). Patients with a PaO2/FiO2 < 200 mmHg had a significantly worse survival profile during hospitalization (log-rank test, p<0.045) and Cox proportional hazards modelling showed a crude HR = 1.7 (95%CI [1-3.2], p<0.05) for in-hospital mortality.
Conclusions: There is a high incidence of lung injury within patients admitted for acute heart failure. Patients with acute pulmonary edema are more prone to develop lung injury. A PaO2/FiO2 ratio < 200 mmHg at admission in patients with AHF is responsible for worse in-hospital survival rates. Even though PaO2/FiO2 ratio is used to define acute respiratory distress syndrome among critically ill patients it might also serve as a useful tool in stratifying risk of patients with AHF. Future larger prospective trials are needed.

P1780
Complications after implants of cardiac electronic device in acute heart failure

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On behalf of: EPICO - Estudo para Investigação de Causas Tratáveis e Otimização terapêutica da Insuficiência Cardíaca

BACKGROUND: Acute Heart Failure (AHF) is the most common cause of hospitalization among the elderly in the Unified Health System (SUS) and is associated with high morbidity and mortality rates. In the last decades, Cardiac Resynchronization Therapy (CRT) and Implantable Cardioverter Defibrillators (ICD) are non-pharmacological and adjunctive therapy options that have become increasingly common.The assessment and decision of implantation of cardiac devices may occur in a scheduled outpatient setting or during hospitalization for decompensation of HF.Patients often have a form of severe disease with frequent episodes of AHF and the implant may be related to a good long-term prognosis but may also be related to severe complicationsin the short term.
OBJETIVE: The aim of the study is to describe the complications after implantation of theseelectronic devices of high risk of Acute Heart Failure.
METHODS: A prospective cohort study of patients who were admitted for AHF and implanted some electronic cardiac device (DEIC) from May 2017 at the state center of reference for implantation of devices by the Unified Health System of the state of Bahia.Heart failure (HF) was defined according to the guidelines of the European Society of Cardiology (ESC) and only cases of systolic heart failure, defined as Left Ventricular Ejection Fraction (LVEF) <50% were evaluated. Clinical, laboratory, drug, and other data were collected from medical records.
RESULTS: Were analyzed 65 patients hospitalized to AHF and who needed to perform the implantation of some high cost cardiac electronic device: ICD 78% (51), 6% (4) CRT-P or 15% (10) CRT-D. The mean age was 56 years, 74% (48) males, 15% (10) patients with ischemic heart disease and 46% (30) Chagas' disease. Of these, 37% (24) developed acute renal failure, 6% (4) had hematoma, and 6% (4) had infection. 1.5% (1) developed pneumothorax, 1.5% (1) had electrode displacement followed device explants (4% - 3). The mean time of hospitalization was 15 days and 6.25% (4) patients died in the hospital, and 4.6% (3) patients died within 1 year of discharge.
CONCLUSIONS: These findings suggest that the implantation of these devices during hospitalization for AHF appears to offer additional risks of serious complications such as infection followed by explants and untildeath.

Coronary Artery Disease

P1781
Predictors of in-hospital mortality in patients with acute coronary syndrome in Kosovo

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Background and Aim: Acute coronary syndrome (ACS) is the major cause of mortality and hospital admissions. The management and outcome of patients with ACS vary in different countries and regions. The in-hospital mortality of these patients declined significantly in developed and developing countries after the introducing of primary percutaneous intervention (PPCI). There are no data regarding mortality and hospital admission of patients with ASC in Kosovo. The objective of this study was to assess possible predictors of in-hospital mortality in patients admitted with ACS.
Methods: This retrospective study included all patients hospitalized for ACS from January 1st, 2014 to December 31st, 2018, at the Clinic of Cardiology of our

University Clinical Center in Kosovo. According to the presenting electrocardiogram, acute myocardial infarction (MI) was categorized as non-ST-segment elevation MI (NSTEMI) and ST-segment elevation MI (STEMI). The in-hospital mortality was defined as the death from the time of the admission till the patient's discharge. **Results:** Among 4667 admitted patients with ACS (mean age 63 ± 12 years, 30% female), according to the final discharged diagnosis, 2982 (64%) patients were identified with STEMI, 1685 (36%) with NSTEMI or unstable angina. Of all ACS patients, 49% underwent diagnostic coronary angiography, 34 0% underwent PPCI, 13 % were referred for coronary artery by-pass graft surgery, and 24 % were transferred to a 24 hours PPCI center. The rest of patients were treated medically. In-hospital mortality in the whole group of patients was 8.4%, whereas in patients that were not transferred to the 24 hours PCI center for PPCI it was 8.9%. The mortality rate was higher in patients that did not underwent reperfusion by PPCI compared to those that underwent (10.6% vs. 4.1%, p<0.001), and even higher in patients that didn't underwent diagnostic coronary arteriography (12.2%). Diabetic patients had higher mortality rate compared to non-diabetic patients (p<0.001), female patients had higher mortality rate compared to male patients (p<0.001) and non-smokers had higher mortality rate compared to smokers (p<0.001). Older age [1.046 (1.025-1.067), p<0.001], low left ventricular ejection fraction [0.962 (0.946-0.978), p<0.001], the presence of STEMI [2.051 (1.295-3.248), p=0.002], high level of creatinine [1.004 (1.002-1.006), p<0.001] and the luck of PPCI intervention [0.338 (0.202-0.566), p<0.001] were independent predictors of in-hospital mortality in ACS patients, in the multivariate analysis. Conclusion: During last five years, the majority of patients with ACS were not treated with PPCI in Kosovo, in whom the in-hospital mortality rate was high. The luck of PPCI intervention, older age, compromised global left ventricular systolic function and renal function are the main predictors of in-hospital mortality in patients with ACS.

P1782

Left ventricular filling pressure as a useful marker of myocardial injury following elective percutaneous coronary intervention

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Objectives: We investigated the value of ratio of early transmittal velocity to tissue Doppler mitral annular early diastolic velocity (E/E') in detecting the occurrence of peri-procedural myocardial injury(MI) in patients undergoing elective PCI.
Methods: 62 patients (mean age:56.7±9.7) who undergoing elective PCI and had EF%>50% were recruited prospectively. E/E' ratio was measured immediately before and within 24 hours after PCI.
Results: The cohort consisted of 44(71%) males, 49(27.4%) had ≥ two risk factors for CAD. 30(48.4%) patients had RWMA (WMSI: 0.74±0.29). MI was diagnosed in 39(62.9%) patients, those with predilation showed reduction of E/E' (7.9±3.2 vs 8.9±2.9,P < .001). E/E' correlated negatively with LV EF%(P < .003), positively with CK-MB and cTn level after PCI(P < .0001), NYHA functional class(P < .001), the number of risk factors, and number of vessel diseased and the number of vessels treated with PCI(P < .0001) . Using ROC curve E/E' value ≥6.55 had 68.1% sensitivity and 66.6% specificity to detect MI. Multivariate regression analysis revealed that E/E' and number of stents are predictors of postprocedural MI in elective PCI.
Conclusion: These data suggest that E/E' may be a useful indicator for predicting early MI after successful PCI. Patients with an elevated E/E′ after PCI may need more careful and close follow up.

P1783

Clinical and angiographic Characteristics of coronary artery disease in patients referred to Egyptian cathterization laboratory. A single center study

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Background This Registry collects data from cardiac catheterization laboratories in Our University hospital, as one of Egyptian tertiary centers to provide a perspective on patients referred for diagnostic and/ or percutaneous coronary intervention (PCI) Objectives: This study sought to provide contemporary snapshot of clinical and angiographic characteristics in patients referred to cath lab and disease extent in patients with obstructive CAD.
Methods Data were collected for 12 consecutive months beginning June 2015, and ending June 2016. This report includes 1100 patients undergoing diagnostic cardiac catheterization and /or PCI.
Results: The mean patient age was 57± 8.9 years, 5.4% are below 45 years of age. Men made up 72.6% of the study population, and the proportion of rural area residents was 54.8%. Chronic stable angina was the most common mode of presentation (65.9%). Urgent coronary angiography present in 9.2 % of patients, they referred from CCU with ACS. The most prevalent conventional cardiovascular risk factors were diabetes mellitus (71%), hypertension in 61%, 45.4% had dyslipidemia followed by smoking in 28% and obesity in 20% (an increased body mass index ≥ 30 kg/m2). Radial artery access was used in 1.7% of all referred patients. Angiographically normal coronary arteries were found in 29.5% of patients. 70.5% patients have evident obstructive CAD, 27.4% had prior STEMI. PCI was performed in 11.4% of total population and 16.1% of patients with obstructive CAD 86% using drugs eluting stents and 5.8% were primary. Pre procedural ECHO showed EF mean 57.7±9.1.In obstructive CAD, The most common location of significant atherosclerotic coronary lesions was the left anterior descending artery 64.6% [64.4% were proximal] followed by the right coronary artery in 44% of patients [50% were proximal]. LCX significant obstruction was present in 41% of patients, of them 63% had proximal lesions. Single-vessel disease was identified in 47.1% of patients, two vessel disease was identified in 29.6% and three vessel disease in 23.3% of patients with a positive result of CAG (stenosis > 50%). The mean severity of coronary artery stenosis using gensini score was 19.4±23.2 75.4% in the group with obstructive atherosclerotic coronary disease. By dividing the Gensini score into four quartiles, patients in highest quartile had three or more CV risk factors, older in age, had increased BMI and lower ejection fraction.
Conclusions: In this registry, patients referred to cath lab are predominantly male, diabetes and hypertension were the prevalent risk factors. Single vessel disease and chronic stable angina were the major presentation. The current practice of PCI is essentially elective.

P1784

2-years follow-up of "Provisional-T" stenting of Left Main Coronary Artery in patients with true bifurcation stenosis

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Aim: to evaluate the long-term results of the use of drug-eluting balloon catheters in patients with Left Main (LM) bifurcation stenosis.
Material: the analysis involved 142 patients with true bifurcations of the Left Main. Randomization in 2 main groups: Group I (n=52) included patients, who received kissing- dilatation with traditional NC balloon catheters and Group II (n=52), who had a kissing-dilatation of the main bifurcation artery with a traditional NC balloon catheters, and a side branch - with drug-eluting balloon catheters. In retrospectively, the third (III) control group (n=38) was formed, where the two-stent technique was performed. All patients from main groups had previously performed 'Provisional T' stenting and final 'kissing balloons' dilation technique. Coronary angiography and OCT were performed to evaluate the results of all patients. Inclusion criteria: true LM bifurcation stenoses according to QCA and OCT; SYNTAXscore <32. Primary endpoints: incidence of MACE - death, MI, re-interventions. Secondary endpoints: the incidence of restenosis and late stent thrombosis.
after 24 months the total incidence of MACE were 11.5 vs. 3.8% in groups I and II respectively (p<0.05). When comparing the results in group II and III, the frequency of MACE was 3.8 vs. 13.2%, respectively (p<0.05). Restenosis of the side branch of more than 50% according to QCA was detected in 4 patients (7.7%) from group I and in 1 patients (1.9%) from group II (p<0.05). In patients from group I, the average MLA in the side branch after 24 months was 5.58±1.34 and 4.12±1.21 mm2, respectively (p<0.05), compared with data after PCI; in the main branch - 6.34±1.56 and 5.88±1.14 mm2, respectively (p>0.05). In patients from Group II, the average MLA were, respectively, 5.38±1.24 and 5.12±1.44 mm2 in side branch (p>0.05) and 6.68±1.75 and 6.36±1.22 mm2 in main branch (p>0.05). When comparing the data of MLA in the side branch in groups I and II, there was a significant difference (4.12±1.21 vs. 5.12±1.44 mm2; p<0.05). There were no cases of late thrombosis of the stents.
Conclusion: the use of dug-eluting balloon catheters for the 'Provisional T' stenting in patients with true LM bifurcation stenoses, associated with significantly lower frequency of MACE and side branch restenosis, according to OCT data, compared with patients who used traditional NC balloon catheters for 'kissing- dilatation' and two-stent technique strategy.

P1785

Intraaortic balloon support for myocardial infarction with cardiogenic shock

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Background: Cardiogenic shock (CS) remains the leading cause of in-hospital death in acute myocardial infarction (MI) and is associated with a mortality rate of ˜50%. Intraaortic balloon support (IABP) was class I ESC guideline recommendation for treatment of CS for many years, but this recommendation was changed to class III after the IABP-SHOCK II study. The aim of this large prospective observational

study was to evaluate the impact of IABP on 30-days mortality and in-hospital complications in patients with CS.
Methods: We used data from the Swedish Coronary Angiography and Angioplasty Registry (SCAAR), which contains information about all PCI procedures performed in Sweden (31 hospitals). We included all procedures from 2005 to 2018 in patients with CS due to MI and divided the patients according to whether or not they were treated with IABP. We used instrumental variable analysis to adjust for differences in patient characteristics and hidden bias. Treating hospital was used as a treatment-preference instrumental variable using two-stage least squares regression. Multilevel modeling was used to adjust for clustering of observations in a hierarchical database. In-hospital complication was defined as the occurrence of any of the following events: major bleeding, minor bleeding, extended compression of the access artery, blood transfusion, surgical revision of the access artery, neurologic complication.
Results: In total, 2,991 patients with CS were included in the study. Of these, 737 (25%) were treated with IABP. In the combined cohort, there were 1,554 (52%) deaths 30 days after PCI and 1,239 (41%) cases of in-hospital complications. IABP was not associated with death at 30 days (risk reduction [RR] -1.1 %; 95% confidence interval [CI] -15.7;13.5; P= 0.881). However, IABP was associated with a higher risk of in-hospital complications (RR 35.4%; 95% CI 17.7-53.1; P<0.001). Conclusion: In this observational study, treatment with IABP, was not associated with 30-days mortality in patients with CS. However, the risk of in-hospital complications was substantially higher in patients with CS who were treated with IABP. Our observational study supports class III recommendation by the current ESC guidelines for the use of IABP in CS.

P1786

Prognosis of patients with chronic coronary artery disease undergoing to percutaneous coronary intervention (5 years follow-up)

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Aim: to evaluate the prognosis of patients with chronic ischemic heart disease, who underwent percutaneous coronary interventions (PCI) and were only on optimal medical therapy (OMT).
Methods: measurement of the fractional flow reserve (FFR) was performed for 432 patients. According to the measurement results, all patients were randomized in 2 groups (1:2): Group I (n=168) – included patients, who had a FFR <0.8 and were followed by PCI; Group II (n=264) – included patients with FFR >0.8 - received OMT and were under monitoring for to 5 years. Inclusion criteria: stable angina II-III FK, post-MI, silent myocardial ischemia. Concomitant diseases: diabetes mellitus (19.2%), multifocal atherosclerosis (21%), hypertension (27%), post-MI (24%), PCI in previously (15%). According to angiography, 44% had a one-vessel disease, 35% had two-vessel diseases, and 21% had a three-vessel disease. Primary endpoints: MACE (death, MI, repeated interventions). Observation periods: 6, 12, 24, 36, 48, 60 months. Long-term results were evaluated by repeated coronary angiography and measurement of FFR.
Results: during 6 and 12 months there were not a single case of MACE in both groups. By the 18th month, 7% of cases conversion from the OMT to the PCI group on the basis of FFR measurements was recorded. By the 24th and 36th months in the OMT, PCI group was performed in 12 and 21% of patients, respectively. By the 48th and 60th month, the number of such patients was 24 and 31%, respectively. Among the total number of performed PCI in Group II, 20% of them were due to unstable angina. Thus, over the entire observation period, 149 patients from group II (56%) had PCI performed. The frequency of MACE in group I to 36 months was 2.4%, and in group II - 18%, respectively (p <0.001). By the end of the observation period, the frequency of MACE in groups I and II was 4.2 and 31%, respectively (p <0.001). Multifactor analysis showed that with SYNTAX score> 28, multifocal atherosclerosis, diabetes mellitus, MACE was significantly more frequent and there was a need to perform PCI in the long-term period.
Conclusions: the prognosis of patients with chronic coronary artery disease undergoing percutaneous coronary intervention, performed using measurement of FFR, is significantly better than in patients who were only on optimal medical therapy.

P1787

Prognostic impact of angiographic results in cardiogenic shock

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On behalf of: CardShock
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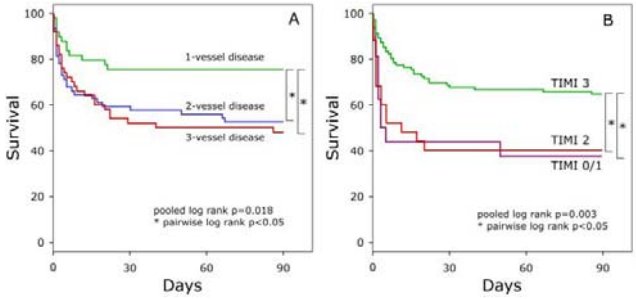
Background In acute coronary syndrome (ACS) related cardiogenic shock (CS) urgent coronary angiography is essential. The aim was to investigate the association of angiographic results with 90-day mortality in CS patients.
Methods This CardShock (NCT0137486) substudy included 158 patients with ACS aetiology and data on coronary angiography. Survival analysis was conducted with Kaplan-Meier curves and Cox regression analysis.
Results Median age was 67±11 years and 121 (77%) were men. During the 90-day follow-up 66 (42%) patients died. Patients with one-vessel disease (n=49) had lower mortality than patients with two- (n=59) or three-vessel (n=50) disease (25% vs. 48% vs. 52%, p=0.011, Figure A). Successful revascularization (post-procedural TIMI grade 3 flow) was achieved more often in survivors than non-survivors (81% vs. 60%, p=0.019, Figure B). Median symptom-to-balloon time was similar between survivors and non-survivors (335 [210-641] min vs. 340 [190-660] min, p=0.70). In multivariable mortality analysis, the CardShock risk score (HR 1.76, CI 1.45-2.13), multivessel disease (HR 2.24, CI 1.13-4.44) and post-procedural TIMI < 3 (HR 1.85, CI 1.08-3.16) were associated with 90-day mortality.
Conclusion Multivessel disease is associated with worse survival in ACS-related CS. Successful revascularization of the IRA had a positive effect on outcome despite delay from symptom onset.



Figure

P1788

The role of intravascular imaging methods during perfomance percutaneous coronary interventions in patients with pseudobifurcation stenosis of the left main coronary artery

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Aim: to increase the effectiveness of endovascular treatment in patients with ostium coronary artery lesions.
Methods: 150 patients were included in the study. Inclusion criteria: ostium atherosclerotic lesions of LAD or LCx > 75% according to OCT or IVUS; stable angina II-III functional class (CCS); silent myocardial ischemia. The main included 108 patients, who were randomized into 2 groups. In I group (n=54) according to IVUS, atherosclerotic plaque spread from the ostium of LAD and/or LCx to the LMCA, and in group II (n = 54) - the plaque did not spread into the LMCA. In Group I all patients were initially treated with 'Provisional T' stenting of the LMCA, and in Group II - stenting of the ostium LAD or LCx. In retrospectively, the third (III) control group (n=42) was formed, where the stenting of the ostium of LAD or LCx was performed without IVUS.
Results: There were no complications associated with PCI in long-term period results (over a period 30.04±12.04 months). The survival was 100% in all groups. There was no conversion to complete bifurcation stenting. In comparative analysis of Group I and II there were non significant differences of MACE's and restenosis (2.3 and 7.5% respectively; p>0,05). In group III (without IVUS and OCT) where 18 patients with precision stenting and 22 with Provisional T stenting. There were significant difference for frequency of restenosis in this group (9 and 27.7%

respectively; p<0,05). In comparative analysis of Group I and III (n= 22 doing the Provisional T stenting) there were more frequency of restenosis in group III, but this data wasn't significant difference (0 and 9% respectively p>0,05). However, in comparative analysis of Group II and III (doing the precision stenting) there were significant difference of frequency of restenosis and TLR (2.5 and 22.2% respectively; p<0,05). The data of Minimal lumen area (MLA) in long-term period has significant difference in patients with precision ostium stenting compared to MLA data after PCI (LCx 5.38 vs 4.76 mm2; p<0,05 and LAD 6.28 vs 5.88 mm2; p<0,05). And the results of measuring the LAD and LCx after doing the provisional T stenting in long term period and after PCI were not valuable (p<0,05). Conclusion: the use of intravascular imaging methods for the analysis of the ostium lesions of coronary artery allows us to choose the optimal stenting technique and also reliably improve the long-term results of endovascular intervention by reducing the incidence of stent restenosis and MACE.

P1789

SCAD (Spontaneous coronary artery dissection)- United Kingdom (UK) data an observation study of PSCAD (Pregnancy/Post partum associated SCAD) vs. Non PSCAD (Non- Pregnancy/Post partum associated SCAD)

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Spontaneous coronary artery dissection (SCAD) is a devastating condition, which affects predominantly young females. It has been associated with Pregnancy and post partum. It is a non-inflammatory, non-atherosclerotic cause of acute myocardial infarction. It can result in significant morbidities such as ventricular arrhythmias, sudden cardiac death and left ventricular systolic dysfunction (LVSD).
The purpose of this study was to compare PSCAD vs. non-PSCAD cohorts to see if there were any substantial differences. UK (United Kingdom) data for SCAD was reviewed from 01/01/2007 to 01/10/2017. Pregnancy and post partum associated SCADs were analysed. Post Partum was defined to be up to 1 year after pregnancy. 24 PSCAD were identified which were randomly matched by age in a 2:1 Ratio. In total 72 SCAD's were selected. 2 patients were withdrawn after the angiograms were reviewed (24 PSCAD and 46 non PSCAD). Data was reviewed using the national registry and SCAD experts reviewed angiograms for all patients.
Mean age for the entire cohort was 35.35. In the PSCAD cohort 62.50% presented as a STEMI (ST elevation Myocardial infarction) with 45.83% having ECG changes in the anterior leads. Compared to non-PSCAD cohort 58.70% presented as a STEMI with 41.30% having ECG changes in the anterior leads. In the PSCAD cohort 33.33% affected the LMS (Left main stem), 20.83% affected the RCA (Right coronary artery), 70.83% affected the LAD (left anterior descending), 29.17% affected LCX (left circumflex artery) and 41.67% affected more than one vessel affected. In 29.17% of cases percutaneous coronary intervention (PCI) was undertaken and 8.33% cases required a coronary artery bypass graft (CABG). In the non-PSCAD group 10.86% affected the LMS, 10.86% affected the RCA, 76.09% affected the LAD, 13.04 % affected LCX and 4.35% affected more than one vessel. 28.26% underwent PCI with 10.87% cases requiring CABG.
Heart failure was reviewed in both cohorts with Echocardiogram or Magnetic resonance imaging (MRI) reviewed at least 3 months after the event. In the PSCAD group 50 % had normal LVSD, 20.83% with mild LVSD, 16.67 with moderate LVSD, 4.17 % with severe LVSD and in 8.33% data was not available. In non-PSCAD group 54.35% had normal LVSD, 19.57% had mild LVSD, 10.87% had moderate, 0 % had severe LVSD and in 15.22% data was not available.
In both sub groups the commonest vessel affected was the LAD. However, the PSCAD group had a higher number of LMS and multi vessel cases of SCAD's. This highlights that this cohort has a more severe form of SCAD. From a heart failure perspective in both subgroups at least half the patients regained normal LV function.

P1790

VEGF-A gene polymorphism and VEGF-A level association with the development of heart failure in patients with ST-elevation myocardial infarction

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The purpose of the study was to assess the predictive value of Vascular endothelial growth factor A (VEGF-A) in associated with in cardiac remodeling and exercise capacity of the VEGF-A gene polymorphism (rs 2010963) with the development of heart failure in patients with ST-Elevation Myocardial Infarction (STEMI) in a 6-month period.
Materials and methods: 91 patients with acute STEMI were examined, 70 (76.9%) males, mean age - 59.21 ± 8.92. The level of the VEGF-A determined by ELISA. VEGF-A gene polymorphism (rs 2010963) assessed by polymerase chain reaction. All patients tested with a 6-minute walking test (6MWT).
Results. Carriers of the genotype GG have a significantly higher level of VEGF-A - 194.10 [115.02-398.86] pg / ml compared to the GC genotype with 148.44 [68.84-221.28] pg / ml, (P = 0.047). The frequency of STEMI was 2.58 times higher in the GC genotype. The 6MWT was 477.35 ± 73.34 m in the GC type, meanwhile, the GG genotype resulted in 545.44 ± 51.09 m (P = 0.014). The ROC analysis determined the cut-off level of VEGF-A ≤ 199.5 pg / ml, as a predictor for left ventricle (LV) remodelling and for poor exercise capacity with a sensitivity of 77.4% and a specificity of 63.3% (AUC 0.654, 95% CI 0.513-0.795, p = 0.032).
Conclusions: The GC genotype in patients with STEMI is associated with more pronounced changes in the LV geometry and poor exercise capacity. The VEGF-A can be suggested as possible predictor for heart failure development in STEMI patients.

P1791

The biomarker gdf 15 in a 5-year prediction of adverse outcomes in patients with acute coronary syndrome

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The search for an optimal biomarker that can significantly predict long-term prognosis in patients with an acute coronary syndrome (ACS) is still going. Growth differentiation factor 15 (GDF 15) is being actively studied.
Purpose: to determine the significance of GDF 15 in the prediction of 5-years adverse outcomes after acute coronary syndrome.
Methods: The study included 70 patients with different forms of ACS. The mean age was 61.8 ± 1.3 years (77% men and 23% women). They were admitted to the hospital from 2012 to 2013 and signed the informed consent. Among them, 54% of the patients with Q-wave myocardial infarction (Q-wave MI), 20% - with non-Q-wave myocardial infarction (non-Q-wave MI), 26% - unstable angina (UA). All patients underwent a baseline investigation which includes: standard electrocardiography, echocardiography, angiography, and determination of marker of myocardial necrosis – cardiac troponin I. In addition to that, the level of GDF 15 determined during the first day of hospitalization. The endpoint considered as all-cause mortality. 20% of patients died during 5-years follow-up. Long-term survival rates were calculated using the Kaplan-Meier method and compared using the log-rank test.
Results: There was a significant difference in GDF 15 serum level between patients who have died and those, who have survived during 5 years after ACS (p=0.0015). The effect of several variables of clinical, instrumental and laboratory status assessed on surviving patients. For the identification of the main risk factors for adverse outcome, we have used logistic regression (LR) method. We have found that GDF 15 (AUC 0.7; p=0.006; 95% CI: 0.552 – 0.814) could independently predict mortality with sensitivity 80% and specificity 60%. GDF-15 < 2350 pg/ml associated with the highest mortality risk. Unadjusted long-term survival is presented as Kaplan-Meier curves, displaying differences in GDF 15 level between patients who survived and those who died (log-rank p = 0.0097 for trend). It was found that the level of GDF 15 significantly predicted the onset of the primary endpoint within 5 years after the ACS (T1 = 12.4 T2 = 8.6; F = 3.36; p = 0.004).
Conclusion: the biomarker GDF 15 is a strong and crucial predictor of 5-years mortality in patients with acute coronary syndrome. The measuring of this biomarker could be used in clinical practice to improve risk stratification during the first 24 hours after the event.

P1792

Role of novel biomarkers of renal injury in patients with st segment elevation myocardial infarction

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Acute deterioration of renal function in patients with ST-segment elevation myocardial infarction (STEMI) is a crucial issue nowadays because it worsens the prognosis. The search for new biomarkers is going on to prevent the acute worsening of kidney functions. One of the promising of biomarker is the soluble ST2 (sST2).
Purpose: to determine the role of soluble ST2 in the prognosis of acute deterioration of renal function in ST-segment elevation myocardial infarction patients.

Methods: 103 STEMI patients with a mean age of 61.85 ± 12.23 years were enrolled to this study (72.8% male and 27.2% female). All patients had to undergo baseline investigations, including the: standard electrocardiography, echocardiography, angiography, determination of marker of myocardial necrosis – cardiac troponin I and level of serum creatinine; the glomerular filtration rate (GFR) was estimated using the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) formula. Accordingly, to the result, a group of patients has been selected (n= 59), their creatinine level was determined during the first 24 hours and after 48 hours of admission. The clinical evaluation, N-terminal pro-brain natriuretic peptide (NT-pro BNP) and sST2 serum levels were estimated once during the first day after STEMI.
Results. Receiver operating characteristic curve (ROC) for baseline showed that the optimal cut-off value of sST2 to predict deterioration of renal function was 36 ng/ml, with a sensitivity (Se) and specificity (Spe) of 77% and 60%, respectively (Area under curve (AUC) 0.67; 95% confidence interval (CI) 0.53-0.8; p=0.02). ROC curve for NT-pro BNP showed the cut-off value was equal to 1345 ng/ml (AUC=0.75; 95% CI 0.56-0.94; Se 60%; Spe 95%; p=0.0089). In a multiple regression model, we found sST2 and blood glucose to be the only significant predictors of acute kidney injury during the first 48 hours of investigation (adj. R2 =0.437, P<0.001) among the parameters included in the study such as the biomarker NT-pro BNP, ejection fraction, E/A ratio, end-diastolic volume and hemoglobin level. Conclusion. The study revealed that sST2 predicts acute kidney injury in patients with ST-segment elevation myocardial infarction and could be useful especially in patients who underwent angiography.

P1793

Impact of left anterior descending artery wrapping around the left ventricular apex on cardiac mechanics in patients with normal coronary angiography

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Background: The anatomic features of left anterior descending (LAD) coronary artery have important clinical significance. An LAD that wraps around the LV apex theoretically supplies a greater amount of myocardium than one that ends at or before the apex.
Objectives: We examined the impact of LAD wrapping on left ventricular longitudinal and circumferential and twist mechanics in patients with normal coronary angiography.
Methods: 71 patients with evidence of normal coronary angiography (Wrapped LAD: n=52,73%) and non wrapped LAD(n=19, 27%) were included in the study. We compared LV longitudinal and circumferential(CS) strain(sys), systolic strain rate(SRsys) early and late diastolic SR (SRe & SRa), LV electromechanical dyssynchrony(TTP-SD) in addition to LV twist and torsion using speckle tracking echocardiography between groups.
Results: No significant difference in age, gender or BSA or EF% between the two groups. LAD wrapped group showed higher LVMI, deceleration time (DT), (P < .0001) global longitudinal SRa (P < .02), CS SRa at the basal segments (P < .02), CS SRsys & SRe and SRa (P < .0001) at the apical segments and apical rotation of septal & anterior segments compared with non wrapped group. LV twist was correlated negatively with LV TTP-SD (r=.25, P < .03), and positively with long. sys (r=.47, P < .0001), CS sys (r=.55, P < .0001), CS SRsys (r=.23, P < .05), CS SRe (r=.55, P < .0001). Using multivariate regression analysis LVMI: OR .922 CI: .860-.990, P < .03, DT; OR: .932, CI: .877-.991, P < .02 and CS SRa at atrial diastole; OR: .000, CI: .000-.271, P < .03, were independent predictors of LAD wrapping around LV apex.
Conclusion: Wrapped LAD is associated with better myocardial relaxation and rotational mechanics in patients with normal coronary angiography. This could explain the worse prognosis in such population when LAD occlusion acutely emerges.

P1794

Clinical significance and dynamics of biomarkers of myocardial remodeling in patients with ST segment elevation myocardial infarction and preserved left ventricular function

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Objective: to determine the clinical significance of markers of myocardial remodeling (NT-proBNP, galectin-3, sST2, MMP-1, 2, 3 and TIMP-1) in patients with ST-segment elevation myocardial infarction and preserved left ventricular function.
Materials and methods: 100 consecutive patients diagnosed with ST segment elevation myocardial infarction and LV ejection fraction ≥40% were included. Echocardiography was performed for all patients on the first day, 10th-12th day of hospitalization and one year later. In all patients on admission to the hospital, on the 10th-12th day and a year later, MI was used to determine serum concentrations of markers: MMP-1, 2 and 3, TIMP-1 , galectin-3; NT-proBNP; soluble protein of the IL-1 receptor family (sST2).
Results: The concentration of MMP-3, determined on the 10th -12th day of the MI, was 1.62 times higher than the values measured on the first day. While the concentration of soluble ST2 receptor, on the contrary, is almost twice as low on the 10th-12th day as measured on the 1st day. Also statistically significant dynamics in the period of hospitalization was determined for galectin-3 (p = 0.0001), MMP-2 (p = 0.0003), NT-proBNP (p = 0.0361). A year later, from the index MI, the value of markers decreased: NT-proBNP - 9.9 times compared with the values of 1-day MI and 2.54 times compared with 12 days from MI; sST2 - 1,9 times in comparison with the values of 1-day MI; galectin-3 - 1,76 times compared with the values of 1-day MI and 1.4 times compared with 12 days from MI; MMP-2 - in 1,3 times in comparison with the values of 1 day of MI and in 1,5 times in comparison with 12th days from MI. The values of MMP-3 and TIMP-1 a year later from the index event increased on the contrary: MPP-3 - 1.7 times compared with the values of 1-day MI; TIMP-1 - in 1,94 times compared with the values of 1-day MI and 2.04 times compared with 12 days from MI. Analyzing the differences in the concentrations of the markers under study, taking into account the presence / absence of signs of DD, draws attention to the fact of large median values in the group of patients with DD (n = 38): galectin-3 at each of the observation points, NT-proBNP by 10-12- day and in a year, MMP-1 - on the 1st and 10-12th day of observation, MMP-2 - at the annual observation stage, MMP-3 - on the 1st and 10-12th days from the MI, TIMP-1 - on the contrary, in the group of patients with DD the concentrations were lower in comparison with patients without DD (n = 62) both on the 1st day and a year later.
Conclusions: It was determined that in the group of patients with ST segment elevation myocardial infarction and preserved LV function in the hospital period and a year later, a statistically significant dynamics of the majority of studied markers: galectin-3, MMP-2, MMP-3, sST2, Nt-proBNP, TIMP-1 , which testify about regular processes of structural and functional remodeling of myocardium of the LV at different stages of observation.

P1795

The influence of gene polymorphism of enos on the course of afterinfarction period

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Endothelial NO-synthase (eNOS), constitutive enzyme, expresses in endothelial cells, promotes vascular dilatation. Polymorphism T786C of eNOS gene may influence on different clinical aspects of ST-elevation myocardial infarction (STEMI) and afterinfarction course of disease. Vascular endothelial growth factor-A (VEGF-) is one of the factors which influences on eNOS generation.
Purpose. To investigate associations of gene polymorphism 786 of eNOS with clinical and anamnestic data in patients with STEMI, the level of VEGF-, clinical course and prognosis of disease.
Methods. 177 patients with STEMI, 139 (78,5%) – male and 38 (21,5%) - female, at average age (61,73±9,44) years that were admitted to intensive care unit between January 2016 and July 2018 were investigated. Polymerase chain reaction was used to determine allele polymorphism T786C of eNOS gene. Serum level of VEGF by enzyme-linked immunosorbent assay was determined. After a 6-month observation period combined end point (afterinfarction angina, chronic heart failure no less then III functional class, cardiovascular death) were assessed.
Results. STEMI originated in 2,58 times more often in patients-careers of 786CC-genotype of eNOS gene in the presence of diabetes mellitus type 2 (95% OR (1,10-5,88)), in 2,28 times – in smokers (95% OR (1,03-4,88)), in 2,28 times – at age before 55 years (95% OR (1,03-4,88)), in 3,03 times (95% OR ((1,34-6,57)) – in patients with unstable angina before event. Uni- and multivariative regression analysis showed that polymorphism 786 of eNOS gene was independent predictor of unfavorable course of afterinfarction period (afterinfarction angina, chronic heart failure, cardiovascular death) during 6-month observation period (=0,0029). VEGF-level rice was in patients with STEMI – careers of 786-genotype of eNOS gene polymorphism and low level – in patients with minor 786CC-genotype. These data testifies to possible genetic determinant between VEFG-A level and eNOS gene polymorphism.
Conclusion. Observed findings may open new approach to stratify patients for unfavorable duration of afterinfarction recovery.

P1796

Complete revascularization on patients presenting with cardiogenic shock: real life data.

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On behalf of: Portuguese Registry of Acute Coronary Syndrome - ProACS

Introduction: The CULPRIT-SHOCK trial showed that immediate multivessel percutaneous coronary intervention (PCI) increased the risk of death or severe renal failure at 30 days on patients (P) presenting with cardiogenic shock (CS).
Objective: Evaluation of prognostic impact of complete revascularization (CR) on P admitted with ST segment elevation myocardial infarction (STEMI) in CS and multivessel disease (MVD).
Material and methods: Retrospective analysis of P data admitted due to STEMI and CS and MVD at multicentric registry between 2000-2018. Compared demographic and clinical characteristics of P who were submitted to CR (group 1 – G1) versus who did not (group 2 – G2) and evaluated its prognostic impact.
Results: Admitted 7919 P with STEMI, which 295 (3.7%) on CS. 46.8% of the P on CS had MVD, 69.6% were submitted to CR. G1 P were younger (61±11 vs 73±12 years, p<0.001). The STEMI location was predominantly anterior (80%) in G1 and inferior in G2 (50%). The stablished timings symptoms start - reperfusion therapy and first medical contact - reperfusion were not statistically different between groups. 20% of G1 P did more than one coronarography during hospitalization. The anterior descendent was the artery more frequently involved in both groups (80 vs 89.8%) being the culprit lesion in 47.4% of G1 P and in 27.7% of G2 P, where the most frequently was the right coronary (43.4%, p <0.001). The majority of G1 P (95%) had 2-vessel disease; in G2 53.4% had 2-vessel disease and 46.6% 3-vessel disease (p<0.001). All the G1 P did PCI; in G2, 96.6% did PCI and 3.4% had a hybrid technique (in 2.3% coronary artery bypass grafting planned after hospital discharge). Other interventions during hospitalization were needed, namely non-invasive ventilation (35 vs 21.6%), invasive ventilation (30 vs 34.1%), intra-aortic pump (20 vs 17%) and temporary pacemaker (5 vs 25%), not statistically significant. The stablished endpoints were reinfarction rate (5% between G1 P vs 0%), AHF (70 vs 83%), stroke (5.3 vs 0%) and in hospital death (35 vs 37.5%), not statistically significant.
Conclusion: Although the evaluated endpoints are different and measured at different timings, our results do not appear to follow the trends presented in CULPRIT-SHOCK trial probably as a result of the small sample size and the shorter follow up time.

P1797
Cardiac arrest predictors in cardiogenic shock

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Background: Cardiac arrest (CA) is a defining moment to patient outcome. Cardiogenic shock (CS) is the cardiovascular emergency with more mortality rates, and CA is considerably more frequent in these patients. Combined, CS and CA, are a potentially lethal event.
Purpose: Evaluate the impact of cardiovascular previous history, clinical signs and diagnosis procedures at admission in the prediction of CA in CS patients.
Methods: Single-centre retrospective study, engaging patients hospitalized for CS between 1/01/2014-31/10/2018. Epidemiological, clinical data at admission and diagnosis procedure's results were collected. Chi-square, Fisher and T-student tests were used to compare categorical and continuous variables. Logistic regression was performed to assess CA occurrence based on the cardiovascular history, clinical signs and diagnostic tools at admission.
Results: 218 patients were included, mean age 62.34±13.90 years, with 68% males. Patients that suffer CA (134 patients) were similar regarding age, gender, body mass index, arterial hypertension, dyslipidemia, previous ACS and arterial pressure at admission. Active smoking status was more frequent in CA (47 vs 32.1%, p=0.03), on other hand diabetes (20.1 vs 34.5%, p=0.018) and previous cardiomyopathy (23.1 vs 38.1%, p=0.018) were less prevalent that in non-CA patients. Beta blockers (43.9 vs 23.9%, p=0.002), angiotensin-converting-enzyme inhibitor (50.6 vs 34.6, p=0.021), furosemide (25.6 vs 13.4%, p=0.018) and platelet antiaggregants (41.5 vs 23.1%, p=0.004) are more frequent in non-CA patients. CA patients with CS had at admission lower values of pH (7.21±0.23 vs 7.39±0.10, p=0.009), however, higher lactate levels (6.5±6.45 vs 4.7±4.12, p0.001) and de novo cardiac arrhythmias (23.1 vs 4.8, p0.001). CA patients had less time until angiography performance (3.0±2.5 vs 5.0±4.5 hours, p0.001), but better left ventricular ejection fraction (LVEF) (38.11±13.69 vs 25.43±6.43%, p=0.001). Logistic regression revealed LVEF (odds ratio (OR) 1.04, p=0.001, confidence interval (CI) 1.015-1.064) and de novo arrhythmia (OR 8.248, p=0.008, CI 2.38-28.63) as predictors of CA in CS patients.
Conclusions: LVEF and de novo arrhythmia at admission in CS were significant predictors of CA arrest.

Valvular Heart Disease

P1798
Opportunity or futility? TAVI in elderly patients with depressed ejection fraction and severe aortic stenosis.

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Introduction: TAVI has become the election treatment in elderly patients with symptomatic severe aortic stenosis (AS) and medium or high surgical risk. However, whether if TAVI is a good option for this population presenting also reduced left ventricular ejection fraction (LVEF) is still unknown. Is TAVI safe in these patients?
Methods: Patients with severe AS who TAVI was implanted were prospectively assessed between 2010-2018. Patients with reduce LVEF (≤40%) were compared against patients with preserved function. Clinical and echocardiographic characteristics at baseline were recorded. All TAVI complications were collected. During follow up clinical and echocardiographic data, hospitalizations and mortality were recorded. Patients without LVEF quantification previous to TAVI were excluded..
Results: A total of 301 patients were finally included. 85,71% (n=258) has preserved(≥50%) and 7,97% (24) patients have a reduced LVEF (≤40%). 6,31% (19) has a LVEF between 40% and 50%. The average follow-up was 16,55 months. Total mortality was 8,39%, and 35,65% patients had a rehospitalisation.
Patients with reduced LVEF were mostly men (75%), with statically significant higher BNP values (1246 vs. 421, p<0,01), worst right ventricle function (TAPSE 15,01 mm vs. 19,42 mm, p<0.02) and more prevalence of low flow-low gradient AS (mean gradient 28,7 mmHg vs. 43,86 mmHg, p<0,01). There were no other differences in baseline characteristics between both groups (Table 1).
There were no differences in intraprocedure complications neither hospitalization days after TAVI (7,55 vs. 5,44 p=0,11).
During the follow up there were no differences in mortality (8,33% vs. 11,24%, p=0,189), rehospitalisation events (16,67% vs. 32,87%, p=0,155) or in the composed endpoint of admissions or mortality (21.05% vs. 38,96%, p=0,121) between reduced and preserved LVEF group.
Conclusions: TAVI in elderly patients with depressed LVEF (≤40%) is a safe procedure with similar outcomes than patients with preserved LVEF. These data should be confirmed in larger and longer registries.

Table 1

	FEVI≤ 40% (n=24)	FEVI≥ 50% (n=258)	P
Age (years)	82.59; 9.44	83.92; 6.03	0.33
Women	6; 25%	173; 67.05%	< 0.01
Pre Cr (g/dl)	1.54; 5.86	1.17; 0.36	0.7573
Pre Euroscore2	7.33; 6.43	4.06; 11.27	0.2534
Pre medium pressure gradient (mmHg)	28.7; 8.56	43.86; 14.72	<0.01
Pre aortic area	0.71; 0.17	0.72; 0.18	0.8007

Baseline characteristics

P1799
MitraClip: impact on symptoms and quality of life

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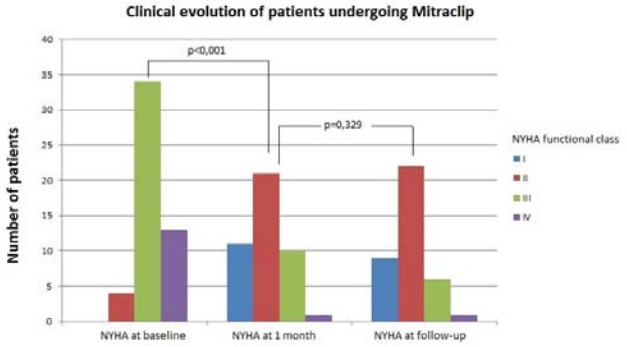
Introduction: In patients with severe mitral regurgitation (MR) and prohibitive surgical risk, percutaneous mitral valve repair seems to be associated with symptomatic and functional improvement.
Aim: To assess the impact on quality of life and symptoms of percutaneous mitral repair in "real world" patients.
Methods: A prospective single-center registry of consecutive patients undergoing percutaneous MR repair with MitraClip from 2013 to 2018. Demographic, clinical (including functional class (NYHA) and Minnesota Quality of Life (QoL) questionnaire) and echocardiographic data were evaluated. Clinical, face-to-face or telephone follow-up with reassessment of functional class and QoL score was performed. For statistical analysis, the chi-square and Student's T tests were used.

Results: 51 procedures (mean age 71.8 ± 13.5 years, 30 men) were performed in patients with symptomatic MR grade III or IV. 14 patients (27.5%) had primary MR and 37 (72.5%) had secondary MR. The procedure success rate per patient was 92.0%. The complication rate was 7.7% (n = 4.2 procedural failures, 1 stroke and 1 vascular complication). During an average follow-up (FUP) of 615 ± 613 days, there were 17 deaths (33.3%). Most patients were in NYHA III functional class (34 patients, 66.7%) or IV (13 patients, 25.5%), with a statistically significant improvement of the functional class in the short-term postoperative period (3.2 ± 0.6 vs 2.0 ± 0.7, p <0.001), which was maintained throughout the FUP period (2.1 ± 1.0 vs. 2.0 ± 0.7, p = 0.329). At the end of the FUP, most patients were in NYHA II (22 patients, 43.1%) or I (9 patients, 17.6%), with only one patient in NYHA IV class. There was also a significant improvement in quality of life, maintained during the long-term FUP (43.7 ± 19.1 vs 22.6 ± 16.6, p <0.001), as measured by the QoL-Minnesota score.
The symptomatic improvement was associated with lower regurgitant volume (69.7 ± 25.8 mL vs 113.3 ± 71.5 mL, p = 0.031) and EROA (0.4 ± 0.2 cm2 vs 0.6 ± 0, 4 cm 2, p = 0.036). No other clinical or echocardiographic predictors of symptomatic improvement were identified.
Conclusion: MitraClip for treatment of severe MR has led to improvement of symptoms and quality of life in real-world patients. As opposed to LVEF, the lower MR severity was a predictor of symptomatic improvement. Thus, it seems important to reaffirm percutaneous repair as a complementary treatment to optimized medical therapy in patients with severe MR and surgical contraindication.



P1800

Prognostic impact of MitraClip in patients with left ventricular dysfunction and functional mitral valve regurgitation: a comprehensive meta-analysis of RCTs and adjusted observational studies.

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Aims The real prognostic impact of MitraClip in patients with significant functional mitral regurgitation (FMR) and left ventricular (LV) dysfunction remains to be elucidated. Two randomized controlled trials (RCTs) with conflicting results have been recently published.
Methods and Results We conducted a comprehensive meta-analysis of all RCTs and adjusted observational studies to evaluate the clinical impact of percutaneous MR repair when compared to optimal medical therapy (OMT) alone in patients with symptomatic FMR and LV dysfunction. Death from any cause and heart failure rehospitalizations on long term follow-up were the primary endpoints. Cardiac death, one year and short-term death were the secondary ones. 2255 patients (1207 for MitraClip and 1048 for OMT-only) from 8 studies (2 RCTs and 6 observational studies) were included. At a median follow-up of 438 days (IQR 360-625) MitraClip was associated to a significant reduction of all cause death (Odds Ratio [OR] 0.55, 95%CI 0.41-0.73, p<0.001; [ORadj] 0.66, 95%CI 0.49-0.90, p=0.009) and rehospitalization (OR 0.49, 95%CI 0.24-1.00, p=0.05 and ORadj 0.63, 95%CI 0.43-0.94, p=0.02). At one year, only a trend favoring the experimental cohort emerged at adjusted analysis (ORadj 0.73, 95%CI 0.53-1.02, p=0.07). Metaregression suggested that benefit of MitraClip on long term survival persists even accounting for prevalence of implanted CRT, burden of comorbidities, NYHA class, cardiomyopathy etiology and LV function and dimensions.
Conclusions MitraClip for FMR in patients with LV dysfunction is associated to a considerable reduction of death and HF hospitalization on long term follow-up. Further ongoing RCTs are needed to strengthen present results.

P1801

Severe mitral regurgitation:mortality and morbidity predictors after percutaneous mitral valve repair with the mitraClip system

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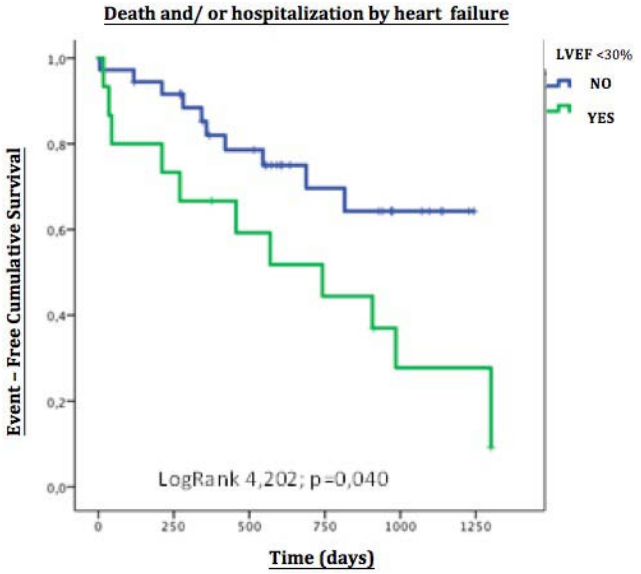
Introduction: Percutaneous mitral valve repair with the MitraClip system is an alternative in cases of severe mitral regurgitation (MR) with prohibitive surgical risk. Therefore, it's relevant to analyse factors that impact prognosis after percutaneous valve repair, and select patients that can most benefit from the procedure.
Aims: To identify predictors of bad prognosis after MitraClip implantation.
Methods: Single centre, prospective registry of consecutive patients (pts) submited to percutaneous mitral valve repair with the MitraClip system from 2013 to 2018. Clinical, echocardiographic and demographic parameters were analysed. Follow up was presential or by phone call. For statistical analysis a primary compound endpoint of global mortality and/or admission from cardiac cause was used. Qui-square($\chi 2$) test, T-student test, ROC analysis and Kaplan-Meier survival analysis were applied.
Results: The analysis included 51 procedures (average age was 71,8±13,5 years; 30 were male pts) performed in grade III or IV symptomatic MR pts. 14 pts (27,5%) had primary MR and 37 (72,5%) had secondary MR. Left ventricular ejection fraction (LVEF) averaged 39,0±14,1%. Success rate per patient was 92,0%. Complication rate was 7,7% (n=4; 2 procedure failures, 1 pericardial effusion and 1 vascular complication). 14 admissions from cardiac cause (27,5%) and 17 deaths (33,3%) were verified during an average follow up of 615±13 days. The compound endpoint of global mortality and/or admission from cardiac cause was verified in 43,1% of pts. During the abovementioned follow up, functional class (NYHA) was higher in pts that reached primary endpoint (2,4 ± 0,9 vs 1,7± 0,5; p = 0,045), the same was true for MR grade (grade III/IV 17,7% vs 8,8%, p=0,041) and LVEF was lower in those pts (35,2 ± 12,3% vs 40,9 ± 17,2%; p=0,033). Using ROC analysis a LVEF<30% was identified as the cut-off assotiated with mortality or admission from cardiac cause (AUC = 0,67; Sensitivity= 55,0%; Specificity= 90,0%, PPV 80%, NPV 72%). Pre-procedural NHYA class (OR 7,065 p=0,014), atrial fibrillation (OR 0,039 p=0,039) and immediate complications (OR 720,6 p=0,024) were identified as predictors of the compound endpoint. In the Kaplan-Meier survival analysis a pre-procedural LVEF <30% was associated with the primary endpoint. There were no other identified mortality and/or admission predictors.
Conclusion: Percutaneous mitral valve repair in cases of severe mitral regurgitation showed an elevated success rate with a reduced complication rate. The primary compound endpoint of mortality and/or admission from cardiac cause occurred in patients with higher NHYA functional class, higher mitral regurgitation grade, immediate complications, atrial fibrillation and LVEF <30%.



P1802

Malnutrition in patients undergoing tricuspid valve edge-to-edge repair: incidence, clinical features and prognostic importance

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Aims: Transcatheter tricuspid valve edge-to-edge repair (TTVR) is currently evaluated as a treatment option for patients with symptomatic tricuspid regurgitation (TR) at increased surgical risk. These patients often present late in the natural history of the disease with late multiorgan sequelae of right heart failure. The aim of the present study was to assess the incidence and clinical relevance of malnutrition in patients undergoing TTVR.

Methods and Results: 86 consecutive patients (mean age 80±7 years, 45% female, mean STS score for mortality 5.3±5.4, mean Euroscore II 8.3±7.5) with moderate-to-severe TR who were deemed at prohibitive surgical risk by a multidisciplinary heart team decision and underwent TTVR were included in the present analysis. 43 patients (50%) had concomitant mitral clipping. Nutrition status was assessed by Mini Nutritional Assessment (MNA) questionnaires prior to TTVR and after one month of follow-up. Blood samples were drawn at the same time points and analyzed in the local laboratory.

At baseline, MNA displayed that 5 patients (6%) had normal nutrition status, 68 patients (79%) were at risk for malnutrition and 13 patients (15%) were malnourished. Patients with MNA score below median, despite having similar clinical characteristics, had larger inferior vena cava diameter on echocardiography and worse physical role functioning in the Short Form 36 Health Survey as compared to patients with an MNA score above median. TTVR led to a reduction in TR vena contracta (pre: 9.3±2.7 mm, 1 month: 5.5±2.0 mm) and TR effective regurgitant orifice area (pre: 0.6±0.3cm^2, 1 month: 0.3±0.2cm^2). MNA scores improved in 60 patients (70%) following TTVR.

At 1 month, 46 patients (53%) were still at risk of malnutrition and 9 patients (10%) were malnourished. Patients with improved MNA score had superior TR reduction on follow-up and indices of backward failure, such as inferior vena cava diameter, cholinesterase levels and renal function were improved in these patients. No such effect was observed in patients without MNA score increase. NT-proBNP levels were lower in patients with improved MNA score. Only patients with improved nutritional status on follow-up had an increase in quality of life assessments and 6-minute walk distance at 1 month.

Patients with worsened MNA score at 1 month, especially in these with an MNA score ≤8, had a significantly increased risk of death and rehospitalization for heart failure during a median follow-up of 6 months.

Conclusions: This study suggests that a substantial part of elderly patients undergoing TTVR are either at risk for malnutrition or malnourished. Despite an increase in MNA scores following TTVR, poor nutrition status remains a concern and is linked to indices of persistent hemodynamic backward and forward failure. Given the association with functional and prognostic improvement, nutritional status likely deserves further study to improve outcome in this patient population.

P1803

Multiparametric evaluation of percutaneous mitral valve repair (MitraClip) after 6 months

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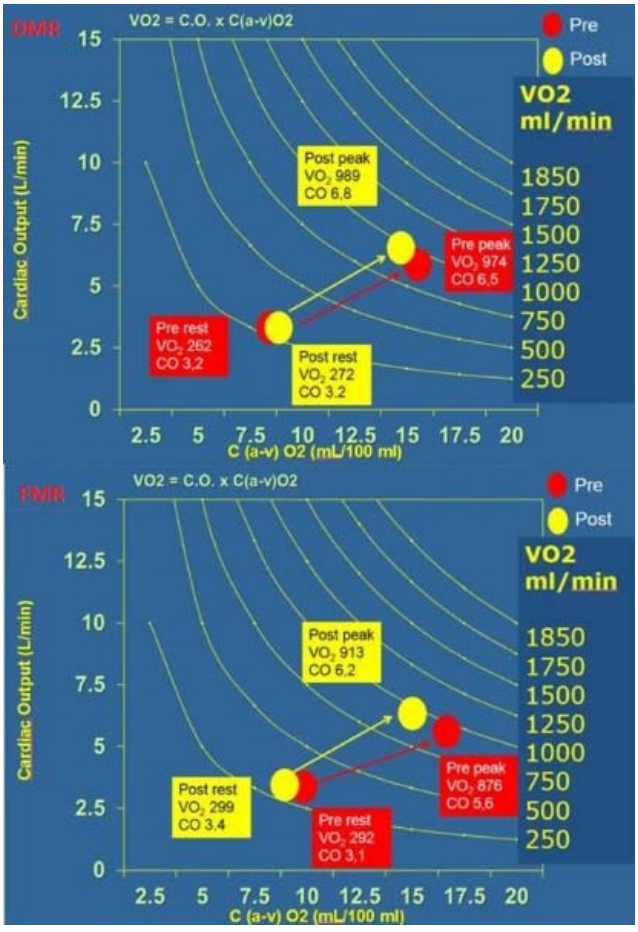
Background. MitraClip (MC) therapy is now established as a secure, feasible treatment option for patients with severe mitral regurgitation (MR) at high surgical risk. The efficacy of the percutaneous approach, especially in patients with functional disease, has been evaluated in a large number of studies, but the endpoints used to establish the success of this procedure over the surgical ones were based on unreliable, less standardizable measures.

Purpose. This study sought to evaluate the efficacy of MC therapy in terms of new functional outcomes, comparing data related to degenerative mitral regurgitation (DMR) and functional mitral regurgitation (FMR).

Methods. Between October 2010 and November 2018, 100 consecutive patients with severe MR and not eligible for surgical mitral valve repair were assessed before MC implant using echocardiogram, BNP assay, cardiopulmonary exercise test (CPX) with non-invasive measurement of cardiac output (CO) with inert gas rebreathing technique, at baseline and after 6 months.

Results. MC implant rate was 95%. Immediate success with reduction of MR to ≤2+ was observed in 80% of cases and 76% after 6 months. In both populations, a significant reduction of MR from baseline was observed (p<0.001). NYHA class showed a significant improvement over six months in both groups. Significant left ventricular (LV) remodeling was observed only in DMR group (LV End-diastolic Volume index was 70±14 mL at baseline, 59±14 mL at 6 months, p<0.001). Systolic pulmonary pressure values were significantly reduced from baseline in both population (PAPs was 44±12 mmHg at baseline, 40±8 mmHg at 6 months, p=0.047 in FMR and 42±12 mmHg at baseline, 38±8 mmHg , p=0.029 in DMR). In DMR LV ejection fraction reduced significantly from 63±9% to 59±8, as expected. CO and stroke volume (SV) increased significantly at rest only in FMR patients (CO 3.1±0.9 L/min at baseline, 3.4±0.9 L/min at 6 months, p=0.006; SV 45±15 mL/min at baseline, 52±14 mL/min at 6 months, p=<0.003), while during exercise in FMR CO improved from 5.6±1.8 L/min to 6.2±1.7, p=0.023 and SV from 56±23 ml/min to 63±21, p=0.007 and AV O2 difference reduced from 17.1±4.3ml/100ml to 15.3±3.9, p=0.019. On the other hand, the population with degenerative disease did not present any improvement. Peak oxygen consumption showed an improving trend, not significant. Heart rate did not show significant changes both at rest and during exercise. No differences were found in BNP levels or VE/VCO2 slope.

Conclusions. MC reduced MR and produced a significant LV reverse remodeling over 6 months in DMR population treated. Functional outcomes, as the implement of CO and SV both at rest and during exercise with an improvement in NYHA class, proved the efficacy of the percutaneous mitral valve repair in patients with FMR.



P1804

The impact of transcatheter aortic valve implantation on aortic elasticity and arterial function

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Background/Introduction: Aortic stiffness and hemodynamics are established independent predictors of cardiovascular risk. Transcatheter aortic valve implantation (TAVI) is a promising non-surgical technique for the treatment of aortic stenosis.
Purpose: We sought to investigate the effect of TAVI upon aortic vascular function and hemodynamics.
Methods: 67 patients (mean age 80.5±8.1 years, 31 male) with severe symptomatic aortic stenosis scheduled for TAVI were enrolled. Arterial stiffness was assessed by carotid-femoral pulse wave velocity (cfPWV) and brachial-ankle pulse wave velocity (baPWV). Pulse wave analysis of the radial waveform was also performed and the aortic augmentation index corrected for heart rate (AIx@75) was estimated. Measurements were conducted prior to the procedure and at discharge.
Results: Before TAVI, mean transvalvular gradient was 50.1±12.9 mmHg for the population of the study. 24% presented with LVEF<50% and 4 patients with low flow- low gradient severe AS. After the procedure, we observed a statistically significant increase in arterial stiffness indices (7.7±1.5 vs 8.3±1.9 m/s for cfPWV and 1871±535 vs. 2449±646 cm/s for baPWV, with p<0.001 for both variables), and a concomitant decrease in wave reflections as measured by AIx@75 (35±12.1% vs 28.7±8.4%, p<0.001). After TAVI a statistically significant increase in peripheral pulse pressure (72.5±19.4 vs 78±15.8 mmHg, p<0.05) was observed, as well.
Conclusions: Shortly after TAVI the increase in arterial stiffness depicts a "stiffer response" of the vascular system to the acute hemodynamic changes. This could also indicate an "unmasking" of true aortic stiffness as a result of the relief of the LV outflow obstruction. These findings shed light on the short-term hemodynamic effects of the transcatheter aortic valve implantation.

P1805

Clinical impact of new generation of prosthesis in aortic regurgitation after transcatheter aortic valve replacement

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BACKGROUND: The degree of residual AR after TAVR leading to excess mortality remains controversial, and little evidence exists with introduction new generation prosthesis. The aim of this study was to determine the impact of the degree of residual aortic regurgitation (AR) after transcatheter aortic valve replacement (TAVR) on outcomes, with new generation prosthesis.
METHODS: A total of 665 patients undergoing TAVR with balloon-expandable or self-expanding valves were included. The presence and degree of AR were evaluated by transthoracic echocardiography. Was identified two groups, CoreValve devices, (group 1, n=436), and with new generation Sapien 3, Evolut R and Pro prosthesis, (group 2, n=229)
RESULTS: Residual AR after TAVI in group 1 compared with group 2 was classified as none in 48.8% vs. 61.2%, mild in 34.4% vs. 28.2%, moderate in 15.9% vs. 9.7% and severe 1% vs. 0.4%, p.0008, respectively. The presence of moderate to severe AR (≥2) was an independent predictor of mortality at a mean follow-up of 39 ± 28 months compared with none to mild (adjusted hazard ratio [HR]: 1.831, 95% confidence interval [CI]: 1.179 to 2.842; p < 0.007) but there was no increased risk of heart failure (HF) rehospitalizations [HR= 1.183 (95% CI 0.595-2.353), p = 0.631]. The new generation prosthesis was an independent protector factor [HR= 0.243 (95% CI 0.169-0.351), p< 0.001], but not associated HF rehospitalizations [HR= 1.123 (95% CI 0.665-1,895), p = 0.665].
CONCLUSIONS: AR occurred very frequently after TAVR, although with new generation prosthesis improves degree of residual AR and was independent protective factors of mortality.

P1806

Risk willingness and survival in patients with severe aortic stenosis.

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Background: Standard Gamble (SG) is a validated tool for assessing patient preferences of treatment. SG derived risk willingness (RW) scores takes into account the notion of risk adhered to the intervention and uncertainty of the outcome, making it well suited to be used in patients with severe aortic stenosis (AS) referred for evaluation of aortic valve replacement (AVR). We anticipated an association between preoperatively assessed risk willingness and survival, but that the association would differ in strength depending on whether patients were operated or not.
Method: Consecutive patients > 18 years with severe AS were preoperatively examined with echocardiography, blood sampling, quality of life questionnaires, functional test, and SG. All patient assessment, including SG was done before and blinded to the treatment decision made by The Heart team. Patients with a Mini Mental Score less than 24 were excluded from this analysis. All-cause mortality data were collected at 5 years after the initial time of decision or intervention. We used the median RW score in the total sample (25%) as a cut of to compare patients with high and low RW.
Results: Overall, 439 patients were included, 365 patients underwent AVR while 74 patients were medically treated (med-treated). Operated patients had a higher RW-score score as compared to med-treated patients; 30% IQR (7-50%) vs. 12.5% IQR (1-40%), respectively, p < 0,005. There was no association between RW and 5-year survival in patients undergoing AVR (Fig. 1), while in the med-treated group ; patients with low risk willingness had higher survival compared to those with high risk willingness , (1229 ±98) vs. (903±111), p=0.035 respectively (days) (Fig. 2). A Cox regression analyses showed that higher RW was associated with increased mortality also when adjusted for gender, NYHA class and NT-proBNP at baseline in the medically treated group.
Conclusion: Patients with severe AS and higher risk willingness are more likely to undergo AVR. The risk willingness is associated with survival only in medically treated patients with severe AS. Patient's risk willingness adds to our knowledge of survival in medically treated patients additionally to established disease markers as NYHA class and NT-proBNP.

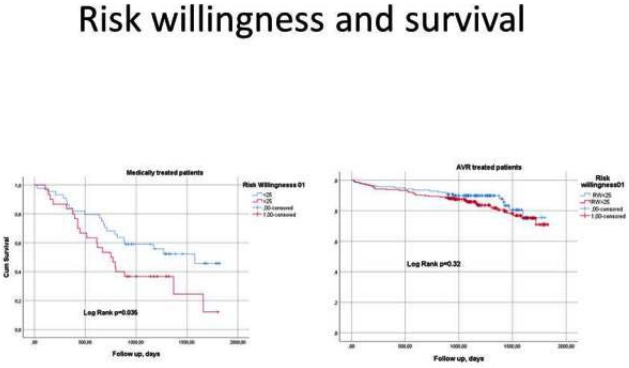

Figure 1. Risk willingness and survival

Myocardial Disease

P1807

The register of pericarditis in the university therapeutic clinic: nosological spectrum, approaches to diagnosis and treatment

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Purpose: to analyze the register of pericarditis in the therapeutic clinic, to evaluate their nosological spectrum, approaches to diagnosis and treatment.
Methods. In 2007-2018, seventy-one patients from 20 to 85 years (52.5±16.1 years), 42 women, were diagnosed with pericarditis. Patients with congestive effusion and isolated hypothyroidism were not included. Diagnostic puncture of the pericardium was carried out in 4 patients, pleural puncture - in 10 patients. Morphological diagnostics included endomyocardial / intraoperative myocardial biopsy (n = 4), thoracoscopic / operative biopsy of the pericardium (n = 5), pleura (n = 5), intrathoracic and supraclavicular lymph nodes (n = 3), lung (n = 1), salivary gland (n = 1), fat (n = 5). Also carried out investigation of viral DNA, the anti-heart antibodies, CRP, ANA, rheumatoid factor, anti-CCP, ANCA, ENA, immunophoresis of proteins, CT, MRI, phthisiatric study, oncological search. The follow-up was 12 [2; 36] months (up to 10 years).

Results. Pericarditis with a large effusion (from 2 cm) was diagnosed in 18 patients, with an average (10-19 mm) in 22, with a small one in 26, and without effusion in 5. The following forms of pericarditis were verified: tuberculosis (14.1%), viral-immune (14.1%, incl. 5.6% with hypertrophic cardiomyopathy) and infectious-immune (36.6%, incl. 26.8% with myocarditis), due to lymphoma and heart tumor (2.8%), sarcoidosis (2.8%), systemic diseases (lupus erythematosus, rheumatoid arthritis, polymyositis, Horton's, Takayasu, Sjogren's diseases, 12.7%, incl. with myocarditis in 56%, virus-positive in two patients), in patients with CHD (after punctures for Dressler's syndrome, bypass surgery and stenting, 4.2%). Pericarditis due to AL-amyloidosis, Loeffler's endocarditis, leukoclastic vasculitis, thrombotic microangiopathy, after ablation, aortic valve replacement, radiation and chemotherapy had one patient each (1.4%). In one case the diagnosis remained unclear. The signs of constriction were diagnosed in 13 patients (18.3%), its leading causes were tuberculosis (38%). The main types of treatment were steroids (n = 23), their combination with cytostatics (n = 12), tuberculostatics (n = 10), acyclovir / ganciclovir (n = 7), hydroxychloroquine (n = 15), colchicine (n = 9), NSAIDs (n = 8), incl. combined treatment in 27 patients. Excellent results (disappearance of effusion, absence of relapses and constriction) were achieved in 51.9% of patients, stable results - in 32.7%, and no result - in 15.4% (in 6 patients pericardectomy was performed). The mortality rate was 12.7% (9 patients) due to heart failure, surgery, PE, tumors. The conclusion. The nature of pericarditis can be established in most patients. Due to low availability of the pericardial puncture the role of other methods of cytological and morphological diagnostics is significantly increased. The predominant forms of pericarditis were tubercular, infectious-immune and pericarditis in systemic immune diseases.

P1808

Acute myocarditis: a retrospective study

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Background: Acute myocarditis is an inflammation of the heart muscle. Its unpredictable evolution justifies the importance of its early recognition. The clinical polymorphism associated with the lack of sensitivity of conventional diagnostic means make diagnosis a challenge for the clinician. However, the magnetic resonance imaging has been of great interest for the differential diagnosis as well as for the evolutionary follow-up of this pathology.
The purpose of this work was to determine the different clinical, echocardiographic and progressive aspects of acute myocarditis.
Methods: This was a descriptive, retrospective study, including 31 patients hospitalized for acute myocarditis at the cardiology department of our hospital between 2011 and 2017. All patients had an electrocardiogram, troponin bioassay, cardiac echography and cardiac magnetic resonance imaging.
Results: The mean age of our patients was 36.5 ± 13.3 years [17-63] with a clear male predominance (sex ratio = 6.75). Smoking was the most common cardiovascular risk factor (60%). Fifty percent of the population had only two cardiovascular risk factors. The most common clinical picture was acute chest pain (84%) preceded by influenza-like illness (53%). The electrocardiogram was pathological in 97% of cases. Hyperleukocytosis was objectified in 33% of cases. Elevation of C-reactive protein was present in 80% of cases. As for troponins, they were high in 94% of cases. Overall myocardial contractility was conserved in 84% of cases with segmental kinetic disorders in 45%. Cardiac magnetic resonance imaging showed pericardial effusion (10%), spontaneous myocardial hypersignal in triple-reversal-T2 recovery (42%) and which corresponded to the zones of late enhancement. Late contrast enhancement was predominant at the lateral wall (39%), with epicardial involvement occurring in 100% of cases.28 patients had a favorable outcome after a follow-up of 24 months. However, there was only one case of death at 3 months and two cases that progressed to dilated cardiomyopathy.
Conclusion: Acute myocarditis is mainly a disease of the young male subject. It can have very different clinical pictures, posing a major diagnostic problem. In this context, cardiac magnetic resonance imaging is of decisive interest for the differential diagnosis.

P1809

Neutrophil to lymphocyte ratio as a predictor of myocardial injury in patients presenting with myocarditis

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Background: There is a growing body of evidence highlighting the role of neutrophil to lymphocyte ratio (NLR) as prognostic predictor in several cardiovascular diseases, as a marker of systemic inflammation. Therefore, our aim is to describe the association of NLR and myocardial injury and function in patients with myocarditis;
Methods: Data from patients discharged with the diagnosis of myocarditis, from January of 2008 and October of 2018, in one center, were retrospectively analysed. NLR was defined as the ration of absolute counts of neutrophils and lymphocytes, at admission;
Results: 63 patients were included. Mean age was 39.7 17 years and 89% (58 patients) were men. The NLR values ranged from 1.1 to 14.78 (median 3.48, interquartile range (IQR) 3.06), without significant differences between women and men. In this population, NLR positively correlates with peak troponin values (p= 0.004, r=0.35) and N-terminal pro B-type natriuretic peptide (NT- proBNP) values (p= 0.005, R= 0.35). NLR also positively correlates with other inflammatory makers, such as C-reactive protein (CRP) (p<0.001, r= 0.42), leukocytes (p<0.001, r=0.59) and monocytes (p=0.004, r=0.35). NLR was higher in patients with left ventricular systolic dysfunction (4.45 vs 3.43) but this difference was not statistically significant (p=0.341);
When the patients were divided into NLR>3.48 and NLR<3.48 groups, myocardial injury markers were significantly increased in the higher NLR group (peak troponin 1.53 vs 0.6, p <0.001 and NT- proBNP 654 vs 244, p= 0.044). There is a statistically significant association between higher NLR and need of inotropic support (p=0.024). No differences on in-hospital mortality (p=0.492) between groups were registered.
Conclusion: NLR is a predictor of myocardial injury and inflammation in this group of patients; Despite being nonspecific, it is a readily available marker and it could be a cost-effective predictor and a useful tool to guide the approach in these patients.

P1810

The superimposed myocarditis in arrhythmogenic right ventricular cardiomyopathy: the role in the course of the disease and the results of treatment

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Purpose: to study the role of myocarditis in patients with arrhythmogenic right ventricular cardiomyopathy (ARVC), and to evaluate the results of its treatment.
Methods: 54 patients (38.7±14.1 y., 42.6% men) with ARVC according to Revised Task Force Criteria 2010 were evaluated (34 patients with definite, 18 - with borderline, 2 with possible diagnosis). Follow-up period 21 [6; 60] months. All patients underwent ECG, 24h-Holter monitoring, echocardiography, DNA-diagnostic, blood tests for detection of anti-heart antibodies (AHA) and DNA of viruses. Also were performed cardiac MRI (n=49), signal-averaged ECG (n=18), endomyocardial biopsy (n= 2), autopsy (n=2).
Results: myocarditis was diagnosed in 38 (70.4%) patients, 8 of whom were virus-positive (2 by myocardium, 6 by blood). Immunosuppressive therapy (IST) was conducted in 25 patients and included hydroxychloroquine (n=22, 200 mg/day), steroids (n=7, 16 [8; 24] mg/day), azathioprine (n=2, 150 mg/day). Patients with myocarditis who received and not received IST were compared. Initially, patients receiving IST had a longer term of disease, higher titers of AHA and a larger end diastolic volume of the left ventricle (LV) by MRI. Patients who received IST, had significantly lower mortality in comparison with patients with myocarditis without treatment (4.0 vs 30.8%, p=0.03). Only patients with myocarditis treated with IST demonstrated significant positive dynamics in PVs number (11,7 [2,6; 37] vs 0,8 [0,01; 4.5] thousand/day., p<0.001); nonsustained ventricular tachycardia (VT, 57.9 vs 26.3%, p=0.034); sustained VT (SVT, 31.6 vs 0%, p=0.014); their LV ejection fraction (EF) remained stable (52.1±14.8 vs 52.4±13.5%, p=0.58). In patients with myocarditis without IST, there was a tendency to EF reduction (64,3±8,8 vs 57,2±9,4, p=0,058). Comparison of patients with isolated ARVC and ARVC plus myocarditis revealed no differences in structural and functional parameters (severity of arrhythmias, EF of both ventricles, heart chambers size, functional class of CHF, etc.), in the effectiveness of radiofrequency ablation and in the frequency of adverse outcomes. The absence of differences is regarded as the result of effective IST. However, myocarditis was significantly less common in patients with the most typical form of ARVD (SVT without significant CHF; with mutations in the PKP2 gene) than in patients with latent arrhythmic form (without SVT, with mutations in the DSG, SCN5A, FLNC genes) and with biventricular HF (mutations in DSP, DES genes).
Conclusion: the frequency of superimposed myocarditis in patients with ARVC exceeds 70%. Myocarditis in ARVC could be primary (including viral) or secondary (autoimmune). Regardless to etiology, myocarditis in ARVC should be actively diagnosed and treated, because patients with myocarditis not receiving IST have significantly worse effectiveness of antiarrhythmic therapy and outcomes in comparison with patients with ARVD and myocarditis, received IST.

P1811

Combination immunosuppressive therapy with prednisone and azathioprine for virus-negative inflammatory cardiomyopathy: meta-analysis of all available evidence

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Introduction: Combination immune suppression with prednisolone and azathioprine (IPA) is used to treat heart failure due to chronic non-fulmintant non-viral myocarditis. However, there has been inconsistency in the effects of immunosuppression treatment.

A systematic review and meta-analysis of trials using (IPA) to treat HF refractory to OMT caused by chronic non-fulminant virus negative or "autoimmune" myocarditis was conducted to demonstrate the effect on LV EF and the combined clinical endpoint of cardiovascular mortality and/or HTx-free survival.

Methods and results: All trials with using IPA versus OMT were searched using OVID Medline and ClinicalTrials.gov, following the PRISMA guidelines. Missing clinical outcome data was retrieved after contacting the corresponding authors. All data was reviewed and analysed using and standard meta-analysis methods. A random effect model was used to pool the effect sizes.

A total of 4 trials were identified. Two were published RCT, one was an aborted RCT without publication but randomised and treated 20 patients and one was a published registry with a corresponding control group, resulting in a total of 369 patients.

IPA on top of OMT did not improve LVEF (mean difference 9.9% [95% confidence interval -1.8, 21.7]). Because of the significant heterogeneity (I296.8%, p<0.001) we performed a subanalysis of this result. First, the studies were divided by whether RCT or not, where I2values remained similar (96.9%). Then, they were sub-grouped by whether published or not, which did not reduce I2-values but the pooled estimates of the change in LVEF became significantly positive with 14% [1.4, 26.6].

A trend towards a benefit in the combined endpoint of cardiovascular mortality and/or heart transplantation-free survival was observed with the intervention but did not reach clinical significance (risk ratio 0.34 [0.08, 1.51]). Because of a moderate heterogeneity (I2= 60%), we again performed a subgroup analyses. When categorised by RCT or not, heterogeneity significantly dropped close to low level (32%) with no difference in the pooled RR of the RCTs. Sub-grouping by publication status increased heterogeneity to almost high category (I2=72.9%).

Conclusion: At the moment, there is insufficient evidence supporting functional and prognostic benefits of IPA added to OMT in virus negative inflammatory positive cardiomyopathy.

There is a potential positive effect on both LV EF and the combined endpoint of cardiovascular mortality or HTx-free survival. Significant heterogeneity exist among individual publications regarding diagnosis, dose regime, duration of therapy, study design and quality of the data. More research is needed to elucidate the exact impact of this treatment. Further adequate-powered well-designed prospective RCTs should be warranted to explore the potential effects of adding immunosuppressive therapy to OMT.

P1812

High circulating ferritin predicts oedema and fibrosis assessed in cardiac magnetic resonance in patients with acute myocarditis

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INTRODUCTION: Pathophysiology of myocardial damage in patients presenting with acute myocarditis (MCD), which can result in post-myocarditis heart failure, is largely unknown. Although ferritin is an acute phase reactant, there are no data describing the interplay between iron status and inflammation in the context of magnetic resonance indices of MCD in these patients.

PURPOSE: We investigated iron status and inflammatory activation to predict myocardial damage in cardiac magnetic resonance (CMR) in patients with MCD.

METHODS: Consecutive patients hospitalized for MCD (the diagnosis was based on clinical symptoms, elevated myocardial necrosis biomarkers, and excluded coronary artery disease) in a tertiary referral cardiology center in 2017-2018 were enrolled and followed-up after 30 weeks (including CMR). Age- and sex-matched volunteers were considered a control group.

RESULTS: We compared clinical, laboratory and CMR data of 11 patients with MCD (age: 31 [26–34] years; men: 95%; baseline left ventricular ejection fraction [LVEF]; 56±10%) and 13 control subjects. Regarding CMR parameters, patients with MCD vs. controls had lower LVEF (57 (54–59) vs. 60 (58–63)%; p<0.05), longer native T1 [1053 (1038–1073) vs. 1018 (993–1029) ms; p<0.01] and higher T2 ratio [2,08 (1,69–2,5) vs. 1.59 (1,25–1,7); p<0.05]. Median number of left ventricle segments with oedema in MCD was 3 and with late gadolinium enhancement (LGE) – 6. Controls had neither oedema nor LGE segments.In MCD patients we observed myocardial recovery after 30 weeks, defined as a decrease in the number of LV segments with oedema [from 3 (0–4) to 0 (0–0)] and with LGE [from 6 (4–7) to 4 (3–5)], native T1 [from 1053 (1038–1073) to 1030 (1010–1033) ms] and T2 ratio [from 2,1 (1,7–2,5) to 1,6 (1,5–1,7)] (all p<0.05). Importantly, clinical recovery was heterogenous – there was no recovery of LV segments with LGE in about 1/3 of followed-up patients.There was a trend towards higher ferritin related to baseline T2 ratio (R= 0.5, p=0.1), and between the ferritin and baseline number of LV segments with oedema (R= 0.5, p=0.1). In patients with MCD serum ferritin correlated with the area of the major LGE focus after 30 weeks of follow-up (R=0.82, p<0.05). Neither troponin nor N-terminal pro-B type natriuretic peptide correlated with CMR indices of myocardial oedema or necrosis.

CONCLUSIONS: Our data report that clinical parameters which are on the crossroad of immune response and iron metabolism are related to pathophysiology of myocarditis. High circulating ferritin may predict myocardial oedema and fibrosis persisted after 30 weeks of follow-up in patients with MCD.

P1813

Diagnostic value of NT proBNP in patients with myocarditis and preserved left ventricular systolic function

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Background: The diagnostic role of N-terminal pro B-type natriuretic peptide (NT-proBNP) in patients with heart failure and left ventricular (LV) dysfunction has been extensively studied. Nevertheless, upper normal NT-proBNP levels can be found in many circumstances without decreased LV ejection fraction (LVEF). The purpose of this study is to evaluate the diagnostic value of BNP in patients with myocarditis and preserved LVEF

Methods: We retrospectively analysed data from patients (pts) admitted in one center, with the diagnosis of myocarditis, from 2008 and 2018;

Results: 63 patients were included. Mean age was 38.8 +/- 16 years and 91% (53) were men. Out of those, 58 (94%) had preserved LVEF (mean 59.9 +/- 4.27%) Average length of stay in hospital was 5 days;

The NT-proBNP values ranged from 24 to 3110 pg/mL (median 482 ng/mL; interquartile range (IQR) = 768). Regarding the group of pts with preserved LVEF, 80% (44pts) had plasma levels of NT-proBNP > 120 ng/mL [upper reference limit]; NT-proBNP positively correlated with peak troponin (p= 0.006, r= 0, 37), leucocyte (p= 0.05, r= 0.25) and neutrophil to lymphocyte ratio (p= 0.003, r= 0.26).

Conclusion: In this population, the majority of the patients with myocarditis did not have significant LV systolic dysfunction, as measured by LVEF; Despite that, most of them presented high levels of BNP at admission. In this subset of patients, in which clinical presentation is highly variable, NT-proBNP measurement may be an important adjuvant in early assessment of myocarditis, regardless LVEF;

P1814

Assessment of left ventricular mechanics before and after surgical myectomy in patients with hypertrophic obstructive cardiomyopathy, using two dimension speckle tracking echocardiography.

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Background: Septal myectomy is the gold standard method to relieve LVOT PG in patients with HOCM. Myocardial mechanics are abnormal in HOCM, demonstrating low longitudinal strain, high circumferential strain, and high apical rotation compared with healthy subjects.

Objectives: The aim of this study was to determine whether functional improvement after myectomy is associated with improved myocardial mechanics.

Methods: A total of 15 patients(60% males and 40% female) with HOCM refractory to medical treatment were subjected to septal myectomy, Clinical data and paired

echocardiographic studies before and within 6monthes after myectomy were analyzed and compared. Myocardial mechanics including longitudinal, circumferential strain, rotation and LV synchronization were assessed using Velocity Vector Imaging.
Results: Symptomatic improvement after myectomy is associated with dramatic reduction of LV outflow gradient 63.13 ± 10.25 to 9.96 ± 2.72mmHg; P < .0001, decreased left atrial volume index (from 37.8 ± 5.6 to 26.4 ± 3.37 cm3/m2; P < 0.05) and decreased E/e´ from (15.2± 2.39 to 9.18 ±1.42, P 0.05). However, longitudinal strain reduced at the myectomy site (basal septum: -7.40± 2.2 vs -5.06 ± 1.75, P < .004), increased in the basal inferior segment and remained unchanged globally (-6.43±6.54 vs -8.70±2.30, P =NS). Meanwhile, circumferential strain decreased from -28.47± 3.35 to -18.26 ± 2.86, P < .05 and LV twist normalized (from 16.52 ± 2.25 to14.02±2.27, P < .05).
Conclusion: Surgical myectomy is associated with different mechanical adaptations and more deterioration of cardiac mechanics despite symptomatic improvement in HOCM.

P1815
Correlations between electrocardiography and echocardiography in hypertrophic cardiomyopathy

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Introduction: In patients with hypertrophic cardiomyopathy (HCM), the electrocardiogram (ECG) represents one of the first line investigation. Despite this fact, the ECG abnormalities may be complex and incomplete recognized in clinical practice. Some of the ECG changes may suggest clues for detecting a specific etiology in HCM or may represent an important diagnostic tool for probands or in relatives.
Purpose: The aim of this study was to determine the relationship between ECG patterns and HCM structural phenotype assessed using echocardiography, as well as to determine the frequency of these parameters.
Methods: We collected data prospectively from consecutive patients with HCM evaluated in our center between October 2015-April 2017. The ECG tracings were analyzed for: cardiac rhythm, P wave anomalies, PR interval, QRS axis and duration, presence and extent of abnormal Q waves, hypertrophy scores, ST-T abnormalities, QTc interval. Conventional echocardiography data included left ventricular (LV) septal and posterior wall thickness, LV maximal wall thickness (MWT), presence of dynamic obstruction, left atrial (LA) and right atrial (RA) anomalies.
Results: The study included 154 patients (57.1% men), mean age 55±14 years. Left atrial enlargement as defined by ECG criteria (64% when considering V1 changes and only 13% of cases when criteria included also changes in unipolar leads) did not correlate with LA dilatation detected by echocardiography (80% patients). In our population, we observed that the mean left atrial volume is greater in patients with atrial fibrillation and furthermore we analized these data in correlation with the type of atrial fibrillation and showed that the left atrial tends to enlarge as AF becomes permanent (from 107±32 ml for paroxystic AF, to 146±72 ml for permanent AF). The interventricular septum was predominantly affected (mean value of 19.5 ± 5mm) when compared with the posterior wall thus reflecting the asymmetrical distribution of hypertrophy. However, no correlation was found between LV maximum wall thickness and the Sokolow Lyon, Cornell or Romhilt-Estes scores. The sensitivity and specificity of Cornell index are higher compared with Romhilt-Estes score, which appears to have, however, a greater positive predictive value. The prevalence of complete AV block seems to be low (3%) and not characteristic for patients with sarcomeric HCM. The giant inverted T waves (>10 mm) were found to predict the presence of apical HCM (p<0.001).
Conclusions: This study demonstrates that normal electrocardiograms are unusual in all subgroups of patients with hypertrophic cardiomyopathy. Not all ECG indices used in clinical practice have similar sensitivity, however using a multiparametric approach usually describes well the severity of structural anomalies.

P1816
Left ventricular longitudinal strain is a predictor of mortality in hypertrophic cardiomyopathy

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Background Echocardiographic global longitudinal strain (GLS) is increasingly recognised as a more effective technique than conventional ejection fraction (EF) in detecting subtle changes in left ventricular (LV) function. This study investigated the prognostic value of GLS in patients with hypertrophic cardiomyopathy (HCM).
Methods The study included 313 patients (62% male, mean age 39 ± 19 years) with left ventricular ejection fraction. They were followed for (3.2 ±1.2 years). GLS was calculated using 2-dimensional speckle tracking. Cox proportional hazard models were used to assess the association of measures of LV deformation and all- cause and CV mortality.
Results The mean GLS at baseline was -7.8 ± 4.3%, 64% were symptomatic. There were 24(7.7%) deaths reported that could be attributed to cardiovascular causes. GLS was a significant predictor of all-cause [Hazard Ratio (HR) 1.09 95%; Confidence Interval (CI) 1.02–1.16; p = 0.01] and CV mortality (HR 1.16 95%; CI 1.04–1.30; p = 0.008) following adjustment for relevant clinical variables including (LVMI) and EF. GLS also had greater predictive power for both all- cause and CV mortality. Impaired GLS (>-16%) was associated with a 5.6-fold increased unadjusted risk of CV mortality in patients with preserved EF.
Conclusion: Abnormal GLS is an independent predictor of adverse outcomes in HCM patients. Standardized use of GLS may provide significant incremental value over traditional variables for risk stratification.

P1817
Modern strategy in hypertrophic cardiomyopathy treatment: a single European center experience

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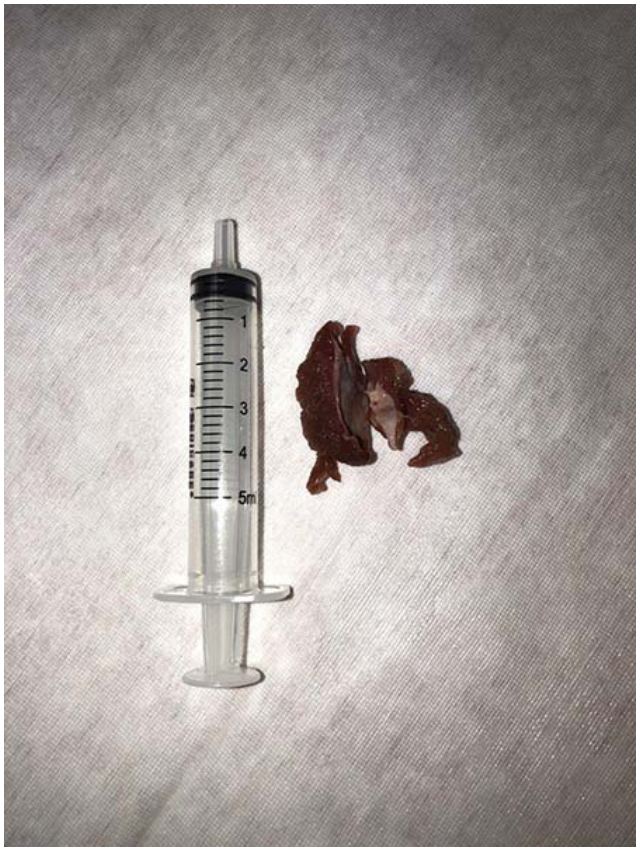
Background. For almost 50 years transaortic septal myectomy has been the standard treatment for patients with hypertrophic obstructive cardiomyopathy (HOCM) and severe symptoms refractory to medical therapy. However, with the beginning of era of alcohol septal ablation (ASA), the number of surgical septal myectomies in Europe and all over the world significantly reduced as it began to be considered less invasive, safer and equally effective procedure. The experience of our Center shows that exceedingly favorable results of the surgical correction not only diminish clinical manifestation of heart failure (HF) but also improve patient's quality of life and reduce the risk of serious complications, including life-threatening ventricular tachyarrhythmias and sudden cardiac death.
Purpose. The cohort randomized study was conducted to establish the effectiveness of surgical extended septal myectomy accompanied by anomalous fibrous chordal attachments resection and papillary muscles (PM) mobilization in symptomatic patients with HOCM and different degrees of HF.
Methods. The research includes 118 consecutive symptomatic patients with HOCM who underwent surgical extended myectomy with anomalous chordal attachments (secondary chordae) resection and mobilization of the anterior and posterior groups of PM. In case of necessity, a plication of the mitral valve leaflet was performed to reduce the length of the oversized structure and thus reduce the risk of post-operative systolic anterior motion (SAM) effect. The following parameters before and after surgical intervention were evaluated: systolic pressure gradient (SPG) on the left ventricle outflow tract (LVOT), mitral regurgitation (MR) degree, NYHA functional class, survival rate and main post-operative complications.
Results. According to the obtained data, SPG on LVOT decreased from 93,6±23,2 mmHg prior the surgery to 19,7±11,4 mmHg after the treatment (p<0,001). 21 (17,8%) patients had moderate degree of MR after the surgery, as before intervention the number of patients having moderate or severe MR degree accounted 101 (85,5%)(p<0,001). Out of 118 patients, 36 (30,5%) of whom have had III-IV NYHA functional class before the procedure, 115 (97,4%) were in functional class I-II at the discharge (p<0,001). No patients with III-IV NYHA functional class were observed. The mortality accounted 1,7% (2 patients). Among 118 patients, one (0,8%) underwent implantable cardioverter-defibrillator (ICD) implantation within sudden cardiac death prophylaxis; 5 (4,2%) patients underwent pacemaker implantation due to complete post-operative AV-block.
Conclusion. Surgical extended septal myectomy remains a gold standard of treatment of patients with HOCM. The presented study showed not only successful results of surgical correction, but most importantly, significant decrease of the HF manifestation in symptomatic patients and improvement of quality of life already in early post-operative period.



The sample of the excised myocardium

P1818

The prognostic value of myocardial fibrosis MRI in assessing the risk of progression of heart failure in patients with HCM

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The progression of symptoms of CHF is still a serious complication that determines the outcome in HCM. It should be noted that in most cases in patients with HCM with symptoms of severe CHF, LVEF remains preserved, which requires a search for new diagnostic approaches to assess the systolic function of the myocardium.
Purpose: to assess the prognostic role of myocardial fibrosis volume by gadolinium contrast-enhanced MRI in patients with HCM as a predictor of CHF progression to FC III NYHA, which required hospitalization.
Methods. The study included 124 patients with HCM (79 males and 45 females) aged 18 to 69 years (median age 46 years), median observation 42 months (3.5 years). The clinical end point included the progression of CHF symptoms from I – II FC to NYHA FC III, requiring hospitalization.
Results. Among 124 patients, the progression of CHF symptoms requiring hospitalization was observed in 24 people and occurred in the presence of preserved systolic function (LV EF> 50 %). 12 patients were hospitalized for two years, which indicates the rapid progression of symptoms of heart failure with NYHA FC I-II to FC III. The cumulative 3-year survival rate was 83 % (95% CI 76.5 - 90.1). The one-factor regression analysis was performed to determine the predictors of the progression of CHF symptoms and hospitalizations. As a new marker aimed at identifying patients at risk of adverse events, myocardial fibrosis volume was analyzed by MRI. Kaplan-Meier curve-free survival showed statistically significant differences in groups with a fibrosis volume of less than 20% and more than 20 % (log-rank p <0.001) and amounted to 95.2 % (95% CI 89.9 -100 %) and 32.1 % (95 % CI 17.9 -57.4 %), respectively. All indicators that were statistically significant in univariate regression analysis were included in the multivariate analysis and their threshold values were determined. In a multivariate analysis, independent factors associated with the progression of CHF and related hospitalization were the following characteristics: age> 50 years old (RR 5.9; 95 % CI 2.3–15.1, p <0.001), presence of episodes of AF (RR 5.6 ; 95% CI 2.2 - 14.2, p <0.001) and the volume of myocardial fibrosis by MRI ≥ 20 % (RR 23.3; 95% CI 7.3 - 74.8, p <0.001). The regression analysis identified a group of patients with HCM, potentially having the risk of progression of CHF, which required hospitalization, with age> 50 years, episodes of AF and the amount of fibrosis ≥ 20%.
Conclusion. Myocardial fibrosis index ≥ 20% is associated with the development of adverse events associated with the progression of CHF in HCM and can be used to identify patients at high risk of developing CHF progression with an unfavorable outcome.

Pulmonary Circulation, Pulmonary Embolism, Right Heart Failure

P1819

Atrial volumes ratio as a predictor of hemodynamic phenotype in patients with pulmonary hypertension

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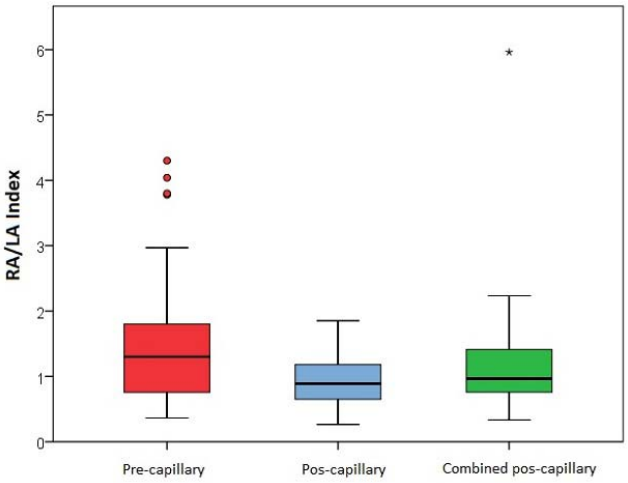
Introduction: Characterization of the hemodynamic profile in pulmonary hypertension (PH) is crucial for the diagnosis and for deciding the appropriate therapeutic strategy. However, given its invasive nature, it is necessary to develop alternative, non-invasive predictors of the hemodynamic classification. Considering the different patterns of atrial overload due to different PH profiles, we intend to determine the role of the relation between the atrial volumes ratio and the hemodynamic classification.
Results: 174 patients were included, 69.9% females, with a mean age of 68 years old (IQR:24). 60% (N=105) had pre-capilary PH, 14% (N=25) isolated pos-capilary PH and 25% (N=44) combined pos-capilary PH. The ratio RA/LA was higher in patients with pre-capillary PH when compared to patients with combined PH and isolated pos-capillary PH (1.42±0.83 vs 1.18±0.92 vs 0.95±0.42, respectively; p=0,019). A ratio RA/LA of 1.31 allowed to differentiate with reasonable diagnostic accuracy (AUC:0.63, specificity:74%, sensibility:50%, NPV:92%, PPV:64%) the pre-capillary phenotype from others.
Conclusion: The ratio RA/LA assessed by TTE is a useful parameter to distinguish between pre-capillary and post-capillary PH.



P1820

Prognostic impact of left ventricle dysfunction in patients with pulmonary hypertension

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Introduction: Left ventricular (LV) dysfunction is the main cause of pulmonary hypertension (PH) and is associated with a worse prognosis. However, the contributory factor of LV dysfunction in patients with predominantly pre-capillary PH is unclear.

Objective: to assess the prognostic impact of LV dysfunction in patients with PH.
Methods: Retrospective, single-center study of consecutive patients followed in the PH treatment center, with hemodynamic diagnosis of PH, submitted to transthoracic echocardiography at diagnosis.
The concomitant presence of LV dysfunction, classified as isolated diastolic dysfunction, systolic dysfunction or valvulopathy with hemodynamic repercussion was evaluated. The association of this variable with any cause mortality at 5 years was determined using the Kaplan Meier survival analysis and the Cox regression analysis.
Results: 176 patients were included, 69.9% female (N = 123), with a median age of 68 years (IQR: 24). LV dysfunction was identified in 28.4% (N = 49), with the majority (N = 40) presenting with group 2 PH.
The5-year mortality rate from any cause was27.3%.Patients with systolic dysfunction had 50%mortality at 5years, significantly higher than the other groups (p=0,001), being a predictor of mortality in this period (p=0,003).
Conclusion: The presence of left ventricular systolic dysfunction is associated with worse prognosis in PH patients.

P1821

Hemodynamic profile of pulmonary arterial hypertension: comparison among subgroups. Insights of the first collaborative registry of pulmonary hypertension in Argentina (RECOPILAR)

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On behalf of: RECOPILAR

Hemodynamic of pulmonary arterial hypertension (PAH) has been poorly characterized in Latin America.
The aim of this report was to compare the hemodynamic and clinical profile among subgroups of PAH in Argentina.
Method: From Jul-14 to Oct-16, 399 incident and prevalent patients with PAH were prospectively included by 72 investigators from 23 provinces of Argentina in a collaborative registry. Patients must fulfill all the following inclusion criteria: 1-Age over three months; 2 - mean pulmonary arterial pressure (mPAP) at rest $\geq$ 25 mmHg by right heart catheterization (RHC) and 3 - clinical stability in the absence of hospitalization in last month. The subgroups of PAH were defined as idiopathic, heritable or drugs associated (1), associated with connective tissue disease (2), HIV (3), porto-pulmonary hypertension (4), and congenital heart disease (5).
Results: The proportion of patients in subgroups 1 to 5 was: 1=41.9%, 2=23.8%, 3=5%, 4=4% and 5: 25.3%. The full comparison of clinical characteristics and hemodynamics parameter is shown in Table. Conclusion: In concordance with other international surveys, this Latin American registry showed that despite differences in hemodynamic profile among subgroups in PAH the clinical presentation was similar. These findings suggest that different factors besides hemodynamic may have influence in the severity of the disease.

Table

Subgroups	1	2	3	4	5	p
Age, years (SD)	44.9 (18.6)	56.3 (15.1)	46 (8.6)	55.9 (10.1)	41.4 (19.3)	<0.001
Female, %	82.6	89.5	45	56.3	72.3	<0.01
Sistolic Blood Pressure, mmHg (SD)	117 (24)	125 (23.9)	120 (21)	117 (21)	115 (21)	0.090
Cardiac Index, l/min/m2 (SD)	2.7 (0.9)	2.6 (0.8)	2.9(0.9)	4.2 (1.9)	2.9 (0.9)	<0.001
Pulmonary Vascular Resistance, dynas(SD)	884 (496)	677 (394)	680 (298)	507 (287)	836 (596)	0.006
mean Pulmonary Arterial Pressure, mmHg (SD)	55.6 (16.9)	45.3 (13.2)	47.9 (13)	47.2 (14.8)	54.8 (18.2)	<0.001
Right Atrial Pressure, mmHg (SD)	10.2(5.9)	9.2(5.7)	8(4.2)	7.9(4.6)	9.4(4.5)	0.370
Wedge Pressure, mmHg (SD)	10.9 (5.6)	10.5 (3.3)	11.2 (4.4)	14.5 (4.6)	11.1 (3.4)	0.090
SatvO2, % (SD)	70.5 (15.1)	68.5 (9.6)	64 (20.2)	68.2 (10.5)	74.3 (12)	0.180
Trans Pulmonary Gradient (SD)	43.8 (16)	35.1 (13.4)	38(10)	34.5 (17.4)	42.5 (17.3)	0.001
Diastolic Pulmonary Gradient (SD)	26.8 (14.1)	18.7 (9.2)	27.6 (9.3)	17.2 (13.2)	24.6 (13.9)	<0.001
Functional Class III-IV (%)	63.6	70.2	85.7	41.7	61.4	0.131
6 Min Walk test, m (SD)	368 (125)	344 (116)	385 (105)	390 (85)	380 (114)	0.380
NT-proBNP, pg/ml (SD)	1187 (1708)	1095 (1397)	740 (711)	625 (860)	794 (1360)	0.690

SD standard deviation

P1822

Prognostic value of baseline and change of NT-proBNP plasma concentrations in pre-capillary pulmonary hypertension

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Introduction /Purpose: NT-proBNP is a validated and widely used biomarker in Pulmonary Hypertension (PH). Little is known about the prognostic value of its change. We aimed to study the prognostic impact of baseline and change of NT-proBNP plasma concentrations after achieving stable pulmonary vasodilator treatment.
Methods: Baseline NT-proBNP refers to NT-proBNP measurement at diagnosis. NT-proBNP delta was calculated as the difference between baseline and 12-month measurement after stable pulmonary vasodilator therapy. Cox proportional hazards models were used to study the relationship between NT-proBNP and death.
Results: We studied retrospectively 116 pre-capillary PH patients with a mean age of 58 years, 70% (n=81) of female gender. Concerning the etiology, the majority of patients were from group 1 (72%, n=83), followed by group 4 (25%, n=29) and group 5 (4%, n=5). Functional class at admission was class III (49%, n=57), class II (27%, n=31), class IV (14%, n=16) and class I (8%, n=9); the mean 6MWD was 300m, and 52%, 35% e 13% of patients were on mono, double and triple vasodilator therapy, respectively. There were 35 (30%) deaths over a mean follow-up time of 5.3±3.5

years. The median and interquartile range of baseline NT-proBNP concentration was 864 [221-2278] ng/mL. The median and interquartile range of 12-month NT-proBNP concentration was 358 [141-1452] ng/mL. The median and interquartile range of NT-proBNP delta was 169 [-22, 854] ng/mL, the median percent of NT-proBNP change was 30%. Baseline and 12-month NT-proBNP were significantly associated to death (p<0.001), however delta NT-proBNP did not (p=0.16).
Conclusion: In contrast to baseline and follow-up plasma concentrations of NT-proBNP, its change did not captured risk of dying. Further studies are needed to explore the correlates of this biomarker changes and its significance in prognostic stratification.

P1823

Correlation between cardiac index and right ventricular systolic function in our patients with pulmonary hypertension.

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Pulmonary hypertension (PH) is a multifactorial disease with a high morbidity and mortality. It requires invasive hemodynamic diagnosis, with a value of mean pulmonary pressure (MPP) ≥25 mmHg. In the recommended algorithm studies, doppler echocardiography (DE) is the screening method, by the estimation of systolic pulmonary pressure and right ventricular systolic function (RVSF). The longitudinal excursion of the lateral wall of tricuspid annulus (TAPSE) is an indicator of RVSF, although it was removed from the HP guidelines. By right heart catheterization, the measurement of cardiac index (CI) expresses the right ventricular function and is a mortality marker. The question arises about the correlation between both techniques as indicators of right ventricular function.
Objective: Determine the correlation of TAPSE value and CI in our population with diagnosis of PH.
Methods. The patients derived to the service between March 2012 and January 2018 with a PH diagnosis (PPM ≥ 25 mm Hg or Eisenmenger syndrome), were analyzed. The data recollection included: filiation information, PH group classification, clinical features, direct hemodynamic variables (CCD), functional variables (six minute walk test (6MWT) and functional class) and echocardiographic values, according to recommendations of international guidelines.
Echocardiographic variables were obtained by three experienced operators. It was recorded: RVSF, TAPSE, pulmonary pressure and pericardial effusion (PE) presence. Hemodynamic confirmation has been obtained by a right heart catheterization, with the recollection of quantified pressures (right atrium, systolic, mean, diastolic PP, wedge pressure, CI, pulmonary and systemic vascular resistance). Both studies were performed with a difference <24 hours and physicians did not know echocardiography results. Bioestat 5.0 statistical package was used and linear correlation variables were analyzed.
Outcomes: It s a multicenter, observational, descriptive, consecutive and prospective study that enrolled 114 cases with incidental hemodynamic diagnosis of HP. The average age of the population was 56 years (SD 19), 59 % female. The PH Group (G) was: GI 66%, G II 14%, G III 7%, G IV 8% and GV 5%. With respect to the clinical features we observed: 80% heart failure and 24% syncope. Direct hemodynamic measurements showed average values: systolic PP 74 mmHg, MPP 45 mmHg (SD 15), diastolic PP 31 mmHg , transpulmonary gradient 34, right atrial pressure 9 mm Hg and cardiac index 2.8 (4.6-1.2) l/min/m2. Among the echocardiographic findings we observed an average TAPSE of 17.6mm (30-10). The concordance correlation coefficient resulted in r 0.02 (95% CI 0.20-0.25), with a Pearson p value of 0.8.
Conclusions In our study population with an established diagnosis of PH we observed a bad correlation between TAPSE and CI. This results support the need to use right heart catheterization as a tool to quantify the systolic function of the right ventricle.

P1824

Pulmonary Hipertension. When the experience overcomes the evidence

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Pulmonay Hypertension (PH) guidelines incorporate clinical, functional, hemodynamic and image variables as prognostic indicators. The parameters of right ventricle systolic function (RVSF), as the tricuspid annular plane systolic excursion (TAPSE), have been excluded from the international scores.Objectives: Determinate the value of TAPSE as a prognosic value in our patients with PH.
Methods: Patients (P) with diagnosis of PH (between 2012 and 2018), confirmed by right heart catheterization (mean pulmonary pressure ≥ 25mmHg), were included. The data was recorded: demographic; PH group (G); clinical variables: symptoms and functional class (FC), neurohormonal: brain natriuretic peptide (BNP), hemodynamic parameters: right atrium (RA) pressure and cardiac index (CI); functional: 6 minute walk test distance (6MW), Ed data: RVSF, TAPSE and pericardial effusion (PE). Poor prognosis factors were defined according to PH international guidelines (between moderate/high risk): heart failure history, syncope, advanced FC (III/IV), 6MW <160m, BNP ≥300pg/dl, PE presence, RA ≥14mmHg and CI ≤2,2 l/min/m2. The outcome was follow up Mortality (M) within two years. TAPSE was analyzed as an integral variable and was dichotomized in > 16 mm (A) and ≤ 16 mm (B). We use the STATA 14 program. T test or Chi-squared was applied, according to the variables. The logistic regression model was used to determinate the impact of TAPSE in M, integrate in a multivariate analysis.
Results: Multicentric, analytical, prospective, included 141 P, with a 25% M, 77% female and 57 (± 18) mean age. PH G was: I 68%, II 13%, III 7 % IV 7%, V 5%. Among the prognostic factors, we highlight: advanced FC 50%, syncope 22%, 6MWT ≤160m 16%, RA ≥14 mmHg 18%, IC ≤2,2 26%, BNP ≥ 300 52% and PE in 30%. Within the Ed observed: 79% RVSF deterioration (24% moderate, 18% severe), a mean TAPSE value of 18 mm (± 4,1), with 75% group A and 25% group B distribution. The relationship between M and mean TAPSE probed a significant association: 19,1 mm in the survival A group (CI 95% 18-20) vs 15,8 mm in the B group (CI 95% 14,5-17,1) and a p value: 0,003. Likewise we observe less mortality in the A group (17 vs 47%; p: 0,001). The multivariate analysis shows a correlation between mortality and different variables, such as age, HF, syncope and TAPSE value (p<0.005). When we integrate the groups, we observe that the group B presents a β coefficient of 1,5 (0,5-2,4), with greater variation than the rest of the variables (p=0,001).The OR of the group B was 4,5, with a higher association force than the rest of the variables (age, HF, syncope), and a model adequacy of 76.6%.
Conclusions: In this population with PH diagnosis, a significant relationship between TAPSE value and Mis observed. The dichotomization of TAPSE ≤ 16, associate in an independent way with M. These findings highlight the necessity of designing a great scale study to determinate the prognostic role of that parameter.

P1825

Evaluation of nutritional status by body mass index in patients with pulmonary arterial hypertension in Latin America

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On behalf of: RECOPILAR

Disorders of nutritional status have been linked to the prognosis in heart failure and pulmonary arterial hypertension (PAH). The aim of this report was to evaluate the prevalence of disorders in nutritional status and its relation to the clinical profile

Table

Variable	M-PAH	N- PAH	OV- PAH	OB- PAH	p
Age, years (SD)	27(20)	47(16)	53(15)	53(13)	<0.001
Female, %	82	83	75	76	ns
Functional class III-IV, %	64	62	72	79	ns
6 Min Walking Test, m (SD)	404(79)	395(102)	349(132)	347(117)	0.025
Sistolic Blood Pressure, mmHg (SD)	101(12)	109(14)	113(17)	122(15)	<0.001
mean Pulmonary Arterial Pressure, mmHg (SD)	62.6(22.5)	53.2(15.9)	52.7(15.1)	51.5(17.3)	ns
Right Atrial Pressure, mmHg (SD)	7.8(2.9)	8.7(5.3)	10.1(5.9)	11.3(5.4)	0.04
Cardiac Index, l/min/m2 (SD)	2.5(0.5)	2.8(1)	2.6(1)	2.7(0.7)	ns
Pulmonary Vascular Resistance, dynas (SD)	1496(870)	813(515)	916(456)	606(281)	<0.001

SD (standard deviation)

and evolution in patients with PAH in Argentina. Method: From Jul-14 to Oct-16, 399 incident and prevalent patients with PAH were prospectively included by 72 investigators from 23 provinces of Argentina. Patients must fulfill all the following inclusion criteria: 1-Age over three months; 2-mean pulmonary arterial pressure (mPAP) at rest ≥25 mmHg by right heart catheterization (RHC) and 3-clinical stability in the absence of hospitalization in last month. Of these, 257 adults with available body mass index (BMI) data were included in this analysis. Results: The distribution according to BMI was: malnutrition (M, ≤18.4) =11 (4.3%); normal (N, 18.5-24.9) =113 (44%); overweight (OV, 25-29.9) =83 (32.3%); obesity (OB, ≥30) =50 (19.5%). The comparison among groups is shown in the table. Mortality during the follow-up (mean of 24 months) was 20.7%. The area under the curve of BMI to predict mortality was 0.62 and a cutoff point of <24.5 had a sensitivity of 59% and specificity of 62%. Cumulative survival at 36 months according to groups M; N; OV and OB was 76.9, 80.2, 82.1 and 89.6%, respectively (p=NS). Long term survival in non-obese vs. obese groups was 80.8 vs 89.6% (p=NS), and according to the cut-off point, greater or less than 24.5, was 78.6 vs 85.6% (p=NS). Conclusion: Disorders of the nutritional status were identified in more than half of the patients with PAH in Argentina, with a prevalence of obesity in 1 out of 5. Despite the differences in the clinical and hemodynamic profile, the evolution shows a non-significant tendency to lower mortality with high body mass index.

P1826

Post-resuscitation arterial oxygen and carbon dioxide partial pressures abnormalities are not associated to outcomes after out-of-hospital cardiac arrest attributed to acute pulmonary embolism

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BACKGROUND: Early partial pressures of arterial oxygen (PaO2) and carbon dioxide (PaCO2) after resuscitation from cardiac arrest were found to be related to in-hospital mortality and neurological outcome by some observational studies. Impact of post-resuscitation PaO2 and PaCO2 abnormalities after out-of-hospital cardiac arrest (OHCA) specifically attributed to acute pulmonary embolism (PE) was not explored yet.
PURPOSE: We aimed to know whether post-resuscitation hyperoxaemia, hypoxemia, hypercarbia and hypocarbia are associated with short-term mortality after OHCA attributed to acute PE.
METHODS: Retrospective review of adult patients admitted to a single-centre emergency department (ED), along 3 years, for OHCA attributed to acute PE. We considered OHCA to be attributed to acute PE if (i) computed tomographic pulmonary angiography proved acute PE; (ii) echocardiography documented right ventricular enlargement in clinical settings suspicious for acute PE; and (iii) necropsy confirmed acute PE. Included patients must had sustained recovery of spontaneous circulation (ROSC) ≥1 hour after ED arrival and at least one arterial blood gas (ABG) sample analysis collected within the first 6 hours. In ABG, we identified presence of hyperoxaemia (PaO2 ≥300 mmHg), hypoxemia (PaO2 <60 mmHg), hypercarbia (PaCO2 >50 mmHg) and hypocarbia (PaCO2 <30 mmHg). Outcome was all-cause 7-day mortality. Association between outcome and hyper- or hypoxemia and hyper- or hypocarbia were analysed by $\chi 2$ (chi-square) test.
RESULTS: We included 21 patients admitted for OHCA attributed to acute PE. Mean age was 67.0±18.8 years, and 23.8% were male. All-cause 7-day mortality was 71.4% (n=15). Hyperoxaemia, hypoxemia, hypercarbia, and hypocarbia occurred in 33.3%, 9.5%, 23.8% and 19.0%, respectively. Hyperoxaemia, hypoxemia, hypercarbia and hypocarbia were not associated with all-cause mortality within 7 days (p=0.354, p=1.000, p=.0115 and p= p=1.000, respectively).
CONCLUSIONS: PaO2 and PaCO2 abnormalities were relatively frequent in OHCA attributed to acute PE with sustained ROSC. However, PaO2 and PaCO2 abnormalities were not associated to all-cause 7-day mortality. These results are somewhat unexpected and may be related to small sample size and to inherent limitations of the study retrospective design. Impact of disturbed oxygenation and ventilation following resuscitation for OHCA attributed to acute PE deserves further evaluation.

Hypertension

P1827

Comparison of 24 hours Ambulatory Central Blood Pressure Reduction Efficacy between Amlodipine- and Hydrochlorothiazide-Based Therapies Combined with Losartan

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On behalf of: The K-Central Study
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Purpose: To compare the 24 hours ambulatory central blood pressure (BP) reduction efficacy between losartan combined with fixed dose amlodipine (L/A group) and dose up-titrated hydrochlorothiazide (L/H group) according to office BP.
Methods: We conducted a prospective, randomized, double-blind multicenter trial in 231 hypertensive patients (mean age=59.2±12.2 years). Patients received losartan 50 mg monotherapy for 4 weeks, followed by additional use of amlodipine 5 mg or hydrochlorothiazide 12.5 mg for 20 weeks after randomization. The patients who did not achieve the BP goal after 4 weeks' randomization received an increased dose of 100 mg/5 mg for the L/A group and 100 mg/25 mg for L/H group respectively. The 24 hours ambulatory central BP was measured at baseline and after 20 weeks' treatment.
Results: Brachial office systolic BP reduction was not significantly different between groups (-15.7±14.0 vs. -14.7±15.1 mmHg, p=0.6130), whereas the 24 hours ambulatory central systolic BP was significantly more reduced in the L/A group compared with that in the L/H group after 20 weeks' treatment (-9.37±10.67 vs. -6.28±10.50 mmHg, p=0.0407). The 24 hours ambulatory central systolic BP at the completion of the study and its reduction magnitude were independently associated with reductions in aortic pulse wave velocity (aPWV), pulse pressure, and wave reflection magnitude.
Conclusion: Losartan combined with amlodipine had a more beneficial effect on 24 hours central systolic BP reduction than losartan combined with hydrochlorothiazide and greater reduction in 24 hours aPWV, pulse pressure, and reflection magnitude. The combination of losartan and amlodipine was more favorable in 24 hours ambulatory central hemodynamics beyond BP-lowering efficacy than the combination of losartan and hydrochlorothiazide, regardless of office BP.

P1828

Predictors of blood pressure response to renal revascularization in renal artery stenosis' patients presenting acute cardiac syndromes

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Introduction: Completely different patterns of activation for the renin-angiotensin-aldosteron system depending on the extension of vascular involvement (unilateral or bilateral) were recently demonstrated. These findings may have an impact upon blood pressure (BP) response to renal revascularization.
Purpose: The analysis was aimed to evaluate the response of BP and renal function in patients with significant renal artery stenosis (>70%) presenting acute cardiac syndromes. Methods: 78 hypertensive patients diagnosed with significant uni- and bilateral RAS were prospectively enrolled, subsequently resulting in 3 groups (34-unilateral, 28-bilateral RAS and 16-RAS in solitary kidney). Clinical, biological and echocardiographic parameters were comparatively evaluated between groups at admission and 12 months' after renal stenting. BP evolution and renal function' after stenting were evaluated after one year. Regression logistic analysis - univariate and multivariate (stepwise Likelihood ratio method) was used in order to determine the independent predictors for major outcomes.

Results: No significant differences between groups regarding baseline characteristics (age, gender, stenosis' severity, comorbidities, blood pressure values, biologic and echo parameters) were found. The comparative analysis identified a significant reduction of BP values (systolic, diastolic, medium, pulse pressure) 12 month' after renal stenting (BP variation of 23.6795±19.86 mmHg, 14.86±12.34mmHg, 17.80±13.46 mmHg and 8.81±15.28 mmHg respectively, p<0.001). Controlled BP after revascularization was found in 35.1% of patients and improved BP in 44.6% of the entire series, without significant differences between groups (p>0.05). Cured BP was not identified in the current analysis. The number of antihypertensive classes after renal stenting remained similar (3.51±1.1 vs. 3.41±1.09, p>0.05). Multivariate regression analysis confirmed three independent predictors for BP responder (cured and controlled BP) in the studied population: diabetes, diastolic BP and the severity of residual stenosis. The non-diabetic status predicted a favorable outcome of 8.42 times higher than diabetes (95%CI, 1.71-4.41). The higher diastolic BP (over the median value of 100 mmHg) indicated a greater likelihood of BP responder (95%CI, 0.86-0.97). The accuracy of the combined predictive model as quantified by the area under the receiver-operating characteristics curve was 0.89 (95%CI, 0.81-0.96, p=0.039). Different predictive models emerged for diabetic vs. non-diabetic patients.
Conclusions: The current findings emphasized favorable outcomes in terms of BP control after renal revascularization in patients presenting acute cardiac syndromes, including diabetes associating nephrosclerosis. The extension of vascular involvement did not significantly impact BP outcomes in the studied groups, although different responses in terms of BP evolution (improvement, controlled or stationary) were observed.

P1829

Morning rise in blood pressure according to ambulatory blood pressure monitoring in patients with hypertension and chronic heart failure

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On behalf of: Olga Kulbachinskaya

The morning rise in blood pressure occurs as a result of activation of neurohormonal systems and is associated with high risk of cardiovascular complications. Objective. Assess profile of the morning blood pressure data on ambulatory blood pressure monitoring (ABPM) in patients with arterial hypertension (AH) and chronic heart failure (CHF). Methods. 128 outpatients were included in the open, one-time study (35.9% M 64.1% F) aged 40 years and older. A general clinical examination, evaluation of the lipid profile, ECG, EchoCG, ABPM, ultrasound duplex scanning of the extracranial regions brachiocephalic arteries of the BCA. Prior to the study treatments, all patients provided written informed consent. The program used is Statistica 10. Results. AH was found in 120 (93,8%) patients (38,3% M/61,7% F) aged 40 to 83 (59,1±7,8) years. LVH according EchoCG was present in 53 (56,4%), thickening of intima-media complex of brachiocephalic artery – in 87 (92,6%), smoking - 21 (17.5%) patients. Co-morbidities were present in 96 (80%) patients: past myocardial infarction – in 5 (4,2%), diabetes mellitus – in 35 (29,2%), CHF – in 59 (49,2%) patients. The median age of patients with CHF was 59,1±9,7 years, without CHF (n=61, 50,8%) – 56,5±9,0 years. Average daily systolic blood pressure (SBP) was increased in 34 (57,7%) patients with CHF and in 26 (42,6%) – without CHF (p=0,145); diastolic blood pressure (DBP) - in 28 (47,5%) and in 23 (37,7%) patients, respectively (p=0,371), average nighttime SBP in 37 (62,7%) and in 20 (40, 9%) patients, respectively (p=0,002); average DBP - in 36 (61%) and in 25 (40,9%), p=0,045), respectively. Insufficient reduction in SBP (non-diper) was in 21 (35.6%) patients with CHF and in 27 (44.3%) - without CHF, respectively; DBP – in 13 (22%) and in 14 (23%) patients, respectively. An overnight increase in SBP (night-picker) was observed in 9 (15.3%) patients with CHF and in 7 (11.5%) - without CHF; DBP – in 7 (11.9%) and in 6 (9 8%) patients, respectively. Morning SBP was 38±17 mm Hg in patients with CHF and 21±14 mm Hg - without CHF (p<0,001), DBP - 31±12 mm Hg and 18±10 mm Hg (p <0.001), respectively. CHF correlated with the value of SBP (r=0,15, p <0,001) and DBP morning rise (r=0,56, p <0,001), regardless of the values of the average daily BP. Morning SBP correlated with LDL cholesterol (r=0,24, p=0,034). Conclusion. The presence of heart failure is associated with an unfavorable profile of morning blood pressure, which can be considered as a target for therapeutic intervention in patients with hypertension and heart failure.

P1830

The role of hyperuricemia in the progression of chronic heart failure in patients with arterial hypertension

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Background. The relationship between high levels of uric acid and cardiovascular disease has been proposed for many decades, which indicates the need for early detection of hyperuricemia in patients with arterial hypertension for preventive measures to prevent the development of coronary and brain disorders.
Purpose. Identify the relationship between serum uric acid level and the progression of chronic heart failure in patients with arterial hypertension.
Methods. A retrospective study of 841 patients' outpatient cards of the City Polyclinic 1 was carried out. 30.4% were women and 69.6% were men aged 41 to 77 years. Patients were divided into 2 groups depending on the concentration of uric acid. In Group 1 patients' blood uric acid level was within the normal range, or 300–350 μm / l (41.9% of patients); while uric acid among patients from Group 2 was above the normal range, or 500–530 μm / l (58.1% of patients). It was decided to prescribe the drug Allopurinol 100 mg once a day. After completing Allopurinol 3-week course, a biochemical blood test was performed for determining the uric acid level.
Results. According to the study, it was noted that the level of uric acid was reduced in 19% (405-429 μm/l). Also, the study showed that the usage of Allopurinol leads to a gradual decreasing of blood pressure in 12%. The Pearson correlation coefficient of uric acid and the presence of arterial hypertension in men is R^2 = 0.906 and in women, R^2 = 0.9088 (Figure 1). In patients with arterial hypertension with high levels of uric acid, a direct and significant correlation is observed. The findings suggest that the group of patients with a high level of uric acid is a special group in which the risk of developing target organ damage is aggravated by an increase in blood pressure.
Conclusions. The study showed that uric acid has ability to induce mechanisms that contribute to the occurrence and progression of cardiovascular diseases. However, when using the drug Allopurinol in a patient, the level of uric acid and blood pressure decreases, which in turn prevents the progression of chronic heart failure.

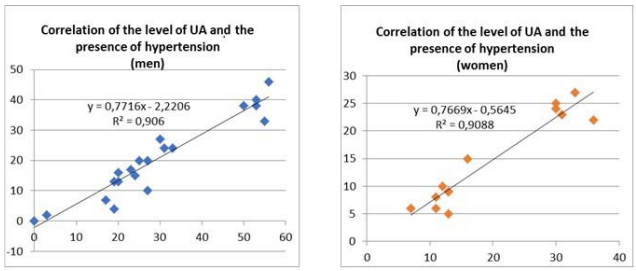

Figure 1

P1831

Daily monitoring pulse wave velocity and other indicators of arterial stiffness in hypertensive patients comorbid with chronic obstructive pulmonary disease

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Background. More than 40% of chronic obstructive pulmonary disease (COPD) patients have arterial hypertension (AH).Purpose: to investigate the central aortic pressure and arterial stiffness parameters during daily monitoring in patients with comorbidity AH and COPD.
Methods. 62 patients with AH were examined. Patients were divided into 2 groups: group 1, n=32, patients with combination of AH and COPD; group 2, n=30, patients with isolated AH. The groups were similar in age and sex. The ambulatory (daily) monitoring of the peripheral, central aortic pressure and parameters of arterial stiffness were made by BPLab v2.3 with Vasotens technology. For statistical analysis we used Mann-Whitney criteria and Spirmen correlation method.
Results. Aortic SBP and aortic DBP in patients with combination of AH and COPD were higher compared with a group of isolated AH on 6 mmHg (p=0,049), 7mmHg (p=0,0023), respectively. Patients with combination of AH and COPD demonstrated the increase of minimum, medium and maximum PWV compared to isolated hypertension on 14.96% (p = 0.015), 6.98% (p = 0.016) and 11.93% (p = 0.0022), respectively. Ambulatory arterial stiffness index (ASI) in patients with combination of hypertension and COPD was higher compared with a group of isolated AH (p=0,045). Smoking Index was strongly correlated with PWV medium per day (r=0,51; p=0,0037) and PWV maximum per day (r=0,42; p=0,019). Smoking history was strongly correlated with PWV medum per day (r=0,51; p=0,0037), with PWV maximum per day (r=0,54; p=0,0017) and with ASI (r=0,40; p=0,033). The aortic blood pressure profiles were non-dipper on 55,5%, over-dipper on 7,4%, dipper and night-piker on 18,5% respectively in patients with comorbidity AH and COPD.

Conclusions. 1. The basic parameters of arterial stiffness were higher in patients with combination of AH and COPD in comparison with patients with isolated hypertension during the daily monitoring. 2. The relationship of smoking and the indicators of arterial stiffness was revealed in patients with COPD and comorbid hypertension. 3. The nondipper profile was predominant in patients with combination of AH and COPD in the ambulatory monitoring of the central aortic pressure.

Dally arterial stiffness parameters		
Parameters	Group 1	Group 2
Aortic SBP mm Hg	130.0 (125.0; 137.0) *	124.0 (116.5; 136.5)
Aortic DBP mm Hg	88.0 (81.0; 93.0) *	81.0 (75.0; 84.0)
PWV min m/sec	7.3 (6.0; 8.3) *	6.35 (5.9; 7.15)
PWV med m/sec	9.2 (8.5; 10.6) *	8.6 (7.9; 9.0)
PWV max m/sec	12.2 (10.9; 14.1) *	10.9 (10.3; 11.4)

* - Statistically significant differences

P1832

Interaction between central hemodynamics and left ventricular geometry in patients with preserved ejection fraction

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Background: Arterial stiffness and hemodynamic load can lead to increased left ventricular (LV) hypertrophy and remodeling. Abnormal LV geometry can be associated with excessive wave reflection, increasing late systolic LV wall stress.
Purpose: to assess interaction between blood pressure, arterial hemodynamics and modes of LV geometry in patients (pts) with preserved ejection fraction (EF).
Methods: The study population consisted 309 hypertensive patients (53% men, mean age 61±10 years). Of these, 145 (47%) patients had stable coronary artery disease and 150 (49%) patients experienced recurrent atrial fibrillation. Echocardiography and pulse wave analysis using the SphygmoCor system were performed.
Results: In according with echocardiographic examination four LV phenotypes (phen) were defined: normal LV (phen1, n=63), concentric remodeling (phen2, n=71), concentric LVH (phen3, n=130) and eccentric LVH (phen4, n=45). Mean LV EF was 63±6%. Differences in hemodynamic parameters presented in the table.
Conclusion: Differences in central arterial hemodynamics exist across LV phenotypes in patients with preserved LV EF. Abnormal LV geometry could be related with wave reflection because of augmentation magnitude depends on the time that the reflected wave returns.

Parameters	Phen1	Phen2	Phen3	Phen4	p
Age, yrs	62±8	60±8	65±9	65±6	0,005
Heart rate, bpm	67±8	71±8	71±9	71±10	0,2
Aortic pulse pressure, mm Hg	41±15	39±9	48±14	51±13	0,02
Augmentation pressure, mm Hg	21±4	10±4	15±5	17±6	0,02
Augmentation magnitude	0,60±0,22	0,39±0,26	0,43±0,26	0,57±0,15	0,03

P1833

Influence of hypertension on QT dispersion and systolic left ventricular function in patients with angina pectoris

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Introduction: QT dispersion (QTd) is a measure of inhomogeneous repolarization of myocardium and is used as an indicator of arrhythmogenicity. According to the values of QTd can identify coronary patients who are at high risk of cardiac death and sudden cardiac death.
Purpose: The aim of this study was to investigate the influence of hypertension on QT dispersion and systolic left ventricular function in patients with angina pectoris.
Methods: The study included 161 patients with angina pectoris (average age 56.8 years), of which 109 were with hypertension, and 52 were without arterial hypertension. There were no significant differences in age and gender between the two groups of patients. In all subjects echocardiographic examination were performed and from standard ECG corrected QT dispersion (QTdc) was calculated.
Results: Patients with angina pectoris and hypertension had significantly higher values of QTdc (58.7 ± 19.6 vs 44.9 ± 17.8 ms; p <0.001) compared to those without arterial hypertension. Also, patients with angina pectoris and hypertension had significantly lower values of left ventricular ejection fraction (58.6 ± 11.5 vs 63.2 ± 12.2%; p <0.025) and significantly higher values of the thickness of the interventricular septum (12.8 ± 1.9 vs 10.7 ± 1.6 mm; p <0.001), left ventricle posterior wall thickness (11.4 ± 1.6 vs 9.3 ± 1.4 mm; p <0.001), left ventricular end-systolic diameter (38.9 ± 6.4 vs 36.1 ± 7.1 mm; p <0.02) and left atrium diameter (41.3 ± 4.7 vs 37.8 ± 5.3 mm; p <0.005) compared to those without hypertension. Patients with angina pectoris and arterial hypertension had higher values of the left ventricular end-diastolic diameter (54.5 ± 5.5 vs 53.8 ± 6.9 mm; p-NS) compared to those without hypertension, but the differences were not statistically significant.
Conclusion: The study demonstrated that patients with angina pectoris and hypertension had significantly higher values of corrected QT dispersion and significantly reduced systolic left ventricular function compared to those without hypertension.

P1834

Evaluation of left ventricle dysfunction and endothelin-1 level in arterial hypertension of renal genesis under influence of therapy

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In arterial hypertension (AH) of renal genesis, the contractility of the myocardium of the left ventricle (LV) is often noted. The powerful vasoconstrictive effect of endothelin-1 and an increase in its level in plasma may be indicative of the progression of hypertension and the development of chronic heart failure (CHF).
Purpose: to study the nature of LV dysfunction in patients with AH of renal genesis complicated by CHF and endothelin-1 level, to evaluate the effectiveness of ramipril therapy for LV dysfunction.
Materials and methods. A total of 96 patients with AH of renal genesis complicated by CHF were examined, including 59 men and 37 women aged 59 to 83 years. The duration of the disease AH was 15.9±1.4 years. Clinical signs of CHF FC were 44, FK-40, FK-12 patients (by NYHA). Intracardiac hemodynamics was assessed on the Envisor HD, Phillips. Endothelin-1 was determined by radioimmunoassay. Ramipril was prescribed in a daily dose of 5-10 mg by a course of 18 days.
Results of the study. In the work we confirmed the significant prevalence of LV systolic dysfunction in patients with AH, including in combination with diastolic dysfunction - in 77.94%. For most patients with AH and CHF, the concentric type of LV hypertrophy is characteristic (76.47%). Diastolic LV dysfunction was found in all patients, even with preserved systolic function: early diastolic filling (E) 70.29±3.16 cm/s, isometric relaxation (IVRT) 82.82 ± 4.67 ms, atrial filling rate (A) 55.39±2.97 cm/s, the time of early speed drop (DT) of 228.25±10.67 ms.
Analysis of endothelin-1 in AH complicated by CHF showed that in patients with I FC CHF there was an increase in the activity of factors indicating the presence of endothelial dysfunction in the form of an increase in endothelin-1 content by 2.6 times, which indicates the prevalence of vasopressor mechanisms.
In patients with CHF II FC, the level of endothelin-1 was close to its content in patients without signs of CHF, while in patients with CHF FC it was increased by 71.9%. With CHF IV FC, the content of endothelin-1 was increased by 4.2 times.
Therapy with ramipril leads to a significant decrease in blood pressure (in 70.58%) andcontributes to the normalization of the daily profile of blood pressure. In the process of treatment, a decline in FSV by 15.3% and a FDV of 4.7%, LS volumes (FSV by 13.6%, FDV by 6.2%), an increase in EF by 11.45% (from 52% , 4±0.49 to 58.4±0.78%) and Fs to 8.75% (from 29.7±0.67 to 32.3±0.88%). After treatment, the decrease in the LVMM index from 143.9±5.68 g / m2 to 132.4±5.43 was noted. Cconclusion. Thus, diastolic LV dysfunction and endothelial dysfunction are observed in patients with AH of renal genesis complicated by CHF, which is manifested in an increase in the endothelin-1 content. The inclusion of ramipril in therapy contributes to the normalization of a number of parameters and improvement of LV function in patients with AH of renal genesis.

P1835

Personifying role of natriuretic peptides in patients with essential hypertension

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The aim of the research: to study NT-proBNP in patients with essential hypertension (EH).
Object and methods of research 420 male patients in age of 30-60 years old were studied, they were divided in 4 groups: group 1 (n=180) – patients with EH without heart failure (HF), group 2 (n=86) – patients with EH and HF, group 3 (n=74) – patients with HF without EH, group 4 (n=80) – the group of control. NT-proBNP (fmol/ml) was measured.
In the prospective part of the study patients of group 1 and 2 (n=60) formed subgroups of 25% (3,8 fmol/ml) and 75% (22,0 fmol/ml) of NT-proBNP percentiles. The results of echocardiography, brachiocephalic trunk ultrasound, heart rate variability were compared in these subgroups at baseline and after 24 months of follow-up.
The results. Patients in group 3 had the highest level of NT-proBNP comparing to the group of control (=0,046), group 1 (=0,037) and group 3
(=0,046). The duration of EH didn't affect the level of NT-proBNP (r=0,186; =0,537). In the group of patients with EH plasma NT-proBNP was lower in patients with grade 2 and 3 of arterial hypertension (AH) comparing to the patients with grade 1 of AH (<0,05). In the group of patients with EH and HF the same pattern wasn't observed (p>0,05). In group 1 NT-proBNP correlated with the grade of AH (r=-0,624; =0,023), in group 2 the same correlation wasn't discovered (r=0,151; =0,294), NT-proBNP interconnected with the functional class of HF (r=0,215; =0,049).
In the prospective part of the study in both groups of patients of subgroup 2 in comparison with group 1, at the beginning of the study, the structural remodeling of myocardium was more pronounced, sympathicotonia prevailed, left ventricle mass index, relative wall thickness index were increasing in the dynamics; however, in patients of the subgroup 1, were more expressed, hypertrophic type of diastolic disorders, dilatation of common carotid artery and thickening of the IMT were progressing. In patients of subgroup 2 dilatation of the right ventricle, the tendency to pseudonormalization of diastolic disorders, thickening of IMT, decreasing of sympathicotonia were observed.
Thus, the results of the study illustrate our assumption about the personifying role of the level of natriuretic peptides in patients with EH: the insufficiency of it in patients with EH is associated with an increase in the degree of AH and the progression of target organ defeat.

P1836

Uncontrolled hypertensives with heart failure with preserved ejection fraction-adherence to therapy

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Background Hypertension is worldwide spread, affects 40.41% of Romanians, and represents the leading cause of death. High blood pressure is associated with left ventricular hypertrophy, diastolic dysfunction and, frequently, evolves to heart failure with preserved ejection fraction. Heart failure with preserved ejection fraction (HFpEF) causes substantial morbidity and mortality and, unfortunately, despite multiple randomized controlled trials, has no disease-specific therapy until now. Suboptimal adherence to therapy is the main impediment in controlling chronic diseases.
Purpose The aim of our study was to assess the adherence to therapy in treated but uncontrolled hypertensives (BP>140/90 mmHg) with HFpEF admitted in an Internal Medicine Department.
Methods We enrolled 64 consecutive treated but uncontrolled hypertensives with HFpEF (satisfying ESC 2016 criteria; left ventricular EF>50%), medium age 65±8 years old, admitted in an Internal Medicine Department. All patients completed the Morisky questionnaire for adherence to treatment.
Results 48 patients (75%) were females, and 16 (25%) males. Morisky score 0 (maximum adherence to therapy) was recorded in only 14.06% of the patients, 39.07% had intermediate adherence (Morisky score 1-2) and 46.87% low adherence (Morisky score 3-4). Adherence to treatment was low in both sexes. Men had a sleight better maximum adherence than women (18.75% vs 12.5%). Women had a sleight lower low adherence to therapy than men (45.85% vs 50%).
Conclusions In-hospital uncontrolled patients with hypertension and heart failure with preserved ejection fraction have a very poor adherence to therapy. Low adherence is present in both sexes. Since adherence to therapy is crucial in controlling chronic diseases, effective strategies to increase adherence to therapy are mandatory in uncontrolled hypertensives with heart failure with preserved ejection fraction.

P1837

Association AG polymorphism of a MTHFR gene in development of an ischemic stroke in patients with an arterial hypertension

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Introduction . The gene of MTHFR is located on 1 chromosome (1p36.3) and consists of 11 ekzon. The gene of MTHFR codes enzyme a metilentetragidrofolatreduktaza which catalyzes transition of the 5.10-metilentetragidrofolat in 5-metiltetragidrofolat. This reaction represents multistage process which will transform amino acid homocysteine to methionine.
Purpose. Studying of a contribution of rs619203 polymorphism of a gene ROS1 to development of ischemic stroke at patients with an arterial hypertension.
Methods. Examination of 124 patients with an ischemic stroke with an arterial hypertension is conducted. Age median – 60[51; 66.75] years from which there were 75 men, an age median – 57[50; 64.5] years and 49 women, an age median – 63[54; 70] years. Clinical investigation included assessment of neurologic symptoms, a research of the somatic status, control of the ABP, record ECG, an echocardiography, a X-ray analysis, the general and biochemical blood tests, ultrasonic examination of carotid arteries, brain computer tomography. Duration, weight and the sequence of development of the accompanying somatopathies and risk factors were analyzed. The family anamnesis including assessment of existence of disturbances of cerebral circulation in the anamnesis, existence of arterial hypertension, heart diseases (a MI, cardiac arrhythmia, HFA), existence of risk factors was studied.
Results. Frequency of a homozygous genotype of AA on a widespread allele at patients with an ischemic stroke was 81.5%±3.5, a heterozygous genotype of AG – 16.1%±3.3 and a homozygous genotype of GG on a rare allele-2.4%±1.4. In control group 72.9%±4.1 were carriers of a homozygous genotype of AA on a widespread allele, 26.3%±4.1 – carriers of a heterozygous genotype of AG and 0.8%±0.8 – carriers of a homozygous genotype of GG on a rare allele of a gene of MTHFR.
Conclusions. Thus, by results of a research some prevalence of carriers of a homozygous genotype of AA on a widespread allele among patients with an ischemic stroke (81.5%±3.5) in comparison with group of control (72.9%±4.1) is established, but this distinction was statistically not significant. Also it is not established statistically significant distinctions on MTHFR gene alleles.

P1838

Association of polymorphism of 9 chromosome in development of an ischemic stroke in patients with an arterial hypertension

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Introduction . Rs1333049 is located on a chromosome 9r21.3 in the so-called ANRIL area (area of not coding RNA).
Purpose. To study a role of polymorphic allelic rs1333049 options (a chromosome 9p 21.3) in development of a stroke in patients with cardiovascular pathology.
Methods. Examination of 124 patients with an ischemic stroke with an arterial hypertension is conducted. Age median – 60[51; 66.75] years from which there were 75 men, an age median – 57[50; 64.5] years and 49 women, an age median – 63[54; 70] years. Clinical investigation included assessment of neurologic symptoms, a research of the somatic status, control of the ABP, record ECG, an echocardiography, a X-ray analysis, the general and biochemical blood tests, ultrasonic examination of carotid arteries, brain computer tomography. Duration, weight and the sequence of development of the accompanying somatopathies and risk factors were analyzed. The family anamnesis including assessment of existence of disturbances of cerebral circulation in the anamnesis, existence of arterial hypertension, heart diseases (a MI, cardiac arrhythmia, HFA), existence of risk factors was studied.
Results. Frequency of a homozygous genotype of GG on a widespread allele at patients with an ischemic stroke was 23.1%±3.8, a heterozygous genotype of CG – 47.1%±4.5 and a homozygous genotype of CC in rare alleles-29.8%±4.2. In control group 26.4%±2.0 were carriers of a homozygous genotype of GG on a widespread allele, 54.9%±2.2 – carriers of a heterozygous genotype of CG and 18.7%±1.7 – carriers of homozygous genotype to a rare allele.
Thus, statistically significant prevalence of carriers of a homozygous genotype of CC in rare alleles among patients with an ischemic stroke (29.8%±4.2) in comparison with group of control (18.7%±1.7), p=0.011 and also allele with in group of patients (53.3%±3.2) in comparison with control (46.2%±1.6), p=0.046 is established.
Conclusions. Statistically significant prevalence of a homozygous genotype of the CC in rare allele gene of rs 1333049 of a chromosome 9r21.3 (29.8±4.2) in group of patients with an ischemic stroke in comparison with the faces of control group (18.7±1.7) and an allele C (53.3±3.2) in comparison with group of control is established (46.2±1.6).

Cardiovascular Nursing

P1839
The development of e-health tools to support dietary sodium assessment, behavioural modification and shared decision making in clinical practice

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Funding Acknowledgements: Canadian Stroke Network, Heart and Stroke Foundation of Canada

Background: Dietary sodium reduction is a recommended therapy for heart failure. However, assessing dietary sodium intake in the clinical setting is challenging. Sodium assessment methods include 24-hour urine collections and self-reported methods such as food recalls and records. These methods are time-consuming, burdensome and do not provide individualized or timely feedback, thereby potentially impeding effective delivery of dietary advice from health care providers and patient-action in behaviour change or adherence.
Purpose: We developed and validated two dietary sodium screening tools: Sodium Calculator (SC) and Sodium Calculator Plus (SCP). The purpose of this abstract is to report the results of iterative user testing during the development phase, and content and face validity by experts and users.
Methods: The SC and SCP are web-based food-frequency questionnaires developed from national survey on foods contributing the most sodium to the Canadian diet. The SCP asks standard portion sizes consumed. To allow for rapid calculations, the SC does not ask about portion size but includes average portion sizes consumed by Canadians in its algorithm. To calculate the amount and sources of sodium in the user's diet, the sodium content of foods and beverages available in the Food Label Information Program 2013/2017 and the Canadian Nutrient File 2010/2015 were used. Nutrition experts conducted face and content validity. University students provided feedback on the SC and SCP in an open-ended survey as part of the iterative testing process.
Results: The SC contains 26 questions on intake frequency and took 5 minutes to complete. The more detailed SCP contains 72 questions and took 10-15 minutes to complete. Nutrition experts made several suggestions about wording, foods included and report formats. They suggested the use of graphs/visual displays to illustrate sodium intake and the inclusion of risk estimates for health impacts of sodium intake. Users (n=118) liked the reported grouping of foods, options for frequency of consumption, concise instructions, and personalized feedback on sodium intakes and felt that SC and SCP both increased awareness of sodium consumption and reading of food labels. However, users indicated some improvements such as clarification of portion sizes, food form (e.g. canned/dry), use of color and larger font and additional examples related to culturally-based diet. These data were used to modify the web-based calculators, as part of the iterative development process.
Conclusion: The SC and SCP provide rapid, detailed, personalized information on dietary sodium. The SC is a rapid screener that is useful in a busy clinical setting. The SCP can provide more detailed assessments and track longitudinal dietary changes. Both tools may be integrated into e-health platforms to support behaviour change and improved health outcomes.

P1840
Cultural factors and power relations influencing willingness to follow self-care recommendation: a qualitative study

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Funding Acknowledgements: Ruth L. Kirschstein NRSA Doctoral Fellowship, Research on Vulnerable Women, Children and Families (T32NR007100)

Background: The prevailing power arrangements resulting from patient characteristics, physicians' specialized expertise and the hierarchical structure of the healthcare institutions may disproportionately put older adult immigrants with cardiovascular disease (CVD) at risk for being marginalized and can result in unwillingness to follow self-care recommendations. The power relations between older adult African immigrants and providers and the role that culture plays in health care interactions has, thus far, been largely unexamined.
Purpose: This study aimed to explore how cultural factors influence immigrant older adults' ability to negotiate their care and follow self-care recommendations within the power dynamics of the U.S. health care system.
Method: A qualitative descriptive method with content analysis was used. Purposive sampling techniques were used to enroll 4 community-dwelling older adults who received care at a primary care center in the northeast U.S. Inclusion criteria were: 1) self-identified or pre-identified as a Nigerian immigrant, (2) over 65 years of age, (3) had a confirmed CVD (e.g. hypertension) based on clinical evidence, and (4) able to speak and understand English. Patients with a diagnosis of cognitive impairment that limited their ability to understand questions were excluded from the study. Semi-structured interviews were conducted using an interview guide. A demographic survey was used for data collection. The tape-recorded interviews were transcribed accurately, and data analysis performed using Atlas.ti, version 7.0.
Results: Participants were all female and legal residents of the US. Age: 75 $\pm$ 3.7 years. Years spent in the US: 6$\pm$3.6 years. Findings revealed that social norms and culture play a role in power relations between African-immigrant older adults living with CVD and their providers. Normative thinking, familism and fatalism influenced decisions concerning self-care. Although providers were seen as experts who were competent and caring, patients' beliefs, values, and preferences often were not considered in making self-care recommendations. As a result, participants exercised power either by withholding critical information or outright refusal to follow physicians' recommendations.
Conclusion: These findings have significant implications for treatment for CVD. Taking patient values, beliefs, power and preferences into consideration may improve willingness to follow self-care recommendations.

P1841
How do race, education, and income adequacy affect self-care maintenance in adults with heart failure?

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Background: Social determinants (conditions within which people are born, age, work, live and the systems put in place to deal with illness) are known to influence health and adequate self-care maintenance improves heart failure (HF) outcomes, however, the relationship between these two factors is unclear. Self-care maintenance reflects healthy behaviors and adherence to a plan of care to maintain physiological stability and prevent symptoms.
Purpose: This secondary analysis explored main effects of specific social determinants of health (race, education, and income adequacy) on HF self-care maintenance. We focused on self-care maintenance because it is the first construct among the three constructs (maintenance, symptom perception and management) of the situation specific theory of HF self-care, thought to be mastered in succession. The situation specific theory of HF self-care underpinned the study.
Methods: The parent study enrolled 631 adults with HF (any type) who spoke English, without dementia or previous heart transplantation, from five sites in the United States. Institutional Review Board (IRB) approval was obtained at all sites. Participants completed the Self-Care of HF Index (SCHFI) v.7.2 and a demographic survey. Scores on the SCHFI range from 0-100, with higher scores indicating better self-care. We used general linear modeling to determine which SDH variables and levels; race (Whites, Other [Asian/Mixed] or Blacks), education (high school or less, trade school, or college), and income adequacy (more than enough, just enough or not enough) were important in explaining self-care maintenance. Bonferroni correction was used to correct for multiple comparisons (alpha = 0.017 (.05/3)).
Results: The sample was predominantly white (71.5%), male (63.1%), married (54.8%), unemployed/retired (78.5%), and college educated (55.1%) with mean age 64.6$\pm$14.3 years. In model 1 ($F(6, 559) = 2.10$ $p = .05$) which included race, education and income adequacy as predictors, race was a significant determinant of self-care maintenance. In Model 2 ($F(4, 577) = 3.39$, $p < .01$), which included race and education as predictors, race and education were both significant determinants. These models explained only 2.2% and 2.3% of the variance in self-care maintenance respectively. Participants with high school or less education had significantly lower self-care maintenance compared to those with college education. Asians/Mixed (Other) participants also had lower self-care maintenance compared to whites. Although the interaction between race and education was non-significant, 51.2% of Blacks had high school or less education compared to 35.9% of Whites.
Conclusion & Implications: Racial minority groups and patients with high school or less education may be at risk for poor self-care maintenance. Interventions targeting racial minorities and those that compensate for low education may be particularly important in reducing disparities in heart failure outcomes.

P1842
Technology acceptance model for Control VIT: heart failure patient follow-up mobile Application

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Introduction Mobile phone based remote monitoring systems for heart failure patients could become simple and affordable tools to improve home management. Research objective: To identify utility and acceptance of Control VIT in heart failure patients.
Method: Pilot observational and descriptive study on 20 heart failure clinic outpatients with reduced ejection fraction, from June to November 2018. For six months, patients used Control VIT Smartphone Application, which contained information to improve selfcare and allowed daily clinical variables registration. Data from the application log was collected in order to identify frequency of use and data submission by patients. At the end of the period of study, a technology acceptance questionnaire was applied to patients. A descriptive analysis with absolute and relative frequency distribution was also performed.
Results: 164 real-time alerts were generated, being weight gain the most frequent one (49 %). 95 % of the patients did not present hospital readmission. Regarding acceptance, 100 % of them acknowledge usefulness in the application. As for the intention and ease of use, 95 % of the patients showed willingness of use without objection or fear.
Conclusion: Control VIT is an efficient tool for prompt complication detection. It can modify pharmacological treatment, avoid disease progression and potential hospitalization. Patient acceptance of the application suggests the need of using it as a complementary follow-up strategy.

P1843
Collaborating with a patient organisation to implement a physical activity intervention

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Introduction: Physical activity is important for cardiac patients and can reduce morbidity and mortality. Despite these benefits, the majority of cardiac patients are not engaging in enough physical activity, even if they are enrolled in or have completed a structured physical activity program. Patient organisation could play an important role long term adherence to activity recommendations.
Purpose: To explore the potential of using co-design as a method to implement a physical activity intervention in a patient organisation.
Method: Cardiac patients from a patient organisation located in two cities in Sweden worked with a research team to design a tournament of exergaming (video gaming that also is form of physical activity) to stimulate physical activity for their members. There were 4-8 participants from each of the two patient organization in the meetings and 4 researchers from 2 universities. Data on the process of co-design was collected through participative observations of the meetings and the exergaming events.
Results: Patients organised training sessions (and received help from the research team when needed) and a day to exergame together with the neighbouring patient organisation. The implementation of exergaming contained a number of key co-design actions: (1) Engaging patients early; (2) Engaging a patient organisation, bringing the design into an social context; (3) Practical testing element in the design where two exergame platforms were tested by patients of one of the patient organisations; (4) Focus on self-organising, where the patient organisations received the two exergame platforms together with an introduction; (5) Using a competition element, where patients of the two organisations were asked to exergame with/against each other.
Conclusion: Implementation of physical activity interventions by patient organisations is promising. A co-design approach, with both putting physical activity in a social context as including a competition element, can optimize first success and sustainability.

P1844
Ex vivo allograft perfusion for heart transplantation: single centre experience

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Purpose: The Organ Care System (OCS) is the only clinical platform for ex-vivo allograft perfusion. Kazakhstan is the 9th largest country in the world, for donor hearts to be transplanted from distant regions to our Center they often need to be transported up to 2000 km. We reviewed our institutional experience to analyze and describe the outcomes of patients underwent heart transplantation managed with OCS.
Methods: In this study we performed a prospective descriptive analysis of 59 patients underwent heart transplantation from 2012 to 2017. Of this, 47 (80%) cases were preserved using OCS. There are currently two methods for ex vivo preservation of donor hearts: standard cold storage (short distances, < 4 hours) and a system for ex vivo perfusion (long distance < 4 hours and after VAD). Primary and secondary outcomes of interest included cumulative survival, freedom from any-treated rejection (ATR), and non-fatal major cardiac events (NF-MACE).
Results: ex vivo preservation of donor hearts using standard cold storage 12 (20%) cases, distant procurement 35 (60%) cases, after VAD support to HTx 25 (45%) cases. Kaplan–Meier survival estimates for all patients after HTx using OCS heart were 91% after 3 months, 85% after six months and 80% after twelve months. There was no ATR, and NF-MACE.
Conclusions: Severe limitations on donor eligibility, recipients after VAD, optimised myocardial protection and use of a portable ex-vivo organ perfusion platform can enable successful, distantly procured transplantation of hearts. This study can further be followed up by studying the HT outcomes after OCS in subgroups.

P1846
The adherence to pharmacological treatment in patients with chronic heart failure

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Despite the efforts to improve the treatment of heart failure (HF), the number of re-hospitalizations and deaths due to HF are still at high level. The efficacy of the treatment depends on patients' commitment, adherence to recommendations and the ability to self-control. Poor adherence to medications is a common problem among heart failure patients. Inadequate adherence leads to increased HF exacerbations, reduced physical function, and higher risk for hospital admission and death. The aim was to analise the level of adherence of pharmacological treatment and the factors influencing the level of adherence.
Material and methods. 475 patients (including 222 women), of mean age 69.7±7.7, with HF were included into the study. The Revised Heart Failure Compliance Scale was used to assess the compliance. The socio-clinical data were obtained from medical records.
Results. The vast majority of the study group were the patients in NYHA II (62.4%) and NYHA III (28.3%), the mean duration of the disease was 6.2±4.9 years, the number of hospitalizations due to exacerbations in the last year was 2±1.5, and the mean ejection fraction of left ventricle (EF) was 48.6±12.6. The patients were most often treated with diuretics (80.8%), beta blockers (68.2%) and angiotensin converting enzyme inhibitors (ACEI) or angiotensin receptor blockers (ARB) (14.5%). The analysis proved that only 60% of respondents adhered scrupulously to the recommended pharmacological treatment. The rest of the study group were the patients who adhere to recommended therapy often (22.1%), seldom (17.9%) and never 2%. The mean level of adherence was 3.3±0.9 (moderate level). In univariate analysis the predictors negatively influencing the adherence were: female gender (rho=-0.325), age below 65 years (rho=-0.014)), loneliness (rho=-0.559), number of hospitalizations (rho=-0.242) and treatment with diuretics (rho=-0.276). The factors influencing positively the adherence were: EF≥45% (rho=0.020) and treatment with ACEI/ARB (rho=0.34). In multivariate analysis the significant predictors influencing the adherence were: negatively - loneliness (β=-0.205) and number of hospitalizations (β=-0.117), and positively –EF ≥45% (β=0.009).
Conclusion: Almost the half of the patients did not adhere to recommended pharmacological treatment. The loneliness and re-hospitalizations were independent determinants of low level of adherence, and EF≥ 45% was the determinant of high level of adherence.

P1847
Feeling powerless to deal with thirst in heart failure patients: a qualitative study of health care providers

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Background: Thirst can be a troublesome symptom in patients with heart failure (HF), and having thirst might decrease patients' quality of life. The pharmacological and non-pharmacological treatment, as well as HF itself can be the reason for an increased thirst in patients. Despite this, there are no evidence-based interventions to reduce thirst distress in patients with HF, and knowledge about thirst and its management by health care providers (HCPs) has scarcely been addressed.
Purpose: The aim of the study was to examine thirst and factors related to thirst in a Spanish cohort of HF outpatients attended in a HF Unit, using information from

HCPs. The goal was to contribute to a better and more personalized care for these patients.
Methods: A qualitative study was performed with purposeful sampling. Data was collected through interviews with 12 HCPs (cardiologists and nurses) working with HF patients, focusing on their experience of thirst in patients with HF, using a structurally developed interview guide. The interviews were recorded and then transcribed. The collected data was analysed using content analysis.
Results: Data on thirst in patients with HF was summarized into 4 categories consisting of a total of 13 subcategories. These categories were 'Thirst is a complex symptom', 'We don't talk about it', 'Thirst is hard to cope with' and 'Nothing helps'. The answers of the HCPs were generally consistent and one statement that permeated the material was that thirst is an important problem that is very difficult for them to solve. Also, the general opinion was that thirst is a complex symptom that is known very little about. Although the HCPs mentioned some practical tips for patients, they also reported that they were not aware of any official guidelines on management of thirst and agreed on that their current advices/treatment methods do not work enough. The HCP also described that they feel powerless in helping patients to deal with thirst. Some culture specific issues were also described.
Conclusions: HCP described that their patients experience thirst as a very complex symptom, causing stress and suffering in patients with HF. The HCPs often feel powerless, trying to help their patients, but realising that their treatment methods/advices are currently insufficient. More knowledge is needed, as well as further research into effective interventions, which might be adapted to specific cultural habits.

P1848

Thirst distress in heart failure outpatients in a Spanish cohort

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Background: Despite studies showing that thirst is a common symptom experienced by heart failure (HF) patients, there is scarce knowledge about its significance in patients from different cultures and climates. The 8-item Thirst Distress Scale for patients with HF (TDS-HF) was recently developed in English, Swedish, Dutch and Japanese to assess how thirst bothers HF patients.
Purpose: To describe thirst distress and associated factors in outpatients at a HF clinic in Spain.
Methods: The TDS-HF (scores 8 to 40) was translated to Spanish and used to quantify the thirst distress perceived by HF outpatients during the preceding three days. Socio-demographic and clinical characteristics were collected and linear regression was performed to identify variables associated with thirst distress.
Results: Three-hundred two HF patients were included (age 67±12 years, 74% male, HF duration 82±75 months, LVEF 42%±14). In total 18% perceived thirst as high or severe. The mean total score obtained was 16.2±9.3 (median 13, Q1-Q3 8-20). The majority of patients perceived mild to moderate thirst distress. Increased thirst distress was associated with female gender, depression, worse NYHA-class, lower serum potassium, higher serum urea, and treatments such as antidepressants and diuretics in the univariable analysis. Serum urea and potassium remained significant in the multivariable analysis, together with the dose of diuretics (Table). Treatment with ARB showed and independent protective effect.
Conclusion: One in five Spanish outpatients patients experienced severe distress of thirst but on average in the total the population seemed mildly to moderately distressed by thirst. Several factors can influence thirst distress in HF patients and might be important targets for thirst relief.

Multivariable regression analysis

	Beta	95%CI	p-value
Dose of diuretics	2.98	1.37 to 4.59	<0.001
Urea*	1.6	0.27 to 2.92	0.019
Potassium	-3.63	-6.32 to -0.93	0.009
ARB	-3.62	-6.89 to -0.35	0.03
Age	—	—	—
Gender	—	—	—
NHYA class	—	—	—
BMI	—	—	—
Depression	—	—	—
Antidepressants	—	—	—

*log-transformed and per 1 SD

P1849

Effects of person-centred telephone-support on fatigue in people living with chronic heart failure: a randomized trail

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Introduction Fatigue is one of the most commonly and debilitating symptoms reported by people with chronic heart failure (CHF), which hampers functional ability and daily activity. In person-centeredness the starting point is the capabilities, needs and goals, of each patient. In people with CHF person-centeredness has been shown to shorten hospitalisation and lessen uncertainty in illness.
Purpose The aim of this study was to evaluate the effects of a person-centred telephone-support on self-reported fatigue in people with CHF.
Method Patients with CHF were randomized to usual care or a person-centred telephone-support intervention in addition to usual care and followed during 6 months. In the intervention group patients where called by a registered nurse and a person-centred health plan reflecting both perspectives was co-created. The health plan was discussed and evaluated during additional follow-ups by telephone. Fatigue was measured with a validated instrument, the Multidimensional Fatigue Inventory-20 (MFI-20), which consists of five dimensions that also can be summarised to a global score. The questionnaire was distributed to the participants at baseline and 6 months follow up. Between group differences were calculated with the Mann-Whitney U test.
Results In total, 77 participants (38 control, 39 intervention) were included in the study, of which 49 (63.6%) were men and 28 (36.4%) women. Their mean age was 80.5. The analysis shows that the participants in the intervention group reported significantly less fatigue in the General fatigue (p=0.042) and Reduced motivation (p=0.009) dimensions of the MFI-20.
Conclusion The findings indicate that person-centred telephone-support relieves symptom burden in terms of reduced fatigue in people with CHF.

Comparission of between the groups

	Control group n=38	Intervention group n=39	P-value		
MFI-20 dimensions	Baseline	Δ baseline-6-months	Baseline	Δ baseline-6-months	
General fatigue; Mean (SD)	14.9 (3.9) (n=38)	0.22 (3.7) (n=27)	14.6 (3.7) (n=39)	-1.73 (3.2) (n=22)	0.042
Physical fatigue; Mean (SD)	15.9 (3.5) (n=37)	-1.15 (3.7) (n=26)	14.7 (3.4) (n=38)	-0.70 (3.4) (n=21)	0.707
Reduced activity; Mean (SD)	15.2 (3.8) (n=38)	0.06 (3.4) (n=27)	14.2 (3.9) (n=39)	-1.71 (4.4) (n=22)	0.163
Reduced motivation; Mean (SD)	11.3 (3.8) (n=37)	0.38 (2.7) (n=26)	10.3 (3.5) (n=38)	-1.41 (3.3) (n=21)	0.009
Mental fatigue; Mean (SD)	10.9 (4.1) (n=36)	-0.44 (3.5) (n=25)	10.0 (3.3) (n=38)	-0.48 (3.8) (n=21)	0.682
Global fatigue; Mean (SD)	68.2 (14.6) (n=37)	-0.92 (12.6) (n=26)	63.6 (13.5) (n=38)	-5.57 (13.8) (n=21)	0.270

MFI-20=Multidimensional Fatigue Inventory-20SD= Standard Deviation

P1850

Psychometric evaluation of the polish version of the council on nutrition (CNAQ) and simplified nutritional (SNAQ) appetite questionnaires in a group of patients with chronic heart failure.

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Introduction. The ESC guidelines for the treatment of acute and chronic heart failure indicate the need to monitor and prevent malnutrition. Malnutrition in heart failure (HF) affects up to about 69% of patients and is a negative prognostic factor, increasing the risk of hospitalization and death. Appetite assessment should be performed systematically as part of the provision of multidisciplinary care and

prevention of the negative effects of protein and energy malnutrition, as its reduction is a factor predicting unintentional weight loss. CNAQ and SNAQ are simple and easy tools to identify loss of appetite among the elderly.
Purpose. Evaluation of psychometric properties of CNAQ and SNAQ questionnaires in a group of Polish patients with chronic HF.
Methods. Data for the analysis were collected from 103 patients diagnosed with chronic HF, in NYHA functional classes II-IV–. The inclusion criteria were: age ≥ 65 years, chronic HF confirmed in the medical documentation, written consent for participation in the study. The study used the CNAQ questionnaire and its abbreviated version - SNAQ. In addition, the Mini Nutritional Assessment (MNA) nutritional evaluation questionnaire was used to assess the validity of CNAQ and SNAQ. In order to evaluate the relationship between the scores obtained in individual questions and the general score, item-total correlation was applied based on multi-core correlations, where the permissible rho is > 0.3. The internal consistency of the tool was assessed using the ordinal version of the alpha coefficient, with the value ≥ 0.7 indicating acceptable reliability.
Results. Correlations between each item and the total results of CNAQ (0.47-0.84) and SNAQ (0.78-0.88) were statistically significant p <0.001. Parallel analysis confirmed the univariate structure of both CNAQ and SNAQ, thus confirming the lack of the need to divide the tool into subscales. A statistically significant correlation was found between CNAQ (rs = 0.8, p <0.001) and SNAQ (rs = 0.81, p <0.001), and MNA. Patients in individual NYHA classes differed significantly as regards their CNAQ (p = 0.008) and SNAQ (p = 0.024) scores. NYHA class II patients had significantly higher CNAQ scores than NYHA class IV patients. Cronbach's alpha was 0.88 for CNAQ and 0.86 for SNAQ, which points to their internal consistency.
Conclusion (s). 1. Loss of appetite increases the risk of malnutrition in the group of HF patients studied. 2. CNAQ and SNAQ have positive psychometric properties and can be used to assess appetite among Polish HF patients.

P1851
What HF patients really need.A systematic review and meta-synthesis.

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Introduction Heart failure (HF) patients frequently have poor health related quality of life (HR-QoL), even when treated with modern evidence-based therapy (Jaarsma et al., 2009).
Support, understanding, receiving comfort and being treated as a whole and unique person are vital for people with HF (Anderson et al., 2012). That is why supportive care may have significant input in HF patients' treatment. Underpinning services may improve their HR-QoL (Cortis and Williams., 2007).
Purpose The purpose of this systematic review and meta-synthesis was to explore HF patients needs from their perspective.
Methods A literature review was conducted using a qualitative methodology. Two of the researchers undertaken the search using the keywords: ("needs" OR "need") AND ("heart failure") AND ("qualitative") in the following databases: PubMed, CINAHL, PsycoINFO, and EBSCO published until the end of February 2018. Pre-defined inclusion and exclusion criteria were set before searching.
A "thematic synthesis" methodology to undertake the current meta-synthesis was used (Thomas and Harden., 2008). This method is a three-step process: 1. Free line by line coding of the findings of the primary studies, 2. the produced free codes have been organized into related areas to build descriptive themes and lastly 3. Analytical themes have been developed (Thomas and Harden, 2008; Barnett Page and Thomas., 2009).
Results Eleven articles were found to fulfill the inclusion criteria which were included in the review and meta-synthesis.
Meta-synthesis extracted five different categories covering patents' needs: Self-management, palliative care, supportive care, social support and continuing person-centered care (CPCC). All themes are correlated together as shown in Figure 1. It begins from the patient itself by recognizing the needs at each time and his ability to self-manage and extends to the "whole 'societal supportive care. On the other hand, meanings are also reversed. The effort of the patient to actively participate in the process of the treatment scheme along to health professionals, may be motivated and empowered by health professionals through the needs and preferences detection, in a continuing basis.
Conclusion A dynamic and interactive continuing care and relationship among patients with HF, their care-givers and health professionals. Giving more emphasis in the human dimension and holistic approach of patients with HF, along with the cardiology medicine development might be the key for the improvement of clinical outcomes and HR-QoL.

P1852
Clinical outcome of cardiac resynchronization therapy patients under a multidisciplinary outpatient clinic model

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As the number of implantable electronic cardiac devices increases, a multidisciplinary team following these patients (P) is warranted to provide professionals who clarify doubts, anticipate complications and tends to increase the quality of life and survival of this population. Beyond targeting the technical aspects of the device, the consultation needs to respond to P with co-morbidities and frequently decompensated heart failure (HF).
Aim: to analyze long-term nursing experience in an outpatient clinic for P submitted to cardiac resynchronization therapy (CRT) in a tertiary center.
Methods: The clinical records of P with a CRT who had ≥1 appointments in 2016 and 2017 were analyzed, and demographic data, clinical history and therapeutic compliance were collected.
Results: During a 2-years period, there were 595 appointments in 324 P (average per P - 2; max - 5, min - 1). The mean baseline left ventricular ejection fraction was 26%, with most of the P in class II/III of NYHA. The majority were male (74.7%), with a mean age of 65 (max – 75, min - 45). In 78% were >1 risk factor for cardiovascular diseases. Systemic hypertension was the most common (85%). The most commonly reported symptoms were fatigue (36%), dyspnea (27%), and peripheral edema (23%). Admission to the emergency room occurred in 20% of the P (mean number of unscheduled visits - 2), with 22% having ≥ 2 hospital re-admissions for any cause. The survival rate was 80.2%, with 65% of the deaths classified as cardiac mortality. Regarding therapeutic compliance, 41% of the P do not know how to describe their prescribed therapy and 9% do not fully comply with the recommended medication.
Conclusions: CRT P visits to the emergency room are common, with frequent re-hospitalizations and high mortality rate. Despite a multidisciplinary approach, almost 10% of the P do not comply with medication. These data point out the severity of the clinical situation in these P, reinforcing the need of a proactive HF team.

Basic Science - Ischemia

P1854
Polyurethane-based scaffold for cardiac aging studies

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BACKGROUND-AIM: Aging is associated with a progressive decline in numerous physiological processes, leading to an increased risk of health complications and disease.In vitro cardiac tissue engineering, through the use of scaffolds able to favour cell adhesion and survival, is a promising tool for identification of aging-related molecular mechanisms. Aim was to show a new approach focused on tissue-specific architecture and mechanical properties mimicking of young and aged tissue (scaffold) integrated with mechanical stimuli (loading) to generate an in-vitro pathophysiological model of cardiac aging.
METHODS: Young and aged artificial tissues were produced by polyurethane (PUR) and polyurethane-polycaprolactone blend, respectively. The polymer blends were studied to simulate the aged muscle, which is stiffer compare to the young one. Polymer scaffolds were produced by Thermal Induce Phase Separation to obtain oriented fibres texture like cardiac tissues. Scaffolds surface was functionalized with fibronectin. Sprague-Dawley primary neonatal rats cardiomyocytes were seeded on young and aged scaffold and cultured for 7 days. For mechanical tests, scaffolds were placed in SQPR bioreactor and subjected to a cyclic loading stimulus (1Hz) for 24 h. To mimic ischemic pathology, a hypoxia/ reperfusion protocol was applied. Cell viability with CellTiter Blue assay was evaluated. Natriuretic Peptides (NPs) and Endothelin (ET-1) system mRNA expression, to evaluate cardiac phenotype, and Connexin (CX)-43, to confirm cellular interaction by gap junction formation, were measured by Real time-PCR.
RESULTS: Results showed a good viability in static and after mechanical loading stimulation in SQPR. An increased expression of ANP/BNP in parallel to a reduction of CNP mRNA levels in young scaffold with respect to old ones were observed in static condition. An activation of NPR-A and NPR-B was also found. After mechanical stimulation, ANP and BNPtrend significantly decreased in old scaffold with respect to young ones (p<0.0001/p=0.0008, respectively) and, on the contrary, CNP was significantly higher (p=0.011) with a counter-regulation of NPR-B. At the end of hypoxia/reperfusion protocol, an acceptable reduction of 30% in cell viability

was observed. During I/R, only CNP was up regulated in SQPR bioreactor scaffold. ET-1 mRNA was higher in old scaffold while CX43 mRNA decreased. During I/R CX43 mRNA levels resulted significantly higher in SQPR bioreactor scaffold with respect to static conditions (p=0.0028) and plastic surface (p=0.014).
CONCLUSIONS: Our engineered model, thanks to integration of structural properties and mechanical stimuli, furnishes a new approach to study in-vitro cardiac aging.

P1855
Lack of macroscopically-evident cardiac regeneration or spontaneous functional recovery in infarcted neonatal pigs

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Background: Neonatal mice possess an impressive -albeit transient- capacity for spontaneous cardiac regeneration following myocardial injury. Whether such robust cardiac regenerative potential is also present in neonatal large mammals has been under-investigated. Recently, two studies reported that 1-day-old and 2-day-old neonatal pigs exhibit a significant spontaneous cardiac regenerative response post-myocardial infarction (MI), characterized by minimal scarring and recovery of left ventricular (LV) function. According to the aforementioned studies, this regenerative capacity is purportedly lost after the first two days of life.
Purpose: We sought to investigate the regenerative capacity of neonatal porcine hearts post-MI.
Methods: Neonatal farm pigs (n=21) were randomized to undergo MI by permanent ligation of the left anterior descending artery on postnatal day 1 (P1) or postnatal day 3 (P3). Infarcted P1 and P3 pigs were sacrificed either at 1 week or at 7 weeks post-MI. Hearts explanted at 1 week post-MI underwent immunohistochemistry for Ki67 and alpha-sarcomeric actinin to quantify myocyte cell cycle re-entry. Transthoracic echocardiography was performed at 7 weeks post-MI to quantify fractional shortening and systolic thickening of the anterior (infarcted) LV wall and the posterior (non-infarcted) LV wall. Hearts explanted at 7 weeks post-MI underwent staining with triphenyl-tetrazolium chloride and Masson's Trichrome to quantify infarct size, infarct circumference and infarct transmurality.
Results: Fourteen animals successfully completed the protocol. Infarct size was comparable in P1 and P3 animals at 7 weeks post-MI (P1: 9.5±2.2% vs P3: 8.9±3.6% of LV, p=0.797). Infarct circumference (P1: 33.8±7.1% vs P3: 29.8±10.6% of LV, p=0.566) and infarct transmurality (P1: 38.1±4.3% vs P3: 40.4±13.7% of anterior wall, p=0.764) were similar in P1 and P3 animals at 7 weeks post-MI. LV function (as assessed by fractional shortening) was comparable in P1 and P3 animals at 7 weeks post-MI (P1: 25.5±2.9% vs P3: 23.7±4.5%, p=0.662). Furthermore, systolic thickening in the anterior (infarcted) LV wall was depressed to a similar degree in P1 and P3 animals (P1: 31.8±5.3% vs P3: 32.3±8.5%, p=0.914) compared to systolic thickening in the posterior (non-infarcted) wall (P1: 72.5±9.0% vs P3: 69.0±11.4%, p=0.666) at 7 weeks post-MI. P1 animals exhibited significantly increased myocyte cell cycle re-entry compared to P3 animals in the infarct border zone (P1: 4.5±1.3 vs P3: 2.3±0.6 per field of view, p=0.045) at 1 week post-MI.
Conclusions: Contrary to recently-published reports, we did not observe robust cardiac regeneration or spontaneous functional recovery in neonatal infarcted pigs. Both 1-day-old and 3-day-old neonatal pigs exhibited substantial cardiac scarring and significant hypokinesia of the infarcted myocardium post-MI. Additional research is warranted to investigate the cardiac regenerative potential of neonatal large mammals.

P1856
Yes-associated protein (YAP) transcriptional coactivator functions in myocardial infarction

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Introduction: Myocardial ischemia has been shown to stimulate angiogenesis in many experimental models. Angiogenesis is regulated by local balance between endogenous stimulators and inhibitors of this process. Angiomotin (Amot) is an angiostatin binding protein that promote endothelial cell migration and angiogenesis. Yes-associated protein (YAP) is a protein that acts as a transcriptional regulator and plays an important role in regulating the angiogenic activity. Both factors contribute to apoptotic process. The aim of this study was to investigate the expression of angiomotin, YAP, VEGF and apoptotic proteins in myocytes after myocardial infarction.
Material and methods: We studied myocardial samples of hearts with histologic findings of acute myocardial infarction (group A), old myocardial infraction (group B), and myocardial samples of normal heart (control group). An immunohistochemical method was performed with the use of Angiomotin, YAP, VEGF, Bax, Bcl-2 antibodies.
Results: Angiomotin and YAP expression was intensive at the risk areas of samples with acute myocardial infarction. VEGF is expressed in cardiomyocytes at the risk areas of acute myocardial infarction in 80% of cases. High concordance of Angiomotin,YAP and VEGF expression was detected (76% of cases, p = 0.020). Bcl-2 positive expression was intense at the risk areas in 75% of samples with acute myocardial infarction.
Conclusions: The increased expression of Angiomotin, YAP and antiapoptotic protein bcl-2 at the risk areas of samples with acute myocardial infarction, represents a possible compensatory mechanism of salvaged myocytes and this may be a compensatory mechanism that could be replace damaged myocardium.

P1857
Transcriptional response HIF1a and HSP70 to hypoxic stress in myocardial ischemia

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Introduction: Hypoxia-inducible gene expression via HIF-1α is a compensatory mechanism in the context of acute or subacute myocardial ischemia. HIF1-α is a transcription factor, sensitive to hypoxia and is up-regulated in regions of myocardial ischemia. Under hypoxia, HIF1-α protein rapidly induces the expression of genes that increase the oxygen availability to cells such as the expression of vascular endothelial growth factor (VEGF). The heat shock response is a defense mechanism against cell stress injury and antagonizes protein unfolding or misfolding during stress responses. Heat shock proteins and hypoxia inducible factors regulate the expression of a battery of genes involved in the promotion or inhibition of apoptotic pathway. However, chronic ischemia can lead to progressive heart failure and the chronic activation of these factors is deleterious.
Methods: We studied myocardial samples of hearts with histologic findings of acute myocardial infarction (group A, n=100), old myocardial infraction (group B, n=100) and myocardial samples of normal heart (control group, n=20). An immunohistochemical method was performed with the use of HIF1-α, HSP70, VEGF, Bax, Bcl-2 antibodies, in order to investigate the expression of these proteins in ischemic cardiac disorders.
Results: HIF1-α expression was intensive at the risk areas of samples with acute myocardial infarction. High concordance of HIF1-α and HSP70 expression (90% of cases, p=0,020), HIF1-α and VEGF expression (82% of cases, p = 0.020) was detected. Bcl-2 positive expression was intense at the same risk areas in 85% of samples with acute myocardial infarction. In old myocardial infraction the bcl-2 positive samples demonstrated weak staining as in the control group. Bax staining was weak in 80% of samples with acute myocardial infraction and intensive in 60% of samples with old myocardial infraction.
Conclusions: The role of hypoxia-induced factors in the genesis of heart failure remains unclear. Although experimental data suggest that these changes in gene expression can be either adaptive or maladaptive, depending on context. Increased levels of HSP70 and HIF1-α were associated with intense expression of antiapoptotic Bcl-2 protein in acute myocardial infraction. Decreased levels of HSP70, HIF1-α and intensive expression of proapoptotic bax were found in cases of chronic ischemia. The decreased expression of HSP70 and HIF1-α is associated with the progressive loss of myocytes by apoptosis. The increased expression of HIF1-α, HSP70 and Bcl-2 in acute myocardial infraction represents a possible compensatory mechanism of salvaged myocytes. The prevalence of the apoptotic mechanism or this of compensatory antiapoptotic may influence the progression of heart failure.

P1858
Association rs619203 polymorphism of a ROS1 gene in development of an ischemic stroke in patients with an arterial hypertension

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Introduction . The gene of ROS1 (rs619203) codes integrated membrane protein I of type. Protein ROS1 has catalytic activity and is a fabric reparation stimulator. It stimulates proliferation of fibroblasts and smooth muscle cells of a vascular wall

and also synthesis of components of connective tissue – glycosaminoglycans and collagen. The specified processes play a key role in an atherosclerosis pathogenesis, and atherosclerosis of cerebral arteries causes an ischemic stroke, and in case of a rupture of the changed vascular wall – a hemorrhagic stroke.
Purpose. Studying of a contribution of rs619203 polymorphism of a gene ROS1 to development of ischemic stroke at patients with an arterial hypertension.
Methods. Examination of 124 patients with an ischemic stroke with an arterial hypertension is conducted. Age median – 60[51; 66.75] years from which there were 75 men, an age median – 57[50; 64.5] years and 49 women, an age median – 63[54; 70] years. Clinical investigation included assessment of neurologic symptoms, a research of the somatic status, control of the ABP, record ECG, an echocardiography, a X-ray analysis, the general and biochemical blood tests, ultrasonic examination of carotid arteries, brain computer tomography. Duration, weight and the sequence of development of the accompanying somatopathies and risk factors were analyzed. The family anamnesis including assessment of existence of disturbances of cerebral circulation in the anamnesis, existence of arterial hypertension, heart diseases (a MI, cardiac arrhythmia, HFA), existence of risk factors was studied.
Results. At 124 patients with an ischemic stroke the following cardiovascular diseases are revealed: at 116 (93.55%) the idiopathic hypertensia of the III level is revealed, atrial fibrillation is diagnosed for 8 persons, that made 6.45%, the ischemic heart disease is documented at 20 patients (16.13%) with an ischemic stroke, chronic cardiac failure at 17 patients (13.71%).
According to results of a research it is established that the frequency of carriers of a homozygous genotype of GG on a widespread allele among patients with ischemic strokes (62.9%±4.3) was statistically significantly higher in comparison with control group (49.3%±2.3, =0.009). Thus, the genotype of GG is risk factor of development of an ischemic stroke, the relation of chances to find GG genotype carrier in group with an ischemic stroke makes 1.459 in comparison with carriers of two other genotypes. Patients had frequencies of genotypes of CC statistically not significantly less with an ischemic stroke (7.3%±2.3), than in group of control (8.0%±1.2, p=0.931).
Conclusions. Communication of polymorphisms of rs1333049 of a chromosome 9r21.3 and ROS1 gene rs619203 with development of an ischemic stroke is shown. Connection between the increased BMI and a heterozygous genotype of CG rs619203 of a gene of ROS1 at patients is established with an ischemic stroke.

P1859

HFWM: - Characterization of a novel closed chest model of ischemic mitral regurgitation in pigs

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Background: Development of translational animal models of cardiovascular disease is crucial to understand the disease mechanism and pathophysiology and provide a unique platform to test novel therapies and devices. Surgical treatment of secondary mitral regurgitation remains a subject of controversy and still doesn't show a clear impact on the mortality. In addition, there is unmet need to establish less invasive approaches in patients with secondary mitral regurgitation.
Aims: therefore, the aim of the present study was to establish and characterize a clinically reliable large animal model of mitral valve regurgitation.
Methods: Young female domestic pigs were used (n=12, weight =60 +/- 12kg)). The induction of mitral valve regurgitation was performed by a localized posteromedial papillary muscle (PMPM) myocardial infarction. The PMPM irrigating branches were first identified by selectively injecting contrast media into the circumflex branches and 2ml of pure Ethanol were injected. The evaluation of the mitral valve regurgitation and cardiac function was assessed by echocardiography. After 6 weeks observation period, pigs euthanized and tissue samples from the papillary muscles and the mitral leaflets were taken for further analysis.
Results: Seven pigs survived the 6 weeks follow up period. Ethanol injection resulted in postero-inferior wall and PMPM dyskinesia. Mitral regurgitation jet area significantly increased (jet area at baseline 0.03±0.015 cm^2 vs at 6 weeks 3.22 ± 0.53cm^2). A significant tenting area developed over the follow up period (Tenting area at baseline 0.35 ± 0.21cm^2 vs 2.17 ± 0.63cm^2 at 6weeks; p<0.001). Significant left ventricle enlargement was noticed (End diastolic diameter at baseline: 50,04 ± 4.34mm vs at 6 weeks 62,12 ± 3.92mm; p<0.001) as well as left atrium enlargement (left atrium area at baseline: 7.75 ±0.95cm^2 vs at 6 weeks 17.65 ± 3.2cm^2; p<0.001). These functional changes were accompanied by an increase expression levels of TGFß, MMP9, IL1ß as well as TLR2 and 4 in the posterior mitral valve leaflet while TNC expression was upregulated in the myocardial tissue but not in the valvular tissue.
Conclusion: We established a novel, reproducible and clinically relevant model of ischemic mitral regurgitation in pigs. The functional changes of MVR were associated with a moderate remodeling on valvular level. Collectively, our large animal model gives a platform to test novel pharmacological and device based therapeutic approaches for treatment and reconstructed MVR.

P1860

Association of titin truncating variants with adverse course of HFrEF in patients with postinfarction cardiosclerosis.

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Background: Titin (TTN) is the biggest protein of human proteome responsible for the majority of sarcomeric myofilament mass in cardiomyocytes. It performs structural and signaling functions within the sarcomere and contributes to myofilament development. Truncating variants of TTN (TTNtv) are found in 25-30% of DCM cases, affecting cardiomyocyte metabolism and modifying the course of the disease. Importantly, TTNtv are found in 1-2% of population being linked to cardiac structural phenotype and remodeling. However, their clinical and pathogenic role in non-cardiomyiopathy patients has not been deeply analyzed. Studies assessing the role of TTNtv in patients with ischemic heart disease and cardiac remodeling after infarction (MI) are lacking. There for the aim of our study was to estimate the frequency of TTNtv in patients with postMI remodeling resulted in severe systolic dysfunction (LV EF<30%).
Materials and methods: Using target high-throughput sequencing with long reads (2x300, insert size – 550-600), we analyzed TTN variants in 74 men aged 40-66 y.o. with postMI remodeling and LV EF (Sim)<30%. Q-MI of the anterior LV wall was detected in 78% cases, the rest patients experienced posterior Q-MI. HF with II/III/IV NYHA was detected in 46/41/13% of the cases. Myocardial revascularization (CABG/PCI) was performed in 50% of patients.
Results: We detected 5 TTNtv and disruptive indels resulting in 6.7%. overall prevalence of TTNtv and disruptive indels in patients with postMI cardiosclerosis and low LV EF. One of these variants is SNP with the formation of a premature stop codon (2:179441737 C>A), one of these variants is frameshift deletion (2:179408726 TC>T). Other variants lead to inframe disruptive insertion or deletion (2:179544685 C>CTCT, 2:179436253 TTTA>T, 2:179514941 TTTTCCTCTTCAGGAGCAA>T (rs374976705). In the studied population, titin truncating variants and disruptive indels were associated with symptomatic sustained ventricular tachycardia (VT): sustained VT was detected more often in TTNtv and disruptive indels-positve compared to TTNtv and disruptive indels-negative patients: 40% vs 13% (<0.05), respectively.
Conclusion: our preliminary data demonstrate that TTNtv and disruptive indels can be associated with severe systolic dysfunction in postMI patients and adverse arrhythmic events. Further studies are needed to assess the impact of TTNtv and disruptive indels on disease course in patients with ischemic heart disease.

P1861

HFWM: - Title: Cannabinoid-sensitive receptor GPR55 deficiency impairs wound healing kinetics and aggravates remodelling post myocardial infarction

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Introduction: Classical cannabinoid receptors CB1 and CB2 have been shown to impact on left ventricular (LV) wound healing post myocardial infarction (MI). Herein, the role of the cannabinoid-sensitive receptor GPR55 remains fully unknown.
Purpose: We aimed at characterizing the impact of GPR55 on acute inflammation and long-term remodelling post MI.
Methods: Female GPR55+/+ and -/- mice were basally characterized or randomly assigned to MI (ligation of the left coronary artery) or sham-surgery and subsequently analysed based on either acute inflammatory and early wound healing responses (infarct size, leukocyte flow cytometry, chemokine qPCR, fetal genes, fibrosis) at day 1, 3 and 5 post MI (n≥6) or based on structural and functional remodelling (echocardiography and gravimetry) at day 3, 7, 14 and 28 post surgery (n≥7).
Results: In the presence of comparable initial infarct sizes (GPR55+/+ vs. GPR55-/-: 27.8±3.6% vs. 22.0±3.2%) at day 1 after MI, onset of acute inflammation, assessed by cardiac expression levels of interleukin-1β, -6 and CCL2, was delayed in GPR55-/- mice, yet subsequently potentiated and even prolonged until day 5 post MI. This was accompanied by a trend towards increased cardiac leukocyte accumulation and splenic myelopoiesis following the coronary occlusion in GPR55-/- mice. Simultaneously, up-regulation of the MI-triggered reparative, pro-fibrotic factors MerTk, MMP-9, MMP-2, TNFα and collagen I and III was accelerated and potentiated in GPR55-/- mice compared to wild-types.

Regarding remodelling, GPR55 deficiency significantly mitigated early compensatory hypertrophy as determined by re-activation of the fetal genes β-MHC and ANP (β-MHC: 5.93±1.42 vs. 2.85±0.67; ANF: 23.16±7.65 vs. 8.18±2.67) and LV function. Besides, lack of GPR55 aggravated features of maladaptation, such as increased LV diameter and volume, decreased ejection fraction and fractional shortening, thinning of the infarcted anterior wall and infarction expansion into the intraventricular septum post MI.
Conclusion: GPR55 deficiency impairs acute wound healing kinetics, attenuates induction of early compensatory hypertrophy and aggravates dilatation, matrix deposition, scar thinning and infarction expansion after MI. Taken together, our study alludes for the first time in vivo toward a regulatory role of GPR55 during post MI wound healing and LV remodelling.

Basic Science - Cardiomyopathies 1

P1863
A novel peptide agonist of galanin receptors reduces doxorubicin-induced heart failure in rats

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Background. The clinical use of the chemotherapeutic agent doxorubicin (D) is limited by its cardiotoxicity, which leads to irreversible degenerative cardiomyopathy and heart failure. [βAla14, His15]-galanine (2-15) (G) is a novel pharmacological agonist of galanine receptors GalR1-3 having cardioprotective properties in animal models in vivo.
Purpose. The aim of this work was to study the effect of the peptide G on metabolic and functional disturbances of the heart caused by chronic Dox-induced cardiotoxicity in rats.
Methods. The study followed the "Principles of laboratory animal care" (NIH Publication no. 85-23 revised 1985). G was synthesized by the automatic solid phase method and identified by 1H-NMR spectroscopy and mass spectrometry. Male Wistar rats were divided into four groups and treated for 8 weeks with Dox (D group), Dox and G (D+G group), G (G group) or saline (control). Dox, G and saline were administered intraperitoneally at doses of 2 mg/kg/week, 50 nmol/kg/day and 1 ml/kg/week, respectively. Before treatment and at the end of the study, the animals were weighed and cardiac function was evaluated by echocardiography; the concentration of thiobarbituric acid reactive substances (TBARS) and the activity of creatine kinase-MB (CK-) were determined in blood plasma. Myocardial content of metabolites and mitochondrial respiratory parameters in saponin-permeabilized fibers of the left ventricle (LV) were determined at the end of the experiments.
Results. After an 8-week study, D group exhibited a pronounced cardiac failure, the absence of weight gain and an increase in TBARS concentration and plasma CK-MB activity in plasm. These disorders were accompanied by a decrease in the content of high-energy phosphates in the heart, deterioration of mitochondrial respiration, accumulation of myocardial lactate and glucose, and alterations in myocardial metabolism of glutamic acid, aspartic acid and alanine. Coadministration of G and Dox prevented an increase in CK-MB activity and significantly reduced the plasma TBARS concentration. In D+G group, the myocardial energy state and respiratory control of mitochondria were higher than in D group, there was a decrease of anaerobic glycolysis in the heart and no change in the content of myocardial amino acids as compared to control. Coadministration of G along with G significantly improved the parameters of LV function and caused weight gain in animals of D+G group compared with these indices in D group. No functional or metabolic changes were observed in G group compared with controls.
Conclusion. The results suggest that the peptide G can be used as an adjuvant therapy against Dox-induced cardiotoxicity.

P1864
Impact of glutathione S-transferase M1, T1 and P1 gene polymorphisms on the chronic heart failure

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Background: Chronic heart failure (CHF) secondary to ischemic heart disease belongs to oxidative disease. 8-hydroxy-2'-deoxyguanosine (8-OHdG) is a marker of oxidative DNA damage caused by reactive oxygen species (ROS). Members of the glutathione transferase (GST) superfamily catalyze a conjugation of glutathione with a broad range of xenobiotics including reactive oxygen species.
Aim: The aim of this study was to investigate the role of certain GST polymorphisms in the risk of CHF development, as well as the association of different GST variants with the level of 8-OHdG among those patients.Material and methods: The genotypes of GSTM1, GSTT1 and GSTP1 were characterized on DNA isolated from 116 patients with CHF classified according to New York Heart Association classification (NYHA) and 166 healthy controls, all of which completed a structured interview. GST genetic polymorphisms were determined by multiplex PCR or qPCR. Byproducts of DNA oxidative damage (8-OHdG) were determined by ELISA method.
Results: The frequency of GSTT1-null genotype was higher in patients with HF (33%) compared to controls (22%), with an adjusted OR of 3.08 (95% CI: 1.23-7.73; p=0.016). GSTM1 null genotype was found in 58% cases and in 49% controls (p=0.458). GSTP1-variant genotype was found in 53% of cases and in 59% controls (p=0.396). 62% of patients had combined GSTM1-active/GSTP1-referent genotype (OR: 2.68; 95%CI: 0.63-11.38; p=0.180) while 63% of CHF patients had combined GSTT1-active/GSTP1-referent genotype with adjusted OR of 0.68 (95%CI: 0.21-2.17). CHF patients with combined GSTM1-active/GSTT1 active genotype didnt have statistically higher level of 8-OHdG compared to the carriers of GSTM1-null/GSTT1-null genotype (OR: 1.19; 95%CI: 0.31-3.19; p=0.329). Also, patients with combined GSTT1-active/GSTP1-referent genotype didnt have statistically higher level of 8-OHdG compared to the carriers of GSTT1-null/GSTP1-variant genotype (OR: 1.18; 95%CI: 0.31-3.41; p=0.619).
Conclusion: The frequency of GSTM1, GSTT1 and GSTP1 null genotype in present study was similar to what was published previously. GSTT1 null genotype increases the risk of chronic heart failure while GST genotype status did not have influence on the level of 8-OHdG.

P1865
Murine Experimental Autoimmune Myocarditis (EAM) is associated with LV hypertrophy but not with reduced LV systolic function

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Background: EAM is a common animal model for the investigation of the pathophysiology of myocarditis. Because of diverging echocardiographic findings regarding LV systolic function from previous studies, we performed serial echocardiographic examinations throughout the course of the disease and investigated the dimensions of the murine heart and LV systolic function.
Materials and Methods: EAM was induced in male Balb/c mice by subcutaneous injection of a fragment of the α-myosin heavy chain (MyHC-α 614–629: Ac-SLKLMATLFSTYASAD), as previously published. Transthoracic echocardiography was performed on days 0, 7 and 21 in healthy animals and mice with EAM.
Results: EAM was associated with a reduction in LV systolic function and an increase in LVIDd and LVIDs 7 days post immunization. After 21 days, EAM was associated with LV hypertrophy (1.3-fold increase in septal thickness), but we did not observe a significant difference in LV systolic function when compared to healthy controls.
Conclusion: Our results indicate that EAM leads to an initial dilatation of the LV that is further followed by hypertrophy of the myocardium. Three weeks after the immunization, there was no significant difference in LV systolic function when immunized animals were compared to healthy controls.

P1866
Role of innate immune mediators in cardiac damage induced by Doxorubicin in vitro

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Background: Even if cardiomyocytes are the most common target of research studies on cardiotoxicity induced by Doxorubicin (DOXO), the contribution of inflammatory cells is of growing interest. Several reports suggest a direct correlation between inflammation and oxidative stress in response to DOXO Purpose: To evaluate the role of inflammation on cardiac damage in response to DOXO. Methods: C57/Bl mice were treated with DOXO (10 mg/Kg) by intraperitoneal injection and histological and biochemical analysis were performed on isolated hearts after 1, 3 and 5

days from treatment. Cytokines production in response to DOXO was evaluated in macrophages culture supernatant by ELISA. In cardiomyoblast (H9C2), mitochondrial mass, TMRE and ROS production were evaluated by cytofluorimetry while LC3 and Caspase levels by western blot. Results: A significant inflammatory infiltrate was observed in mice hearts 5 days after treatment, when a cardiac damage is also present. In order to evaluate whether a crosstalk could exist between macrophages and cardiomyocytes that could affect cardiac outcomes in response to DOXO, we compared two different conditions in H9C2 cells: treatment with culture medium from macrophages (RAW 264.7) exposed to DOXO for 24 hours (M-DOXO) and direct treatment with DOXO (D-DOXO). Both conditions caused an increase of Cleaved caspase-3 levels that was higher in response to M-DOXO. D-DOXO exposure induced an increase of ROS production that was associated with the activation of mitochondrial recovery in terms of increased mitochondrial biogenesis, mitochondrial mass and mitochondrial potential. Conversely, in response to M-DOXO mitochondrial recovery was impaired. Indeed, the increase of mitochondrial biogenesis did not occur and an impaired mitochondrial morphology, showing a prevalence of mitochondrial fission processes, was observed. Moreover, M-DOXO caused a reduction of LC3 mitochondrial levels suggesting alterations of mitophagy, a key player of mitochondrial recovery. Once evaluated the indirect effects of DOXO on cardiac cells through macrophages, we identified the molecules which are secreted by macrophages in response to DOXO that could affect cardiac cell biology. DOXO affected macrophages cytokines production profile, with main alterations of IL-4 and IL-1b expression.
Conclusions: Our data suggest that a crosstalk between inflammatory and cardiac cells could be responsible of cardiac damage in response to DOXO. The identification of inflammatory molecules that could orchestrate the cardiac deleterious effects of DOXO would allow the discovery of new therapeutic targets and/or early markers of anthracycline-induced cardiotoxicity.

P1867
Genetics and Histopathology Features of Noncompaction Cardiomyopathy in heart transplant individuals

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Background: Left ventricular non-compaction cardiomyopathy (LVNC) is a genetic cardiomyopathy with unclear etiology. The clinical symptoms range from asymptomatic to heart failure, arrhythmia, and sudden cardiac death.
Purpose: This study investigated the genetic background and histopathology features of LVNC, and aimed to establish the correlation between genotype-phenotype.
Methods: We recruited 16 LVNC cases who underwent heart transplantation in our hospital. Exome-sequence data, clinical and histopathology features of patients were reviewed and analyzed. Gene-expression profiling of tissue fibrosis was evaluated by quantitative RCR.
Results: This study consisted of 16 LVNC patients, the median age was 21±9.5 years. Of 16 patients, 14 patients harbored sarcomere gene mutations associated with genetic cardiomyopathy. Multiple mutations in TNNT2, MYH7 and MYBPC3 were the major genetic causing of patients. Young patients with TNNT2 mutations had high risk for heart failure and ventricular tachycardia at an early age. Myocardium samples with MYBPC3 and/or MYH7 mutations have hypertrophic cardiomyocytes and disordered morphology of sarcomere. The obvious myocardial interstitial fibrosis was observed in half of samples, as well as young patients who have positive late-Gadolinium enhancement at MRI. By comparison, fibrosis was more associated with the onset-time of symptom, not just age of patients. Genes related with cardiac myofibroblasts activation and extracellular matrix remodeling were dramatically upregulated, whereas the anti-fibrotic factor was corresponded downregulated, which suggested fibrosis of LVNC was a result of accumulative disease progress. Young patients (<18y) with lower LV ejection fraction and multiple mutant genes was more likely to deteriorate rapidly.
Conclusion: In conclusion, LVNC has a complex genetics and histology features. Multiple sarcomere mutations played an important role on etiology of LVNC. Genetic testing is benefit for identifying patients in risk and should be considered in genetic counseling.

P1868
Progression of cardiac and vascular dysfunction in a mouse model of Duchenne muscular dystrophy

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Background: Duchenne Muscular Dystrophy (DMD) is an X-linked recessive, progressive muscle wasting disease. Besides skeletal muscle degeneration, increasingly important source of morbidity and mortality is dilated cardiomyopathy leading to heart failure, arrhythmias and vascular dysfunction. There is substantial evidence that Tenascin C (TN-C) plays role in maladaptive left ventricular remodelling and its serum levels were associated with the severity of left ventricular (LV) dysfunction in patients with ischaemic heart disease and heart failure. In addition, recent studies demonstrated that endothelial dysfunction may contribute to the progression of dilated cardiomyopathy. Aims: Our study was aimed to 1) assess the progression of cardiac and vascular (dys)function in mice (3, 6 and 10 months old) with DMD and 2) explore the role of TN-C, as a potential biomarker of the cardiac complications in DMD. Methods: Male mdx and BL/10 mice were used (3, 6 and 10 months old). Echocardiography was performed to assess LV ejection fraction (LVEF) and hemodynamic function was recorded by an invasive method involving the determination of LV systolic pressure (LVSP). Vascular reactivity was performed by wire myography. RT-qPCR was performed to assess the expression of Tnc mRNA and plasma levels of TN-C was measured by ELISA. Results: Mice with DMD showed a moderate and severe endothelial dysfunction at age of 3, 6 and 10 months old in comparison with Wt littermates ($p<0.05$). In addition, LV dilation was observed in DMD mice compared to Wt littermates ($p<0.05$; 6 and 10 months old) and plasma levels of TN-C was positively correlates with LV-end systolic and LV-end diastolic diameter.
Conclusions: Our study first time demonstrated an early and progressive endothelial dysfunction in mice with DMD. In addition, plasma levels of TN-C increased and correlated with LV dimension. Collectively, our data are suggesting that targeting early endothelial dysfunction and TN-C upregulation may be a novel therapeutic approach for preserving cardiovascular function in patients with DMD.

P1869
Inhibition of cardiac lymphangiogenesis in imatinib-induced cardiomyopathy

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Background: Imatinib mesylate (IM) is the backbone for the treatment of chronic myeloid leukemia and gastrointestinal stromal tumors. It inhibits the Abl-tyrosine kinase and PDGFR. Tyrosine kinase inhibitors have been implicated in cardiovascular side effects and the observed fluid retention may result from a defective lymphatic drainage.
Purpose: The possibility that PDGFR-targeting drugs can affect the integrity of cardiac lymphatics was tested in a model of IM-induced heart failure.
Methods: Myocardial samples of two patients who died of heart failure while under IM treatment were analysed. For animal studies, rats were injected with 100mg/kg IM three times a week for 3 weeks. Hemodynamic data were obtained, and the hearts were collected for morphometric, immunofluorescence and electron microscopy analysis.
Results: IM-treated human hearts were characterized by interstitial edema, mitochondrial damage and several features of autophagy. IM treatment reduced survival in the absence of severe myelotoxicity. Slight decrease in systolic blood pressure and altered left ventricular end-diastolic pressure and positive and negative dP/dT were detected. These changes were accompanied by increased theoretical water content and reduced lymphatic vessel density in the myocardium. To determine whether IM affect the process of lymphatic lineage commitment, expression of Prox-1 was evaluated in the population of rat cardiomyocyte-fibroblast-depleted stromal cells with the very low expression of Prox-1. VEGF-C containing lymphatic specific medium induced a 6-fold increase in Prox-1. This effect was blunted by IM.
Conclusions: Inhibition of tyrosine kinase by IM is translated at myocardial level in structural and functional alterations of cardiac lymphatics in the absence of myocardial fibrosis. These data indicate that defective lymphangiogenesis may contribute to tyrosine kinase inhibition-induced cardiovascular events.

P1870
Proarrhythmic interaction of NaV1.8 and CaMKII in human heart failure

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In human heart failure (HF), persistent Na+ current (INaL) is enhanced and may lead to arrhythmias. During HF, Ca/Calmodulin-dependent protein kinase IIδ (CaMKIIδ) and INaL are increased in parallel. CaMKIIδ increases INaL via regulation of sodium channels thereby contributing to arrhythmias through early- and

delayed-afterdepolarizations (EADs and DADs). Genome-wide association studies (GWAS) have described the implication of the neuronal sodium channel isoform NaV1.8 (SCN10A) in cardiac electrophysiology showing modulation in cardiac conduction, such as PR and QRS interval. Our group showed that the expression of the isoform NaV1.8 is significantly upregulated in human HF cardiomyocytes and contributes substantially to the enhanced INaL.
In the present study, we investigated a potential cross-talk of CaMKIIδ and NaV1.8 and its role in cardiac electrophysiology and arrhythmogenesis the heart.
Co-immunoprecipitation experiments revealed an association of CaMKIIδ and Nav1.8 in human homogenates. Furthermore, immunohistochemistry staining in isolated human cardiomyocytes showed a co-localization of CaMKIIδ and NaV1.8 at the intercalated disc and t-tubules. Therefore, we performed electrophysiological experiments to investigate the functional consequence of these findings.
Whole-cell patch clamp experiments were performed in isolated human and murine ventricular cardiomyocytes to measure the contribution of NaV1.8 and CaMKIIδ in INaL generation. We observed a significant reduction in INaL after adding the novel specific NaV1.8 blocker PF-01247324 (orally bioavailable; 1 μmol/L) and a CaMKIIδ inhibitor, autocamtide inhibitory peptide (AIP, 1 μmol/L) in failing human ventricular cardiomyocytes. When PF-01247324 and AIP were administered together a more pronounced decrease in INaL compared to PF-01247324 or AIP alone was recorded, indicating a synergistic effect.
Ca2+-sparks were measured using confocal microscopy with the Ca2+ dye fluo-4 AM. Inhibition of both NaV1.8 and CaMKIIδ lead to a decreased SR-Ca2+ spark frequency (CaSpF) in failing human cardiomyocytes. These findings illustrate that SR Ca2+-leak can be induced by NaV1.8-dependent INaL via Ca2+ overload possibly resulting in arrhythmia.
Additionally, Ca2+ transients were measured using epifluorescence microscopy with the Ca2+ dye fura-2. We did not observe a change in the amplitude of Ca2+ transients after administration of a NaV1.8 blocker in transgenic murine cardiomyocytes suggesting no negative inotropic effect.
Our results demonstrate the significance of both CaMKIIδ and NaV1.8 in INaL generation and their detrimental interaction. This data suggest that increased CaMKIIδ activity plays a substantial role for the activation of NaV1.8-mediated late sodium current.

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P1874
HFWM: Sera from myocarditis patients caused iron depletion in cultured human cardiomyocytes

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Background Cardiomyocytes are the main cells affected in the course of myocarditis. They are particularly sensitive to changes in iron homeostasis and reactive oxygen species (ROS). Iron is crucial for the maintenance of optimal energy metabolism, but also plays an important role in inflammation and ROS production. We hypothesize that iron homeostasis might be involved in the pathogenesis of myocarditis.
Purpose The aim of the study was to assess differences in profiles of the expression of key genes involved in iron homeostasis, cardiac remodeling, and protection against ROS in human cardiomyocytes (HCMs) cultured in the presence of sera from patients with acute myocarditis and after 6 weeks of recovery, and also to compare the results with healthy controls.
Methods In HCMs cultured for 48 hours with sera from 11 patients and 7 controls we analyzed expression of light and heavy ferritin chains [FTL, FTH], transferrin receptor 1 [TfR1], galectin 3 [LGALs3], TGFß signaling [TGFß1, TGFß2, TGFß3], glutathione peroxidase [GPX] and superoxide dismutase [SOD1] at the mRNA level using RT-qPCR.
Results We found a significant increase in an expression of TfR1 ($p<0,01$) in HCMs exposed to sera from myocarditis patients, in comparison to those treated with sera from healthy controls. Additionally, elevated expression of TfR1 in cells correlated with serum levels of total iron ($R=-0,52$; $p<0,05$), CRP ($R=0,67$; $p<0,05$), and NT-proBNP ($R=0,55$; $p<0,05$), suggesting increased iron demand in HCMs and its possible relation to inflammation and hemodynamic dysfunction in patients. Moreover, we observed elevated expression of FTH and FTL (both $p<0,01$) and its strong correlation with expression of TfR1 as well as with increased levels of CRP in sera. It could be explained by the double role of ferritin in iron storage and in inflammation.
In the context of remodeling potential HCMs treated with myocarditis sera, in comparison to those treated with sera from healthy controls, displayed augmented expression of galectin 3 ($p<0,01$) and disturbances in TGFß genes. Interestingly, upregulation of galectin 3 was related to changed iron homeostasis, reflected by correlations with TfR1($R=0,77$; $p<0,05$), FTH($R=0,92$; $p<0,05$) and FTL ($R=0,76$; $p<0,05$).
Additionally, HCMs treated with sera from myocarditis patients showed increased expression of ROS defensive genes such as GPX and SOD1 (both $p<0,01$), and also strongly correlated with expression of TfR1, FTH, and FTL. Thus, it is possible that an impairment in iron homeostasis in the course of myocarditis may exaggerate oxidative stress.
A similar pattern of gene expression profile was observed in HCMs treated with sera collected after 6 weeks of clinical recovery, suggesting that the negative impact of sera was preserved.
Conclusions Malfunctioning of cardiomyocytes in myocarditis might be related to derangements in the expression of genes involved in iron homeostasis, cardiac remodeling, and ROS protection

P1875
Mir-146a plasma levels are increased in patients with hypertrophic cardiomyopathy

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Introduction: Hypertrophic cardiomyopathy (HCM) is a genetic disease of the myocardium caused by mutations in sarcomeric genes and characterized by hypertrophy and fibrosis. MiRNAs are important posttranscriptional regulators of gene expression with an increasingly recognized role in cardiovascular disease. Among the miRNAs studied so far, miR-146a could be a promising biomarker or therapeutic target for HCM. Besides its role in the inflammatory response resolution, emerging evidence suggests that mir-146a also plays a significant role in cardiac hypertrophy, atherosclerosis and peripartum cardiomyopathy.
Purpose: The aim of this study was to investigate plasma miR-146a levels in hypertrophic cardiomyopathy patients and normal controls.
Materials and methods: miR-146a levels were analysed in plasma samples from 50 patients with hypertrophic cardiomyopathy and 30 normal controls using real time qPCR and specific TaqMan assays. cel-miR-39 was used as external spike-in control. Relative quantitation was performed using the 2-ΔΔCt method. Patients were subjected to standard echocardiographic evaluation. Data regarding myocardial fibrosis assessed using late gadolinium enhancement cardiovascular magnetic resonance (LGE-CMR) were retrieved from patients’ records. Serum Troponin I was used as a marker of myocardial damage. Statistical analysis was performed using SPSS (v25). This research was approved by the appropriate institutional review board, and a written informed consent was obtained from each participant.
Results: miR-146a plasma levels was significantly higher in HCM patients than in healthy controls ($p=0.012$). Interestingly miR-146a was not associated with maximal myocardial wall thickness ($rs=0.098$, $p=0.595$), the extent of myocardial fibrosis (LGE-CMR) ($rs=-0.094$, $p= 0.760$) and serum troponin I levels ($rs=0.097$, $p=0.524$).
Conclusion: Our study indicates that plasma miR-146a is increased in HCM patients. However, the potential role of miR-146a as a genetic modifier in HCM remains to be elucidated.

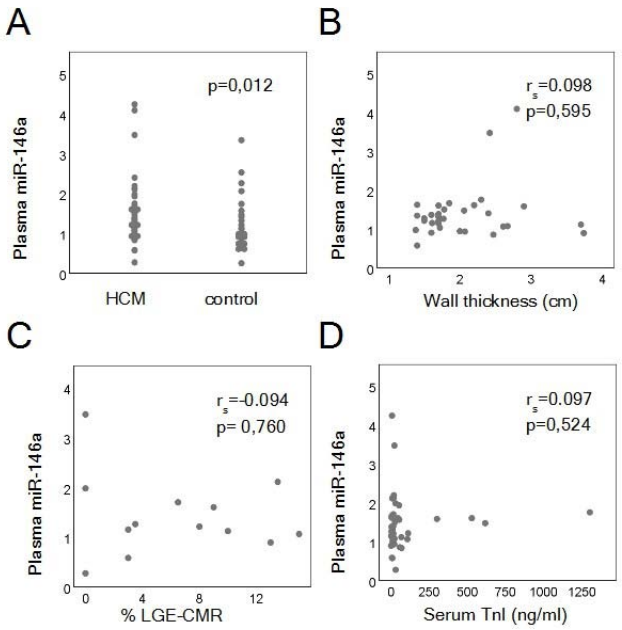

Figure 1: miR-146a serum levels in HCM

P1876

HFWM: - Title: Reactivation of fetal gene program, cardiomyocyte dedifferentiation and hypertrophy in heart failure

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In heart failure (HF) cardiomyocyte remodeling includes: restructuring of the contractile apparatus; changes in energy metabolism. Dedifferentiation represents a key feature of cardiomyocyte remodeling. It is characterized by reactivation of the fetal gene program. Compared to normal myocytes, dedifferentiated cells become more fetal with increased diameter and surface area. Dedifferentiation arises in vivo, in fibrillating atria, ischemic myocardium, and in the border zone of myocardial infarcts. Such dedifferentiated myocytes are not apoptotic and presumably reflect adaptations to abnormal myocardial stress. Re-expression of alpha skeletal actin (alpha SKA) is a marker of cardiomyocyte dedifferentiation but in the same time it is a marker of cardiomyocyte hypertrophy too. Cell dedifferentiation is accompanied by a shift from oxidative phosphorylation to glycolysis. A key regulator of cardiac energy metabolism is transcription factor peroxisome proliferator-activated receptor alpha (PPAR alpha).

The aim of the work to study cardiomyocyte dedifferentiation and hypertrophy in dilated cardiomyopathy (DCM) and HF, the expression of alpha SKA, PPAR alpha and of myosin protein kinase zipper interacting protein kinase (ZIPK) in cardiomyocytes. Endomyocardial biopsies (EMB) were obtained from 28 patients with DCM and HF. Transmission electron microscopy was used to detect cell ultrastructure. The gene expression levels of PPAR alpha, alpha SKA and ZIPK were determined using real time PCR.

Revealed cardiomyocytes have main features of dedifferentiated cardiomyocytes - increased diameter and surface area, sarcomere disorganization, enhanced glycogen content. Gene expression levels of PPAR alpha decreased, gene expression levels of alpha SKA and ZIPK increased in DCM and HF.

PPAR alpha expression level decrease shows shift from oxidative phosphorylation to glycolysis, a transition to dedifferentiated state of cardiomyocytes. Our results demonstrate the reactivation of the fetal gene program, features of fetal heart include the preference of carbohydrates over fatty acids as energy substrate. ZIPK expression level is elevated, perhaps ZIPK is involved in sarcomerogenesis during hypertrophy in HF. The level of alpha SKA may be a useful determinant for the degree of dedifferentiation in HF and an indicator for possible redifferentiation. Since the reactivation of the fetal cardiac gene program is also a characteristic feature of hypertrophic cardiomyocytes during HF, it is possible that the main distinction between hypertrophy and dedifferentiation was made by the presence or absence of glycogen accumulation. We propose that cardiomyocytes detected in our study are dedifferentiated cardiomyocytes. Dedifferentiated cardiomyocytes may take part in cardiac regenerative processes in HF and the understanding of the mechanisms of dedifferentiation, proliferation and redifferentiation of cardiomyocytes is important for heart regeneration and repair.

P1877

Myocardial perfusion disturbance in the development of chronic Chagas cardiomyopathy

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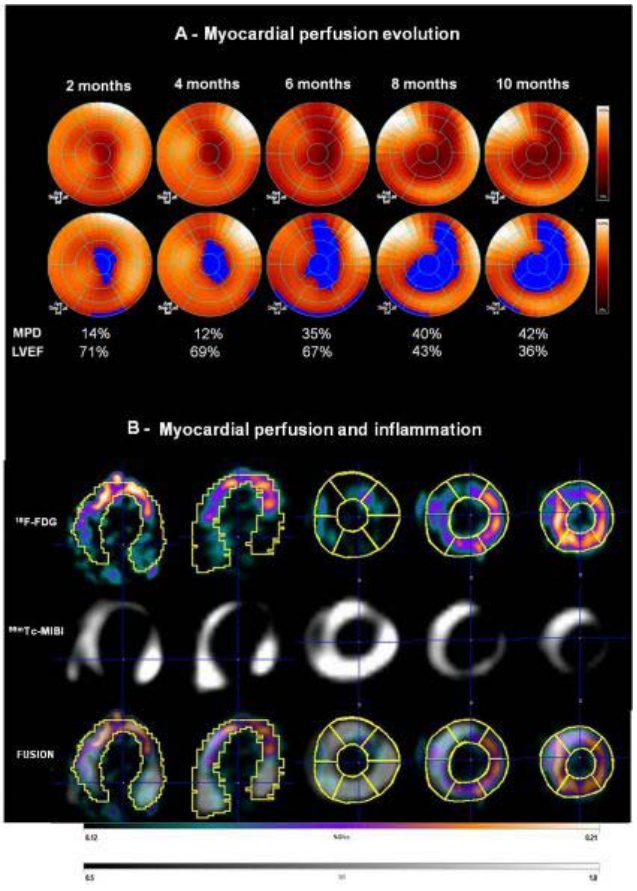
Funding Acknowledgements: São Paulo Research Foundation (FAPESP)

Background: Myocardial perfusion defects (MPD) is a common finding in Chronic Chagas cardiomyopathy (CCC), but it is unclear if the perfusion derangement can precede and correlate with the development of left ventricular (LV) systolic dysfunction and myocardial fibrosis.

Purpose: We investigated the time-course of myocardial perfusion changes and the correlation with the histopathological changes and the progression of LV systolic dysfunction in an experimental model of CCC.

Methods: The study included 40 female Syrian hamsters infected with 3.5x104 trypomastigotes forms of T. cruzi Y-strain and their respective controls (n=10). Surviving animals (22 infected and 10 controls) were submitted to in vivo imaging 2, 4, 6, 8 and 10-months afterwards. Rest high-resolution SPECT imaging using 99mTc-sestamibi was used to assess MPD extension that was analyzed by using polar maps considering the uptake threshold of 50% compared to the maximum pixel uptake value. The left ventricular ejection fraction (LVEF) and the systolic and diastolic diameter (LVSD and LVDD) were assessed by using 2D-echocardiogram. The animals underwent PET imaging using 18F-FDG for assessment of myocardial viability and inflammation. Histological analysis included quantification of myocardial inflammation intensity and fibrosis extension.



Picture

Results: Eight out of 22 (36%) surviving infected animals showed significant LV ejection fraction (LVEF) deterioration after 8-months (%; 60±11 vs 70±3 vs 70±5, p=0.007) and 10-months (%; 54±9 vs 70±3 vs 70±3, p<0.0001) compared to control and infected animals without systolic dysfunction, respectively. However, MPD in infected animals showing LV systolic dysfunction displayed significant progressive deterioration first detected at 6 months after infection. Early stages MPD correlated with the late values of LVEF, LVSD, LVDD and extent of myocardial fibrosis. Moreover, MPD at 6-months correlated with the LVEF decrease from 6 to 10 months after infection (r= 0.56, p=0.0008). MPD in the present experimental model exhibited frequency and topographic similarities with MPD seen in human CCC. Also, MPD correspond to areas with metabolically viable myocardium and correlates topographically with higher 18F-FDG uptake indicating that MPD were associated to myocardial inflammation, which was confirmed by histological assessment.
Conclusions: Rest MPD precedes the development and correlates with the ulterior fibrosis and deterioration of LV systolic dysfunction in experimental CCC. The MPD was topographically associated with increased 18F-FDG uptake, suggesting a correlation between inflammation and the myocardial perfusion derangement. Our findings indicate that MPD may be a surrogated marker for myocardial inflammation in CCC and raise the possibility of using perfusion imaging for risk stratification and monitoring the course of this myocardial disease.

P1878

Oxidative sensitivity of sarcomeric titin isoforms gradually decline during cardiac development

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Introduction: During the perinatal adaptation the N2BA titin isoforms are switched for N2B titin isoforms leading to an increase in sarcomeric passive force (Fpassive). We assume that cardiomyocyte development is accompained by a gradual decline in the oxidative sensitivities of titin, and consequently Fpassive becomes more and more resistant against oxidative insults in developing cardiomyocytes. Here we attempted to reveal a hypothetical link between the extents of titin isoform oxidation and small heat shock protein (sHSP) expressions (i.e. HSP27 and αB-crystallin).
Methods: Mechanically isolated and permeabilized left ventricular cardiomyocytes from 0, 7 and 21 day-old and 8 weeks old adult control rats were used. The effects of SH oxidation and carbonylation of titin isoforms were evaluated following in vitro exposures to an oxidative agent, dithiodipyridine (DTDP) or Fenton reagents in cardiomyocytes. Western immunoblot assays were carried out for the semiquantitative determination of oxidized SH-groups or carbonyl-groups of titin isoforms and to monitor sHSPs' expressions. Immunohistochemistry assays were performed to correlate the age-dependent characteristics of titin isoform and sHSPs expressions.
Results: The relative extents of DTDP-evoked SH oxidations and Fenton-evoked carbonylations declined with cardiomyocyte age for both titin isoforms (N2BA(DTDP): 80±1%, 71±1%, 64±1%, cannot detect; N2B(DTDP): 74±1%, 62±2%, 53±2%, 32±2%,; N2BA(Fenton): 2.57±0.06 AU, 2.37±0.04 AU, 1.35±0.03 AU, cannot detect; N2B(Fenton): 2.90±0.10 AU, 2.58±0.04 AU, 1.80±0.04 AU, 1.51±0.03 AU in 0, 7 and 21-day- old rats and adult animals, respectively, P<0.05, n=4-20). The expression levels of sHSPs increased significantly with age (HSP27: 1.04±0.09, 2.14±0.21, 3.04±0.46, 4.83±0.47; αB-crystallin: 1.00±0.12, 1.61±0.17, 3.23±0.58, 4.41±0.70 in 0, 7, 21 day-old and adult rats, respectively, in relative units, P<0.05, n=6). Strong correlations were found between the expression levels of sHSPs and oxidation of titin isoforms. Conclusion: Our data implicate a gradual build-up of a protective mechanism against titin oxidation through the upregulation of HSP27 and αB-crystallin expressions during postnatal cardiomyocyte development.

P1879

A novel phospholamban p.Arg14del cardiomyopathy mouse line treated with heart failure medication

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BACKGROUND: Phospholamban (PLN) plays a role in cardiomyocyte calcium handling by acting as a negative regulator of the sarcoplasmic/endoplasmic reticulum Ca2+-ATPase (SERCA). A mutation in the PLN gene leading to the deletion of arginine 14 (R14del) of the PLN protein, is the most frequently identified mutation in patients with dilated cardiomyopathy (DCM) or arrhythmogenic cardiomyopathy (ACM) in the Netherlands. Cardiomyopathy patients that carry the PLN-R14del mutation have a worse prognosis than cardiomyopathy patients that do not carry this mutation, evidenced by more appropriate implantable cardioverter-defibrillator (ICD) discharges and more sudden cardiac death (SCD). There is no specific therapeutic treatment available for these patients other than standard heart failure treatment and heart transplantation.
PURPOSE: The aim of this study is to generate a mouse model of PLN-R14del-induced cardiomyopathy and to screen for treatment options. First treatment consisted of standard heart failure medication including a beta blocker (metoprolol) and a mineralocorticoid receptor antagonist (MRA; eplerenone).
METHODS: The PLN-R14del mutation was introduced into the genome of C57BL/6N mice and backcrossed into C57BL/6J mice. Cardiac function was assessed using echocardiography, electrocardiography (ECG) and histological and molecular analysis. Metoprolol was orally administered as ‘350 mg/kg/day via the drinking water and eplerenone was orally administered as ‘200 mg/kg/day via the chow (n=10-12 per group). All animal studies were performed according to National Institutes of Health (NIH) guidelines and in accordance with national regulations.
RESULTS: Homozygous PLN-R14del mice had increased left ventricular (LV) volume with decreased fractional shortening (FS) in comparison to wild-type littermates. In addition, decreased ECG potentials and prolonged QTc were observed. This resulted in decreased survival with a maximum life span of 2 months. Histological analysis showed severe cardiac fibrosis and aggregation of PLN proteins in the cardiomyocytes. Molecular analysis demonstrated increased levels of genes and proteins associated with cardiac stress, fibrosis and endoplasmic reticulum (ER) stress. Administration of eplerenone significantly decreased LV volume and atrial and pulmonary congestion. In addition, gene expression of B-type natriuretic peptide (BNP) and collagen genes was reduced. However, neither metoprolol nor eplerenone could improve cardiac function or survival of these mice.
CONCLUSION: Homozygous PLN-R14del mice exactly mimic human disease in an accelerated manner. Administration of standard heart failure treatment including metoprolol and eplerenone does not give beneficial effects in these mice. The findings of this study underline the need for better understanding of the pathology of PLN-R14del-induced cardiomyopathy and problem-targeted therapy.

P1880

MicroRNAs expression in hypertrophic cardiomyopathy patients.

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Purpose: to analyze the circulation miRNAs expression in patients with hypertrophic cardiomyopathy (HCM) and heart failure (HF).
Methods: Forty three patients with HCM (21 patient with stable course (SC) (men-15; average age 52.6±3.04) and 23 patient with progressive course (PC) (men-15; average age 56.8±2.48) and 43 healthy controls were enrolled to the study. HFpEF was observed in 14 HCM patients. For miRNA profiling the RT-qPCR assay was performed. Based on literature data 3 miRNA associated with hypertrophy and fibrosis were selected for the study: miRNA-29a, miRNA -21, miRNA -133a.
Results: Expressions of these miRNAs were compared in studied groups. There were statistically significant differences of miRNAs expression between HCM patients and control group. Expression of miRNAs were higher in patients with HCM (p<0.005). The ratio of miRNA-21 level in HCM patients to controls (HCM/controls) was 4.806 [4.16; 5.45], miRNA -133a (HCM/controls) - 0.014 [0.010; 0.018], miRNA -29a (HCM/controls) - 0.522 [0.455; 0.590]. There were no significant differences between miRNAs expression in HCM patients with and without HFpEF. There were no significant differences in miRNAs expression between stable course of HCM and progressive course.
Conclusions: 1. Expression of miRNA-21, -133a, -29a were higher in patients with HCM in comparison with control group.
2. There were no significant differences between miRNAs expression in HCM patients with and without HFpEF.
3. There were no significant differences in miRNAs expression between stable course of HCM and progressive course.

P1881

The altered expression of autophagy-related genes participates in heart failure: NRBP2 and CALCOCO2 decrease left ventricular function in human dilated cardiomyopathy

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Background: Dilated cardiomyopathy (DCM) frequently results in heart failure, a syndrome with an increasingly high prevalence and mortality rate. Recently, we reported changes in expression and structural alterations in Golgi apparatus of patients with DCM. This organelle has been described as a potential source for autophagosomes development, an essential stage of the autophagy mechanism.
Purpose: This study aimed to analyze changes in the expression of autophagy- and phagocytosis-related genes in patients with DCM, especially in relation to left ventricular (LV) dysfunction. Furthermore, we investigated if the gene expression changes were translated into ultrastructural alterations.
Methods: Twenty-three human left ventricle tissue samples were obtained from DCM (n = 13) patients undergoing heart transplantation and control (CNT; n = 10) donors. Diagnosis of DCM was based on clinical history, Doppler echocardiography, and coronary angiography data. Total mRNA levels of heart samples were analyzed by RNA sequencing. Furthermore, transmission electron microscopy of the diseased tissue was carried out by a JEOL TEM system.
Results: The altered expression ($P < 0.05$) of 13 autophagy- and 3 phagocytosis-related genes was observed. The expression changes of the autophagy-related genes NRBP2 and CALCOCO2 were associated with cardiac dysfunction and remodeling ($P < 0.05$). The affected patients had a higher activity of these degradation processes, as evidenced by the greater number of autophagic structures in the DCM tissue ($P < 0.001$). Differences in the ultrastructural distribution were also found between the DCM and CNT tissues.
Conclusions: These results show that in patients with DCM, the altered expression of NRBP2 and CALCOCO2 is related to LV dysfunction and remodeling. Clarification of the molecular mechanisms of cardiac autophagy would help in the future development of therapies to improve LV performance.

P1882

Identification of RAF1 gene mutations in Hungarian patients with hypertrophic cardiomyopathy

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Noonan syndrome (NS) belongs to RASopathies and is an autosomal dominant genetic disorder characterized by distinct facial features, short stature, congenital heart defects and developmental delays. However, in many cases it occurs de novo. Pathogenic variants in several RasMAPK pathway genes have been found to contribute to the phenotype, the most prevalent gene (50% of cases) being PTPN11. The rest of the affected individuals harbour mutations in other genes among which the proto-oncogene RAF1 is quite rare (only 3-17% of cases). RAF1 encodes a MAP3K that plays an essential role in cell division, differentiation and apoptosis. Mutations in this gene are associated with Noonan sy. 5 and Leopard sy. 2. Moreover, the majority of patients with RAF1 pathogenic variants manifest cardiac involvements, especially HCM (hypertrophic cardiomyopathy).
The goal of the study was genetic screening for RAF1 mutations in a Hungarian HCM cohort.
We screened 133 HCM patients (81 men, 52 women, average age: 45±15 years) using Next Generation Sequencing. RAF1 gene was also included in the 103 HCM genes panel.
Out of 133 HCM patients included in the study, 2 carried rare pathogenic variants in RAF1 gene that are indicative of NS: p.Ser257Leu in exon 7, and p.Leu633Val in exon 18. The first missense mutation was identified in a 1 year old girl and it's clustered in the CR2 domain of the RAF1 protein known for its regulatory role. Several reports in the literature describe this mutation as highly pathogenic. The second mutation was identified in a newborn boy without a typical manifestation of NS but with a complex cardiac phenotype including severe obstructive hypertrophic cardiomyopathy, pulmonary stenosis and atrial septal defect. Family screening revealed that the mutation occurred de novo, further reinforcing its pathogenicity.
RAF1 pathogenic gene variants are rare cause of typical HCM and may be suspected in syndromic disease or with complex cardiac phenotypes.

P1883

A risk prediction score for early-medium term adverse events in patients with infective endocarditis

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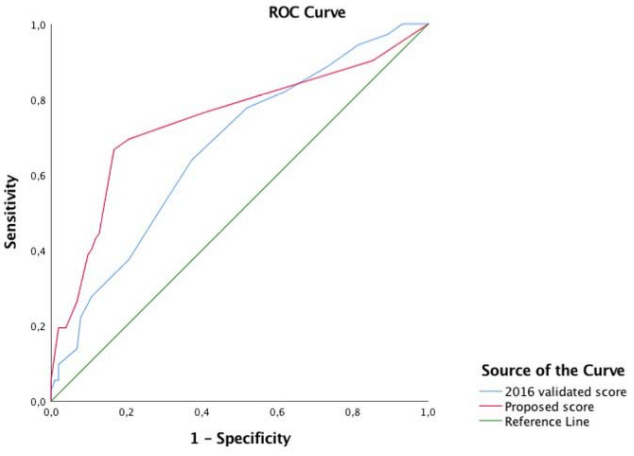
Introduction: Host factors and complications have been associated with higher mortality and morbidity rates in infective endocarditis (IE). In 2016, a validated risk score for predicting 6-month mortality was published, based on 2 prospective multinational registries; not including Portugal as a participating country (J Am Heart Assoc. 2016; 5: e2003016).
Objectives: To identify independent predictors of early-medium term adverse events on a Portuguese population with IE and to develop a score system for risk stratification. To assess the predictive value of the 2016 risk score in that population and compare the accuracy of both models.
Methods: Retrospective study including consecutive patients (pts) admitted to a tertiary center with the diagnosis of IE from 2006 to 2017. Clinical, echocardiographic and follow-up data were evaluated. Early-medium term adverse events were a composite of 6-month mortality (including in-hospital death) and reinfection (≤ 6 months from the initial diagnosis). The proposed score was developed from the entire data set using the Cox proportional hazards model. The 2016 validated score, consisting of 14 variables, was applied to each case. Receiver operating characteristic (ROC) curves and area under curve (AUC) were calculated for both scores and used for comparison.
Results: 174 episodes of IE were included in a total of 167 pts (mean age 62.2 ± 16.2 years, 75.3% male). Native valve infection occurred in 73.6%. Aortic valve was the most affected and Staphylococcus aureusthe mainly isolated agent. The adverse events occurred in 41.4% of cases: 6-month mortality rate was 40.2% (n=70, 50 pts died during hospital stay) and reinfection rate 1.2% (n=2). Multivariate Cox regression identified 4 independent predictors (only 1 protector): paravalvular abscess (HR 2.1, 95%CI 1.1-4.2, p = 0.03); heart failure development (HR 1.9, 95%CI 1.2-3.4, p = 0.01); progression to septic shock (HR 3.6, 95%CI 1.9-6.4, p < 0.01); cardiac surgery (HR 0.6, 95%CI 0.3-0.9, p = 0.04). The AUC was 0.74 (95%CI 0.7-0.8, p < 0.01) for the proposed score which performed similarly to the 2016 validated risk score (AUC 0.67, 95%CI 0.6-0.8, p < 0.01).
Conclusions: In this population, IE was associated with a high rate of early-medium term adverse events. Comparing with the 2016 validated score, the proposed model seemed to have at least similarly accuracy for risk stratification of pts with IE and it included only 4 independent predictors, making it easier to apply.



ROC curves

P1884

Air pollution on myocardial remodeling in acute phase of Chagas disease in experimental model.

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Background: There are more than 8 million patients with Chagas' disease around the world. This disease is characterized by intense myocardial fibrosis triggered by a complex cascade of inflammation, oxidative stress and apoptosis. The air pollution is a health problem in urban centers and stimulates the same pathways. We aimed to assess the role of air pollution upon myocardial fibrosis in acute phase of Chagas' cardiomyopathy model. Methods: 100 females Sirius Hamsters were divided into 4 groups: Control (Ct), Control + Pollution (CtP), Chagas (Ch) and Chagas + Pollution (ChP) and analyzed until sixty days of infection. The animals were infected with 105 Tripanossoma cruzi Y strain. Animals were daily exposed to pollution by inhalation of particulate matter produced by burning diesel fuel. The animals were euthanized after 60 days. Morphometric analyses of the interstitial (ICVF) was performed. The evaluation of the inflammation, oxidative stress and apoptosis were studied by gene expression analysis using real-time RT-PCR, ELISA and TUNEL. Results: In the analysis of ICVF, we observed a higher deposition in the LV of the chagasic groups compared to control (p=0.04). Also pollution alone increased myocardial fibrosis in the control exposed to pollution compared to the control group. We observed that the infection did not amplify the deposition of interstitial collagen in the infected groups. Oxidative stress analysis Nox1, MnSOD and iNOS showed higher expression in the Ch and ChP compared to controls, the pollution did not modulate an expression of these genes in infected animals. In the analysis of apoptosis, we observed that the infected groups showed higher expression of the Bcl-2 and Caspase 3 genes in comparison to the controls. The ChP group showed even greater expression than the Ch group suggesting amplification of apoptosis modulated by pollution. In the protein analysis of the inflammatory cytokines on tissue IL-10 and INF-γ we observed increasing of these cytokines in the infected groups. TNF-α also increase, but with no statistical significance. Chagasic group exposed to pollution presents 3 times more apoptotic cells than the chagasic group, demonstrating again a possible modulation of apoptosis by pollution.
Conclusions: We concluded that air pollution amplified apoptosis in a Chagas heart disease model acute phase. However, it was not enough to increase myocardial fibrosis, probably because the strong pathway activation by T. cruzi infection.

P1885

Cardiomyocyte-specific STAT3 deficiency alters the epigenetic program of cardiac progenitor cells from endothelial towards adipocyte priming

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Background: Cardiac STAT3 expression decreases with age and is reduced in failing hearts. Male mice with a cardiomyocyte-restricted knockout of STAT3 (αMHC-Cretg/+; STAT3flox/flox, CKO) show age-related heart failure with reduced capillary density associated with diminished Erythropoietin (EPO) production and subsequent reduction of the endothelial differentiation potential of Sca-1+-cardiac progenitor cells (CPC).
Purpose: We hypothesized that reduced cardiomyocyte STAT3 expression impairs the cardiomyocyte secretome and thereby changes the epigenetic priming of CPC.
Methods: Freshly isolated CPC (MACS) from 14 weeks old CKO and WT male mice as well as 2 clonally expanded CPC cell lines were used. Genome-wide methylation profiling was performed on freshly isolated CPC by reduced representation bisulfite sequencing. 3T3-L1 preadipocytes were incubated with conditioned supernatants of HL-1 cardiomyocytes with a lentiviral knockdown of STAT3 (STAT3-KD). Mice (age: 3 months) were injected weekly (i.p.) with NaCl or with a low-dose of an EPO derivative (3 μg/kgBW) for 3 months. Cardiac fat content was analyzed by triglyceride measurement and Oil Red O staining. Using qRT-PCR, immunoblotting and FACS, the expression of (pre-)adipocyte markers was measured.
Results: Clonally expanded CPC could be differentiated in endothelial cells or in adipocytes indicating that both cell types can derive from the same CPC cell. CKO-CPC showed a 2-fold increase in adipocyte formation after 4 weeks in culture (Oil Red O measurement, enhanced mRNA levels of FABP4, CEBPA and OLR1, *P<0.05) compared to WT-CPC. Epigenetic analysis revealed 568 differentially methylated regions between CKO- and WT-CPC. Zfp423, a transcription factor controlling preadipocyte determination, was found to be less methylated in CKO-CPC. QRT-PCR confirmed higher expression of Zfp423 in CKO-CPC compared to WT-CPC. EPO treatment (10 ng/ml) of CKO-CPC cultures reduced Zfp423 expression and adipocyte formation. Cultivation of 3T3-L1 with conditioned media from STAT3-KD HL-1 cardiomyocytes significantly increased adipocyte formation (Oil Red O absorbance, increased mRNA levels of FABP4, AdipoR1 and CEBPA, decreased mRNA levels of Pref-1 and PDGFRα) compared to cultivation with control media, which could also be attenuated by EPO supplementation. Left ventricular fat content and adipocyte number were increased in hearts of 6-month-old CKO mice (2.5-fold compared to WT, *P<0.01), which could be reduced by EPO treatment.
Conclusion: Age-related heart failure in CKO mice is associated with an epigenetic shift in the differentiation potential of CPC from endothelial cells to adipocytes. This is in part caused by diminished EPO secretion by STAT3-deficient cardiomyocytes into the cardiac microenvironment and changes in the epigenetic pattern of adipogenesis related genes. EPO administration could reduce enhanced adipocyte formation in hearts of CKO mice.

P1886

RBM20 missense variant presenting as acute myocarditis and postpartum cardiomyopathy.

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Background: RBM20 is a splicing factor regulating network of several cardiac genes. It has been shown that mutations in RBM20 gene impair nuclear localization of RBM20 protein, that, in turn, causes abandoned alternative splicing of TTN. In addition to effect on TTN RBM20 gene mutations have been shown to affect genes associated with calcium metabolism, such as CAMK2D gene. Pathogenic variants in RBM20 gene have been shown to cause dilated cardiomyopathy. However, the precise spectrum of RBM20-associated clinical phenotypes is not fully described. Here we present a clinical case of familial cardiomyopathy and variable clinical presentations associated with pathogenic variant in RBM20 gene.
Clinical case: 14-years old boy was admitted to the hospital due to progressive signs of heart failure presenting soon after viral infection and a fever. Progressive decrease of ejection fraction (19% Simpson) and chamber dilation accompanied by myocardial injury markers lead to the primary diagnosis of myocarditis. Due to severe refractory pump failure the patient was supplied with LVAD as a bridge to recovery/transplantation. Further diagnostic workup revealed that patient's mother died two months after delivery due to peripartum heart failure, which initiated broad genetic testing. Using high-throughput target exome sequencing a mutation in RBM20 gene was identified. It was previously shown as disease causing variant in patient with dilated cardiomyopathy (RBM20 (Chr10:112581114, rs397516607, NM_001134363.2:c.G2737A :p.Glu913Lys). The variant is located in exon 11, and leads to an amino acid change from a negatively charged and acidic glutamate to a positively charged and basic lysine residue. The result of genetic testing lead to diagnostic reassessment with diagnosis of familial dilated cardiomyopathy and considered implantation of LVAD as a bridge to transplantation.
Conclusions: genetic cardiomyopathy cases may have variable clinical presentation often mimicking myocarditis. Broad genetic workup can be of value in patients presenting as myocarditis or peripartum cardiomyopathy.

P1887

A rare case of Prader-Willi syndrome presenting with heart failure due to dilated cardiomyopathy

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Background: Prader-Willi syndrome (PWS) represents a rare genetic multiorganic disorder (1:10,000-1:30,000) characterized by severe neonatal hypotonia, specific cranio-facial features, short stature, small extremities, hyperphagia leading to obesity in older children and adults, mental retardation and behavioral problems. Being an obesity-related complication, heart failure is regarded as one of the contributing factors of mortality and reduced life expectancy in adult patients with PWS. Therefore, cardiac abnormalities are not typical for PWS patients at birth and in early childhood.
Purpose: Here we report on a girl who was hospitalized due to dilated cardiomyopathy and heart failure at the age of 1 year (left ventricular end diastolic diameter Z-score 2.0, EF 32% Simpson). Extracardiac presentations mainly included moderate muscular hypotonia, symptomatic epilepsy, some dysmorphic facial features and psychomotor developmental delay. Cardiomyopathies are known to be a part of various congenital syndromes and multisystem diseases, which complicates correct diagnosis of such conditions and appropriate genetic counseling. Here we aimed to determine the genetic basis of the complex clinical phenotype to extend our knowledge on molecular mechanisms underlying the clinical syndromes with dilated cardiomyopathy.

Methods: The investigation was approved by the local ethical committee. Informed consent was obtained from patient's parents. Target sequencing of 108 cardiomyopathy-associated genes was performed to uncover the genetic background of dilated cardiomyopathy followed by molecular-cytogenetic analysis using oligonucleotide array-based comparative genomic hybridization (CGH-array) on a 180K microarray platform with 13 kb median probe spacing.
Results: Target next generation sequencing did not identify any pathogenic, likely pathogenic variant, or variant of unknown significance in a gene segregating with the observed phenotype. High-resolution array-CGH analysis allowed to identify a ~4.8 Mb microdeletion of a 15q11.2-q13.1 locus known as the Prader-Willi/Angelman syndrome critical region. Indeed, 15q microdeletion of the paternal chromosomal copy is the most common genetic cause of Prader-Willi syndrome. A subsequent clinical examination of the patient at the age of 2.5 revealed development of typical features of PWS such as severe hypotonia, global developmental delay, excessive weight gain and hip dysplasia, which supported our genetic finding.
Conclusion: Here we demonstrate a rare case of Prader-Willi syndrome presenting with systolic heart failure due to dilated cardiomyopathy. Our data support the utility of not only next generation sequencing, but also array-CGH screening in patients with heart failure of unknown ethiology and complex clinical phenotype.

P1888

Polymorphisms in the CYP11B2 and AGT genes related to the renin-angiotensin-aldosterone system and their correlation with ischemic and non-ischemic phenotypes in patients with chronic heart failure.

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Background: The renin-angiotensin-aldosterone system represents a target for understanding the mechanisms involved in the development of heart failure (HF). Despite the therapeutic advances in this area, HF still represents one of the main causes of mortality. Association studies are commonly used to identify the genetic basis of quantitative traits as well as susceptibility to complex diseases.
Purpose: To determine the allelic and genotypic frequencies distribution of 8 polymorphisms, supposedly deleterious, associated with the production of aldosterone and angiotensinogen in samples of patients with HF. Ancestral information markers of insertion/deletion polymorphisms were also determined in the samples to better identify the ancestralities of the individuals.
Methods: A cross-sectional study of 326 individuals of both genders followed-up at a HF outpatient clinic. They were 220 DNA samples from peripheral blood of patients with HF, 102 with ischemic HF (caucasians= 70; blacks= 16; others= 16), 119 with non-ischemic HF (niHF) (caucasians= 53; blacks= 32; others= 30), and 106 samples from healthy volunteers. The genomic DNA samples were extracted by the salting-out technique and genotyped by the PCS and SnapShot Multipex systems for polymorphisms rs3802228 (UTR-3 region), rs309 (UTR-3), rs72554626 (T498A), rs5317 (F487V), rs146655862 (V129M) and rs5315 (V403E), located in the CYP11B2 gene, which encodes the enzyme aldosterone synthase, in addition to the polymorphisms rs699 (M235T) and rs3789678 (intronic region NM_000029.3) of the angiotensinogen gene. Their allele and genotype frequencies were calculated by the SnapStats Software and compared between the two groups separated by etiology.
Results: The mean age of patients with HF was 64.09±12.67 y.o. and the mean age of the healthy subjects was 42.71±12.68 y.o. The polymorphism rs3802228 demonstrated a possible influence on both HF etiologies when the results were adjusted for age, gender and ethnicity, assuming the co-dominance models (p = 0.013) (genotype frequencies of iHF group were: G/G: 44.9%; G/A: 50%; A/A: 5.1%; and niHF group were: G/G: 30.1%; G/A: 57.3%; A/A: 12.6 %); dominance model (p = 0.014) (genotype frequencies of iHF group were G/G: 44.9%; G/A-A/A: 55.1%; and niHF group were: G/G: 30.1%; G/A: 57.3%; A/A: 12.6%) and recessivity model (p = 0.029) (genotype frequencies of the iHF group were: G/A-A/A: 94.4%; A/A: 5.1%; and niHF group were: G/A-A/A: 87.4%; A/A: 12.6%). The genotypes and alleles of the other polymorphisms studied did not show any significant association with the parameters evaluated in the study population.
Conclusion: these preliminary results suggest a possible link between polymorphism rs3802228, located in the UTR-3 region of the aldosterone synthase gene, and a higher susceptibility to HF, although it has not been possible to identify if this SNP can influence to a higher or lower degree the ischemic and non-ischemic phenotypes of HF.

P1889

Investigation of atrial remodeling induced by exercise training in a rodent model of athletes heart

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Introduction Atrial fibrillation and heart failure share common risk factors and frequently coexist as atrial fibrillation leads to impaired myocardial function. Although regular exercise training is associated with cardiovascular benefits, the increased risk of atrial arrhythmias has been observed, with differences in prevalence between genders. While multiple mechanisms are likely, the atrial alterations induced by long-term physical exercise still need to be elucidated.
Purpose We aimed at investigating exercise-induced atrial remodeling in a rat model of athlete's heart and determining sex-specific differences.
Methods Age-matched young adult rats were divided into female exercised (FEx), female control (FCo), male exercised (MEx) and male control (MCo) groups. After exercised animals completed a 12-week-long swim training protocol, echocardiography was used to describe atrial alterations. In vivo electrophysiologic investigation was performed by programmed stimulation with an octapolar catheter inserted into the right atrium and atrial gene expression analysis was carried out. We used two-way ANOVA for statistical evaluation.
Results Post-mortem atrial weight data confirmed marked atrial hypertrophy (atrial weight to tibial length: 18.6±2.7g/cm FEx, 10.3±1.0g/cm FCo, 23.7±2.2g/cm MEx, 15.8±1.9g/cm MCo, pex<0.01), while echocardiography data showed slight atrial dilatation and improved contraction in both exercised groups. Exercise training was associated with bradycardia, P-wave enlargement and prolonged right atrial effective refractory period (RAERP: 45.7±4.3ms FEx, 40.2±5.9ms, FCo, 49.8±4.2ms MEx, 43.1±4.6ms MCo, pex<0.01). Sinus node recovery time (SNRT) did not differ between groups and we could not induce significant number of arrhytmias by programmed stimulation (double extrastimulation, burst pacing) in any groups. We found increased atrial gene expression of antioxidant enzymes (e.g. NADPH oxidase 2, superoxide dismutase 2) in both genders. Despite the marked atrial hypertrophy, no gene expression alteration was found regarding markers that describe pathological remodeling (atrial natriuretic factor), proinflammatoric (tumor necrosis factor-α) and profibrotic [e.g. transforming growth factor-β (TGF-β), matrix metalloproteinase-2 (MMP-2)] processes. While exercise training did not affect on the expression of profibrotic markers, female gender was associated with lower TGF-β and MMP-2 expression. We found altered expression of ion channels participating in atrial depolarization and repolarization.
Conclusions Our data suggests that long-term exercise-induced atrial hypertrophy is not associated with harmful electrical remodeling and no inflammatory or profibrotic response was observed in the atrium of exercised rats.

P1890

Human cardiac precursor cell secreted exosomes improved cardiac function of cardiomyopathic myocytes

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Background: The global heart failure is growing and the ominous prognosis is still a socioeconomic burden. Cardiometabolic dysfunction may contribute to the pathogenesis of certain cardiomyopathy and heart failure. The exosomes secreted from human cardiac precursor cell (hCPC-Exo) were reported to have cardioprotective actions. However, it is unclear whether hCPC-Exo can rescue cardiometabolic dysfunction in cardiomyopathic myocytes.
Purpose: This study aimed to examine whether hCPC-Exo could recover cardiometabolism in cardiomyopathic myocytes and to investigate the underlying mechanism.
Methods: Monolayer culture method was used to culture hiPSCs derived from healthy and left ventricular cardiomyopathy patients (LVNC). Cardiomyogenic differentiation of hiPSC was conducted by sequential Wnt modulation (CHIR99021 in the initial day 1-2 and followed by IWP4 in day 3-10). The culture medium in day 3-10 was collected to purify the exosome by ExoQuick-TC. The vesicle size was further measured by Nanosight. The exosomal miRNA profile was characterized by RNA seq. Mitochondrial function of human cardiomyocyte derived from left ventricular non-compaction patient's iPSC (LVNC-hiPSC-CM) was examined by by Agilent seahorse XF24 analyzer.
Results: The significant decrease of oxygen consumption rate (OCR) and extracellular acidification rate (ECAR) was detected in LVNC-hiPSC-CM as compared to those in healthy hiPSC-CM. In the presence of hCPC-Exo (500 ng total exosomal RNA per 104myocytes) for consecutive 7 days, both of OCR and ECAR were prominently increased. The velocity of cell shortening was also increased in hCPC-Exo-treated group. Mirpath analysis shows the possible involvement of the regulated pathways including fatty acid metabolism and glucose metabolism.
Conclusions: The present study demonstrated hCPC-Exo possesses therapeutic potential to improve cardiometabolic dysfunction in LVNC.

Clinical Cases

P1891

A curious case of syncope in an implantable cardioverter defibrillator patient.

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INTRODUCTION: A 68 year old woman presented to the hospital because of multiple syncopal episodes since three weeks. These episodes were almost exclusively after increasing intrathoracic pressure or with sudden changes in body position. Furthermore, she experienced progressive dyspnea and a headache with mild swelling and red appearance of her head since one day.
Her medical history was positive for an out of hospital cardiac arrest due to ventricular fibrillation (VF) for which she received an implantable cardioverter defibrillator (ICD) in 2011. An angiography at that time showed no significant coronary lesions and myocardial fibrosis was excluded using cardiac MRI with gadolinium contrast (LVEDD 101 ml, EF 67%).
On physical examination a sinus rhythm of 70 bpm and oxygen saturation of 90% was noted. Blood pressure was 156/78 mmHg. Auscultation of the lungs revealed mild wheezing and there was some swelling of her head and neck for which methylprednisolone and an anti-histaminic drug were prescribed on the emergency department.ECG showed a sinus rhythm of 76 bpm. There were no ventricular arrhythmias when analyzing her ICD. TTE revealed preserved biventricular systolic function and absence of valvular lesions. A transtricuspid gradient was not measurable.
Blood gas analysis showed a pO2 of 58mmHg, pCO2 33 mmHg, pH 7.47 and elevated blood lactate concentration of 4.7 mmol/l. The patient was brought to the intensive care unit (ICU).COURSE DURING HOSPITALIZATION
At the ICU one episode of syncope, during defecation, was documented. Continuous heart rate monitoring showed an accelerated idioventricular rhythm with desaturation during the syncope. The patient's condition worsened within a day and she was intubated because of respiratory distress.
A CT scan of the thorax was performed and showed no signs of pulmonary embolism. An intraluminal filling defect at the vena cava superior (VCS) was described but interpreted as an artefact by the radiologist.
DIFFERENTIAL DIAGNOSIS: Because of the intraluminal filling defect at the VCS, the diagnosis of vena cava superior syndrome was suspected. A transesophageal echocardiography (TEE) was performed and confirmed an occlusive thrombosis around the ICD lead. Because of the acute onset of symptoms and rapid progression, thrombolysis (alteplase 100mg/2h) was administered. A control TEE showed almost complete resolution of the thrombus. Afterwards, the patient was put on oral anticoagulant therapy with rivaroxaban.
CONCLUSION Superior vena cava syndrome after transvenous ICD implantation is generally an uncommon but serious complication which can lead to syncope, respiratory insufficiency and in extreme cases cardiogenic obstructive shock. Symptoms usually occur early after implantation but may develop at any time, as is shown in this case. In our case, thrombolysis and subsequent oral anticoagulation with a DOAC was successfully used as a treatment.

P1892

Impact of ICD implantation and PVI in patient with Isolated left ventricular apical hypoplasia accompanied by left ventricular noncompaction

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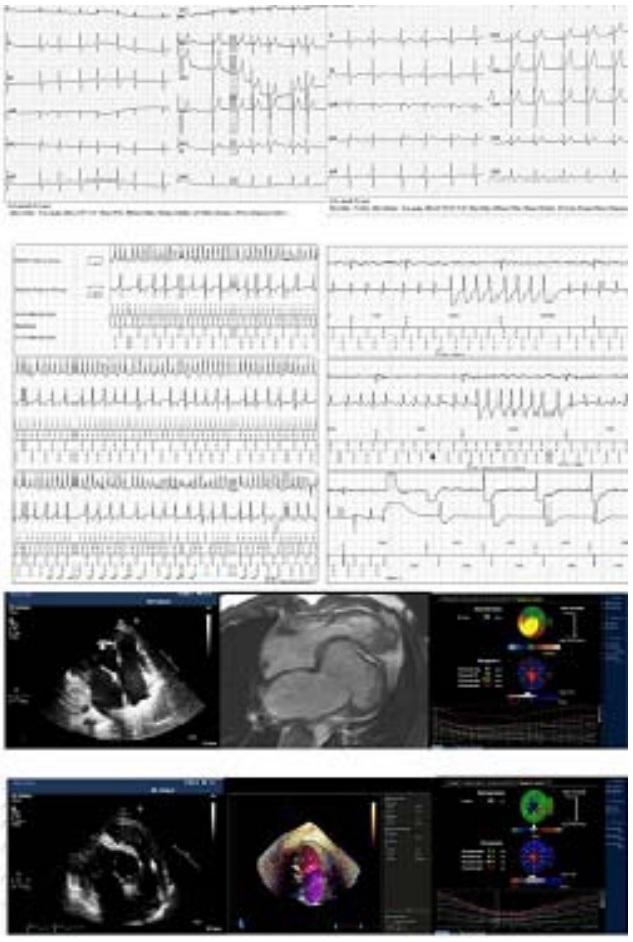
Introduction Isolated left ventricular apical hypoplasia (ILVAH) was first described as congenital heart disease with an unusual restrictive type of cardiomyopathy at CCF, USA in 2004. ILVAH frequently presents with different clinical forms from no symptoms in children to congestive heart failure, pulmonary edema, or atrial fibrillation and malignant tachycardia in adults.
Description: A 32-year-old male patient with exertional dyspnea, anasarca and poorly controlled atrial fibrillation (AF) was admitted to our hospital. The walk distance of 6 MWD was 316 meters. The 24-Hour Holter Monitoring showed atrial fibrillation entire observation period with 8 pauses of 2500-3000 ms in the night.
TTE and TEE revealed a mildly dilated LV with moderately to severely reduced function: LA- 65 ml/m2; RA- 52 ml/m2; LV- 108 ml/m2; LV diameters: basal - 65 mm; mid - 67 mm; longitudinal – 43 mm; RV diameters: basal - 38mm, mid – 30 mm, longitudinal – 96 mm. EDV – 162 ml, LVEF was 32% by 3DECHO and CMR, RV systolic function was abnormal (FAC -29%). There were significant TR and high PASP as an important marker for RV dysfunction and PH.
The TTE and CMR demonstrated all of the phenotypical features of ILVAH: 1) a spherical truncated LV with impaired function; 2) replacement of the LV apex with fatty material contiguous with epicardial fat; 3) anteroapical origin of the papillary muscle network; and 4) an elongated RV. Non-compacted endomyocardial layer and deep myocardial trabeculae, particularly in the mid-cavity of the LV was determined by both methods.
The surgical treatment that was done consistently by implantation of ICD and PVI. After 12 months' follow-up, we registered sinus rhythm, the walk distance of 6 MWD was 650 meters. There was improvement of EFLV and FAC, but LA and RA volumes were the same in comparison with the first exam, TTE data still displayed moderate TR and PH. After the 15 months' follow-up the patient had documented paroxysm of AF in the area of detection of VT 158-210 bpm with a subsequent recovery of the sinus rhythm by "shock" at 23 J. Next day Care Link system recorded the paroxysm of VT 280 bpm, sinus rhythm was restored by ATP.
Conclusion: The early TTE and CMR diagnosis is particularly important due to the difference in the prognosis and treatment of ILVAH from those of other diseases with symptoms similar to this rare entity. This is the first description of rare combination ILVAH and LV noncompaction with successful results of surgical treatment by implantation of ICD device in primary prevention of SCD and pulmonary vein isolation (PVI) for AF treatment.This case also demonstrates the degree to which such patients are highly dependent on atrial contractile function because of altered LV and RV geometry.



15 months follow-up patient with ILVAH

P1893

Atrial and atrioventricular resynchronization therapy bachmanns bundle and his bundle pacing

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On behalf of: Students' Scientific Association, Wroclaw Medical University, Department of Clinical Nursing, Wrocław, Poland

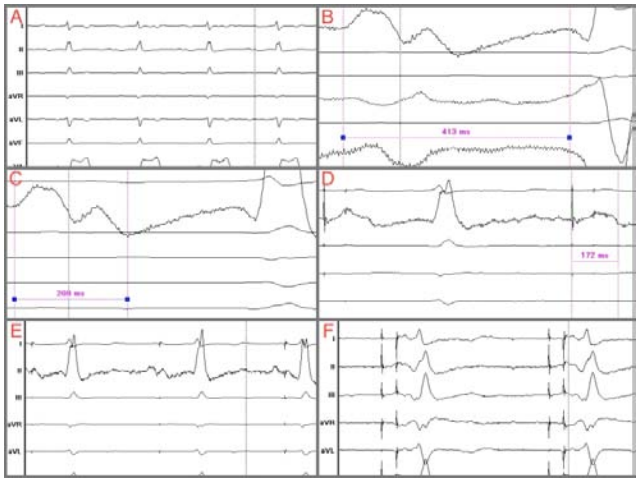
GENERAL INFORMATION ON PATIENT:
71 years old male,
HT, DMT2, BMI 38,4 kg/m2
MI 2007, CABG 2012
HF, reduced EF, NYHA class III

BACKGROUND: Recommendations by the ESC guidelines state, that CRT should be used in patients with heart failure and concomitant atrioventricular conduction delay. In patients with a narrow QRS complex, this conventional approach could contributes to worsening of the situation.
So far, biventricular pacing (BiVP) is the investigated and approved method for CRT in patients with LBBB. A novel therapeutic option for this special case is the permanent His-bundle pacing (pHBP). It´s main advantage is the direct access to the His-bundle, propagating it´s activation in a physiological direction compared to BiVP. This way, proximal AV block can be overcome. In combination with pHBP, Bachmann´s bundle pacing can reduce the prolonged interatrial conduction, resulting in electrocardiographic and clinical improvement. Further cardiac remodeling is stopped or even reversed.

PROCEDURE: Due to HFrEF, NYHA class 3, LVEDD of 66mm and EF of 27% we considered the patient as a candidate for CRT-D with pHBP in order to shorten the atrioventricular conduction. The prolonged interatrial conduction of 209 ms made us to use also the Bachmann's bundle pacing. The ECG examples depict the procedure stages and results – Figure 1.
OUTCOMES: To be seen in the Table. Additional ECG shows (A) Baseline ECG, (B) PR duration, (C) P duration, (D) P resynchronization, (E) AV resynchronization, (F) Final ECG

CONCLUSIONS: The effective combination of pHBP with Bachmann´s-bundle pacing, shows remarkable results. In cases like our patient´s, this could be a better primary approach as compared to conventional CRT according to the guidelines.

	Before	After
LVEDD (mm)	66	58
EF (%)	27	40
NYHA (1-4)	3	1
P (ms)	209	172
PR (ms)	413	180



P1894
Bundle branch reentrant tachycardia treated with cardiac resynchronization therapy in a patient with dilated cardiomyopathy

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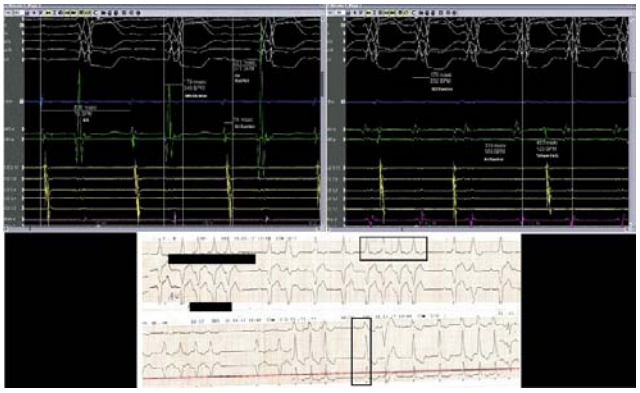
Introduction A 66 – years old woman with known dilated cardiomyopathy and severely reduced ejection fraction presented in our clinic with progressive dyspnea on minimal exertion (NYHA Class III – IV). Physical examination revealed blood pressure 90/70 mmHg, fine crackles over lung basis, a third heart sound, distended jugular veins and mild peripheral pitting oedema.
Drug history included ramipril 5mg od, spironolactone 25 mg od and furosemide 40 mg od. Laboratory results showed only an elevated BNP 850pg/ml.
ECG at presentation demonstrated sinus rhythm with markedly prolonged PR interval, right bundle branch block with left axis deviation and frequent runs of wide complex tachycardia with QRS morphology same as in sinus rhythm.
Echocardiogram reported a dilated left ventricle with diffuse hypokinesia , severely depressed EF=20%, preserved RV function, moderate mitral regurgitation and elevated filling pressures.
We performed an electrophysiological study in order to investigate the nature of the wide complex tachycardia. Baseline intervals in sinus rhythm were: BCL=826ms, AH=76ms, HV=220ms and QRS=176ms. The clinical tachycardia that was reproducibly induced with atrial extrastimulation at 600ms and one extrastimulus at 400ms, had CL=487ms , HV= 300ms and AV dissociation confirming the diagnosis of bundle branch reentrant tachycardia (BBRT).



Picture

Discussion: BBRT is an uncommon form of ventricular tachycardia incorporating both bundle branches into the reentry circuit. It is often seen in patients with cardiomyopathy and conduction defects. The QRS morphology during VT is a typical bundle branch block pattern, usually with LBBB. In addition, the cycle length (CL) of the tachycardia is very short and patients become severely symptomatic in contrast to our findings with extremely long CL of the tachycardia. The diagnosis is based on electrophysiological findings and pacing maneuvers that prove participation of the His- Purkinje system in the tachycardia mechanism. Antiarrhythmics are not helpful, with radiofrequency ablation of right bundle regarded as the first line therapy.
In our patient the ablation imposes a high risk of complications in view of the existing conduction defects. Consequently we decided to proceed at first with a CRT – D implantation that allowed us to optimize medical treatment according to the current guidelines and evaluate the ablation strategy in one month. Patient's follow up revealed no VT episodes and marked symptomatic improvement, supported by device interrogation (report demonstrated increasing thoracic impedance and enhanced patient's activity).
Clinical implication/ conclusion: We describe the first bundle branch re-entrant tachycardia treated with cardiac resynchronization therapy. The rationale is that biventricular pacing can intervene in the tachycardia circuit interrupting the re-entry mechanism. As a result biventricular pacing may serve as an alternative method to ablation treatment.

P1895
Acute myocarditis in a young patient after hypoxic gases exposure

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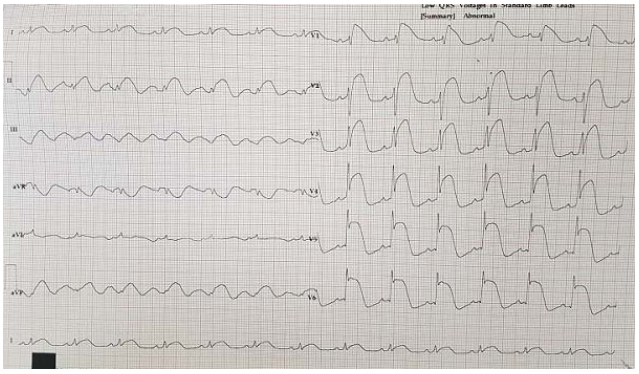
Case description: A 26 year old male patient, without prior pathology, in good functional status, was exposed to possibly toxic gases in an underground environment (assumed low fraction of inspired O2). He showed early signs of encephalopathy that completely resolved after 2 weeks (without IRM sequelae). Three days after the incident, while in hospital, he complains of intense chest pain and develops new ST elevation up to 10mm in precordial leads (figure 1).
Clinically he presented with systemic congestive signs but with no signs of hypoperfusion. Blood tests revealed elevated cardiac troponin and transaminases, elevated C reactive protein (up to 33mg/dl), normal blood count.

First echocardiographic evaluation showed severely depressed left ventricular ejection fraction (LVEF), with diffuse hypokinesia and right ventricular (RV) dysfunction. Magnetic resonance imaging revealed late gadolinium enhancement only in the RV wall and the interventricular septum at the RV insertion sites, with normal structure of LV walls.
Although adequate tissue perfusion was maintained, in-hospital evolution was complicated by two episodes of ventricular fibrillation (within first 48 hours), frequent nonsustained and sustained left bundle branch block morphology tachycardia suggesting RV inflow tract origin, which only disappeared after 2 weeks of heart failure medication comprising carvedilol, perindopril (titrated inhospital up to 100mg and 10mg, respectively), spironolactone, furosemide, high doses of Q10 coenzyme. He later evolved well: he regained normal functional status within 2 months, resolution of ST elevation after 1 month, normalisation of cardiac troponin and of echocardiographic LV ejection fraction after 2 weeks, but with persistent RV radial dysfunction at 3 months.
Conclusion: Late onset of myocardial disease after hypoxic insult was only rarely described in the literature. Isolated persistent right ventricular dysfunction while complete resolution of LV dysfunction (functionally and structurally) is also less frequently observed in acute myocardial disease but may carry an immediate dismal prognosis. Although there are no evidence based therapies, use of neurohormonal medication is probably of substantial benefit even in acute setting.
Figure 1. ECG in day 3 after the incident.



P1896
Rapid recovery of myocardial dysfunction in an oncologic patient

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On behalf of: Investigation team of Saint-Pierre University Hospital in collaboration of the team of the Institute Jules Bordet

23 year old female, treated for an intestinal mucinous adenocarcinoma of the small bowel with metastatic disease (lymph nodes, hepatic, peritoneal) by Nivolumab 3mg/kg and Ipilimumab 1mg/kg, was admitted to the emergency department, three weeks after the last treatment, with abdominal pain. The abdominal scanner confirmed peritonitis due to tumoral perforation secondary to an eventual response to immunotherapy. A laparotomy was performed for rinsing and drainage. The biopsies taken were negative for neoplastic cells. During a prolonged hospitalization, the patient presented recurrent febrile episodes requiring numerous antibiotic regimens. Subsequently, the patient developed a septic shock with renal and hepatic failure, which was successfully by Linezolide and Piperaciline-Tazobactam. Over the following days the patient developed progressive peripheral edema, anasarca, hypotension and tachycardia. There was a slight elevation of the troponine T (48 ng/l), while the NTproBNP was at 16916 pg/ml. The electrocardiogram showed sinus tachycardia without any other particularities. A cardiac ultrasound was performed, which revealed global hypokinesia with severe left ventricular systolic dysfunction (ejection fraction 30%). The previous echocardiography was unremarkable, showing normal left ventricular ejection fraction (LVEF).
The differential diagnosis of acute heart failure, in this context, includes bacterial or viral myocarditits (but multiples serology came back negative), sepsis, drug cardiotoxicity and ischemia. At this point, the sepsis was controlled, and the patient didn't have any cardio-vascular risk factors or any sign of myocardial ischemia.
Imunotherapy cardiotoxicity was considered among the most probable causes of deterioration of LVEF and some cases of myocarditis due to checkpoint inhibitors, such as Nivolumab and Ipilimumab, in oncologic patients were reported in the literature. The combined immune checkpoint inhibition produces durable antitumor responses in some patients, but it is associated with immune-related adverse events. The cardiotoxicity with the combined regimen of Nivolumab and Ipilimumab is neither frequent nor well-known, but the incidence of drug-induced myocarditis is higher, and in some cases fatal. The patient was treated by corticotherapy (2mg/kg), diuretics, betablockers and angiotensin-coverting enzyme-inhibitors and she experienced a rapid clinical improvement and recovery of myocardial function after five days of treatment. She was discharged two weeks later.
The initial condition of the patient was too fragile to perform cardiac magnetic resonance for myocardial tissue characterization. When renal function recovered and after the administration of the corticoids, the resonance did not show any presence of late gadolinium enhancement and confirmed the improvement of LVEF at 48%. Nevertheless, we retained the diagnosis of myocarditis due to the immunotherapy in the light of the disease evolution.

P1897
Heart failure in a hypertrophic cardiomyopathy phenotype with an unknown genetic mutation: a new aggressive variant?

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A 52 years old man presented for progressive dyspnea since six months, atypical chest pain and anasarca. Vital signs were within limits, no fever. Medical history was negative. Familiar history was positive for sudden cardiac death (SCD) (father at 50). Clinical exams were suspect for pulmonary edema; ECG showed atrial fibrillation, low QRS voltages in limb leads and repolarization non-specific alterations. Echocardiogram showed severe biventricular dysfunction (EF 30%), diffuse hypokinesia and concentric hypertrophy of left ventricle (IVS 20 mm, PP 17 mm) with granular and hyperechoic appearance, marked bilateral atrial dilatation, central and moderate mitral regurgitation, restrictive diastolic pattern. At blood tests troponin I was slight increased (1.92ug/L). Treatment with anticoagulants, beta-blockers, ace-inhibitors and intravenous diuretics started promptly. TC-Angiography and coronarography excluded acute events, so patient underwent cardiac MRI that showed severe left ventricle asymmetric hypertrophy and diffuse full thickness late gadolinium enhancement. Suspecting cardiac amyloidosis, serum protein electrophoresis showed a weakly increase in monoclonal IgM lambda component while Bence-Jones proteinuria was negative. Periumbilical fat biopsy was negative. 99m-Tc-diphosphonate myocardial scintigraphy excluded Transthyretin-related amyloidosis, so the main hypotheses were light chains amyloidosis or sarcomere hypertrophic cardiomyopathy (HCM). Therefore myocardial biopsies of right ventricular septum and a genetic counseling were required. Frequent hemodynamically well tolerated episodes of NSTV were recorded. Considering the high risk of SCD, an ICD was implanted. Biopsy showed no amyloid deposition by Congo red staining or other pathological deposits, but minimal and focal subendocardial and interstitial fibrosis and focal myofibrillar disarray, findings compatible with sarcomeric HCM. Genetic test identified an unknown extremely rare variant of sequence 716G>A p. (Cys239Tyr) in heterozygosity in the MYBPC3 gene of uncertain meaning. With medications left ventricular function partially recovered (50% EF) and patient was discharged in good hemodynamic compensation.

DIAGNOSTICAL EXAMS IMAGING

A: Apical four chambers view at US: hypertrophic and hyperechoic left ventricle walls. **B:** Cardiac MRI: lack of parietal edema in T2-weighted scanning sequences. **C:** Diffuse full-thickness late gadolinium enhancement suggesting amyloidosis. **D:** Myocardial scintigraphy with 99m-Tc-diphosphonate negative for transthyretin-related amyloidosis

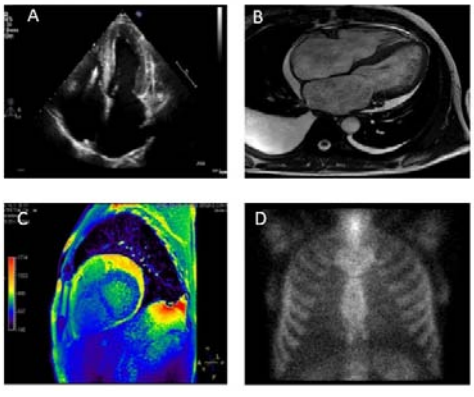

FIGURE 1

This case underlines the importance and complexity of differential diagnosis in hypertrophic ventricular phenotypes. In fact, echocardiography, MRI and electrocardiographic findings were strongly suggestive of cardiac amyloidosis, but our clinical case shows that a sure diagnosis needs myocardial biopsy, as it revealed sarcomere

HCM. So, biopsy still remains the gold standard for diagnosis. Myocardial hypertrophy etiology may also impacts on the stratification of the arrhythmic risk and, with other risk factors, consequently helps to identify forms that could benefit from specific therapy or ICD implantation.
This might be the first report of a more aggressive rare hereditary genetic HCM variant with unclear presentation. More cases are needed for further assessments.

P1898

Primary systemic amyloidosis, a rare cause of congestive heart failure

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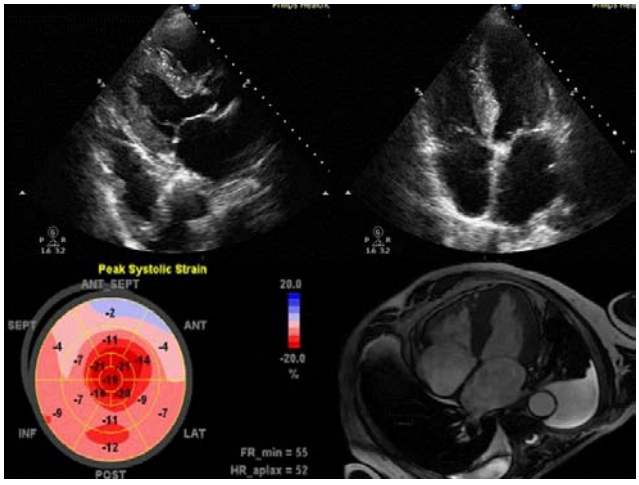
Introduction: Primary systemic amyloidosis (PSA) is a rare condition associated with poor prognosis. Heart failure (HF) and renal failure are major causes of death in these patients.
Case description: This is the case of a 71-year-old man with a history of Grawitz tumor and prostatic adenocarcinoma 3 years prior to the present hospitalisation.
The patient was admitted with signs and symptoms of congestive HF for the last 2 months. Physical examination revealed a heart rate of 100 beats/min with a blood pressure of 95/60 mmHg, peripheral edema and jugular venous distention of 9 cm. The electrocardiogram showed sinus rhythm with first-degree atrioventricular block and right bundle branch block. Initial blood tests asserted mild anemia, an elevated creatinine and severely increased brain natriuretic peptides (BNP of 7586 pg/ml). The echocardiogram performed revealed a pattern of restrictive cardiomyopathy with nondilated, hypertrophic ventricles ("granular sparkling" appearing ventricular septum of 15 mm and hypertrophy of the free wall of the right ventricle), reduced left ventricle (LV) global function with severe diastolic dysfunction and dilatation of both atria; small left pleural effusion was observed. Further analysis using segmental longitudinal strain proved preserved apical strain, raising the suspicion of cardiac amyloidosis. The same findings were confirmed using cardiac magnetic resonance imaging which showed concentric LV thickening with reduced systolic function (a calculated ejection fraction of 44%) and a pattern of restrictive diastolic filling with enlargement of the atria; we should mention a particular thickening of the atrial septum. On delayed postcontrast (gadolinium) images acquired, there was no enhancement of the thickened myocardium. To confirm the diagnosis of amyloidosis, the patient was referred to a haematology departament to continue investigations. Using a serum free-light-chain assay, highly elevated concentrations of kappa isotype light chains were demonstrated. Fine-needle aspiration of abdominal fat was positive for amyloid deposits when stained with Congo red and viewed under polarizing microscopy. Bone marrow biopsy excluded other associated haematologic disorders, confirming the diagnosis of primary systemic amyloidosis. Extended investigations revealed neurologic involvement, hepatic and renal impairment with a decreased glomerular filtration rate and nephrotic range proteinuria. The patient received supporting HF treatment with diuretics and angiotensin-converting enzyme inhibitors and was initiated chemotherapy with high doses of melphalan and dexamethasone. The 6-month evaluation showed mild HF symptoms and no progression of the renal impairment.Conclusion: Even if prognosis in PSA is still poor, chemotherapy substantially improved survival of patients with PSA and cardiac involvement. This case emphasizes the importance of complex cardiac imaging techniques in the diagnosis of rare diseases.



Cardiac Amyloidosis

P1899

Clinical presentation of a novel pathogenic variant in MYBPC3 gene

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Background Mutations in MYBPC3 gene are responsible for up to 30% of familial hypertrophic cardiomyopathy (HC) cases. We present a 29-year-old male patient (Fig. 1; IV.-1) exhibiting NYHA class III symptoms and having a family history of HC (Fig. 1) and sudden deaths. Pathogenic MYBPC3 gene variant NM_000256.3:c.1996A>T, p.(Lys666Ter) was identified to the affected family members. The alteration has not been described previously in the scientific literature.
Family history: The father of the patient (III.-3) died at the age of 40; the uncle of the patient (III-.6) died at the age 21; the father's grandmother (I-.2) suddenly died at the age of 35 (Fig. 1). The causes of the deaths were not determined. The aunt (III.5) (Fig. 1) was diagnosed with stage D heart failure due to HC and received a heart transplant at the age of 50.
Diagnostic work-up: Echocardiography demonstrated severe concentric left ventricular (LV) hypertrophy (interventricular septum at end-diastole 18 mm; LV posterior wall at end-diastole 16 mm; myocardial mass index 140 g/m2; Relative wall thickness 0.8). Systolic anterior motion of the mitral valve with dynamic LV outflow tract obstruction (peak pressure gradient of 70 mmHg during the Valsalva maneuver), midventricular obstruction, severe left atrial dilatation, pseudonormal diastolic function and preserved systolic function were observed. B-type natriuretic peptide at admission was 1310 ng/l. The results of cardiac magnetic resonance imaging were in line with the diagnosis of HC. Fabry disease was excluded. Coronary angiography showed normal coronary arteries. There was no pressure gradient between LV base and aorta detected at rest, whereas pressure gradient of 70 mmHg was identified between LV apex and aorta. Genetic testing revealed MYBPC3 gene variant NM_000256.3:c.1996A>T, p.(Lys666Ter). This variant has been previously identified to the patient's aunt. The alteration causes premature termination of the encoded myosin-binding protein C, resulting in inappropriate binding with cardiac muscle myosin heavy chain in thick filaments and titin in elastic filaments. The truncation of the protein interferes with cardiac contraction and ends up with the development of HC.
Treatment approach: Percutaneous alcohol septal ablation was performed, decreasing the gradient between LV apex and aorta to 30 mmHg. HC sudden cardiac death score revealed high risk of sudden cardiac death (9.6 %), thus an implantable cardioverter-defibrillator was implanted for primary prophylaxis. Metoprolol succinate was up-titrated to 75 mg QD. The treatment successfully reduced heart failure symptoms to NYHA class I.

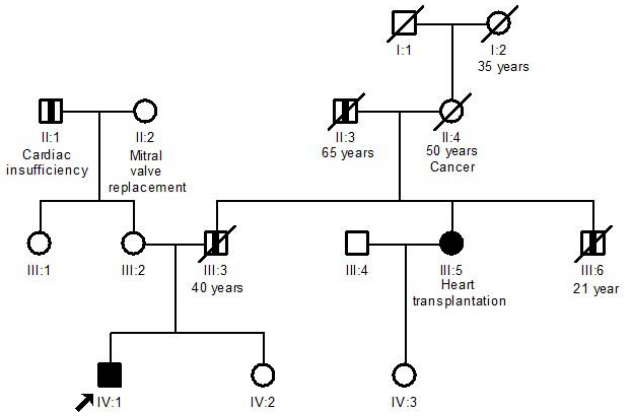

Figure 1

Conclusion Novel pathogenic variant of MYBPC3 gene NM_000256.3:c.1996A>T, p.(Lys666Ter) was related to severe LV hypertrophy, advanced heart failure with preserved ejection fraction and high risk of sudden cardiac death.

P1900

Combination of novel pathogenic variants in sarcomeric proteins genes and GLA gene in relatives with hypertrophic cardiomyopathy

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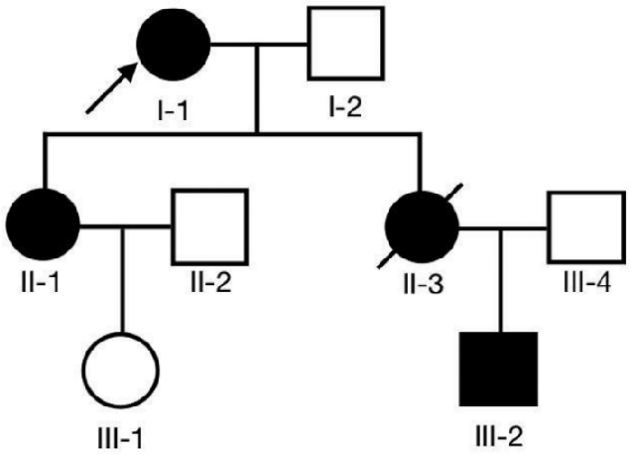
Introduction Hypertrophic cardiomyopathy (HCM) is a primary cardiac muscle disease defined by left ventricular hypertrophy (LVH), in the absence of abnormal loading conditions. Clinical presentation of the disease shows great variability, ranging from little or no cardiovascular symptoms to heart failure (HF) and sudden cardiac death (SCD). Screening of patients with HCM of unknown aetiology reveals a high prevalence (1-12%) of Fabry disease (FD).PurposeOur aim is to demonstrate a confusing case of 4 relatives with HCM phenotype, who were suspected having FD after genetic variant of unknown significance (GVUS) in α-galactosidase A (GLA) gene was identified in 2 of 3 alive patients. As the cause of HCM remains uncertain, it is recommended to perform a sequencing of sarcomere protein genes.MethodsA GVUS in GLA gene c.937G>T (p.Asp313Tyr) was identified in 2 of 4 patients with HCM phenotype. Since clinical features and histological findings consistent with FD were absent, the cause of HCM was still uncertain after evaluation of patients' medical history, physical, laboratory, instrumental examination and histological data, next generation sequencing of sarcomere proteins' genes was performed to three relatives (I-1, II-3, and III-1). Coding sequences of the genes associated with HCM (ACTC1, ACTN2, BRAF, CAV3, CSRP3, GAA, GLA, HRAS, KRAS, MAP2K1, MAP2K2, MYBPC3, MYH6, MYH7, MYL2, MYL3, MYLK2, MYOZ2, NEXN, NRAS, PLN, PRKAG2, PTPN11, RAF1, SOS1, TCAP, TNNC1, TNNI3, TNNT2, and TPM1) were analysed.
Results: We report a case of four patients from one family with HCM phenotype, progressive HF and SCD of the proband's (I-1) older daughter (II-1). Since classical clinical features consistent with FD were absent, renal and endomyocardial biopsies were performed for proband and her daughter (II-3). Histological analysis of proband's renal tissue revealed minimal histological changes which could be consistent with FD. Histological examination of proband's daughter's myocardium showed no histological changes. Next generation sequencing of sarcomere proteins' genes revealed two heterozygous pathological variants in all patients: PLN gene c.26_29dupGCTC (p.Ala11Leufs*10) and MYBPC3 gene c.3530_3531insG (p.Phe1177Leufs*31).ConclusionData of the current case suggests that GLA gene variant c.937G>T p.(Asp313Tyr) is not necessarily associated with FD. Two novel heterozygous pathogenic variants in sarcomeric protein genes which have not been previously reported in the literature – PLN gene c.26_29dupGCTC p.(Ala11Leufs*10) and MYBPC3 gene c.3530_3531insG (p.Phe1177Leufs*31) – determine the development of HCM phenotype. Multiple mutations are related to an earlier presentation of HCM with more severe phenotype and higher risk of sudden cardiac death. Multiple variants in sarcomeric protein genes should be recommended as an additional biomarker in the assessment of SCD.



Genetic family tree

P1901

Left ventricular hypertrophy in young man with stroke and end stage renal failure

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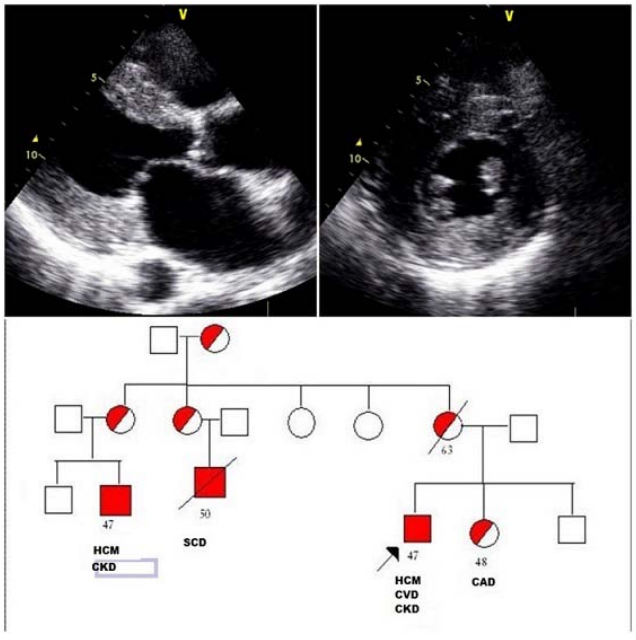
Introduction: Fabry disease is an inherited progressive X-linked inborn error of metabolism of the glycosphingolipid pathway due to mutations resulting in a-galactosidase deficiency. The disorder results in intracellular lysosomal storage of globotriaosylceramide, a glycosphingolipid, accumulating in multiple tissues leading to end stage organ impairment, specifically acroparesthesias, skin manifestations, renal failure, neurological and cardiac disease. Hemizygous males are predominantly affected, while heterozygous females are carriers of the disease with a 50% probability per pregnancy of transmitting it to their offspring.
Case presentation: A 47 year old male patient was admitted to the Nephrology Department of our hospital. He presented with symptoms of deteriorating dyspnoea despite intensification of his dialysis sessions. His past medical history was significant for right hemiplegia due to left middle cerebral artery occlusion that occured 3 months ago, arterial hypertension and chronic kidney disease. His electrocardiogram had signs of left ventricular strain. Echocardiography revealed left ventricular end diastolic and end systolic diameters within normal limits accompanied by severe wall hypertrophy (interventricular septum and posterior wall 18 and 17 mm respectively) with a moderately reduced ejection fraction, biatrial enlargement and moderate atrioventricular valve insufficiencies. Restrictive type diastolic dysfunction was demonstrated with an E/E' ratio of 20, indicative of increased filling pressures. Family history revealed a case of sudden death in a male relative living abroad who was diagnosed post mortem with Fabry disease. Subsequently a-galactosidase enzyme blood levels were measured which appeared undetectable. The patient underwent supportive therapy since his disease was advanced at the time of diagnosis with multiorgan failure. Family genetic counselling was adviced and a pedigree was designed which uncovered other affected family members.
Conclusion/Discussion: Early diagnosis is key to Fabry disease management since the disease is controllable after the development of recombinant enzyme replacement therapy. Moreover diagnosis of one patient should prompt targeted genetic family screening to uncover other relatives who may benefit from enzyme substitution and other therapeutic options that improve prognosis.



Advanced fabry disease

P1903

Two cardiomyopathies in one clinical case

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Introduction: Cardiomyopathies (CMP) are rare, genetically determined, primary diseases of the heart muscle, and are mostly diagnosed in heart failure or after sudden cardiac death.
Case report : A 61-year-old female smoker patient underwent a cardiac examination with symptoms of presyncope, chest pain and weakness. Based on the symptoms, the chest leads detected negative T waves and the extensive apical wall motion abnormalities a coronary angiography was performed showing no alterations on the coronaries. Thus, in accordance with the results of the repeated echocardiography and the cardiac MRI, Tako-tsubo CMP and hypertrophic CMP were suggested as diagnoses.
A year later, the patient was again hospitalized with the above mentioned symptoms. Acute echocardiography showed typical apical ballooning with decreased ejection fraction, asymmetric septal hypertrophy and compensatory hyperkinetic basal segments leading to significantly high outflow tract gradient and systolic anterior motion of the mitral valve (SAM), with grade 3 regurgitation. Troponin kinetics ruled out acute coronary syndrome. NT-proBNP was highly elevated. After the initiation of the heart failure medication, echocardiography showed normalized ejection fraction with no remarkable wall motion abnormalities; the outflow tract obstruction and the SAM phenomenon were no longer demonstrated. While the repeated MRI and echocardiography examinations confirmed hypertrophic CMP without wall motion abnormalities, coronary angiography ruled out the coronary disease. The result of the genetic test is pending.
Conclusions: Based on the symptoms and the morphological alterations we confirmed the diagnosis of Tako-tsubo CMP with preexisting hypertrophic obstructive CMP. The coexisting manifestation of the two disorders, especially the recurrence of the event is extremely rare in the literature. The proper treatment and the connection between the two CMP entities raise further questions.

P1904

Hypertrophic cardiomyopathy and dynamic left ventricular outflow tract obstruction, a possible pathophysiological mechanism of injury in takotsubo cardiomyopathy.

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Background The aetiology of Takotsubo cardiomyopathy (TCM) is unclear and there have been case reports showing underlying features of hypertrophic cardiomyopathy (HCM) with left ventricular outflow tract obstruction is present in some cases of TCM. This has been postulated to be part of pathophysiological mechanism, as catecholamine driven left ventricular outflow tract obstruction, coupled with coronary microvascular spasm may contribute to myocardial stunning and apical ballooning seen in TCM. We report a case of underlying hypertrophic cardiomyopathy masked by Takotsubo cardiomyopathy.
Case
A 63 year old lady with a background of depression was admitted to hospital with severe chest pain that came on following the sudden onset of right calf pain. This was associated with sweating and nausea. She recently returned from America after visiting her son nine days ago. She did not report any recent bereavement. Pulmonary embolism was suspected.
Physical examination was normal. The admission ECG showed deep T wave inversion in anterolateral leads with a raised Troponin-T level of 492.9ng/L. Other blood tests including renal function, full blood count and c-reactive protein were normal, in particular D-Dimer 85 (normal range 0-229). Coronary angiogram showed unobstructed coronary arteries. Transthoracic Echo (TTE) demonstrated mid to apical akinesis of the left ventricle with preservation of basal contraction and an overall ejection fraction of (LVEF) 35-44%, features typical of Takotsubo when in the presence of unobstructed coronary arteries.
A cardiac MRI scan three months later demonstrated normal biventricular function with mild asymmetrical left ventricular hypertrophy with a basal septal bulge and mild chordal SAM suggestive of hypertrophic cardiomyopathy. Late gadolinium showed mild atypical enhancement in the basal to mid inferolateral segments. She did not have systemic hypertension.
Follow up TTE in a years' time revealed normal left ventricular ejection fraction with mild hypertrophy of the basal septum and turbulent flow in the left ventricular outflow tract (LVOT), features consistent with HCM.
Conclusion: There have been previous case reports linking hypertrophic cardiomyopathy and Takotsubo cardiomyopathy, and this case adds to the growing evidence that basal septal hypertrophy and catecholamine driven LVOT obstruction may be part of the pathophysiological mechanism underlying Takotsubo cardiomyopathy. Therefore, we suggest a careful diagnostic approach and consideration of cardiac MRI to identify the concurrence of these two conditions.

P1906

Chicken or egg? A case of tako-tsubo cardiomyopathy and spontaneous coronary dissection

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Case presentation: A 50-year old woman, with a history of Sudeck atrophy leading to amputation of her left forearm, was transferred to our hospital due to acute onset of chest pain. ECG showed non-specific ST-T alterations in the inferolateral leads. Due to the mild electrocardiographic changes and due to atypical presentation, we performed an urgent transthoracic echocardiography before an angiography. Severe hypokinesia in the apico-lateral segment was seen, compatible with ischemia in the circumflex area. An urgent coronary angiography was performed. This revealed a moderate stenosis in the distal portion of the RCX. Ventriculogram showed severe hypokinesia in the anterior wall and in the apex, as seen in Tako-Tsubo cardiomyopathy. ECG on day three, showed a typical evolution with negative T waves in the precordial leads. The patient was treated with RAAS-inhibition and a beta-blocker.
Course during hospitalization: During her admission, the patient kept on having mild attacks of angina. However, troponin levels were dropping. Transthoracic echocardiography on the third day showed dyskinesia in the basal and mid portions of the inferolateral and inferior wall. On day five, Q-wave formation was seen on ECG, again suggesting ischemia in the RCX or RAC territory. Due to these evolutive signs of ischemia on ECG and TTE, a repeat angiography was performed on the seventh day. We saw a type I spontaneous dissection (SD) of the RCX and a type II SD in the RAC. OCT or IVUS was not attempted, because of the risk of worsening the dissection with subsequent occlusion. Our patient was treated medically with a low dose Aspirin, an ACE-inhibitor, Spironolactone and a Beta-blocker. Echocardiography on the day of discharge (18 days after admission) showed a near to full recovery of the left ventricular function. She is still in ambulatory follow up.
Discussion We present a case of Tako-Tsubo cardiomyopathy associated with spontaneous dissection of the RAC and RCX. Medical therapy with beta-blockers and RAAS-inhibition is the treatment of choice in both diseases, although PCI and CABG are needed in some cases of SD, who have ongoing ischemia. The role of dual antiplatelet therapy for both diseases is not well established.
Conclusion We describe a case of a 50-year old woman presenting with chest pain due to a Tako-Tsubo cardiomyopathy. During hospital stay, persistent evolutive symptoms of angina , ECG changes and regional wall abnormalities on TTE prompted us to perform a repeat angiography. In our case, we treated the patient with optimal medical therapy and a full recovery of systolic function was obtained. Due to the distal location of both the dissections, coronary intervention was not needed. Patients with SD, however, do require PCI or CABG, if the ischemia is ongoing. We conclude that we should be aware of evolutive coronary pathology, requiring intervention, in patients with Tako-Tsubo cardiomyopathy.

P1907

Implantation of the left ventricular epicardial lead complicated by stenosis of the left internal thoracic artery graft over 7 years

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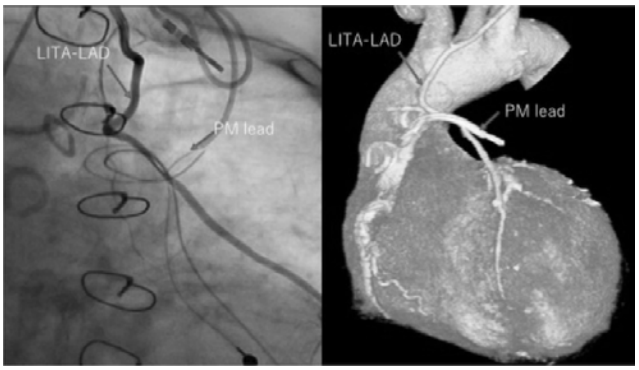
The patient is a 64-year-old man with worsening of angina, and suffered from hypertension, diabetes mellitus, dyslipidemia and renal failure requiring dialysis. He originally underwent a coronary-artery bypass grafting (CABG) surgery for triple vessel disease with low ejection fraction (EF) 7 years ago (left internal thoracic artery(LITA)-LAD, saphenous vein graft (SVG)-LCX #14PL, SVG-RCA #4AV). At the same time, the left ventricular (LV) epicardial bipolar lead was implanted for wide QRS with bifascicular block and low EF, in preparation for cardiac resynchronization therapy. After the CABG, he underwent several percutaneous coronary interventions due to occlusion of SVG-LCX #14PL and SVG-RCA #4AV grafts. The coronary angiography (CAG) revealed no significant stenosis of LITA graft until 3 years ago. This time, CAG was performed to evaluate new coronary stenosis due to worsening of angina, it was revealed that the body of theLV epicardial leadwas positioned just beside the LITA, causing 90%stenosis of the LITA. And the intravascular ultrasound reveled that there was compression against the outside of the artery, and the absence of arteriosclerotic changes. The computed tomography showed the LITA was positioned just between theLV epicardial lead and the pulmonary artery.These postoperative anatomical features mightbecome a major contributor

to severe stenosis of the bypass graft. We needed not only ballooning but stenting to achieve good dilatation and flow of the LITA.
Conclusions Although a rare occurrence, an epicardial leadcan be positioned close to the bypass graft and can cause severe stenosis followed by angina several years later.

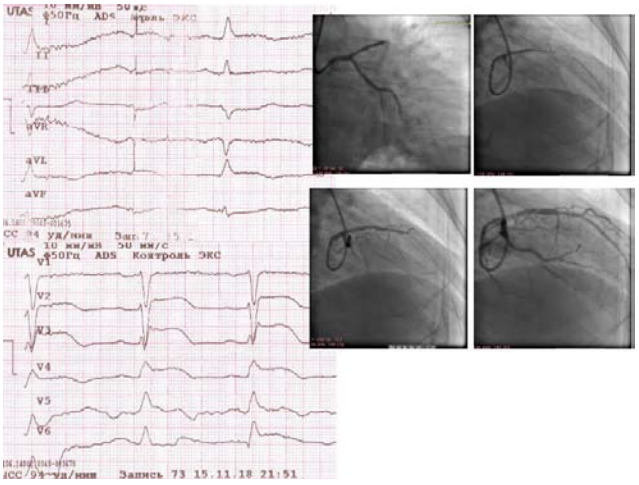


P1908

A 39-year-old childbearing potential woman in lactation period suffering from STEMI.

IA Mezhiievska[1]; VI Maslovskyi[1]; II Leta[1]; YV Maslovskyi[1]
[1]*National Pirogov Memorial Medical University, Internal medicine #3, Vinnitsa, Ukraine*

A 39-year-old woman was brought by the ambulance regarding STEMI. She is the mother of two children. At the present time moment, she has been on maternity leave (the lactation period). In 2009, she was diagnosed with diabetes during the first pregnancy. Further, she took sugar-reducing therapy (gliclazide). In 2009 during labor she had acute retinopathy of both eyes. In anamnesis, after the first pregnancy, there was noted an increase in blood pressure of 160/90 mmHg, she didn't take antihypertensive drugs. From 2016, in connection with the second pregnancy she stopped taking any medications. Over the past two days, the patient noted a significant recrudescence of general condition. She suffer from chest pain, which she didn't feel in a state of rest. At about 16.00 she had intensive burning pain in the heart area, pouring sweat. She called the ambulance and was taken to the hospital. In the medical examination, she had a heart rate of 95 beats / min and a BP of 120/80 mmHg. Auscultation of the heart showed normal heart sounds without additional sounds or noises. No signs of congestive heart failure were noted. The respiratory test was not noticeable. Rate of blood sugar at hospitalization was 24.0 mmol / l. Total cholesterol - 8.12 mmol / L, triglycerides - 2.3 mmol / L, LDL - 8 mmol / L, HDL - 0.8 mmol / L, Hb1AC - 8%. At time of admission ECG showed sinus rhythm, ST-elevation I, aVL, V2-V5, ST-depression III, aVF (Fig. 1). Her echocardiography showed hypokinesis of the anterior wall of the left ventricle. Urgent coronary angiography was performed. Acute thrombosis of LAD was detected. She was performed predilatation of LAD with the further stenting with stent system Alex 3.2 × 22 mm / P – 10 Atm. In the distal part, after the dissection followed stenting with stent system Integrity 3.0 × 30 mm P – 9 Atm. Postdilation to 22 Atm. Angiographic results were satisfactory. There were detected no hemodynamically significant coronary artery stenosis, RCA - 10% of distal stenosis. Post-procedure and follow-up: The course of the postoperative period showed no particularities. The patient received treatment: LWMG, Ticagrelor, ASA, Atorvastatin, Carvedilol, Ramipril, Pharmasulin. 72 hrs post procedure, the patient's condition was stabilized, she was asymptomatic and hemodynamically stable, serum urea and creatinine showed normalization dynamic. The patient was discharged in stable condition.
Discussion: Despite the fact that the patient had a high cardiovascular risk due to acute retinopathy after the first pregnancy, she did not receive antihypertensive and other prognosis-modifying therapy. Conclusion. Premenopausal women are believed to have a lower risk of cardiovascular issues than those who are in the postmenopausal period. But in our case, probable decisive factor was diabetes mellitus, non-corrected dyslipidemia, metabolic syndrome and probable toxicosis of the second half of pregnancy.



P1909

Interventricular septal rupture treated by percutaneous device closure

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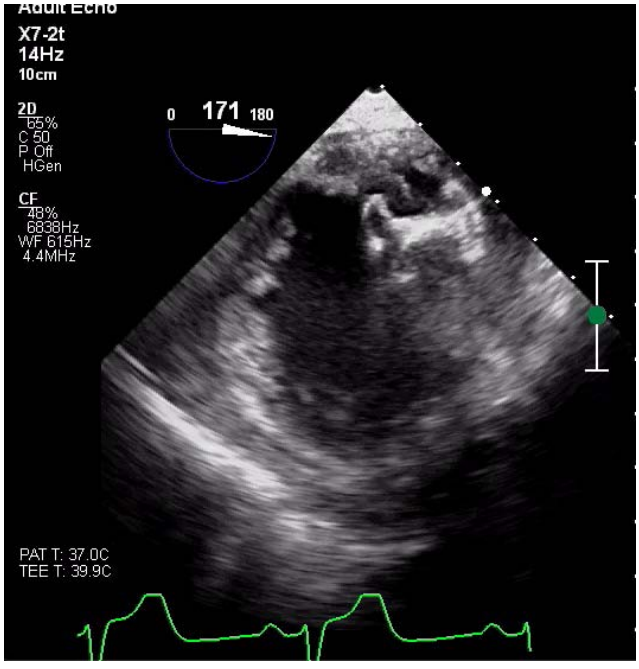
Case description: A 69 year old female patient was diagnosed with acute anterior ST elevation myocardial infarction and was transferred for rescue PCI after thrombolysis. Her medical history reveals multiple cardiovascular risk factors and chronic kidney disease requiring haemodialysis (having a brachial arteriovenous fistulae). Emergency coronarography showed triple vessel disease and acute thrombotic occlusion of left anterior descendant artery for which percutaneous revascularization was performed. Specific therapy was immediately initiated. The following day the patient complained severe chest pain, without ECG evidence of ischemia, but with hypotension, cold, clammy skin. A new loud systolic murmur was heard and immediate echocardiography revealed new apical septal rupture, 1cm large.The patient evolved with cardiogenic shock and right ventricular dysfunction in the following two days, refractory to mechanical support with intraaortic balloon pump and necessitating increased doses of inotropes. The arteriovenous fistulae was closed to minimise right ventricular load. Given the hemodynamic instability, with rapid development of pulmonary hypertension, percutaneous device closure was chosen. Although small residual shunting was present (but with significant reduced ratio of pulmonary vs. systemic flow), the clinical status improved, and three month later she was proposed for cardiac surgery for definite correction.



Transgastric view of device.

Conclusion: Septal ventricular rupture associated to acute myocardial infarction remains a pathology with severely dismal prognosis. Early percutaneous device closure may be an adequate solution for refractory cardiogenic shock patients in order to avoid prolonged use of mechanical circulatory support.

P1910

Impact of intracoronary injection of bone marrow on CMR derived myocardial strain 12 months after myocardial infarction

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Funding Acknowledgements: German research Foundation (DFG) Research Fellowship (GA 2621/1-1)

Background: The effect of intracoronary injection of bone-marrow unselected mononuclear cells (BM-MNC) after acute myocardial infarction (MI) and its impact on left-ventricular (LV) remodelling and ejection fraction (LVEF) remains controversial. To evaluate the 3-dimensional nature of myocardial function, strain parameters as assessed by cardiovascular magnetic resonance (CMR) imaging or transthoracic echocardiography can be used. They have been claimed to be more sensitive to functional changes of the heart than LVEF.
Purpose: The purpose of the present study was to assess potential changes of global longitudinal (GLS) and global circumferential strain (GCS) in a group of patients treated with BM-MNC after MI.
Methods: In this prospective multicentre study, 113 patients with successfully reperfused ST-segment MI were included. Patients were divided into an open-labelled control (N=42), an early BM-MNC treatment (5-7 days after MI, N=41) and a late BM-MNC treatment group (3-4 weeks, N=30). CMR using a standard ECG-triggered steady state free precession (SSFP) sequence was acquired at baseline and 12 months after MI. GLS and GCS of the LV were obtained using feature tracking software. The primary endpoint was the change of end-systolic GLS and GCS between baseline to 12-months follow-up. GLS and GCS values were noted in percentages [%] with strain being defined as relative deformation and negative values denoting shortening.
Results: The absolute change in GLS between baseline and 12-months follow-up was significant for the early (2.9±6.0%, p=0.006) and late treatment group (2.7±6.1%, p=0.031), but not for controls (0.9±4.0%, p=0.22). Although not statistically significant, baseline GLS of the early and late treatment groups (-11.7±4.1% and -11.8±3.8) was lower compared to the control group (-13.0±4.0%, p=0.427 and p=0.486). 12 months GLS was not different between all groups. Adjusting for different baseline GLS as a covariate, analysis of covariance (ANCOVA) did not reveal a significant change of GLS between the groups (p=0.56).
The absolute change in GCS between baseline and 12-months follow-up was not significant for all groups. Baseline GCS values were not different for controls and treatment groups (-19.4±5.4, -17.4±5.6%, and -19.1±5.7, respectively). LVEF did not show a significant change in any group as well.
Conclusions: In summary, the study found no improvements in myocardial strain due to BM-MNC treatment. Early and late treatment with intracoronary infusion of BM-MNC after MI resulted in significantly improved absolute GLS 12 months after MI. When adjusting for differing baseline values, significant improvement of the BM-MNC treatment groups vanished. Also for GCS and LVEF, no significant changes from baseline to 12-months follow-up were found.

P1911

Paget disease of the bone associated with severe acute reduced heart failure: a case report

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Background: Paget's Disease of the bone (PD) is characterized by a slow progressive skeletal deformity. Heart failure (HF) has not been defined as an initial manifestation of PD, however 4% of the people with PD develop cardiac alterations. We discuss the relevance and poor prognosis of this association in acute severe Heart Failure Reduced Ejection Fraction (HFrEF).
Case Summary: A 73-year-old man without comorbidities history. In a thirty days period, developed rapid onset exertional dyspnea, severe reduction of exercise tolerance, progressive edema and longitudinal asymmetry in lower limbs. Initially the patient was treated with high dose of loop diuretics. He was known in our Institution due to de novo acute Heart Failure in New York Heart Association (NYHA) III functional class. Initial serum NT-proBNP test was elevated significantly (19358 pg/ml). MRI demonstrated dilated cardiomyopathy with Left Ventricular Ejection Fraction was 11%. CT scan angiography didn't evidence ischemic damage as etiology.
Characteristically, X-rays and tomography showed asymmetry of the lower limbs with a longer left lower limb.
Patient fulfilled Paget's disease criteria, which was confirmed by elevated serum alkaline phosphatase. Our therapeutic approach was based and focused in optimizing medical treatment for acute HF symptomatology, according ESC Heart Failure clinical guidelines, in association with vitamin D, due to the decreased glomerular filtration rate we delayed the use of bisphosphonate therapy. After three months follow-up, there was no edema, dyspnea or fatigue, patient had improved to NYHA class I. improvement in NT-proBNP, creatinine, alkaline phosphatase.
Conclusion: We present a case of a man who was diagnosed with de novo acute HFrEF and Paget's Disease. Although PD is a very rare etiology of HF, we suggest that a screening with alkaline phosphatase should be requested in patients above 50 years old with idiopathic dilated cardiomyopathy to define etiology and modify prognosis.

Observed response in Paget causing HFrEF

Lab results	Basal	Follow-upmonths
NT-proBNP (pg/ml)	19358	2390
Alkaline phosphatase (U/L)	309	155
Creatinine (mg/dL)	1.85	1.67
Calcium (mg/dL)	9.37	8.5
Potassium (mmol/L)	4	4.95
Sodium (mmol/L)	140	134
Serum labs (units)		

P1912

Acute chagas cardiomyopathy in a 40-yo Mexican with very reduced LVEF: a case report

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Chagas cardiomyopathy (CC) is a chronic cardiac complication of Chagas Disease (CD), characteristically generated by the protozoan T. cruzi and transmitted by the kissing Bug (Triatominae) in Latin America. It primarily affects low-income populations and is a major cause of chronic morbidity and mortality. Heart failure (HF) usually appears at least 20 years after the original infection and it has been suggested it is an immune-mediated myocardial injury .
Introduction: A 40-years-old Mexican farmer and handicraftsman male with low incomes, who lives in rural zone arrived to our institution with acute congestive HF symptoms, featuring with NYHA III, medium efforts dyspnea, orthopnea and severe hydric retention. At the physical examination we found an important yugular engorgement, S3 , mitral and tricuspid regurgitation, coarse crackles at both bases, hepatomegaly, jaundice and pretibial oedema. The patient refers he had been bitten by a Triatominae insect several times some previous months ago and reported painless nodule on the right leg. EKG: Showed sinus rhythm, LBBB and both ventricular and auricular dilatation.
MRI showed global dilated cavities, non ischemic intramyocardial enhancement, moderated tricuspid and mitral regurgitation, apical thrombus in both ventricles and severe LV systolic dysfunction (LEVF: 26%). Labs studies showed a NT-proBNP of 19,203 pg/ml and another of >25,000 pg/ml.
Management was based on strict adherence HF-ESC clinical guidelines, to correct heart failure decompensation. The case was reported to the corresponding epidemiology department to obtain antichagasic drug. Three months later he presented clinical improvement and functional class NYHA I.
Conclusions: We present a case of a man who developed HF of rapid clinical deteority and acute Chagas disease, with the referred antecedent of been bitten by the reduviid bug and the documented recent pathognomonic lesion of chagoma in the leg. Although there are anti chagasic drugs available, and our patient improved with this therapy, more studies are needed to recommend the early stages treatment based on clinical benefit and prognosis impact on these patients.

P1913

Hepatitis or heart attack? A rare presentation of acute heart failure

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A 54 year old man with a 4 week history of diarrhoea and no cardiovascular risk factors other than well controlled hypercholesterolaemia, presented to the emergency department following a collapse. Initial examination found hepatomegaly, pulmonary oedema and significant peripheral oedema. Blood tests showed an acute liver injury and a lactate of 6. High sensitivity troponin was only 49.
As part of a work up for hepatitis, he had a CT abdomen which revealed a large left ventricular aneurysm. An urgent echocardiogram demonstrated a dilated and severely impaired left ventricle. There was thinning of the mid-ventricular anterior and septal walls and apical segments. A midventricular inferoseptal ventricular septal defect was noted. These findings were confirmed by cardiovascular magnetic resonance (figure 1). His Qp/Qs was 2.7 indicating significant left-right shunting. The right ventricle was also dilated with severely reduced ejection fraction. Furthermore, laminar thrombus was evident in the early gadolinium images. His constellation of signs and symptoms were attributed to cardiogenic shock secondary to septal rupture due to delayed presentation of myocardial infarction (MI). Consequently he was transferred a high dependency setting for diuresis and inotropic support for optimisation prior to possible surgical intervention. Coronary angiography demonstrated an occluded left anterior descending artery and critical stenosis of the right coronary artery. An intra-aortic balloon pump (IABP) was sited. Multi-disciplinary input from surgical, critical care and heart failure teams discussed the options including percutaneous device closure and suitability and timing of surgical operative repair. A date for surgery was set beyond 21 days of the presumed index event, but unfortunately the patient deteriorated clinically despite escalation of treatment, and a decision was made to palliate.
DIscussion: Whilst ventricular aneurysms and ventricular septal rupture (VSR) are known complications of MI, they are increasingly rare in the era of reperfusion, with rates of 0.17-0.31% of patients. This case is particularly unusual as not only did the patient not have an typical cardiac presentation with chest pain, he also did not have any of the risk factors associated with VSR, such as older age, female sex, chronic kidney disease or prior heart failure. Additionally, this case highlighted the importance of optimal timing of surgical intervention. Mortality is highest (>60%) in those who undergo operative repair within the first 24 hours. Survival rates increase if surgery is deferred beyond 7-21 days and this is attributed to increased stability of the fibroising myocardium, but also survival bias. However, there is a fine balance in deferring surgery against the risk of further clinical deterioration, as seen in this case.

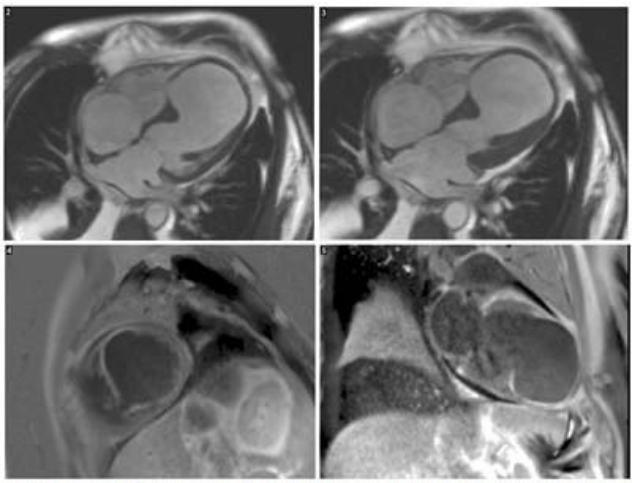

Figure 1: Cardiovascular magnetic resonance imaging of the aneursmal LV with a VSD

Panels 1 and 2 show 4 chamber views in end-diastole and systole respectively. There is thinning of the LAD territory and an aneurysmal apex. Significant left to right shunting is clearly seen. In panels 3 and 4 dark blood late gadolinium images show the transmural infarction (white), with the VSD visible in the short-axis view.

P1914

Ventricular septal defect after acute myocardial infarctation-a clinical case

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Introduction: Post – myocardial infarctation ventricular septal defect (pos-MI VSD) is an increasingly rare complication of myocardial infarctation. It usually develops a few days after a transmural MI involving the septum and is associated with a high mortality rate. Despite the improving outcomes, making the decision of performing surgery is complicated by the severe preoperative condition of the patient and the softness of the necrotic tissues.
Clinical case: 75 years old ex-smoker man with previous relevant history of controlled hypertension, dislipidemia, diabetes, obesity and hyperuricemia. He was medicated with antihypertensive drugs, oral antidiabetics and allopurinol.
He came to medical attention in 2018 with a three-day history of retrosternal chest pain associated with nausea and worsening fatigue At the hospital admission he was conscient, hemodinamically stable and well perfused. His blood pressure was 114/67 mmgH. Cardiac auscultation revealed a harsh holosystolic murmur, which was heard over the entire precordium. The EKG showed sinus rhythm at 110 bpm, ST segment elevation in the anterior wall as well as Q-wave presence in the same derivations. Transthoracic echocardiogram (TTE) revealed a non dilated left ventricule with preserved ejection fraction, apical, septal and anterior wall akinesia and hyperkinesia of the remaining segments It also showed a large and well demarcated anterior interventricular septal defect.
It was admitted subacute anterior myocardial infarctation complicated with ventricular septal defect. Coronary angiography revealed occlusion of the left anterior descending artery. The patient was immediatly transfered to the surgical centre, after the implantation of an intraaortic balloon pump. He was submitted to surgical intervention 15 days after the event, with a succsseful closure of the septal deffect.
The postoperative period was complicated with nosocomial pneumonia and septic shock, requiring aminergic and renal replacement therapy, as well as acute isquemic stroke. 1 month after de surgery, a new TTE revealed a small restrictive interventricular communication. Despite those findings, there was a progressive clinical improvement.
Conclusion: Pos-myocardial infarctation ventricular septal defect is a complication that is still associated to high mortality rate. Closing the shunt and stabilizing the hemodynamic condition of the patient is of paramount importante. However, the optimal time for the intervention remains debatable.

P1917

Striking reduction of a giant intracavitary thrombus in a 46-yo male with heart failure with very reduced ejection fraction due to myocarditis: a case report.

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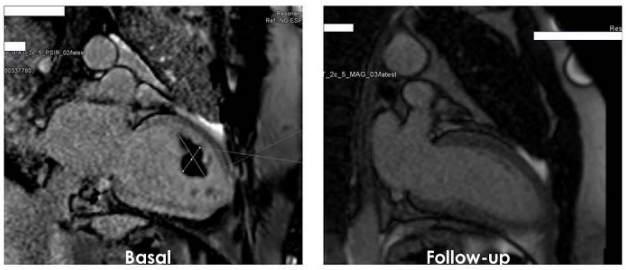
Heart failure (HF) is a pathology associated with high morbidity and mortality. LV regional wall akinesia and dyskinesia results in blood stas. Intraventricular thrombi (IT) are a complication in 25% of patients with myocarditis, and significantly increasing the mortality associated with thrombectomy or heart transplant.
Case Summary: We present the case of a 46-year-old male only with a history of arterial hypertension. Three months ago featured with small efforts dyspnea, paroxysmal nocturnal dyspnea, edema in lower extremities, mild ascites and NYHA IV. At the admission he presented acute HF due to sinus tachycardia, pulmonary congestion and pleural effusion. Laboratory studies presented Troponin I 0.024 ng/ml, NT-pro-BNP 8568 pg/ml, and elevated C-reactive protein (19.64mg/L).
An inicial MRI showed a LVEF of 15%, left ventricle systolic diameter of 55 mm and a diastolic diameter of 63 mm. It also revealed two giant thrombi on LV, one of 52 x 13mm of diameter adhered to the anteroseptal left wall, and a second one of 33 x 21mm with a thin and very mobile pedicle; reported left atrium diameter of 68 x 53 mm (area of 36 cm2); evidenced moderate mitral and tricuspid regurgitation and septal and apical intramyocardial reinforcement, suggesting myocarditis.
Treatment was focused on optimal medical treatment for HF associated with vitamin K inhibitor. We considered the indication of heart transplantation due to the potential surgery risk of the thrombectomy, nevertheless the patient refused. After 45 days he presented improvement of functional class to NYHA I, without signs of hydric retention, marked reduction of NT-pro-BNP to 190 pg/ml. A second MRI was performed, which reported a remarkable improvement of LVEF to 52% and just a single 3.5 x 2mm thrombi attached to the anterior wall; mild mitral regurgitation, with resolution of tricuspid regurgitation. It's important to clarify that no cardioembolism has been reported in the follow up.
Conclusion: The present case demonstrates the great improvement of a young male with giant intracavitary thrombi treated with oral anticoagulation in a short period

of time, with no reported cardioembolism, and no need of thrombectomy or heart transplantation. With the ejemplificación of this case we bring up the possibility of good outcome of a giant intracavitary thrombus in young adults using only anticoagulation therapy, no requiring thrombectomy or heart transplantation. More studies are needed to make recommendations on these patients.



Basal and Post Treatment Cardiac MRI

P1918

A case of complicated acute aortic dissection

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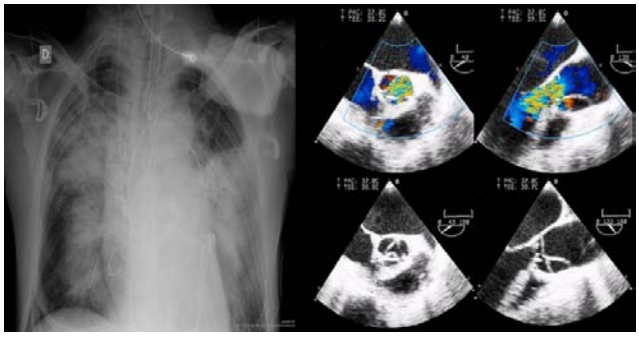
Abstract: A 50-year-old male, with a clinical background of allergy to Penicillin, smoker of 10 cigarettes per day and consumer of Cocaine, presented to the emergency department with a 4-day history of increasing shortness of breath with fever and dark expectoration. On arrival, the patient was hemodynamically unstable. The blood pressure was 90/60 mmHg, the pulse 120 bpm, the respiratory rate 32 breaths per minute, and the oxygen saturation 77% while he was breathing ambient air. He had respiratory work and universal crackles on the pulmonary auscultation.
The admission ECG showed an extensive myocardial ischemia with ST segment depression of 3 mm in leads II, III, aVF, V2-V6 and elevation in V1 and aVR. Initial laboratory data revealed a partial acute respiratory failure, data of poor peripheral perfusion (serum creatinine of 1.51 mg/dL, lactate dehydrogenase 54.6 mg/dL), increased markers of myocardial damage (CK 232 U/L, us-Troponine T 3422 ng/L) and inflammatory parameters (C reactive protein 10.04 mg/dL, leucocytes 23.700).



Respiratory failure occurred, so intubation was performed and inotropic agents were initiated. Cultures of blood were extracted and empiric antibiotic therapy with Levofloxacin was administered. Under suspicion of septic shock derived from respiratory tract infection complicated with myocardial ischemia, Cardiology was called. Bedside echocardiography showed severe impairment of left ventricular ejection fraction due to an extensive apical akinesia and a dilated aortic root with severe aortic valve insufficiency. A transesophageal echocardiogram was performed, revealing a proximal aortic dissection with an entry point immediately distal to the aortic valve, with an intimal flap that was interfering in the closure of the aortic valve (in the left coronary cusp) and occluding the ostium of the left common trunk.
The case was accepted for emergent cardiac surgery. Multiple entry points were visualized in the proximal aorta, but dissection did not affect the aortic valve nor the coronary arteries. An aortic valve-preserving technique was performed with re-implantation of the aortic valve into a tubular graft. After surgery, the patient continued to do well and was discharged home after 16 days of admission.
Few cases of acute pulmonary edema originated by aortic dissection complicated with both acute myocardial infarction and severe aortic insufficiency are reported and it results of interest. Differentiating acute aortic dissection with coronary malperfusion from true acute myocardial infarction is challenging and inappropiate treatment may have catastrophic consequences.

P1919

Polyserositis post influenza vaccination, presented as acute heart failure

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Background: The dyspnea is a frequent presentation of heart failure. It is a frequent morbidity in elderly age. We describe a patient with heart failure presentation due to presumed diastolic dysfunction, but investigation of the case showed inflamed polyserositis post influenza vaccination.
Case report :A 72 years old men with long history of hypertension, IHD, PVD was admitted to cardiology department complaining of severe dyspnea during the last 2 weeks and dizziness.A one years ago because compliance of mild dyspnea an echo examination was performed and revealed normal LV ejection fraction and mild atrial enlargement.His physical examination was remarkable for signs of dyspnea, BP 130/70 mm Hg, HR 90/min, t 37.0, Sa 93% at room air. ECG revealed normal sinus rhythm without changes from previous recording 1 year ago. At admission BNP was 210pg/ml, normal hs-Troponine, mild leucocytosis and thrombocytosis.
Chest x-ray showed enlarged heart silhouette and left pleural effusion.The acute coronary syndrome was excluded because absence chest pain, normal repeated troponin level and unchanged ECG. The first diagnosis of acute heart failure due to diastolic dysfunction was done and the treatment was started with IV diuretics ,but without improvement in his condition.The diagnostic evaluation of causes for acute heart failure was performed.Blood tests revealed normal for age creatinine level , normal thyroid and liver function tests . Remarkable findings of leucocytosis and high CRP level were suspected for inflammation/infection. Echocardiography examination showed normal LV ejection fraction, mild Left atrial enlargement, moderate to large pericardial effusion without signs of cardiac compression.Although absence clinical and ECG signs of acute pericarditis the treatment with high dose aspirin and colchicine was started for probable pericarditis.The investigation was continued by CT chest and abdomen that showed bilateral moderate to large pleural effusion, large pericardial effusion, mildly enlarged mediastinal lymph nodes.Diagnostic pleurocentesis was performed and revealed exudative pleural effusion.Blood tests for connective tissue disease, cytology and flow cytometry from pleural effusion, blood procalcitonin were all negative.An important anamnestic remark was influenza vaccination 3 weeks ago.A short trial with steroid was done in additional to ASA and colchicine treatment.A patient condition significantly improved , repeated echo revealed mild pericardial effusion and mild pleural effusion on chest x ray.Summary: Although acute heart failure due to diastolic dysfunction is common condition induced dyspnea and pleural effusion, the thorough investigation in this patient revealed polyserositis post influenza vaccination. Hence, rare cause of fluid overload should be considered in differential diagnosis of heart failure.

P1920

Miscellaneous clinical manifestations of an intracardiac tumour

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A 60 years old female was admitted to the emergency department presenting signs and symptoms of heart failure, complaining of extreme breathlessness, fatigue, haemoptysis, orthostatic hypotension. The patient didn′t have any medical history besides two physiological pregnancies (35 years ago) and grade I arterial hypertension. Vital signs were stable with a blood pressure of 106/65 mmHg, PR 125 bpm, RR of 19 brpm and subfebrility (37.7 °C). Lungs were clear to auscultation bilaterally with bilateral basal crackles. Cardiovascular exam was notable for a holosystolic murmur at the apex and regularly regular accelerated rhythm. Pulses were intact bilaterally in upper and lower extremities with no edema. Levels of serum electrolytes, glucose, blood urea and creatinine, and complete blood counts were normal, D-dimers were positive, high level of blood lipids and slight hyperglycemia were noted. In the emergency room the patient didn′t respond to conventional diuretic and anticoagulation therapy and presented with worsening of symptoms and alteration of the hemodynamic parameters. Transthoracic echo exam showed normal ejection fraction (EF 58%), moderate mitral regurgitation, moderate to severe tricuspid regurgitation, high probability pulmonary hypertension (PSAP 60 mmHg) and a large mass in the left atrium, attached to interatrial septum, filling the whole chamber with slight protrusion into the anterior mitral valve leaflet and left

ventricle during diastole. It measured 5.6x3.8x5,3 cm (14,8 cm2). A diagnosis of left atrial myxoma was made, the patient was immediately transferred to another hospital and underwent resection of the left atrium myxoma and left atrial wall with pericardial reconstruction. Post-operatively the patient showed significant clinical and haemodynamic improvement, the postoperative echo exam didn't reveal any signs of a cardiac tumour with a normal ejection fraction and mild mitral and tricuspid regurgitation.
Conclusions: Atrial myxomas are the most common primary cardiac tumours in adults, accounting for nearly half of primary cardiac tumours, developing in any of the cardiac cavities, but up to 90% of them are located in the left atrium, mainly adhered to the atrial septum near the fossa ovalis (1). The large spectrum of symptoms and signs as dyspnea, orthopnea, paroxysmal nocturnal dyspnea, pulmonary edema, could easily mislead to several diagnoses, making it difficult for clinicians to consider atrial myxoma (2). Transthotacic echo exam is the cornerstone in the appraisal of the right diagnosis, performing the differential diagnosis and tumour classification according to the tissue appearance. As soon as the suspicion of a myxoma has been raised and the diagnosis by an imaging method was performed expeditious surgery becomes imperative, as the risk of cardiovascular complications is extremely high (3). Generally the results of the surgery are positive, with a low rate of reccurence and a relatively low mortality (4).

P1921
Infective endocarditis complicated with heart failure - when everything goes wrong

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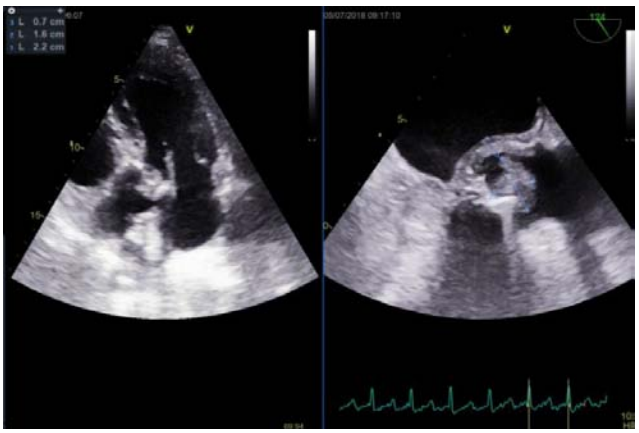
A 68-year-old patient, after aortic valve bioprosthesis implantation in 2016 due to severe stenosis, admitted to the Department of Gastrology for the diagnosis of microcytic anemia. Due to persistent fever with unclear etiology associated with elevated inflammatory parameters, the patient underwent transthoracic and



TTE endocarditis

transesophageal echocardiography, where two additional pathological, excessively mobile structures associated with the bioprothesis where confirmed measuring 10x4 mm (from the LVOT side) and 22x16mm (on the aortic side), as well as inflammatory infiltration around the aortic annulus and in the wall of the aortic root. After the Heart Team consultation, the operation of mechanical aortic prosthesis implantation was performed by accessing the median sternotomy. The procedure was complicated with a complete heart block. Due to the efficient escape rhythm, the pacemaker implantation was postponed. The patient was transferred to the Cardiological Rehabilitation Department. In the laboratory tests the aetiological agent was neither produced from blood nor from an explanted aortic prosthesis although in the culture of the anus VRE carriage. Empirical antibiotic therapy with vancomycin, gentamicin and rifampicin has been continued. During the treatment process, maculo-papular rash occured on the entire body. Due to the ineffectiveness of local treatment with steroids and antihistamines, it was decided to replace current antibiotics with ceftazidime. During further hospitalization, increasing markers of severe heart failure with preserved left ventricle ejection fraction: massive edema of the whole body and resting dyspnea. In echocardiography, moderate perivalvular leak, significant tricuspid regurgitation, moderate mitral regurgitation, preserved left ventricle ejection fraction at the level of 50%. In computer tomography: fluid in the pleural cavities and areas of atelectasis in the right lung. In chest x-ray, a high diaphragm on the right side, suspicion of diaphragmatic nerve palsy. Due to the bradyarrhythmia up to 30/min, the patient had temporary right ventricule stimulation through the right internal jugular vein and later on a permanent dual-chamber pacemaker system was implanted. In further hospitalization, clinical improvement was observed. The patient was discharged from the department in NYHA functional class III. For 4 months, she has been on ambulatory surveillance with stable NYHA III symptoms. In transthoracic echocardiography we find, moderate perivalvular leakage, severe tricuspid regurgitation. NT-pro BNP levels by 7000 pg/ml, with exponents of moderately good prognosis in the spirometry test with VO2 peak 1318 ml/min, hundred percent of stimulation during pacemaker control. The patient still has two therapeutic goals. Percutaneous closure of valve-related leak and the tricuspid outlet sealing. The question remains whether to consider both interventions and which order to choose, or perhaps conservative treatment?

P1922
Broken heart syndrome: a challenging diagnosis

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INTRODUCTION: Takotsubo cardiomyopathy (TC) is a differential diagnosis of myocardial infarction with nonobstructive coronary disease (MINOCA) and is often related to a physical or emotional stress. Although some image features can help to support the diagnosis, the clinical presentation has many similarities with myocardial infarction, making TC a challenging diagnosis.
CASE REPORT: We describe the case of a 75-year-old woman with hypertension, type 2 diabetes mellitus, dyslipidaemia, obesity, depressive syndrome and obstructive sleep apnoea.
She had history of a hospitalization 8 months earlier because of a suspected myocardial infarction with non-ST segment elevation. At that time, she complained of a constrictive chest pain after a vigorous effort. ECG showed a non-specific intraventricular conduction delay with QS from V1-V2 and poor R wave progression. Echocardiography showed hypokinesis of the apical segments of the septum, inferior and inferior-lateral walls; the left ventricular ejection fraction (LVEF) was preserved and a slight hypercontractility of the basal segments was noted. She had troponin elevation (peak 3.5 ng/mL; N<0.045 ng/mL). Coronary angiogram did not show coronary disease and she was discharged with dual antiplatelet therapy.
She was again admitted to our Emergency Room for acute pulmonary oedema, with no complaints of chest pain. The ECG revealed a ST-segment elevation in the anterior precordial leads. An emergent coronary angiogram showed non-obstructive coronary disease. The ventriculography showed akinesia/dyskinesia of the mid/apical segments of all walls. She was admitted with the diagnosis of a probable TC. Transthoracic echocardiogram (poor acoustic window) showed akinesia of all mid-apical segments and a mildly depressed LVEF. During hospitalization peak troponin was 1.9 ng/mL and she developed biphasic T waves in the precordial leads. A revaluation echocardiogram showed improvement of the previous wall motion abnormalities and a preserved LVEF. When exploring the possible triggers, the patient referred that both situations were similar and that she was having sexual intercourse when the symptoms suddenly started. The first event was assumed as a TC and dual antiplatelet therapy was stopped. Because of anxiety over the situation, she had to be referred to a psychiatry appointment.
DISCUSSION: MINOCA should be considered a working diagnosis and the underlying aetiology requires active investigation. Distinction between TC and acute coronary syndrome can be difficult, especially in the presence of atypical features. This case highlights the clinical history as a cornerstone to patients' clinical approach. Also, it points that TC recurrences can have a significant impact in patients' life so, despite their relatively low prevalence, further studies of the mechanisms and therapies for their prevention are essential.

P1923
Tachycardiomyopathy and subclinical hyperthyroidism: when should antithyroid treatment be given? a case report

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Background: Tachycardiomyopathy (TCMP) is a reversible cause of myocardial dysfunction due to increased ventricular workload secondary to chronic or sustained arrhythmias. Thyroid function alterations have been associated with arrhythmias and, in some cases, the appearance of TCMP.
Case Summary: A 42-year-old male with Grave's disease managed with radioiodine therapy and of atrial fibrillation (AF) with prior intact heart function (ejection fraction

(EF) of 65%) managed with Propafenone in a poorly adherent manner, consults for a two-week history of dyspnea, cough, and extremity edema. Physical examination exhibited arrhythmic heart sounds; R3; holosystolic murmur grade II/VI in the mitral; HR: 160 bpm; RR: 16 rpm; AP: 110/80 mmHg; T: 37 C; Jugular engorgement; and grade III edema of lower limbs. The initial ECG displayed AF with rapid ventricular response associated repolarization disturbances on the inferolateral aspects. A chest x-ray showed diffuse infiltrations, upper right lobe consolidation, and cardiomegaly. Rate control medication (metildigoxin 0.1 mg QD, Metoprolol 12.5 mg TIB), diuretics (furosemide 8 mg TIB) and antibiotic (Ceftriaxone 2 g QD) were initiated. Six hours after admission the patient referred palpitations without chest pain and so was started on Warfarin 5mg QD and Propafenone. In the Intensive Care Unit (ICU), subclinical hyperthyroidism was documented (TSH: 0.14 (0.34-5.6), T3L: 2.16 (2.5-3.9), T4L: 0.89 (0.6-1.2) and a transthoracic echocardiogram showed dilated cardiomyopathy, severe compromise of the systolic/diastolic function (EF 29%) and severe mitral/tricuspid insufficiency (IMAGE 1). Since TSH levels were >0.1, no antithyroid medication was started and heart failure management was given with metildigoxin 0,1 mg QD, Metoprolol 50 mg BID, Enalapril 2,5 mg BID, Spironolactone 25 mg QD, and furosemide 10 mg TIB. Still, despite proper management for 7 days, the patient was persistently symptomatic with only a modest decrease in heart rate (120 bpm). Due to the lack of clinical improvement, the case was taken to a board meeting and Methimazole was started 5 mg BID. 3 days later, the patient was euthyroid (TSH: 0.674), heart rate was stable at 90-100 bpm, the edema resolved, there were no overload signs and the patient lost 4 kg. After thyroid control was achieved, heart function improved so the diagnosis of TCMP was made.

Discussion: Clinical and subclinical thyroid disturbances promote and sustain arrhythmias, increased ventricular mass index, TCMP and mortality so both should be treated. The current indications to start treatment are a high prior to cardiovascular risk and TSH <0.1; none of which were present in this patient. Nevertheless, his condition improved once antithyroid treatment was given. There is no clear benefit for correcting subclinical hyperthyroidism when it comes to cardiovascular outcomes, this case supports the idea of treating subclinical hyperthyroidism regardless of TSH levels

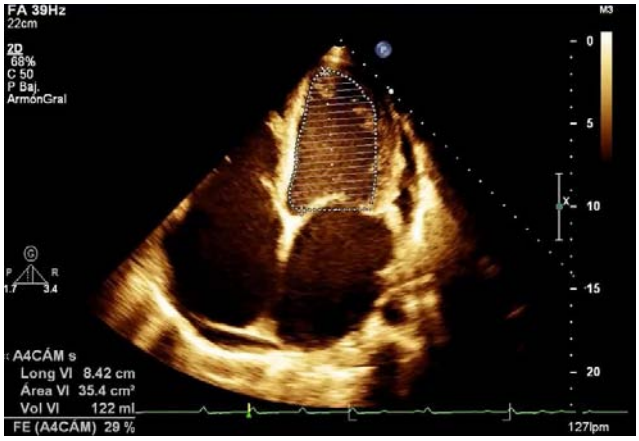

Image 1. TTE with TCMP

P1924

An unusual case of myocarditis

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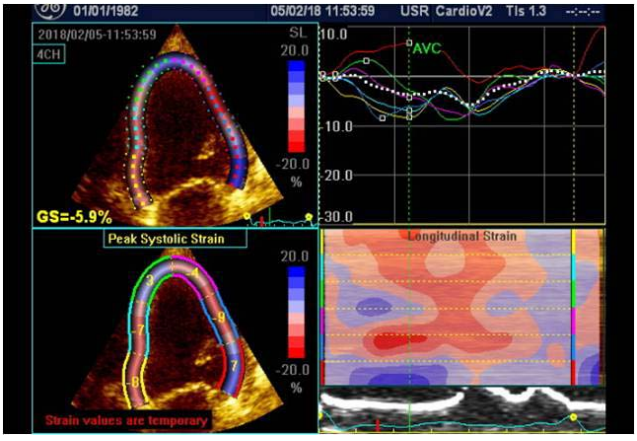
A 37 year old female presented to the emergency department complaining of fatigue, progressively worsening over one month, following an upper respiratory tract infection. Three years ago, due to Raynaud's sign, episodes of photosensitive facial rash and a previous admission for arthritis affecting her right knee, she had undergone screening which was negative for active connective tissue disease. She has been a smoker.On admission, there were signs of acutely decompensated heart failure consisting of sinus tachycardia (130bpm) with audible S3, bibasal crackles, elevated jugular venous pressure, ascites, oedema, pallor and cold extremities. Her blood pressure was 90/50 mmHg, oxygen saturation 92% on room air and respiratory rate was 32/min. There was no evidence of infection and her temperature was normal. ECG showed sinus rhythm with left anterior hemiblock and no signs of ischemia. Laboratory results revealed thrombocytopenia, abnormal liver function tests, severely reduced eGFR (38 ml/min), raised hs-troponin (3.145 pg/ml) and increased CRP and natriuretic peptides. Echocardiogram demonstrated severely dilated left ventricle with D-shape, global hypokinesia and an estimated LVEF of 15% (GLS=-6%). Right ventricle appeared dilated with reduced systolic performance (RV systolic TDI=7cm/sec). There was increased pulmonary pressure with no significant left sided valvular disease.She was admitted in the ICU for invasive monitoring. She was treated with inotropes (levosimendan and noradrenaline) and diuretics and a gradual improvement of tissue perfusion, dyspnoea and diuresis was noted.

The working diagnosis included myocarditis, viral or connective tissue disease related. After the patient's stabilisation a coronary angiogram was performed and it was negative for CAD. The laboratory work confirmed according to the rheumatology consultation an atypical form of systemic lupus erythematosus (reduced C 3 and C4, positive anti-rib-P). Besides the medical management of heart failure, she received high dose of corticosteroids and chemotherapy (cyclophosmamide). The cardiac MRI confirmed the severely reduced LV function. Additionally, it showed subepicardial and subendocardial fibrosis, especially affecting the antero and inferolateral walls consistent with myocarditis and vasculitis.Two months later her clinical picture was improved, as well as the echo study findings (LVEF 35%, GLS=-11%, RV systolic TDI=10cm/sec). At that time a repeat MRI scan showed moderate improvement in LV function with sustained fibrosis in the above mentioned segments. The latter, in conjuction with episodes of non sustained VT in the 24h ECG, prompted the placement of an ICD pacemaker. The patient has been under the joint care of Cardiology and Rheumatology department.



GLSonadmission

Rapid Fire 7 - Improving our insights: biomarkers, imaging, scores

1925

Multiple patterns of left ventricular diastolic function and its determinants in cardiac amyloidosis: an updated evaluation according to ASE/EACVI 2016 guidelines

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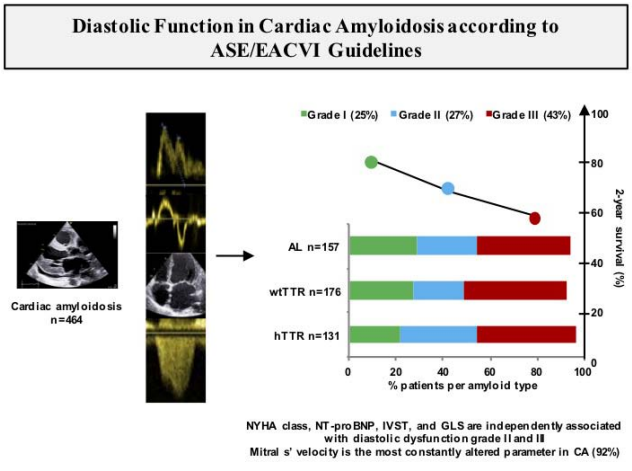
Introduction : Cardiac amyloidosis (CA) is an increasingly recognized cause of restrictive cardiomyopathy but its prognosis remains pejorative. Thus, early diagnosis is necessary. The ASE/EACVI guidelines for the evaluation of left ventricular diastolic function (LVDF) have never been applied to CA.
Aim: Assess the pattern and phenotype of LVDF in a large cohort of CA according to these new recommendations, identify the determinants of the diastolic dysfunction, and describe the prognosis of LVDF patterns.
Methods: We conducted a monocentric, observational, retrospective study on patients referred to our expert centre of CA (Henri Mondor Hospital, Creteil, France) between 09/2008 and 06/2017 in 464 patients with a confirmed diagnosis of CA balanced between the three main types. We analysed their diastolic function by standard echocardiography according to the ASE/EACVI 2016 guidelines together with clinical, biological and survival parameters.
Results: 43% had a restrictive mitral pattern (diastolic dysfunction grade III) and 25% had non-elevated LV filling pressures (diastolic dysfunction grade I). No difference was found between the the main type of CA. After multivariate analyses, grades II and III (increase of LV filling pressures) were independently associated with dyspnea, higher NT-proBNP level, cardiac infiltration (intreventricular septal thickness) and systolic dysfunction (global longitudinal strain). Grade I patients had a better prognosis than grades II and III, and showed early impairment of systolic function linked to LV amyloid involvement, especially mitral s' velocity (<8 cm/s).
Conclusion : CA should not be ruled out in patients with mild impairment of diastolic function. It is time to diagnose patients at this early stage associated with less mortality and need for heart transplant, and for which mitral s' velocity is the most constantly impaired parameter.



Diastolic function in CA

1926

High prevalence of cancer in patients with peripartum cardiomyopathy and potential pathophysiological connections

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Background/Aims: Peripartum cardiomyopathy (PPCM) is a severe heart disease affecting previously heart-healthy women in the last months of pregnancy or in the first postpartum months. PPCM patients have a high chance for cardiac recovery and are at young age at time of diagnosis. Therefore, co-morbidities can occur many years after diagnosis and are of great importance regarding the prognosis of the patients. Here we evaluate the risk of cancer in PPCM patients.
Methods and Results: In a German-Swedish PPCM cohort the prevalence for cancer was more than 10-fold higher (8.5%, 20/235 PPCM patients) than in aged-matched women (cancer prevalence: 0.59%). Cancer occurred in 11 patients prior and in 10 patients after PPCM (n=23 as one patient suffered from cancer before and after PPCM). Two plasma markers associated with cancer, Her2 and sIL-6Rα, were significantly elevated in all PPCM patients (n=47) at diagnosis compared with pregnancy-matched controls (n=23). Ten patients with cancer prior PPCM had obtained cardiotoxic treatments (chemotherapy with Doxorubicine derivatives, Vincristine, Cisplatin and/or radiation) prior PPCM, but did not have left ventricular (LV) dysfunction or heart failure before pregnancy. These patients had a lower chance for full cardiac recovery (LVEF$\geq$50% at 6 months FU) compared to PPCM patients without these treatments (full cardiac recovery after 6 months: 33% vs. 56%). Treatment of juvenile female mice (C57Bl6) with low dose Doxorubicine did not induce LV dysfunction. However, RNAseq of left ventricular tissue revealed persistingly altered expression of 29 genes including HDAC4 and the long non-coding RNA lncpint. No difference in circulating monocytes/macrophages was observed between DOX and control mice. Breeding these mice three weeks later led to high peripartum mortality associated with cardiac inflammation and fibrosis and heart failure. RNAseq revealed the induction of different gene programs by pregnancy in control PP and in Dox treated mice. Among the genes only upregulated in control PP mice were genes involved in sarcomere function and cardioprotection including Mybpc3, Nox4, Nrg1, topoisomerase (DNA) II binding protein 1 and Bcl2. In turn DOX PP mice displayed induction of a pro-inflammatory and pro-fibrotic gene expression program including the upregulation of Adgre1, CCR2, Pecam1 and Timp1, Col3a1, Col4a1.
Conclusion: Our findings suggest a higher prevalence of cancer among PPCM patients compared with age-matched controls. Pregnancy seems to trigger late onset cardiomyopathy after previous cardiotoxic chemo-/radiotherapy. Experimental data suggest that Doxorubicine chemotherapy persistingly alters the epigenetic program and thereby the cardiac response to pregnancy stress.
Therefore, in women with cancer history, especially if chemo-/radiotherapy was applied, heart structure and function should be evaluated before pregnancy and monitoring during pregnancy should be considered.

1927

After initial improvement, left ventricular ejection fraction remains stable in long-term survivors with dilated cardiomyopathy

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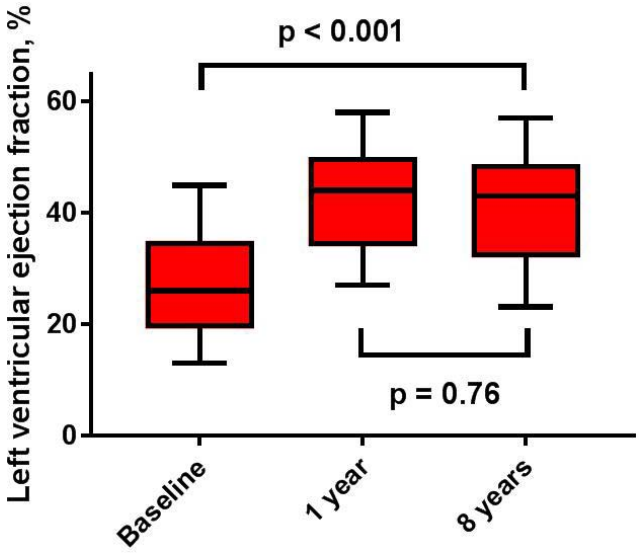
Purpose: Over the last decades, survival in patients with heart failure has improved with the introduction of beta-blockers, inhibitors of the

renin-angiotensin-aldosterone system and implantable devices. We and others have reported a substantial improvement in left ventricular ejection fraction (LVEF) after the initiation of optimal therapy in patients with recent-onset dilated cardiomyopathy (DCM). In a prospective cohort study, we aimed to evaluate whether this initial improvement presaged enduring left ventricular competence or represented a honeymoon phenomenon.

Methods: We included 102 consecutive patients referred to our tertiary care hospital with DCM and an LVEF < 40 %. Patients with significant coronary disease, primary valvular disease, congenital disease, hypertensive cardiomyopathy, myocarditis and specific causes of DCM were excluded. After extensive baseline work-up, follow-up was performed after 1 and 8 years. LVEF was determined by echocardiography.

Results: At baseline, the mean age was 51 ± 14 years. 74 (73%) patients were male. The average duration of symptoms prior to inclusion was 7 (1-13) months, the average LVEF was 26 ± 10 % . The mean New York Heart Association (NYHA) functional class prior to enrolment was 3.2 ± 0.9. At follow-up after 7.8 (IQR 6.3 – 9.0) years, 26 (26%) patients were either dead or had received heart transplants. In long-term survivors, the average LVEF increased from 28 ± 10 % to 42 ± 10 % after one year and remained stable until 7.8 years, (t 41 ± 10 % ; Figure). Circulating levels of NT-proBNP fell substantially from baseline to 1 year (1238 [423-2427] pg/ml vs 320 [121-609] pg/ml, p < 0.001), with no significant difference after that (320 [121-609] pg/ml vs 288 [86 – 919] pg/ml, p = 0.06). Likewise, the average NYHA class improved from 3.2 ± 0.9 prior to inclusion to 1.4 ± 0.6 after one year (p for difference < 0.001), and remained at 1.6 ± 0.6 at 8 years (p for difference from 1 year, 0.10).

Conclusion: After a substantial initial improvement, left ventricular function, natriuretic peptides and functional class remains stable in long-term survivors of dilated cardiomyopathy.



Left ventricular ejection fraction

1928

Clinical utility of the IMPACT score for mortality prediction after heart transplantation: external validation study.

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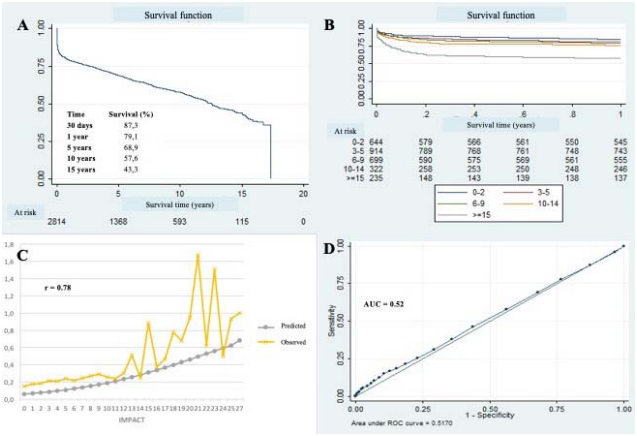
Funding Acknowledgements: CIBERCV

Background: The Index for Mortality Prediction After Cardiac Transplantation (IMPACT)score was derived and validated as a predictor of short and long term mortality after orthotopic heart transplantation (OHT). According to the standards in prediction model research, before implementing a risk score in daily clinical decision making, discrimination ability and impact in clinical practice or prognosis should be evaluated. The primary objective of this work is to externally validate the IMPACT score in the Spanish cohort.

Material and methods: Spanish Heart Transplant Registry data were used to identify adult (>16 years) OHT performed from January 2000 to December 2015. Retransplantation and combined transplantation were excluded from the analysis. Individual values of the IMPACT score were calculated for each patient. Overall 1-year mortality after OHT was assessed and 1-year mortality rates between predefined IMPACT score groups (0-2pts, 3-5pts, 6-9ptos, 10-14ptos, ≥15pts) were compared. Correlation between the observed and expected mortality according to the IMPACT score was evaluated. Finally, discrimination ability was assessed by the area under the ROC curve.

Results: We identified 2,814 OHT. Mean age was 53 ± 12 years, 78% were male and 31% had dilated ischemic cardiomyopathy. Mean value of the IMPACT score was 6.3 ± 4.9 points. Overall 1-year survival rate was 79.1%. Kaplan-Meier 1-year survival rates by IMPACT score groups were 84.6%, 81.3%, 79.4%, 76.4% and 58.3% respectively (Log-Rank test: p <0.001). Correlation between the observed mortality in our series and that expected according to the IMPACT score was good (r=0.78), while its discrimination ability was poor (AUC=0.52).

Conclusions: OHT mortality in Spain is adjusted to that expected by the IMPACT score, so there is good calibration of the predictive model. However, its predictive strength is poor and similar to that determined by chance. On the other hand, there is a lack of studies that compare the IMPACT score with other predictive models and studies that evaluate the impact on clinical practice and outcomes of OHT. In the absence of these studies, we cannot implement the IMPACT score in our daily clinical decision making.



1929

Genetic risk prediction of atrial fibrillation in a contemporary heart failure cohort

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Funding Acknowledgements: [CVON2014-11 RECONNECT] [FP7-242209-BIOSTAT-CHF; EudraCT 2010–020808–29].

Background: A genetic basis for atrial fibrillation (AF) is evident in the community, but it remains unclear whether individuals with AF in the context of heart failure share a similar genetic susceptibility.

Purpose: There is an association between AF and common genome-wide susceptibility loci for the arrhythmia in patients with heart failure.

Methods: Associations between an AF genetic risk score (GRS), based on ninety-seven single nucleotide polymorphisms (SNPs) from the latest AF genome wide association study, and AF prevalence was studied in the BIOlogy Study to Tailored Treatment in Chronic Heart Failure (BIOSTAT-CHF). The GRS was calculated by summing the dosage of each AF risk allele (ranging from 0-2) weighted by the natural logarithm of the relative risk for each SNP. Patients were classified into the AF group if they had AF or atrial flutter (AFL) at baseline ECG and/or a prior diagnosis of AF or AFL.

Results: 3759 Caucasian individuals from BIOSTAT-CHF with genetic and rhythm data, of which 1783 in sinus rhythm and 1976 with (a history of) AF, were identified. The GRS was associated with AF after multivariable adjustment for clinical risk factors including; age, sex, BMI, coronary artery disease, hypertension, diabetes and renal disease. The odds ratio for AF was 2.15 per 1-unit in GRS (95% confidence interval (CI) 1.86-2.47, P=4.02x10-26) in the total BIOSTAT cohort. The GRS ranged from 2.12 per 1-unit in GRS (95% CI 1.77-2.55, P=4.58x10-16) to 1.85 per 1-unit in GRS (95% CI 1.27-2.70, P=0.001) in HFrEF (1137 SR, 1125 AF) and HFpEF (223 SR, 307 AF) respectively.
Conclusions: The AF genetic risk score was associated with increased AF risk in heart failure patients, which suggests at least a partial heritable component to the propensity of AF in heart failure. Efforts are warranted to determine the causal mechanisms and extent by which genetic AF susceptibility influences AF risk in patients with heart failure.

1930

Long-term left ventricular ejection fraction trajectory in diabetic patients: is there any difference?

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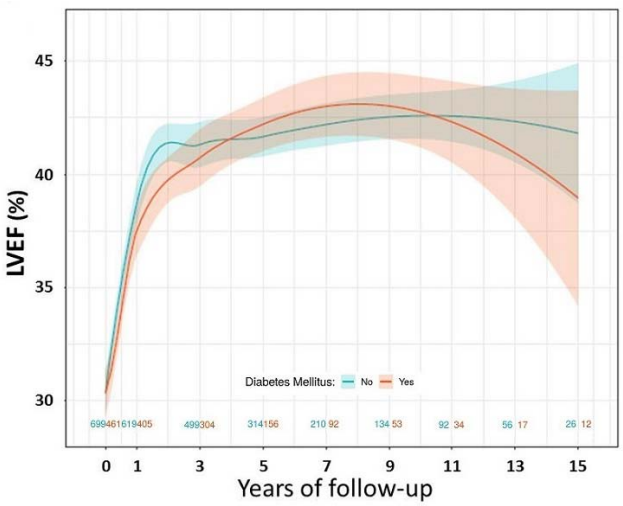
Background: Advances in heart failure (HF) treatment are responsible for systolic function improvement in patients depressed left ventricular ejection fraction (LVEF). This improvement might be maintained through a decade in survivors. It is known than diabetic mellitus (a pathological situation that usually carries an increased atherosclerotic load and also a low-degree inflammation) entails a worse prognosis in patients. Whether the presence of diabetes mellitus (DM) interferes in the improvement and trajectories of LVEF is not completely elucidated.
Purpose: To prospectively assess very long-term (up to 15 years) LVEF trajectory in diabetic HF patients (form ischemic and non-ischemic aetiology), and to compare these trajectories with those observed in non-diabetic patients.
Methods: Ambulatory patients admitted to a multidisciplinary HF Unit were prospectively evaluated by 2D-echocardiography at baseline and at 1, 3, 5, 7, 9, 11, 13 and 15years of follow-up. Out of 1921 patients, 461 diabetic patients and 699 non-diabetic with LVEF <50% and at least 2 LVEF measurements were included in the study. Statistical analyses of LVEF change along the time were performed by Linear Mixed-Effects (LME) modelling. Locally Weighted Error Sum of Squares (Loess) curves were also plotted for the two pre-specified study subgroups.



Results: LVEF measurements were obtained from 461, 405, 304, 156, 92, 53, 34, 17, and 12 diabetic patients at the predefined time-points, and were compared to those obtained in 699, 619, 499, 314, 210, 134, 92, 56, and 36 non-diabetics. Mean number of echocardiography measurements performed was 3.6 ± 1.7. Although the magnitude of LVEF improvement was similar in diabetic and in non-diabetic patients, Loess curves showed a more pronounced inverted U shape in diabetic patients, with a slower improvement during the first years and a higher decline beyond 9 years of follow-up (Figure). LME analysis showed statistical interaction between diabetes mellitus and the LVEF trajectory along time for the quadratic term of time (p=0.009), justified by the most prominent inverted U shape trajectory curve. Remarkably, the interaction between diabetes and LVEF trajectory was observed only in patients from ischemic aetiology in whom the interaction was significant both for the linear term of time (p=0.004), quadratic term of time (p<0.001), but not in patients from non-ischemic aetiology.
Conclusions: LVEF in diabetic patients with depressed systolic function significantly improved during the first years of management in a HF Clinic, in a similar magnitude that was observed in non-diabetic patients. However LVEF trajectory along a very long-follow-up showed a statistically significant interaction between time and diabetes, showing diabetic patients a more pronounced inverted U shape of LVEF trajectory. This interaction was concentred in patients from ischemic aetiology.

1931

Concentric versus eccentric remodeling in heart failure with reduced ejection fraction: clinical characteristics, pathophysiology and response to treatment

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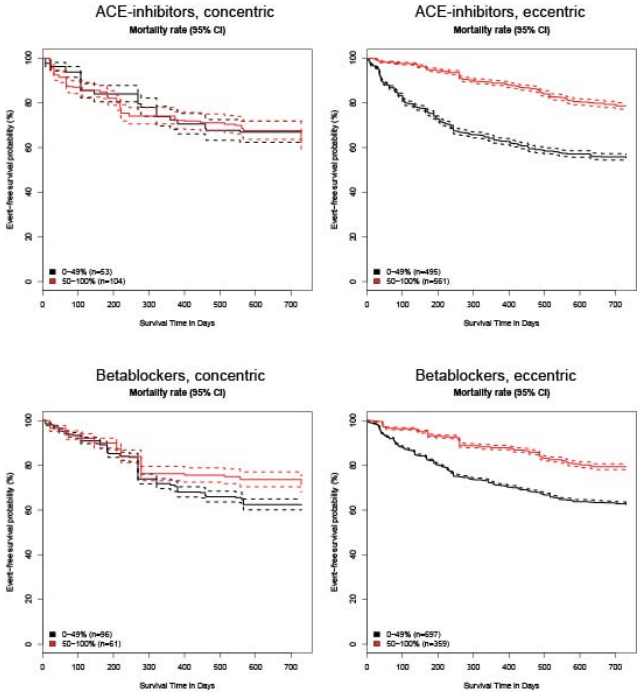
Aims: Heart failure (HF) is traditionally classified by left ventricular (LV) ejection fraction (EF), rather than by LV geometry, with effective guideline-directed medical therapies in HF with reduced EF (HFrEF) but not HF with preserved EF (HFpEF). Most patients with HFrEF have eccentric LV hypertrophy, but some have concentric LV hypertrophy. We aimed to compare the clinical characteristics, biomarkers patterns, and response to treatment of patients with HFrEF and eccentric versus concentric LV hypertrophy.



Event-free survival probability

Methods We included 1213 patients with HFrEF (LVEF<40%) from the BIOlogy Study to TAilored Treatment in Chronic Heart Failure (BIOSTAT-CHF) study and classified LV geometry by standard echocardiographic methods. Network analysis of 92 biomarkers was used to investigate pathophysiologic pathways in geometry groups. The response to uptitration of ACE-inhibitors/angiotensin receptor blockers (ACEi/ARBs) and beta-blockers was adjusted for the likelihood of uptitration, based on a previously published model using inversely probability weighing.

Results Concentric LV hypertrophy was present in 157 (13%) patients with HFrEF, who were on average older, more often female and more likely hypertensive compared to those with eccentric LV hypertrophy. Network analysis revealed that NT-proBNP was the most important hub in eccentric LV hypertrophy, whereas in concentric LV hypertrophy, tumor necrosis factor receptor 1 (TNF-R1), urokinase plasminogen activator surface receptor (U-PAR), paraoxonase (PON3) and P-selectin (SELP) were the most important hubs. Uptitration of ACEi/ARBs and beta-blockers was associated with a mortality benefit in HFrEF with eccentric but not concentric LV hypertrophy (p for interaction ≤0.02).
Conclusion Patients with HFrEF with concentric LV hypertrophy were distinctly different from those with eccentric hypertrophy. Patients with HFrEF and concentric LV hypertrophy resembled patients with HFpEF in their clinical and biomarker profile, as well as (lack of) response to HFrEF therapy.

1932

Risk of readmission and death in patients admitted with new-onset versus worsening heart failure: insights from a nationwide cohort

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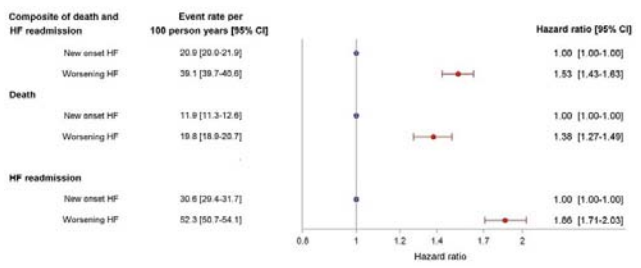
Background: There are two distinct group among patients admitted with acute decompensated heart failure (ADHF) – those presenting with new-onset heart failure (HF) and those with worsening of established HF. However, how these groups compare, and their subsequent outcomes, have not been described.
Purpose: To examine the rates of all-cause mortality and HF readmission in patients admitted with ADHF according to HF duration – new-onset HF (defined as a history of HF of 30 days or less) and worsening of established HF (defined as a history of HF of more than 30 days including both in- and outpatient HF contacts).
Methods: In this nationwide observational cohort study, patients aged below 90 years, surviving a hospital admission for HF (defined as an overnight stay and primary discharge diagnosis of HF) between January 1, 2013 and December 31, 2015 and alive at discharge were identified using data from Danish nationwide registries. The rates of outcomes according to HF duration were examined by multivariable Cox regression models.
Results: Of the total 9,617 eligible patients, 4,771 (49.6%) patients were admitted with new-onset HF and 4,846 (50.4%) with worsening of established HF. Compared with patients with new-onset HF, patients with worsening of established HF were characterized by advanced age and a greater burden of cardiovascular and non-cardiovascular comorbidities. Compared with new-onset HF, worsening of established HF was associated with a higher rate of the composite endpoint of death and HF readmission (adjusted hazard ratio [HR] 1.53 [95% confidence interval [CI], 1.46-1.63]), death (HR 1.38 [95% CI, 1.27-1.49]), and HF readmission (HR 1.86 [95% CI, 1.71-2.03]) (Figure). There was a graded relationship between increasing HF duration and rate of these outcomes. In all subgroups (age, sex, ischemic heart disease, atrial fibrillation, diabetes), worsening of established HF was associated with a higher rate of the composite endpoint of death and HF readmission compared with new-onset HF. There was an interaction between atrial fibrillation (AF), HF type, and outcome; in patients with new-onset HF, AF was associated a lower rate of the composite endpoint, as compared with sinus rhythm (HR 0.86 [95% CI, 0.78-0.95]), whereas AF was associated with a higher rate of the composite endpoint in patients with worsening of established HF (HR 1.33 [95% CI, 1.05-1.22]) (P-value for interaction < 0.001).



Adjusted hazard ratios of outcomes

Conclusions: Among patients discharged from hospital with ADHF, worsening of established HF was associated with poorer outcomes compared with new-onset HF. AF was associated with worse outcomes in patients admitted with worsening of established HF, but not in new-onset HF.

1933

18F-Flutemetamol PET/MR imaging of cardiac amyloidosis

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Background: Non-invasive diagnosis of cardiac amyloidosis by means of nuclear imaging is gaining acceptance as an alternative to endomyocardial biopsy. The diagnostic accuracy of bone-tracer scintigraphy for the detection of transthyretin-related cardiac amyloidosis approaches 100%. Positron emission tomography (PET) with amyloid-binding tracers has the advantage of detecting both common types of amyloid deposits. i.e. light-chain (AL) and transthyretin (TTR) with a reported sensitivity of 95% and a specificity of 98% in a recent meta-analysis. Cardiac magnetic resonance (MR) imaging is another established method that provides insight to myocardial structure and performance, especially with the introduction of myocardial T1 mapping. In our study, we describe the first time use of 18F-Flutemetamol PET/MR imaging in a series of patients with diagnosed or suspected cardiac amyloidosis.
Methods: The study included patients with known or suspected cardiac amyloidosis. All study participants underwent PET/MR imaging in a 3 Tesla hybrid system with estimation of tracer-uptake (SUV mean und SUV max of the basal septum), late gadolinium enhancement, T1 global relaxation time and extracellular volume (ECV). Two nuclear specialists blinded for the results of any available biopsies prior PET/MR imaging analyzed the studies.
Results: We included four patients with cardiac amyloidosis (three patients with TTR-Amyloidosis and one with AL-Amyloidosis) and four patients with suspected cardiac amyloidosis and negative histologic results of cardiac biopsy or abdominal fat pad aspirate. The mean age of the amyloidosis patients was 67 (61-77) years and the mean age of patients with suspected amyloidosis was 76 years (67-84). Average myocardial SUV max in the amyloidosis group was 2,24 compared to 1,86 in the comparison group (p=0.15). Average myocardial SUV mean was 1,85 and 1,39, respectively (p=0.07). T1 relaxation time and ECV were higher in amyloidosis patients (1484,7 vs. 1347,9 sec, p=0.07 and 60,6 % vs. 39,4 %, p=0.08, respectively).
Conclusions: 18F-Flutemetamol PET may be an alternative to endomyocardial biopsy and has the potential to outperform scintigraphy due to the specific tracer-affinity to both common types of amyloid deposits. The diagnostic accuracy of PET/MR imaging should be further investigated in larger studies.

1934

Risk of stroke in patients with chronic heart failure and sinus rhythm: clinical prediction model based on the Swedish heart failure (Swede-HF) registry

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Funding Acknowledgements: This work has received support from the EU/EFPIA Innovative Medicines Initiative 2 Joint Undertaking BigData@Heart grant n° 116074

Background Chronic heart failure (HF) is accompanied by a 2-3 fold increased risk of ischemic stroke, independent of atrial fibrillation (AF), yet anticoagulant therapy has not shown to be effective on a group level in HF patients without AF. Improved risk stratification using readily available clinical information may facilitate the identification of HF patients at higher risk of ischemic stroke.
Purpose To describe the incidence and independent predictors of ischemic stroke in patients with heart failure without atrial fibrillation.
Methods We selected 16,275 HF patients without AF, not receiving anticoagulation from the nationwide Swedish HF (Swede-HF) registry between 2000-2012. A Weibull Hazard Model with backwards selection was used to develop a clinical prediction model for ischemic stroke and/or TIA within 1 year after HF diagnosis.
Results Stroke occurred in 982 (6.0%) patients during a median follow up of 2.35 years [IQR range 0.97 – 4.21 years], amounting to an incidence rate of 21.5/1000 patients-years respectively. Using a Weibull Hazard model with backwards selection, 12 predictors were included in the final multivariable prediction model and the

strongest predictors were: age (hazard ratio (HR) 1.39, 95% confidence interval (95% CI), 1.25 – 1.55 per 10 years), diabetes (HR 1.40, 95% CI 1.12 – 1.74), hypertension (HR 0.79, 95% CI 0.62 – 0.99), peripheral artery disease (HR 1.49, 95% CI 1.12 – 1.98) and previous stroke or TIA (HR 2.16, 95% CI 1.69 – 2.75). The model performance had a c-statistic of 0.689 (95% CI 0.662 – 0.716) (Figure 1a). Based on the prediction model we classified patients based on risk quartiles into highest, high, intermediate and low risk of stroke (Figure 1b). Of note, neither dilated cardiomyopathy, coronary artery disease or HF type (HF with preserved ejection fraction (EF), HF with midrange EF, HF with reduced EF) were independently associated with increased risk of stroke.
Conclusion Using 12 clinically available variables, HF patients with sinus rhythm at high risk of stroke could be identified with moderate accuracy, and the highest risk quartile had stroke rates comparable to HF patients with AF.

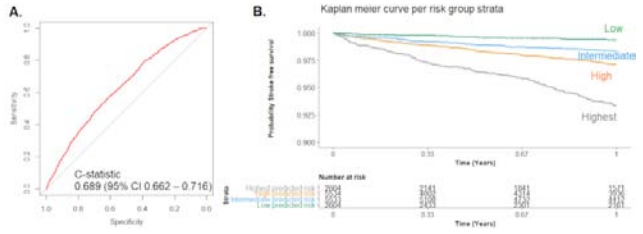

Figure 1

1935

High prevalence of progression of structural and functional abnormalities in a cohort at -risk for heart failure. Report from the STOP HF cohort.

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Background: STOP-HF has shown that natriuretic peptide (NP) guided intervention reduces new onset heart failure, ventricular dysfunction and MACE. Patients with BNP level of ≥50pg/mL underwent serial echocardiography studies. Despite the fact that it is well known structural and functional parameters such as LVEF, LAVI, LVH and e' have been shown to be powerful predictors of cardiovascular risk, the value of serial Doppler-echocardiography in this at -risk but stable asymptomatic population is unclear.
Methods: STOP-HF patients with elevated NP who remained asymptomatic and with 3 sequential echocardiography studies were included. Progression was defined as: left ventricular systolic dysfunction (LVSD) progression when LVEF<50% and reduction of >5% from prior study; left ventricular diastolic dysfunction (LVDD) progression when average E/e'>14 and increase of >2 and/or e'<9cm/s with drop of >2cm/s. Left ventricular dysfunction (LVD) progression included LVSD and/or LVDD. We also recorded LAVI progression (LAVI>34ml/m2 with 3.5ml/m2 increased) and LVH progression (>125g/m2 male/>110g/m2 female, with increase of >20g/m2). Baseline characteristics and MACE events during follow-up were recorded.
Results: 211 patients were included (median age 69.2, 46.9% male). Hypertension (77.6%) and diabetes mellitus (38.4%) were the most prevalent comorbidities. 129 (61.1%) patients were considered to have progressed. The common type of progression was LVDD (36.5%, table 1). In the multivariable analysis, the only clinical factor associated with progression was age (OR=1.05, CI95% 1.01-1.1, p=0.02). Neither BNP at baseline or change in BNP predicted progression. Progression was not associated with MACE events but follow-up period was limited and the number of events low.
Conclusion: These sequential Doppler-echocardiographic studies in an asymptomatic at-risk cohort show high prevalence of progression in structural and functional metrics. While no association was shown with clinical events this observation is noteworthy. This coupled with the failure to clearly define a phenotype at risk underlines the need of further studies.

Table 1. Rate of progression.

	YEAR 1-2 (n=211)	YEAR 1-3 (n=211)
LVSD prog.	0 (0%)	2 (0.9%)
LVDD prog.	49 (23.2%)	77 (36.5%)
LVD prog.	49 (23.2%)	79 (37.4%)
LAVI prog.	33 (15.6%)	63 (29.9%)
LVH prog.	9 (4.3%)	22 (10.4%)
LVD/LAVI/LVH prog.	85 (40.3%)	129 (61.1%)

1936

Validation of the HFA-PEFF-score for the diagnosis of heart failure with preserved ejection fraction

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Funding Acknowledgements: This work was funded by Health Foundation Limburg and the Dutch Heart Foundation (VvE), and by the American Heart Association Scientist Development Gr

Background: The diagnosis of heart failure with preserved ejection fraction (HFpEF) is challenging. The European Heart Failure Association has proposed a novel diagnostic algorithm, the HFA-PEFF score. The aim of this study is to validate the diagnostic value and establish the potential clinical impact of the HFA-PEFF score.
Purpose: The aim of this study is to validate the diagnostic value and establish the potential clinical impact of the HFA-PEFF score.
Methods and results: The HFA-PEFF score was evaluated in two independent, prospective cohorts from Europe and the U.S.A., respectively, i.e. the Maastricht cohort (228 HFpEF patients and 42 controls, diagnostic validation), and the Chicago cohort (459 HFpEF patients, application). In Maastricht, the HFA-PEFF score categorizes 4% of the total cohort with suspected HFpEF in the low-, 40% in the intermediate-, and 56% in the high-risk category. A high HFA-PEFF score (5-6 points) has proven to be a good 'rule in' for HFpEF with high specificity (93%) and a PPV of 98%. A low HFA-PEFF score (0-1) points can rule out HFpEF with a sensitivity of 99% and NPV of 73%. The diagnostic accuracy of the HFA-PEFF score is 0.89 as determined by the AUC of the ROC-curve. The distribution of the score was similar in HFpEF patients from Chicago. Risk categories were also predictive of HF hospitalization or death in both cohorts.
Conclusion: This study validates and characterizes the HFA-PEFF score in two independent, well phenotyped cohorts in Europe and the U.S.A. We demonstrate that the HFA-PEFF score has a good diagnostic value and can be helpful in clinical practice for screening and risk stratification.

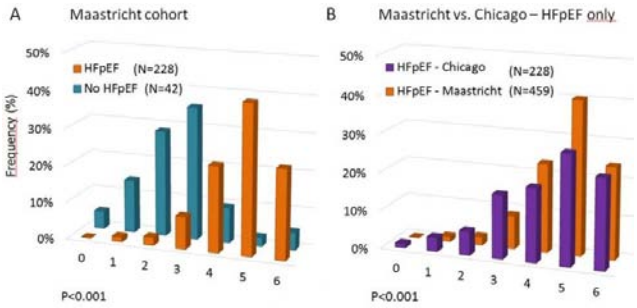

Figure 1

1937

Predictive utility of high-sensitivity troponin-T for new-onset heart failure is higher in women than in men

N Navin Suthahar[1]; LMG Meems[1]; DJ Van Veldhuisen[1]; JE Walter[2]; RT Gansevoort[3]; P Van Der Harst[1]; JE Kootstra-Ros[4]; C Mueller[2]; SJL Bakker[3]; RA De Boer[1]
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Funding Acknowledgements: Netherlands Heart Foundation, Netherlands Organization for Scientific Research, European Research Council

Background: Detectable cardiac tropoinin-T (cTnT) levels in the plasma indicate ongoing myocardial damage and individuals with higher cTnT have an increased risk of developing heart failure (HF). Data is scarce on sex-specific associations of cTnT and new-onset HF in the general population.
Purpose: To evaluate sex-specific associations of cTnT with incident HF
Methods: Observational study in general population setting; included 8225 community-dwelling individuals from the PREVEND (Prevention of Renal and Vascular ENd-stage Disease) cohort. Mean age=49 years and 50% women. Measurements include baseline cTnT levels and incident HF, and its sub-types. HF cases were identified according to HF guidelines issued by the European Society of Cardiology. Cox proportional-hazards models adjusting for age, classical HF-risk

factors, EKG-assessed left ventricular hypertrophy and NT-proBNP (N-terminal pro-B-type natriuretic peptide) were employed to evaluate the predictive utility of cTnT in men and women separately.
Results: cTnT was a robust predictor of incident HF in the general population, and its predictive utility was greater in women than in men. During a mean follow-up of 12 years, 358 developed HF (36% women). cTnT doubling was associated with a greater risk of developing new-onset HF in women – Pint=0.025, HR-1.60-(1.15-2.14) vs 1.39-(1.12-1.73). Secondary analyses revealed that sex differences were stronger and only present for incident HFrEF (HF with reduced ejection fraction), Pint = 0.003; but not for incident HFpEF (HF with preserved ejection fraction), Pint = 0.988.
Conclusions: cTnT can be particularly useful in predicting new-onset HFrEF in women.

1938

Evaluation of creatinine based methods for estimating glomerular filtration rate in heart failure

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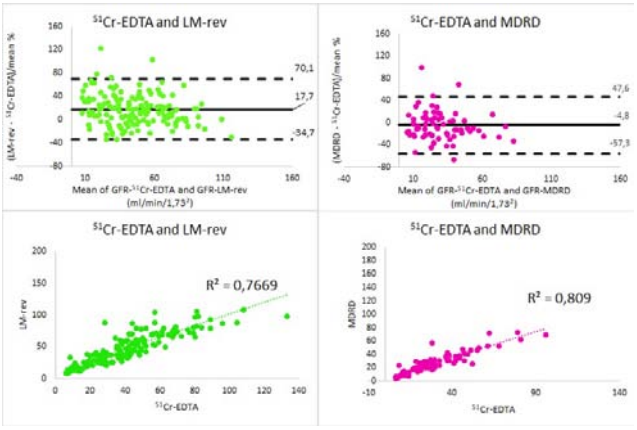
Funding Acknowledgements: This work was supported by the Heart Foundation of Northern Sweden.

Background: Glomerular filtration rate (GFR) is an important factor in management of heart failure. 51CrEDTA based clearance is a method for exact measure of GFR (mGFR) but these and other reference methods are not applicable in large number of patients why estimated GFR (eGFR) is preferred in clinical practice.
Purpose: To validate creatinine-based equations for renal function against 51CrEDTA based clearance in a heart failure population.
Methods: All patients within a predefined catchment area, diagnosed with heart failure, who underwent 51CrEDTA clearance between 2010 and 2018 were included. eGFR were estimated using Cockcroft-Gaults ideal and actual weight (CGIW and CGAW), The Modification of Diet in Renal Disease Study (MDRD), simplified MDRD (sMDRD), The Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI), Lund-Malmö (LM-rev), Full Age Spectrum (FAS) and the Berlin Initiative Study 1 (BIS1). Pearson's correlation and Bland-Altman plots (B&A) were performed. The accuracy were defined as the percentage of patients whose eGFR was within +30% of measured GFR.
Results: 146 patients were included (age 68 +13 years, LVEF <40 % n=53 (36 %)). Mean mGFR were 42 ml/min/1,73 m2 and mean eGFR for all equations were eGFR 30-59 ml/min/1,73m2 except for MDRD with a mean eGFR of 28 ml/min/1,73 m2 due to urea only available for patients with renal impairment. Pearson's correlation coefficient (r) had the highest precision for MDRD (r=0.9), followed by LM-rev (r=0.88) and lowest for CGAW (r=0.81). B&A showed that MDRD had lowest bias (-4,8) followed by LM-rev (17,7). CGAW (29,8) and sMDRD (31,9) had highest bias. Accuracy were under 75% for all equations except MDRD (MDRD 80%, LM-rev 68%, CGIW 63%, BIS1 59%, CKD-EPI 58%, FAS 55%, CGAw 46%, sMDRD 46%).
Conclusions: LM-rev showed the lowest bias and highest precision and accuracy in estimating GFR in our population of patients with chronic heart failure. In patients with renal impairment and heart failure, MDRD was the most accurate method. The most common method, Cockroft-Gault, had the weakest correlation and overestimates renal function the most.



Bland-Altman and Pearson's correlation

1939

Soluble suppression of tumorigenicity-2 in cardiac amyloidosis, hypertrophic and dilated cardiomyopathy

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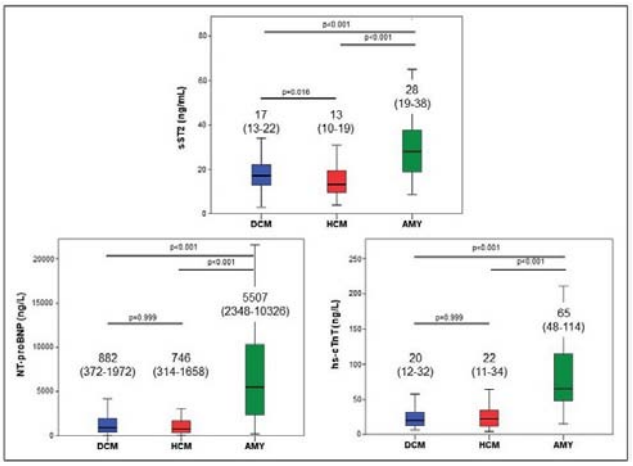
[1]Sant'Anna School of Advanced Studies, Institute of Life Sciences, Pisa, Italy; *[2]Gabriele Monasterio Foundation, Pisa, Italy*

Background: Soluble suppression of tumorigenicity-2 (sST2) is a cardiac biomarker related to inflammation and myocardial tissue remodeling. Although these processes are critically involved in both cardiac amyloidosis and cardiomyopathies, sST2 levels have never been specifically evaluated in these settings.
Purpose: We aimed to assess circulating levels of sST2 in patients with cardiac amyloidosis, hypertrophic cardiomyopathy (HCM) and dilated cardiomyopathy (DCM), as well as their clinical and biohumoral correlates.
Methods: We analysed 339 patients with an established diagnosis of cardiac amyloidosis (n=86, 25%), HCM (n=110, 32%) or DCM (n=144, 43%), undergoing a characterization including sST2, N-terminal fraction of pro-B-type natriuretic peptide (NT-proBNP), and high-sensitivity cardiac troponin T (hs-cTnT).
Results: Median sST2 was higher in cardiac amyloidosis (28 [interquartile interval 19-38] ng/mL) than either HCM (13 [10-19] ng/mL) or DCM (17 [13-22] ng/mL) (p<0.001 for both comparisons). Similar results were found for NT-proBNP and hs-cTnT (Figure). Differences in sST2 between cardiomyopathies were not influenced by gender (p for interaction=0.192), age (p=0.517), glomerular filtration rate (p=0.375) or clinical setting (in- vs. out-patient) (p=0.673). When considering all available patient characteristics at multivariate linear regression analysis, gamma-glutamyl transferase (GGT) (β=0.431 [95% confidence interval - CI 0.127-0.422], p<0.001) emerged as the sole independent predictor of elevated sST2 levels in cardiac amyloidosis. Similarly, in the DCM group, GGT (β=0.206 [95% CI 0.005-0.073], p=0.024) and free triiodothyronine (β=0.193 [95% CI 0.022-0.319], p=0.025) concentrations were associated with increased sST2 levels, independently of other determinants. C-reactive protein (β=0.268 [95% CI 0.001-0.227], p=0.048) was the only independent predictor of sST2 increase in HCM.
Conclusions: Circulating levels of sST2 are higher in cardiac amyloidosis compared to other cardiomyopathies independently from age, gender and renal function. Higher sST2 levels may reflect systemic inflammation and multi-organ involvement.



Figure

Clinical Case Corner 6 - From inflammation to infiltration

1961

Fulminant eosinophilic myocarditis: a rare initial presentation of churg-strauss syndrome

P Pedro Lopes[1]; B Rocha[1]; G Cunha[1]; S Ranchordas[1]; C Albuquerque[1]; A Ferreira[1]; J Ferreira[1]; C Aguiar[1]; M Trabulo[1]; S Ramos[1]; JP Neves[1]; M Mendes[1]
[1]*Hospital Santa Cruz, Carnaxide, Portugal*

Case Presentation: A 22-year-old male presented to the emergency room with nausea, vomiting, anorexia and lumbar pain for 5 days. He also had chest pain prior to admission. His past history was notable for asthma and allergic rhinitis. Physical examination was unremarkable, other than a 126bpm regular tachycardia. Laboratory workup showed leukocytosis (24.0x10^9/L), marked eosinophilia (11.7x10^9/L, 48%) and elevated C-reactive protein (19.9mg/dL). Hs-Cardiac troponin T and NT-proBNP were increased, 2500ng/L and 18795pg/mL, respectively. There was inferolateral ST-segment depression on ECG and transthoracic echocardiogram revealed severe left ventricular (LV) systolic dysfunction due to global hypokinesis, a restrictive filling pattern and pericardial thickening. Chest CT revealed bilateral ground-glass lung infiltrates and paranasal CT scan showed cranial sinus opacifications.

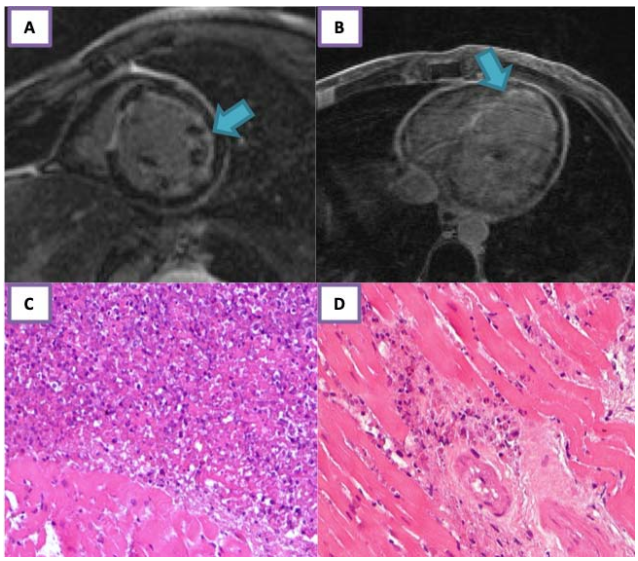


Figure 1

He rapidly progressed to cardiogenic shock in the following hours and was urgently transferred to a Cardiac Intensive Care Unit. Invasive ventilation, empiric antibiotics and IV inotropes were started. However, peripheral veno-arterial extracorporeal membrane oxygenation (ECMO) was required for hemodynamic support just 24h after admission. An endomyocardial biopsy was performed, revealing a necrotizing eosinophilic vasculitis and thrombosis (Figure 1 C and D). On further investigation, cardiotropic viruses, HIV, Aspergillus, Toxoplasma and parasites were negative, as were ANCA antibodies.
Eosinophilic granulomatosis with polyangiitis (EGPA, or Churg-Strauss Syndrome) was considered as the most likely diagnosis, as four out of six criteria were present: (1) asthma; (2) eosinophilia; (3) extravascular eosinophils; and (4) paranasal sinusitis. Thus, IV corticosteroids were started, with significant improvement. ECMO was discontinued after 6 days, while being weaned off of both ventilator and inotropes. Cardiac MRI showed widespread subendocardial late gadolinium enhancement (Figure 1 A and B). Coronary arteries were unremarkable on CT-Angiography. Despite optimal medical treatment, LV ejection fraction plateaued at 34% and a subcutaneous ICD was implanted. After 45 days, the patient was doing well and was discharged home on oral glucocorticoids and twice monthly IV cyclophosphamide pulse treatment.
Conclusion: EGPA is a systemic necrotizing vasculitis often associated with respiratory findings and eosinophilia. We here report a rare case of rapidly progressing vasculitis presenting with fulminant myocardial involvement.

1962

Acute ischemic stroke as the sole manifestation of reversible cardiac dysfunction in a patient with systemic lupus erithematous

AM Alexandra-Maria Chitroceanu[1]; RA Radu[2]; N Patrascu[2]; A I Nicula[2]; D Vinereanu[2]
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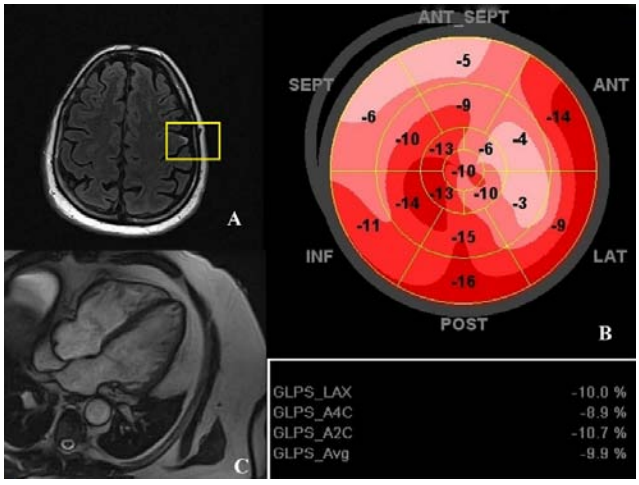
Introduction . Cardiac dysfunction, a rare but life threatening event in the course of systemic lupus erythematous (SLE), can be related to the inflammation due to the disease itself, even in the absence of coronary artery disease or hypertensive cardiomyopathy. With timely therapy, almost full recovery of cardiac function can be achieved.



Case report . A 46 year-old male was admitted for acute ischemic stroke. His past medical history was consistent with SLE, with biopsy confirming renal involvement 8 years before. He was on treatment with low-dose Prednisone and Azathioprine. He presented with a mild-to-moderate ischemic stroke (score NIHSS=7), mainly with language disturbance. He was treated with intravenous thrombolysis and his symptoms improved markedly in the first 24 hours. He was considered with minor stroke in the left middle cerebral artery territory on repeated head imaging. He did not complain of dyspnoea, or had any signs of acute heart failure. There were no signs of large artery disease. ECG showed no rhythm disturbances, however transthoracic echocardiography (TTE) detected markedly reduced left ventricular (LV) function (LVEF = 30%), moderately dilated LV (90 ml/m2) with global severe hypokinesia. His blood tests were positive for phospholipid antibody syndrome. Thus, his stroke was considered to be either embolic, of cardiac origin (global severe hypokinesia with reduced LVEF), or due to altered coagulation in the context of antiphospholipid antibody syndrome. A myocardial biopsy could not be performed. He was treated with Acenocumarol and conventional treatment for heart failure, without change of

his immunosuppressive treatment. At 3 months follow-up, TTE and cardiac magnetic resonance (CMR) showed an improvement in LVEF to 60%, with moderately dilated LV (89 ml/m2).
Questions, problems. LV failure in SLE may be secondary to myocardial inflammation, or to systemic complications such as hypertension or atherosclerosis. Recently, a stress-related cardiomyopathy syndrome was demonstrate to occur in SLE patients during the course of the disease. In our case, hypertension was unlikely to be the cause, since no significant LV hypertrophy was present on TTE. Due to the minor stroke with rapid improvement after thrombolysis and small ischemic lesion, stroke related stress cardiomyopathy was also unlikely. Since subclinical cardiac involvement is a common finding in SLE, the presumed diagnosis of myocarditis is based on clinical findings of LV dysfunction and imaging. Although TTE cannot diagnose myocarditis with certainty, global hypokinesis, in the absence of other known causes, is strongly suggestive. Moreover, reversible LV function detected on CMR is an argument for myocarditis.
Conclusions. Cardiac dysfunction with low LVEF is a major cause of cardioembolic stroke and extensive cardiologic work-up should be offered to all patients. Lupus myocarditis should be distinguished from stress-related cardiomyopathy syndrome in SLE patients.

1963

Influenza b-induced refractory cardiogenic shock, treated with temporary ecmo support

AH Yamac[1]
[1]*Bezmialem University, Cardiology, Istanbul, Turkey*

A 26-years-old healthy woman without a significant past medical history, presented to the Emergency Room of our center complaining of 5 days of productive cough, diffuse myalgia, and fatigue. Before, she visited several times the family doctor and was prescribed a course of antibiotics for presumed bronchitis.
The patient was found to be hypotensive (90/60 mmHg), tachycardic (115 beats/min) and there were signs of centralisation and peripheral hypoperfusion. Thus an immediate echocardiography was performed revealing a severely impaired left ventricular systolic function with an ejection fraction of 20%.
At the Coronary Care Unit dobutamin, low dose norepinephrin and empiric piperaclillin/tazobactam were started. Hemodynamics were assessed continously and blood gas samples were taken every 2 hours.
Within 8 hours of representation her condition deteriorated, paralleled by increasing lactat values, thus an emergency-ECMO (extracorporeal membrane oxygenator) was implanted.
On the next day she had to be resusciated under ECMO perfusion due to sudden asystole. After 20 minutes of CPR (cardiopulmonary resuscitation) spontaneous circulation returned. She was stabilized with concomitant dobutamin and norepinephrine. Due to renal failure intermittennt hemodialysis was performed using the venous arm of the ECMO. Hemodynamics were monitored via radial artery and Swan Ganz catheter. On day 4 she got extubated and inotropes began to be weaned with regression of the limb ischemia. She patient was awake during these procedures. Meanwhile endotracheal aspiration after CPR returned positive for influenza B by polymerase chain reaction (PCR). Blood, BAL and urine cultures were negative for bacterial growth and empiric antimicrobials were stopped on day 5 and oseltamivir was continued for a total of 7 days. Echocardiography was performed every day, revealing a left ventricular ejection fraction of 45% on day 6. On the next day ECMO was weaned succesfully up to 1 l/min. Thus we decided to withdraw the ECMO support on the same day. The patient was discharged on hospital day 25. Transthoracic echocardiography one month after discharge demonstrated normal LV systolic function with an EF of 60%, normal LV wall thickness, trace mitral regurgitation and no ventricular dilation.
In conclusion, we report this case to draw attention that influenza B, which is usually considered less pathogenic, can unexpectedly be complicated by fulminant myocarditis or cardiomyopathy leading to cardiogenic shock in young adults. Therefore, a multidisciplinary approach including early initiation of antiviral treatment and aggressive cardiac support is essential for a favorable outcome.

1964

Myocarditis in Antisynthetase Syndrome: an infrequent association

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Introduction: Antisynthetase Syndrome (AS) corresponds to an inflammatory myopathy identified by specific autoantibodies. Myocardial involvement is poorly described. Clinical Case: A previously healthy 65-year-old woman was admitted to ICU after 1 week of fever and dyspnea. Respiratory failure secondary to pulmonary interstitial involvement resolved after 3 weeks of mechanical ventilation and corticosteroids. During the descending pattern of corticosteroids was readmitted for respiratory failure. An autoimmune disorder was suspected due to corticodependence, muscular weakness and the appearance of "mechanic´s hands". Laboratory studies: anti-Jo1 and anti-Ro52 positive. The electromyogram had myopathic patterns and the muscular biopsy had an inflammatory myopathy with intense immunoexpression of HLA in all fibers. After AS diagnosis was made,She underwent treatment with prednisone, cloroquine and cyclophosphamide followed by mycophenolate mofetile. Despite pulmonary radiological improvement, during treatment follow up dyspnea worsened with an increase in Troponin, CK, CK-Mb, Aldolase and NT-proBNP levels. TTE showed non dilated cardiac chambers with LVEF of 45%, inferoposterior wall hypokinesia and moderate MR. Patchy edema and delayed enhancement was evidenced in the cardiac MRI. Despite immunosuppressive therapy and heart failure supportive treatment with ACEi, B-blockers, MRA and loop diuretics the evolution was poor. Serum markers of myocardial damage went down but she had a NYHA III with non sustained polymorphic ventricular tachycardia and TTE showed a clear deterioration: initially it consisted of diastolic dysfunction but it progressed until 4 chamber dilatation,severe MR and severe biventricular dysfunction. Cardiac catheterization excluded coronary artery disease and revealed moderate pulmonary hypertension. Treatment was upgraded with ARNI and an ICD placement. 2 months later she was readmitted in ICU due to an arrhythmic storm (FV). She was not considered for cardiac transplantation owing to age and a mild myositis outbreak despite optimal inmunosupressive treatment and the residual pulmonary damage. Discussion: Understanding the pathophysiologic mechanisms would help with treatment, however, remains speculative. AS antibodies are likely to be associated with muscle and lung inflammation. The effect of antibodies on the heart is unclear. There are no guidelines to aid in the diagnosis of cardiac manifestations. After screening laboratory tests, TTE and especially cardiac MRI are the most useful tools for the diagnosis of myocarditis as the biopsy findings do not alter disease management. Progressive heart failure may result in cardiac complications, such as fatal arrhythmias, despite improvement in skeletal muscle and pulmonary affection.
Conclusions: In the context of AS, the myocarditis diagnosis is important to make as the outcome can be severe. Heart involvement may be a cause of death specially in anti-Ro and anti-Jo positive forms.

1965

Acute heart failure in young male with body dysmorphic disorder: heroin induced myocarditis.

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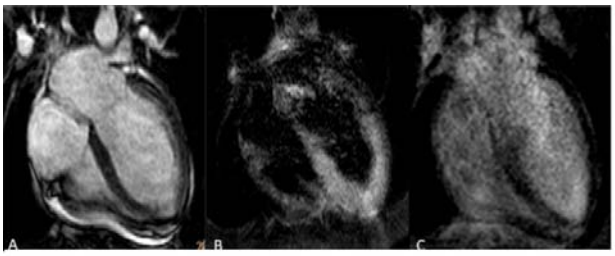
A 23-year-old male, with past medical history of depression, body dysmorphic disorder and usage of illicit drugs, was admitted to the Emergency Department for decreased level of consciousness.
He was comatose, had mild fever and severe respiratory acidosis that required intubation and mechanical ventilation. A gastric pump lavage and activated carbon were administered due to the suspicion of drug overdose. A complete work up was done including normal brain computed tomography, normal lumbar puncture, negative C-reactive protein (CRP) and serology for neurotrophic virus. Blood work results showed markedly elevated high sensitivity troponin T (1082 pg/mL) and NT-proBNP (4194 pg/mL). EKG was unremarkable, with sinus tachycardia and no repolarization abnormalities. A transthoracic echocardiogram (TTE) showed left ventricle (LV) dilation with severely impaired LV ejection fraction (EF) 20%.
The patient's evolution was unfavorable, with progressive cardiogenic shock that required vasoactive support. He was referred to our center to assess mechanical circulatory support. On arrival we repeated complete work up with similar results. Urinary toxic panel was positive for opioids and benzodiazepines. Cardiac MRI (CMRI) and coronary angiography revealed a dilated LV (indexed LV diastolic volume (iLVDV) 144 ml/m2), severely impaired LV EF 25%, global hypokinesis, edema in mid and apical segments, no late gadolinium enhancement and normal coronary arteries. Right heart catheterization revealed pulmonary pressures 30/18/22 and PCWP 18. An endomyocardial biopsy (EB) was executed in the same procedure. Differential diagnoses at this point included myocarditis, illicit drug use or stress-induced cardiomyopathy.
Heart failure (HF) treatment was initiated with a satisfactory evolution, that allowed suspension of vasoactive support and extubation the following days. The Psychiatry department was consulted for symptoms of acute drug withdrawal, and antipsychotic treatment was reinitiated. The patient confessed heroin consumption the night before admission.
Prior to discharge, when HF treatment was optimized, he underwent a new CMRI that showed a normal LV (105 ml/m2 iLVDV) and almost complete normalization of LV

EF (54%). The EB revealed non-specific myocarditis, focal neutrophil infiltrates and negative viral CRP for common viral causes of myocarditis. He was discharged with no HF symptoms, and is currently being treated for substance abuse and previous psychiatric conditions.
In conclusion, drug induced myocarditis is a rare but increasingly recognized cause of HF, with a potentially fulminant course. The underlying mechanisms of heroin toxicity are still unclear. Cardiac dysfunction is generally reversible once consumption has ceased but early initiation of treatment is essential. A holistic and multidisciplinary approach is necessary in order to improve prognosis and avoid new episodes of potentially fatal drug induced cardiovascular toxicity.



A. SSFP Cine sequence showing dilated LV with akinesia of mid and apical segments.
B. T2-STIR sequence showing edema in mid-apical septal and lateral segments.
C. Late gadolinium enhancement sequence that reveals absence of fibrosis or necrosis.

Left ventricle cardiac MRI sequences

1966

Intra-cardiac aspergilloma in a normally structured heart: a case report

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Fungal endocarditis is a relatively rare condition which mostly complicates those with intra- cardiac devices whose immune system is compromised. Survival largely depends on timely diagnosis and management which is not frequently achieved.
This case is a 63-year-old diabetic man with two-weeks history of weakness and fatigue. He's undergone coronary artery bypass surgery one year before and had dental procedure (root canal and filling of one tooth) 45 days prior to his current presentation. He was afebrile with relatively stable hemodynamics and a II/VI systolic ejection murmur at left sternal border on auscultation. Transthoracic echocardiography (TTE) showed a mobile mass in left ventricular outflow tract (LVOT) which passed across the aortic valve (AV) in a to and fro movement. Cardiac magnetic resonance (CMR) further confirmed the presence of an 18x20x18 mm mass with suggestive morphologic signs for fungal infection. Amphotericin B was administered at the same day after which distal embolization of the mass to distal abdominal aorta ensued shortly. TTE documented the disappearance of the mass from LVOT and AV. After removed the mass from abdominal aorta and the patient had become unstable and signs of septic shock occurred which ultimately led to his death in 48 hours. The pathology revealed aspergilloma then after.
In such cases CMR can be a very useful tool in rapid diagnosis of any cardiac mass where TTE hardly differentiates thrombus and especially cystic tumors.

1967

Exudative-constrictive pericarditis in association with arthritis: toracoscopic biopsy as the only way to diagnosis and treatment

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Purpose: to present the problems and modern possibilities of nosological verification of diagnosis and treatment in a patient with resistant exudative-constrictive pericarditis.
Methods: the male patient 31 y. was admitted to the clinic due to exudative pericarditis and arthritis of the left knee joint. His medical history included the association of a disease debut with a respiratory infection, periodic febrile fever with a cough, episodes of syncope and atrial fibrillation, treatment with antibiotics and corticosteroids with a temporary effect. A clinical examination was carried out: blood tests for the genome of cardiotropic viruses and anti-heart antibodies, ENA profile, ANCA, antibodies to DNA, cardiolipin, antinuclear antibodies, rheumatoid factor, thyroid stimulating hormone, EchoCG, chest X-ray and CT, investigations of the sputum (incl. acid-fast mycobacteria by the luminescent microscopy and PCR), skin test with tuberculin antigen, ultrasound examination of the knee, puncture of the pericardium and knee joint with general, bacteriological, virological examination of the fluid and a complex of studies on tuberculosis, thoracoscopic biopsy of the intrathoracic lymph nodes and lung.
Results. No data were received for systemic disease, hypothyroidism, tumor. With CT in both lungs, small areas of fibrosis were identified, a few dense foci up to 5 mm in size, more pronounced on the right; there is no fluid in the pleural cavities, and lymphadenopathy has been identified. Pericardial sheets diffusely thickened. When sputum was sown, the growth of nonspecific microflora was obtained. In EchoCG, LV EDD was 4.0 cm, EF 47%, in the pericardial cavity to 1 liter of fluid with fibrin. Elevated titers of anti-heart antibodies did not allow excluding myocarditis. With puncture, a serous fluid, poor in cells, is obtained, all tests for viruses and tuberculosis are negative. With puncture of the knee joint, exudate was obtained, the ultrasonic picture did not fully correspond to inflammatory arthropathy. To verify the nature of lymphadenopathy (lymphoma? sarcoidosis? tuberculosis?), thoracoscopy was performed. Pleural tubercle was found, a pleural biopsy, a right lung and lymph nodes were performed. Morphological examination showed tuberculosis granulomas with caseous necrosis. When sputum was sown again, the growth of mycobacteria of tuberculosis was obtained. Therapy included pyrazinamide, ethambutol, levofloxacin, prednisolone 20 mg / day. Ponce's disease regressed. Due to the increase of constriction, subtotal pericardectomy with a full clinical effect was performed.
Conclusion. Tuberculosis is one of the real causes of pericarditis with massive effusion and an outcome in constriction in the Moscow therapeutic clinic. The negative results of all laboratory tests for tuberculosis and the absence of an active pulmonary process do not exclude the diagnosis. It is necessary to use invasive morphological diagnosis, including thoracoscopic biopsy.

1968

A mutant Thr95Ile ATTR cardiac amyloidosis with polyneuropathy

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A 72-year-old man was referred for progressive dyspnea and peripheral edema since last year. He had a history of advanced gastric cancer and subsequent radical subtotal gastrectomy with adjuvant chemotherapy (Tegafur/Gemeracil/Oteracil) two years ago. There was no family history of cardiovascular disease. A chest X-ray showed cardiomegaly, and an electrocardiogram showed sinus bradycardia with low QRS voltage in limb leads and left axis deviation. An echocardiogram showed thickened biventricular walls with granular sparkling appearance and biatrial enlargement. Global left ventricular (LV) systolic function was reduced to ejection fraction (EF) 43%, and in diastole, LV showed restrictive filling pattern. Cardiac magnetic resonance (CMR) imaging showed diffuse transmural delayed gadolinium enhancement of LV. A cardiac biopsy revealed deposition of amorphous material in interstitium. However, immunofixation of serum and urine proteins demonstrated no abnormal finding, while Technetium-99m Pyrophosphate (PYP) scan was suggestive of TTR-related amyloidosis (ATTR) with intensely diffuse PYP uptake in myocardium of LV. DNA sequencing of the exon 3 in TTR gene revealed Thr95Ile (c.284C>T) mutation, which is reported as the second case in the world. His LVEF was progressively decreased to 32% in spite of optimal medical treatment for heart failure. He underwent implantable cardioverter-defibrillator implantation for primary prevention. He also suffered from paresthesia in both legs, which was diagnosed as sensori-motor polyneuropathy. Therefore, he is scheduled to be treated with tafamidis, proven to be an effective therapy for ATTR cardiomyopathy and peripheral neuropathy.

1969

Direct confirmation of suspected hereditary ATTR by genetic sequencing

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Clinical presentation. 68-year old female was admitted to our institution for diagnostic and therapeutic management. Her only comorbidity was hypertension. She has been complaining of exertional shortness of breath for over 1 year, which has gradually worsened. At the time of admission she was fatigued and short of breath at minimal exertion. On physical examination there was S4-galop and reduced air entry in the left lung base. There was moderate pitting oedema in both lower limbs below the knees. Peripheral pulses were normal. There was no particular family of heart disease. Her daughter had known CKD for which she was followed up.
Clinical investigations and diagnostic process. EKG revealed NSR, low peripheral voltage and and QS in V1-V3. Transthoracic echo revealed biatrial dilation, LVH of 16mm and marked RVH of 9mm. There was a rim of pericardial effusion and small left pleural effusion. GLS was reduced to -12.4% with notable apical sparing and

LV EF was 52.3%(Picture 1). Transmitral PW doppler was pseudonormal, e' was < 5cm/sec. Her labs were normal with no evidence of renal failure or proteinuria. The constellation described above is typical for amyloidosis with cardiac involvement. On direct questioning the patient admitted weight loss of 5kg in the last year, feeling of early satiety and paresthesias in hands and feet for the last 3-4 years. Focussed clinical examination revealed symptoms consistent with bilateral carpal tunnel and reduced sensation in both feet. We referred the patient for genetic sequencing, which confirmed Ser77Phe pathological mutation in the TTR gene. Presence of pathological mutation in symptomatic patients with clinically suspected cardiac amyloid confirms the diagnosis of hereditary ATTR. She was referred to neurology and started on tafamidis treatment for the polyneuropathy as only this indication is reimbursed in our country. Cascade screening was done and her daughter was not carrying the mutation.

Conclusions. Bulgaria is an endemic region for hereditary ATTR. Our cases can be characterised with late onset (frequently in their 60s) and mixed phenotypes (both cardiac and neurological involvement). Peripheral tissue biopsies are rarely positive in hereditary ATTR and CMR cannot distinguish between amyloid types. 99Tc-DPD tracer is not available in our nuclear centers. The slow progression of the disease maked AL-amyloid very unlikely in this particular case. Therefore, we decided to proceed directly to genetic sequencing without performing further tests as the pre-test probability of hereditary ATTR was very high. If genetic testing was negative we would have focussed on exlcuding AL-amyloid by immunofixation electrophoresis and attempting to confirm amyloid deposition by biopsy. In conclusion, local resources do vary and our approach of direct referal for genetic sequencing seems reasonable and effective in cases with high pre-test probability of hereditary ATTR considering the local circumstances.

1970

Rapidly progressive heart failure symptoms in a patient with amyloid cardiomyopathy caused by rare Glu89Lys TTR mutation

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Transthyretin (TTR) amyloidosis is a systemic disorder caused by mutations in the TTR gene or by the deposition of wild-type TTR protein. The prevalence of different mutations varies according to ethnicity and geographic region. Here we describe the case of patient with TTR amyloidosis caused by a rare Glu89Lys TTR mutation.

A 57-year-old male was referred to our institution for further evaluation because of 3 months history of progressive exertional dyspnoea (NYHA class III at initial presentation) and massive lower-limbs edema. He also suffered from periorbital purpura, weight loss and paresthesias. His family history was unremarkable.

Physical examination revealed bilateral crackles, liver enlargement, and jugular veins distension.

The standard 12-lead ECG demonstrated occult atrial fibrillation of unknown duration, pseudo-infarct pattern, non-specific ST segment and T-wave abnormalities (Fig. 1A). The chest X-ray showed pulmonary congestion and small left sided pleural effusion (Fig. 1B). The baseline level of high-sensitivity cardiac troponin T was 50,4 (normal range 0-14) ng/L and N-terminal pro B-type natriuretic peptide (NT-proBNP) was 2122 (normal range 0-125) pg/mL.

Transthoracic echocardiography (TTE) revealed significant left ventricular (LV) hypertrophy, sparkling echoes, restrictive LV filling pattern and decreased LV ejection fraction (EF 45%). Right ventricle was enlarged with increased wall thickness. Both atria were enlarged and small pericardial effusion was present (Fig. 1C-D).

Cardiac magnetic resonance (CMR) scan confirmed the presence of LV hypertrophy with a maximal wall thickness of 23 mm at interventricular septum. LV systolic function was decreased with EF 42%. The right ventricular function was significantly impaired. Moreover, diffuse subendocardial areas of late gadolinium enhancement were found. Results of CMR suggested cardiac amyloidosis (Fig. 1E-F).

Labial salivary gland as well as gastric biopsy reveled TTR-related amyloid deposits. Bone scintigraphy with DPD tracer confirmed TTR amyloid cardiomyopathy (Fig. 1G). Genetic analysis demonstrated Glu89Lys mutation in the TTR gene. Neurological examination revealed mild symptoms of polyneuropathy. Haematological examination excluded light chain amyloidosis.

Two months after initial presentation patient was stable but with further incease in NT-proBNP and hs-cTnT levels (3513 pg/mL and 68 ng/L respectively). He was referred to the treatment with tafamidis as a bridge to combined heart-liver transplantation.

In conclusion, we present a case of rapidly progressive heart failure in a patient with TTR amyloid cardiomyopathy. Glu89Lys TTR mutation was described previously only in four families and is characterized by early onset and severe phenotype with unusually early heart dysfunction leading to heart and liver transplantation. Our case underlines the diagnostic challange of TTR amyloidosis and the importance of TTR mutation screening for prognostic purposes.

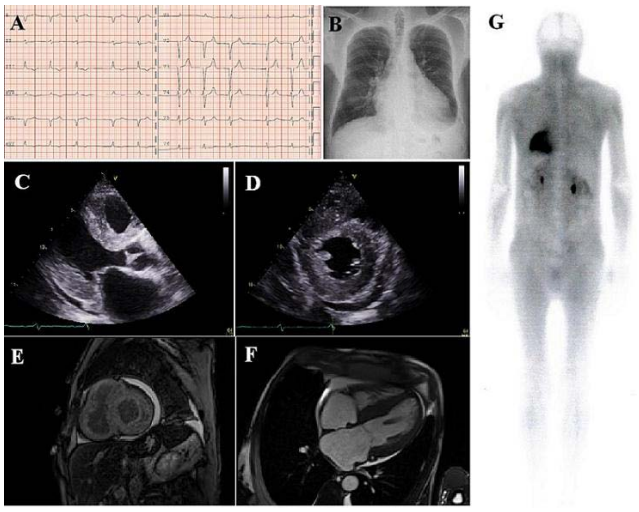

Figure 1.

Moderated Poster Session: Everlasting questions, new answers

1971

Determinants of right ventricular dyssynchrony in patients with heart failure: combined gated blood-pool SPECT and invasive hemodynamic study

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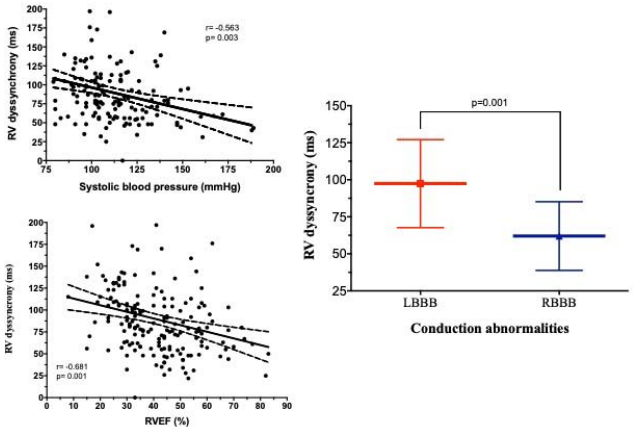
Introduction: Ventricular dyssynchrony compromises myocardial mechanical efficiency. While mechanisms of left ventricular (LV) dyssynchrony are well understood, little is known about the right heart dyssynchrony patterns.Methods:We examined 214 patients with advanced compensated HF (age 56.8±10.5 years, LVEF 29.5±18.0%, 80% males, body mass index 28.9±5.2 kg/m2). Patients underwent right heart catheterisation with thermodilution, followed by a nuclear study. 30 minutes after injection of stannous pyrophosphate (Technestan PYP), erythrocytes were in-vivo labelled by intravenous injection of 740 MBq 99mTc isotope (radiation dose 5-6 mSv). The heart chambers were imaged using D-SPECT camera (Spectrum Dynamics, Israel) with Cadmium-Zinc-Telluride detector. Time-averaged ECG-gated acquisitions were performed. 3D chambers reconstruction was performed using semiautomatic plug-in software (QBS Cedars-Sinai, USA). Right ventricle (RV) was segmented with a pole in the free wall. Interventricular septum was segmented with LV. Standard deviation of peak regional displacements over averaged cardiac cycle (PSD) was used to calculate dyssynchrony and was expressed in milliseconds (ms).



Figure

Results: In the overall population RV end-diastolic volume (EDV) was 260±89 ml and RV ejection fraction (EF) was 41±14%. Peak mechanical contraction occurred at 325±80ms in the LV and at 329±69 ms in the RV (p=0.44). On average, RV and LV had similar degrees of global dyssynchrony (PSD: 89.4±56.3 ms vs 88.9±39.1 ms, p=0.90), but RV differed from LV in the determinants of dyssynchrony. RV dyssynchrony (RV-PSD) increased with the severity of RV dilatation (r=0.065; p=0.05) and dysfunction (r= -0.681; p=0.001). QRS widening had larger effect on LV than on RV dyssynchrony (LV: r=0.13, p=0.001; RV: r=0.02, p=0.71). Left bundle branch block (LBBB) induced more dyssynchrony than right bundle branch block (RBBB) in the RV (LBBB 97.4±29.7 ms vs RBBB 62.0±23.2 ms, p=0.001). RV-PSD inversely correlated with age (r= -1.271; p<0.001) and BMI (r= -1.774; p=0.002), and directly with LV-EDV (r= 0.056; p=0.004) and LVEF (r= -0.507; p=0.002). No correlation was found between RV-PSD and LV-PSD (p=0.382). Regional LV dyssynchrony did not correlate with RV free wall dyssynchrony, with the only exception of the LV inferior wall (p=0.015). RV afterload was not related to RV dyssynchrony. Opposite, transeptal pressure difference (SBP-PAPsystolic) strongly correlated with RV but not with LV dyssynchrony, and this relation was driven by a strong negative correlation between RV-PSD (and RVEF) and systemic blood pressure (r= -0.563; p=0.003).
Conclusions: QRS duration has no significant influence on RV dyssynchrony, that was more pronounced in dilated and dysfunctional RVs. Systemic blood pressure strongly correlates with RV dyssynchrony, indicating the effect of RV-LV systolic interdependence on RV synchrony. Further studies are needed to understand the role of RV synchrony restoration in HF.

1972

Early stages of heart failure in obese patients are associated with natriuretic peptide deficiency and lack of overall neurohormonal activation

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Background: Obesity is a risk factor for heart failure (HF) with preserved and reduced ejection fraction and it is associated with hemodynamic changes (e.g. increased blood volume) and structural changes in the heart (e.g. hypertrophy and diastolic function). Furthermore, plasma concentrations of amino-terminal pro-B-type natriuretic peptide (NT-proBNP) and mid-regional pro-atrial natriuretic peptide (MR-proANP) are lower in obese patients, but the associations between obesity and neurohormonal activation estimated by midregional-pro-adrenomedullin (MR-proADM) and copeptin in patients with HF is not elucidated.
Purpose: To evaluate the associations between the natriuretic peptide activity (NT-proBNP and MR-proANP), and the neurohormonal response (MR-proADM and copeptin) in non-obese and obese outpatients with and without HF.
Methods: This prospective cohort-study included 392 outpatients without known or suspected HF, ≥60 years, and ≥1 risk-factors for HF (diabetes, chronic kidney disease, cardiovascular disease, atrial fibrillation, hypertension). Patients were categorized as 'non-obese' BMI=18.5-29.9kg/m2 (n=273) or 'obese' BMI≥30kg/m2 (n=119). Physical examination was performed, patients fulfilled the Minnesota Living with HF questionnaire, cardiac biomarkers were analyzed, and echocardiography was performed. Unrecognized HF was diagnosed according to the European Society of Cardiology guidelines, requiring the three following: patient-reported symptoms of HF, clinical signs of HF, and structural or functional changes by echocardiography.
Results: The obese patients were younger, with a higher prevalence of diabetes and chronic kidney disease, but a lower prevalence of atrial fibrillation. A total of 39 (14.3%) non-obese and 26 (21.8%) obese patients were diagnosed with HF. In the obese patients, HF was not associated with higher plasma concentrations of NT-proBNP (P=0.064), MR-proANP (P=0.187), MR-proADM (P=0.168), or copeptin (P=0.669), figure 1A-D. In contrast, plasma concentrations of NT-proBNP (P<0.001), MR-proANP (P<0.001), MR-proADM (P<0.001) and Copeptin (P=0.054) were all higher in patients with HF among the non-obese patients, figure 1A-D. Additionally, obese patients with HF had lower plasma concentrations of NT-proBNP (P=0.012), and MR-proANP (P=0.007) compared to non-obese patients with HF, but plasma concentrations of MR-proADM (P=0.484) and copeptin (P=0.578) were not affected, figure 1A-D.

Conclusions: Patients with HF and obesity have a natriuretic peptide deficiency and a lack of increased plasma concentrations of MR-proADM and copeptin, suggesting that obese patients have a blunted overall neurohormonal response to HF.

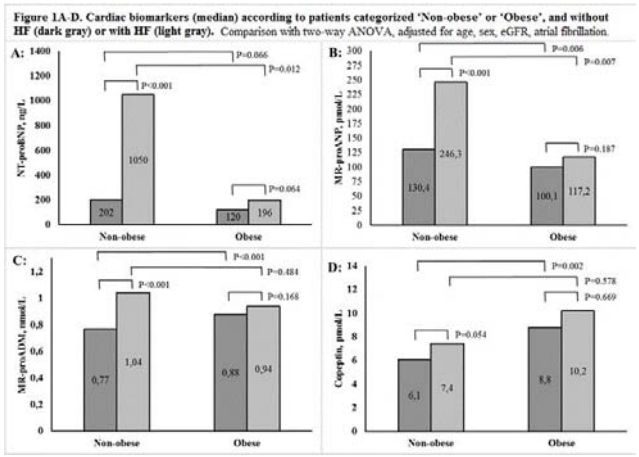

Figure 1A-D.

1973

Frailty evaluation in patients with chronic heart failure - A comparison of screening vs assessment tools

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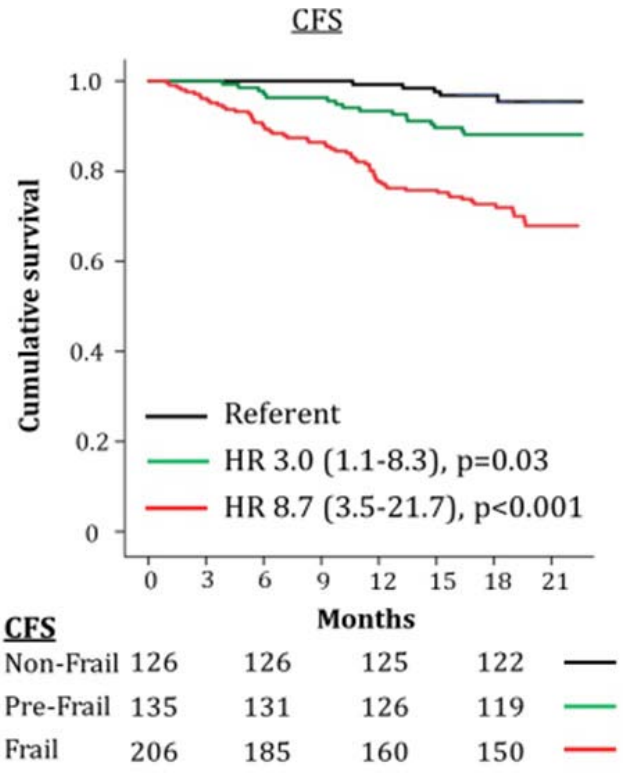
Background: Frailty is common in patients with chronic heart failure (CHF) and is associated with adverse outcome. Many frailty tools are available, however, there is no consensus as to how to best evaluate frailty in patients with CHF.
Purpose: To report the prevalence of frailty, agreement and prognostic significance amongst 3 frailty assessment tools and 3 screening tools in CHF patients.
Methods: We comprehensively studied frailty using 6 frailty tools. Frailty screening tools include: Clinical frailty scale (CFS); Derby frailty index & Acute frailty network frailty criteria. Frailty assessment tools include: Fried criteria; Edmonton frailty score & Deficit index. Since there is no gold standard in evaluating frailty in CHF patients, for each of the frailty tools, we used the results of the other 5 tools to produce a combined frailty index which we used as a "standard" frailty tool. Subjects were defined as frail if so identified by at least 3 out of 5 tools.
Results: We studied 467 consecutive ambulatory CHF patients (67% male, median age 76 (IQR:69-82) years, median NTproBNP 1156 (IQR:469-2463) ng/L) and 87 controls (79% male, median age 73 (IQR:69-77years).
Prevalence of frailty was much higher in CHF patients than in controls (30-52% vs 2-15%, respectively). Amongst the assessment tools, Fried criteria scored the greatest proportion of CHF patients as frail (52%) while EFS scored the lowest proportion as frail (30%). Amongst the frailty screening tools, DFI scored the greatest proportion of CHF patients as frail (48%) while CFS scored the lowest proportion as frail (44%). Frail patients were older, have worse symptoms, higher NTproBNP and more co-morbidities compared to non-frail patients.
Of the screening tools, CFS had the strongest agreement with assessment tools (kappa coefficient:0.65-0.72, all p<0.001). CFS had the highest sensitivity (87%) and specificity (89%) amongst screening tools and the lowest misclassification rate (12%) amongst all 6 frailty tools in identifying frailty according to the combined frailty index.
During a median follow-up of 559 days (IQR 512-629 days), 82(18%) patients died. 55% (N=45) of frail patients died of non-cardiovascular causes. Worsening frailty was associated with worse outcome. Amongst frailty tools: CFS and Fried criteria increased model performance for mortality prediction most compared with base model (c-statistics:0.78 to 0.80 for both). Patients who were frail according to CFS had a 9 times greater mortality risk than non-frail patients (Figure).
Conclusion: Frailty is common in CHF patients and is associated with worse outcome. CFS is a simple screening tool which identifies a similar group as lengthy assessment tools and has similar prognostic significance.



Figure

1974

Evaluation of malnutrition using 6 screening tools in patients with chronic heart failure.

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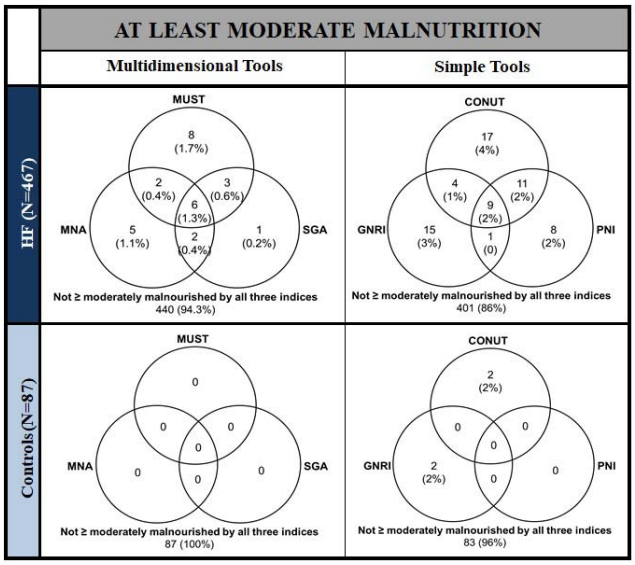
Introduction: Malnutrition is common in chronic heart failure (CHF) patients and is associated with adverse outcome. However, there is no standard method of evaluating malnutrition in patients with CHF.
Objectives: To report the prevalence of malnutrition and classification performance of 6 screening tools in patients with CHF.
Methods: We evaluated malnutrition using 3 simple and 3 multidimensional screening tools. Simple screening tools include: Controlling nutritional status index (CONUT), geriatric nutritional risk index (GNRI) & prognostic nutritional index (PNI). Multidimensional screening tools include: malnutrition universal screening tool (MUST), mini nutritional assessment-short form (MNA-SF) & subjective global assessment (SGA). Since there is no "gold-standard" for malnutrition evaluation, for each of the malnutrition tools, we used the results of the other 5 tools to produce a standard combined index. Subjects were 'malnourished' if so identified by ≥ 3/5 tools.
Results: We studied 467 consecutive ambulatory CHF patients (67% male, median age 76 (IQR: 69-82) years, median NTproBNP 1156 (IQR: 469-2463) ng/L) and 87 controls (79% male, median age 73 (IQR: 69-77) years). The prevalence of at least moderate malnutrition ranged between 3-9% in patients vs 0-2% in controls. Amongst the simple tools: CONUT; and amongst the multidimensional tools: MUST score classified the highest proportion of subjects as having at least moderate malnutrition. (Figure 1)
The prevalence of at least moderate malnutrition was similar in CHF patients with reduced vs normal ejection fraction and in patients with atrial fibrillation vs sinus rhythm. Malnourished patients tended to be older, have worse symptoms, higher NTproBNP and more co-morbidities.
Of the simple screening tools, GNRI had the highest, and CONUT score the lowest agreement with multidimensional screening tools in identifying at least moderate malnutrition in patients with CHF. (Kappa coefficients (K) for GNRI: 0.34-0.43; K for CONUT: 0.26-0.36, all p <0.001)

Of all 6 tools, CONUT had the highest sensitivity (80%); MNA-SF and SGA had the highest specificity (99%) and MNA-SF had the lowest misclassification rate (2%) in identifying at least moderate malnutrition in patients with CHF as defined by the combined index.
Conclusion: Malnutrition is common in CHF patients and is associated with increasing age, co-morbidities and HF severity. The prevalence of malnutrition is variable and is dependent on the tool used. The agreement amongst tools was heterogenous, suggesting that they are likely to measure different aspects of malnutrition. Further work is required to compare the prognostic value of malnutrition tools in patients with CHF.



Figure

1975
Sex-based differences in heart failure across the ejection fraction spectrum: phenotyping, prognostic and therapeutic implications

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Background. Females are under-represented in randomized clinical trials (RCTs). Potential sex-related differences in heart failure (HF) might question the generalizability of trials.
Purpose. To assess sex-related differences in a large cohort of unselected patients with HF across the ejection fraction (EF) spectrum.
Methods. The Swedish Heart Failure Registry population was considered. Multivariable Cox regression models were fitted to investigate differences in prognosis and in prognostic predictors across sex and EF.
Results.Of 42,987 patients, 37% were females [55%, 39% and 29% with HF with preserved (HFpEF), mid-range (HFmrEF) and reduced (HFrEF) EF, respectively]. Females were older and more symptomatic, more likely to have hypertension, kidney disease and receive diuretics, but less likely to have diabetes, ischemic heart disease and receive renin-angiotensin-system inhibitors. Crude mortality/HF hospitalization was higher in females in HFpEF and HFmrEF but lower in females in HFrEF. After adjustments, the risk was lower in females in HFrEF (HR:0.81; 95%CI:0.78 to 0.85) and HFmrEF (HR:0.91; 95%CI:0.85 to 0.98), with only a trend in HFpEF (HR:0.94; 95%CI:0.88 to 1.01). Main sex-related differences in outcome predictors concerned diabetes in HFrEF and anemia and heart rate in HFmrEF.
Conclusions. Males and females with HF showed different characteristics across the EF spectrum. Males reported better crude risk of mortality/morbidity in HFpEF and HFmrEF but worse outcome in HFrEF, although, after adjustments, females reported better outcome in all the EF categories, most markedly in HFrEF. The observed sex-related differences highlight the need of an adequate representation of females in HF RCTs to improve generalizability.

1976
Right ventricular to pulmonary artery coupling and risk of recurrent admissions in heart failure with preserved ejection fraction

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Right ventricular (RV) and pulmonary hypertension (PH) are common features in heart failure with preserved ejection fraction (HFpEF). In recent years, tricuspid annular plane systolic excursion (TAPSE) to pulmonary artery systolic pressure (PASP) ratio has emerged as a non-invasive global index of RV-PA coupling. We aimed to evaluate the association between TAPSE/PASP ratio and the readmission burden in patients with HFpEF.
Methods: We prospectively included 1127 consecutive HFpEF patients discharged for acute HF. TAPSE and PASP estimation were obtained by echocardiography through the index admission. Of them, in 367 patients (32.6%) PASP could not be accurately measured, leaving the final sample size to be 760 patients. Negative binomial regression method was used to evaluate the association between TAPSE/PASP ratio and recurrent all-cause and HF-related admissions. Risk estimates were expressed as incidence ratio ratios (IRR).
Results: Mean age of the cohort was 75.6 ± 9.7 years, 68.3% were women, and 46.5% had suffered from previous HF admissions. At a median (interquartile range) follow-up of 2.0 (2.9) years, 352 (46.3%) patients died and 1214 readmissions were registered in 482 patients (63.4%), being 506 of them HF-related. There was a stepwise increase in the rates of all-cause and HF readmission by decreasing TAPSE/PASP ratio. After multivariable adjustment, TAPSE/PASP ratio <0.36 was associated with a higher risk of HF-related recurrent admissions (IRR=1.51; 95% confidence interval (CI), 1.01-2.24; p=0.04), whereas patients in the lowest quintile (TAPSE/PASP<0.28) exhibited the highest risk of both all-cause and HF-related recurrent admissions (IRR=1.40; 95% CI, 1.04-1.87; p=0.025 and IRR=1.85 ;95% CI, 1.22-2.80 ;p=0.004, respectively).
Conclusion: TAPSE/PASP ratio, as a non-invasive index of RV-PA coupling, is able to identify patients with HFpEF at a high risk of recurrent hospitalizations.

1977
Myocardial perfusion mapping in cardiac amyloidosis- Unearthing the spectrum from infiltration to ischaemia

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Background: Cardiac involvement is the main driver of outcome in systemic amyloidosis, but the relationship between amyloid deposits and outcomes is not well understood. The simple explanation of physical, mechanical replacement of the interstitium by amyloid material seems insufficient. Preliminary studies support the hypothesis that myocardial ischaemia could contribute to cell damage.
Purpose: To (1) To assess the presence of myocardial ischaemia in patients with cardiac amyloidosis. (2) To compare patients with cardiac amyloidosis to patients assessed on invasive coronary angiography (ICA) to have normal coronary physiology (NCP), microvascular dysfunction (MVD) and triple vessel coronary disease (3VD). (3) To assess correlation of perfusion mapping parameters to markers of disease severity and prognosis.
Methods: 86 patients and 20 healthy volunteers (HV) underwent CMR at 1.5T (Siemens) with standard cine imaging, Phase Sensitive Inversion Recovery Late Gadolinium Enhancement (PSIR-LGE), T1 mapping, T2 mapping, Extracellular Volume (ECV) mapping and adenosine stress with myocardial blood flow (MBF) mapping. Thirty-eight patients also underwent ICA with 3 vessel assessment of Index of Microcirculatory Resistance and Fractional Flow Reserve: 7 had cardiac amyloidosis, 8 had NCP, 15 had MVD and 8 had 3VD.
Results: Cardiac amyloidosis patients had severe reduction in stress myocardial blood flow (stress MBF) and myocardial perfusion reserve (MPR) – (1.22ml/g/min±0.70 and 1.62±0.63 respectively) compared to HV (3.21ml/g/min±0.64,p<0.001 and 4.17±0.78,p<0.001 respectively), NCP (2.66± 0.56, p<0.001 and 2.51±0.43, p=0.036) and MVD (2.10 ±0.31,p<0.001 and 2.29 ± 0.87,p=0.014) with the degree of reduction being similar only to patients with 3VD (1.44±0.54, p=1.000 and 1.64± 0.68, p=1.000) (Figure 1). Rest MBF was also slightly lower in amyloidosis than HV. Cardiac amyloidosis stress MBF (and MPR) inversely correlated with myocardial amyloid burden (measured as extracellular volume, r=-0.715, p<0.001); the transmurality of LGE (no LGE 2.24 ml/min/g, subendocardial LGE 1.16 ml/min/g and transmural LGE 0.81 ml/min/g, p<0.01); systolic dysfunction (EF, r=0.405, p<0.01) and blood biomarkers (NT-proBNP,

r=-0.678, p<0.001 and Troponin T, r=-0.628, p<0.001). There was a correlation between stress MBF and native T1 (r=-0.588, p<0.001) but not with T2 values (p=0.591). Stress MBF and MPR were also early disease markers, being elevated in patients with early cardiac amyloid infiltration (raised ECV, no LGE).
Conclusion: Myocardial ischaemia is common in cardiac amyloidosis – with stress MBF and MPR similar to that of patients with severe three vessel disease. The reduction correlates with the degree of amyloid infiltration and markers of adverse prognosis, highlighting the potential role of myocardial ischaemia as a key mechanism in the pathophysiology of cardiac amyloidosis

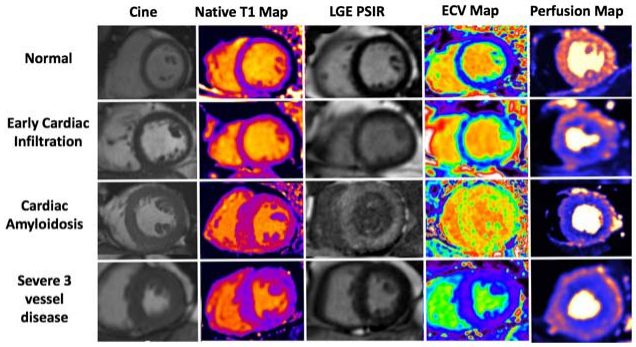

Figure 1. Short axis cine SSFP images in end-diastole, corresponding native T1 mapping, late gadolinium enhancement (LGE) images, ECV Mapping and stress myocardial blood flow mapping in a normal subject, a patient with early cardiac infiltration (raised ECV, no LGE), a patient with cardiac amyloidosis, a patient with severe three vessel coronary disease.

1978

Relationship between diastolic dysfunction and cognitive impairment in patients with CAD and HFpEF

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Background/Introduction: Cognitive impairment (CI) is a well-known predictor of mortality and readmissions in patients with coronary arteries disease (CAD) and heart failure (HF). Arterial hypertension and reduced left ventricle ejection fraction (LVEF) are known predictors of cognitive function worsening. On the other hand, role of diastolic dysfunction (DD) in the development of CI is less studied.
Purpose. Purpose of the study was to evaluate the relationship between DD, left ventricle filling pressure (LVFP) and CI.
Methods: For 110 patients with established CAD (prior myocardial infarction (MI), unstable angina (UA), percutaneous coronary intervention or coronary arteries bypass grafting) testing of cognitive functioning by validated scales – MMSE, MoCA, FAB – and echocardiography were performed. By results of echocardiography all patients were divided in three groups: I – normal diastolic function; II – impaired relaxation; III – pseudonormalization or restriction.
Results: The average age of patients was 60.1 ± 8.74 years. 71.8% male patients, 28.2% of women. In 64,5% of cases, there was prior MI, and in 35,5% - unstable angina. Mean LVEF in I, II and III group consisted 58,3±5,9%, 52,1±8,2% and 53,1±10,2%, respectively. There are no differences in age, diabetes mellitus prevalence, office blood pressure levels, smoking status, lipids and BNP levels between groups were noted. LVEF was significantly lower and left atrium volume index and left ventricle mass index (LVMI) were significantly higher in II and III group in comparison with I group. Mean score by MMSE scale in I group was 25,45±2,62; II – 24,95±2,69, III– 22,30±3,17. Comparison of groups showed that mean score by MMSE was significantly lower in III group (p1,3<0.00001, p2,3=0.0004). Mean score on the MoCA scale was in the first group 23.58 ± 3.47, in the second group - 22.33 ± 3.72, in the third - 20.07 ± 5.48. Significantly worse values were also noted in III group (p1,3 = 0,003, p2,3 = 0.04). There were no differences in FAB scores between groups. Negative correlation between E/e' ratio – that reflects LVFP – and MMSE, MoCA and FAB scores were noted (r=-0.50, -0,27, -0,24, respectively; p<0,05). Multivariable logistic regression analysis showed that among others (age, LVEF, indexed left atrium volume, LVmi, Hb1Ac, total cholesterol) only E/e' value (OR=1.28, 95% CI 1.11 to 1.47, P=0.0007) –was significantly associated with CI by MMSE score.
Conclusions: In HFpEF patients with grade II-III DD there are significantly lower rates of cognitive function than in patients with normal diastolic function or grade I DD. A negative correlations (r = -0.50, r=-0,27, r=-0,24) between E/e' and MMSE, MoCA and FAB points, respectively, were noted. Multivariable logistic regression analysis showed that E/e' ratio (OR=1.28, 95% CI 1.11 to 1.47, P=0.0007) was the independent predictor of CI by MMSE score.

1979

Outcome of subsequent pregnancies in women with a history of peripartum cardiomyopathy at contemporary.

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Background: Women with subsequent pregnancies (SSPs) in patients and history of peripartum cardiomyopathy (PPCM) are at risk of heart failure (HF) recurrence.
Purpose: To describe cardiac and obstetric outcomes of SSP in post-PPCM women.
Methods: Sixty-four women with PPCM are prospectively followed in our pregnancy/heart failure clinic. We identified women with SSP and analyzed their clinical, obstetrical and echocardiographic data.
Results: Among 64 PPCM patients with PPCM treated and followed, 27 had subsequent pregnancies, 8 women had miscarriages or terminations and 19 completed their full-term pregnancy and were included in this study. The mean age was 33±7 years, the mean LV ejection fraction (LVEF) was 53.4±7.4%. Most of the women (n=15, 79%) with SSP had recovered LV function (LVEF ≥50%) prior to SSP. Four patients had reduced LVEF at the time of SSP (ranged 38-43%).
All 19 women delivered healthy babies with mean weight 2870±415 gram. Mean gestational age at delivery was 38±2 weeks. No decline in LVEF was seen during SSP in women with recovered LVEF. In four women with LVEF<50% prior to SSP transient reduction in LVEF was obtained (absolute reduction of 5 to 10% of LVEF) with recovery to the LVEF prior to SSP. All four women were on HF medical treatment. No major adverse events were observed during pregnancy and post-partum.
Conclusions: In our cohort, most of the women with a history of PPCM and SSP had recovered LV function and did not experience a relapse. Those with reduced LVEF at SSP had transient worsening of LV function without clinical complication. No cardiovascular complications were observed and obstetric and neonatal outcomes were favorable. Close follow-up and multidisciplinary management by dedicated cardio/obstetric team are essential to prevent possible complications.

1980

Cardiac arrhythmias at baseline predict a clinically relevant genetic yield in idiopathic non-familial DCM affecting long-term outcome

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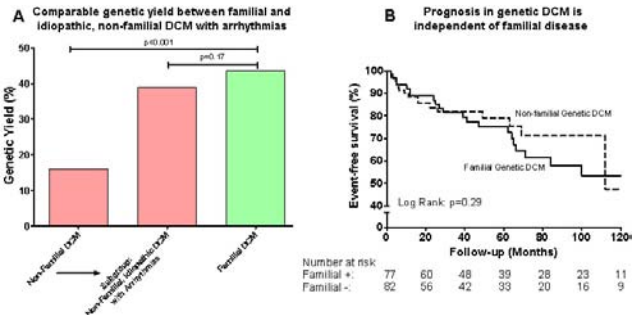
Background: Current guidelines recommend genetic analysis only in dilated cardiomyopathy (DCM) patients with a clear familial history. This increases the diagnostic yield of pathogenic mutations and decreases false-positive variants in non-familial DCM. Moreover, DCM patients with an acquired disease -such as chemotherapy- are not routinely genetically tested. Therefore, the genetic substrate in so-called acquired and/or non-familial DCM remains largely unknown. Which specific clinical variables or diseases could predict the need for genetic screening remain to be determined.
Purpose: To determine the genetic yield, their prediction by underlying clinical variables, and its prognostic value in a large consecutive DCM population.
Methods: This study included 689 DCM patients from the Cardiomyopathy Registry who had full genetic evaluation using a 47 cardiomyopathy-associated gene panel. All patients underwent a complete diagnostic work-up including echocardiography, cardiac MRI, endomyocardial biopsies and holter monitoring. Environmental triggers were predefined as viral, inflammatory, toxic, electrical and systemic auto-immune disease. The combined endpoint constituted of cardiac death, heart transplantation, heart failure rehospitalization or life-threatening arrhythmias with a median follow-up of 4 years.
Results: At least one etiology (genetic and/or environmental) was found in 530 patients (77%) after complete diagnostic workup, of which 159 (23%) had a genetic mutation. One in five of the DCM patients (n=90; 20%) had a combination of a genetic and acquired (environmental) trigger (Figure). All of the acquired triggers had a genetic yield around 20%, indicating no specific subgroup of environmental triggers yields a significant abundance of genetic mutations. Although familial DCM had a significant higher yield of genetic mutations compared to non-familial DCM (43% versus 16%, p<0.001), the prevalence of pathogenic mutations is still 1 in 6. In non-familial DCM patients with arrhythmias at baseline but without environmental trigger, the genetic yield was even 39%, comparable to the yield in familial DCM

(43%; p=0,17). Also, genetic DCM has a worse prognosis compared to non-genetic DCM (Log-Rank=0.008), irrespective of familial history (Log-Rank=0.29).

Conclusions: One in five DCM patients with an acquired trigger and/or absence of familial history has an underlying genetic mutation. Therefore, the finding of one cause for DCM does not exclude a genetic predisposition. Non-familial DCM patients with arrhythmias and no clear etiology have a comparable genetic yield compared to familial DCM. This provides new criteria to select DCM patients who most likely have a genetic mutation, which is important as we show that a genetic substrate has consequences for the prognosis of a patient irrespective of familial disease.



Genetic yield and prognosis of DCM

Poster Session 4

Device Therapy

P1987

Noninvasive diagnostic technique in ventricular tachyarrhythmias assessment in patients with coronary artery disease and secondary prevention indications for ICD implantation

T Atabekov[1]; R Batalov[1]; S Krivolapov[1]; M Khlynin[1]; S Sazonova[1]; A Levintas[1]; A Mishkina[1]; K Zavadovsky[1]; Y Lishmanov[1]; S Popov[1]
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Background. Sudden cardiac death (SCD) remains a serious public health problem. Certainly, coronary heart disease (CAD) is the most common cause leading to SCD. SCD in patients with CAD is caused principally ventricular tachyarrhythmias (VTA). The implantable cardioverter-defibrillator (ICD) is one of the most effective interventions for SCD prevention. However, about 25% patients did not receive an ICD therapy during the first 5-years follow-up. So, it's necessary to find out new predictors of SCD and VTA incidence, which will help to optimize the selection of patients who really need a device implantation.
Purpose. To study the diagnostic value of heart rate variability (HRV) individual parameters analysis, left ventricle ejection fraction (LVEF) assessment and cardiac 123I-methaiodobenzylguanidine (123I-MIBG) scintigraphy in the VTA prediction in patients with CAD and high risk of sudden cardiac death SCD.
Methods. 30 patients (male - 22, female - 8, average age 66,9±8,6 year) with CAD, myocardial infarction and secondary SCD prevention indications were examined. Before ICD implantation, patients underwent echocardiography, HRV individual parameters analysis and cardiac 123I-MIBG scintigraphy. All patients were treated with antiarrhythmic therapy (beta-blockers and amiodarone). All patients were divided into 2 groups according to the incidences VTA events during sixth months' follow-up. The first group consisted of patients with VTA events, second group - without VTA. Data of HRV, LVEF and cardiac 123I-MIBG scintigraphy before ICD implantation were compared.
Results. The 1-st group consisted of 19 (63,3%) patients with VTA events (male - 15, female - 4, age 66,4±9,1 years). The 2-nd group consisted of 11 (36,7%) patients without VTA events (male - 7, female - 4, age 67,7±8,1 years). There were statistically significant differences between patients with and without VTA before ICD implantation in terms of: LVEF - 50,63±9,22% vs. 64,18±7,96% (p=0,001), low frequencies domain - 719,47±437,83 ms vs. 1385,01±889,98 ms (p=0,01), total frequencies domain - 1910,63±882,04 ms vs. 2830,81±1208,61 ms (p=0,04), summed 123I-MIBG score calculation on early (31,68±17,71% vs. 7,36±2,24% (p=0,0005)) and delayed (33,05±18,08 vs. 9,36±3,93% (p=0,0003)), respectively. Conclusion. HRV assessment, as well as LVEF and cardiac sympathetic activity assessment can be used for identification of SCD highest risk group. But cardiac 123I-MIBG scintigraphy is more powerful predictor of VTA events then heart rate variability and left ventricle systolic function assessment in patients with CAD.

P1988

Effect of cardiac resynchronization therapy on right ventricle in adult with congenital heart disease

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Background: There are published data about the effect of cardiac resynchronization therapy (CRT) on left ventricular function in adult with congenital heart diseases (ACHD)but it's effect on right ventricular (RV) function and remodeling remains insufficiently elucidated.
Purpose: To assess whether CRT is influenced by or affects RV function in ACHD.
Methods: We retrospectively studied all ACHD patients with impaired systemic left ventricle who received CRT in our ACHD centre (2006-2017). Clinical and echocardiographic data were analysed at pre-CRT, early (1.5±0.5 years) and late (4.9±0.6 years) follow-up after CRT.
Results: Forty patients with CRT (median age 48 years, range 22–73 years, 75% male) were followed for 5.6±2.7 years. The underlying anatomy was left-side obstructive lesions (n=17; 42%), right-sided lesions (n=10; 25%), shunt lesions (n=9, 23%) and double outlet right ventricle with ventricular septal defect (n=4, 10%). All patients had previous surgical repair, 21 (53%) were upgraded from RV pacing.
Right ventricular dysfunction (right ventricular fractional area change, RVFAC <35%) before CRT was observed in 26 (65%) patients. At early follow-up, patients with and without RV dysfunction exhibited a similar improvement in NYHA functional class, QRS duration, left ventricular function. The RVFAC was improved ≥5 unit in 62% of patients with RV dysfunction and in 29% of those without RV dysfunction (p=0.047). Magnitude of ΔRVFAC in patients with RV dysfunction was higher than those without RV dysfunction (6.9±6.0% vs. 2.0±6.3%, p=0.020) .
CRT was associated with significant improvement in RV diameters, RVFAC, tricuspid annular plane systolic excursion and tissue Doppler-derived tricuspid lateral annular systolic velocity (S') at early follow-up, but only improvement in S' was sustained at late follow-up (p <0.05).
Eight patients died and 2 had heart transplantation. On univariate Cox regression analysis, RVFAC was independently associated with transplantation and death from all causes. At early follow-up, normalization of RV function was observed in 11 patients (28%) with RV dysfunction at baseline, which invoked favorable clinical outcome. (p=0.034).
Conclusion: Cardiac resynchronization therapy results in RV reverse remodeling, improves RV function and clinic outcomes in ACHD patients with impaired systemic LV. RVFAC was a determinant factor for survival. Improvement in RV function at early follow-up was associated with better outcome.

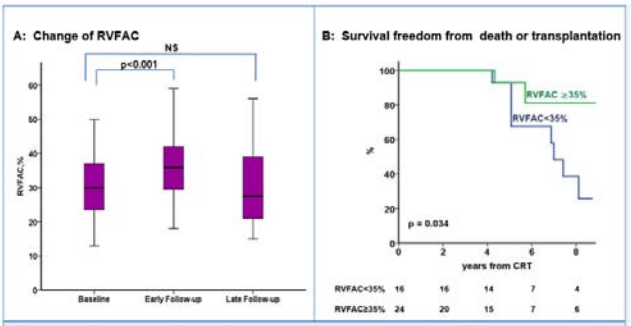

Figure 1 A : There was a significant early but not late improvement in RVFAC. **B:** Kaplan-Meier plots of patients stratified by RVFAC, demonstrating that RVFAC ≥35% at early follow-up was associated with better clinical outcome with respect to freedom from death or heart transplantation. RVFAC = right ventricular fractional area change.

Effect of CRT on RV in ACHD

P1989

ECG predictors of outcome in non-left bundle branch block cardiac resynchronization therapy patients

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Background: The effectiveness of cardiac resynchronization therapy (CRT) in patients without left bundle branch block (non-LBBB) QRS morphology is limited,

compared to those with LBBB. Still, a substantial part of these patients can benefit from therapy and additional selection criteria are needed to identify these patients.
Purpose: To evaluate the association of additional baseline 12-lead ECG features; with clinical and echocardiographic outcomes in CRT-treated non-LBBB patients.
Methods: Pre-implantation 12-lead ECGs from 790 consecutive non-LBBB CRT patients from 3 implanting centres in the Netherlands, were evaluated for the presence of predefined ECG parameters. QRS morphology (right bundle branch block and intraventricular conduction delay), QRS duration (≥/< 150ms), QRS area (≥/< 109μVs), left ventricular activation time (≥/< 125ms) and the presence of fragmented QRS. The association with the primary endpoint, the combination of left ventricular assist device implantation, cardiac transplantation and all-cause mortality, was evaluated.
Results: There was a significantly lower occurrence of the primary endpoint in non-LBBB patients with QRS area ≥109μVs (p<0.001) and in those without PR prolongation (p<0.001), and without fQRS (p=0.004). (Figure 1)
Conclusion: A larger QRS area is positively associated to all-cause mortality, LVAD implantation and cardiac transplantation. The presence of fragmented QRS is negatively associated with long term clinical outcome in non-LBBB patients. QRS duration, morphology and LVAT however were not associated to the occurrence of long term events in non-LBBB patients treated with CRT. These data may provide additional value for patient selection for CRT in non-LBBB patients and warrant prospective studies.

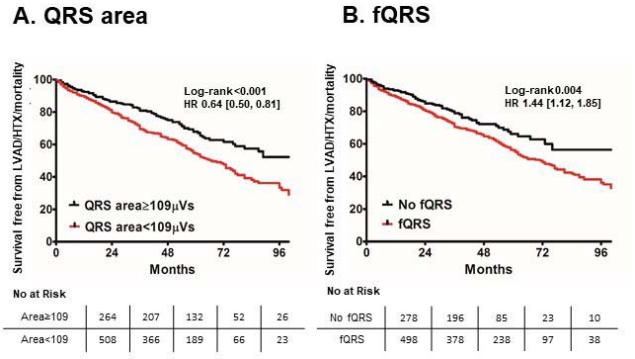

Figure 1.

P1990
Definition of myocardial electrical dissynchrony by noninvasive activation mapping in predicting response to cardiac resynchronization therapy
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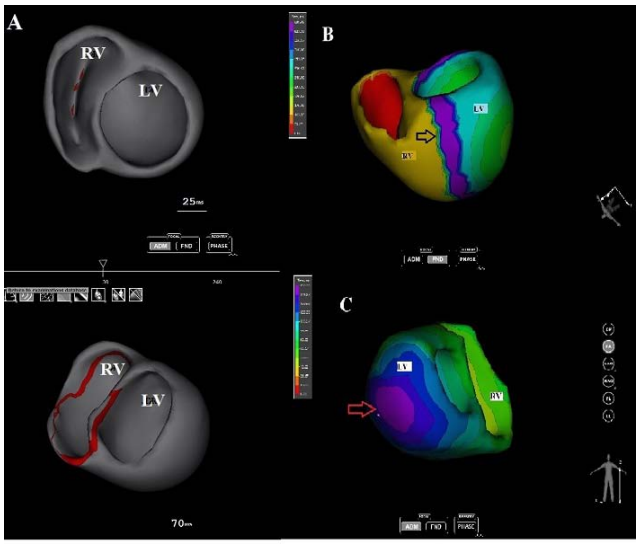
Purpose. To assess the ventricular myocardium activation pattern obtained by non-invasive epi- and endocardial mapping (NIEEM), as well as electrocardiographic (ECG) variants of left bundle branch block (LBBB) and to estimate the value of these data for the success of cardiac resynchronization therapy (CRT).
Materials and methods. The study included 53 patients (mean age 60,9±9,9years, 32 males/21 females) with LBBB, QRS duration≥130 ms, left ventricular ejection fraction (LVEF)≤35%, heart failure (HF) NYHA II-IV despite optimal pharmacological therapy during 3 month. All patients had undergone CRT-D implantation. Depending on presence or absence of LBBB ECG-criteria, proposed by Strauss D.G., patients were divided into 2 groups: 1group - strict LBBB, proposed by Strauss D.G. and 2 group – other ECG morphologies of LBBB. NIEEM by the 'Amycard 01C EP Lab' (EP Solutions SA) system with an analysis of epi- and endocardial ventricular electrical activation was performed in all patients. Ventricular electrical uncoupling (VEU) (Fig.A) defined as the difference of duration between the mean LV and RV activation times duration spontaneous rhythm (ms). A line of slow conduction (Fig.B) was recorded if the activation times of adjacent points on either side of this line differed by>50 ms. The zone of late LV activation (Fig.C) was defined as the latest area identified on the isochrones map. Response to CRT was estimated by echo and was defined as decrease in LV end-systolic volume by > 15% after 6 months of follow-up. Results. LBBB ECG-criteria, proposed by Strauss D.G., was detected in 37 patients (70% of all included). According to the results of NIEEM, these patients had more pronounced ventricular electrical uncoupling (=0,022). Most often the line of conduction block was detected in the anteroseptal or posterolateral region of the LV in the "LBBB-Strauss" group. The zone of late LV activation, which is the most optimal position for the LV pacing electrode, was located in the basal and middle segments of the lateral and posterior walls. After 6 months of CRT 34 patients (64%) were included in the "response" group, the remaining 19 patients (36%) formed the "non-response" group according to echo criteria. In the "response" group the morphology of the QRS complex more frequently met the criteria, proposed by Strauss D.G. than other ECG variants of LBBB (30 vs. 4 respectively, p <0,001). Initially, VEU was more pronounced in the "response" group (VEU 55 [51;59] ms in the "response" group vs 35 [14;47] ms in the "non-response" group, p<0,001).
onclusions. LBBB ECG criteria, proposed by Strauss D.G., identify patients with delayed transseptal interventricular conduction due to complete LBBB, what is a good target for CPT. Identification of individual ventricular activation properties may in patients with LBBB help to reveal responders to CRT and to further the response to CRT by improving a patient-specific lead placement and device programming.



Electrical dissynchrony by NIEEM

Chronic Heart Failure - Pathophysiology and Mechanisms

P1991
Exercise unmasks greater arterial stiffness and arterial load in HFpEF patients vs hypertensive controls
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Background: Arterial stiffness is an important contributor to the pathophysiology of heart failure with preserved ejection fraction (HFpEF).
Purpose: We sought to examine rest and exercise measures of arterial stiffness and arterial load among patients with HFpEF compared to hypertensive controls.
Methods: We examined 299 patients with dyspnea on exertion and EF ≥50% who underwent cardiopulmonary exercise testing with invasive hemodynamic monitoring between 2006-2017. Arterial stiffness measures were ascertained using invasive arterial waveforms, and integrated measures of arterial load calculated using simultaneously measured hemodynamics and Fick cardiac output. HFpEF was defined as % predicted peak VO2 < 80% with elevated rest or exercise left heart filling pressures. Hypertensive controls were defined as those with elevated resting blood pressure (>140/90) or taking blood pressure medications with normal left heart filling pressures. We compared measures of arterial stiffness (aortic augmentation pressure [AP] and Augmentation Index [AIx]), pulsatile load (total arterial compliance index [TACI], effective arterial elastance index [Eal], pulse pressure amplification [PPA]), and non-pulsatile load (systemic vascular resistance index [SVRI]) at rest, 30 watts, and peak exercise between HFpEF patients and hypertensive controls in age- and sex-adjusted analyses.
Results: We studied 204 HFpEF patients (age 61 ± 13 years, 57% women) and 95 hypertensive controls (age 55 ± 15 years, 53% women). There was no difference in resting arterial stiffness or load parameters between HFpEF and hypertensive groups in age- and sex-adjusted models (P>0.05 for all, Figure). At 30 watts, measures of pulsatile load were worse among HFpEF patients vs hypertensive controls (P<0.05 for TACI, Eal, PPA). Peak exercise further highlighted differences in arterial stiffness and pulsatile and non-pulsatile load among HFpEF patients vs hypertensive controls

(P<0.05 for AP, AIx, TACI, EaI, PPA, and SVRI). Pulsatile load (TACI) during peak exercise correlated with pulmonary capillary wedge pressure response to exercise in patients with HFpEF, but not in hypertensive controls (age- and sex- adjusted r=0.34, P<0.0001 vs r=0.14, P=0.18).

Conclusions: Patients with HFpEF had similar resting arterial stiffness and load compared with hypertensive controls. By contrast, exercise unmasked worse arterial stiffness, pulsatile, and non-pulsatile load among HFpEF patients vs. controls. Furthermore, exercise arterial load correlated with abnormal left heart filling pressure responses to exercise, suggesting possible contribution of vascular stiffness to the hallmark symptoms of exercise intolerance among patients with HFpEF.

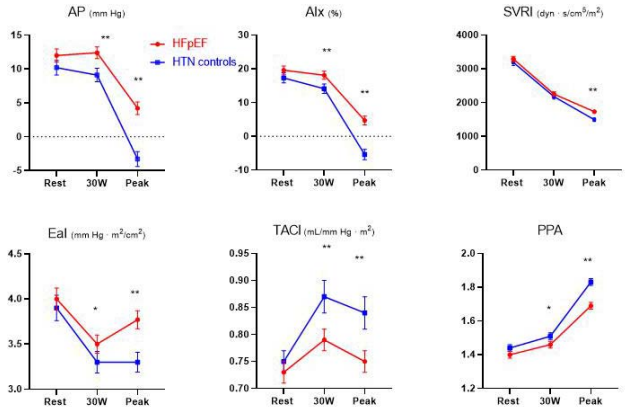

Figure 1. Arterial stiffness and load at rest, 30 watts, and peak exercise in HFpEF vs hypertensive controls, adjusted for age and sex. * denotes P<0.05, ** denotes P<0.01 (AP=aortic augmentation pressure, AIx=augmentation index, SVRI=systemic vascular resistance index, EaI=effective arterial elastance index, TACI=total arterial compliance index, and PPA=pulse pressure amplification)

P1992

Latent class analysis of echocardiographic phenotypes predicts adverse outcomes and treatment response in heart failure with preserved ejection fraction

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Introduction Heart failure with preserved ejection fraction (HFpEF) accounts for half of all heart failure cases, but clinical trials in HFpEF have not demonstrated effective therapies. Defining and exploring distinct HFpEF phenotypes may help develop targeted therapies for this condition. We used latent class analysis (LCA) to identify different echocardiographic phenotypes of HFpEF in the Americas cohort of Treatment of Preserved Cardiac Function Heart Failure with an Aldosterone Antagonist trial (TOPCAT).

Echocardiographic Class Phenotypes				
Echo Feature	Class 1(N=172)	Class 2(N=131)	Class 3(N=155)	Class 4(N = 196)
Grade II-III Diastolic Dysfunction ‡	77%	28%	1%	71%
Left Atrial Volume Index < 34 mL/m2 ‡	90%	78%	60%	49%
LV Mass Index ‡	Normal	Mild-Moderately Increased	Normal	Moderate-Severely Increased
LVH Type ‡	Concentric Remodeling	Concentric Hypertrophy	Concentric Remodeling	Concentric Hypertrophy
E/e' (Septal) < 15 ‡	27%	100%	85%	1%
LVEF (45-55%) *	34%	52%	48%	45%
RVSP < 36 mmHg ‡	62%	73%	46%	41%

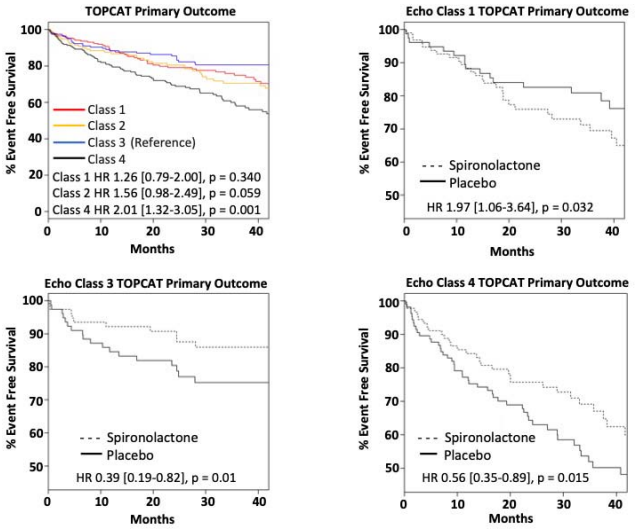
*p<0.05, ‡p<0.001

Purpose Complex HFpEF echocardiographic phenotypes identified using LCA would vary in prognosis and response to spironolactone.

Methods Echocardiograhic phenotype definitions were derived using the maximum likelihood estimation to identify the most common patterns of 7 echocardiographic features. The optimal number of phenotypes was determined using the first minima of the Bayesian Information Criterion and chi squared error statistics. Hazard ratios between echocardiographic phenotypes and treatment response were determined using multivariate Cox proportional hazards models. The primary outcome was a composite of cardiovascular (CV) mortality, aborted cardiac arrest, or heart failure (HF) hospitalization.

Results4 echocardiographic phenotypes were identified with distinct combinations of diastolic dysfunction, structural heart disease, and elevated left atrial pressures (Table). There were significant differences between echocardiographic phenotypes in the primary outcome. There was a significantly increased risk of the primary outcome with use of spironolactone in the Class 1 phenotype (HR 1.97 [1.06-3.64], p = 0.032), while the Class 3 phenotype (HR 0.39 [0.19-0.82], p= 0.01) and class 4 phenotype (HR 0.56 [0.35-0.89], p = 0.015) showed a significantly reduced risk with use of spironolactone (Picture).

ConclusionsUsing LCA, 4 echocardiographic phenotypes were identified and predictive of outcomes and response to spironolactone in HFpEF.



P1993

The usefulness of handgrip exercise echocardiographic tests for diagnosis of heart failure with preserved ejection fraction compared to invasive bicycle exercise cath

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Funding Acknowledgements: Korean circulation society

Background Invasive diastolic stress test (DST) is gold standard for diagnosis of heart failure with preserved ejection fraction (HFpEF) through demonstrating increase of pulmonary capillary wedge pressure (PCWP) during exercise. However bicycle exercise is not available in sizable numbers of cardiology labs. Handgrip exercise has been shown to increase PCWP in HFpEF patients by augmenting afterload. However correlation between handgrip exercise PCWP and bicycle exercise PCWP is not well established in HFpEF patients. Therefore we investigated whether noninvasive handgrip echo could substitute invasive bicycle cath for diagnosis of HFpEF. Method Thirty one patients with undefined dyspnea and EF>50% on echo performed invasive DST. Right heart cath was done with simultaneous echocardiography and expired gas analysis. After resting cath, handgrip exercise with 50% of maximal voluntary power was performed for 3 minutes in supine position. After recovery of resting hemodynamic condition, supine bicycle exercise was performed with graded increments of workload 10 watt for every 3 minutes until patients reached exhaustion. Patients with resting PCWP > 16mmHg or bicycle exercise PCWP > 25mmHg were defined as HFpEF. Results Among 31 patients, 20 patients were revealed as HFpEF and 11 revealed as noncardiac dyspnea (NCD) by invasive bicycle exercise cath. Resting PCWP was higher in HFpEF (15.6±2.6 vs 12.7±2.5 mmHg, p<0.01) and resting E/e' was marginally higher in HFpEF (13.1±3.5 vs 10.6±3.6 mmHg, p=0.07). Handgrip exercise increased PCWP both in HFpEF and NCD but this increase was more marked in HFpEF group (22.4±6.8 vs 17.6±5.4 mmHg, p=0.06). However handgrip exercise did not increase E/e' in both HFpEF and noncardiac dyspnea groups and was not different (HFpEF 14.4±5.2 vs NCD 12.1±4.5, p=0.22). While handgrip E/e' was not correlated with handgrip PCWP

(r2=0.25 p=0.22), handgrip E/e' was correlated with both low grade exercise (20watt) PCWP (r2=0.36 p=0.07) and peak exercise PCWP (r2=0.48, p=0.02). In ROC curve analysis, handgrip E/e' was a marginally significant predictor for detection of invasively proven HFpEF (p = 0.07) and the optimal cutoff value for handgrip E/e' to detect HFpEF was 11 (sensitivity, 0.69; specificity, 0.80), yielding an area under the curve of 0.71 (95% confidence interval, 0.51 to 0.92). Positive predictive value of handgrip E/e' > 11 for diagnosis of HFpEF was 81% and negative predictive value was 62%. Conclusion Handgrip exercise E/e' was correlated with bicycle exercise induced increase of pulmonary capillary wedge pressure (PCWP). Handgrip exercise echo might be used for detecting HFpEF in substitution for bicycle exercise cath.

P1994

Characteristics of Worsening Ejection Fraction during Follow-up in Heart Failure Patients with Preserved Ejection Fraction

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On behalf of: the KCHF Registry Investigators

Background: Heart failure with preserved ejection fraction (HFpEF) has been recognized as a major and growing public health problem worldwide. However, previous registry data has provided limited information about the changes of ejection fraction in HFpEF patients.
Purpose: The current study sought to clarify characteristics of worsening ejection fraction in HFpEF patients.
Methods: From the consecutive 898 patients hospitalized for acute heart failure (AHF) from October 2014 to March 2016, discharged alive, and performed echocardiography in the acute (during the index hospitalization) and chronic phase (6 months after hospital discharge), we studied 369 patients with HFpEF (baseline EF ≥50%). We classified the HFpEF patients hospitalized for AHF into 2 groups by the change of EF during 6 months after hospital discharge: those with worsening EF in the chronic phase (Group A) and those without worsening EF in the chronic phase (Group B). Worsening EF was defined as EF worsening below 50% compared to baseline EF or the decline of more than 10% in the chronic phase. Clinical predictors of worsening EF during follow-up were identified using multivariate logistic regression analysis.
Results: Group A and B included 56 patients and 313 patients, respectively. Regarding the baseline characteristics, Group A had significantly greater prevalence of patients with prior myocardial infarction (29 vs. 12%, P<0.001), while Group A had significantly lower prevalence of patients with hypertensive heart disease (HHD) as underlying heart disease (21 vs. 42%, P=0.003), and atrial fibrillation (32 vs. 49%, P=0.02). Regarding the clinical presentations, systolic blood pressure and heart rate was lower in Group A than in Group B [143±33 vs. 154±35 mmHg (P=0.04), and 83±30 vs. 91±28 beat/min (P=0.04), respectively], and left ventricular asynergy and left bundle branch block were higher in Group A than in Group B [47 vs. 16% (P<0.001), and 19 vs. 7.1% (P=0.005), respectively]. After adjusting for potential confounders, independent risk factors for worsening EF during follow-up included left ventricular asynergy [odds ratio (OR) 5.71, 95% confidence interval (CI) 2.40–13.6, P<0.001] and HHD (OR 0.33, 95% CI 0.13–0.83, P=0.02).
Conclusions: Worsening EF during follow-up in patients with HFpEF was associated with greater prevalence of left ventricular asynergy, and lower prevalence of HHD as underling heart disease.

P1995

Impact of the geriatric nutritional risk index in non-diabetic patients aged >80 years with heart failure with preserved ejection fraction

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Background: Malnutrition has been identified as an important predictor of poor clinical outcomes in patients with heart failure with preserved ejection fraction (HFpEF). The clinical significance of nutritional risk assessment in non-diabetic HFpEF patients aged >80 years is less well defined. Methods: We studied consecutive 112 Japanese HFpEF patients (54 males, older than 80 years of age (85.1 +/- 3.7years) who were hospitalized with HFpEF at the authors' institution. The impact of nutrition, assessed using GNRI on admission was calculated as follows:14.89 × serum albumin (g/dl) + 41.7 × body mass index/22. None had evidence of diabetes mellitus, unstable angina, chronic inflammatory disease, collagen disease, or cancer at the time of evaluation. Patients were followed up for an average of 25.2 months, and 19 of 112 patients had all death. Results: Patients in the low-GNRI group(GNRI<92) had higher cystatin C, interleukin-6, and B-type natriuretic peptide (BNP), noradrenalin, and uric acid compared to those in the high-GNRI(GNRI92) group (P<0.05, respectively). By multivariate Cox proportional hazard analysis, GNRI, IL-6, and cystatin C were significant predictors for all death in those patients.
Conclusions: These findings indicate that the assessment of nutritional status using GNRI may be helpful for risk stratification in those non-diabetic elderly patients with HFpEF.

P1996

Correlation of inflammatory and fibrosis markers with diffuse interstitial fibrosis by T1 myocardial mapping and echocardiography parameters in heart failure with preserved ejection fraction patients

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[1]National Research Center for Preventive Medicine, Moscow, Russian Federation; *[2]M.F. Vladimirsky Moscow Regional Research and Clinical Institute, Moscow, Russian Federation*; *[3]Center for strategic planning and management of medical and biological health risks, Moscow, Russian Federation*

Purpose: The aim of the study was to investigate the association between the serum markers of systemic low-grade inflammation and myocardial fibrosis with the results of transthoracic echocardiography with tissue Doppler imaging and the level of diffuse interstitial myocardial fibrosis calculated by cardiac magnetic resonance T1-mapping in patients with heart failure and preserved ejection fraction (HF-pEF).
Methods: Fifty patients with confirmed HF-pEF (mediana and interquartile range for age 67 [64; 74] years, 52% men, body mass index <35 kg/m2 and no previous history of either acute coronary syndrome or myocardial infarction or diabetes) were enrolled in the study. The patients underwent transthoracic echocardiography with tissue Doppler study, HF-pEF was confirmed according to the recent ESC guidelines (based on E/' ratio, N-terminal pro-B type natriuretic peptide >125 pg/ml and symptoms or signs of HF). The levels of tumor necrosis factor α (TNF-α), transforming growth factor β1 (TGF-β1), procollagen type I C-peptide (PIP) and soluble ST2 were evaluated in patients' serum using enzyme-linked immunosorbent assay. As the last step T1-myocardial mapping was performed to assess native and postcontrast late gadolinium enhancement (LGE) values of T1.
Results: The mean±standart deviation in TGF-β1 was 209,2±61,3 pg/ml, mediana and interquartile range in TNF-α was 55,9 [28,3; 113,7] pg/ml, in PIP was 883,5 [680; 999] pg/ml, in sST2 was 44,75 [26,3; 62,5] pg/ml. The results of T1 mapping adjusted to myocardial segments were: T1 native (base) 1127,8±93 ms, T1 native (middle) 1074,7±53,8 ms, T1 native (apex) 1165,4±151,8 ms; T1 LGE (base), 497±72,5 ms, T1 LGE (middle) 502,8±56,1 ms, T1 LGE (apex) 506±56,2 ms. The analysis revealed significant correlations between TNF-α and e' (r= -0,37); correlation index between PIP and left atrial volume index was 0,29; sST2 correlated with native T1 (base), r=0,29 and diastolic pulmonary artery pressure, r=0,31; TGF-β1 correlated with LGE T1 (apex), r=0,49 and systolic pulmonary artery pressure, r=0,35. All values with p<0,05.
Conclusion: Among the investigated serum markers only sST2 and TGF-β1 significantly correlated with both: T1 myocardial mapping values of diffuse interstitial fibrosis and the parameters of echocardiography in patients with HF-pEF. PIP and TNF-α had no statistically significant correlation with the results of diffuse interstitial fibrosis assessed by T1 myocardial mapping.

P1997

The effects of long-term treatment with sympathetic nervous system blockers on diastolic function in patients with resistant hypertension and heart failure with preserved ejection fraction

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Background The sympathetic nervous system (SNS) plays an important role both in the pathogenesis of resistant hypertension (HTN) and heart failure (HF). The treatment of HF with preserved ejection fraction (HFpEF) and resistant HTN remains a challenge for contemporary cardiology. Moreover, there are insufficient clinical trials demonstrating the efficacy of some remedies in this category of patients.
Purpose Evaluation of diastolic function in patients with resistant HTN and HFpEF under the influence of long-term medication with sympathetic nervous system blockers.
Methods 100 patients with essential HTN gr.3 and HFpEF, without comorbidities, after a 3-week treatment with standardized treatment with Losartan, Amlodipine

and Indapamide and confirmation of their resistance were randomized in two groups, depending on the medication supplemented to the previously administered: group I (M) – selective I1-imidazoline agonist Moxonidine and group II (B) – cardioselective beta-blocker Bisoprolol. All patients were evaluated by transthoracic echocardiography at baseline, six and twelve months follow-up.

Results The authentic improvement in diastolic function parameters occurs from 6 months of continued medication with both SNS blockers with superior potency in the Bisoprolol treatment group, beneficial effect maintained until the end of the surveillance period. The most sensitive parameters have proven to be LAVI and TR velocity (Tab.).

Conclusion Long-term treatment with SNS blockers demonstrated a statistically significant improvement in diastolic function parameters with a superior potency of Bisoprolol in this group of patients.

Diastolic function parameters

Variables	baseline	p	6 months	p	12 months	p	
E/A	Group I	0.78±0.04	> 0.05	0.88± 0.08	> 0.05	0.82± 0.05	< 0.05
Group II	0.72±0.03	0.77±0.03	0.78±0.02				
$e_m´$, cm/s	Group I	4.5±0.3	< 0.05	4.8±0.3	< 0.01	4.8± 0.3	< 0.01
Group II	3.6±0.2	4.0±0.2	4.1±0.2				
E/ $e_m´$	Group I	13.4±0.7	> 0.05	13.0±0.6	< 0.01	13.0± 0.7	< 0.01
Group II	14.7±0.4	14.2±0.3	13.9±0.3				
LAVI, ml/m^2	Group I	38.2±0.7	> 0.05	37.0±0.6	< 0.001	36.0± 0.6	< 0.001
Group II	37.8±0.6	36.6±0.5	36.0±0.4				
TR velocity,m/sec	Group I	3.03±0.02	<0.05	2.94± 0.001	<0.001	2.93± 0.04	< 0.001
Group II	2.96±0.02	2.9±0.02	2.86±0.01				

P1998

The relationship between pulse-wave parameters and myocardial fibrosis determined by T1 myocardial mapping in patients with heart failure and preserved ejection fraction

AN Kaburova[1]; OM Drapkina[1]; MS Pokrovskaya[1]; MV Vishnyakova[2]; SM Uydin[3]; SN Koretsky[1]; AS Abramenko[2]; GV Chermensky[2]; BB Shoybonov[1]; AA Fedorovich[1]; LA Matskevich[1]; NV Gomiranova[1]; EV Zyatenkova[1]; IA Efimova[1]; VV Makarov[3]

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Introduction: Myocardial fibrosis is the pathophysiological hallmark of the diastolic function impairment and the subsequent development of heart failure with preserved ejection fraction (HF-pEF). Major arteries stiffening increases systolic load on the left ventricle contributing to its hypertrophy and leading to increased myocardial oxygen demand, as well as indirectly promoting impaired perfusion. Arterial stiffness and wave reflection effects augment systolic blood pressure and place additional mechanical load on the heart leading to diastolic dysfunction and myocardial fibrosis. Additionally cardiac magnetic resonance T1 myocardial mapping represents the new tool for the accurate assessment of diffuse interstitial fibrosis.Purpose: The research was aimed at investigating the relationship between the results of pulse-wave analysis reflecting vascular stiffness and the diffuse interstitial myocardial fibrosis calculated by T1 myocardial mapping in patients with HF-pEF.

Methods: 50 patients with confirmed HF-pEF (mediana and interquartile range of age 67 [64; 74] years, 52% men, body mass index <35 kg/m2 with no history of acute coronary syndrome, myocardial infarction or diabetes) were enrolled in the study. The patients underwent transthoracic echocardiography with Doppler study, HF-pEF was confirmed according to the recent ESC guidelines (based on E/' ratio, N-terminal pro-B type natriuretic peptide >125 pg/ml and symptoms of HF), 6-minute walk test mean±standart deviation result in patients was 422±23,8m. The following pulse-wave characteristics were measured with novel professional finger photoplethysmographic device AngioScan-01: stiffness index (SI), reflection index (RI), augmentation index adjusted to a heart rate of 75 (AIp75) and ejection duration percent (ED%). As the last step of the study T1-myocardial mapping was performed to assess native and postcontrast late gadolinium enhancement (LGE) values of T1.

Results: The results of pulse-wave analysis were for SI 7,6 [6,8; 8,1], RI 36,3 [21,2; 46,2], AIp75 10,6 [1;17], ED% 32,4±5,9%. The results of T1 mapping adjusted to myocardial segments were: T1 native (base) 1127,8±93 ms, T1 native (middle) 1074,7±53,8 ms, T1 native (apex) 1165,4±151,8 ms, T1 LGE (base), 497±72,5 ms, T1 LGE (middle) 502,8±56,1 ms, T1 LGE (apex) 506±56,2 ms. Among the examined parameters the statistical analysis revealed significant correlations between AIp75 and T1 (base), r=0,37, 1 (apex), r=0,33; as well as the correlation between ED% and T1 LGE (base), r= 0,42. All with p<0,05.

Conclusion: Among the investigated pulse-wave characteristics AIp75 (the elevated values of which reflect the increase in the major arteries stiffness – the process that contributes to elevated central pressure) and ED% (the increase of which denotes the decrease of diastole duration and thus may predict the future myocardial damage) were positively correlated with the results of T1 myocardial mapping (T1 native and T1 LGE).

P1999

Central aortic pressure: the link with markers of inflammation and fibrosis and diastolic function parameters in patients with heart failure and preserved ejection fraction

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Purpose: The aim of the study was to investigate the association between central aortic pressure (Spa) and serum markers of systemic low-grade inflammation and myocardial fibrosis along with the relationship with Doppler study parameters of diastole in patients with heart failure and preserved ejection fraction (HF-pEF).

Methods: consecutive ambulatory patients with confirmed HF-pEF (n=50, mediana and interquartile range of age 67 [64; 74] years, 52% men, body mass index <35 kg/m2 with no previous history of acute coronary syndrome, myocardial infarction or diabetes) were enrolled in the study. The patients underwent transthoracic echocardiography with Doppler study, HF-pEF was confirmed according to the recent ESC guidelines (based on E/' ratio, N-terminal pro-B type natriuretic peptide >125 pg/ml and symptoms of HF). The levels of tumor necrosis factor α (TNF-α), transforming growth factor β1 (TGF-β1) and procollagen type I C-peptide (PIP) were evaluated in patients' serum using enzyme-linked immunosorbent assay. Central aortic pressure was measured by use of the novel professional finger photoplethysmographic device AngioScan-01.

Results: The mean±standart deviation in TGF-β1 was 209,2±61,3 pg/ml, mediana and interquartile range in TNF-α was 55,9 [28,3; 113,7] pg/ml, in PIP was 883,5 [680; 999] pg/ml. Spa was 118,2±2 mm Hg, e' 5,7±1,1 and E/e' 13,4±0,7 cm/s. Among the investigated serum markers and echocardiographic parameters of diastole the statistical analysis revealed significant correlations between Spa and e' (r= -0,31), TNF-α (r=0,30) and PIP (r=0,32). All values with p<0,05.

Conclusion: Among the examined serum markers central aortic pressure correlated with the levels of PIP and TNF-α, but not TGF-β1. Additionally pressure in aorta showed negative correlation with e' which lowered values reflect the slowed ventricular relaxation in HF-pEF.

P2000

Red blood cell distribution width predicts 5-years all cause mortality in patients with preserved ejection fraction heart failure

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Background: Studies have already validated the prognostic role of red blood cell distribution width (RDW) on outcomes in patients with heart failure as well as other diseaseas. We investigated the association between RDW values at admission and 5- years mortality in patients with decompensated heart failure with preserved ejection fraction (HfpEF).

Material and method: we prospectively followed-up for a period of 5 years, 144 patients with decompensated HFpEF admitted in Cardiology Unit during the period 2012-2013; mean age of the cohort 73.9± 9.36 years, 58% female. At the end of the follow-up, the patients were randomized in 2 groups: survivors vs. non-survivors. Patients with cancer, moderate to severe anemia, COPD, infectious diseases or autoimmune disorders were excluded during the first randomization.

Results: After a median follow-up of 37 months (range 18-60 months), 84 pts. died (58%), non-cardiac mortality accounting for half of this. Non-survivors had higher baseline RDW value (median value 13.9±2.72% vs.12.38±0.61%, p=0.0001), NT-proBNP levels (3885±834pg/ml vs. 2315±78pg/ml, p=0.05), New York Heart Association functional class, presence of atrial fibrillation, the indexed left atrial volume (48.5±15 ml/m2 vs. 45±7.5 ml/m2, p=0.0125) and systolic pulmonary artery pressure (47.3±12 mmHg vs. 38±15.6 mmHg, p=0.03). A multivariate

Cox regression analysis revealed that RDW levels were independently correlated with all-cause and non-cardiac mortality after adjusting for other risk factors, including age, brain natriuretic peptide, echocardiographic parameters. In a receiver-operating curve analysis, a cut-off value of RDW above 14.2% have a 87% sensitivity and 75% specificity to predict the adverse outcome.
Conclusion: The current study demonstrated that besides NTproBNP, functional NYHA class, left atrial size and systolic pulmonary pressure, the RDW levels independently predict poor outcomes in patients with decompensated HFpEF.

P2001
Prognostic value of post-exercise oxygen uptake kinetics in heart failure with preserved ejection fraction

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Objectives: Cardiopulmonary exercise testing (CPET) is a well known prognostic tool in chronic heart failure (CHF). Recent data indicate high predictive value of oxygen uptake (VO2) kinetics following exercise test in patients with CHF. The aim of this study was to confirm prognostic significance of VO2 recovery delay (VO2RD) in HF with preserved ejection fraction (HFpEF).
Methods: We retrospectively analyzed the subgroup of 47 patients with HFpEF, NYHA classes II-III (33 male, mean age 64,2±11,7 years) previously included in the prospective observational study. At baseline the patients underwent comprehensive investigation including CPET. VO2RD defined as time from the end of loaded exercise until permanent fall of VO2 below VO2 peak values, was used for estimation of VO2 recovery kinetics. Average follow-up amounted 34 months. Composite end-point of cardiovascular death and hospitalization for HF decompensation was considered a primary analysis variable.
Results: Cardiovascular mortality amounted 23,4% (n=11). Composite end-point was observed in 57,4% of patients (n=27). ROC-analysis demonstrated significant independent predictive value of VO2RD for composite end-point (AUC=0,868; 95%CI=0,726 to 0,953; p<0,0001). Patients were subsequently dichotomized by a VO2RD of 25 seconds used previously as a cut-off point [Bailey CS. JACC Heart Failure 2018]. Kaplan–Meier analysis confirmed prognostic relevance of VO2RD for composite end-point (hazard ratio = 3,3; 95%CI = 1,4- 7,5, Logrank p = 0,0039).
Conclusion: Prolonged post-exercise VO2 recovery delay indicates unfavorable prognosis and may be used as an independent non-invasive marker for risk stratification in chronic heart failure patients with preserved ejection fraction.

P2002
Arterial stiffness and the autonomic nervous system function with different phenotypes of heart failure with preserved ejection fraction

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PURPOSE: to study the relationship between arterial stiffness and autonomic nervous system with different phenotypes of heart failure with preserved ejection fraction (HFpEF).
METHODS: This study included 77 patients with arterial hypertension (m-61%, f-39%). 19 of these patients with a verified diagnosis of coronary artery disease (CHD) with HFpEF, the others 58 without CAD. Ejection fraction in patients with CHD and without CHD was significantly different (52±4,3; 65±7,1, p=0,001). These groups were comparable by age (66.5±11.4; 62.9±8.9, p=0.14), body mass index (28.0±3.3; 26.9±3.7, p=0.26), office blood pressure (BP) systolic (133.2±13.9; 140.2±15.0, p=0.08) and diastolic (82.1±7.4; 84.9±7.9, p=0.18). All patients underwent Ambulatory blood pressure monitoring (ABPM) (BPLabVasotens) device. Arterial stiffness was assessed by means of using pulse wave velocity (PWV) measurements using validated Vasotens technology. The assessment of the circadian rhythm of the heart, reflecting the function of the autonomic nervous system was determined by the value of the circadian index (CI).
RESULTS: Within patients with CHD, Central systolic BP and central diastolic blood pressure BP were significantly lower than without CHD (119,0±9,2; 125,7±11,6, p=0,02 and 72,3±7,2; 79,0±8,3, p=0,004, respectively). PWV in the main group was higher than in the control group (11.8±2.7; 9.5±3.4, p=0.007), while in the main group there was more rigid CI (1.12±0.09; 1.21±0.10, p<0.001). Within the patients with HD, a negative relationship between PWV and CI (r=-0.5, p=0.03) was revealed, on the contrary, in patients without HD such a relationship was not revealed (p=0.15).
CONCLUSION: Increased arterial stiffness is associated with an imbalance of the autonomic nervous system, which is detected in patients in HFpEF with CHD, despite more effective treatment of arterial hypertension and dyslipidemia, compared with patients without CHD.

P2003
Galectin-3, AGEs serum levels and endothelial function in post infarction heart failure patients with preserved ejection fraction

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The aim of the study to evaluate serum levels of galectin-3, AGEs and endothelial function, cardiac hemodynamics in post infarction chronic heart failure patients with different ejection fraction. Materials and methods. All patients divided into two main groups according to ejection fraction: 1st group - 20 patients have chronic heart failure with preserved ejection fraction, 2nd group -15 patients with chronic heart failure and reduced ejection fraction. Standard laboratory blood tests for erythrocyte sedimentation rate, haematological parameters, lipid profile, glucose, renal function, echocardiographic examination, endothelial function determine were performed for all patients. AGEs and galectin-3 serum levels was determined. Results. Patients with chronic heart failure and reduced ejection fraction and myocardial infarction in anamnesis had significantly increased left ventricle end diastolic volume, left ventricle end systolic volume, left ventricle end diastolic dimension and left ventricle end systolic dimension ($p < 0.05$). AGEs serum level mildly increased in both groups. Galectin-3 level was significantly higher in pts with chronic heart failure and reduced ejection fraction ($p < 0.05$) and was correlated with age (R=0.74, $p < 0.05$), left ventricle end diastolic volume (R=0.57, $p < 0.05$), left ventricle end diastolic dimension (R=0.48, $p < 0.05$), triglycerides level (R=0.45, $p < 0.05$). Most of the patients with chronic heart failure with myocardial infarction in anamnesis had endothelial dysfunction, the FMD % level was significantly higher in patients with preserved ejection fraction ($p < 0.05$). Conclusions. Patients with chronic heart failure and reduced ejection fraction are characterized by significantly higher levels of galectin-3, endothelial dysfunction frequency, cardiac hemodynamics abnormalities.

P2004
Dynamics of sST2 and NTproBNP in heart failure with a preserved ejection fraction in acute myocardial infarction

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Introduction . Heart failure with preserved ejection fraction (HFpEF) is characterized by an increase in diastolic pressure and an overload of the left atrium. It is important to identificate biomarkers that can be used to control of HFpEF course.
Objective: To study the dynamics of the stimulating growth factor sST2 and the NTproBNP in heart failure with a preserved ejection fraction in acute myocardial infarction (AMI).
Material and methods. The study included 25 patients with AMI, degree of severity of heart failure was to KILLIP I - 43%, KILLIP II - 57%, mediana of age was 52.8 [46; 58] years. The inclusion criteria for the study was the left ventricular ejection fraction (LVEF) over 50%. On the 1st day, the 14th day and 6 months after the onset of myocardial infarction concentration of NTproBNP (pg/ml) and sST2 (ng/ml) in blood serum was determined, and the diastolic size of the left ventricle (LVD, mm), LVEF (%), the size of the left atrium (LA, mm), ratio of peak E and A of transmitral blood flow (E/A) were studied.
Results. LV EF values were normal and did not significantly changed over the entire follow-up period: at 1st - 55.0 [46.0; 63.0]%, on the 14th day – 54.5 [44.3; 58.5]%, after 6 months - 52.0 [45.8; 58.3]%, p> 0.05. The values of LVD also did not differ too: 45.0 [42.0; 49.0] mm, for the 14th day - 45.3 [42.7; 49.0] mm, after 6 months - 45.8 [43.0; 47.0] mm, p > 0.05. The E/A ratio of transmitral blood flow was significantly lower at 1st day AMI, p<0.003. The LA size at 1st day AMI was 36.7 [35.0; 38.0] mm, and 14th day - 36.0 [33.5; 38.4] mm, p>0.05. The LA size was a significant increase after 6 months - 37.9 [35.1; 40.0] mm, p<0.02.
The NTproBNP concentration was higher on 1st day of AMI - 645.4 [197.08; 993.65] pg/ml. It was decreased at 14th day - 164.96 [91.97; 614.76] pg/ml, p=0.05, and after 6 months - 52.55 [16.05; 787.88] pg/ml, p<0.02.
The sST2 serum level was higher on 1st day of AMI: sST2 - 31.86 [27.4; 38.57] ng/ml, and decreased by the 14th day of AMI - 25.99 [20.66; 33,87] ng/ml, p <0.01. After 6 months the level of sST2 concentration significantly increased - 32.39 [28.55; 36.58] ng/ml, p = 0.04.
Conclusions. HFpEF is characterized by an increase in the size of the left atrium and an increase in serum sST2 concentration in the late post infarction period. This allows sST2 to consider as a marker for control the heart failure with a preserved ejection fraction in acute myocardial infarction patients.

P2005

The impact of a clinical educational and self-care intervention in patients with heart failure with preserved ejection fraction

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Background Multidisciplinary team (MDT) care, including education and self-management, improves outcomes in patients with heart failure (HF). Although approximately 50% of patients with HF have preserved ejection fraction (HFpEF), these patients are frequently excluded from MDT services.
Purpose To assess the impact of a clinical educational and self-care intervention on outcomes in patients diagnosed with HFpEF.
Methods Patients with suspected HF are seen in a dedicated HF clinic and receive specialist clinical assessment, echocardiography and diagnosis in a one-stop clinic. Those diagnosed with HF with reduced EF are referred to the MDT. Due to local restrictions, those with HFpEF are usually discharged to their GP. 25 consecutive patients newly diagnosed with HFpEF were offered an additional comprehensive individualised intervention including clinical review, risk factor modification, education and self-management training. Outcomes were knowledge of diagnosis and how to seek help, confidence in self-management, medication changes, and hospitalisations and mortality at 3 months. The intervention group were compared to the 25 consecutive preceding patients who had received usual care.
Results Patients in the intervention group were more likely to have diuretics increased and felt more confident in their ability to self-manage their condition and seek help. There was a non-significant trend towards a reduction in mortality and all-cause hospitalisation at 3 months compared to the standard care group. For both groups combined, after an extended follow-up of 8±5 months, all-cause mortality was 8% and all-cause hospitalisations 26%.
Conclusion Patients newly diagnosed with HFpEF have a poor short-term prognosis with high rates of hospitalisations yet lack access to the MDT. The results suggest that a preventive intervention may improve self-care and patient outcomes. Patients with HFpEF should have access to MDT care. The growing burden of HFPEF means that confirmation in a large study should be an urgent priority.

Characteristic / Outcome	Standard care group n=25	Intervention group n=25	p value	Both groups n=50
Age (Years)	84	83	0.44	84
Gender (%female)	60	68	0.56	64
Hypertension (%)	56	36	0.16	46
Atrial fibrillation (%)	88	76	0.46	82
Mortality n (%)	2 (8)	0 (0)	0.29	2 (4)
Hospitalisation n (%)	4 (16)	2 (8)	0.67	6 (12)
Diuretic increases n (%)	2 (8)	4 (16)	0.67	6 (12)

P2006

The sophisticated echo parameters in diabetic and non-diabetic patients with preserved ejection fraction after STEMI

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Coronary heart disease (CHD) and diabetes mellitus (DM) are very often associate diseases. Sophisticated echo parameters as strain and strain rate are powerful predictors of CHD in diabetic patients.
Aim: To compare the parameters of myocardial mechanic of left ventricle and left atrium in diabetic and non-diabetic patients after STEMI and preserved ejection fraction (EF).
Method: Echo examination performed on VIVID 9GE, Echo PAC Ver 202. We analysed conventional echo parameters and parameters of left ventricle myocardial mechanics of systolic and diastolic function, as well as left atrial function. Results: 106 consecutive patients after STEMI treated with primary PCI were analysed by conventional and sophisticated echo parameters. 13/106 diabetic patients were older 61.6±10.5 vs. 56.9±10.3 yr, p=0.126, more female 46.2/31.2%, p=0.282 had impaired LVEF 53.15±3.87 vs. 57.08±4.69, p=0.005 and impaired global longitudinal strain (GLS) in endocardial layers -16.38±2.49 vs. -18.90±2.49 %, p=0.034. However, GLSs in mid layers -14.27±2.43 vs. -16.16±3.33 %, p=0.052 and epicardial layers -12.56±2.38 vs. -14.03±2.99 %, p=0.092 were not significantly different. The parameters of diastolic dysfunction as E/A were different between groups 0.67±0.12 vs. 0.91±0.32, p=0.009. The other parameters of systolic and diastolic function of left ventricle and left atrium were not significantly different between diabetic and non-diabetic patients (table 1).
Conclusion: The conventional echo systolic and diastolic parameters as EF and E/A remain important in diabetic patients with CAD. Still, larger studies are needed to define parameters of myocardial mechanic in these patients.

Table 1. Echo parameters

	Patients with DM (n=13)	Patients withouth DM (n=93)	p
GCS endo (%)	-25.26±5.70	-25.47±5.22	0.900
GCS mid (%)	-17.43±3.50	-17.69±3.75	0.824
GCS epi (%)	-12.47±2.44	-12.58±3.07	0.913
LA vol index (ml/m^2)	17.64±4.86	18.85±5.08	0.517
E/E´	8.09±3.10	7.19±2.37	0.212
E/SrE (m)	0.53±0.24	0.50±0.26	0.636
LAsreservoir(%)	20.39±8.52	24.41±10.98	0.236
LAa pump (%)	12.60±4.83	12.82±6.73	0.914
LAe conduit (%)	7.83±5.31	11.88±7.42	0.071
LA Sr S (s^{-1})	1.18±0.44	1.31±0.62	0.462
LA Sr e (s^{-1})	-0.77±0.67	-1.08±0.64	0.134

P2007

A novel echocardiographic based diagnostic score for identifying heart failure with preserved ejection fraction

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Background. Heart failure (HF) with preserved ejection is caused by structural and functional cardiac abnormalities. Therefore, echocardiography is key for the diagnosis of HFpEF. While echo based diagnosis of HF with reduced ejection fraction (HFrEF) is relatively straight forward, the most parsimonious combination of structural and functional abnormalities for diagnosing HFpEF are unclear.
Aims. We aimed to (1) develop a simple echocardiographic diagnostic score; (2) validate the score against invasively measured pulmonary capillary wedge pressure (PCWP); and (3) determine which proportion of patients in two randomized large-scale clinical trials qualified as having HFpEF based on this score.
Methods. Recognizing that hypertensive heart disease is the most common precursor to HFpEF and has overlapping echocardiographic characteristics with HFpEF, we compared echocardiographic features of 233 patients with HFpEF (LVEF ≥50%) to 273 hypertensive controls with normal EF but no HF. An agnostic model was developed using Classification and Regression Tree (CART) analysis. The association of the derived echocardiographic score with invasively measured PCWP was investigated in a separate cohort of 96 patients. An optimal cutoff point to diagnosis HFpEF for the score was chosen based on the highest specificity.
Results. A weighted score based (0-10 points) based on left ventricular ejection fraction (LVEF <60%), posterior wall thickness (>10 mm), E-wave (>0.8 m/s) and left atrial volume index to body surface area (LAVi, >24 ml/m2) had a combined AUC of 0.9 to identify HFpEF from hypertensive controls (Table). The score was significantly associated with PCWP in patients with HFpEF (R^2= 0.23, P= 0.029). An optimal cutoff point of ≥5 for the score was selected. In the TOPCAT Americas and I-Preserve trials, 60% and 33% respectively had ≥5 points and did considerably worse with regard to the primary combined clinical endpoint compared to patients with <5 points in both the TOPCAT Americas (HR 1.59; 95%CI 1.09-2.31) and I-Preserve (1.86; 95%CI 1.19-2.89) trial.
Conclusion. A simple echocardiographic score can distinguish HFpEF from hypertensive controls and is associated with objective measurements of severity and outcomes in HFpEF.

Table

Echocardiographic variable and value	Points
Left ventricular ejection fraction ≥50%, <60%	4
Posterior wall thickness > 10 mm	3
E-wave >0.8 m/s	2
Left atrial volume indexed to body surface area >24 ml/m^2	1

P2008

Influence of cardioversion on left atrial volume and function in patients with heart failure and preserved ejection fraction and atrial fibrillation

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Background: Atrial Fibrillation (AF) is frequent in Heart Failure with Preserved Ejection Fraction (HFpEF) and associated with increased mortality and morbidity. Growing evidence underlines the importance of left atrial (LA) phasic function in HFpEF. Aim of the current study was to investigate acute and chronic changes of LA volume and phasic deformation in patients undergoing cardioversion (CV) for first episode of atrial fibrillation.
Methods: We performed 3-D echocardiography and strain analysis of the LA before CV (baseline, BL), after 25±10 days (post,PO) and after 190±20 days of Follow-up (FU). 3 aspects of atrial deformation were analysed: LA reservoir function, conduit function and booster pump function (at PO and FU) with corresponding volumes from 3-D volume-time curves. Patients were classified as HFpEF according to European Guidelines during the post visit..
Results: 39 patients with sinus rhythm and preserved LV function were available for analysis, including 16 patients with HFpEF. LA maximum volume (LAmax) remained unchanged by cardioversion (BL vs FU 40±11 vs 39±10ml/m^2), but HFpEF patients had higher volumes at all phases of the cardiac cycle at baseline (LAmax 46±10 vs. 35±10 ml/m^2, p=0.001, LAmin 34±11 vs. 24±10ml/m^2, p=0.001) and follow up (LAmax 44 ± 9 vs. 35 ± 8 ml/m^2, p=0.001, LAmin 34±11 vs. 24±10, p=0.001). LA reservoir, conduit and boster pump function were lower at all timepoints in HFpEF (e.g. LAmax strain PO 14.4 ± 4.0 vs 25.2 ± 12.0, p=0.001). In all patients LA conduit function remained unchanged after cardioversion (conduit strain BL vs PO 12.2±7.9 vs 12.5±5.8%, P=ns), but LA booster pump function changed over time: while it was restored immediately post CV in the control group, with no further increase on FU (PO vs FU 11.8±5.5 vs 12.6±8.1, p=ns), it increased in HFpEF over time (PO vs FU 5.7±5.7 vs 8.9±7.0%, P=0.049). This was accompanied by an increase in total LAEF in HFpEF (PO vs FU 32±17 vs 41±16%, p=0.01), while it remained unchanged in controls (PO vs FU 51±17 vs 54±17%, p=0.36).
Conclusion: CV restores booster pump function in all patients, while 3-D derived LA maximum volume and LA conduit function remain unchanged after a median follow up of 190±20 days. Despite the same symptom duration before CV, LA booster pump function needs more time to recover in HFpEF and is an important driver of LA total EF.

P2009

Association of endothelial NO-synthase gene polymorphism with the left ventricle diastolic dysfunction and pulmonary hypertension in patients with heart failure and preserved ejection fraction

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Introduction . Pulmonary hypertension (PH) develops in 50-80% of patients with left-sided heart failure (HF), regardless to the left ventricle (LV) ejection fraction (EF). Endothelial NO-synthase (eNOS) activity plays important role in the development of PH in patients (pts) with heart failure with preserved ejection fraction (HFpEF). Genetic polymorphisms of eNOS may affect the severity of the left ventricle (LV) diastolic dysfunction (DD) and the elastic properties of systemic arteries in pts with HFpEF.

Purpose. To determine the polymorphism of the eNOS gene 786T>C rs 2070744 and the association of the corresponding genotypes with the severity of LV DD, PH and elastic properties of the arteries in patients with arterial hypertension (AH) and HFpEF.
Methods. We included 69 hemodynamically stable pts with AH and HFpEF (58.1% men, 67.4 ± 10.2 years; NYHA II-III). All patients underwent NT – proBNP evaluation; echocardiography; applanation tonometry; 6-minute walk test (6MWT); endothelium-dependent, flow-mediated vasodilation (FMD); LV myocardium mass index (LVMI), arterial elastance (Ea), ventricular elastance (Ees), their ratio (Ea/Es) and systemic arterial complaence (SAC) were also calculated. Genotyping for eNOS 3 was performed by polymerase chain reaction in the real-time. Genomic DNA samples were isolated from stabilized blood. Patients were divided into 3 groups, according to genotype.
Results. "Wild" homozygous TT genotype was found in 34 (49.3%) pts (TT group), heterozygous TC genotype – in 21 (30.4%) pts (TC group), "mutant" homozygous CC genotype – in 14 (20.3%) pts (CC group). Pts did not differ in gender (19 (55.9%), 12 (60%), 11 (61.1%) men, respectively), age (67.1 ± 8.9, 65.4 ± 10.6, 64.9 ± 10.3 years, respectively), and the prevalence of comorbidities (all p> 0.05). In pts of CC group, compared with TT and TC, there was the worst result of 6MWT (314.3 ± 69.1, 371.8 ± 77.7, 385.7 ± 85.4 m, respectively); higher NT-proBNP level (806.9 ± 369.7, 668.1 ± 317.8, 636.9 ± 433.2 pg/ml, respectively); greater LVMI (187.4 ± 37.1, 182.2 ± 25.7, 195.2 ± 28.5 g/m2 respectively); more pronounced LV DD, according to average e' (4.7 ± 0.6, 5 ± 1.7, 5.3 ± 0.8 sm/sec, respectively) and E/e' ratio (15.9 ± 2.1, 14.5 ± 1.3, 15.1 ± 1.5, respectively); the highest systolic pulmonary artery pressure (50 ± 19.9; 39.6 ± 10.3; 40 ± 19.2 mmHg, respectively); worse elastic properties of arteries according to augmentation index (33,8±4,9, 26,5±4,6, 27,3±5,6%, respectively), pulse wave velocity (13,1±0,7, 12,2±0,8, 12,4±1,1 sm/sec, respectively), SAC (1,1±0,2, 1,6±0,2, 1,55±0,3 ml/mmHg, respectively), Ea (2,3±0,2, 1,9±0,3, 2,1±0,3, respectively) and worse results of the FMD (8,1±2,5,10,1±4,5, 9,8±2,2, respectively, (all p <0.05).
Conclusions. Compared to other polymorphisms, the CC genotype of the NOS3 rs 2070744 gene is associated with more impaired LV diastolic function and systemic arteries elasticity, and greater PH in patients with AH and HFpEF.

P2010

Regional differences in characteristics and correlates of coronary microvascular dysfunction in HFpEF

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PURPOSE: In heart failure with preserved ejection fraction (HFpEF) coronary microvascular dysfunction (CMD) is a key feature. However, HFpEF is heterogeneous and phenotypes may differ between countries and regions.
METHODS We compared clinical characteristics and associations with CMD in 202 stable HFpEF patients in US, Singapore, Finland and Sweden in the multi-center PROMIS-HFpEF study. All patients had HFpEF according to current guidelines and no patient had unrevascularized macrovascular coronary artery disease. CMD was defined as coronary flow reserve <2.5. Associations between clinical characteristics and CMD were analysed by multiple logistic regression. The final model included age, sex, smoking, atrial fibrillation/flutter, NT-proBNP and left atrial strain.
RESULTS In Singapore HFpEF patients had the lowest BMI and highest prevalence of hypertension and diabetes, while in Finland and Sweden atrial fibrillation, low atrial strain and high NTproBNP were common (TABLE). In US, patients were younger, more obese with less atrial fibrillation and hypertension. CMD was present in US: 59% (n=30); Singapore: 80% (n=16); Finland 88% (n=35) and Sweden 77% (n=70) (p=0.013). In the final model only smoking was associated with CMD (OR 3.5 (95% CI 1.7-7.2; p <0.001). There was no significant interaction with country in any variable, but LDL and cholesterol were borderline (both p=0.084).

TABLE

Variable	USA n=51	Singapore n=20	Finland n=40	Sweden n=91	p-value overall	OR (95% CI; p-value
Age (years)	69 (63;75)	70 (69;80)	75 (70;81)	77 (71;83)	<0.001	1.03 (0.99-1.07;0.116)
Sex,female, n (%)	36 (71%)	8 (40%)	24 (60%)	43 (47%)	0.024	0.65 (0.34-1.25; 0.197)
Smoking	28(55%)	8 (40%)	19 (48%)	73 (80%)	<0.001	3.11 (1.61-5.98; <0.001)
Heartrate (bpm)	69(64;78)	66(59;71)	72(61;79)	67(60;79)	0.498	1.33 (1.02-1.75; 0.038)
Systolic blood pressure (mmHg)	126(113;135)	161 (142;171)	139(129;152)	140(130;157)	<0.001	1.01(0.87-1.17;0.889)
Hypertension	43 (84%)	20(100%)	35(88%)	72 (79%)	0.120	0.37(0.12-1.12;0.080)
Atrial fibrillation	11 (22%)	6(30%)	28 (70%)	61 (67%)	<0.001	2.84 (1.38-5.86; 0.005)
Diabetes mellitus	14 (27%)	10 (50%)	9 (23%)	25 (27%)	0.152	1.24(0.60-2.55; 0.557)
Coronary artery disease	18(35%)	10(53%)	13(33%)	37(41%)	0.458	1.37(0.70-2.67; 0.354)
NT-proBNP (pg/mL)	198 (93;440)	386(131;1243)	1220(742;2040)	1260 (813;1940)	<0.001	0.63 (0.24-1.62; 0.336)
LDL LDL(mmol/L)	1.9 (1.7;2.6)	2.4 (1.9;2.7)	2.0 (1.5;3.1)	2.4 (1.8;3.1)	0.136	0.51(0.24-1.09; 0.084)
Left atrial reservoir strain	24 (16;28)	18 (12;25)	11 (9.1;20)	12 (8.1;18)	<0.001	0.93 (0.89-0.97;<0.001)

Clinical characteristics of HFpEF patients per country. Odds ratios (OR (95% confidence interval (CI); p-value) for presence of coronary microvascular dysfunction.

Chronic Heart Failure - Epidemiology, Prognosis, Outcome

P2011

Heart rate and rhythm in relation to quality of life in outpatients with heart failure

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Background Studies denote correlation between high heart rate and atrial fibrillation with mortality but less is known about quality of life with these factors in patients with chronic heart failure. This study examined these relationships in a large sample.
Method The Minnesota Living with Heart Failure Questionnaire average score (MLWHFQ score) was examined in relation to heart rate in patients attending specialized hospital outpatient clinics who had sinus rhythm (SR) or atrial fibrillation (AF). The patients were registered at the first visit in our national registry. The difference of the scores between SR and AF were examined by Student t-test and between the rates by one-way Annova.
Results There were 4524 patients. Patients with AF comprised 33% and they were significantly older, had worse renal function, higher NYHA functional class, higher EF, lower s-potassium, lower s-sodium, more stroke, lower systolic blood pressure, less ischemic reason for HF, and used higher doses of diuretics than patients with SR. Patients with AF had significantly worse MLWHFQ scores than patients with SR except for heart rate above 90 bpm. The scores are shown in the table. Higher HR was significantly related to poor quality of life for both rhythms ($p<0.001$). In multivariate Cox proportional hazard regression model after a median 14 months follow-up, the type of rhythm and heart rate were not independent predictors for mortality.
Conclusions Disease specific quality of life measured by MLWHFQ average score was significantly related to heart rhythm (SR vs. AF, $p<0.02$) except for HR>90 bpm ($p=0.9$). Patients had worse quality of life with increasing HR irrespective of rhythm ($p<0.001$).

Table

Heart rate(beats/min)	Sinus rhythm (N=3036)	Atrial fibrillation (N=1488)	p-value fordifferences
< 70	1.65 ± 1.09	1.89 ± 1.09	<0.001
70-79	1.85 ± 1.09	2.05 ± 1.11	0.004
80-89	1.94 ± 1.17	2.15 ± 1.06	0.016
>90	1.94 ± 1.17	2.19 ± 1.07	0.9

Average Minnesota Living with Heart Failure Questionnaire scores ± standard deviation and type of heart rhythm and heart rate at the first visit to the hospital specialized outpatient units.

P2012

Heart failure in Colombia: results form the RECOLFACA registry

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Background: data about heart failure in Latino America is scarse, the main objective of this registry was to characterize the population of outpatients with heart failure that were followed in 60 Colombian hospitals in order to have a better understanding of the burden of this disease in our country.
Methods: data were collected prospectively, demographic, clinical characteristics and treatment patterns were collected. Univariate analyzes was used with frequencies and proportions for categorical variables and measures of central tendency, positions and dispersion for continuous variables.
Results: 2099 patients were included from September 2016 to September 2018, mean age was 67.59 +/- 13.54 years, 43.46% were female and 72.83% lived in urban areas. 70% had HFrEF , 14.6% had HFmEF and 15.4% had HFpEF.The NYHA was: I: 11.1%, II: 55.7%, III: 27.1%, IV: 4.7%. The most common comorbidities were hypertension (42.5%), malignancy (15.09%), type 2 diabetes (26.11%), hepatic disease (39.7%), coronary artery disease (18.83%), atrial fibrillation (19.93%) and COPD (4.4%). Ischemic cardiomyopathy was the cause of heart failure in 76.2% and Chagas heart disease in 0.8%. 72.5% of the patients were hospitalized once during the last year, 16% twice and 11.5% three or more times. The average length of stay was 11.4 +/- 12.8 days. The percentage of use of medications was: beta blockers: 87.96%, diuretics: 68.29%, MRA: 56.19%, ACE inhibitors: 34.2%, ARB 42.08%, ARNI: 11%. The use of CRT was 10.3% and 5.6% for ICD.
Conclusions: This is a population with a high burden of comorbidities, with an appropriate use of medical therapy but with a lower use CRT and ICD. There is a high number of hospitalizations that represents high costs for our health care system and requires the creation of more multidisciplinary heart failure programs.

P2013

Pulmonary arterial hypertension treatment in latin america

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Introduction: Pulmonary arterial hypertension (PAH) is a progressive and serious illness that requires structured diagnostic strategies in order to select the best treatment options. Most countries in Latin America (LA) are developing countries

and their social and health characteristics limit access to different medical and interventional procedures, affecting diagnosis and treatment approaches in PAH.
Purpose: This article aims to reveal data about the treatment options for PAH population in LA; This data is necessary to create new lines of cooperation in LA to develop local, national and international strategies and to generate new health policies that meet the specific needs for each country in order to decrease complications related to PAH.
Methods: This is a descriptive observational study conducted in 19 countries in LA. Data was collected since January 2017 to June 2018. A structured questionnaire was sent to each national coordinator of the Council of Heath Failure and Pulmonary Hypertension (CIFACAH) of the Interamerican Society of Cardiology (SIAC). This questionnaire evaluated "availability" (available: yes, no) and "accessibility" (type of access: public/goverment, private, patient, donation or research) to 13 interventions: 10 pharmacological agents and 3 surgical procedures (Pulmonary thromboendarterectomy [PTE], balloon atrial septostomy [BAS]) and lung transplantation).
Results: Sildenafil and bosentan are the only pharmacological agents with public access (ideal coverage) in more than 50% of countries. 58% of countries have access to less than 50% of the interventions, while Argentina, Colombia and Mexico have public access to 80%, 90% and 70% of those interventions (Figure 1). PTE and BAS have public coverage in 52.6% and 57.9% of LA countries, respectively. Lung transplantation centers are located in Argentina, Brazil, Chile, Colombia, Costa Rica, Cuba and Peru.
Conclusion: Access to PAH interventions are unequal among LA countries. 58% of countries have access to less than 50% of interventions in PAH. Some countries do not have different pharmacological or interventional options to treat these population. Only sildenafil and bosentan are available through public access in more than 50% of countries. Limited access to this or other interventions increases disease progression and mortality. This data will help to develop national and international policies that will improve availability and accessibility to these 13 interventions in PAH.

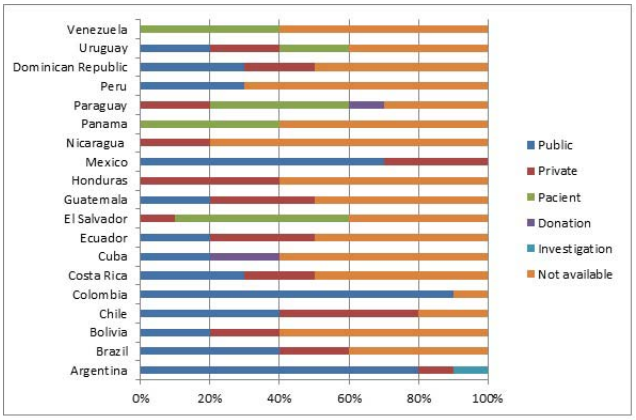

Figure 1. Health system's coverage

P2014

Prevalence of cardiac and non cardiac comorbidities in heart failure outpatients with preserved, mid ranged, and reduced ejection fraction: a single tertiary university center experience

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Purpose: To assess the prevalence of major cardiac and non-cardiac comorbidities in a contemporary, unselected chronic heart failure (HF) population visiting the HF Clinic of a tertiary University Hospital, stratified by ejection fraction.
Methods-Results: This is a prospective, observational study collecting epidemiological information in ambulatory HF patients from January 2016 to December 2018. Patients were classified according to baseline LVEF into HF with reduced EF [EF <40% (HFrEF)], mid-range EF [EF 40-50% (HFmrEF)] andpreserved EF [EF >50% (HFpEF)]. Major cardiac and non-cardiac co-morbidities were recorded at baseline.
Results: Overall, 1064 patients (mean age 73.4 years, 57.7% men, mean LVEF=43.6%) were recruited in this study [n = 361 (33.9%) HFrEF, n = 247 (23.2%) HFmrEF, and n = 456 (42.9%) HFpEF]. The frequency of comorbidities in the total population is presented in Table. In comparison with HFmrEF and HFpEF subjects, patients with HFrEF were more likely to have a prior myocardial infarction (80.1% vs. 55.1% vs. 9.4%), diabetes (29.1% vs. 21.5% vs. 21.5%), dyslipidemia (50.4% vs. 45.3% vs. 33.8%), anemia (36.6% vs. 30.8% vs. 26.3%) and chronic kidney disease (37.1% vs. 28.7% vs. 20.4%), but less likely to have hypertension (58.7% vs. 66.8% vs. 95.4%) or obesity (19.4% vs. 21.9% vs. 61%). Interestingly, the three groups had similar prevalence of chronic obstructive pulmonary disease and atrial fibrillation.
Conclusion: In a contemporary community population with chronic HF, the HFmrEF group resembled the HFrEF group in more features than the HFpEF group. Non-cardiac co-morbidity rates were similarly high, except for obesity and hypertension which were more prevalent in HFpEF.

Table 1. Frequency of comorbidities in the HF population and stratified by EF phenotype

Comorbidity	Total n=1064	HFpEF n=456	HFmrEF n=247	HFrEF n=361	P
Obesity, n (%)	402 (37.8)	278 (61.0)	54 (21.9)	70 (19.4)	0.000*
Hypertension, n (%)	812 (76.3)	435 (95.4)	165 (66.8)	212 (58.7)	0.000*
Myocardial infarction, n (%)	468 (44.0)	43 (9.4)	136 (55.1)	289 (80.1)	0.000*
COPD, n (%)	155 (14.6)	59 (12.9)	32 (13.0)	64 (17.7)	0.118
Diabetes mellitus, n (%)	256 (24.1)	98 (21.5)	53 (21.5)	105 (29.1)	0.025*
Atrial fibrillation, n (%)	331 (31.1)	147 (32.2)	72 (29.1)	112 (31.0)	0.698
Dyslipidaemia, n (%)	448 (42.1)	154 (33.8)	112 (45.3)	182 (50.4)	0.000*
Anaemia, n (%)	328 (30.8)	120 (26.3)	76 (30.8)	132 (36.6)	0.007*
Chronic kidney disease, n (%)	298 (28.0)	93 (20.4)	71 (28.7)	134 (37.1)	0.000*

* Statistically significant
COPD, chronic obstructive pulmonary disease; EF, ejection fraction; HFmrEF, heart failure with mid-region ejection fraction; HFpEF, heart failure with preserved ejection fraction; HFrEF, heart failure with reduced ejection fraction

P2015

Patients with CHF at low risk after acute decompensation do not need for careful observation and intensive treatment

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Purpose: Assess the need for careful observation and intensive treatment of patients (pts) at low risk after acute decompensation of heart failure (ADHF)
Methods: In the prospective single-center trial were included 100 with class III-IV CHF and left ventricular ejection fraction (LV EF) <40% due to ischemic heart disease, dilated cardiomyopathy, or arterial hypertension. After compensation of HF before discharge they were distributed into groups of low (NT-proBNP <1400 pg/ml, n=30, group LR) or high (NT-proBNP ≥1400 pg/ml, n=70) risk. High risk (HR) pts were randomized into 2 treatment groups: NT-proBNP -control (group 1, n=35) and standard (according to clinical guidelines) therapy (group 2, n=35). Blood sampling to determine the biomarkers concentrations (NT-proBNP, soluble ST2, copeptin, galectin-3, hsTnT and NGAL) were collected at discharge from the hospital, 3 and 6 months after. Pts from groups 1 and 2 attend visits monthly, but LR pts after 3 and 6 months for blood tests only. ombined endpoint (CE) included CV death, HF rehospitalization, resuscitation and worsening heart failure requiring intravenous diuretics.
Results: At the end of the study all pts have been treated by recommended combination, but the mean doses up-titration of iACE/ARB and beta-blockers at the 6 months of treatment were significantly higher in group 1 vs group 2, p<0.05. In groups LR mean doses of iACE and beta-blockers did not change and at 6 months became significantly lower than ones in groups 1 and 2. At discharge median NT-proBNP concentration was 839,2 (508,3;1029,8), 3750.0 (2224.0; 6613.0), 2783.0 (2021.5; 4827.5) pg/ml in groups LR,1 and 2, respectively. After 6 months of treatment, median NT-proBNP concentration significantly decreased in group 1 (Δ%= -53,1%) and in group 2 (Δ%= -11,1%, p=0.024). The same more

pronounced biomarkers activity reduction were found in group 1 for sST2 (Δ%= -37,1% vs -10,4%, p=0,0001) and copeptin concentration (Δ%= -29,9% vs -3,4%, p<0,001). Concentration of galectin-3, hsTnT and NGAL significantly decreased only in group 1. Biomarkers activity changes in LR pts were not found. Minimal rate of CE in HR pts was in group 1 -0,32/pt vs 1,03/pt in group 2 (p=0,002). But the rate of CE in group LR was the same as in group 1 – 0,23/pt (p=0,49).
Conclusion: Patients after ADHF and with discharge concentration of NT-proBNP <1400 pg /ml have the same rate of CE as patients from NT-proBNP-control therapy group. So, patients with CHF at low risk do not need for careful observation and intensive treatment.

P2016

Determinants and prognostic impact of intra-hospital worsening of renal function in acute heart failure

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Background & Aim: Factors prolonging hospitalization for acute heart failure (AHF), e.g. renal insufficiency (RI) or worsening of renal function (WRF), are ill understood. We analyzed the impact of RI and WRF on intra-hospital course and 12-month outcome.
Methods The AHF Registry at the Comprehensive Heart Failure Center aims to comprehensively phenotype all AHF patients (except cardiogenic shock or high output failure) on a 24/7 basis, and describe in-hospital and post-discharge outcomes. In-hospital WRF was defined as change of baseline serum creatinine (Crea) ≥0.3 mg/dL, and designated as persistent if present at discharge, or transient if not present at discharge. RI was excerpted from medical records. Prognostic impact was analysed using logistic or Cox proportional hazard regression.
Results We report on the first 425 patients consenting to the long-term follow-up study, who were not on chronic hemodialysis. Characteristics at admission were: median age 76 years; 42% women; NYHA class IV/III/II was 52%/40%/5%; 40% had left ventricular ejection fraction ≤40%; mean Crea was 1.3 mg/dl; median NT-proBNP 7700 pg/ml. WRF occurred in 174 patients (41%; Crea 1.6 mg/dl). In n=17 (4%; Crea 1.5 mg/dl), WRF occurred in conjunction with other types of clinical worsening. WRF without concomitant worsening of other condition occurred in 157 patients (36%; Crea 1.7 mg/dl). Baseline Crea in patients without WRF was 1.4 mg/dl (p for difference with isolated WRF <0.001). WRF was transient in n=90 (21%; Crea 1.7 mg/dl), but persisted in n=84 (20%; Crea 1.6 mg/dl; p=ns). The following characteristics were associated with any WRF (odds ratio with 95%CI compared with no-WRF): age per 10 years (1.24; 1.04-1.47), hypertension (2.22; 1.29-3.82), hyperlipidemia (1.80; 1.20-2.70), diabetes mellitus (1.60; 1.07-2.38), coronary artery disease (2.15; 1.44-3.22), RI (2.95; 1.95-4.46), Crea per mg/dl 1.79 (1.32-2.42). WRF was associated with prolonged length of hospital stay: no WRF 9 days (quartiles 6, 13); transient WRF 13 days (9, 19); persistent WRF 13 days (9, 18) (p for no-WRF vs WRF<0.001). Intra-hospital death rate was 1.2% in no-WRF, 4.4% in transient WRF, and 7.1% in persistent WRF. The respective OR for WRF vs no-WRF was 5.0 (95%CI 1.4-18.6; p=0.015), and persisted after adjustment for age and Crea. Age-adjusted 1-year death rate was 23% in patients without WRF, and 31% with WRF (hazard ratio 1.32, 95%CI 0.91-1.92; p=0.15), and was similar for transient and persistent WRF. Of note, age-adjusted RI predicted 12-month death risk (1.89, 95%CI 1.29-2.76).
Discussion Both transient as persistent WRF increase the length of hospitalization by about 50% and raise intra-hospital mortality risk 4- to 6-fold. After discharge, mortality risk seems to be determined mainly by RI per se rather than intra-hospital WRF. Future research should aim to better clarify triggers of in-hospital WRF and develop avoidance strategies.

P2017

Heart failure in very elderly patients (90 years of age and older)

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Background: Very elderly patients (≥ 90 years) with heart failure (HF) are rarely included in clinical trials. The aim of this study was to assess clinical characteristics, therapy, and outcomes of very elderly patients after their first HF hospitalization.
Methods and Results: This is a prospective, observational study that included 157 HF patients ≥80 years (mean age 89.2 years, 47% male) hospitalized in our Medical Academy, between January 2016 and December 2017. We used generalized estimating equations to evaluate outcome differences between different age groups within the very elderly cohort (80 to 89 years and ≥ 90), adjusting for comorbidities, demographics, and clustering by treatment facility. Outcomes of interest were pharmacological treatment of HF, mortality during index admission, 30-day and one-year mortality, and 30-day all-cause and HF readmissions. When compared to 80-89 years group, the ≥ 90 years group had less ischaemic heart disease and hypertension; and higher prevalence of atrial fibrillation, conduction abnormalities, chronic kidney disease, and anaemia (p<0.01). Preserved left ventricle ejection fraction (LVEF) was detected in 71% of patients, mid-range LVEF in 18%. When compared to 80 to 89 years group, the patients ≥ 90 years had lower body mass index ((24.9 ± 4.7) vs. (23.5 ± 4.0) kg/m2, p = 0.011), lower systolic blood pressure on admission ((131.5 ± 23.6) vs. (118.3 ± 18.2) mmHg, p = 0.002), higher mortality (29.2% vs. 39.1%, p = 0.003). Multiple logistic regression analysis showed that LVEF < 50% was an independent risk factor for death in the entire cohort. In-hospital, thirty-day, and 1-year mortality were similar (11% in 80-89 years vs. 12% in the ≥ 90 year (p=0.7)), 6% vs 7% (p=0.6), and 18% vs. 20%, respectively (p=0.5). 30-day all-cause readmissions and HF readmissions did not differ between age groups. The most frequently used therapy for HF in patients ≥ 90 years when compared to 80-89 years was beta-blockers (42% vs. 29%, p =0.01) and digitalis (28% vs. 21%, p = 0.02). Non-adherence to medications and to lifestyle recommendations was detected during follow-up in both groups.
Conclusions: The HF patients ≥ 90 years have high mortality and frequent readmission rates. The most frequently prescribed therapy for HF in this age group is beta-blockers and digitalis, which is most likely due to high prevalence of atrial fibrillation in these patients.

P2018

Right ventricular dysfunction in heart failure with preserved ejection fraction: an impact on survival

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Background. Right ventricular (RV) dysfunction and pulmonary hypertension (PH) are common in heart failure with preserved ejection fraction (HFpEF) and are associated with poor outcome.
Purpose. The aim of the study was to investigate the prevalence of RV dysfunction, RV dilatation and PH in patients hospitalized for HFpEF and their impact on survival.
Methods. We retrospectively analyzed medical records of all patients discharged from a regional hospital with the diagnosis of HFpEF (EF ≥ 45%) between January and June 2016. Echocardiographic parameters were analyzed for the presence of RV dilatation (RV diastolic area >25 cm^2, basal RV diameter >41 mm), RV dysfunction (tricuspid annular plane systolic excursion (TAPSE) <17 mm, fractional area change (FAC) < 35%), and pulmonary hypertension (PH) (pulmonary artery systolic pressure (PASP) ≥40 mmHg) and a 2-year mortality was assessed.
Results. 80 patients (mean age 78.6 ± 7,1 years, 60% females) were included in the study. We were able to assess pulmonary pressure in 74 patients, of which 55 (74.3%) had PH. Subjects with PH were further divided into three groups. The first group consisted of 21 subjects with PH, normal RV dimensions and normal RV function. In this group 2 patients died (9.5% mortality). The second group consisted of 18 subjects with PH, dilated RV and normal RV function, of which 7 died (38.9% mortality). The mortality was highest (81.2%) in 16 subjects with PH, RV dilatation and RV dysfunction (third group).
Conclusions. Our data confirm that PH is highly prevalent in HFpEF patients. The progression to RV dilatation and finally to RV dysfunction had an important impact on survival. Accurate assesment of RV function and better understanding of the mechanisms implicated in the development of RV dysfunction and its clinical role in HFpEF may aid to develop novel effective treatment strategies to improve outcomes of this complex disease.

P2019

Comparison of baseline characteristics and outcomes in women versus men referred for advanced heart failure therapies

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Background: Despite the steady increase in prevalence of patients with end-stage heart failure (HF) who are referred for advanced HF therapies such as ventricular assist device (VAD) or heart transplantation (HTX), sex differences in baseline characteristics and outcomes remain understudied.
Methods We assessed sex differences in baseline characteristics and outcomes in 429 (23% women) consecutive ambulatory adult HF patients, with a left ventricular

ejection fraction <45% who underwent right heart catheterization (RHC) for assessment of advanced HF therapies.
Results At the time of evaluation, women were younger than men (47.9 +13.2 years vs. 51.3 +12.4 years, p=0.02). There were no differences in duration of HF <6 months (62% in women and 60% in men), or time from HF diagnosis to index RHC (median (IQR) 1 (0-5) years in women and 2 (0-7) years in men). Women were less likely to have ischemic cardiomyopathy compared to men (18% vs. 33%, p=0.004). The burden of comorbidities (diabetes mellitus, myocardial infarction, peripheral arterial disease, stroke / transient ischemic attack, venous thromboembolism, sleep apnea, chronic obstructive pulmonary disease, chronic kidney disease, hepatic dysfunction, current / previous malignant disease, depression) was similar, except for atrial fibrillation (18% in women and 36% in men, p=0.0007) and thyroid disease (16% in women and 6% in men, p=0.005). There were no significant differences in NYHA class or physical examination (pulmonary rales, pleural effusion, hepatomegaly, ascites, peripheral hypoperfusion or oedema), except for jugular vein distension (13% in women and 25% in men, p=0.03). Use of contemporary medical HF therapy and CRT/ICD was equal between the sexes. Women had lower RHC pressures (pulmonary capillary wedge (16.9 +7.2 vs. 20.5 +8.4), pulmonary arterial mean (25.5 +9.6 vs. 29.4 +10.2), right ventricular systolic (37.9 +12.7 vs. 43.0 +37.9), and right atrial (9.0 +5.1 vs. 10.5 +6.6), in mmHg, p<0.02 for all), but similar cardiac index compared to men. Peak oxygen uptake was not significantly different (15.3 (9.2-18.6) in women and 12.9 (10.9-16.1) in men, in ml/kg/min, p=0.66). During 1-year follow-up, there were 38 deaths (5% of women and 10% of men, p=0.16), 27 VAD implants (1% of women and 8% of men, p=0.009), and 64 HTXs (24% of women and 13% of men, p=0.01). The time from index RHC to HTX was shorter in women compared to men (81 (51-179) days in women and 174 (110-278) days in men, p=0.003). During total follow-up time (1.5 (0.4-4.3) years), there were 147 deaths (18% of women and 30% of men, p<0.0001), 43 VAD implants (3% of women and 12% of men, p=0.007), and 107 HTXs (31% in women and 23% in men, p=0.15). There were no sex differences in time from index RHC to experiencing an event.
Conclusion At elective evaluation for advanced HF therapies, hemodynamics were less deranged in women. A higher proportion of women received HTX, their waitlist time was shorter, and survival greater.

P2020

The prognosis of patients with chronic heart failure, depending on adherence to observation in a specialized heart failure treatment center

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Introduction: Reducing the risk of overall mortality in patients with chronic heart failure (CHF) depends on effective treatment methods and physical rehabilitation. The main goal today is to increase adherence to the treatment of patients with CHF.
Purpose: To determine the risks of total mortality in patients with CHF during two years of follow-up, depending on adherence to observation in a specialized center for the treatment of chronic heart failure (enter CHF).
Methods: The study included 942 patients with CHF of any etiology over the age of 18, who were discharged from the hospital after the decompensation of CHF. Analyzed the patient's adherence to observation in center CHF: group 1 consisted of 313 patients who continued monitoring at center CHF for two years, group 2 - 382 patients who, after discharge from the hospital, refused observation in center CHF and were observed only in ambulatory department, group 3 - 197 patients who were observed at the center CHF during the first year and then discontinued, and a group of 4−49 patients who were included in the study, refused to follow up, but a year later they began to contact center CHF and were observed throughout the second year. Patients from group 1 visited the cardiologist of center CHF at least 1 time in 3 months regulary. Patients who missed or refused follow-up were under the supervision of a nurse, who made structured phone calls at least once every 3 months. For statistical processing, the program Statistica 7.0 was used.
Results: The average age of patients in groups 1,2,3 and 4 is 69.6+9.9, 71.8+11, 70.1+10.9 and 71.6+8.3 years respectively (p1/2=0.006, other intergroup differences are unreliable). Non-heavy functional class (FC) (I-II) and heavy FC (III-IV) NYHA were found in group 1 in 48.6% and 51.4% of cases respectively, in group 2 - in 41.1% and 58.9%, in group 3 - in 59.6% and 40.4%, and in group 4 in 49% and 51% of cases respectively (p1/2 =0.052, p1/3=0.02, p1/4=0.96, p2/3<0.001, p2/4=0.3, p3/4=0.2). Total mortality after 2 years of follow-up was significantly higher in group 2: 32.4% versus 11.2% in group 1 (OR=3.8, 95% CI 2.5-5.7; p1/2 <0.001), versus 9,1% in group 3 (OR=4.8, 95% CI 2.8-8.1; p2/3<0.001) and against 8.2% in group 4 (OR=5.4, 95% CI 1.9 -15.3; p2/4=0.0005).
Conclusions: Elderly patients initially refused to observe in the center CHF and showed significantly higher mortality. It is necessary to create a system of observation at home for this category of patients. The patients with non-heavy FC NYHA, who initially began observation at the center CHF, subsequently refused to visit. Patients with III-IV FC NYHA were more likely to maintain a high commitment to long-term follow-up at the center CHF, who had a better prognosis of life.

P2021

The importance of changes in prognostic markers during the management of HFrEF : reassessment better predicts the outcomes than the initial evaluation.

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Purpose: Risk scores in HFrEF are based on an analysis of numerous prognostic markers at baseline or at one point during the follow-up regardless of the patient's treatment evolution. However, patient's management and therapy response will change their prognosis.
Objectives: To appreciate the changes of prognostic markers throughout management of patients with HFrEF and to compare the prognostic value of these changes with the same markers collected at baseline.
Methods: All patients hospitalized at our institution from 1st May 2011 to 30th April 2015 with LVEF<40% at first visit (M0) with at least a second visit 6 month after (M6) were included and followed for 3 years. Data on pharmacological and non-pharmacological treatment between MO and M6 were collected. Usual prognostic markers such as EF, LVEDD, NYHA class, BNP, heart rate, 6 MWD, GFR, haemoglobin, mitral regurgitation grade, RV systolic function (S') were studied. The primary outcome was a composite of death, heart transplantation, need of mechanical circulatory support or hospitalization for heart failure.
Results: Among the 328 patients included at M0, 81% were men, mean age was 57 years, 42% had ischaemic cardiomyopathy and 39% were in NYHA class I or II. The average BNP was 584pg/mL (IQR 211-777) and LVEF was 28±7%. The exposure to specific heart failure therapy was significantly higher at M6 when compared with M0: 96% at M6 versus 55% at M0, (p<0.001) for beta-blockers, 94% versus 65% (p<0.001) for ACEI/ARB and 86% versus 43% for ARM (p<0.001). Moreover, the target doses of these treatments were greater at 6 months than at baseline: 61±34% of target dose (TD) versus 28±35% for beta-blocker (p<0.001), 63±35% TD versus 35±37% TD for ACEI/ARB (p<0.001), 65±35%TD versus 27±37%TD (p<0.001) for MRA. Same findings were seen for non-pharmacological therapies: use of cardiac rehabilitation (63% at M6 versus 12% at M0, p<0.001), ICD implantation (49% versus 27%, p<0.001) and CRT (29% versus 19%, p=0.003) were greater at 6 months than at baseline. The primary outcome occurred in 20% of the patients at one year and in 35% at three years. During follow-up, there were significant changes on prognostic markers like NYHA class (86% in class I-II at M6 versus 39% at M0, p<0.001), BNP (394ng/mL (IQR 63-441) at M6 versus 584pg/mL (IQR 211-777) at M0, p<0.001) and LVEF (35±12% at M6 versus 28±7% at M0, p<0.001). On multivariate analysis, better predictors of outcomes were: BNP level at M6 (HR 6,25; IC 95% 3,13-12,51; p<0,001), NYHA at M6 (HR 3,76; IC 95% 2,06-6,86; p<0,001), GFR at M6 (HR 2,28; IC 95% 1,33-3,89; p=0,003), RV systolic function (S' wave) at M6 (HR 2,28; IC 95% 1,23-4,24; p=0,009) and HR at M0 (HR 1,3; IC 95% 1,04-1,62; p=0,021).
Conclusion: Prognostic markers measurements after treatment optimization during six months are more associated with long-term mortality/morbidity when compared with the same markers collected at the beginning of the management in patients with HFrEF.

P2022

Follow-up of patients with heart failure and right ventricular dysfunction: clinical profile and prognosis.

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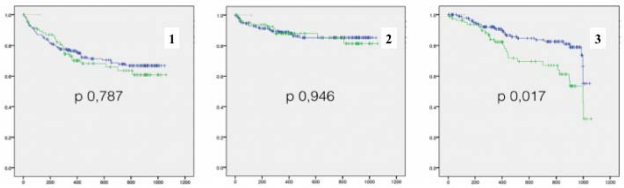
Introduction: the role of the right ventricle in the pathophysiology of heart failure (HF) and its clinical and prognostic implications in case of dysfunction, have aroused a growing interest in recent years.
Purpose: the aim of this study is to compare the clinical profile and prognosis of patients with heart failure and right ventricle dysfunction (RVD) and those with preserved right function.
Methods: patients admitted to a Cardiology ward in a tertiary hospital were collected prospectively and consecutively during 12 months with diagnosis of HF and right ventricular dysfunction, comparing with those with equal diagnosis without dysfunction, with subsequent follow-up.
Results: 321 patients were included, 93 patients with RVD (28.97%) and a mean TAPSE of 14.2 mm. There was a greater proportion of males (63.4%, p 0.04) with a worse cardiovascular risk profile (more HBP, DM, dyslipidemia, CKD, and AF, without reaching the statistical significance).
A greater proportion was associated with depressed LVEF (63.4% vs 46.5%, p 0.01), with higher average PASP figures (48 vs 41mmHg, p <0.001). The mean NT-proBNP figures at discharge were significantly higher (7776 pg / ml vs. 3539 pg / ml, p 0.01). Regarding the treatment, patients with RVD took more diuretic at admission (71% vs 48.5%, p 0.001) as well as RMAs (33.35% vs 18.5%, p = 0.01) and digoxin (18.3%,

vs 5.7 p 0.002). At discharge, more beta-blockers were used (77.4% vs 69.8%), diuretic (82% vs 69.4%), RMAs (40.7% vs 24.5%) and digoxin (16.1% vs 7.1%) reaching significance only in the last group (p 0.04). The consumption of ACEIs / ARBs was similar, close to 60% in both groups. The rate of ICD implantation was higher (18.3% vs 5.4%, p 0.001), but not that of CRT, with a higher percentage being derived to heart failure units at discharge (44.1% vs. 19.8%; p <0.001). In terms of follow-up, there were no differences in terms of mortality from all causes (1) or from HF (2), although a greater number of readmissions was described at 6 months by HF (3) (figure 1, 29.9 vs 15.4%, p 0.017).

Conclusion: the patient with HF and DVD tends to present a worse cardiovascular risk profile and greater concomitant left ventricular dysfunction. Regarding treatment, it was related to an increased use of diuretics, RMA and digoxin, greater implantation of ICD and greater referral to HF units at discharge. Although no differences in mortality were detected in our series, readmissions for HF were higher in this subgroup.



P2023

Risks of death from decompensation and cardiovascular causes in patients with chronic heart failure, depending on adherence to observation in a specialized center.

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Specialized centers for treatment chronic heart failure (center CHF) contribute to reducing the risk of death from decompensation of heart failure (DHF) and cardiovascular cases (CVC). The analysis of the work first in Russia center CHF is presented in this work.

Purpose: to determine the risks of death from CVC and DHF in patients with chronic heart failure (CHF) during two years of follow-up, depending on the adherence to observation of center CHF.

Methods: 942 patients with CHF of any etiology older than 18 years old who were discharged from the hospital after DHF were included to the study. For two years, the patient's adherence to observation in center CHF was investigated. 4 groups were created: group 1, n=313, observation at center CHF for two years, and group 2, n=382, were observed at the other clinics, group 3, n=197, only the first year at center CHF was observed, and group 4, n = 49, the 1st year was observed in the other clinics and the 2nd year in center CHF. Observation of a cardiologist at the center CHF at least 1 time in 3 months. In cases of refusal from supervision, the control was carried out by a nurse who did structured telephone calls 1 time in 3 months. For statistical processing, the program Statistica 7.0 was used.

Results: The mean age of patients in groups 1,3,4 did not differ significantly. Significant differences were found between groups 1 and 2 (69.6+9.9 and 71.8+11 years, p1/2=0.006). Patients with III-IV FC NYHA initially in groups 1, 2, 3, and 4 met in 51.4%, 58.9%, 40.4%, and 51% of cases respectively (p1/2=0.052, p1/3=0,02, p1/4=0.96, p2/3<0.001, p2/4=0.3, p3/4=0.2). Death from CVC for 2 years of follow-up was significantly higher in group 2 versus 1 (8.1% and 1.3% of cases, OR=6.8, 95% CI 2.4-19.5; p1/2<0.001), also in group 2 versus 3 (3%), OR=2.8, 95% CI 1.1–6.8; p2/3=0.02. When comparing groups 1 and 4 (6.1%), death from CVC was higher in group 4, OR=5.0, 95% CI 1.1-23.2; p1/4=0.02. When comparing other groups there are no significant differences (p1/3=0.2, p2/4=0.6, p3/4=0.3).

The risks of death from DHF over the 2 years of follow-up were significantly higher in group 2 (16.4%) compared with all groups: group 1 (6.4%), OR=2.9, 95% CI 1.7-4, 9; p1/2<0.001; group 3 (5.1%), OR=3.7, 95% CI 1.8-7.3; p1/3<0.001; group 4 (2%), OR=9.5, 95% CI 1.3-69.7; p1/4=0.008. When comparing other groups, no significant differences were obtained (p1/3=0.5, p1/4=0.2, p3/4=0.4).

Conclusions: In groups 1, 2, and 4 baseline prevailed patients with severe CHF. The patients in group 3 were not committed to follow-up after 1 year but retained lower risks of death of CVC and DHF in comparison with patients who did not attend the center CHF. The highest risks of death from CVC and DHF were obtained in patients who were not observed in the center CHF after discharge from the hospital. Prolonged regular follow-up in specialized center CHF reduces the risk of death from CVC and DHF.

Conflict of interest: not declared.

P2024

Comorbidity burden can discriminate chronic heart failure with preserved and reduced but not with mid-range ejection fraction

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Introduction: The 2016 ESC guidelines formally introduced a new classification whereby three types of HF patient are distinguished based on LVEF, comprising those with HF with reduced (HFrEF), mid-range (HFmrEF), and preserved EF (HFpEF). Whether or not comorbidity burden can define the new HFmrEF phenotype has never been explored.

Purpose: To evaluate the discriminative ability of comorbidity burden in the traditional vs. the newly introduced phenotype models.

Methodology: All consecutive ambulatory HF patients visiting the HF Clinic of a Tertiary University Center were examined for major cardiac and non-cardiac comorbidities and classified according to baseline LVEF into HFrEF (EF <40%), HFmrEF (EF=40–49%), and HFpEF (EF ≥50%). The discriminative ability of comorbidities to predict the Echo-based HF phenotype was then evaluated.

Results: 1140 HF patients were included in this prospective study, 500 (43.9%) with HFpEF, 259 (22.7%) with HFmrEF, and 381 (33.4%) with HFrEF. In comparison with HFpEF subjects, patients with HFrEF were more commonly younger, male, with prior myocardial infarction, chronic kidney disease, and anemia but less likely to have hypertension or obesity (Table 1). The prevalence of the respective comorbidities for the HFmrEF group most of the times resembled that of the HFrEF group. When the traditional model was used for classification the discriminative ability of comorbidities was very good in the total population (82,4% correct classifications) as well as for both HFpEF (87.6%) and HFrEF (78.4%). When HFmrEF was introduced, the discriminative ability dropped significantly for the total population (66.2%), due to the very poor discrimination of patients with HFmrEF (17.4%), even though it remained very good for HFpEF (86.8%) and modest for HFrEF (72.3%) patients respectively.

Conclusion: The discriminative ability of comorbidity burden is very good with regards to HFpEF and HFrEF but very poor when HFmrEF is introduced.

	HFpEF n=500(43.9%)	HFmrEF n=259 (22.7%)	HFrEF n=381 (33.4%)	P
Age (years)	72.8±11.4	71.2±14.4	70.4±11.6	0.015
Obesity	302 (60.4%)	60 (23.2%)	79 (20.7%)	< 0.001
Hypertension	480 (96%)	172 (66.4%)	226 (59.3%)	< 0.001
MI	52 (10.4%)	142 (54.8%)	305 (80%)	< 0.001
Diabetes	105 (21%)	54 (20.8%)	112 (29.4%)	0.007
CKD	102 (20.4%)	71 (27.4%)	140 (36.7%)	< 0.001
Atrial Fibrillation	167 (33.4%)	78 (30.1%)	119 (31.2%)	0.614
Anemia	135 (27%)	80 (30.9%)	139 (36.5%)	0.011

P2025

Recovered ejection fraction in alcoholic cardiomyopathy: is alcohol abstinence the only predictive factor?

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Introduction: Alcoholic cardiomyopathy (AC) is a presumptive diagnosis when other etiologies are excluded and there are excessive drinking habits. Since it is a toxic cardiomyopathy, recovery of left ventricular systolic function (EFrec) after cessation of consumption would be expected. However, the degree of ejection fraction (EF) improvement varies, possibly in the dependence of other factors not completely understood.

Purpose: Characterize a cohort of patients (pts) with AC admitted in a Heart Failure (HF) Clinic (HFC) and analyse the potential contributing factors to EF recovery.

Methods: Unicentric, retrospective analysis of AC pts followed in a HFC since 3/2011. Divided in two initial groups according to EFrec (defined as an EF increase > 10% with respect to the initial value) and then evaluated regarding alcoholic habits maintenance – four groups were obtained: G1 (abstinent pts with EFrec), G2 (non-abstinent pts with EFrec), G3 (abstinent pts with non-EFre) and G4 (non-abstinent pts with non-EFrec). Clinical, demographic, analytical, electrical, echocardiographic characteristics and major cardiac events – HF hospitalization (HFH) and mortality were analysed.

Results: Included 75 pts, mainly men (95%), with a mean age of 53.3 ± 11.2 years. Among the 35 pts who recovered EF, 70% ceased alcohol consumption (25 pts – G1). 10 pts had EFrec without becoming abstinent. Regarding non-EFrec (40 pts), 18 pts ceased alcohol consumption (G3) and 22 pts maintained their habits (G4). Considering cardiovascular risk factors, no significant differences in body mass index, hypertension, diabetes, dyslipidaemia or tabagism were identified between groups. Atrial fibrillation (AF) was more prevalent in G3 than in other groups (72.2% vs 33.3%, p=0.003); QRS mean duration was more significant in G4 in contrast to other groups (139ms vs 123ms, p=0.030). No statistically significant differences were documented in terms of NYHA functional class and HF hospital admissions.
Conclusion: In this cohort, most of the pts who recovered EF had ceased alcohol ingestion. However, some pts who ceased drinking habits did not show EF improvement; in this group, a higher prevalence of AF was observed. Despite the small size of the subgroups included in this study, the data obtained suggest that other factors may be implicated in EF recovery, such as rhythm disturbances as AF.

P2026

Prevalence of palliative care needs in patients with heart failure

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Background: The implementation of Palliative Care (PC) is heart failure is still limited, particularly in developing countries. The objective of this study was to identify the prevalence of PC needs and to describe the symptom burden and quality of life in a cohort of patients with heart failure (HF) followed in two HF clinics in our city.
Methods: Descriptive, cross-sectional study using a comparative and correlational design. Assessment of PC needs was conducted using NECPAL CCOMS-ICO, an instrument that helps to recognize needs of palliative care for different diseases. Symptom burden and quality of life were assessed using the Edmonton Symptom Assessment Scale (ESAS), The SF-12 Health Survey and the Kansas City Cardiomyopathy Questionnaire (KCCQ). Descriptive, correlational and comparative analyses were conducted using non-parametrical statistical tests.
Results: 136 patients were included; mean age was 66,43 +/- 14.55 years. 53,7% were male. 75.7% had HF with reduced ejection fraction, NYHA classification was: I (34,6%), II (45,6%) III (19,9%), NYHA IV (0%). 42.6% were classified as candidates for PC according to NECPAL CCOMS. The PC candidates were older, with average age of 71,6 Vs 62,4 (p<0,0001) and higher burden of symptoms according to ESAS (p =0,002). There was not difference in ejection fraction mean 33% Vs 33,2%. Main symptoms were pain, dyspnea and affective symptoms. KCCQ and SF-12 showed worse scores in different dimensions: physical function median 59,16 Vs 83,33 (p<0,001) and social function median 50 Vs 87,5 (p<0,0001), quality of life median 58,33 Vs 79,15 (p=0,004). SF-12 subscales showed total physical score median 37,25 Vs 62,5 (p<0,001) and general health median 25 Vs 50 (p=0,023). ESAS scores for emotional symptoms were inversely correlated with scores SF- 12.
Conclusion: More than 40% of patients attended in these heart failure programs were potential candidates for PC. Those patients presented more symptom burden and lower quality of life. Patients with heart failure should be assessed and treated by cardiologist along with palliative care team.

P2027

Short-term mortality in final stage heart failure patients.

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Purpose: This study is aimed at analyzing the impact of the main factors contributing to short and long-term mortality in patients at final stages of HF.
Methods: It is a multicenter cohort study including 1148 HF patients attending 279 primary care centers, and followed for one-year after reaching New York Heart Association (NYHA) IV.
The primary outcome was all-cause mortality. Multivariate logistic regression models were performed at 1, 3, 6, and 12 months.
Results: Mean age of patients was 82 (SD 9) years and women represented 61.7%. A total of 135 (11.8%) and 397 (34.6%) patients died three months and one year after inclusion, respectively. Male gender, age, and decreased body mass index were associated with higher mortality from three months onwards. In addition, low systolic blood pressure levels, severe reduction in glomerular filtration, malignancy, and higher doses of loop diuretics were related to higher mortality from 6 to 12 months.
The most important risk factor over the whole period was presenting a body mass index lower than 20kg/m2 (three months OR 3.06, 95% CI: 1.58-5.92; six months OR 4.42, 95% CI: 2.08-9.38; and 12 months OR 3.68, 95% CI: 1.76-7.69).
Conclusions: male, age, and decreased body mass index determined higher short-term mortality in NYHA IV. In addition, low systolic blood pressure, reduced glomerular filtration, malignancy, and higher doses of loop diuretics contribute to increasing the risk of mortality at medium and long-term.

P2028

Gender-related differences in chronic heart failure: is there anything else to learn?

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Background: Heart failure (HF) is a disease characterized by steep morbidity and mortality rates posing a challenge for the sustainability of our healthcare systems. Literature shows that sex-specific differences do exist even though women are less represented in clinical trials.
Purpose: Aim of this study was to evaluate clinical sex-based differences among real life outpatients suffering from chronic HF and to evaluate whether these differences might impact therapy and outcomes.
Results: 2528 HF patients were studied (mean age 76, 42% female) between 2009 and 2015. Women were older than men, less obese and with less cardiovascular disease such as hypertensive and ischemic heart disease, diabetes, peripheral disease, and atrial fibrillation. Furthermore, they had a lower renal function and lower values of haemoglobin. Female gender had less frequent HFrEF and HFmrEF, but more frequent HFpEF. There were no differences in terms of HF therapy, except for a slightly high prescription of ß-blockers in HFrEF and a higher prescription of MRAs in the female group with HFmEF and HFpEF. No differences in therapy adherence between sex and inside the three LVEF groups were described. Age, anemia, chronic kidney disease, cancer, chronic obstructive pulmonary disease and BMI were independent prognostic factors for survival in female.
Conclusions: Outpatient women with HF were older and with fewer cardiovascular co-morbidities than men, even if they had a worse renal function and they were more anaemic. Age and comorbidities but not LVEF were independent prognostic factors for death.

P2029

Do elderly patients with chronic heart failure have special clinical profile? Data from Russian National Heart Failure Registry 2012.

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Background: Heart failure (HF) is the leading cause of hospitalization for those over the age of 65 and represents a significant clinical and economic burden. At this point, it is necessary to study the characteristics of elderly HF patients to optimize care.
The purpose of the study was to analyze the clinical profile of elderly patients with HF in real clinical practice in Russia.
Methods: we performed a sub analysis of data from Russian National Heart Failure Register 2012. The patients were divided into two groups: <65 year age and ≥ 65 year age.
Results: this analysis included 2055 patients with HF: 1003 patients ≥ 65 years and 1052 patients <65 years. There were more women in the ≥ 65 year age-group (64.1% vs 32.0%; p<0.001). Among elderly patients had fewer smokers (4.1% vs 18.0%; p<0.001). HFpEF patients significantly prevailed in the elderly group. Among younger patients most had HFrEF and HFmrEF (HFpEF 58.6% vs 43.0%, HFmrEF 25.1% vs 29.5%, HFrEF 16.3% vs 27.6%; p<0.001). The frequency of myocardial infarction in elderly patients was slightly lower than in younger (40.5% vs 47.0%; p=0.004). The prevalence of hypertension (95.0% vs 88.3%; p<0.001) and atrial fibrillation (44,3% vs 30,4%; p<0.001) in the elderly was higher. The prevalence of diabetes in both groups was not significantly different. Elderly patients had a lower functional status according to the results of the 6-minute walk distance test (HFrEF 288.3 m vs 333.8 m, HFmrEF 256.1 m vs 297.2 m, HFpEF 221.4 m vs 271.2 m; p<0.001). The frequency of prescribing RAAS blockers and beta-blockers was not significantly different in both groups. However, elderly HFrEF patients were less likely to receive mineralocorticoid receptor antagonists (45.4% vs 60.5%; p=0.0023).

Conclusion: Elderly patients with HF demonstrate a different clinical profile compared with younger patients. The number of women was higher in the age group of ≥ 65 years. Elderly HF patients had a higher left ventricular ejection fraction (LVEF), lower prevalence of previous myocardial infarction and smoking. There are was a higher prevalence of hypertension and atrial fibrillation in the age group of ≥ 65 years. Elderly patients with comparable LVEF and therapy had a lower functional status.

Chronic Heart Failure - Treatment

P2030

Real life heart failure, a heterogeneous population benefiting from a specialized multidisciplinary programme

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Introduction: Heart failure(HF) is a public health problem, affecting a diversified population, growing in prevalence despite therapy and prevention advances. Most Cardiology departments' registries describe predominantly HF with reduced ejection fraction(HFrEF), while Internal Medicine(IM) mainly reports HF with preserved ejection fraction(HFpEF).
Purpose: To evaluate demographics, clinical characteristics and acute management(AM) of a non-selected population hospitalized in an Acute Heart Failure Unit with a multidisciplinary team.
Methods: Retrospective study of consecutive hospitalizations due to decompensated HF over one year.
Results: Of 181 hospitalizations, 55.2% were men, mean age 76 years. Most patients(77.3%) were admitted from the emergency room and 12.1% were admitted from our Day Hospital(DH). 50.8% had non-HErEF (HEpEF 44.2% and HF with mid-range ejection fraction(HFmrEF) 6.6%) and 49.2% HErEF. The most frequent etiologies were hypertensive(48.6%), ischemic(44.2%) and valvular(26%). 93% patients had chronic HF. Most decompensation were due to arrhythmias(26%), infection(24.9%), medication non-adherence (24.9%). Patients were admitted in NYHA classes III (35.4%) or IV (64.6%), and at discharge the majority (70.7%) were in class II. Most were on B profile(95.6%) requiring IV diuretics; of these 14.4% evolved to C profile requiring inotropics, 9.4% of which on levosimendan. Mean stay: 8,1days, mortality 6%. Population had high multimorbidity, the most common: arterial hypertension (75.6%), atrial fibrillation (6.2%), chronic Kidney disease (56.4%), diabetes (42.5%). After discharge, 87.7% were referred to DH, 76,5% HF consultation and 45.7% other speciality evaluation (22.2% Pneumology, 16% Cardiology, 4.3% Nephrology, Endocrinology and IM). Readmission at 30 days was 12.5% (52.4% due to decompensated HF) and mortality 5.3% (45.4% due to HF).
Conclusion: results support epidemiologic data, where HErEF tend to be as prevalent as non-HErEF. Despite differences, AM tends to be similar as most patients are congestive at admission. All groups had similar number of comorbidities, requiring multidisciplinary approach. A specialized and structured HF Program allows integrated care, with systematic and differentiated approach, reflected on our short hospital stay and mortality, inferior to national and international data.

	HFrEF	HFmrEF	HFpEF
Population	89 (49.2%)	12 (6.6%)	80 (44.2%)
Male	60 (67.4%)	7 (58.3%)	33 (41.3%)
Number of comorbidities (average)	5.3	4.8	5.6

P2031

New approaches in personalized diagnose of patients with symptomatic obstructive hypertrophic cardiomyopathy optimize the type of treatment decision-making.

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Background. Obstructive form of hypertrophic cardiomyopathy (HCM) is still the most common inherited myocardial disease characterized by clinical and genetic heterogeneity. Treatment diversity of HCM, including surgical approaches, is available nowdays, but personalized decision-making is still a challenge.
Aim. To review the clinical and diagnostic indications, genetic testing, outcome and 9-years follow up due to optimize surgical decision-making for the HCM patients (pts) with obstructive form.
Material and methods. From 2009 to 2018, 91 symptomatic HCM with obstructive form patients (49 (53,8%) male, the mean age was 47,4±14,8 years) had been operated. 64% pts had III – IV FC NYHA (functional class, New York Heart Association). The average follow-up period after operation was 7 years. Equal clinical, instrumental, biochemical, and genetic investigations were performed for all patients. Histopathological study was carried out for myocardial and valve samplings.
Results: According to the researches, all pts were distinguished in 2 main morphological phenotypes -group I (46 pts, 52%) had predominant hypertrophy of the basal segment of the interventricular septum and group II (42 pts, 48%) had diffuse generalized HCM (diffuse hypertrophy of the septum and free wall, increased number of the hypertrophic papillary muscles displaced to the apex, and significant mitral valve insufficiency). In 25 pts from group I underwent open-heart surgery was performed, and in 21 pts - septal alcohol ablation. Cardioverter-defibrillator (ICD) was implanted for pts with a high risk of sudden cardiac death (SCD). All these pts underwent expanded myoectomy, and parietal resection of the enlarged papillary muscles and left ventricular trabeculae. Chordal sparing mitral valve replacement was performed for 28 of them. All operated pts showed significant cardiac function improvement. During follow-up period in 5 pts was observed ICD chocks, and 2 pts died suddenly due to ventricular tachycardia. Total mutation detection rate was 40% in whole HCM cohort but vary significantly between groups II and I. Histopathological study had revealed mitral valve dysplasia in all studied samples. in
Conclusion: To optimize surgical decision-making for the HCM patients the multidisciplinary approach is needed. Genetic background and fibrosis level may contribute in the SCD risk assessment.

P2033

Reassuring community heart failure care in the absence of specialist involvement; but some gaps indicate need for continued specialist team input

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Introduction: Adherence to guideline-recommended therapy in heart failure (HF) management among patients receiving cardiology care remains a concern. Given that the majority of HF patients do not receive regular specialist input, this concern is likely heightened in patients exclusively managed in the primary care setting. Aim of this study was to evaluate the community care gaps in HF population who are not under active cardiology management.
Methods and study setting: Irish Data from 15 family practitioner services have been interrogated. Patients with confirmed HF diagnoses and no contact with secondary care services for ≥1 year were assessed. Quality of care for HF-PEF patient was based on 5 items: self-care education, flu vaccination, clinic BP control <140/ 90mmHg, appropriate use of oral anticoagulants and avoidance of inappropriate medicines (1 point per item if strategy adhered to; max score 5). For HF-REF (LVEF<45%) in addition to above metrics a point was given for use of ACEi/ARB/ARNi, Beta-blocker and/or MRA, and Appropriate device therapy (HF-REF; Total Score 9).
Results: 220 patients (77±9 years; 56% male) included. 70% were documented HF- PEF phenotype and mean care score was 3.76 ± 0.55. The most obvious gap in management was self-care education provided(in ≤ 2% of patients); Other management strategies were achieved in > 85% of patients. In the HF-REF cohort, the mean score was 6.51 ± 1.23 with self-care again being poor (22.6%). In addition, there was a deficit in MRA prescription (21% of patients); whereas >80% had ACEi/ARB/ARNi and BB. 66% had Appropriate device therapy. Target doses achieved; 66% for ACEi/ARB/ARNi, 88% for BB and 92% for MRA.
Conclusions: Data from a HF population exclusively managed in primary care demonstrated an overall acceptable standard of management. Failure to educate patients/family in self-care strategies is a prevalent gap across both phenotypes. Notable under-utilisation of MRA among HF-REF patients might reflect the lack of awareness of the value of the intervention. This last observation underscores the need for continuing contact between primary and secondary care teams to ensure heart failure care management reflects current guidelines.

Heart Failure Management in Community

	Total (n=220)	HF-PEF (n=155)	HF-REF (n=62)	p-value
Self-care education	17 (7.7%)	3 (1.9%)	14 (22.6%)	<0.001
BP control	190 (86.8%)	132 (85.2%)	56 (91.8%)	ns
Flu vaccination	209 (95.4%)	150 (96.8%)	56 (91.8%)	ns
Appropiate use OAC	210 (95.9%)	149 (96.1%)	58 (95.1%)	ns
Use of inappropiate medicines	10 (4.6%)	6 (3.9%)	4 (6.6%)	ns

P2034

Factors influencing guideline-led prescribing to heart failure patients in an Egyptian critical care setting

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Introduction: Heart Failure represents a crucial issue for the healthcare systems in the Middle East and North Africa due to its considerable human and economic burden. Guideline-led prescribing improves HF patient outcomes, however little is known about the factors influencing guideline-led prescribing to HF patients in Egypt.

Purpose: To assess the knowledge and behaviours of medical doctors towards prescribing to HF patients and to investigate potential barriers and facilitators to HF guideline-led prescribing in an Egyptian setting.

Methods: An 11-item survey was disseminated in hardcopy and electronically to all medical doctors (n=62) at the Critical Care Medicine Department, Cairo University Hospitals, Egypt from July – November 2018. Doctors were classified as Associate Staff (Bachelor of Medicine holders) or Staff (postgraduate degree holders). Ten survey items were rated on a 5-point Likert scale. Likert questions were anchored, as appropriate, by very familiar/completely unfamiliar or always/never. Comparisons between groups were made using $\chi 2$ test or Fischer's Exact test.

Results: Thirty-four doctors responded (54.3% response rate), of whom 15 (44.2%) were Staff. Overall, 82% of respondents reported that they use international clinical guidelines to inform prescribing practice (100% Staff vs. 66.7% Associate Staff, p =0.027). Staff were more familiar with ESC Guidelines for the Diagnosis and Treatment of Acute and Chronic Heart Failure 2016 than associate staff (66.7% vs. 36.8%, p=0.012). Most respondents (76.5%) stated that they always/often comply with prescribing guidelines. Medication choice is discussed with the patient always/often by 44.1% of respondents, however, Staff were more likely to do so than Associate Staff (86.7% vs. 26.3%, p=0.036). Over 85% of prescribers always/often considered patients' renal function and serum potassium when prescribing a loop diuretic or a renin-angiotensin system inhibitor and >75% of prescribers always/often considered heart rate, blood pressure and pulmonary function when prescribing beta-blockers. The most frequently cited barriers to guideline-led prescribing were the absence of local guidelines (79.4%); the cost of medication to patients (76.5%); and absence of Egyptian national guidelines (67.6%). Associate Staff reported workload as a barrier to guideline-led prescribing more often than Staff did (52.3% vs. 13.3%, p=0.026). Two-thirds of respondents supported greater involvement of clinical pharmacists to improve guideline-led prescribing to HF patients in this setting.

Conclusion: Familiarity with international HF guidelines was high however experienced Staff were more likely to be familiar with and to implement prescribing guidelines than less experienced Associate Staff. Availability of local or national HF prescribing guidelines and greater involvement of clinical pharmacists provide opportunities to deliver optimised HF care in Egypt.

P2035

Meta-analysis on MitraClip implantation for functional mitral regurgitation

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In patients with heart failure reduced left ventricular ejection fraction (HFrEF), moderate-to-severe or severe functional mitral regurgitation (FMR) may is associated with high rate of hospitalizations for heart failure and with increased mortality. Transcatheter mitral valve repair (TMVR) by MitraClip® implantation may effectively reduce severe MR; however, the long-term clinical effects of this procedure are not well defined.

Aims: We analyzed outcomes for rehospitalization and survival in heart failure patients with moderate-to-severe or severe functional mitral regurgitation (FMR) treated by either medical treatment (MT) only versus transcatheter mitral valve repair (TMVR) by MitraClip® implantation + MT by meta-analysis.

Methods & Results: By systematic search of bibliographic databases, we evaluated publications comparing heart failure patients with FMR treated by MT only versus treatment by MT combined with TMVR (by Mitraclip® implantation). Studies with a minimum of 25 enrolled patients and a follow/up period of at least 12 months were deemed eligible for this meta-analysis. We identified n=8 studies enrolling 2,960 HFrEF patients, divided into two study arms: MTVR by MitraClip® implantation and MT (n=1,692), versus FMR patients receiving MT only (n=1,268). At 12 months, there was a significant reduction in all-cause mortality favoring TMVR+MT (OR: 0.67; CI 95% 0.55-0.81), as well as a reduction of unplanned rehospitalizations (OR: 0.64; 95%; CI 0.54-0.77), compared with the MT only patients. At 24 months, there was a significant reduction of all-cause mortality in the TMVR+MT patient group (OR: 0.50; CI: 95%: 0.38-0.66; p<0.001). TMVR+MT was associated with significantly lower rates of unplanned re-admissions for heart failure compared with MT only at 12 months (OR: 0.69; 95% CI: 0.53-0.89; p<0.001) and at 24 months (OR: 0.53; 95% CI: 0.39-0.71; p<0.001).

Conclusions: This meta-analysis on n=2,960 patients with moderate-to-severe or severe FMR reveals that TMVR+MT, as compared with MT alone, is associated with a significant reduction of rehospitalizations and improvement of survival. These data imply additional evidence for TMVR by Mitraclip® in eligible heart failure patients with relevant FMR, which might be important for an update of the corresponding guidelines.

P2036

First-in-human VisONE heart failure study implant experience and study design: asymptomatic diaphragmatic stimulation for chronic heart failure

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Background Asymptomatic Diaphragmatic Stimulation (ADS) is a novel device-based heart failure (HF) therapy under investigation. Prior studies have shown that diaphragmatic contractions gaited to the cardiac cycle transiently lower intrathoracic pressure thereby affecting cardiovascular preload, venous return, right atrial pressure, right ventricular end diastolic volume, pulmonary artery flow and stroke volume. An early feasibility study to deliver ADS to the diaphragm via a superior thoracic approach in post-CABG patients demonstrated chronic ADS decreased LV volumes after 3 weeks in moderate symptomatic HF patients with reduced ejection fraction (HFrEF) incremental to optimal care.

Purpose: To prospectively evaluate the benefits and risks of chronically delivering ADS in patients with HFrEF and preserved ventricular synchrony, using a novel dedicated implantable system containing an algorithm for delivering ADS pulses gaited with sensed cardiac activity, via a new laparoscopic inferior approach, on chronic measures of HF function in an observational pilot study (NCT03484780).

Methods Medical refractory patients with symptomatic HFrEF (EF $\leq$ 35%) with no evidence of arrhythmias or ventricular dyssynchrony were screened to undergo laparoscopic implantation of the VisONE ADS system comprised of a pulse generator and two bipolar sutureless active fixation leads affixed to the inferior left and right hemispheres of the diaphragm. Exclusion criteria included severe primary pulmonary disease, known intra-abdominal infections and contraindications to laparoscopy. Therapy was programmed to deliver cardiac-gaited diaphragmatic stimulation at asymptomatic outputs. Patients will be followed at pre-specified times (1, 3, 6 and 12-months) using efficacy measures of haemodynamic, echocardiographic, HF status, and diaphragmatic function in conjunction with standard safety measures including adverse events.

Results: Nineteen patients were screened and 15 men (61 $\pm$ 7 years, EF 28 $\pm$ 5%, NYHA class II/III (2.5 $\pm$ 0.5), 87% prior myocardial infarction) were enrolled and successfully implanted with the VisONE system. The time from implant to

hospital discharge was 3.3 ± 2.4 days. For all patients an effective asymptomatic diaphragmatic pacing threshold was confirmed using palpitation and patient perception. All patients were discharged with ADS therapy turned on without therapy-related complications.
Conclusions Early pilot data suggests a dedicated ADS system implanted using a minimally invasive laparoscopic procedure can be performed successfully with short in-hospital stays. In addition, all implanted patients were free of device-related symptoms at discharge. Results from upcoming monitoring visits will further elucidate the risks and benefits of chronic ADS therapy.

P2037
Heart failure patient's journey: clinical practices and attitudes regarding the diagnosis and management of heart failure

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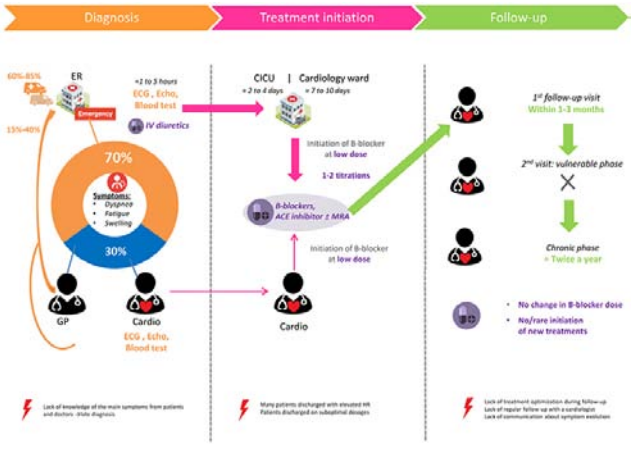
Funding Acknowledgements: SERVIER

Background. Multiple studies have identified gaps and challenges in current heart failure (HF) care. A better understanding of the patient journey could be useful for tailoring educational interventions to address knowledge and practice gaps in the long-term management in HF. This survey assessed the attitudes and perceptions of the different health care professionals (HCPs) involved in HF patient management at different steps of the HF patient's journey.
Method. A total of 25 intensive care unit (ICU) cardiologists, 34 non–ICU cardiologists, and 25 primary care physicians (PCPs) from France, Germany, Spain, the UK, and Russia were interviewed between March and April 2018.
Results: Cardiologists and primary care physicians reported that HF was diagnosed in 70% of patients in the hospital following an acute decompensation or an ischemic event and in 30% of patients in an outpatient setting. Up to 30% of patients diagnosed in the hospital seemed to be referred to the hospital by an office-based physician. A majority of HF patients get to the hospital in an ambulance or emergency truck.
PCPs are generally seen within 1 week after discharge / diagnosis. Cardiologists are generally seen within 1 month for severe patients or up to 3 months for most patients. Up to 10% of patients may not come back for follow-up consultations.
Physicians estimate that approximately 30% to 40% of patients diagnosed with HFREF decompensate and they are readmitted to the hospital within weeks or months after diagnosis. The main reasons for decompensation declared involved respiratory infections, difficulties to see and monitor patients as frequently as needed, difficulties to continue the titration process in an outpatient setting, difficulties to provide appropriate and comprehensive patient education, lack of patient compliance, and failure to identify early signs of decompensation.
Conclusion. These results identify multiple gaps over the spectrum of HF care, including, treatment, diagnosis (difficult access to echocardiography), treatment planning (underuse of recommended agents and subtherapeutic dosing), treatment monitoring and adjustment (lack of adherence to recommendations), and long-term management (difficulties to provide appropriate and comprehensive patient education). These data may help identify current areas of potential improvement in the management of patients with HF.



Heart failure patient's journey

P2038
Service quality in a heart failure clinic: a comparison analysis to a general cardiology clinic

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On behalf of: Universidade Luterana do Brasil Heart Failure Study Group

Background - Heart failure clinics add multidisciplinary resources in order to obtain an integrated patient care to heart failure outpatient. The level of patient satisfaction can be acquired by using service quality scores as the SERVQUAL method. Purpose - The study aims to compare the SERVQUAL service quality scores of an heart failure outpatient clinic to a general cardiology clinic. Methods - A cross-sectional analysis was performed to obtain quality indices by the SERVQUAL questionnaire of outpatients heart failure clinic and in outpatients from a general cardiology clinic attended at the same University general hospital in southern Brazil, from February to September 2018. The SERVQUAL scale consider domains of tangibility, reliability, assurance, responsibility and empathy. The gap analysis between the health care quality domains was calculated by the difference between the delivery and expectation means by statistical T test analysis. A positive gap score was related to service satisfaction. Results - The total population sample included 224 patients, 74 are from the heart failure clinic and 150 from the general cardiology outpatient clinic. The total average of the SERVQUAL gap questionnaire mean was positive in the heart failure clinic and negative in the general cardiology outpatient clinic and were statically different (0,03 x -0.32, P<0,001).Conclusion - We observed significant better quality health care scores of heart failure outpatients clinic in comparison of a general cardiology clinic using the SERVQUAL tool.

SERVQUAL dimensions of service quality

Domains	Clinic	N	Mean	St device	Mean diff.	P
Tangibility	GC	150	-0.15	0.33	-0.18	p≤0.001
HF	74	0.03	0.23			
Reliability	GC	150	-0.71	0.62	-0.76	p≤0.001
HF	74	0.05	0.35			
Empathy	GC	150	-0.18	0.40	-0.20	p≤0.001
HF	74	0.02	0.10			
Responsibility	GC	150	0.13	0.40	0.13	p=0.001
HF	74	0.00	0.22			
Assurance	GC	150	0.25	0.39	0.26	p≤0.001
HF	74	-0.01	0.29			
Total	GC	150	-0.32	0.30	-0.35	p≤0.001
HF	74	0.03	0.18			

GC: general cardiology clinic; HF: heart failure; Diff: difference

P2040
Consultant-led multidisciplinary community heart failure service improves the delivery of guideline directed medical therapy and reduces hospital admissions, re-admissions and length of stay.

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Introduction: Heart failure (HF) epidemic is estimated to affect 26 million people worldwide, with nearly a million patients living in the United Kingdom alone. Guideline directed medical therapy improves survival and quality of life in HF patients. Long-term adherence with medical therapy declines after discharge from hospital and under-treatment with evidence-based pharmacotherapy is an important problem in community dwelling HF patients.
Objectives: This observational study aims to assess the impact of a cardiologist led community HF service (comprising consultant, HF specialist nurses and allied health professionals) on the delivery of / adherence to first line treatments for HF patients, their unplanned hospital admission / readmission rates and length of stay.
Methods: Retrospective data analysis of 700 consecutive patients treated by our community heart failure service was included in this study. Data were collected from medical records, prescriptions, hospital episode statistics (HES) database and national audit office socio-economic database for the north-west of England.

Results: Baseline study characteristics: Mean Age (79 years +/- 8), Gender (Male =65%, Female=35%), ECG rhythm (Sinus Rhythm=65% , AF=35%), NYHA class (I -10%, II &III -88% , IV – 2%), Aetiology of HF (IHD 52%, Idiopathic cardiomyopathy 16%, Valve disease 12%, Hypertension 10%, Other 20%), Heart Rate (<80/minute -85%) and Blood Pressure (135/80 mmHg – 66%).
Of the study cohort, 85% were taking first line HF treatment as recommended by the NICE UK guidelines (beta blocker 85%, ACE inhibitors 65%, MRA 65%). This is well above the regional average (60%). Of the patients taking beta-blockers, most were on cardio-selective drugs (Bisoprolol, Nebivolol ,Carvedilol); and >50% were on the target dose. Clear explanations were documented in medical records for the patients not on a first line drug or below target dose.
For the study period (2017); HF related unplanned hospital admission rate for our local community was 310 (per 100,000 population) and re-admission rates 38 (per 100,000 population) were much lower than the northwest average 600 and 72.5 per 100,000 population, respectively. Average Length of stay for HF related hospital admission in the study population was 5.07 days (compared to regional average of 9 days).
Conclusions: Our study shows that a consultant-led community HF service significantly improves delivery of guideline directed therapy by offering expertise and skill-set required to maintain patients on appropriate dosages of first line medications required to achieve target heart rate and blood pressure; and as a result lower admission and re-admission rates. Large scale studies and national audits must include community dwelling HF patients to get a better snapshot of how this increasingly complex medical problem is managed in the real world after hospital discharge.

P2041
Self-care management intervention in heart failure

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Background In elderly heart failure (HF) patients there is little experience regarding evaluation of digital self-care management interventions. Previous digital interventions studies in HF has a mean age of 62-65 years.
Purpose: Evaluate a novel home-based self-care intervention in an elderly HF population.
Methods HF patients were enrolled at five general practitioners and two hospitals and randomized 1:1 to intervention (IG) or control group (CG). The intervention group received a tablet computer with education and symptom monitoring, wirelessly connected to a weight scale and incorporating a titration module for loop-diuretics. Baseline data was collected at randomization and the number of days lost to HF-hospitalizations was analysed using negative binomial regression. Patients will be followed up after eight months, and this is an interim analysis of data after three months.
Results: One hundred patients were randomized to IG, n=50 and CG, n=50. The groups were well balanced at randomization, except for a higher diastolic blood pressure in the CG. The mean age was 79±9, 59 % were male. Five percent were NYHA-class I, 64 % NYHA-class II and 31 % NYHA-class III. There were no significant differences in terms of pharmacological treatment, self-care behaviour or quality of life. A total of 88 HF-related in-hospital days were registered (61 days in the CG group and 27 in the IG). The unadjusted risk ratio between IG and CG was 0.44 (CI: 0.24-0.81) for HF-related in-hospital days. The log rank test for time to event was significant with p-value 0.046. There was no group difference in number of admissions.
Conclusions This interim analysis indicates a significant reduction of in-hospital days due to HF by 56 % in this elderly HF population.

P2042
OPTIMIZE Heart Failure Care Program in Mexico. Impact on early and mid term Heart Failure readmissions

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On behalf of: OPTIMIZE HEART FAILURE CARE PROGRAM

Introduction . Acute Heart Failure (AHF) is a frequent clinical condition that is related to adverse outcomes. The OPTIMIZE Heart Failure Care program focuses on the early optimization of the integral treatment of heart failure after hospitalization for AHF and during the vulnerable phase. It consider three steps: 1. Start and/or optimization of treatment before discharge, 2. Use of a check-list in the pre-discharge period as a safety barrier and 3. Patient education and follow-up.

Methods: We implement the OPTIMIZE HF program in a prospective cohort of hospitalized AHF patients without inotropic requirements. Optimized treatment was defined as the proper use of drugs recommended by current clinical practice guidelines (ACEIs/BRAs, Beta blockers, Aldosterone antagonists, Ivabradine and diuretics), use of CRT and/or ICDs in selected patients and HF education for patients, relatives and caregivers. The primary outcomes were the frequency of HF re-admissions at 30, 90 and 180 days. The results were compared with a historical cohort of 167 patients with the same characteristics.
Results: 165 patients with AHF were studied prospectively. The average age was 58+/-4 years in the prospective group and 60+/-3 years in the comparative group (p = NS), the leading HF etiology in both groups was ischemic heart disease, the mean LVEF was 29+/-5% in the prospective group and 31+/-6 % in the historical cohort (p=NS). The proportion of patients with optimized treatment was 91% in the prospective group and 63% in the comparator (p <0.05). The impact of the early optimization protocol showed a significant reduction in the readmission rate 12% vs 29 % at 30 days, 8% vs. 20% at 90 days and 4% vs. 15% at 6 months (p<0.05 in all comparisons) (Table I).
Conclusions: In this population, the OPTIMIZE HF program was effective in reducing re-admissions in the short and mid-term after an episode of AHF. It can be considered as a true window of opportunity for a group of patients during the vulnerable phase.

Characteristics and primary outcomes

	OPTIMIZE HF Care Program (n=165)	Historical cohort (n=167)	P- value
Age (years)	58+/-4	60+/-3	NS
Ischemic heart disease as primary HF etiology (%)	55	53	NS
LVEF (%)	29+/-5	31+/-6	NS
Readmission rate30 day90 days180 days	1284	292015	< 0.05 < 0.05 <0.05

P2043
Overcoming challenges in adopting guideline-based device therapy in patients with heart failure; a real-world experience

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On behalf of: Cardiology Department, Eastbourne District General Hospital
Funding Acknowledgements: No external funding

BACKGROUND: Once a disease that had a 5-year survival rate of only 25%, mortality in heart failure (HF) has reduced markedly. In the past two decades, several large clinical trials have shown an additional mortality benefit (up to 30-40%) with cardiac resynchronisation and/or defibrillator therapy (CRT-P or -D/ICDs) compared to medical therapy alone, in patients with severe left ventricular systolic dysfunction (LVSD). Current international clinical practice guidelines strongly recommend device therapy in the management of HF.
PURPOSE: Although patients may fulfil the guideline-based criteria to warrant a device, in clinical practice, patient selection for device implantation is not straightforward. A systematic approach to identify these challenges has not been previously described. Therefore, we adopted a dedicated multidisciplinary team (MDT) strategy to address these issues.
METHODS: The MDT consisted of 2 HF specialist nurses, 3 cardiology specialist consultants (devices/intervention, electrophysiology/devices and heart failure/imaging). Meetings were held each month to discuss all HF patients who were referred for a cardiac device from both outpatient and inpatient services at our district general hospital. The clinical history of each patient was discussed before device implantation or upgrade, and their imaging (e.g. cardiac MRI, echocardiograms) were also reviewed. Data were collected for 1-year (Sept 2017 – Aug 2018) and then a mixed-method (quantitative and qualitative) analysis was carried out.
RESULTS: Of the 69 patients presented in the MDT, 77% were male and their average age was 71.3±11.3 years. 30% had atrial fibrillation (AF). 71% of patients were NYHA class II or III, with 93% having at least moderate LVSD with an ejection fraction of ≤45%. 70% had either LBBB or a QRS duration of ≥150ms. 33% had pacemakers (PMs) for a bradycardia indication and 94% of these patients had at least moderate LVSD.Qualitative analysis of the MDT outcomes revealed multiple barriers for device implantation or upgrade: 1. not being on optimal disease-modifying pharmacological therapy (11 patients) 2. discrepancies in the

estimation of LV function after imaging review (9 patients) 3. recovery of LV function with medical therapy or no longer symptomatic (6 patients) 4. multiple medical comorbidities and frailty (5 patients) 5. patient choice (4 patients) 6. concomitant AV node ablation due to AF (1 patient). Only 32% of all patients referred were clinically appropriate for a new device or an upgrade from PM to CRT-P/D.
CONCLUSIONS: Our findings show that patients who are considered for cardiac device therapy should be assessed carefully. Inappropriate patient selection could potentially affect mortality, have an adverse psychosocial impact, and increase healthcare cost. We propose that a specialist device MDT, which reviews clinical cases prior to device implantation, will help to overcome these challenges.

P2044

Clinical outcomes after renal replacement therapy in heart failure patients with cardiorenal syndrome and refractory congestion: a comparison between peritoneal dialysis and hemodialysis

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Introduction: Patients with advanced heart failure (HF) frequently present worsening renal function known as cardiorenal syndrome that may participate in causing refractory congestion and repeated hospitalisations. Even though the use of renal replacement therapy (RRT) has already been described in this clinical scenario, there is no previous comparison of the outcomes between different ambulatory methods of dialysis in those patients.
Purpose: Compare the main outcomes between 2 dialysis methods, namely peritoneal dialysis (PD) and hemodialysis (HD), in patients with advanced heart failure with reduced ejection fraction (HFrEF) associated with cardiorenal syndrome and refractory congestion.
Methods: This is a retrospective study, based on the review of medical records of 22 consecutive patients with advanced HFrEF (persistent functional class IV, under optimized medical therapy) with refractory congestion and repeated hospitalisation within 6-months or single hospitalisation with refractory congestive status, associated with cardiorenal syndrome, in which RRT was indicated (PD or HD), aiming at clinical compensation and decrease in subsequent hospitalisation rate. Patients with prior chronic renal disease progressing to heart failure or systemic diseases leading to both cardiac and renal failure (type 5 cardio-renal syndrome) were excluded.
Results: Despite all patients were initially considered for PD, only 11 patients were effectively submitted to PD at long term (n=11; 65±9-year-old, 54% male, left ventricular ejection fraction=27±14%) and 11 patients eventually underwent HD (67±10-year-old, 73% male, left ventricular ejection fraction=25±6%). The reasons leading to indication of HD were: urgent clinical situation (n=4), lack of social conditions for installation of PD (n=1), contraindication of PD by nephrologist (n=1), patient refusal of PD (n=2), patient non-adaptation to the PD method (n=1), ineffective PD (n=1) and repeated peritonitis episodes (n=1). We observed a significant reduction in the number of heart failure hospitalisations between the 12-months previous to the RRT (total number=32; mean hospitalisations per patient=1.38 [range = 6.0 - 0.0]) and the 12-months follow-up after the start of RRT (total number=5; mean hospitalisations per patient=0.09 [range = 1.0 - 0.0]), p = 0.0024. At 12-months after start of the RRT a higher proportion of patients were alive in the PD group (n=9; 82%) as compared to the HD group (n=3; 27%), p = 0.03. There were only 4 hospitalisations for peritonitis in the peritoneal dialysis group within 12-months of RTT.
Conclusions: The use of RRT in patients with HFrEF and refractory congestion due to cardiorenal syndrome is associated to reduction of HF hospitalisations. PD seems to be the preferential dialysis method, as it presents a higher survival rate as compared to HD. Larger studies are needed to confirm the results of this small retrospective study.

P2045

Establishing the first pharmacist-led heart failure medication optimization clinic in the middle east gulf region

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Introduction: Heart failure (HF) 30-day readmission rate exceeds 21% and is the highest among any chronic disease state. Medication errors and indiscretions have been found to be prevalent post discharge. It has also been reported that only 1% of eligible HF patients are on target doses of all evidence based medications. Innovative strategies to reduce HF readmissions and improve utilization of guideline-directed medical therapies (GDMT) are needed. We seek to describe a per protocol weekly HF Pharmacotherapy optimization clinic established at our institution in February 2017 as part of a collaborative practice agreement and its impact on HF patients. Methods: Selected HF patients could be referred from the inpatient or outpatient setting by the HF physician. A clinic visit consists of a nursing encounter for volume status assessment followed by a cardiology pharmacotherapy specialist to assess self-care and adherence and to perform medication titration or adjustment. Patients could be scheduled for further pharmacotherapy clinics or referred back to the HF physician at the discretion of the pharmacotherapy specialist. Follow-up period was defined as the time between the first visit and up to 30 days after last pharmacotherapy visit. All assessments, education and interventions were documented using a standard HF pharmacotherapy optimization clinic template. Results: A total of 63 patients and 133 visits were completed between February 2017 and June 2018 for a mean follow-up period of 55.9 ± 42.7 days with about half of them (52.4%) seen for only one visit. Most patients were referred from the outpatient setting (65.1%), had HF reduced ejection fraction (HFrEF) (84.1%) with New York heart association (NYHA) class II symptoms (72.6%), and were admitted with heart failure within the last 3 months (55.6%). The most common reason for referral was medication titration (57.1%) followed by transition of care and medication titration (35%). At the first visit, many patients had inadequate weight monitoring (63.3%) and most (75.4%) had at least one deficiency in either self-care or adherence to salt, fluid, weight, symptom recognition or medications. A total of 219 interventions were documented for an average of 3.5 interventions per patient and the vast majority (96.8%) had at least one intervention. The most common intervention was teaching and correction of an inadequacy (46 patients) followed by renin angiotensin aldosterone system (RAAS) medication titration (48 titrations). More patients were at target doses of GDMT at the last visit (figure 1). A total of 6 patients (9.5%) had a HF related admission during follow-up period, 5 patients (7.9%) within 30 days of first visit, and 12 patients (19%) within 6 months of first visit. Conclusion: Pharmacist-led heart failure clinic establishment corrects noncompliance and optimizes medication therapy. More data regarding cost is necessary to quantify the value and impact of these clinics.

Figure 1: Percentage of patients on target doses of GDMT (n=63)

Figure 1

P2046

Introduction of a multidisciplinary specialist heart failure team prevented 2 in 3 heart failure readmissions

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Background and objectives:Over half a million people are living in the UK with heart failure (HF), costing 2% of the National Health Service budget, of which 60-70% is incurred from hospitalisation. Management of patients within a dedicated HF unit improves mortality and reduces readmission rates. Our objective was to assess HF length of stay and readmission rates for patients admitted to a dedicated HF unit when compared to standard medical care within a tertiary centre.
Methods: Patients admitted with HF over a single year (2015-16) at a multicentre tertiary NHS Trust were included in this retrospective cohort study. Heart failure length of stay and readmission rates (within 30 days) for patients admitted under the direct care of an inpatient specialist heart failure service were compared to HF admissions under a general medical team.
Results: A total of 479 patients were admitted with HF over 12 months. Of these, 32% were to a dedicated HF unit. Mean age of those admitted to the unit was 69.4yrs compared to 77yrs when admitted under the general medical team (p<0.05).

There was no significant difference in initial length of stay between those admitted under the specialist HF team and those under the general medical team during the initial admission. However, incidence of readmission was significantly less when the index admission was under the specialist HF team (6.5% vs 17.5%, p<0.05). Patients readmitted under the care of a specialist HF team had a numerically shorter length of stay than those admitted under the general medical team (6.3 Vs 9 days respectively).
Conclusion: Direct admission under a HF specialist team prevented 2 in 3 readmissions at 30 days and reduced by 1/3 the length of stay during readmissions. Reasons postulated are earlier pharmacological intervention, faster medication up-titration, discharge on optimal doses, more intensive diuresis during admission and access to advice and guidance to avoid admission. Using an average HF admission cost of £3796, expansion of our service would be expected to save ≃£136656 over one year because of ≃36 fewer readmissions. In addition to the improvement in morbidity and mortality in patients with HF, our results suggest significant financial gains could be made from ensuring patients are admitted under a HF specialist team.

P2047
Current status of palliative care for heart failure; from the clinical experience of a general hospital in Japan

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Background: Palliative care (PC) for advanced heart failure (HF) was added as medical treatment fee from April 2018 in Japan, but there are some gap in clinical needs and the criteria to taking cost of PC-addition of medical insurance in Japan. We assessed current status of PC for HF and contrasted with the criteria for PC-addition of medical insurance in Japan.
Methods: Between April 2015 and March 2018, there were 894 patients consulted to PC team for any disease in our hospital and 499 patients who admitted to our hospital for HF. We extracted 21 patients with advanced HF who was consulted to PC team, and we examined patients characteristics to contrast with the criteria for PC-addition of medical insurance in Japan; 1) optimal medical therapy, 2) NYHA 4, 3) more than two times of hospitalization for HF within 1 year, 4) left ventricular ejection fraction (LVEF) ≤ 20%, 5) end-stage.
Results: Their mean age was 78.4-years-old and 13 patients (61.9%) were male. All of them were optimally treated but remained NYHA 4, and 16 patients (76.2%) were first-time hospitalization for HF within 1 year. Their median LVEF was 50.7% and only 3 patients (14.3%) were below LVEF 20%. 16 patients (76.2%) were considered as end-stage but the other 5 were not. As a result of those, only 4 patients (19%) were met to the criteria for PC-addition and the other 17 were not met. As a content of PC, 19 patients (90%) underwent symptomatic relief by opioids, and 8 of them withdrew from opioids.
Conclusions: Our data demonstrates that there is obvious gap between clinical needs of PC for HF and the criteria for PC-addition of medical insurance in Japan. We should take appropriate care of patients without being bound by the criteria for PC-addition of medical insurance in Japan.

P2048
An evaluation of heart failure register reviews and virtual clinics 2016-2018

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Background The Integrated Heart Failure Service provides specialist advice and support to local general practices to improve the management of heart failure in primary care.
One way this is delivered is through an annual review of all patients on the general practice heart failure register and a subsequent discussion of the patients as part of a multi-disciplinary team. Virtual clinics are a forum to allow discussion of known heart failure patients, but also those that may be un-diagnosed and need treatment optimisation.
Objectives To review the virtual clinics undertaken in the last two years, to:
· Ensure all patients on the general practice heart failure register have a confirmed diagnosis of heart failure and are coded correctly as having heart failure with a reduced ejection fraction (HFrEF) or heart failure with preserved ejection fraction (HFpEF)
· Ensure all patients on the heart failure register with HFrEF are treated with the maximum tolerated dose or target dose of an ACE inhibitor (or licensed Angiotensin-II receptor blocker) and a beta-blocker, unless contraindicated.
Method Retrospective review of all heart failure virtual clinics and register reviews conducted between April 2016 and March 2018. All data were collected and analysed using Excel.
Results In 2016-17 there were 7 register reviews and 35 virtual clinics, attended by pharmacists, nurses and consultants, and 605 patients were discussed. In 2017-18 this increased to 815 and there were 22 virtual clinics. All 22 practices had completed a register review prior to the virtual clinic.
Results are shown in Table 1 - Outcomes
Conclusions There is a clear need for continued support in primary care as a large number of patients are not coded correctly, nor are on optimal therapy for HFrEF. The increase in interventions in 2017-18 shows that completion of a register review ahead of the virtual clinic allows a greater number of patients to be discussed. This in turn leads to more coding amendments, which helps ensure patients are treated correctly, but also has a financial implication for the general practice.
Further work needs to be completed looking at the long-term outcomes of patients following virtual clinic discussion.

Outcomes from virtual clinics 2106-18		
	Year2016-17	Year2017-18
Total number of patients intervened on	409	609
Number of patients with HFrEF	440	401
Number with HFrEF on optimal treatment prior to review	85	156
Number of patients requiring a coding change	218	519
Number of patients with unclear diagnosis requiring confirmation	45	284

Table 1

P2049
Non-invasive Venous Waveform Analysis (NIVA) estimates static volume

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Background/Introduction: Volume overload in patients with congestive heart failure (CHF) leads to symptomatic edema and pulmonary congestion, resulting in decreased quality of life and frequent hospital admissions. Clinical signs of volume overload including weight gain, edema grade, and shortness of breath occur late and are not reliable indicators of volume overload. Medical devices for outpatient volume assessment to prevent readmission includes impedance devices such as ZOE (NonInvasive Medical Technologies) but have failed to gain widespread use. Non-Invasive Venous waveform Analysis (NIVA) is a novel technology that captures the peripheral venous waveform with a wristband containing a piezoelectric sensor, allowing analysis of waveform changes that occur at different volume states.
Purpose: This is a proof-of-concept study demonstrating the use of NIVA for estimation of static volume status by correlation with an existing approved non-invasive device, the ZOE impedance monitor and with pulmonary capillary wedge pressure (PCWP), the current gold standard.
Methods: The NIVA device was attached to the volar aspect of the wrist overlying the venous plexus and signals obtained for at least three minutes. The power magnitude of the fundamental pulse frequency (f0) and weighted magnitudes of harmonics of the pulse frequency (f1-7) were used to generate a preliminary proprietary algorithm to derive a NIVA Value. The ZOE device was applied as per manufacturer's instructions and the average of three consecutive measurements used for analysis. PCWP was performed at end expiration by an experienced interventional cardiologist. All measurements were obtained within one hour of right heart catheterization.
Results: With increased fluid, thoracic impedance decreases hence ZOE measurements correlate inversely with volume. NIVA Values correlated inversely with ZOE measurements (r= -0.80, n=29, p < 0.05). PCWP ranged from 4 to 27 mmHg, with a mean of 14.4 mmHg. NIVA correlated significantly with PCWP (r=0.75, n=73, p<0.05).
Conclusions: NIVA correlates with existing thoracic impedance technology (ZOE) and with the gold standard PCWP. NIVA represents a new technology that utilizes a novel physiologic signal, the peripheral venous waveform, to provide an estimation of static volume status for guidance of outpatient treatment in patients with CHF.

P2050
Vaccination uptake in HF patients; identifying a critical gap of care

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Background Influenza vaccine (IV) & Pneumococcal vaccine(PV) are recommended by multiple heart failure (HF) guidelines. However, despite its importance, poor uptake among HF population has been reported.

In a recent study of precipitants of HF hospitalisation, Lower Respiratory tract infection (LRTI)was identified as a single most common cause of admission in 35 % (n= 47) cases, hence, we sought to investigate the uptake of influenza and pneumococcal vaccines and assess the relationship between the adherence to vaccine and subsequent LRTI-precipitated hospital admission.
Methods Vaccination history was obtained at time of hospitalization.
IV uptake was defined as having the vaccine administered in the previous year,
PV uptake was defined as having the vaccine administered at all in the past
The relationship between Vaccination uptake & HF phenotype (using LVEF 50% as a cutoff) was assessed, along with the relationship between vaccination uptake, LRTI & de novo diagnosis v/s known HF presentation.
Chi-square & Fisher exact test were carried out , with p value<0.05 considered significant
Results Of the total number of patients analysed (n=127 for IV & n=122 for PV), 67% (n=85 (Denovo HF =41, Known HF=44)) were up to date with IV, and 29% (n=35(Denovo HF =17, Known HF=18)) were up to date with PV.
Statistical Analysis revealed patients HFpEF phenotype were more likely to be up to date with IV (p=0.009) & PV (p=0.033)
A statistically significant relationship was observed between Known HF patients who had received the IV & LRTI as a precipitant (p=0.038)
No statistically significant relationship was observed between PV & any of the variables of interest
Conclusion Our findings represent a poor uptake, especially of pneumococcal vaccines in Irish HF population, which is a comparable finding to the reported literature, representing a critical gap of care in HF patients that should be addressed on an urgent basis.
HFpEF phenotype was observed more likely to be up to date with vaccinations which could be reflective of advanced age & higher comorbidity burden of HFpEF population
We observed that LRTI was less likely to precipitate hospitalization in known HF patients, who were up to date with IV compared to patients who were up to date with IV and present as a de novo diagnosis of HF

P2051

Impact of Quality Improvement Strategies on the performance of Specialised Heart Failure Nurses regarding patient managment

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Background: It is important that patients are provided with adequate information about their condition, investigations and treatments. Polypharmacy is inherent in the medical management of heart failure patients. Good communication therefore essential towards patient satisfaction and enhancing patient understanding leading to a better compliance with treatment.
Purpose: Evaluate the use of a pre discharge questionnaire and checklist in enhancing patient understanding of their condition.
Method: The study was conducted using a questionnaire and checklist in association with Specialised heart failure nurses in patient diagnosed with heart failure, to assess their understanding of their diagnosis, investigations and medications including changes made and side effects and OP Follow up plans in the community.
Questionnaire was repeated in the community within 1-3weeks to establish wether the patients readily accepts and understands their condition and assess their compliance to the medications and facility offered to them in community.
(See Fig1&2 - Questionnaire and checklist used)
Results: The study included 50 patients, 37 new LVSD mean age of 60yrs and 13 were known to HF team, with LVSD mean age fo 60yrs post discharge from cardiology ward.
(See TABLE1 for results)
All these patients were on 5 or more medications at the point of discharge (polypharmacy)
Conclusion: 1. Heart Failure patients are at risk of being discharged with insufficient understanding of their in patient stay, medication changes and followup plans.
2. The utilisation of a simple checklist is highly effective in enhancing patient awareness of their management, medication changes and followup plans.

P2052

Impact of a clinical pharmacy service on heart failure guideline-led prescribing at discharge in an Egyptian critical care unit

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Introduction: Guideline-led prescribing improves outcomes in heart failure (HF) patients, however, discharge prescriptions may not adhere to the recommendations of the HF guidelines. The clinical pharmacist is uniquely positioned to address guideline-led prescribing in order to optimise HF care and improve patient outcomes.
Purpose: To assess the impact of the introduction of a clinical pharmacy service on guideline-led prescribing to HF patients at discharge from a Critical Care Unit (CCU) in Egypt.
Methods: This was a retrospective observational study of HF patients discharged from CCU from 1st January 2013 to 31st December 2017. The European Society of Cardiology Guidelines for the Diagnosis and Treatment of Acute and Chronic Heart Failure 2012 were the reference guidelines. Prescribing was assessed using Guideline Adherence Index (GAI-3), that considers prescribing of renin-angiotensin system inhibitors (RASI); beta-blockers (BB) and mineralocorticoid receptor antagonists (MRA). The adjusted GAI-3 considered patient contraindications to these medicines. The GAI-3 target dose considered the prescription of 50% or more of the recommended target dose of each medicine. High-GAI based management was defined as prescription of ≥2 disease-modifying therapies. A clinical pharmacy service was introduced to the CCU in January 2016. Multivariable logistic regression analysis was performed to identify associates of High-GAI prescribing.
Results: The study identified 284 HF patients, mean age 66.7±11.5 years and 53.2% male, who were discharged from CCU during the study period. Loop diuretic was the most frequently prescribed HF medication (85.2%). Prescription rates for GAI-3 agents were RASI 51.4%; BB 29.9%; and MRA 54.9%. Population GAI-3 was 45.5%, however, when adjusted to patients' contraindications, this increased to 51.0%. GAI-3 target dose was 24.3%. High GAI-3 was prescribed to 136 patients (47.9%). Compared to those with Low GAI-3, these patients were younger (62.6 vs. 70.5 years); less affected by kidney disease (22.1% vs. 33.8%); and had fewer comorbidities (4.9 vs. 5.6), (all p<0.05). Post-introduction of the clinical pharmacy service, BB prescription increased from 24.1% to 38.6% (p<0.001) while digoxin prescription decreased (34.7% vs. 23.7%, p=0.049). Associates of High-GAI were age (Odds Ratio, OR=0.96, 95% Confidence Interval, CI 0.92-0.98), serum creatinine >2.5 mg/dl (OR=0.31, 95% CI 0.09-0.98) and reduced ejection fraction (OR=5.50, 95% CI 2.66-11.55).
Conclusion: This study is the first to consider HF guideline-led prescribing and the role of clinical pharmacy in an Egyptian setting. It highlights inconsistencies between guideline recommendations and current practice. Clinical pharmacy services in Egypt are in their infancy and their impact may increase with time.

P2053

Multidisciplinary care for end-stage HF. How to improve care?

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Palliative care in advanced heart failure (HF) patients is not standardized. Several trials have demonstrated the usefulness of starting palliative care along with cardiac treatment in the final stages of the disease
Purpose: Assess the feasibility of a multidisciplinary team in patients with advanced HF.
Material and methods: Observational, prospective, single-center study performed in outpatients with advanced HF excluded for heart transplantation or LVAD. The multidisciplinary team includes a cardiologist and nurse specialized in advanced HF, a palliative care physician, case manager nurses and primary care physicians.
Patients were identified as palliative according to the clinical clues reported in 2013 ACC/AHA guidelines. All patients and their relatives accepted to be included in the program.We evaluated the level of knowledge of the end-stage phase of the disease, the main non-cardiovascular symptoms and treatments, number of hospital admissions, time to death and place of death.Results: From October 2016 to March 2018, 23 patients were included. Age 77 ± 5 years, 92% men. Most of them had high comorbidity (Barthel 78.6 ± 15) and some degree of dependency (Charlson 6 ± 1.1). Ten patients had HFpEF.
All patients knew the severity of their illness and 65% considered the possibility of dying soon.More than 70% of the patients had non cardiovascular symptoms. The main symptoms and palliative treatments are shown in Figure 1 and 2.During a mean follow-up of 4±2 months, 7 patients (30%) were admitted (4 patients for cardiovascular (CV) problems and 3 for non-cardiovascular) and 16 patients died (14 CV deaths and 2 non-CV). Of those, twelve patients (75%) died at home or in long-stay centers.Conclusion: In our experience the multidisciplinary care for end-stage HF was feasible and well accepted for the patients and their relatives. Most of them knew the severity of the disease and the poor prognosis.The majority of patients received treatments for non-cardiovascular symptoms, being the multidisciplinary palliative care useful for the management of these patients.A

high percentage of patients died outside the hospital. The high short-term mortality probably suggests that palliative care should be considered earlier in end-stage HF.

Chronic Heart Failure - Clinical

P2054

Chronic heart failure in patients with systemic amyloidosis

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Introduction . Amyloidosis is a group of diseases with amyloid deposition in various organs, including the heart. The aim of our work was to analysis features of chronic heart failure (CHF) in pts with amyloidosis. Material and methods. We performed a retrospective analysis of the medical records of 36 pts (38.9% men, 61.1% women) with systemic amyloidosis, confirmed by a morphological study, including Congo red color and polarized light (in 63.9% – posthumously, in 36.1% – intravital). The median (interquartile range) of age was 72.5(65.5–80.5)years. Secondary amyloidosis occurred in 8.3% due to rheumatoid arthritis, ankylosing spondylitis, multiple malignant metachronous neoplasms. Results. CHF was in 72.2% of pts: II NYHA class - in 19.2%, III - in 65.4%, IV - in 15.4%. 52.8% of pts had coronary artery disease in diagnosis, 80.6% - arterial hypertension, 33.3% - myocardial infarction in anamnesis. CHF symptoms were dyspnea in 65.4%, weakness - in 65.4%, edema - in 65.4%, palpitations - in 3.8%. ECHO was performed in 44.4% of pts. The left ventricular ejection fraction (LVEF, Simpson) was 55(48-56)%. LVEF<40% was detected in 12.5%, 40-49% - in 12.5%, >=50% - in 75% of pts. Left ventricular hypertrophy (LVH) was present in 93.8% of pts, 80% of them had an interventricular septum/posterior LV wall thickness >=14 mm. 81.3% of pts had mitral, 37.5% – aortic, 12.5% – pulmonary, 75% – tricuspid regurgitation. 25% of pts showed signs of "granular sparkling" myocardium appearance, 13.8% – low ECG voltage, 12.5% – regional LV wall motion abnormalities, 68.8% - pulmonary hypertension, 31.2% – LV diastolic dysfunction (60% – abnormal relaxation pattern, 20% – pseudonormalization, 20% – restriction), 18.8% – normal diastolic function (DF); in 50% LVDF was not assessed. Atrial fibrillation (AF) was detected in 36.1% of pts: in 16.7% – permanent, in 2.7% – persistent, in 16.7% – paroxysmal form. Conduction disorders were presented in 25% of pts: atrioventricular (AV) block – in 11.1%, right bundle branch block – in 16.7%, left bundle branch block – in 16.7%. A pacemaker was implanted in 13.9%. Chronic kidney disease (CKD) was presented in 88.9% of pts: stage 2 – in 14.3%, 3a – in 7.1%, 3b – in 10.7%, 4 – in 32.1%, 5 – in 32.1%. The glomerular filtration rate (GFR, CKD-EPI) was 24.75 (13.4-45.8) ml/min/1.73 m2. Proteinuria was detected in 84.6% of pts, its level was 1.1 (0.5-3.0) g/l, >3g/l - in 30.7%. Leukocyturia was in 59.1% of pts. According to the kidney ultrasound 15.4% of pts had a decreased kidneys size, 7.7% – an increased kidneys size. Conclusions. CHF was presented in 72.2% of patients with systemic amyloidosis, with preserved LVEF in 75%, NYHA class III - in 65.4%, with LVH – in 93.8%, with AF – in 36%, with conduction disorders - in 25%. Patients with CHF of unclear etiology, especially in the presence of preserved LVEF, LVH, CKD 4-5 stages and nephrotic range albuminuria, should be screened for amyloidosis.

P2055

Benefit of buspirone on chemoreflex and central apneas in heart failure

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Background. Increased chemosensitivity to carbon dioxide (CO2) is an important trigger of central apneas in heart failure (HF), with negative impact on outcome. We hypothesized that buspirone, a 5HT1A receptor agonist that inhibits serotonergic chemoreceptor neuron firing in animals, can decrease CO2 chemosensitivity, thus preventing CA in patients with HF.

Methods. Sixteen patients with systolic HF (age 71.3±5.8 years, left ventricular ejection fraction 29.8±7.8%) and moderate-severe central apneas (nighttime apnea/hypopnea index AHI≥15 events/hour) underwent a double-blind, placebo-controlled, cross-over, randomized study of oral buspirone administration (45 mg/day for 1 week).

Results. Buspirone reduced CO2 chemosensitivity compared to placebo (1.2 IR [1.1-1.5] vs. 2.0 [1.6-2.2] L/min/mmHg, p=0.008). Furthermore, buspirone improved the AHI at nighttime (16.5 [8.5-24.7] vs. 27.5 [23.0-37.3] events/hour, p=0.002), and daytime (8.0 [2.3-11.5] vs. 12.5 [6.3-18.8] events/hour, p=0.006), the central apnea index at nighttime (4.0 [1.0-19.0] vs. 12.5 [8.3-27.3] events/hour, p=0.01) and daytime (1.0 [0.0-3.0] vs. 4.0 [1.3-6.0] events/hour, p=0.009) and the oxygen desaturation index at nighttime (4.7 [1.0-11.0] vs. 20.0 [8.7-26.5] events/hour, p=0.004) and daytime (0.2 [0.1-0.7] vs. 1.2 [0.3-4.8] events/hour, p=0.005), showing at the same time a good safety profile.

Conclusions. Buspirone reduces CO2 chemosensitivity and improves central apneas both during the day and the night in patients with systolic HF.

P2056

Efficacy and safety of carvedilol and losartan with various combinations of bronchodilators in patients with chronic heart failure due to coronary artery disease combined with COPD

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Purpose: to compare clinical efficacy and safety of carvedilol and losartan with various combinations of bronchodilators in complex therapy in patient with CHF due to CAD combined with COPD.

Methods: after enrollment in this trial 98 patients (70 men and 28 women), aged 64.1 ± 4.8 years, with CHF classes II to III (New York Heart Association) combined with moderate to severe COPD (GOLD-2015) with initial ejection fraction of the left ventricle (LVEF) less than 45%, were randomized into three groups – tiotropium (18 μg daily, n=36), indacaterol (150 μg daily, n=32) and tiotropium/indacaterol group (18/150 μg daily, n=30). Patients of all groups received the complex CHF treatment comprising carvedilol, losartan, diuretics, nitrates, cardiac glycosides (if necessary) and basic COPD therapy (inhalation corticosteroids). Echocardiography, exercise tolerance, 24-hour electrocardiography, respiratory function test were assessed at baseline and after 6 months of treatment. The quality of life was evaluated by MYHFQ, SGRQ and mMRC.

Results: after 6 months of therapy the improvement of clinical condition and quality of life were marked in all groups. In 1st, 2nd and 3rd group LVEF was increased by 20.9%, 18.3% and 22.5%, pulmonary hypertension decreased by 21.2%, 22.8% and 26.7%, episodes of silent myocardial ischemia decreased by 52.3%, 47.6% and 52.4%, respectively. Towards the end of the observation period, in all groups there was a confident and authentic increase of FEV1 witch made 10.4%, 7.8%, and 11.9% accordingly. Patients showed statistically significant and clinically meaningful reduction of SGRQ, MYHFQ scores and MMRC dyspnea grade (see table 1). All treatment regimens were well tolerated.

Conclusions: the carvedilol and losartan with tiotropium and/or indacaterol administration in patients with CHF combined with COPD raises efficiency of treatment, improves quality of life, basic parameters of central hemodinamics and pulmonary function. Efficacy of long-acting inhaled anticholinergic agent (tiotropium) and long-acting β-agonist (indacaterol) in patient with CHF due to CAD combined with COPD are similar. Combination of these drugs significantly enhances the positive effects of the therapy.

Dynamics of clinical parameters (,%)

	Group 1tiotropium (n=36)	Group2 indacaterol (n=32)	Group 3tiotropium +indacaterol (n=30)
CHF class (NYHA)	-17,2*	-16,1*	-20,1*
mMRC	-20,1*	-23,2*	-27,5*
6 minute walk test	+18,2*	+21,4*	+24,4**
MLHFQ	-27*	-25*	-30,2*
SGRQ	-15,4*	-18,6*	-24,4*
-symptoms	-12,8*	-10,6	-14,1*
-activities-impact	-22,5*	-21,4*	-26,4**
	-9,2	-8,3	-13,7*

* - p<0,05, ** - p<0,01 compared to baseline

P2057

Defining iron deficiency in acute heart failure: preliminary results

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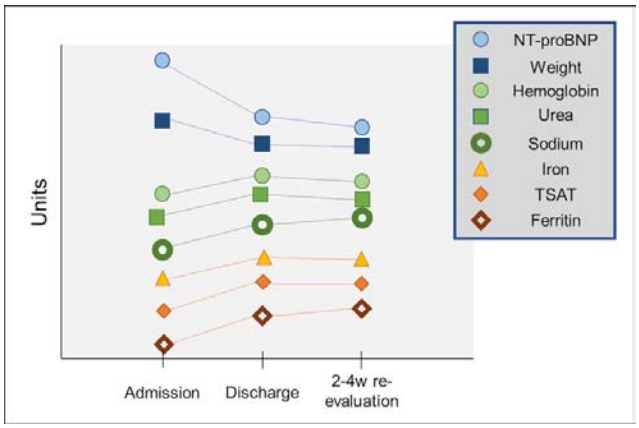
Background: Iron Deficiency (ID) is defined in chronic Heart Failure (HF) as absolute (ferritin <100μg/L) or functional [ferritin 100-300μg/L and transferrin saturation

(TSAT) <20%]. In symptomatic chronic HF patients with ID and reduced left ventricular ejection fraction (LVEF), intravenous (IV) iron improves symptoms and quality of life and may reduce hospitalizations. However, these results may not be extrapolated to acute decompensated HF, as the definition is based on markers strongly influenced by inflammation and potentially by plasma volume status.
Purpose: The main goals of this study are to assess the variation of iron status between chronic HF and acute decompensated HF and determine whether current ID definition is adequate to identify patients for correction at discharge.
Methods: Prospective multicenter study of patients aged ≥18 years with "wet and warm" decompensated HF, as per European Society of Cardiology guidelines. The main exclusion criteria were recent iron or erythropoietin intake, increased inflammation (i.e., C-reactive protein >5mg/dL or infection) and significant hemorrhage. Iron status and clinical signs of congestion were assessed at enrollment, discharge (euvolemia) and 2-4 weeks after discharge (reevaluation). 3-month preliminary results are here reported.
Results: A total of 32 patients were included. Mean age was 73.3 ± 13.3 years, most were male (53.1%) with ischemic (34.4%) or hypertensive (37.5%) HF. Mean LVEF was 43.3 ± 16.5%. ID significantly decreased from enrollment to discharge (68.8% vs 34.4%, p=0.039) but not from discharge to reevaluation (34.4% vs 28.1%, p=1.000). Ferritin, TSAT and serum iron levels had a significant incrementfrom enrollment to discharge (p=0.011; p=0.005; p=0.002, respectively), as did sodium, urea and hemoglobin (p=0.013, p=0.05, p=0.02),stabilizing2-4 weeks later (all p≥0.05) (Figure 1). Additionally, weight and NT-proBNP had a significant decreasefrom enrollment to discharge (p=0.001 and p<0.0001, respectively), while remainingstable from discharge to reevaluation (all p≥0.05) (Figure 1).
Conclusions: Iron status in HF patients is strongly influenced by congestion. ID prevalence has a tendency to be overestimated in acute decompensated HF. Current definition appears to be appropriate with euvolemia, thus implying that ID identification and ensuing correction could be adequate at discharge. These preliminary results may be further strengthened with increasing enrollment.



Iron and congestion status evolution

P2058

Iron status and skeletal muscle fatigability in men with heart failure with reduced ejection fraction

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INTRODUCTION: Skeletal and respiratory myopathy constitutes an important pathophysiological feature of heart failure. The aetiology of skeletal muscle dysfunction in these patients is complex and multifactorial, with several contributing and overlapping pathomechanisms.
PURPOSE: We investigated the hypothesis of whether iron deficiency is associated with decreased skeletal muscle performance in men with heart failure with reduced ejection fraction (HFrEF).
METHODS: We comprehensively examined 31 men with stable HFrEF (age: 59±12 years; left ventricular ejection fraction [LVEF]: 28±7%; NYHA class I/II/III: 23/45/32%; ischaemic aetiology: 42%). We analyzed clinical characteristics, iron status, body composition, and skeletal muscle performance regarding forearm flexors compartment. We developed handgrip exercise protocol with simultaneous non-invasive surface electromyography (sEMG) in 3 muscle regions within the forearm: flexor carpi radialis (RAD) and ulnaris (ULN), and brachioradialis muscle (BRA). In brief, patients were asked to rhythmically handgrip the electronic dynamometer for 300 seconds at 50% of predetermined maximal voluntary contraction (MVC) (150 squeezes). Before and after exercise we compared muscle performance index (MPI), i.e. MVC strength (N) divided by processed sEMG signal amplitude (higher MPI = better muscle function). Additionally, during 10-second isometric contraction at 50% of MVC we measured a decrease in sEMG signal frequency (FREQ) and increase in amplitude (AMPL) (both reflecting muscle fatigability) between the first and the last second. Iron deficiency was defined as ferritin <100 ng/mL or ferritin 100-299 ng/mL with transferrin saturation (TSAT) <20%.
RESULTS: In examined men with HFrEF mean serum ferritin was 190±150 ng/mL, TSAT 30±2%, and haemoglobin concentration (Hb) 15.0±1.3 g/dL. Patients with (42%) and without ID had similar decrease in MPI RAD, MPI ULN, and MPI BRA during exercise (all p>0.05). Increase in AMPL RAD correlated with LVEF (r=-0.39, p=0.03), Hb (r=-0.50, p=0.004), red blood cells (r=-0.39, p=0.03), haematocrit (r=-0.51, p=0.003), and TSAT (r=-0.39, p=0.03). Decrease in FREQ RAD correlated with serum ferritin (r=-0.36, p=0.049), and there was a trend towards greater decrease in patients with higher percentage of body fat (r=0.31, p=0.09) and ischaemic vs. non-ischaemic HFrEF (r=0.32, p=0.08). Decrease in FREQ ULN was related to ischaemic aetiology (r=0.43, p=0.02), and there was a trend towards greater decrease in FREQ ULN in patients with higher percentage of body fat (r=0.33, p=0.07) and with lower serum ferritin (r=-0.31, p=0.09). Importantly, in men with HFrEF the fatigability of RAD region during isometric exercise (FREQ RAD) was related to inspiratory muscle strength (maximal inspiratory pressure at mouth) (r=-0.40, p=0.04).
CONCLUSION: These preliminary results suggest that iron deficiency can contribute to increased fatigability of skeletal muscles in men with HFrEF.

P2059

Empagliflozin:effects on the heart and vessels

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Background: In the EMPA-REG Outcome trial, empagliflozin (EMPA) reduced the 3P-MACE (CV death, non-fatal MI or non-fatal stroke) and hospitalizations for heart failure. Cardiac evaluation was not performed, so the underlying mechanisms for these positive results are not known.
Aim: To analyze the impact of EMPA on cardiac and vascular function in patients with Type 2 diabetes mellitus (T2DM).
Methods: We prospectively included patients with T2DM before starting medication with EMPA between June 2017 and May 2018. Other Inclusion criteria were stable anti-diabetic and cardiovascular therapy in the last 3 months, eGRF≥60 ml/min/m2; exclusion criteria were acute coronary syndrome, diagnosis of heart failure or sepsis in the last 6 months. Patients had a visit before and 6 months after starting EMPA, and anthropometric measures, blood analysis, Echocardiogram, and measure of Pulse Wave Velocity (PWV) were performed. Baseline and follow-up data were compared using paired sample t-test.
Results: 38 patients were evaluated, only 23 completed follow-up. Mean follow-up length was 7 months. Mean age 65±7 (47-80) years, 70% males. At baseline, BMI was 31.4±±4.3 Kg/m2, hemoglobin was 14.0±1.2 gr/dL, and 59% of patients had hgbA1c= 7%. Only 8% were treated for cardiac disease.
At baseline, 52% pts had left atrium (LA) area > 20 cm2 (-21.6 ± 3.8 cm2), 57% had left atrium volume index (LAVI) >34 ml/m2 (35.0 ± 9.7 mL/m2), E/e´ was >8 in 71%. Left ventricular mass index (LVMI) was 108.2 gr/m2 in men and 111.6 gr/m2 in women. GLS was <-20 in 85% of patients (mean value -17.3 ± 3.4). No other echocardiographic abnormalities were found.
At the end of follow-up, BMI decreased (31.4 vs 30.4 Kg/m2; p=0.04) and hemoglobin values increased (14.0 vs 14.8 gr/dL, p<0.001).
There was a significant reduction in LA area (21.6 to 20.3 cm2, p=0.036), LAVI (35.0 to 31.7mL/m2 p=0.044) and also in right atrial volume index (21.0 to 18.6 mL/m2, p=0.048). E/e´ decreased (12.1 vs 11.0; p=0.029), but only in those with E/e´ = 8 at baseline.
Additionally PWV showed a significantly reduction – from 9.5 to 8.0 m/s (p=0.006).
Conclusion: In most of our DM patients, Echocardiographic evaluation showed diastolic dysfunction, and abnormal left ventricular Global Longitudinal Strain value. Treatment with EMPA decreased atrial volume, suggesting ventricular unloading. PWV, an important metric of vascular health, was also significantly improved.

P2060

Evaluation of kidney function impairment in patients with chronic heart failure and preserved ejection fraction depending on cardiac rhythm

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Aim: to evaluate kidney functional status in patients with chronic heart failure (CHF) and preserved ejection fraction of left ventricle (LV EF) depending on cardiac rhythm.
Methods and materials: 60 patients with CHF and preserved LV EF were included. Average age was 67.2±10.9 years. Diagnosis of CHF was confirmed by presence of clinical symptoms and signs and increased level of N-terminal natriuretic peptide NT-proBNP≥125 pg/mL. LV EF was considered as preserved when ≥50%. Additionally, soluble stimulating growth factor expressed by gene 2 (sST2) had been used to confirm CHF and to evaluate its severity. Serum levels of creatinine and cystatin C were measured, as well as glomerular filtration rate (eGFR) using CKD-EPI based on both creatinine and cystatin C were made to evaluate renal filtration function. Neutrophil gelatinase-associated lipocalin (NGAL) was used to detect early tubular kidney damage. Depending on the heart rhythm, the patients were divided into 2 groups. The first group included 30 patients with persistent atrial fibrillation (AF), the rest 30 patients with sinus rhythm.
Results: the groups were matched by sex, age, comorbidity, therapy (except for anticoagulants and antiarrhythmic agents). The parameters of the main criteria for the CHF diagnosis did not differ between groups.Thus, LV FV in the 1st group was 60.4 [CI 58.0-62.8]%, in the 2nd group - 61.1 [CI 59.0-63.2]% (p = 0.624). NT-proBNP level in group 1 is 219.0 [167.4; 548.5] pg / ml, in the 2nd — 258.8 [216.0; 586.1] pg / ml (p = 0.430). No differences between groups among the indicators of renal function - creatinine and creatinine-based eGFR (p = 0.145 and p = 0.695, respectively) were found. A higher level of NGAL in the 1st group - 1.05 [0.63; 2.10] ng / ml, than in the 2nd - 0.75 [0.60; 1.10] ng / ml (p = 0.033) was detected. The sST2 in the 1st group was 46.0 [41.0; 69.0] ng / ml, and in the 2nd 50 [36.0; 109.0] ng / ml (p = 0.773). Also, there were no differences in the level of cystatin C: 2.2 [1.7; 2.7] and 2.0 [1.4; 3.1] ng / ml (p = 0.589). Conclusion: persistent AF in CHF patients with preserved LV EF is associated with impaired tubular kidney function in comparison with patients who have sinus rhythm.

P2061

Endothelial dysfunction in chronic obstructive pulmonary disease patients according to exposure by tobacco or biomass

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Bachground: The endothelium is one of the most important tissues in pulmonary diseases, plays an important role in the regulation of vascular tone, controls blood flow and inflammatory responses. Endothelial dysfunction (ED) is implicated in the pathogenesis of cardiovascular diseases, the important cause in the morbidity and mortality of patients with chronic obstructive pulmonary disease (COPD). However, it is unknown the severity of DE according to COPD type (biomass and smoking)
Objective: To evaluated ED in COPD patients according to exposure by tobacco or biomass.
Material and methods: A cross-sectional study, 260 patients older than 40 years with a confirmed diagnosis of COPD were included; subjects with a diagnosis of asthma were excluded. The population was divided according to to exposure in: Biomass and tabaquism. The ED was evaluated by photoplethysmograph, DE was determinated if quotient between maximum amplitude time / total time of the pulse wave (MAT / TT) greater than 0.30
Results: Mean age was 71 ± 9.6 years. Significant differences were observed between biomass group (n = 100) and smoking group (n = 160). Biomass group had a higher prevalence of women (88% vs 29.3%, p<0.001), heart failure (68.09% vs 50.00%, p = 0.051), and ED (0.36 ± 0.068 vs 0.34 ± 0.064, p = 0.0124) than the smoking group .
Conclusion: Patients with COPD by biomass have greater ED than tobacco smoking subjects. This could induce greater cardiovascular risk.

P2062

Opioid administration for patients with end stage heart failure in Japanese real world

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Background Safely provide opioids for cancer pain and symptom relief is readily and continually available. However, there are some barriers to palliative care of patients with chronic heart failure their use of opioids. The aim of our study was to ascertain the usage of opioids in the real word of the clinical setting.
Methods: Sixty-seven patients (mean age; 80±12 y.o., male;55.2%) in end-stage heart failure and suffering from moderate to severe dyspnea were included in this retrospective study. All of them were obtained written informed consent and administered opioid intravenously or subcutaneously. Their vital signs, urine volume, VAS face scale, and dietary quantity (feeding volume/number of times) were collected and baseline recording data was compared with 48hours after administration.
Results: Ischemic heart disease was 66.6% and comorbidity was 96.5%. A frequent flyer patient was 85.5%. After administration, rapid heart rate and respiration decreased without significant hypotension (table). Although 3 patients died within 24 hours due to pneumonia and septic shock and 1 patient was discontinued due to excessive sedation, 14 patients could discontinue opioid and 8 patients (57.1%) were able to discharge to home. The administered opioid dose was 6.25 mg (median, 235-20) and duration was 7 days (median, 1-47). Among 67% of the patients with oliguria, volume was improved in 35.5%. Diet intake improved 28.9%. Improvement of dietary intake after 48 hours is only predicted factor for withdrawing opioid(p<0.001, risk ratio 2.73).
Conclusion: In palliative care for end-stage heart failure, opioids have the possibility of allowing symptom control and discharge to the home which contributes to patients' QOL.

Table

	baseline	after	p
HR(/mmHg)	99±22	91±18	<0.001
systolic BP (mmHg)	106±25	106±22	0.939
mean BP (mmHg)	78±15	76±13	0.872
RR(/min)	25±5	16±3	<0.001
VAS scale	4.7±1.8	2.3±1.6	<0.001
diet intake	1.6±1.9	2.2±2.9	0.177

HR; heart rate, BP; blood pressure, RR; respiratory rate, VAS: visual analgesic score

P2063

Relation between cognitive impairment and blood pressure before psychological stress in right heart failure patients

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Introduction . Right heart failure (RHF) patients can have dysfunction in several areas, highlighting autonomic and cognitive alterations, due to damage that affects cerebral perfusion and the central nervous system. This syndrome, frequently in comorbidity with COPD, is one of the main type of chronic noncommunicable diseases. However, the characteristics of RHF patients are rarely studied.
Purpose: To describe the relationship between the psychophysiological response of systolic blood pressure (SBP) and diastolic blood pressure (DBP) before psychological stress and cognitive impairment (CI) patients with RHF secondary to COPD.
Methods: Comparative cross-sectional study included 35 patients with RHF participated. They were classified by level of CI with the Montreal Cognitive Assessment (MOCA): Without CI (G1,> 26 points, n=5, 63.57±15.95 years old, 60% men), mild CI (G2, 20-25 points, n=14, 66.16±14.77 years old, 57% women) and moderate CI (G3, <19 points n=16, 66±15.12 years old, 75% women). They were evaluated with a psychophysiological stress profile of three phases of five minutes each with an eight-channel biological feedback system Procomp Infiniti, brand Thought Technology and with Omron baumanometer, model HEM-7320: baseline (BL), arithmetic stressor (AE) and recovery (R), registering SBP and DBP. ANOVA analysis and Pearson test correlation were performed in the SSPS v25 software.
Results: Significant differences were found (p <0.05) between the groups (G1 / G2 / G3) in the SBP during the three phases: BL: 118.77 ± 32.65 / 112.07 ± 12.52 / 139.58 ± 31.31, AE: 122.36 ± 32.78 / 115.20 ± 9.94 /138.91±28.98, R: 115.88 ± 34.08 / 108.47 ± 12.86 / 136.22 ± 28.02. Not so (p < 0.05) in the DBP values: BL: 70.27 ± 12.67 / 71.57 ± 10.09 / 77.79 ± 19.84, AE: 70.26 ± 13.12 / 73.66 ± 13.39 / 80.85 ± 19.33, R: 66.85 ± 14.41 / 67.88 ± 11.71 /75.85±19.75. There was a negative correlation between SBP and MOCA: BL: rP = -.44, p <0.05, AE: rP = -.40, p <0.05, R: rP = -.44, p <0.05. The correlation between DBP and MOCA was not significant (p <0.05).

Conclusions: The higher the SBP the lower the score in the MOCA, indicating higher CI. Patients with higher CI had a psychophysiological pattern less adaptive to psychological stress, with little or no reactivity to the stimulus.

P2064

Impact of obesity on volume status in chronic heart failure

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Background: Volume overload is common in both heart failure (HF) and obesity, but the quantitative relationship between the extent of volume expansion and BMI in obese and non-obese patients with chronic HF has not been defined.
Methods: Total blood volume (TBV) was measured using a standardized nuclear medicine radiolabeled albumin-dilution technique in predominately Class III outpatients referred for clinical assessment. A second sensitivity cohort consisted of patients admitted to hospital for volume overload-related symptoms with acute on chronic HF. Obesity was defined by BMI ≥30kg/m2.
Results: TBV was correlated with body weight and excess body weight (both p<0.01). Severe intravascular volume expansion (defined as >25% expansion above normal expected volume) was highly prevalent and more common in the obese ambulatory cohort (53%) as compared to non-obese HF patients (28%, p=0.04) (Fig 1). In contrast, while severe volume expansion was also highly prevalent in the decompensated HF cohort, there was an equal distribution in obese (50%) and non-obese (52%) patients. RBC polycythemia was a significant contributor to volume overload in ambulatory obese and non-obese HF patients (Fig 1) but was more prevalent in the cohort of decompensated obese and non-obese HF patients (55% and 52%, respectively).
Conclusions: Severe intravascular volume expansion is highly prevalent in ambulatory HF, but is significantly more common in HF patients with obesity supporting the concept of a distinct phenotype of obesity-related HF. However, in the volume overload state of decompensated HF, obesity as defined by BMI no longer serves to stratify volume status. Further study is needed to better understand the mechanisms controlling volume regulation in the setting of obesity and HF.

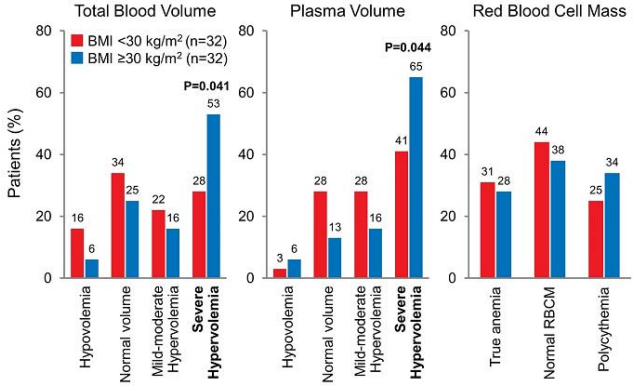

Figure 1

P2065

The new clinical tool of severity assessment in elderly patients with heart failure

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The symptom of chronic heart failure (CHF), experienced while bending forward for the first 30 seconds, called bendopnea, was suggested in 2014. This symptom is associated with an increase in ventricular filling pressure during a tilt, especially in patients with a low cardiac index. Aims: Evaluation of clinical and hemodynamic parameters of elderly patients with CHF and bendopnea. Methods: The open, comparative single-stage study included 58 outpatients (26M, 32F) with II-IV FC NYHA aged ≥60 years with a BMI <30.0 kg/m2. Depending on the presence or absence of bendopnea, the patients were divided into 2 groups: those with and without bendopnea. All patients were underwent general clinical and laboratory examination, ECG, echocardiography. The program used is IBM SPSS Statistics version 22. Results: coronary heart disease (CHD) was the primary cause of CHF in 46 (79%), arterial hypertension - in 11 (19%) patients. NYHA class II was present in 30 (52%), III - in 27 (47%), IV - in 1 (1.7%) patients. Bendopnea symptom was detected in 25 (43%) patients aged 75 (67-79) years. The age of patients without bendopnea was 75 (67-79) years (p=0.239). Patients of the 2 groups were comparable in BMI (p=0.861), concomitant hypertension (p=0.200), anemia (p=0.673), atrial fibrillation (p=0.204), diabetes mellitus (p=0.932), chronic kidney disease (p=0.375). In patients with bendopnea, the left ventricular ejection fraction (LVEF) was 43 (35-51)%, without bendopnea - 60 (56-62)%, p<0.001. There was the correlation between the bendopnea and the indexed LVESV (p=0.001, r=0.46) and LVEDV (p=0.001, r=0.53), LV aneurysm (p<0.001, r=0.45, LVEF (p <0.001, r=-0.66), left atrium (p=0.039, r=0.29), PASP (p=0.004, r=0.41), EDD (p<0.001, r=0,50), ESD (p<0.001, r=0.50), NYHA FC (p<0.001, r=0.92), NT-proBNP (p=0.26, r=0.44). Conclusion: Twenty-five (43%) patients with CHF and BMI<30.0 had bendopnea. A close association bendopnea with an adverse hemodynamic profile, high NYHA FC and the level of NT-proBNP allows to consider this symptom as a tool clinical state severity of CHF elderly outpatients.

P2066

One stop heart failure clinic- a real world experience

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Introduction: UK NICE guidance states that patients with suspected heart failure should be triaged according to risk. Patients with a history of MI (myocardial infarction) should have a specialist assessment and echocardiography within 2 weeks (urgent referral). Patients with no MI history should have a NTproBNP measured. Patients with high levels (>2000pg/ml) should be seen within 2 weeks (urgent referral), patients with raised levels (400-2000pg/ml) should have a review within 6 weeks (routine referral). We developed a One Stop Heart Failure Clinic to allow timely diagnosis and management plan implementation. The clinic provides investigations including bloods, ECG and echocardiogram, access to a cardiologist specialising in heart failure and a heart failure specialist nurse.Purpose: To determine the suitability of referral and referral prioritisation to our One Stop Heart Failure Clinic in comparison to NICE guidance.
Methods: Data from our local One Stop Heart Failure Clinic was collected retrospectively from January 2017 to October 2018. 74 patients (46 male, 28 females) mean age 67 years (range 17-97) were referred. Patients were identified as routine or urgent on the referral form. We reviewed patient's medical history including documented symptoms, history of MI and NTproBNP level and categorised them according to NICE guidance. Diagnosis and outcomes were documented in clinic letters.
Results: 16/74 patients had a previous MI. The mean time to review was 27 days (range 13-57). 5 were appropriately referred as urgent with an average time to review 25 days (13-36). The remainder of MIs were inappropriately referred as "routine" with an average time to review 29 days (13-50). 58/74 had no previous MI. Contrary to guidance 35 patients had no documented NTproBNP with an average time to review 31 days. 15 patients had a NTproBNP >2000pg/ml, 10 were correctly referred as urgent with mean review time of 24 days (median 22, range 12-46). 5 were inappropriately marked as routine and were seen with an average review time of 21 days (median 21, range 4-41). 6 patients had a NTproBNP of 400-2000pg/ml. 3 were incorrectly classed as urgent on the referral (mean review 13 days), 3 were marked as routine (mean review 38 days). Only 2 patients were inappropriately referred with normal NTproBNP and clinic discharge.
Conclusion: The majority of referrals to the One Stop Heart Failure Clinic were appropriate. Referral information was often incomplete and incorrectly prioritised. 21/39 (54%) patients who had a prior MI or documented NTproBNP were inappropriately classed leading to inappropriate triage and subsequent misassignment of clinic appointment. Notably there is poor awareness of prior MI as determinant of an "urgent" classification, and a lack of NTproBNP testing. Time targets are not currently being met, demonstrating the need to expand the clinic. We propose implementing a formal referral proforma to improve concordance with NICE guidance.

P2067

Association between obesity parameters and the risk of left ventricular dysfunction in type 2 diabetic patients

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Background: Bidirectional link between obesity and diabetes is well established, but the direct connection between obesity and diabetic heart failure, independent of hypertension and coronary artery disease, is not well defined.
Purpose: We aim to estimate the association of obesity with left ventricular dysfunction in asymptomatic type 2 diabetic patients.

Methods: We analyzed 72 asymptomatic normotensive patients with diabetes mellitus type 2, without coronary artery and valve disease. All patients underwent anthropometric measurements– body weight (BW), body mass index (BMI) and waist-to-hip ratio (WHR), and echocardiographic analysis of the left ventricular function, using 2D echocardiography with PW Doppler analysis, Tissue Doppler Imaging-TDI and Speckle-Tracking echocardiography-STE). We assessed the association of echocardiographic parameters of LV dysfunction with obesity parameters using Pearson Product Moment of Correlation.
Results: From the investigated cohort group, 34 (47%) patients have diastolic dysfunction. Twenty one (62%) of them have BMI>25 kg/m2, 22 (65%) have higher WHR. Mann Whitney U Test showed a statistically significant association between BW, BMI, WHR and left ventricular dysfunction (U = 1.9, p = 0.04; U = 2.1, p = 0.03, U = 3.5, p = 0.004).
Pearson Product Moment of Correlation shows strong negative correlation between BMI and E/A ratio (r= - 0.4) and a strong positive correlation with E/E' ratio (r= 0.4). In the analysis of the deformation, the curve has downward trend, i.e. individuals with higher BMI have lower global longitudinal strein- GLS (r= - 0.6), that is indicative of systolic dysfunction.
Conclusion: Strong correlations of obesity parameters with LV dysfunction suggest their role as
predictors of increased risk of heart failure in patients with asymptomatic type 2 diabetes mellitus.

P2068
Clinical and echocardiographic features in diabetic and non-diabetic patients with chronic heart failure

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Background and Aim: Heart failure is a common cardiovascular complication of diabetes mellitus (DM) and these two diseases often co-exist. The aim of this study was to investigate the clinical characteristics and echocardiographic indices in diabetic and non-diabetic patients with chronic HF.
Methods: In 344 included chronic HF patients (mean age 61 ± 10 years, 54% female), clinical, biochemical and antropometric data were registered. In all study patients an echo-Doppler study and a six-minute walk test (6-MWT) were performed in the same day.
Results: Among 344 HF patients 111 (32%) had DM. Diabetic patients were older (p=0.026), had greater waist-hip ratio (p=0.041), had more compromised renal function (increased levels of urea and creatinine [p=0.003 and p=0.008, respectively]) and lower hemoglobin level (p=0.02), compared with non-diabetic patients with HF. All echo-Doppler indices, including tissue Doppler measurements, did not differ between diabetics and non-diabetics. On the other hand, diabetic patients with HF had higher New York Hear Association functional class (p=0.008) and shorter walking distance at 6-MWT (p<0.001), compared to non-diabetic patients with HF.
Conclusion: The prevalence of DM in HF patients is high. Diabetes mellitus has deleterious on renal function and anemia in HF patients. Diabetic patients with HF are also more symptomatic and have more compromised exercise capacity, irrespective of structural and functional heart changes, compared to non-diabetic patients with HF. These findings highlight the need for better optimization of medical therapy and regular exercise in diabetic patients with chronic HF.

P2069
Risk factors of heart failure among patients with hypertension

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Background: Hypertension is the leading cause of heart failure globally. Preventive public health approach to reducing the scourge of heart failure in patients with hypertension must seek to understand the risk factors and determinants of heart failure in at risk populations. This will improve cardiovascular preventive care and aid the prognostic stratification of patients with systemic hypertension.
Purpose: The aim of this study was to determine the risk factors of heart failure (HF) among patients with hypertension attending a tertiary hospital.
Methods: The study was a case control study. The cases were patients with HF secondary to hypertension while the controls were age and sex-matched patients with hypertension without HF.
The patients were interviewed following which they were examined and evaluated clinically for cardiometabolic and lifestyle risk factors. Medication adherence was assessed using the Medication Adherence Questionnaire (MAQ). Subjects underweight cardio-metabolic risk profiling. Conditional logistic regression remodeling was used to determine the risk factors of heart failure in the study population. A two-sided p-value of <0.05 was considered statistically significant in all analyses.
Results: One hundred and one (101) case-control matched pairs were recruited. The mean age of the cases is 62.5±14.3 years while that of the controls is 60.1±13.0 years. There are 50 males (49.5%) and 51 females (50.5%) in each group. Traditional cardiovascular risk factors are prevalent in both groups but they cluster more among the heart failure group. Medication adherence was significantly lower among subjects who developed HF compared to the controls (Low/moderate adherence 80.2% in HF group vs 39.6% in hypertension without HF group; high adherence 19.8% in HF group vs 60.4% in hypertension without HF, p <0.001).
The independent risk factors of heart failure in this study are alcohol consumption (OR: 3.34; 95% CI:1.15-9.74; p=0.025) poor drug adherence (OR: 6.21; 95% CI: 2.30-16.75, p=<0.001), electrocardiographic LVH (OR: 3.10; 95% CI: 1.19-8.05, p=0.020), PVCs (OR:8.37; 95% CI: 1.30-53.90, p=0.025and conduction abnormalities (OR: 6.77; 95% CI: 1.85-24.80; p=0.004).
Conclusion: Alcohol consumption, poor drug adherence and abnormal electrocardiographic markers are strong risk factors that independently tilt patients to heart failure. This is important for public health interventions and preventive cardiovascular care.

P2070
Pulmonary hypertension and left atrial enlargement are associated with blunting of reduction in hospital resource utilization in patients enrolled in specialty heart failure clinic

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BACKGROUND: The prevalence of heart failure (HF) has increased demands on the healthcare system and it is a leading cause of hospitalization in the elderly. HF specialty clinics have made a positive impact in decreasing hospital resource utilization (HRU). The presence of left atrial enlargement (LAE), being a surrogate for possible diastolic dysfunction, and pulmonary hypertension (PH) are prognostic indicators in the HF patient population. We sought to determine if HF clinic enrollment would reduce HRU, particularly in those patients with PH or LAE.
METHODS: We conducted a retrospective chart review on patients seen at a high-acuity tertiary care HF clinic. A total of 278 patient charts were reviewed for their clinical characteristics and initial baseline echocardiogram data. Using the first clinic visit day as a reference date, we collected data regarding HRU for each patient. These includes the number of total and HF related hospital admissions, length of stays (LOS), and emergency room visits over the span of one year before and after the reference date. Patients were grouped based on their echocardiogram parameters including baseline ejection fraction (EF), left atrial volume index (LAVI), and tricuspid regurgitation peak gradient (TRPG). Each group was analyzed separately and divided into subgroups based on specific clinical guideline cutoff ranges. Patients were divided by EF into HFpEF (EF>50%) and HFrEF (EF<40%). Presence of PH was defined as TRPG>31.6 mmHg. Possible LAE was defined by LAVI>34 mL/m2. For each group, we compared their respective HRU one year prior and after the reference date.
RESULTS: In all patient groups, enrollment into HF clinic led to significant reduction in all aspect of analyzed HRU including number of total and HF related hospital admissions, LOS, and emergency room visits compared to before enrollment (P=0.000). There was no significant difference between HFpEF and HFrEF groups in terms of HRU reduction after enrollment. Patients with LAE had higher rate of HRU compared to patients without LAE in HF related admission (0.53 vs 0.09, p=0.012) and LOS (3.32 vs 0.25, p=0.016) after enrollment into HF clinic. Patients with PH had higher rate of HRU compared to patients without PH in all admission (0.93 vs 0.38, p=0.015) and HF related admissions (0.48 vs 0.11, p=0.032) after enrollment into HF clinic.
CONCLUSION: There were significant relative reduction in every aspect of the analyzed HRU after a patient has been enrolled in HF clinic. The benefit is best seen in patients without PH or LAE particularly in reducing HF related admission and LOS. These benefits were still present but blunted in patients with PH or LAE. Age may be a confounder as presence of PH or LAE is positively correlated. These findings confirm the benefit of a single-center advanced HF clinic in reducing HRU but also suggest more attention needs to be given to patients with advanced HF complicated with PH or LAE.

P2071
Longitudinal changes in serum creatinine in patients with heart failure receiving oral anticoagulation for atrial fibrillation

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Background: Recent studies found that an increase in serum creatinine (sCr) over time is less common and milder in subjects with atrial fibrillation (AF) receiving

non-vitamin K antagonist oral anticoagulants (NOAC) than vitamin K antagonists (VKA). This effect may be particularly relevant in patients with heart failure (HF), which is associated with substantial rates of worsening renal function (WRF).

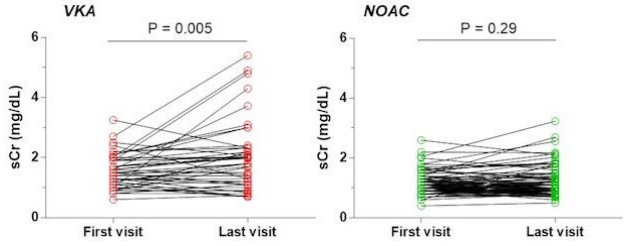
Methods: By reviewing the records of 440 consecutive HF patients referred to a tertiary outpatient clinic between Oct. 2014 and Jan. 2019, we selected those meeting the following criteria: ≥2 visits over the study period; persistent oral anticoagulation for AF; sCr available at both the basal and last evaluation. The characteristics between VKA and NOAC users and the changes in sCr were compared by chi-square or t-test, as appropriate. WRF was defined as an increase in sCr ≥0.3 mg/dL from the baseline value. The association of NOAC treatment with this outcome as well as with sCr doubling was assessed by logistic regression.

Results: After excluding the subjects who received VKA for a mechanical valve or left ventricular (LV) thrombus (n. 26), switched from VKA to NOAC (n. 14) or vice versa (n. 1), interrupted anticoagulation (n. 1), and faced a rise in sCr to >2 SD (n. 1), 46 patients on VKA and 84 on NOAC were included in the analysis.

NOAC users were younger, although not a significant extent (72.7±12.7 vs. 76.4±8.4 years, P=0.07), and had diabetes (22.6% vs. 41.3%, P=0.02) and chronic kidney disease (15.5% vs. 63%, P<0.0001) less frequently than VKA users. They also tended to have less often anaemia (10.7% vs. 23.9%, P=0.08) and a LV ejection fraction ≥40% (39.3% vs. 56.5%, P=0.06). Less subjects on NOAC than on VKA were hospitalised at least once during follow-up (21.4% vs. 39.1%, P=0.03).

At the first visit, mean sCr was 1.6±0.6 mg/dL and 1.15±0.4 in VKA and NOAC users, respectively (P <0.0001). At the last evaluation, it was significantly increased by 0.4±1 mg/dL in the former patients, while a non-significant change of 0.04±0.4 mg/dL was observed in the latter ones (Figure). Consequently, sCr was also significantly higher in VKA than NOAC recipients at the last visit (2±1.1 mg/dL vs. 1.2±0.5 mg/dL, P <0.0001). WRF occurred in 20 (43.5%) cases in the VKA group and in 13 (15.5%) in the NOAC one (P =0.001), while sCr doubled in 6 (13.0%) vs. 1 (1.2%) patients taking VKA or NOAC, respectively (P =0.004). There was a negative association of NOAC therapy with both WRF (OR 0.24, 95%CI 0.1-0.55, P=0.001) and sCr doubling (OR 0.08, 95%CI 0.01-0.69, P=0.02), which persisted after adjusting for age, baseline sCr, diabetes and time between the first and last visit (WRF: OR 0.29, 95%CI 0.12-0.75, P=0.01; sCr doubling: OR 0.08, 95%CI 0.01-0.86, P=0.04).

Conclusions: These data suggest that NOAC are nephroprotective in HF with AF as compared with VKA. Bigger and multicentre studies are warranted to verify this hypothesis.



P2072

Differences between physical and psychological stress in right heart failure patients

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Introduction: Frequently, right heart failure (RHF) coexist with COPD. Patients with both diseases have constant psychological stress due to their health condition, even at physical rest. Physical stress and psychological stress have an impact on the health of these patients; altering, among others, the autonomic activity, which makes necessary to know if there are differences between the physiological response to both types of stress in this population.

Purpose: To describe the differences between the physiological responses to physical stress, evaluated in the six-minute walk test (6MWT), and psychological stress, measured during a psychophysiological stress profile in patients with RHF related to COPD.

Methods: Comparative cross-sectional study was conducted. This included 35 patients with RHF, (66.25 ± 14.97 years, 62.85% women). 6MWT and a PSP were performed to evaluate physical stress and psychological stress, respectively. Both test consisted of three phases: baseline, stimulus (reactivity) and recovery.

An Eight-channel biological feedback system Procomp Infiniti, brand Thought Technology; and an Omron baumanometer, model HEM-7320 was used during psychophysiological stress profile. Additionally, a pulse oximeter, model MD300 was used during 6MWT. Heart rate (HR), respiratory frequency (RF), systolic blood pressure (SBP) and diastolic blood pressure (DBP) were recorded. Reactivity and recovery were calculated taking the baseline as reference. Student's t-test was used in SPSS v25.

Results: Statistically significant differences were found between the stimuli (psychological stress / physical stress) in: reactivity HR [t (42.90) = -3.601, p = 0.001]: 1.36 ± 4.98 / 9.58 ± 12.40, recovery HR [t (40.32) = -2.135, p = 0.039]: -0.01 ± 2.65 / 2.97 ± 7.71, reactivity RF [t (69) = 3.015, p = 0.004]: 8.41 ± 5.96 / 4.14 ± 5.96. No significant differences were found between the responses of reactivity and recovery of SBP and DBP to both stimuli.

Conclusions: The reactivity and the recovery of the HR were greater in terms of physical stress, possibly due to the higher metabolic requirement for physical activity. The reactivity of the RF was greater in psychological stress, hypothetically because of the oxygen demand in cognitive tasks. The SBP and DBP in the two types of stress reflect that patients even at rest, maintain high levels of pressure due to psychological stress.

P2073

Sarcopenia and cardiac dysfunction in community-living older adults

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Background/Introduction: Sarcopenia is a generalised skeletal muscle disorder that primarily affects older adults and is common in chronic heart failure (HF). Its association with cardiac dysfunction in community-living older adults remains unclear. As previous studies have found moderate diastolic dysfunction to be predictive of incident HF and reduced survival, we reason that sarcopenia is a component of the preclinical HF syndrome in the elderly.

Purpose: To delineate the prevalence, characteristics and association of sarcopenia and cardiac dysfunction in community-living ambulatory older adults without known HF.

Methods: We recruited 306 community-living individuals aged ≥60 years into the UFO study. A previously validated 5-item questionnaire, SARC-F, was administered at recruitment. A score of ≥4 indicated the presence of sarcopenia, whereas <4 denoted non-sarcopenia. Echocardiography and N-terminal prohormone of B-type natriuretic peptide (NT-proBNP) were used to assess for cardiac dysfunction.

Results: A total of 102 (33.3%) individuals were sarcopenic. Compared with non-sarcopenic individuals, sarcopenic counterparts were older (79.69±7.56 vs 72.25±6.59, P<0.01) and more likely to be female (85.3% vs 60.8%, P<0.01). Hypertension (76.5% vs 60.3%, P<0.01), diabetes mellitus (DM) (35.3% vs 24.5%, P<0.05) and ischaemic heart disease (IHD) (10.8% vs 4.4%, P<0.05) were more prevalent in the sarcopenia group.

Overall, the prevalence rates of diastolic and systolic dysfunction (left ventricular ejection fraction (LVEF) ≤50% by Simpson's method) were 67% and 4.2%, respectively. Diastolic dysfunction was more common in sarcopenic than non-sarcopenic individuals (82.4% vs 59.3%, P<0.01). The prevalence of diastolic dysfunction progressively rose from 49.4% to 100% with increasing SARC-F scores. LVEF did not significantly differ between sarcopenic and non-sarcopenic individuals.

Amongst echocardiographic parameters of diastolic function, the ratio of peak mitral inflow velocity-to-early diastolic mitral annular velocity (E:E') and left atrial volume index (LAVI) were greater in the sarcopenia than non-sarcopenia group (septal E:E', 17.27±5.9 vs 13.24±4.66, P<0.01; lateral E:E', 13.61±5.52 vs 10.36±4.0, P<0.01; LAVI, 31.4±10.08 vs 25.92±10.65 ml/m2, P<0.05), whereas E' was lower in the sarcopenia group (septal E', 4.79±1.44 vs 5.51±1.45 cm/s, P<0.01; lateral E', 6.25±2.05 vs 7.14±2.09 cm/s, P<0.01).

Serum NT-proBNP levels (median, IQR) were significantly higher in the sarcopenia than non-sarcopenia group (177.13 (101.34–399.42) vs 81.95 (43.30–166.62) pg/ml, P<0.01). By regression analysis, NT-proBNP >300 pg/ml was associated with an increased risk for sarcopenia (OR 2.40, 95% CI 1.05–4.19, P<0.01) after adjusting for hypertension, DM and IHD.

Conclusion(s): Diastolic dysfunction was highly prevalent in community-living older adults. Preclinical cardiac dysfunction was associated with an increased risk for sarcopenia.

P2074

Sarcopenia and reduced physical fitness are associated with cardiac dysfunction in community-living older adults

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Background/Introduction: Sarcopenia is an ageing-related disorder characterised by impaired muscle strength, reduced gait speed (GS), and is associated with increased mortality, hospitalisation, and adverse outcomes. It has rarely been investigated in association with cardiac dysfunction in community-living older adults.
Purpose: To evaluate the effects of sarcopenia on cardiac dysfunction and physical performance in community-living older adults.
Methods: Individuals aged ≥60 y and without a history of heart failure were recruited from community and a Geriatric Day Hospital during 2017-18. A SARC-F score (range, 0-10 points) of ≥4 indicated the presence of sarcopenia. Handgrip strength per body mass index (HGS), GS, and 6-min walk distance (6MWD) were assessed. Echo was analysed according to standard international guidelines.
Results: 306 older adults were recruited. The prevalence of guideline-defined diastolic (DD) and systolic dysfunction was 67% and 4.3%, respectively. Among those recruited, 102 (33%) were sarcopenic and had reduced HGS, GS and 6MWD. The prevalence of DD was higher in the sarcopenia than non-sarcopenia group (82% vs. 59%, P<0.01). Sarcopenia was associated with DD after adjusting for co-morbidities (Table 1). Successive increase in SARC-F score from 0 to 1-2, 3-4, 5-6 and 7-10 was associated with increasing risks for DD by 1.8-fold (95% CI 1.0–3.3, P<0.05), 2.8-fold (1.4–5.6, P<0.01), 5.6-fold (2.1–14.8, P<0.01) and 12.8-fold (2.9–57.5, P<0.01), respectively.
Among individual SARC-F components, 'carrying 10 pounds', 'walking across the room', 'climbing 10 stairs', and 'rising from bed or chair' were associated with 2.27- to 8.86-fold increase in the risks for DD, while 'fall(s) within 1 year' was not associated. Decreasing physical fitness was associated with increasing risks for DD by 1.87-fold (95% CI 1.41–2.48, P<0.01) per 0.3 decrement in HGS, 1.83-fold (1.41–2.39, P<0.01) per 0.2-m/s decrement in GS, and 2.09-fold (1.55–2.82, P<0.01) per 100-m decrement in 6MWD.
Conclusion(s):
The prevalence of sarcopenia and DD was high in community-living older adults. Sarcopenia was associated with increased risk for DD and corresponding decline in physical fitness.

Table 1. Logistic regression analysis.

	Univariate logistic regression	Multivariate logistic regression				
Odds ratios	Any DD	Grade II-IV DD	Any DD	Grade II-IV DD		
	-	-	Model I	Model II	Model I	Model II
Non-sarcopenia	Ref	Ref	Ref	Ref	Ref	Ref
Sarcopenia	3.20 (1.79-5.72)*	3.00 (1.67-5.36)*	1.67 (0.87-3.19)	2.73 (1.50-4.96)*	1.88 (0.99-3.58)	2.79 (1.54-5.06)*

*P <0.01. Model I: adjusted for age. Model II: adjusted for hypertension, diabetes mellitus and ischaemic heart disease.

P2075

The association of reduced cardiac systolic function with morphological vascular abnormality rather than functional vascular abnormality in coronary artery disease

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On behalf of: FMDJ study
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Aims: FMD-J study is a multicenter prospective observational study to examine the usefulness of vascular function (endothelial function and arterial stiffness) in clinical management in patients with coronary artery disease (CAD). The present cross-sectional study, as a sub-analysis of FMD-J study, was conducted to examine whether reduced cardiac systolic function is differently associated with the vascular functional or morphological abnormalities in patients with CAD.
Methods: Brachial-ankle pulse wave velocity (baPWV), a marker of arterial stiffness, and flow-mediated vasodilatation in brachial artery (FMD), a marker of endothelial function, were obtained in 674 patients with CAD at the baseline of FMD-J study.
Results: Among these patients, left ventricular ejection fraction (LVEF) <50% was observed in 83 patients. While FMD (4.3±2.6 % vs. 4.7±2..8 %, p=0.19) was similar, baPWV (15.5±2.4 m/s vs. 16.4±2.9 m/s, p<0.05) was lower, and diameter of brachial artery was larger (4.5±0.7 mm vs. 4.3±0.6 mm, p<0.05) in patients with LVEF <50% (n=83) than in those with LVEF >50% (n=591). Multivariate analysis, adjusted with age, smoking status, blood pressure, and medication for hypertension, demonstrated that LVEF was a significant determinant for brachial-arterial diameter but not baPWV.
Conclusion: In patients with CAD, reduced cardiac systolic function may be associated with vascular morphological abnormality rather than functional abnormalities.

P2076

Clinical determinants of Doppler derived intrarenal hemodynamics in patients with HFpEF

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Purpose: The interaction between the systemic and intrarenal hemodynamics (IRH) in hypertensive patients is a complex physiological phenomenon which has been largely discussed and widely analysed, meanwhile there is a lack of consistent data about the clinical determinants of the IRH in patients with heart failure (HF). Thus, the aim of our study is to appraise the clinical and hemodynamic determinants of the IRH in a group of patients with HFpEF.
Methods: The population of our study were 62 patients (34 females and 28 males, mean age 50,15 ± 14,50 years) with HFpEF. All subjects underwent careful clinical history and physical examination. A complete echocardiographic study, ambulatory blood pressure monitoring and color Doppler ultrasound of renal and intrarenal arteries were performed to all the subjects. Intrarenal Doppler measurements were repeated in three parts of both kidneys (superior, median, and lower) untill three reproducible waveforms were obtained. The following IRH parameters were obtained: renal resistive index (RRI), renal pulsatile index (RPI), acceleration time (AT).
Results: The mean RRI was 0,6672 ± 0,0452, mean RPI 1,2533 ± 0,178, mean AT 66,68 ± 2,324 ms, mean daytime ambulatory systolic blood pressure (SBP) was 153,73 ± 12,82 mmHg, mean nighttime SBP was 138,32 ± 16,35 mmHg, mean 24 hours SBP was 146,12 ± 13,96 mmHg, mean daytime ambulatory diastolic blood pressure (DBP) was 92,07 ± 18,93 mmHg, mean nighttime DBP 81,79 ± 8,34 mmHg mean 24 hours DBP 86,59 ± 6,78 mmHg. The mean pulse pressure (PP) was 59,10 ± 22,90 mmHg. The mean 24 hours heart rate (HR) was 75,14 ± 26,86 beats/minute. RRI as well as the RPI were negatively related to ambulatory 24 hours DBP (r = -0,239, p < 0,01), (r = -0,139, p < 0,01), mean nighttime DBP (r = -0,299, p<0,01), (r = -0,129, p<0,01), HR (r = -0,326, p<0,01), (-0,123, P<0,01). There was a positive association of only IRR with ambulatory 24 hours SBP (r = 0,359, p < 0,01), mean daytime SBP (r = 0,260, p<0,05) ambulatory PP (r = 0,266, p < 0,01), age (r = 0,253, p < 0,01), left ventricular mass (LVM) (r = 0,459, p < 0,001) and relative wall thickness (RWT) (r = 0,293 p<0,01), statistically significant even after adjustment for various confounding factors. In multiple regression analysis, mean 24 hours SBP, daytime SBP, PP (p < 0,01) and LVM (p <0,05) were revealed as main determinants of RRI and IPR in patients with HFpEF, meanwhile we didn't find an important correlation of AT and any clinical or hemodynamic parameter in this particular group of patients.
Conclusions: In addition to local renal vascular properties, the central hemodynamic factors significantly influence the intrarenal arterial patterns in patients with HFpEF. Though IRH was initially considered as a reflection of the intrarenal vascular changes, it is actually the result of a complex interaction between renal and systemic vascular factors useful in assessment of a large spectrum of cardiovascular conditions.

P2077

Cerebral blood flow is lower in heart failure patients with reduced ejection fraction who have atrial fibrillation

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Purpose: There is an adverse interaction between heart and brain in heart failure (HF). The presence of atrial fibrillation (AF) in HF poses an increased risk for stroke and cognitive impairment. Transcranial Doppler (TCD) provides information on the velocity of cerebral blood flow and detects microembolic signals that can be used to determine the risk of cerebrovascular events. In this study, we evaluated the effect of

AF on the blood flow velocities of cerebral arteries in patients with HF and reduced ejection fraction.
Methods: This study included 46 HF patients with an ejection fraction less than 35% who underwent to TCD examination. In addition, 26 healthy individuals with sinus rhythm were included in the study as a control group. We compared the both right middle cerebral arterie's (RMCA) and left middle cerebral arterie's (LMCA) minimum, maximum and mean flow velocities between HF patients with AF and those with sinus rythm or normal healthy individuals.
Results: The average maximum and mean flow velocities of RMCA were 65.87cm/s and 38.55cm/s in HF with AF group and 87.84cm/s and 56.41cm/s in control group, respectively (p=0.002 and p<0.001, respectively). The average maximum and mean flow velocities of LMCA were 62.95cm/s and 37.8cm/s in HF with AF group and 88.73cm/s and 57.15cm/s in control group (p<0.001 and p<0.001). The average minimum flow velocities of RMCA and LMCA were 34.66cm/s and 32.0cm/s in HF patients with AF and 36.53cm/s and 36.34cm/s in control group, respectively (p=0.592 and p=0.286, respectively). The average mean flow velocity of RMCA was 38.55 cm/s in HF with AF group and 50.91cm/s in HF with sinus rhythm (p=0.042). The average mean flow velocity of LMCA was 37.8 cm/s in HF with AF group and 49.95cm/s in HF with sinus rhythm (p=0.026).
Conclusion: The results of this study suggested that cerebral blood flow rates were lower in HF patients with AF as compared to HF patients with sinus rhythm or control healthy subjects, which may partly explain heart and brain adverse interaction in HF patients with AF.

P2078

Osteoporosis in males with heart failure: impact on survival.

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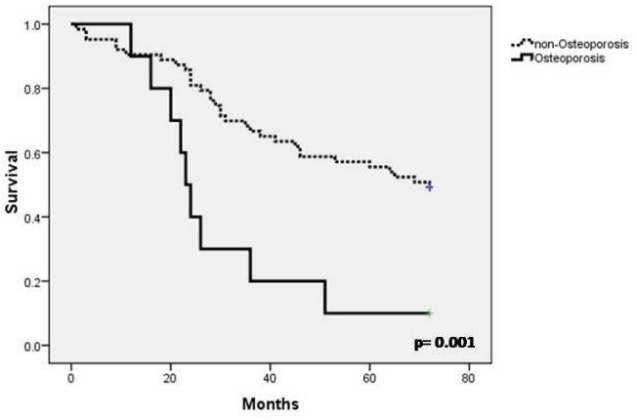
Background: Heart failure (HF) and osteoporosis are highly prevalent aging-related syndromes that exact an enormous impact on society.
Purpose: To evaluate the rate of osteoporosis, its determinants and impact on survival in elderly males with HF.
Methods: A total of 73 no-diabetic, no-cachectic, male patients with HF and reduced left ventricular ejection fraction ≤40% (age: 68±7 years, left ventricular ejection fraction 29±8%) were enrolled. Bone mineral density (BMD) at the level of the hip and body composition were measured by dual energy X-ray absorptiometry, while muscle performance was assessed by hand grip strength. N-terminal pro B-type natriuretic peptide (NT-proBNP), markers of bone turnover (osteocalcin, β -CrossLaps), receptor activator of nuclear factor-kappaB ligand (RANKL) were assessed. Patients were divided into 2 groups according to the diagnosis of the osteoporosis defined as T score of hip total ≤ -2.5 and were compared in respect to survival at 6-years of follow-up.
Results: 10 (14%) patients were diagnosed with osteoporosis. They were similar in age compared to no-osteoporosis patients (69 ± 9 vs. 67 ± 7, p= 0.621). Patients with osteoporosis presented with lower body mass index (24 ± 2 vs. 28 ± 2 kg/m2, p= 0.010) along with more prominent wasting of other body compartments (15 ± 5 vs. 23 ± 11 kg, p= 0.019 for total fat mass; 47 ± 5 vs. 55 ± 9 kg, p= 0.006 for total lean mass). Increased bone turnover was noted in patients with osteoporosis compared to patients without osteoporosis (59 ± 30 vs. 35 ±15 ng/ml, p< 0.0001 for osteocalcin and 830 ± 386 vs. 465 ± 238 pg/ml, p< 0.0001 for β -CrossLaps), while serum RANKL was not significantly increased in osteoporotic patients (p= 0.092). Patients with osteoporosis presented with decreased grip strength (83 ± 14 vs. 97 ± 20 kg, p= 0.019) and renal dysfunction (44 ± 12 vs. 67 ± 22 ml/min, p= 0.002) compared to the patients without osteoporosis. NT-proBNP was increased in osteoporotic patients (4117(5512) vs. 1761 (2259), p= 0.027). A total of 41 (56%) patients died within 6 years of follow-up. Kaplan-Meier survival analysis showed impaired survival in patients with osteoporosis (p= 0.001, Figure 1). In multivariate logistic regression analysis, only creatinine clearance was independently related with osteoporosis [OR 0.92 (95% CI 0.87-0.98), p=0.007]. In multivariate Cox regression analysis, NT-proBNP [HR 3.70 (95% CI 1.93-7.09), p< 0.0001], and presence of osteoporosis [HR 2.76 (95% CI 1.26-6.02), p= 0.011] were independent determinants of all-cause mortality after 6 years of follow-up.



Survival analysis

Conclusions: Although the rate of osteoporosis is modest in no-cachectic, elderly men with HF, these patients have impaired survival compared to the patients without ostoporosis. Osteoporosis was independent predictor of all-cause mortality. Whether specific treatment of osteoporosis in HF patients may improve its survival has not been studied so far.

P2079

Metabolism evaluation and ketones utilization in the failing human heart

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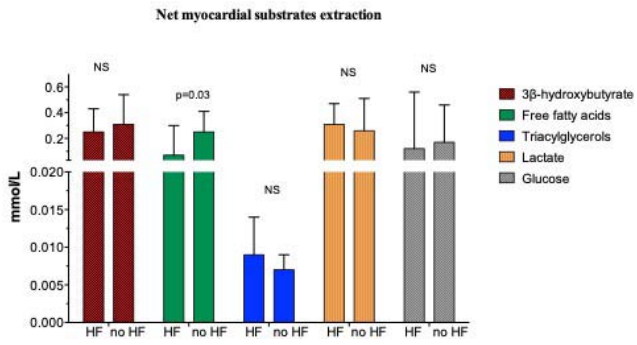
Background: Under normal circumstances, free fatty acids (FFAs) are the predominant energetic substrate of the heart. The aim of this study was to identify and quantify the heart substrates utilization in mild to moderate human HF.Methods: β-hydroxybutyrate, lactate, triacyclglycerols, glucose and FFAs concentrations in arterial, coronary sinus (CS), and central venous beds were measured after an overnight fast to derive myocardial substrates utilization in HF patients and controls scheduled for cardiac device implanting procedures.
Results: A total of 15 HF patients and 11 controls were enrolled. Arterial and CS metabolites concentration were similar between the groups. A significant reduction in the myocardial FFAs extraction was showed in HF patients compared to controls (HF 0.07 ± 0.23 mmol/Lvs non-HF 0.25 ± 0.16 mmol/L, p=0.03), together with an inverse association between FFAs and neurohormonal and echocardiographic HF hallmarks. In particular we showed a strong and inverse correlation between left ventricular end-diastolic diameter and FFAs myocardial extraction (p<0.001). Opposite, β-hydroxybutyrate, lactate, triacyclglycerols and glucose extractions were relatively unchanged between groups (Figure). The net cardiac extraction of β-hydroxybutyrate was directly associated to HF duration. When diabetic and non-diabetic patients were compared among HF population, the results were substantially similar, with a slight trend in reduction of FFAs net extraction (HF 0.03 ± 0.30 mmol/L vs non-HF 0.26 ± 0.12 mmol/L, p=0.09).



Conclusions: In our study ketone bodies utilization was unchanged between mild to moderate HF patients and controls. We showed a reduced myocardial FFAs extraction consistent with a downregulation of beta-oxidation in the failing heart in HF population. Future studies are needed to clarify mechanisms that regulate the changes in myocardial substrates utilization and its timing.

P2080

Cross talk between endothelial dysfunction and myocardial fibrosis in patients with heart failure: the role of galectin-3.

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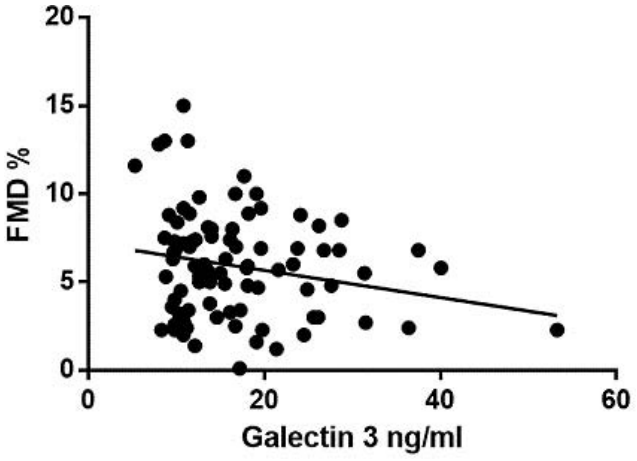
Background: Endothelial function is impaired in patients with heart failure (HF) and may contribute to clinical status of HF patients. Galectin-3 is a mediator of myocardial fibrosis and remodeling, and is related to prognosis patients.
Purpose: To examine the association of endothelial dysfunction with galectin-3 levels in patients with HF of ischemic etiology.
Methods: We consecutive enrolled 82 subjects with stable ischemic HF and reduced ejection fraction. Ultrasonographic recordings of the brachial artery were used to assed non-invasively endothelial function by means of flow mediated dilation (FMD). Among other factors serum levels of galectin-3 and b-type natriuretic peptide (BNP) were measured in blood samples.
Results: The median values of galectin-3 in our study population was 14. (11.2-19.9) ng/ml and the mean value of FMD in our study population was 5.90±2.99%. There was significant association of Galectin-3 levels with age (r=0.35, p<0.001) with creatine clearance (r=-0.50, p<0.001) and with BNP levels (r=0.29, p=0.003). Importantly there was a significant inverse association of Galectin-3 levels with FMD (r=-0.21, p=0.04) (Figure).
Conclusions: In the present study we found that there is association of endothelial dysfunction with galectin-3 levels in patients with chronic HF of ischemic etiology implying the central role of endothelial ysfunction in the development and progression of ischemic heart failure.



Acute Heart Failure

P2081

Associations of serum extracellular matrix markers with liver stiffness and congestion in patients with decompensated heart failure

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Objective: In patients with heart failure (HF) liver stiffness (LS) assessed by transient elastography (TE) relies heavily on tissue congestion apart of intrinsic fibrosis. In clinical setting it remains unclear how to accurately discern the two processes. The aim of the study was to assess relationship of serum extracellular matrix (ECM) markers levels with LS and congestion in patients with decompensated HF (DHF).
Methods: LS by TE, congestion status by bioimpedance vector analysis (BIVA) and serum ECM markers (collagen type IV, hyaluronic acid, glycoprotein YKL-40 and matrix metalloproteinase–2 (MMP-2)) were assessed in 36 patients with DHF on admission (67% male, 66±12 years [M±SD], arterial hypertension 89%, myocardial infarction 50%, atrial fibrillation 53%, diabetes mellitus 33%, chronic kidney disease 28%, chronic anemia 17%, left ventricular ejection fraction [EF] 37±14%, EF<40% 58%, NT-proBNP 4568 [2187;7014] pg/ml). Mann-Whitney, Spearman correlation tests were performed. P<0.05 was considered significant.
Results: Median value of LS was 11 (7.8;17.9) kPa. Mild, moderate and severe congestion by BIVA was revealed in 11, 25 and 44.4% of patients. Following median values, prevalence of elevation of ECM markers were revealed: collagen type IV 195.3 (163.2;249.8) μg/l, 97.2%; hyaluronic acid 85.3 (36.9;264.8) ng/ml, 77.8%; YKL-40 168.2 (88.4;228.7) ng/ml, 94.4% and MMP-2 215 (167.5;242.5) ng/ml, 36.1%.
LS significantly correlated with parameters BIVA - R/h (r=-0.578) and Xc/h (r=-0.581). Patients with vs without LS>11 kPa had higher levels of collagen type IV (238.4 (193.9;257.1) vs 163.2 (124.2;196.6) μg/l, p=0.002) and MMP-2 (240.5 (200;292) vs 179.5 (134;222) ng/ml, p=0.006). The similar associations were revealed for group with vs without severe congestion by BIVA: collagen type IV (237 (187.9;286.9) vs 176.5 (124.2;252.5) μg/l, p=0.034) and MMP-2 (241 (212;279) vs 184 (145;225) ng/ml, p=0.026).
Collagen type IV and MMP-2 significantly (p<0.05) correlated with LS (r=0.635 and 0.523) and BIVA parameters: R/h (r=-0.388 and -0.540), Xc/h (r=-0.486 and -0.700). YKL-40 and hyaluronic acid were not associated with LS and BIVA parameters.
There was a trend towards to increase of hyaluronic acid in groups with vs without IVC dilation (94.9 (52.1;404.3) vs 42.1 (19.8;141.2) ng/ml, p=0.059), RV dilation (173.9 (41.3;288.2) vs 56.8 (25.6;92.8) ng/ml, p=0.086) and HF history > 2 years (108.7 (43.4;509.8) vs 64.4 (23.4;92.3) ng/ml, p=0.060). Importantly, hyaluronic acid significantly correlated with LS (r=0.519) in 20 subjects from control group without HF and acute conditions.
Conclusions: Collagen type IV and MMP-2 correlated with LS and BIVA parameters in patients with DHF. Absence of correlations of hyaluronic acid with congestion and tendency towards to higher levels with RV dysfunction and longer history of HF may be indicative for intrinsic liver fibrosis.

P2082

Impact worsening renal function on acute decompensated heart failure, depending on ngal changes

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Background. Our purpose was to determine the value of worsening renal function (WRF) depending on the NGAL and in so-called "wet and warm" patients with acute decompensated heart failure (ADHF).
Methods. In 141 patients with ADHF at the age of 38 to 85 years old (mean age 66,4 ± 2,2) were involved in the prospective study. Worsening renal function (WRF) for creatinine occurred in 38 (27%) patients (WRF+), including 23 pts with increasing NGAL on D3 more than 15% relative to D1 (WRF+NGAL+) and 15 pts without (WRF+NGAL-)
Endpoints were CVP at days 4-6 (D 4-6), dyspnoe by Borg scale, E/E' at discharge (Dsc)
Results. The WRF group with elevated NGAL differed from patients with WRF without elevated NGAL in dyspnoe, E/E' and CVP. In the same time the WRF group without elevated NGAL was comparable with no WRF group (see in table).
Conclusion: In the so-called "wet and warm" patients with ADHF WRF associated with an increase in signs of congestion only in patients with an increase in NGAL after 48 hours.

	No WRF	WRF+ NGAL -	WRF+ NGAL+	P1-2	P1-3	P2-3
Dyspnea Borg D1	7,8 ± 0,47	8,1 ± 0,49	8,9 ± 0,53		p<0,05	
Dyspnea Borg Dsc	2,5 ± 0,15***	2,9 ± 0,17***	4,0 ± 0,24***		p<0,01	p<0,05
CVP,D1	174 ± 10,4	177 ± 10,6	196 ± 11,7		p<0,05	p<0,05
CVP D 4-6	83 ± 4,98***	89 ± 5,34***	110 ± 6,60***		p<0,01	p<0,05
E/E' D1	18,1 ± 1,09	18,6 ± 1,12	20,9 ± 1,25***		p<0,05	p<0,05
E/E' Dsc	12,9 ± 0,77 ***	14,1 ± 0,85**	16,8 ±1,12**		p<0,05	p<0,05

* - p<0,05, ** - p<0,01, *** - p<0,001 compared to D1;

P2083

Natriuretic peptides in prognosticating mortality in acutely ill patients: bad news peptide. Investigation beyond heart failure in a single centre tertiary referral centre.

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Background Natriuretic peptides are commonly used to assist in the diagnosis of heart failure and often used as a biomarker for follow up. We assessed at all NTpBNP results >35000pg/ml performed at our institution, a tertiary cardiology referral centre and dialysis and transplant centre, over a 12 month period.
Methods We assess all eligible patients by accessing the laboratory records of those who had NTpBNP>35000 in 2018, as well as corresponding contemporaneous creatinine, CRP, troponin and clinical data was derived from patient electronic hospital records. Data collected included presence of end stage renal failure (ESRD), history of congestive cardiac failure (CCF), survival status at point of follow up and left ventricular ejection fraction (LVEF) as HFpEF(>45%), HFmEF(45-35%), HFrEF(<35%)as per ESC guidelines.
Results: In our cohort, 71 patients had NTpBNP>35000. The average age was 76(SD +/-13.3), 65% male. Overall 28 had CKD or ESRD, 50% were deceased at follow up and 82% had a history of CCF. 16 patients had recorded troponin-T, 81% with significantly elevated levels (>0.04ng/ml). Of 69 patients with recorded CRP, 62% were >100 with clinical evidence of sepsis.
Overall 30% of patients had both raised CRP and troponin-I with mortality of 57%. Of those without ESRD, average creatinine level was 193(SD +/-84.2). Mortality rates according to LVEF for HFPEF, HFmEF, HfrEF were 67%, 65%, and 48% respectively, and 78% in patients without a echocardiogram.
We divided the data to investigate those with a minimum 6 month follow up; 27 patients, overall mortality 67%. 81% of patients in this category had no ESRD, overall mortality rate 73%.
Of those 15 patients with normal LV function, 4 had features of right ventricular failure and 3 had a diagnosis of a respiratory condition with pulmonary fibrosis, respiratory tract infection, and lung cancer. In addition one patient had systemic sclerosis with RVfailure.
Conclusion: This single centre study demonstrates that a markedly elevated NTpBNP>35000 confers a significant mortality risk of 67% when followed for 6-12 months. Although our numbers are limited, these data raise interesting questions about the prognostic value of NTpBNP measurements irrespective of HF aetiology; sepsis, ACS and AKI may lead to marked elevation in NTpBNP. Interestingly there was no correlation between LVEF, combined raised troponin and sepsis or diagnosis of CKD and mortality. A small subset of patients with normal EF had severely elevated NTpBNP as a consequence of right ventricular failure related to lung pathology.
NTpBNP could potentially be a useful prognostic indicator of mortality on a broad spectrum of acutely ill patients. We plan to follow a larger cohort of patients over an extended period and assess outcomes as a function of treatment for heart failure and other interventions and assess if changes in NTpBNP reflect response to treatment with associated reduction in mortality.

P2084

NT-proBNP as a prognostic marker development of acute kidney injury in patients with acute decompensated heart failure

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Acute kidney injury (AKI) is often observed in patients with acute decompensated heart failure (ADHF), but it is difficult to predict the development of AKI on the severity of heart failure. At the same time N-terminal pro-B type natriuretic peptide (NT-proBNP) is a marker of cardiac stress and reflects the severity of hemodynamic disorders in patients with ADHF. The aim of this study was to investigate possibilities of NT-proBNP in predicting AKI in patients with ADHF.
Methods. 83 patients (55 males, 28 females, mean age was 65±11years) admitted to hospital with ADHF were studied. The main cause of heart failure was a combination of coronary artery disease and arterial hypertension in 70 (84.4%) patients . ADHF was diagnosed and evaluated according to ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure, 2016. AKI was diagnosed according to the KDIGO Guidelines, 2012. NT-proBNP was evaluated with enzyme immunoassay. We did not include patients who were given X-ray contrast agents during hospitalization or 7 days before it for excluding the development of contrast-induced AKI.
Results. The serum level of NT-proBNP in patients with ADHF was 981.0 (95% CI 546.3-1556.1) pg/ml. AKI was diagnosed in 27 (33%) patients. 16 (59%) patients had hospital AKI, 11 (41%) - pre-hospital AKI. The first stage of AKI was in 19 (70%) patients, the second stage – in 5 (19%) and the third stage – in 3 (11%) patients with ADHF. The level of NT-proBNP was significantly higher in patients with AKI compared with patients without AKI: 1.498.6 (95% CI 938.7-2246.2) and 848.7 (95% CI 510.8-1249.9) pg /ml respectively, p=0.003. NT-proBNP showed good diagnostic capabilities in AKI predicting (Cut Point: NT-proBNP> 1304 pg/ml, sensitivity - 63%, specificity - 79%, AUC = 0.70, p=0.001). Logistic regression analysis showed that NT-proBNP more than 1304 pg/ml was associated with a significant increase of AKI risk developing (RR 5.62; 95% CI 2.04–15.48; p <0.001).
Conclusion. The serum level of NT-proBNP more than 1304 pg/ml is associated with a high risk of AKI in patients with acute decompensated heart failure.

P2085

Usefulness of in-hospital loop diuretic amount and diuretic response measurements in patients with acute decompensated heart failure

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Background Intravenous loop diuretic is a landmark treatment in Acute Heart failure (AHF). Despite its wide use, few randomized controlled Trials exist evaluating whether their temporal administration and amount improves or worsens patients outcome.
Purpose: In this study we sought to evaluate:1-different loop diuretic administration in relation to outcome;2-the significance of temporal Diuretic Response (DR) measured over the whole intravenous timing administration.
Methods: AHF patients were screened in relation to loop diuretic dose comparing Low (LD) vs High (HD) dose of drug infusion during hospitalization and oral amount before discharge. DR formula was defined as weight loss/40 mg daily of furosemide and it was examined at day 1, day 3 and during the whole infusion period.
Results 121 AHF patients were consecutively evaluated. ROC curve analysis showed that both infusional treatment and oral diuretic amount at discharge are able to predict poor prognosis (IV dose AUC 0.84; p<0.001; Oral AUC 0.82; p<0.001). DR measured at day 1 (HR 1.69 [1.03-2.80];p=0.04), at day 3 (HR 2.35 [1.41-3.91];p=0.01) and during entire infusion timing period (HR 3.25 [1.92-5.50];p<0.001) were all related to poor outcome. At Multivariable analysis DR measured during the whole infusion (HR 2.45 [1.07-5.66];p=0.03) and oral HD furosemide at discharge (HR 3.36 [1.43-7.88];p=0.005) remained both associated with increased adverse events risk.
Conclusions Both High oral diuretic amount at discharge and low DR during hospitalization are related with adverse outcome. Current analysis could be of potential interest for diuretic dose optimization and strategy after hospitalization.

P2086

Higher daily oral furosemide requirement is a predictor for short term mortality in heart failure patients

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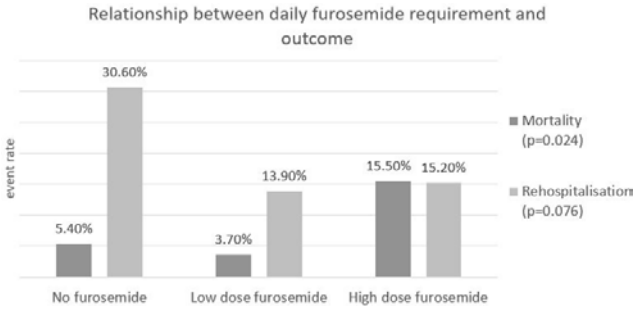
Background: Loop diuretics are widely used to improve symptoms and exercise capacity in both acute and chronic heart failure patients. Although multiple patient physiologies and disease aspects including its severity determine the dosage required to achieve clinical decongestion, little is known about the prognostic implication of daily diuretic dosage.
Purpose: The purpose of this study is to assess whether higher dose of furosemide is a prognostic factor for worse outcome in patients after discharged from hospitalisation with acute heart failure.
Methods: We conducted a prospective study of 191 consecutive patients admitted due to acute heart failure. Patients fulfilled Framingham criteria for the diagnosis. Doses of oral furosemide at the time of discharge were reviewed whether patients were prescribed with high dose furosemide (≥80 mg/day), low dose furosemide (<80 mg/day) or were loop diuretics free. Outcomes gathered were 30-day all-cause mortality and 30-day rehospitalisation. Chi-square and ANOVA were used for analysis.
Results: Of 191 patients enrolled (mean age 68.41, 53.4% male, mean ejection fraction 36.7%), majority required high dose furosemide (82 patients, 42.93%) compared to those prescribed low dose and no furosemide (64 patients, 33.51% and 45 patients, 23.56% respectively). Age, comorbidity and concurrent treatment with oral disease-modifying heart failure therapy were not different among groups. Patients receiving high dose furosemide had higher NYHA classification (p=0.03). High dose furosemide group showed higher rate of 30-day mortality than low dose group and furosemide free group (15.5% vs 3.7% vs 5.4%, p=0.024). Although 30-day rehospitalisation rate was high in patients not receiving furosemide, no significant difference was found between groups (p=0.076).
Conclusion: Patients requiring higher dose furosemide show to be at increased risks for short term mortality. When prescribing heart failure patients with high dose

diuretics, physician may arrange for closer follow-ups and additional management strategy should be in place in order to prevent adverse disease outcome.



P2087

Interest of Ivabradine in patients with cardiac failure treated with Dobutamine

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Background Ivabradine is a selective and specific inhibitor of the pacemaker If current that acts at the sinus node without interfering with cardiac flow and contractility parameters.
Purpose The purpose of the study was to evaluate the changes induced by the slowing of the pacemaker. heart rate by Ivabradine on cardiac output myocardial function in chronic heart failure patients treated with dobutamine.
Methods The study included 20 subjects admitted for acute heart failure, of which 11 received in addition to ivabradine dobutamine. All subjects received ultrasound before and after treatment with ivabradine (3 hours after oral administration of ivabradine 5 mg) .
Results Interestingly, the increase in Dobutamine cardiac output was significantly greater after treatment with Ivabradine (37 ± 9% vs. 27 ± 10%, r <0.001), and was correlated with the reduction in heart rate and the improvement of left ventricular filling.
Conclusion In subjects with heart failure, the reduction in heart rate achieved with ivabradine appears to improve myocardial contractility and cardiac output for a similar dose of dobutamine. This effect is beneficial in the management of patients with acute heart failure who have catecholamine-induced tachycardia.

P2088

The change in noninvasively measured left ventricular end diastolic pressure during outpatient intravenous diuresis is related to ejection fraction and initial filling pressure

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Background: The ability to measure left ventricular (LV) filling pressure has shown improvement in heart failure (HF) outpatient outcomes. We have developed a non-invasive device that determines LV end diastolic pressure (LVEDP) based on pulse amplitude changes of a finger photoplethysmography signal in response to a standardized Valsalva maneuver (VM).
Purpose: To evaluate how outpatient LVEDP and hemodynamic response to one session of IV diuresis compares in HF patients with preserved and non-preserved ejection fractions.
Methods: HF outpatients (n=50) undergoing 76 sessions of diuresis with IV furosemide ± metolazone were enrolled. Each participant performed a VM effort of 20 mmHg for 10 seconds into a pressure transducer pre-, and post- (120 minutes after), diuretic administration. LVEDP was calculated in real-time using a previously developed equation. Participants were grouped as having either preserved ejection fraction (HFpEF, EF >50%), moderate ejection fraction (HFmEF, EF 40-49%), or reduced ejection fraction (HFrEF, EF 1-39%). Elevated LVEDP was defined as > 16mmHg.
Results: Mean age 65 +-13 years (46% female; 56% Caucasian); mean LV ejection fraction (EF) was 47±17%. 28 patients had preserved ejection fraction (57%) and 21 (43%) patients did not (13 HFrEF, 8 HFmEF). Mean initial LVEDP was 19.0 +- 4.6 mmHg; mean change in LVEDP was 0.5 +-3.3mmHg; mean urine output (UOP) was 1052 +- 538cc; mean change in weight was 1.0 +- 0.5kg. One participant did not complete testing.
Mean initial LVEDP was 18.6 mmHg in patients with HFpEF and 20.8 mmHg in participants with HFrEF or HFmEF (p = 0.043). There was no detectable difference in LVEDP from pre- to post-diuresis in a single session (20.8 ± 5.6 mmHg versus 20.7 ± 6.0 mmHg, p=0.47) in participants with HFrEF or HFmEF. There was a significant difference in LVEDP (18.6 ± 3.6 mmHg versus 17.8±5.6 mmHg, p=0.047) in HFpEF patients.
Amongst the three groups, there was no significant difference detected in initial LVEDP (p = 0.13) or change in LVEDP (p = 0.62). Regardless of EF, a significant change in LVEDP with a single session of diuresis occurred in participants that had elevated initial LVEDP (p = 0.005) but not in those with non-elevated initial LVEDP (p = 0.12).
Conclusion: Noninvasively measured LVEDP decreased with a single session of outpatient diuresis in HF patients with preserved ejection fractions but not those with non-preserved ejection fractions. This is likely explained by the steeper pressure-volume relation in patients with preserved ejection fractions as compared to those with non-preserved ejection fractions. Participants with non-preserved ejection fractions presented with a higher LVEDP than those with preserved ejection fractions. This may represent clinical tolerance of higher LVEDPs of patients with non-preserved ejection fractions due to the shallowness of their pressure-volume relation curve.

P2089

Patterns of access to medical care in acute myocardial infarction

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Introduction: Despite the recommendations, a significant proportion of patients [pts] with acute myocardial infarction [AMI] do not activate the Emergency Medical Systems [EMS], thus placing themselves in situations of greater and unnecessary risk.
Purpose: To determine the type of access to medical care in AMI and to evaluate why some pts do not use the EMS.
Methods: It was conducted a prospective survey study of pts with AMI, admitted between June and December of 2018, which included a questionnaire (performed in the first 24h of admission) and consultation of the clinical records.
Results: 95 pts, of whom 73% were male, with a mean age of 63.8 years (95% CI: 61.2 - 66.5) were initially evaluated. 94.4% of the pts considered that in the presence of symptoms suggestive of AMI, EMS should be activated. However, 47.4% (n=45) did not call the EMS and constituted this study population. The time from the symptoms onset to FMC was longer than 24h in 22.2% and in those who took < 24 hours, the mean delay was 153 minutes (95% CI: 113-192). The FMC was: emergency department of public (51.2%) and private (25.6%) hospitals, family doctor (16.3%) and private physician (7%). These pts sought the FMC alone in 20.9% and accompanied in 79.1% and the transport used was: personal car in 81.4% (driving in 28.6%; conducted by third person in 71.4%), public transport in 11.6%, taxi in 4.7% and walking in 2.3%. Although the majority of these pts (82.2%) had typical chest pain, the main reason for not calling the EMS was thinking the condition wasn't serious enough (65.9%). Other reasons were: EMS would take longer - 17.1%; symptoms would pass - 9.8%; other - 7.3%.
Conclusions: Unfortunately, there is a significant proportion of pts with AMI that do not use the EMS and directly seek medical care and this was principally due to an underestimation of the severity of the disease. Implementation of educational programs is imperative, to ensure more appropriate use of the EMS.

P2090

Acute heart failure has many faces- clinical characteristics, response to the treatment and long-term outcome in patients with different physical presentations of cardiac decompensation.

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Background. The severity and onerousness of cardiac decompensation signs and symptoms force patients with acute heart failure (HF) to seek urgent medical help. Acute HF may manifest as a peripheral, central, both types of congestion or none of them. The prevalence of cardiac decompensation signs, its association with patients' clinical characteristics and long-term outcome have not been well established.

Purpose. The aim of this study was to characterize patients with acute HF and assess their long-term outcome according to the signs of congestion presented during hospital admission.
Methods. We investigated 360 patients (mean age: 68±13 years, 77 % men) hospitalized due to acute HF, who were divided according to the type of physical signs of cardiovascular decompensation on admission to the hospital into four groups: A- patients with no physical signs on admission (n=8, 2 %), B- those with isolated pulmonary congestion (n=52, 14 %), C- patients with isolated peripheral signs (peripheral oedema, ascites, hepatomegaly, elevated jugular venous pressure; n=31, 9 %), D- those with mixed signs of acute HF (pulmonary and peripheral congestion; n=269, 75%). Concomitant acute coronary syndrome was a criteria for exclusion from the study.
Results. There was a difference in the baseline level of NT-proBNP between studied groups, with the highest level in patients with lung and peripheral congestion (A vs. B. vs. C vs. D: 4905 [2102-9579] vs. 4113 [2495-7980] vs. 3634 [2772-6372] vs. 6093 [3646-11958] pg/mL, P=0.007). In group D there was also a highest percentage of patients with HF de novo (A vs. B. vs. C vs. D: 25 vs. 54 vs. 57 vs. 74%, P=0.0006). Patients with isolated signs of lung congestion had the highest systolic blood pressure (SBP) on admission (A vs. B. vs. C vs. D: 139±39 vs. 141±36 vs. 120±20 vs. 127±29 mmHg, P=0.007) and the biggest change in SBP after 24 and 48 hours (P<0.01 in both comparisons). There were also differences in urea, bilirubin, white and red blood cells, C-reactive protein, GGTP, albumin level, weight and heart rate change after 24 and 48 hours between studied groups (P<0.05 for all comparisons). After one year of follow up there was a difference in all-cause mortality (A vs. B. vs. C vs. D: 0 vs. 12 vs. 28 vs. 29%, P=0.02).
There were no other differences in baseline clinical characteristics and laboratory indices.
Conclusions. Patterns of physical signs of acute HF are associated with baseline differences in clinical characteristics, treatment response and the long-term outcome. Therefore, better understanding of the pathophysiology underlying the acute HF signs, especially a fluid overload caused either by fluid redistribution or by fluid accumulation is needed to correctly determine goals of the therapy.

P2091

Recognition of risk factors and symptoms of acute myocardial infarction

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Introduction: Health education for the general public is essential to ensure better medical care. Specifically in Acute Myocardial Infarction (AMI), symptom recognition is critical to ensure proper and prompt activation of the necessary medical care for the best treatment of this disease.
Purpose: To assess the knowledge of patients (pts) admitted with AMI about cardiovascular risk factors (CVRF) and symptoms of this disease, as well as their ability to recognize these symptoms during the acute event.
Methods: Prospective evaluation of pts admitted with AMI between June and December of 2018. The survey included a questionnaire (performed in the first 24h of admission) and consultation of the clinical records.
Results: The study population consisted of 95 pts, of whom 73% were male, with a mean age of 63.8 years (95% CI: 61.2 - 66.5). Almost all pts (96.8%) had at least one CVRF, but only 35.8% considered to have any of. When asked, the majority of pts correctly considered the following conditions as CVRF: smoking – 96.6%, hypertension –95.5%, obesity – 94.4%, dyslipidemia - 92.1%, sedentary lifestyle – 86.5%, diabetes – 84.3%, family history of coronary heart disease – 84.3%. Recognition of AMI symptoms was assessed by asking the pts from a list of typical symptoms and others not related to AMI. 19.6% declare that did not know the symptoms of AMI. Among pts who reported to know these symptoms, the most frequently identified were central chest pain (100%), dyspnea (79.7%) and diaphoresis (72.6%), while pain in other classic locations -epigastrium/left arm/neck (67.1%) and nausea/vomiting (54.8%) were sub-identified. Furthermore, 65.3% mistakenly attributed non-cardiac symptoms to AMI, especially symptoms of stroke, such as hemiparesis (67.1%), paresthesia (61.6%) and dysarthria (49.3%). At the acute phase of the event, less than half of the pts (45.2%) thought that they were having an AMI. The remaining attributed their symptoms to: indigestion - 37.8%, anxiety – 13.3%, respiratory causes – 11.1%, muscular causes – 8.9% and others – 17.8%, while 11.1% did not consider their symptoms to be serious. From the total population, 28.4% had previous history of ACS/stable coronary heart disease (PHD) and these pts were more capable to attribute their symptoms during the event to an AMI(70.4% vs 34.8%; p=0.002).
Conclusions: Although most pts were able to theoretically identify the main symptoms and CVRF for AMI, in practice this did not translate into a correct identification of the acute event in more than half of them. Pts with PHD were more effective in assigning their symptoms to an AMI, even though there was still a significant proportion of these that were not capable to do that. These findings may have important and adverse implications on the clinical outcomes.

P2092

When is heart failure not heart failure?

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Background/ introduction: The diagnosis of heart failure is based on the history, clinical findings and specialist investigations. A single measurement of B-type natriuretic peptide (BNP) over 100ng/l or a N-terminal pro-B-type natriuretic peptide (NT-proBNP) over 300ng/l is suggestive of heart failure and should prompt a transthoracic echocardiogram within 48 hours to help guide early specialist management. If the serum peptides and transthoracic echocardiogram are normal, despite clinical overload, an alternative diagnosis should be sought after such as liver disease or nephrotic syndrome.
Purpose Identifying patients with heart failure is critical in ensuring that their care processes are streamlined and life prolonging medications are commenced and up titrated to the maximal tolerated doses. Evidence has shown that patients on optimal therapy in conditions such as left ventricular systolic dysfunction have a significantly better prognosis than those without treatment. We aimed to identify the number of patients incorrectly coded as having heart failure despite having a normal serum BNP and echocardiogram.
Methods A retrospective data search was performed on all patients that were discharged from our centre in a 6 month period with the coding of any of the following; 'Heart failure, unspecified', 'Congestive Cardiac failure' or 'Left Ventricular Failure'. Echocardiogram reports for these patients were then assessed for features of heart failure and ejection fractions were recorded. Those with no evidence of heart failure on echocardiography were also assessed using their medical notes and BNP to correlate the echocardiogram findings with an alternate diagnosis.
Results 107 patients were discharged from our centre with the coding of either CCF, LVF or heart failure. Of these 95 had an echocardiogram performed before discharge of which 44 patients had evidence of LVSD and 27 had evidence of heart failure with preserved ejection fraction. The remaining 24 patients did not have any evidence of heart failure on their echocardiogram (6 of these had a small rise in their BNP which could be explained by other causes).
Conclusion Around a quarter of the admissions which were coded as CCF during this 6 month period had normal BNP's and normal transthoracic echocardiograms. Despite this they were discharged with the diagnosis of heart failure and therefore the alternative causes of fluid overloaded were not sufficiently investigated. We suggest that all patients with a normal BNP and echocardiogram have a protein: creatinine ratio and an albumin level to look for alternative causes of the fluid overload. Ensuring that heart failure registers only contain patients with heart failure will help cardiologists and HF nurse specialists focus their efforts on the most at risk patients.

P2093

Frequency and severity of geriatric syndromes in elderly patients with acute coronary syndrome in relation to left ventricular ejection fraction

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Background. Frailty reflects the complex functional disorders and is associated with negative outcomes both in patients with acute coronary syndrome (ACS) and in heart failure (HF) patients. The aim of the study was to characterized geriatric syndromes and risk scales in ACS elderly patients depending on left ventricular ejection fraction (EF).
Methods. 6-month prospective study included 130 patients ≥75 years (83±5 years, arterial hypertension 92%, previous myocardial infarction 32%, atrial fibrillation 32%, diabetes 27%, chronic HF 77%, acute HF (Killip I - 60%, II- 29.2%, III - 10%, IV- 0.8%) admitted with MI (75%) or unstable angina (25%). Frailty by national validated questionnaire, physical disability (Barthel index), functional mobility, nutritional status (Mini Nutrition Assessment), cognitive function (Mini Mental State Examination), morale scale, Charlson Comorbidity Index (CCI), mortality (GRACE) and hemorrhagic risks (CRUSADE scale) were compared by groups depending on EF. Outcomes data were available for 118 patients.
Results. Patients with vs without frailty had similar EF and incidence of reduced EF. Patients with vs without EF <40% were characterized by similar incidence (77,1 vs 62,1 %, p=0,11) and severity of frailty (3 (3;4) vs 3 (2;4), p=0,28) and cognitive function (27 (24;31) vs 29 (24;31), p=0.43), functional mobility (35 (29.5;38) vs 36 (30;38), p=0.29), nutritional status (23.5(22;25) vs 22.5 (21;24), p=0.07), morale scale (35 (18;48) vs 46 (21;50), p=0.13), and other, except higher incidence of malnutrition (5.7 vs 0%, p=0.019).
8.6 % of the participants with EF <40% were non-frail, 14.3 % pre-frail and 77.1 % frail.
Overall, disorders of functional mobility were revealed in 100% of patients with EF <40% (mild and moderate in 57.1 and 42.9%); 25.7 and 42.8% of patients had mild

and moderate physical disability of daily living. The risk of malnutrition was revealed in 51,4% of patients, two (5,7%) patients were malnourished. 40% of patients had cognitive dysfunction (mild 25.7%, moderate 14,3%), 8,5% of patients had mild violations in morale scale.
EF<40% was associated with higher CCI (7.4±1.8 vs 6.5±1.5 points, p<0.05), hemorrhagic risk (50.8±10.9 vs 45.9±9.2 points, p<0.05) and risk of mortality (181.1±40.7 vs 153.3±29.8 points, p<0.01).
There were no differences in length of hospital stay, in-hospital mortality, 6-month mortality between EF groups.
Conclusion. Among elderly ACS patients incidence and severity of frailty was not associated with EF. Elderly patients with reduced EF were characterized only by higher incidence of malnutrition and higher risk of ischemic and hemorrhagic complications.

P2094
Is dyspnoea a different sign in men and women with ACS?

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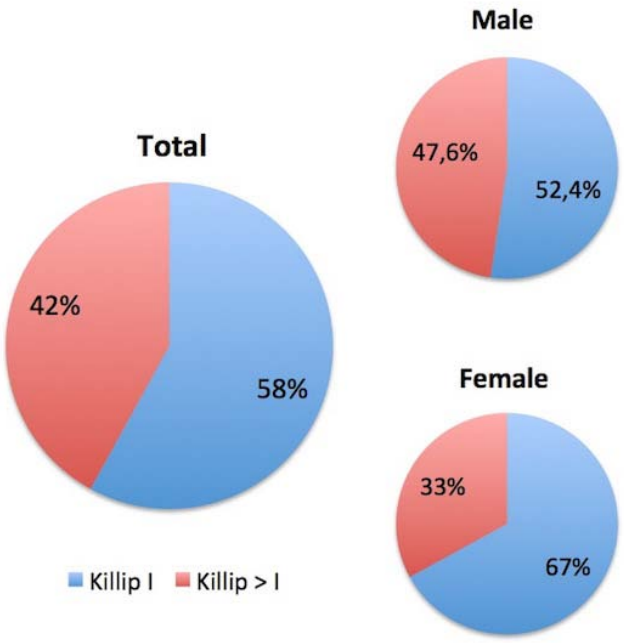
Introduction: Atypical symptoms are more frequently described by women with ACS. This differences in clinical presentation has traditionally been identified as one of the reasons of delayed diagnosis and poorer outcomes in women with ACS.
Methods: An observational study was designed in order to evaluate if dyspnoea at admission was related to acute heart failure while hospitalisation due to an ACS. A comparison analysis between gender was accomplished.
Results: A total of 243 patients (from a database of 1042 patients admitted due to ACS in ten tertiary-care Spanish hospitals) referred dyspnoea at admission. Meanwhile, 142 (58%) of them referred dyspnoea but did not show pulmonary congestion or heart failure signs.
Women represented 41% (100) of the sample. Baseline characteristics between men and women included are reflected in table 1. In the group of men with dyspnoea at admission, 68 (47,6%) were on Killip-Kimball class > I, whereas only 33 (33,0%) patients of the female group (p 0,024). As a result, regarding women admitted with ACS diagnose, two out of three of them are in Killip-Kimball class I in spite of feeling breathlessness (with or without chest discomfort associated).
Conclusions: Presence of dyspnoea at admission due to ACS was less frequently related to an acute heart failure state between women. This symptom might reflect more an atypical angina pattern than a congestive state.

Male	Female	P	
Age (years)	68,1 ± 13,0	71,9 ± 11,3	0,035
Smoking	95 (66,0%)	29 (28,7%)	0,001
Hypertension	90 (62,5%)	78 (77,2%)	0,015
Diabetes	58 (40,3%)	44 (43,6%)	0,607
Dyslipidemia	82 (56,9%)	60 (59,4%)	0,701
CKD	13 (9,0%)	11 (10,9%)	0,629
COPD	27 (18,8%)	7 (6,9%)	0,008
AMI	49(34,0%)	23 (22,8%)	0,057
AF	13 (9,0%)	13 (12,9%)	0,336
Peripheral arteriopathy	28 (19,4%)	13 (12,9%)	0,175
Admission due to HF	14 (9,7%)	15 (14,9%)	0,221
Diuretics	30 (20,8%)	32 (32,0%)	0,049

CKD= chronic kidney disease; COPD= chronic obstructive pulmonary disease; AMI= acute myocardial infarction; AF= atrial fibrillation; HF= heart failure;



P2095
Acute decompensated heart failure therapy enriched with angiotensin-neprilysin inhibitor, a single-center real life experience.

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Background: Sacubitril/valsartan therapy initiation has been intensively studied among patients with acute decompensated heart failure(HF) in the last years.
Methods: We enrolled in observational cohort study 18 patients(age 55(35-70) years,14 males)who were hospitalized due to acutely decompensated congestive HF from June to September, year 2018. HF was caused by CHD(5 patients), a hypertensive heart disease(8 patients), a dilated cardiomyopathy(5 patients). All these patients had a significantly increased NT-proBNP level(5000pg/ml on average); no hypotensive patients were enrolled. At the admission all patients received therapy with beta-blocker,ACEI, mineralocorticoid antagonist and intravenous(i/v) diuretics. After detection of LV EF <35% and i/v diuretics change to perioral, ACEI was switched to angiotensin-neprilysin inhibitor. Doses of sacubitril/valsartan were optimized to individual tolerance. Distance of six minute walk test(6MWT), ECHO parameters and laboratory analyses results received before patient's discharge from the hospital were compared to ones obtained after 3 months.
Results: Statistically significant increase of 6MWT distance, ECHO signs of reverse heart remodelling and renal function improvement were found(see table). None of studied patients died, experienced hypotension, was rehospitalized or cancelled sacubitril/valsartan therapy due to adverse effects during the 3 month long follow-up period.

Dynamics of ECHO, GFR and 6MWT distance			
Characteristic	Inclusion	After 3 months	P - value
EF(%)(mean(SD))	28(5)	36(4)	.012
EDD(mm)(mean(SD))	66(9)	61(7)	.008
EDS(mm)(mean(SD))	55(8)	50(7)	.003
LAVI(ml/m)(mean(SD))	61(16)	48(15)	.032
RVD(mm)(mean(SD))	39(5)	34(5)	.001
TAPSE(mm)(mean(SD))	16(3)	19(2)	.001
GFR(ml/min)(mean(SD))	57(25)	62(14)	.000
6MWT(m)(mean(SD))	303(49)	371(74)	.000

EF- Left ventricular (LV) ejection fraction; EDD- end-diastolic LV diameter; EDS- end-systolic LV diameter; LAVI- left atrial volume index; RVD- right ventricle diameter; TAPSE- tricuspid annular plane systolic excursion; GFR- glomerular filtration rate; 6MWT - six minute walk test distance.

Conclusions: An advanced medication therapy of decompensated HFrEF including sacubitril/valsartan improved study patients functional status, ECHO parameters and renal function. Early inclusion of sacubitril/valsartan in decompensated HFrEF therapy scheme was safe in the study population.

P2096

Evolution of level of evidence c recommendations in European Society of Cardiology clinical practice guidelines on heart failure

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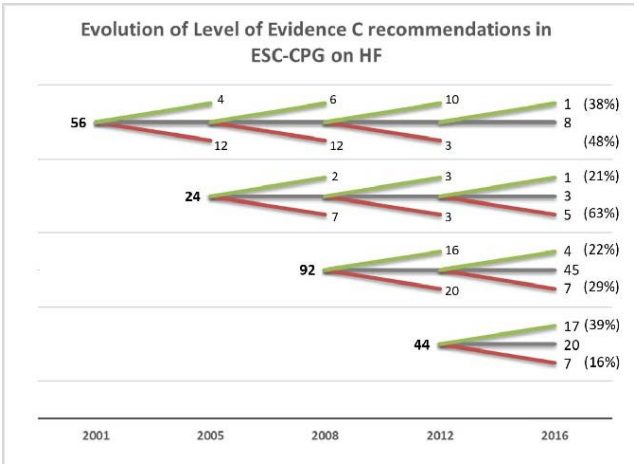
Background: Over the past two decades, the European Society of Cardiology (ESC) Clinical Practice Guidelines (CPG) on Heart Failure have increasingly become a familiar part of Cardiology practice and are used worldwide. Level of Evidence C recommendations are based on expert consensus and/or small retrospective studies and registries with limited and non-representative populations evaluated. Furthermore, Task Force members for a given subject are often unbalanced on specialty.
Purpose: The purpose of our study was to describe and evaluate the evolution of Level of Evidence C recommendations of ESC CPG on Heart Failure and to provide a quality assessment of its benefits in the following years.
Methods: In this retrospective observational Case-Control study, we identified and collected all Level of Evidence C recommendations in five consecutive published documents of ESC CPG in the years 2001, 2005, 2008, 2012 and 2016. Each identified recommendation was classified between two major groups: Diagnostic and Complementary Exams (group 1) and Therapeutics and Interventions (group 2) and were followed up in the following documents. Primary outcomes were classified as: (1) Upgrade to Level of Evidence A or B [Upgrade], (2) Elimination or disproven benefit/harm [Downgrade] and (3) Maintenance or minor reformulation with unchanged benefit/harm [Maintenance]. We applied Kaplan-Meyer survival analysis to estimate the probability of Upgrade or Downgrade in each group.
Results: A total of 239 different Level of Evidence C recommendations were submitted to final analysis, 22.6% (n=54) in group 1 and 77.4% (n=185) in group 2. On follow-up, 35.2% (n=76) of recommendations were upgraded, 29.6% (n=64) were downgraded and 35.2% (n=76) were maintained. Regarding outcomes, downgrade of recommendations occurred predominantly in the Therapeutic and Interventions group (94.4%). Considering all the eliminated recommendations, 60.9% took place on the next following published ESC CPG document. Likewise, 60.5% of upgraded recommendations also occurred on the next following published ESC CPG document. The probability of upgrade or downgrade in the next following document was 52.8%, predominantly in the Therapeutics and Interventions group (37.5% vs 57.9%, p=0.012).
Conclusions: Level of Evidence C recommendations constitute an important asset of ESC CPG on Heart Failure as they are usually updated on new treatment options and are developed by experts in the specific topic. However, the probability of elimination due to disproven benefit or potential harm was high (29.6%), particularly regarding therapeutics and interventions (94%). Since a significant fraction of Level of Evidence C recommendations remain unchanged on the following document (35%), the need for high quality data derived from randomized trials or meta-analyses for prompt revalidation, specifically regarding therapeutic interventions, is warranted.



P2097

Association between 1-year blood pressure level and 1-year heart failure events in hypertensive patients with acute myocardial infarction

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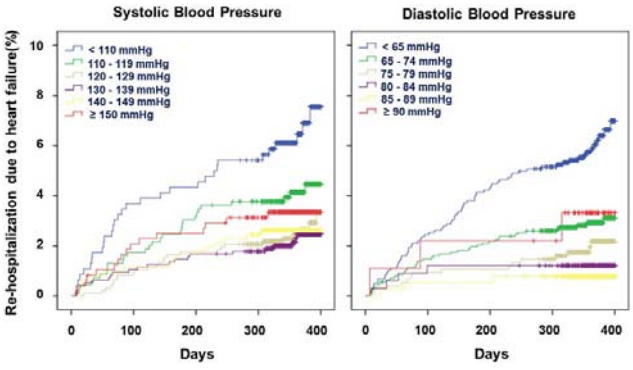
Background;Hypertension is the most prevalent modifiable risk factor for the development of heart failure (HF). Elevated blood pressure (BP) increases the pressure load on the left ventricle, causing systolic and diastolic dysfunction of the left ventricle and promoting left ventricular remodeling.In recent study, systolic BP and diastolic BP lower or higher than optimal level increased clinical events in hypertensive patients with stable coronary artery disease. This study aimed to investigate the association between 1-year BP level and 1-year HF events in hypertensive patients with acute myocardial infarction (AMI).
Methods: Among 13,104 patients who enrolled in nationwide AMI database of South Korea, the KAMIR-NIH Registry, 4,166 hypertensive patients, who had 1-year BP data, were selected in this study. They were divided into six systolic or diastolic BP groups according to BP levels.
Results;Lowest 1-year systolic BP group of <110 mmHg had the highest 1-year readmission due to heart failure (7.6± 1.4%). Lowest 1-year diastolic BP group of <65 mmHg also showed the highest 1-year re-hospitalization due to heart failure (7.0 ± 0.9%). On univariate and multivariate Cox-proportional hazard analysis with 1-year systolic BP 130-139 mmHg or diastolic BP 90-99 mmHg as a reference respectively, lower systolic BP (<110 and 110~119 mmHg) or diastolic BP (<70 and 70~79 mmHg) than reference group increased 1-year re-hospitalization due to heart failure. However, on multivariate analysis including age, gender, Killip class, renal function, and left ventricular systolic function, lowest systolic BP and lowest diastolic BP was a significant risk factor for 1-year re-hospitalization due to heart failure.
Conclusion;Systolic and diastolic BP lower than optimal level at 1-year increased 1-year re-hospitalization due to heart failure in hypertensive patients with AMI.



Re-hospitalization due to heart failure

P2098

Renal function changes in decongestion of patients with acute heart failure: independent predictor for mortality or just confounder?

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Table P2097. Multivariate Cox-proportional hazards analysis for 1-year rehospitalization due to heat failure according to blood pressure
Cox-proportional hazards analysis

systolic BP(mmHg)	No.	HR	95% CI	p value	Diastolic BP(mmHg)	No.	HR	95% CI	p value
<110	461	2.40	1.37-4.18	0.002	<70	1,184	3.89	1.22-12.44	0.022
110-119	690	1.74	0.98-3.06	0.057	70-79	1,426	2.44	0.75-7.90	0.138
120-129	968	1.06	0.60-1.89	0.840	80-84	749	2.08	0.60-7.24	0.251
130-139	955	1.00	Reference		85-89	331	1.59	0.35-7.11	0.545
140-149	611	0.95	0.49-1.84	0.883	90-99	385	1.00	Reference	
≥150	481	1.10	0.57-2.10	0.781	≥100	91	4.77	0.96-23.68	0.056

BP; blood pressure, CI; confidence interval, HR; hazard ratio *Multivariate Cox-proportional hazard analysis including age, sex, BMI, DM, prior angina, prior MI, prior HF, Killip class, smoking, CKD, beta-blockers, inhibitors of RAS, statins, LV ejection fraction, and STEMI as co-variates

Background Renal function change is common during decongestion of patients with acute decompensated heart failure. Worsening renal function (WRF) during decongestion has been considered as a predictor for poor prognosis. In post-hoc analysis of DOSE trial, improvement of renal function (IRF) during decongestion was also strongly associated with poor outcomes. This study was aimed to analysis 1) the characteristics and prognosis of the patients with WRF and IRF and 2) association between renal function changes and other confounders to evaluate the causal relation of renal function changes to prognosis of patients with acute heart failure.
Methods From Korean acute heart failure registry, 4,364 in-hospital survivors were included. WRF and IRF was defined as more than 0.3mg/dL decrease and increase of serum creatinine at discharge compared to that at admission. Patients underwent renal replacement therapy during index admission were excluded. Composite event of all-cause mortality and hospitalization for hear failure was evaluated as prognosis.
Results During 1-year follow-up, composite event was observed in 32.7% of patients. Patients classified as WRF and IRF was 359 (8.2%) and 806 (18.5%) patients, respectively. In patients with WRF and IRF, 1-year event was observed in 40.1% and 39.7%, which was significantly higher event rate compared to 30.2% of patients with stationary renal function (SRF) (WRF vs. SRF; p<0.001, IRF vs. SRF p<0.001). However, change in renal function more than 0.3mg/dL, whether increase or decrease, was highly dependent upon natriuretic peptide level and baseline serum creatinine level. Renal function change occurs in 8.0%, 12.6%, 36.2%, 65.9%, and 88.1% in patients with initial estimated glomerular filtration rate (eGFR) >90, 60-89, 30-59, 15-30, and < 15 mg/mmol, respectively (p<0.001). Renal function change also occurs more frequently depending on the increase of natriuretic peptide levels. (18.2%, 23.15, and 38.7%, p<0.001). Impact of renal function change on prognosis was completely neutralized after adjusting the baseline eGFR and natriuretic peptide levels, and baseline renal function and natriuretic peptide levels remained independent predictor for prognosis. Those findings are implying that changes in renal function, whether increase or decrease, can be a clinical confounder and may not have a causal relationship with prognosis.
Conclusions WRF and IRF was associated with poor prognosis. However renal function changes largely depend upon baseline renal function and natriuretic peptide level, which are proven prognostic indicators for patient with heart failure. Changes in renal function during decongestion can be a clinical confounder rather than independent prognostic indicator.

P2100
Low T3, it is not the same. Part II.

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Intro: Two years ago, we analyzed that our patients (p) with low T3 had a worse prognosis than the normal one, regardless the rest of the thyroid profile. We add p to our statistics, so we want to figure if this difference remains significantly.Objective: To establish the difference between p hospitalized with decompensating heart failure (DHF) according to T3 values (normal or diminished).
Method: A retrospective analysis of 578 patients (p) admitted for DHF, consecutively, in our Cardiology Department, from June 2012 to December 2018. Median follows up: 44 months (27 – 64). We divided 2 groups according to admission T3 values (normal T3 60-220 ng/dl): NT3: normal T3 (274 p) and LT3: low T3 (201 p). Quantitative variables were expressed with median (m) and quartiles (analyzed by Mann Whitney's Test). Dichotomous variables were analyzed by Chi^2.
Results: Median age was 69 years old in NT3 and 78 years old in LT3, with statistically significant difference (SSD); there was a higher prevalence of males in NT3. Those p in LT3 required more days at hospital (p=0.01), had more valvular etiology (p=0.006), smaller ventricular diameters (LVED p=0.0017 and LVES p=0.0008) and more p with preserved ejection fraction. On LT3, labs values were worst: BNP at admission (A) and at discharge (D) and renal function (RF) (urea and creatinine, A and D) were higher, with also, worst 24 hours glomerular filtration rate (all of them with SSD). We observed, otherwise, that on NT3 there was higher worsening RF during hospitalization. NT3 had more sinus rhythm (p=0.003).
There was more in-hospital mortality on LT3 (p=0.0135), without any difference on mortality or rehospitalization on the follow-up.
Conclusions: Patients with low T3 were associated with worst hospital outcome, also showed a subgroup with more serious heart failure. We believe it is very important to detect this sort of patients in admission to be aware of and to adjust treatment. Hormonal replace treatment is still controversial.

P2101
Determinants and consequences of new acute kidney injury in acutely decompensated heart failure: a retrospective analysis at a tertiary australian centre

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Background: Acute Kidney Injury (AKI) is common in patients with acutely decompensated heart failure (ADHF), but few studies have reported routinely assessed renal function early post-discharge. We sought to determine the determinants of serum creatinine (SCr) and incidence of new AKI within 2 weeks of discharge from index admission.
Method: Patients with ADHF admitted to a single tertiary centre (July 2015 – July 2017, adjudicated by Boston criteria), excluding those with ongoing dialysis, were included. AKI was defined by the KDIGO criteria, (a raise in creatinine levels >30mg/L or an increase of 50% from baseline levels); incident post-discharge AKI [AKI(post)] was defined as AKI occurring within 30 days of discharge, in those without AKI during index admission. Determinants of follow-up SCr [SCr(post)] and incident AKI(post) were evaluated were evaluated using multivariate models.
Results: 375 patients (median age 82 years, 54% male, 51% HFpEF) had SCr(post) determined at a median of 8 days post discharge. Incident AKI(post) occurred in 39 (11%), was mainly mild and was associated with higher mean creatinine at both baseline (mean 118 vs 93umol/L, p <0.001) and admission (129 and 98umol/L, p<0.001). Median length of index hospital admission was significantly longer in the AKI(post) group (6 vs 4 days; p<0.02) and the mean number of days to readmission 33 versus 65 in the remainder (p <0.001). Determinants of SCr(post) included discharge SCr (p<0.0001), admission SCr (p<0.001) and baseline SCr (p<0.04), as well as ischaemic aetiology of heart failure (p<0.05). Determinants of AKI(post) included, both baseline and discharge serum creatinine (p<0.0001), MAP at presentation (p<0.03) and ischaemic aetiology (p<0.02). Pharmacotherapies including diuretics were not associated with excess AKI(post).
Conclusion: Routine post-discharge screening of SCr reveals a significant post-discharge incidence of AKI in those not manifesting AKI. This may represent another facet of the complex pathophysiology of renal injury in ADHF, for which predictive models need to be refined. Although an excess of rehospitalisation is not surprising in this group, preventative strategies may specifically offset this risk.

P2102

Clinical characteristics of patients with acute heart failure with adverse reactions to anticoagulation. Clinical impact of time in therapeutic range with acenocoumarol

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Introduction: Generally, patients with acute heart failure (HF) require oral anticoagulation for the treatment of other comorbidities such as atrial fibrillation.

Goals: To assess the impact of INR lability, defined as therapeutic time in the range of less than 60% in the last 6 months (TTR <60%), in patients diagnosed with HF who have presented an adverse effect related to oral anticoagulation.

Methods: Retrospective and cross-sectional study of 180 patients hospitalized in the San Carlos Clinical Complex, during the period from January 2016 to July 2018. All presented as diagnoses HF and adverse reaction to oral anticoagulation with acenocoumarol (overdosage, underdosage, hemorrhage or thrombosis), and were divided into two groups according to whether they presented TTR <60% or not.

Clinical characteristics (CHADSVASC, HASBLED), analytical (INR, hemoglobin, glomerular filtration according to the CKD-EPI formula), therapeutic and prognostic characteristics (readmission at 30 days, mortality) were collected and compared between the two groups described. A bivariate analysis was performed with Student's T and Chi-square, using SPSS v23 (statistical significance of $p < 0.05$).

Results: Of the 180 patients, the mean of age was 82 years, 56% were women of whom 52.8% had TTR <60%. Patients with TTR <60% had a higher score of CHADSVASC (4.8 vs 4.4, p = 0.09) and HASBLED (4.1 vs 2.7, p <0.05), higher INR value at the time of the event (5.8 vs 4.7, p <0.05), lower hemoglobin (11.6 vs 12.8, p = 0.09) and glomerular filtration (48.7 vs 51, p = 0.501). They also had a higher re-entry rate at 30 days (24.2% vs 14.1%, p = 0.06) .Treatment with Acenocoumarol was maintained at discharge in 52.6% of patients with TTR <60%.

Conclusions: In this sample of patients diagnosed with acute HF and adverse reaction to Acenocoumarol, the TTR <60% was associated with an increased risk of bleeding, INR at the time of the event and an early admission rate. In addition, in more than half of the patients with TTR <60%, treatment with Acenocoumarol was maintained on discharge. A change of oral anticoagulation towards direct oral anticoagulation should be assesed in this patients.

P2103

The old and new echocardiographic predictors of acute heart failure in STEMI patients

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Parameters of echocardiographic myocardial mechanic could be good substrate of prediction acute heart failure (AHF) in myocardial infarction with ST elevation (STEMI). Aim: To determine the best parameters of myocardial mechanic as predictors of AHF. Method: 260 consecutive STEMI patients with PPCI were prospectively included. Echo examination performed on day 4±2 (VIVID 9GE, Echo PAC Ver 202). We analysed conventional echo parameters and parameters of left ventricle myocardial mechanics of systolic and diastolic function, as well as left atrial function. Results: 37/260 (14.1%) patients had AHF. Global longitudinal strain (GLS) of all three layers, global circumferential strain (GCS) of all three layers (epi, mid, endo) were impaired in patients with AHF (p<0.001). Parameters which obtain diastolic dysfunction: E/E´, E/SrE, LA reservoir, LA conduit were significantly different in patients with AHF (table 1). The largest area under the ROC found for GLS (epi 0.866, mid 0.865, endo 0.862) and GCS (endo 0.804, mid 0.786, epi 0.750), p<0.000, with high sensitivity and specificity. The EF was also significant predictor of AHF and area under the ROC was lower for EF (0.848), p<0.000. Conclusion: In STEMI patients parameters of left ventricle and left atrial myocardial mechanic could be important predictors of AHF. Still, larger studies are needed to define the best of these.

	Patients with AHF (n=37)	Patients withouth AHF (n=223)	p
LVEF (%)	37.1±8.9	48.7±9.1	<0.001
GLS endo (%)	-10.3±3.2	-16.4±4.3	<0.001
GLS mid (%)	-8.9±2.7	-14.2±3.8	<0.001
GLS epi (%)	-7.7±2.5	-12.5±3.3	<0.001
GCS endo (%)	-15.8±5.1	-22.7±5.9	<0.001
GCS mid (%)	-11.4±3.6	-15.9±4.1	<0.001
GCS epi (%)	-8.5±2.8	-11.5±5.2	<0.001
LA vol index (ml/m^2)	20.0±7.1	18.2±5.1	0.132
E/A	0.95±0.49	0.86±0.32	0.610
E/E´	8.9±4.0	7.5±2.7	0.029
E/SrE (m)	0.88±0.42	0.56±0.28	<0.001
LAsreservoir(%)	17.3±6.8	22.8±10.3	0.011
LAa pump (%)	10.6±6.4	12.8±6.7	0.106
LAe conduit (%)	7.0±4.3	9.8±6.4	0.032

P2104

Acute cardiac failure and fatal arrythmia in severe respiratory infections

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Introduction . Cardiac complications such as acute cardiac failure (ACF) and fatal arrythmia (FA) in severe respiratory infection (SRI) remains an important problem. In recent studies cardiac complications expose as the main cause of death in those patients. However, a real prevalence of the ACF and FA in severe respiratory infections is still unclear, alike the influence of this complications to the prognosis of the individual patient.

Aims and objectives. The main purpose of the given study was the analysis of ACF and FA frequency in SRI and their influence on the patient's prognosis.

Methods. 99 patients with SRI in the respiratory intensive care department were examined. SRI diagnoses (including severe pneumonias and severe COPD exacerbations) were set in accordance of ERS/ECCMID joint-guidelines, 2011. The verification of the diagnoses was based on the clinical symptoms and / or the existence of lung consolidation on a chest X-ray or CT-scans. All the patients recieved antibiotics, additional oxygen or respiratory support and fluid resuscitation. Multifactorial regression analysis and the relative risk indicator were calculated.

Results. On the whole investigated group 24 patients (24,24%) died. The fatal arrythmia (mostly respresented as ventricular tachicardia/ ventricular fibrillation) occurred in 8 patients (8,0%) and resulted in their death. All of patients at the time of FA were in full consciousness, and had no signs of multiorgan dysfunction and/ or septic shock. The third tone, as a simple marker of ACF was observed in 31 patients (31,1%). Among patients whose third tone was detected, 16 died (51,6%), 15 patients survived. The multiple regression analysis showed the main predictors of FA were the extended QTcF interval (>500 msec): RR=2,56 [1,27; 5,15] and the low level of SpO2 during oxygen therapy/ respiratory support (<90%): RR=3,55 [1,79; 7,03]. Also the revealing of the third tone was linked to higher mortality: RR=4,38 [2,1; 9,1].

Conclusion. The one third of patients died of severe respiratory infection had the fatal arrythmia as the main cause of death. The appearance of the third tone was a strong predictor of mortality, compared in importance with other cardiac complications markers. This problem demands further studying.

Acute Heart Failure - Epidemiology, Prognosis, Outcome

P2106

Characteristics and management of post-acute coronary syndrome acute heart failure patients in indonesia

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Background Acute Coronary Syndrome (ACS) is the leading cause of heart failure (HF) in the world today, including Indonesia. Acute HF post-ACS have been linked with adverse outcomes and increased mortality rates in previous studies. Even so, while acute HF post-ACS have been described in several large scale epidemiological studies in the West, few studies in Indonesia have described this important complication of ACS.
Purpose This study aims to compare the characteristics and management of post-ACS patients with and without acute heart failure in Indonesia.
Methods A retrospective non-randomized cohort study was conducted involving ACS patients at Cengkareng General Hospital admitted from 1 January – 31 December 2016.
Results A total of 145 ACS patients (mean age 56±9 years) were admitted, most of them male (81.4%), overweight and obese (59.4%), and suffer from STEMI (71%). Thirteen patients (8.9%) had HF prior to ACS and were excluded from analysis. Fifty-seven patients (43.2%) suffer from acute HF post-ACS, most of which were male (78.9%), hypertensive (61.4%) and with STEMI (73.7%). Only 6 patients (10.5%) had a known history of dyslipidemia and had a history of statin prescription. Diabetes was found in 33.3% of patients. When compared with non-acute HF post-ACS patients, acute HF post-ACS patients did not show significant differences in the prevalence of diabetes, hypertension, dyslipidemia and history of statin use. Even so, significantly higher prevalence of overweight and obesity (70.2% vs 51%, p-value <0.05) were found in the acute HF group. Surprisingly, significantly lower LDL levels were found in the acute HF group (mean LDL 108±33 mg/dL vs 125±40 mg/dL, p-value 0.048). No significant differences in anti-hypertensive, β-blocker, antiplatelet/anti-coagulant and statin prescription was found between both groups. Rates of fibrinolytic use and percutaneous coronary intervention also did not significantly differ between both groups. However, those with acute HF were at significantly higher risk of recurrent myocardial infarction (Relative Risk 2.016, 95% Confidence Interval 1.414-2.874, p-value 0.005). They also have a higher risk of cardiogenic shock, acute lung edema and mortality although these were non-significant. Significantly higher GRACE risk score results (p-value 0.005), higher percentage with high risk score (50.9% vs 26.7%, p-value<0.05) were found in the acute HF group as well as risk of in-hospital (p-value 0.008), 6 months (p-value 0.007), 1 year (p-value 0.004) and 3 year (p-value 0.017) mortality rates.
Conclusion ACS patients with acute HF have a significantly higher risk of recurrent myocardial infarction, worse GRACE risk score, GRACE risk category and a higher risk of future mortality compared with those without acute HF.

P2107

Acute kidney injury in patients with acute decompensation of chronic heart failure

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Background. Acute kidney injury (AKI) as a manifestation of acute cardiorenal syndrome is a pathological condition with a poor prognosis in patients with acute decompensation of chronic heart failure (ADCHF). Purpose. To assess the prevalence and prognostic value of AKI in patients with ADCHF depending of ejection fraction of left ventricular, to identify predictors of AKI. Materials and methods. In a prospective study included 141 patients with ADCHF. AKI was diagnosed according to KDIGO recommendations. The end point was defined as death from cardiovascular causes. Outcomes were assessed at 3, 6, and 12 months after discharge of the patient from the hospital during a telephone survey. Result. During the follow-up from 1 to 37 months (median follow-up was 18 months) in 24.8% an endpoint was reported. AKI developed in 13.5% of patients. When patients were divided into groups with heart failure with a reduced ejection fraction (HFrEF) (69.5% of patients) and heart failure with preserved ejection fraction (HFpEF) (19.1% of patients), there were no differences in comorbidities depending on the presence of or lack of AKI, as well as the frequency of administration of various groups of drugs, including intravenous diuretics (p=0.561 and p=1.0, respectively), vasodilators (p=0.545 and p=1.0, respectively) and the need for inotropic support (p=1.0 and p=0.155 respectively). The development of AKI has been associated with an increase in cardiovascular deaths in patients with HFrEF compared with patients without AKI (90.9% and 9.2%, p<0.001), but did not increase the incidence of death from cardiovascular causes in patients with HFpEF (50.0% and 34.8%, p=0.613). An analysis of the OR for onset of death from cardiovascular causes during the observation period, depending on the presence or absence of AKI and the separation of patients on HFrEF and HFpEF, showed that AKI increases the risk of this endpoint among patients with HFrEF many times (OR 95% 98.750 (11.158-873.976), p<0.001), but does not increase the OR among patients with HFpEF (OR 95% 1.875 (0.221-15.930), p=0.565). In multivariate analysis in patients with HFrEF, the following risk factors for the development of AKI were identified: high albuminuria (AU) from 30 mg/l (OR 95% 5.763 (1.338-24.819), p=0.019), GFR<45 ml/min initially at admission to hospital (OR 95% 6.593 (1.193-36.446), p=0.031) and age>75 years (OR 95% 15.933 (1.020-248.856), p=0.048). It was not possible to identify any risk factors for the development of AKI in patients with HFpEF. Conclusion. In patients with ADCHF HFrEF development AKI is associated with a poor prognosis, but does not affect the prognosis of patients with HFpEF. AKI in patients with ADCHF HFrEF can be predicted using predictors: GFR<45 ml/min, AU more than 30 mg/l.

P2108

Heart failure in France- insights from a cohort of french heart failure patients using claims data

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BACKGROUND: In France the prevalence of HF has been estimated at 2.3% in the adult population and is expected to increase further. Contemporary data on patient characteristics, treatment and outcomes is needed. This real-world data study aimed to describe patient characteristics, outcomes and treatment patterns for adult HF patients in a French setting. METHODS: A descriptive retrospective cohort design was applied using a French health insurance claims database (Echantillon Généraliste de Bénéficiaires, EGB); an anonymous, representative national sample listing outpatient and inpatient healthcare consumption of the population covered by the general insurance scheme, which covers most of French citizens. EGB data was available from 1st July 2008 to 31st December 2016. Adult HF patients were included in the study from 1st January 2010 to 31st December 2016 to allow a minimum 18 months baseline period for patients. Patients were described at baseline and followed over time from their index HF diagnosis to describe outcomes and exposure to treatment. RESULTS: A total of 10813 HF patients were identified in the EGB. Among these, 5563 patients had no recorded HF at least 18 months prior to their index HF diagnosis and constituted the analysis cohort for this study. Majority of patients were female (54%), elderly (mean age 78 years (standard deviation 12.8)), and highly comorbid; hypertension (87%), diabetes (27%), atrial fibrillation (18%), malignant cancer (16%) and myocardial infarction (12%). During follow-up patients had a very high rate of all-cause hospitalization (Incidence rate (IR) 10938/10000 person-years (PYs); 95% confidence interval (CI) [10609 - 11274]), HF-related hospitalizations (IR 1702/10000 PYs; 95% CI [1620 - 1788]), and all-cause death (IR 1882/10000 PYs; 95% CI [1805 - 1961]). At 1 year after their index diagnosis date patients had a 70% risk of all-cause hospitalization and 24% risk of all-cause death (see Kaplan Meier curves in Figure 1). HF guideline recommended drugs were prescribed as follows during follow-up: Beta-blockers (BBs): 61%; Renin-angiotensin system inhibitors (RASi) 63%; diuretics: 77% and 10% of patients were exposed to the recommended combination of BBs+RASis+diuretics. Polypharmacy was common and discontinuation of individual HF drugs occurred for more than 50% of patients for each studied drug class.
CONCLUSIONS: The study showed the high burden of hospitalizations and mortality of HF patients in France, among the highest in Europe, and highlights the current shortcomings in addressing the HF epidemic in France.

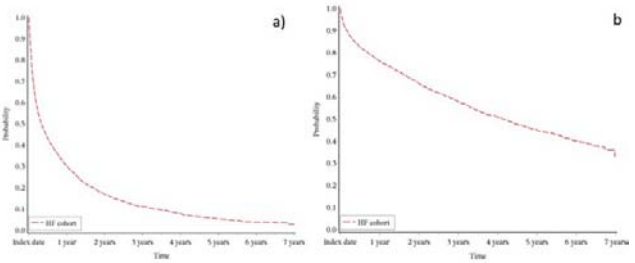

Figure 1.KM curves a)AC hosp, b.AC death

P2109

Prognostic value of serum potassium levels among Egyptian patients hospitalized with acute heart failure: data from ESC heart failure long-term registry

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On behalf of: ESC heart failure long-term registry-Egyptian Cohort

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Background: Data on the the prognostic value of potassium level (K) in heart failure (HF) are conflicting. No studies were conducted in the Middle East where patients' characteristics might be different from Western countries.

Purpose: We sought to determine the prognostic value of K at admission and discharge regarding all-cause mortality in a multi-center Egyptian cohort with acute HF.

Methods: We investigated a subgroup of the European Society of Cardiology-Heart Failure (ESC-HF) registry. A total of 1475 patients with acute HF were recruited from 20 Egyptian centers between 2011-2014. Data on K at admission and discharge and 12-month mortality were available for 1085 patients who constituted our final analysis cohort. Patients were divided into three groups according to K: hypokalemia, normal, and hyperkalemia (K <3.5, 3.5-5.0, and >5.0 mEq/l, respectively).

Results: In all, 71 patients died in-hospital and additional 256 died during 12-month follow-up. Restricted cubic spline analysis showed a U-shaped relationship between admission K and 1-year mortality (Figure 1 A). Admission and discharge hyperkalemia were significant univariable predictors of 1-year mortality (p-value <0.001 and 0.004, respectively; Kaplan-Meier curves shown in Figures 1 B and C). On multivariable Cox-regression analysis, hyperkalemia was only a border-line significant predictor of mortality (p-value = 0.094), with significant/border-line predictors shown in Table.

Conclusion: In this large multi-center study of Egyptian patients with acute HF, hyperkalemia at admission and discharge were significant univariable predictors of 12-month all-cause mortality. However, serum potassium was marginally significant on multi-variable analysis, with age, ejection fraction, and inhibitors of renin/angiotensin system upon discharge being the most powerful predictors of mortality.

Table

Variable	Coefficient	Hazard ratio (95% confidence interval)	p-value
Age	0.038	1.039 (1.027-1.051)	<0.001
COPD	0.294	1.342 (0.987-1.825)	0.06
Coronary artery disease	0.397	0.673 (0.513-0.881)	0.004
Diastolic blood pressure	0.01	0.990 (0.982-0.998)	0.015
Ejection fraction	0.046	0.955 (0.943-0.966)	<0.001
Haemoglobin	0.078	0.925 (0.871-0.981)	0.009
Hyperkalemia at admission	0.288	1.333 (0.952-1.866)	0.094
Discharge ACE-I/ARB	0.860	0.423 (0.311-0.576)	<0.001

Table. Results of multivariable Cox-regression analysis for 1-year mortality (significant/border-line significant variables shown)

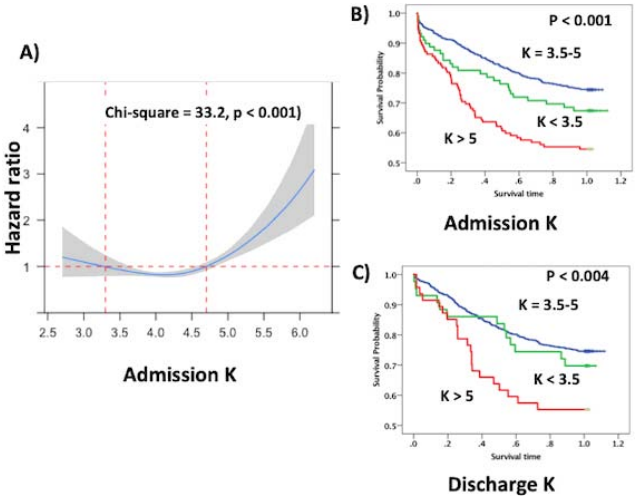

Fig 1.Univariable survival figures for K

P2110

Comparison of clinical profile and outcomes of patients with acute dyspnea due to acute heart failure, pulmonary causes or combination thereof

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Introduction: In the settings of acute dyspnea a significant overlap of congestion and pulmonary diseases may take place. The relevant risk stratification according to the primary diagnosis and co-morbidities is important.Purpose: We aimed to compare the clinical profile and outcomes of patients with acute dyspnea due to worsening heart failure, exacerbated pulmonary diseases, and their combination.

Methods: Prospective two-centre observational cohort study enrolled consecutive patients admitted to the emergency department with acute dyspnea. All patients were categorised into three groups according to their adjudicated diagnosis: I - acute heart failure (AHF) patients with no pulmonary comorbidities, II - pulmonary diseases (chronic obstructive pulmonary disease/ bronchial asthma, pneumonia and pulmonary embolism) and III -AHF with pulmonary comorbidities. Quantitative variables and categorical variables were compared among those groups using chi-square test.

Results: A total of 979 patients were included in the study. Clinical profiles and outcomes of three groups are summarized in the Table.

Conclusions: Combination of AHF with pulmonary comorbidities was consistent with the most severe congestion and kidney disease as well as with the highest short-term mortality compared to either heart failure or pulmonary disease alone. Patients presenting with acute dyspnea due to pulmonary diseases died after 1 and 3 months more frequently than acute heart failure patients.

Clinical profiles and outcomes

Variable	Acute heart failuren=659	Pulmonary diseases n=272	AHF+pulmonary diseasesn=48	p value
Age*	71.0 (62; 79)	69.0 (59; 78)	73.5 (67; 81)	0.249
Cancer	59.0 (9.0%)	50.0 (18.4%)	5.0 (10.4%)	<0.001
Smoking	58.0 (8.8%)	44.0 (16.2%)	8.0 (16.7)	0.002
Heart rate (BPM)*	84.0 (71; 102)	90.0 (79; 107.5)	96.0 (79; 118)	0.001
SpO2 (%)*	94.0 (90; 96)	90.8 (87; 94)	92.0 (88; 95)	<0.001
NT-proBNP (pmol/l)*	3596.0 (1475; 7865)	873.0 (171.5; 2601.5)	5150.0 (2533; 10151)	<0.001
Hb (g/l)*	130.0 (115; 144)	134.0 (119; 147)	127.5 (116; 144.5)	0.019
Creatinine (μmol/L)*	100.0 (81; 130)	92.0 (74; 115)	98.0 (76; 152)	0.013
D-dimers (mg/l)*	355.0 (135; 892)	260.0 (2; 1493.5)	847.5 (220; 1580)	0.067
1-month all-cause mortality	35.0 (5.3%)	23.0 (8.5%)	8.0 (16.7%)	0.004
3-month all-cause mortality	70.0 (10.6%)	41.0 (15.1%)	10.0 (20.8%)	0.032
1-month CV mortality	8.0 (1.2%)	12.0 (4.4%)	5.0 (10.4%)	<0.001
3-month CV mortality	20.0 (3.0%)	18.0 (6.6%)	5.0 (10.4%)	0.024

*(median (Q1;Q3))

P2111

The influence of diabetes mellitus on outcomes in patients with acute heart failure

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Background The association between diabetes mellitus (DM) and heart failure (HF) is well-established and studies have shown that their co-existence contributed to poorer patients' outcome. The adverse interaction between these two disease entities are complex and not well understood and results from existing studies are often conflicting, suggesting the need for further studies.
Purpose: The aim of this study was to describe the baseline characteristics and outcomes differences among patients with acute HF with and without DM. In addition, we investigated parameters which were related to mortality in patients hospitalized for acute HF.
Methods We studied 2,785 hospitalized patients with acute HF from 1 January 2009 to 31 December 2015 in a single cardiac centre in Malaysia. Data analysis were carried out to evaluate differences in clinical characteristics and outcomes in acute HF patients with DM and non-diabetics. Multivariable analysis was performed using logistic regression forward stepwise method.
Results: Among 2,785 patients admitted with acute HF, 64% (n= 1771) had DM. Patients with diabetes were more likely to be male, older, with ischaemic etiology of HF, and had multiple co- morbidities such as renal insufficiency, hypertension, dyslipidaemia and stroke. The median left ventricular systolic function for diabetic cohort was 30% (IQR 40.0-24.0) and majority of the patients had HFrEF (72%). There was no difference in the prescription of ACE inhibitors/ Angiotensin Receptor Blockers and beta blockers between the groups. However, patients with diabetes were morely likely to be treated with antiplatelet and lipid lowering agents compared to non-diabetics. Diabetic patients had significantly lower in-hospital mortality (3.8% vs 5.5%, p=0.03) but no differences in 30-day (1.7% vs 2.7% in non-diabetic, p= 0.14) and 1-year mortality (8.9% vs 9.6% in non- diabetic, p=0.68). In contrast, diabetic patients had non- statistically significant increase in 30-day readmission (8.5% vs 7.2%, p=0.25) and significant 1-year readmission (24.9% vs 19.6%, p=0.002). Multivariate analysis revealed that presence of atrial fibrillation (OR 2.87; 95% CI 1.19-6.94, p=0.02), systolic BP (>140mmHg) (OR 0.27, 95% CI 0.09-0.78, p= 0.02), higher NT proBNP (> 4800 pg/ml) (OR 4.87; 95% CI 1.71-13.85, p=0.003), low sodium (<120mmol/L) (OR 23.51; 95% CI 2.71-203.61, p=0.004) and positive troponin T level (≥ 0.014ug/L) on admission (OR 7.16; 95% CI 3.09-16.59, p<0.001) were independent predictors of in-patient mortality.
Conclusion: Diabetes mellitus contributed to significant proportion of patients admitted with acute heart failure with the presence of multiple co-morbidities. There were discordant in mortality and morbidity outcomes in which diabetics with AHF had lower in-hospital mortality but with higher readmission rates.

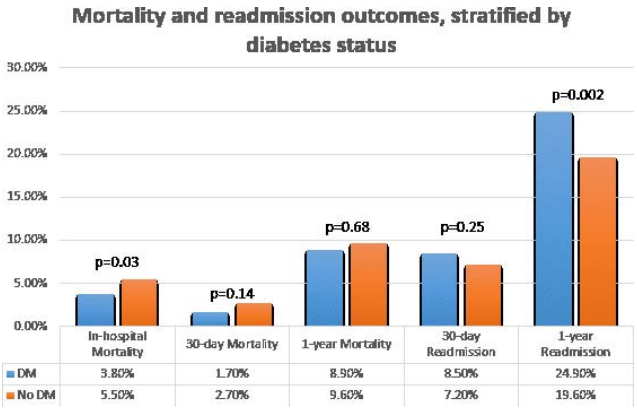

Figure 1

P2112

Incidence, predictors, and implications of readmission for heart failure after acute myocardial infarction

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On behalf of: Korea Acute Myocardial Infarction Registry-National Institutes of Health
Funding Acknowledgements: Fund by Research of Korea Centres for Disease Control and Prevention

BACKGROUND: Patients who survive an index acute myocardial infarction (AMI) are at an increased risk for future cardiovascular events. However, there have been few studies about heart failure (HF) readmission after AMI in an unselected group of patients.
PURPOSE: We, therefore, sought to explore the incidence, predictors, and subsequent clinical outcomes of post-AMI HF readmission from nationwide AMI registry.
METHODS: The study population consisted of 13,104 patients admitted for an index AMI between Nov 2011 and Dec 2015. The index in-hospital mortality rate was 3.85%, and these patients were excluded from the subsequent analysis, leaving 12,600 patients in the study cohort.
RESULTS: A total of 510 HF readmission (4.0%) had occurred in 444 patients during median 732 (696–760) days follow-up; 382 (86.0%) were readmitted once and 62 (14.0%) were readmitted ≥2 times. The median time to first HF readmission was 123 (42–335) days. A HF readmission occurred in in 270 patients (60.8%) within 6 months; the incidence of HF readmission steadily increased thereafter, with 174 more patients (39.2%) having a HF readmission between 6 months and 2 years. Among 444 patients with HF readmission, 42 (9.5%) patients were adjudicated as directly related to the myocardial re-infarction, occurring before 6 months, and between 6 months and 2 years in 22, and 20 patients, respectively. By multivariable analysis, the independent predictors of HF readmission at 2-year follow-up were age (older); gender (female); previous heart failure; acute HF (Killip classification ≥2); lower baseline estimated creatinine clearance and left ventricular ejection fraction; anterior AMI as culprit location; multivessel coronary disease; and major bleeding and acute kidney injury during index hospitalisation. Percutaneous coronary intervention as principal management strategy and discharge use of renin angiotensin aldosterone system blocker were predictors of less HF readmission. However, β-blockers was not associated with HF readmission at 2-year follow-up. In a time-adjusted multivariable analysis, HF readmission was a significant independent predictor of myocardial re-infarction (adjusted hazard ratio [HR] 3.008 [2.099-4.310]), any repeat revascularisation (adjusted HR 2.484 [1.187-5.200]), and stent thrombosis (adjusted HR 3.352 [1.623-6.925]); and a borderline predictor of cardiac death but did not reach statistical significance (adjusted HR 1.390 [0.964-2.004], p=0.078).
CONCLUSIONS: In the nationwide AMI registry, HF readmission within 2 years after AMI occurred in 4.0% of patients, with 60.8% within 6 months. Several baseline and procedural factors were identified as independent predictors of HF readmission.

A HF readmission was strongly associated with subsequent adverse clinical outcomes, and therefore, strategies to identify and treat the risk factors for post-AMI HF readmission should be implemented to prevent this devastating complication.

P2113

Selenoprotein P deficiency and risk of mortality and re-hospitalisation in acute heart failure

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On behalf of: HARVEST-Malmö
Funding Acknowledgements: Medical Faculty of Lund University, Skane University Hospital, the Crafoord foundation, Swedish Heart and Lung foundation, Wallenberg Center of Mollec

Introduction: Although endemic selenium deficiency has been proposed to be pathogenic in Keshan cardiomyopathy, the involvement of selenium in acute heart failure (AHF) prognosis remains uninvestigated. Selenium mediates its antioxidant effects through incorporation with the 25 selenoproteins currently known, of which Selelonprotein P (SePP) has been associated with cardiovascular disease and septic shock.
Purpose: We examined the value of SePP in predicting 30-days hospitalisation and 1-year mortality in a Swedish acute heart failure (AHF) cohort.
Methods: Plasma SePP was measured in subjects with AHF from the Swedish Heart and Brain Failure Investigation study (HARVEST-Malmö) (n=295, 30.7% females; mean age 74.4 ± 11.5 years).
Results: After adjusting for traditional risk factors, each 1 SD increment in SePP levels was inversely associated with risk of 30-days hospitalisation (n=61) (Hazard ratio, HR (95% confidence interval (CI)): 0.67 (0.51-0.89), p=0.005), as well as one-year mortality (n=54); HR 0.65 (0.48-0.88), p=0.005. Subjects with the lowest SePP levels were at greater risk of 30-day re-hospitalisation (HR 4.29 (1.59-11.6)) and one-year mortality (HR 4.13 (1.64-10.4)), as compared to subjects in the remaining quartiles (p for trend 0.004 and 0.001, respectively).

Sepp and outcomes

	One-year mortality(n=54)		30-day re-hospitalisation (n=61)		Composite endpoint (n=98)	
	HR (95%CI)	p	HR (95%CI)	p	HR (95%CI)	p
Age	1.07 (1.04-1.11)	<0.001	1.01 (0.98-1.04)	0.524	1.02 (0.99-1.054	0.248
Sex	0.41 (0.21-0.82)	0.012	1.14 (0.65-1.99)	0.644	1.21 (0.72-2.05)	0.471
BMI	0.99 (0.93-1.06)	0.881	0.99 (0.94-1.05)	0.779	1.01 (0.96-1.05)	0.803
SBP	0.98 (0.97-0.99)	0.001	1.00 (0.99-1.01)	0.462	0.99 (0.98-1.00)	0.217
Smoking	1.33 (0.51-3.50)	0.562	1.03 (0.47-2.25)	0.943	1.09 (0.52-2.23)	0.820
Prevalent AF	0.59 (0.33-1.03)	0.063	1.05 (0.63-1.76)	0.852	0.99 (0.61-1.63)	0.985
Prevalent diabetes	1.76 (0.96-3.23)	0.068	0.97 (0.54-1.74)	0.925	0.99 (0.57-1.72)	0.204
Prior CHF	1.02 (0.51-2.06)	0.948	1.25 (0.69-2.25)	0.462	1.21 (0.69-2.11)	0.697
NT-proBNP	1.46 (1.07-1.98)	0.017	0.92 (0.70-1.19)	0.516	0.96 (0.75-1.23)	0.743
SePP	0.65 (0.48-0.88)	0.005	0.67 (0.51-0.89)	0.005	0.66 (0.51-0.86)	0.002

Values are hazard ratios (HR) and 95% confidence intervals. BMI=body mass index; SBP=systolic blood pressure; AF=atrial fibrillation; CHF=congestive heart failure, SePP=Selenoprotein P.

Conclusion: This observational study identifies SePP as a novel marker of poor outcome in AHF and encourages future studies examining if supplementation of selenium might improve prognosis in AHF-patients.

P2114

Impact of anemia on long-term clinical outcome in patients with left ventricular systolic dysfunction after acute myocardial infarction

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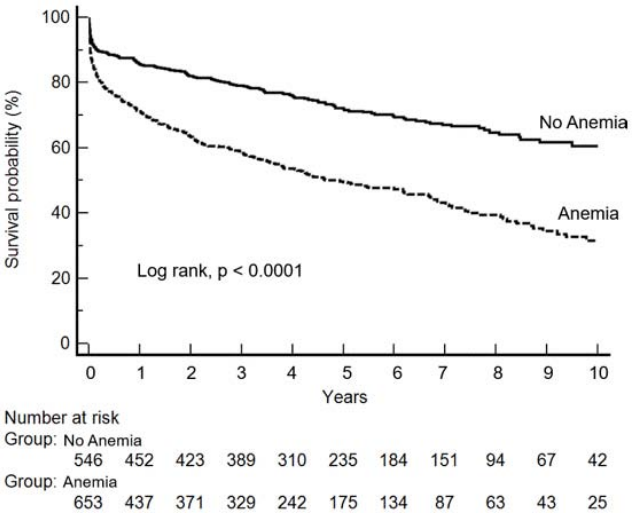
Background: Anemia may confer a poor prognosis among patients with acute coronary syndrome. However, contemporary data are lacking on the prognostic importance of anemia in patients with left ventricular (LV) systolic dysfunction after acute myocardial infarction (AMI).
Methods: AMI patients receiving percutaneous coronary intervention were consecutively enrolled from January 2004 to August 2014. A total of 1,246 patients with LV systolic dysfunction: LV ejection fraction <40% as measured by echocardiography, were divided according to the presence of anemia. Anemia was defined as a hemoglobin level <14 g/dL in men and <12 g/dL in women. All-cause mortality within a follow-up period was compared in groups of patients with and without anemia.
Results: Median follow-up duration was 44 months (interquartile range 10 to 75 months). Patients with anemia were older, more likely to have hypertension and diabetes, but the two groups did not differ in sex, presence of dyslipidemia, and status of smoking. Patients with anemia had greater all-cause mortality (30.4% vs. 52.6%). Anemia was an independent predictor of all-cause mortality after adjusting confounding risk factors (hazard ratio: 1.705, confidence interval: 1.404-2.069, p < 0.001).Conclusion: In patients with LV systolic dysfunction after AMI, anemia is associated with increased risk of poor outcome independently of coexisting risk factors.



P2115

The relationship between hemoconcentration during hospitalization and outcomes in patients hospitalized for acute heart failure

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Background: In acute heart failure (AHF) treatment, hemoconcentration during hospitalization represents the effectiveness of decongestion. However, the association between changes in hematocrit (Hct) and outcomes is still controversial.
Purpose: We aim to investigate the association between hemoconcentration within the first 7 days of hospitalization and 30 and 180-day all-cause mortality or rehospitalization in AHF patients.
Methods: This was a retrospective study of consecutive patients hospitalized for AHF at a tertiary care hospital from July 2017 to April 2018. Changes in Hct within the first 7 days of hospitalization were used to identify hemoconcentration. The patients who received blood transfusion and/or erythropoietin were excluded. The primary outcomes were 30 and 180-day all-cause mortality or rehospitalization. The analysis tool was one-way ANOVA.

Results: From total of 191 patients admitted for AHF, 114 patients with available Hct data were included (mean age of 68.5±13.2, 52.9% male). Mean Hct change was 2.06±3.604 percent-point. When classifying patient based on changing in Hct level into 3 tertiles, there were no statistically significant differences in baseline characteristics or body weight changes. The second tertile had significantly lower rates of primary outcomes both at 30 and 180 days ($p < 0.05$) (Table).

Conclusion: Most patients with AHF had increased Hct level during hospitalization as a part of a decongestive therapy. The optimal hemoconcentration during first 7 days of hospitalization, not too low or too high, was predictive of favorable 30-day and 180-day clinical outcomes.

	3rdTertile (n=38)	2ndTertile (n=38)	1stTertile (n=38)	p-value
Baseline characteristics				
Age, mean ±SD	65.1±12.8	66.7±14.4	69.7 ±11.7	ns
Male, n (%)	17 (44.7)	23 (60.5)	22 (57.9)	ns
EF Preserved Midrange Reduced	12 (54.5) 1(4.5) 9 (40.9)	10 (47.6) 4 (19) 7 (33.3)	9 (34.6) 4 (15.4) 13 (50)	ns
BUN, mg/dL	27.5±15.8	32.3±21.2	29.5±17.0	ns
Cr, mg/dL	1.47±1.0	1.71±1.4	1.56±1.0	ns
Hemoconcentration				
Hct change, percent-point	-1.61±1.2	1.68±0.8	6.10±2.6	<0.001
BW change, kg	-6.61±11.9	-4.65±3.5	-5.47±5.3	ns
Percent BW change, %	-9.77±12.2	-7.92±7.8	-8.34±8.8	ns
Outcome (all cause death or rehospitalization)				
30- day, n (%) 180-day, n (%)	13 (38.2) 19 (55.9)	8 (24.2) 14 (42.4)	18 (54.5) 24 (72.7)	0.041 0.045

P2116

Neutrophil-lymphocyte ratio predicts in-hospital and post-discharge 3-year mortality in acute heart failure patients

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Funding Acknowledgements: This work was supported by grants from Research of Korea Centers for Disease Control and Prevention

Aims: Neutrophil-lymphocyte ratio (NLR) is reported as independent predictor for all-cause mortality or cardiovascular events in patients with acute coronary syndromes. However, the prognostic implications of NLR on short and long-term mortality have not been fully elucidated in patients with acute heart failure (AHF).

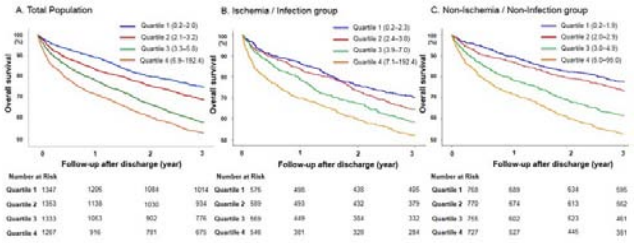
Methods: Of the 5,625 patients enrolled in the Korea Acute Heart Failure (KorAHF) registry, 5,580 patients were evaluated. Patients were stratified into quartiles by their NLR level and their in-hospital mortality and post discharge 3-year mortality were analyzed.

Results: Among 5,580 patients, patients in the highest NLR had the highest in-hospital mortality (adjusted-odds ratio (OR) 2.21, 95% Confidence Interval [CI] 1.43–3.42) and post-discharge 3-year mortality. (adjusted OR 1.50, 95% CI 1.30–1.74) (Table 1.) In addition, a positive trend between post discharge 3-year mortality and NLR was observed. (Figure 1-A.) The same trends were observed by dividing the aggravating factor into the infection or ischemia group and the non-infection or ischemia group. (Figure 1-B and C)

Among the patients whose aggravating factor were infection or ischemia (n = 3,127), NLR ≥ 7.0 was associated with increased risks of in-hospital mortality (adjusted OR 1.90, 95% CI 1.30-2.78) and post-discharge 3-year mortality (adjusted OR 1.20, 95% CI 1.02-1.40). Among the patients whose aggravating factor were not infection or ischemia (n = 2,453), NLR ≥ 5.0 was associated with increased risks of in-hospital mortality (adjusted OR 2.12, 95% CI 1.33-3.37) and post-discharge 3-year mortality (adjusted OR 1.43, 95% CI 1.24-1.65).

Conclusions: Elevated NLR on admission is an independent predictor for in-hospital and post-discharge 3-year mortality even if adjust well-known predictors and interactions. Increased NLR may reflect increased sympathetic tone at admission. NLR is an inexpensive, easy to obtain marker to aid in the risk stratification of patients with AHF.

Figure 1. Overall survival after discharge (3 years)



P2117

Short-term outcome of hypokalemia in patients hospitalized for acute heart failure in a heart failure unit.

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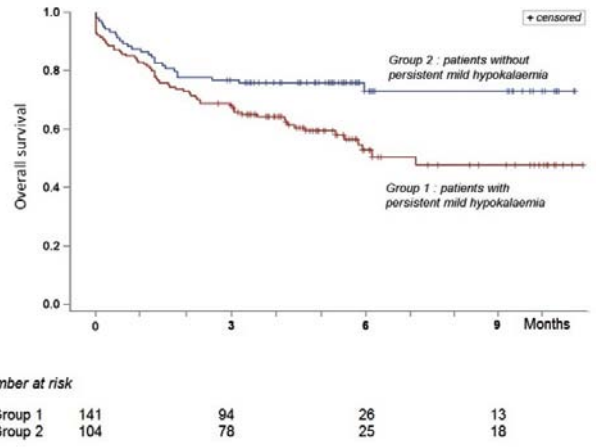
INTRODUCTION: Acute heart failure (AHF) is frequent with heavy morbidity and mortality. Hypokalemia as a prognostic factor has been previously studied with heterogeneous findings.

PURPOSE: We aimed to determine the association of hypokalemia during stay with the short-term outcome after discharge in patients hospitalized for AHF in a Heart Failure Unit.

METHODS: We prospectively included all consecutive patients admitted for AHF in our center Heart Failure Unit, between February and December 2017. We defined several hypokalemia models: punctual severe hypokalemia (any serum potassium level < 3.5mmol/L occurrence during stay), punctual mild hypokalemia (any serum potassium level < 4 mmol/L occurrence during stay), persistent severe hypokalemia (serum potassium level < 3.5mmol/L lasting at least 3 days during stay), persistent mild hypokalemia (serum potassium level < 4 mmol/L lasting at least 3 days during stay). The primary composite endpoint was all-cause death and rehospitalizations for heart failure 3 months after discharge.

RESULTS: Two hundred and forty-five (245) patients were studied with 59% male patients and a mean age of 77.7±10.2 years. 41.6 % of the patients had a reduced ejection fraction, 43.3 % had a preserved ejection fraction, and 15.1% a moderately reduced ejection fraction. During the hospitalization, 86.9% received an intravenous loop diuretic depletion with a mean dosage of furosemide of 280±287 mg. The mean serum potassium level at admission was 4.13±0.57 mmol/L and it increased by 0.5±1.5% at discharge. Though 83.3% of the patients received potassium supplementation, severe persistent hypokalemia and mild persistent hypokalemia were found in 13.9% and 57.6% of the cases, respectively. Overall, the primary composite outcome occured for 87 patients (35.5%). This rate was significantly higher for patients with persistent mild hypokalemia compared to patient without (43.3% versus 25.0% respectively, OR=2.3[1.3-4.0], p=0.004). This result remained significant in multivariate survival analysis (p log rank=0.005).



CONCLUSION: Hypokalemia remains frequent despite current strategies in hospitalized patients for AHF and it is associated with poor prognosis. It could be a surrogate marker of an uncontrolled neurohormonal activation and the severity of the disease.

P2118

Heart failure detection in an urban population

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Background: Heart failure (HF) is a chronic and progressive condition characterised by recurrent exacerbations and frequent hospital admissions. Epidemiological studies suggest that the incidence of HF is around 1-2%. Our study was conducted in an area responsible for the health care of 308,000 people. The observed prevalence of HF within this population is 0.7% meaning that there are a significant number of HF patients in the community who have apparently not yet been identified.
Purpose: Early diagnosis, prompt treatment and effective community follow up reduces hospital admissions and improves outcomes in patients with left ventricular systolic dysfunction (LVSD). We aimed to identify whether patients with LVSD were being accurately recorded within this area.
Methods: There were 1663 patients with a diagnosis of heart failure cared for by 48 primary care practices. A virtual (desktop) clinical review was undertaken at all of these practices by searching existing heart failure registers. The clinical records were reviewed to confirm the diagnosis of HF, to assess the aetiology of HF and in particular to identify whether LVSD was present.
Results: At the start of the virtual clinics there were 451 individuals with a diagnosis of LVSD. Following the virtual clinics this number had increased to 849, of whom 146 were confirmed by reviewing echocardiogram results from secondary care. The original cohort of 451 also included 50 patients in whom the diagnosis of LVSD could not be confirmed.
Conclusions: The data demonstrates a near doubling of LVSD recording in primary care. This has significant implications for the optimisation of therapy and care processes for the individuals where the primary care record is inaccurate as not all of these patients are under active secondary care surveillance. Poor communication between service providers across primary, secondary and community settings is commonly to blame and one of the fundamental issues is the various IT systems which do not automatically transfer information between the different healthcare sectors. We suggest that commissioners should work with IT providers to ensure that the sharing of patient information is streamlined. Improving this will ensure more patients receive prompt management and has the potential to reduce the number of HF hospital admissions and improve patient outcomes. With e-noting becoming increasingly prevalent in secondary care, this will facilitate accurate recording of information for heart failure and other conditions. Furthermore, SNOMED CT is a simple clinical vocabulary that can be used within electronic health records to simplify the transfer of information between the different healthcare sectors.

P2119

Short and mid-term prognosis of acutely decompensated heart failure by clinical scenarios on admission

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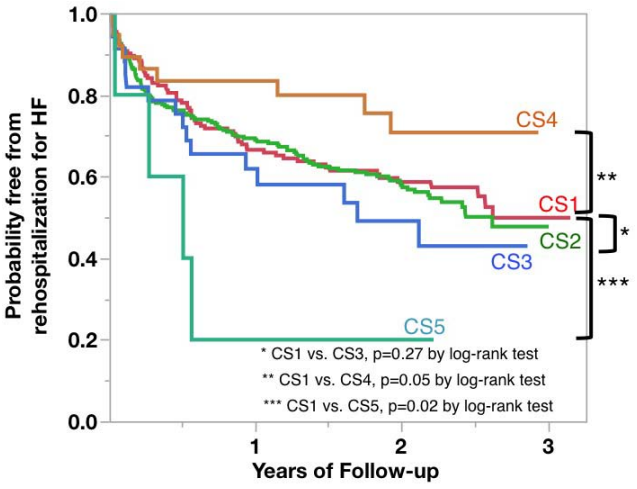
Background: Patients presenting with acutely decompensated heart failure (ADHF) are a complex and heterogeneous population. Five clinical scenarios (CS1 systolic blood pressure >140 mmHg; CS2 100-140 mmHg; CS3 <100 mmHg; CS4 with acute coronary syndrome; and CS5 isolated right ventricular failure) were proposed to identify an initial therapeutic approach and are commonly used by physicians. However, the difference of time course by CS has not been clarified.
Purpose: To recognize the difference of prognosis in ADHF according to the type of CS.
Methods: We retrospectively analyzed consecutive 641 ADHF patients admitted to our institution. Initial treatments were determined according to CS on admission and subsequent guideline-directed medical therapies were performed.
Results: Of 641 patients, 194 (31.6%) were classified as CS1, 349 (56.8%) as CS2, 45 (7.3%) as CS3, 46 (7.5%) as CS4 and 7 (1.1%) as CS5. Baseline characteristics and exam data are shown in Table. In-hospital cardiac mortality, occurred in a total of 24 (3.7%) patients, was significantly higher in CS4 patients than CS1 or CS2 patients (p=0.01 or 0.02, respectively). Of 593 patients discharged, 226 patients were rehospitalized for ADHF. CS5 patients had significantly lower survival rates free from rehospitalization for ADHF than CS1 patients (p=0.02), while CS4 patients had significantly higher survival rates than CS1 patients (p=0.05). (Figure)
Conclusion: CS4 patients had high in-hospital cardiac mortality despite first hospitalization for HF. Although CS5 patients were not majority, rates of rehospitalization for ADHF were highest among all the CSs.

Baseline characteristics and exam data				
CS1(n=194)	CS2(n=349)	CS3(n=45)	CS4(n=46)	CS5(n=7) P
Age, years±SD77.9±11.5	77.3±11.674.7±10.9	75.6±11.976.7±19.5	0.46	
Male, n(%)91(46.9)	199(57.0)28(60.9)	28(60.9)3(42.9)	0.09	
Hypertension, n(%)150(77.3)	205(58.9)21(47.7)	31(67.4)3(42.9)	<0.01	
Diabetes Mellitus, n(%)69(35.6)	105(30.1)9(20.5)	17(37.0)1(14.3)	0.21	
Chronic kidney disease, n(%) 81(41.8)	132(37.8)23(52.3)	16(34.8)2(28.6)	0.33	
Previous hospitalizationfor HF, n(%)67(34.5)	141(40.5)25(56.8)	3(6.5)3(42.9)	<0.01	
Hemoglobin, g/dl±SD11.8±2.2	11.4±2.311.7±2.0	12.1±2.312.0±1.1	0.33	
Creatinine, mg/dl±SD1.8±2.0	1.6±1.52.1±3.5	2.1±2.31.6±1.2	0.32	
Left ventricular ejection fraction, %±SD39.5±9.9	36.9±11.632.5±10.5	37.6±7.850.1±8.8	0.01	
Severe mitral regurgitation, n(%)4(2.1)	17(4.9)2(4.4)	0(0)0(0)	0.28	
Severe aortic stenosis, n(%)14(7.2)	34(9.7)2(4.4)	0(0)0(0)	0.13	
Severe tricuspid regurgitation, n(%)3(1.6)	19(5.4)5(11.1)	0(0)5(71.4)	<0.01	



P2120

The prognostic impact of hepatic injury in acute heart failure

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Introduction: Hepatic injury has been reported in patients with acute heart failure (AHF).
Purpose: This study aims to assess the prognostic value of elevated transaminases (TM) and alkaline phosphatase (AP) in patients (P) admitted for AHF.
Methods: Retrospective study of 618 consecutive P admitted in our Hospital for AHF: 57% women, 79±11 years, 61% hypertensive, 23% with chronic kidney disease, 16% with coronary artery disease. A comparative analysis was performed according to the elevation above 2x the upper normal limit of aspartate or alanine TM (TM+: with vs TM0: without) and of AP (AP+: with vs AP0: without), regarding demographic, clinical and analytical parameters, and medication during hospitalization, to evaluate potencial predictors. Prognosis (mortality) was assessed by Cox Regression during a 6 month follow-up.

Results: AP elevation occurred in 14.8% P. By univariate analysis, the group AP+ had higher basal values of urea (63.6 vs 54.9mg/dL, p=0.02) and creatinine (1.24 vs 1.08mg/dL, p=0.02), and required higher doses of furosemide during hospitalization (387 vs 316.2mg, p=0.04). By multivariable regression, only basal creatinine was independent predictor of AP+ (OR 0.137, 95%CI 0.001–0.253, p=0.048). TM elevation occurred in 22.5% P. By univariate analysis, P with TM+ were younger (78±11 vs 80±10 years, p=0.02), showed higher values of AP (157.2 vs 128U/L, p=0.001) and hemoglobin (12.7 vs 12.2g/dL, p=0.02), with no difference in furosemide dose (p=ns). By multivariable regression, AP was an independent predictor of TM+ (OR 0.173, 95%CI 0.000–0.002, p=0.01). No differences were found regarding blood pressure, ejection fraction, NT-proBNP value or lenght of stay for both AP+ and TM+ groups. Mortality was 21% at 30 days and 38% at 6M. Survival was worse at 30 days for AP+, after adjustment for demographics and comorbidities (HR 0.4, 95CI%: 0.25–0.74, p=0.002). Regarding TM elevation, no survival difference was found; however, in TM+ group, hemoconcentration occurred in 41.2% of P and was associated with increased survival at 6M (HR 49.8; 95%CI 2.44–1016.72; p=0.011), as well as the use of higher doses of furosemide (HR 1.0; 95%CI 1.001–1.005; p=0.012).
Conclusion: Elevation of AP was associated with higher mortality in P admitted for AHF. TM elevation alone didn´t show prognostic impact; nevertheless, its association with hemoconcentration and higher furosemide doses seems to improve survival.

P2121
Incidence and prognostic value of acute kidney injury in patients with acute decompensated heart failure

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Introduction: Acute kidney injury (AKI) is a commonly encountered syndrome associated with worse prognosis in patients with cardiac diseases.
Purpose: to evaluate the incidence and prognostic value of AKI in patients with acute decompensated heart failure (ADHF).
Methods: 278 patients with ADHF were examined: mean age 69.7±10.2 tears (M±SD), 55% were male, 47.8% current smokers, 30.6% alcohol abusers. Comorbidities: arterial hypertension 90.3%, 70% had anamnesis of symptomatic heart failure with frequent hospitalizations, obesity 55.8%, (mean BMI 30.1±6.4 kg/m2), previous myocardial infarction (MI) 47.1%, atrial fibrillation 46%, chronic kidney disease (CKD) 45%, stable angina 43.5%, anemia 40.6%, chronic obstructive pulmonary disease 34.9%, diabetes mellitus (DM) 33.1%. CKD and AKI were diagnosed according to KDIGO 2012 Guidelines. AKI phenotypes depending on time of development (community-acquired or in-hospital), persistence (transient or persistent), history of CKD (AKI de novo or AKI on CKD) were identified.
Results: Incidence of AKI in ADHF was 43.5%. AKI stage 1 was prevalent (54.5%). Patients with ADHF with vs without AKI had higher rate of previous MI (70.3 vs 29.3%, p<0.001), stable angina (59.5 vs 31.2%, p<0.01). outpatient therapy rarely included beta-blockers (p<0.05) and loop diuretics (p<0.01), at the time of admission those with AKI more frequently had systolic blood pressure (SBP) <110 mmHg (15.7 vs 4.5%, p<0.01) and serum creatinine (SCr) above the median level (98 μmol/l) (60.3 vs 41.2%, p<0.05).
Community-acquired AKI, AKI on CKD, AKI de novo and persistent AKI were found in 20.5, 20.8, 23% and 20% of patients respectively. Changes of SCr during hospitalization in the range 10-50%, which did not meet AKI criteria, were designated as subclinical AKI and occurred in 19.4% of patients.
In-hospital mortality was higher in patients with vs without AKI (12.4 vs 5%, p<0.01) and was the highest in patients with in-hospital persistent AKI de novo and community-acquired persistent AKI on CKD (41 and 29%, p<0.01). In the group of subclinical AKI mortality was comparable with the patients with AKI (11.8%).
Independent predictors of AKI were: GFR <30 ml/min/1.73 m2 (odds ratio (OR) 6.5, 95% confidential interval (CI) 3.4-12.6, p<0.001), SCr >118μmol?l (OR 5.5, 95% CI 3.6-8.5,p<0.001), SBP <90mmHg (OR 4.6, 95% CI 1.2-17.1) (all parameters at admission).
Conclusions: The incidence of AKI in ADHF was 43.5% and was associated with higher in-hospital mortality. Patients with baseline tendency to hypotension and severely impaired kidney function are at high risk of developing AKI.

P2122
Long-term outcomes of patients discharged from acute heart failure hospitalisation and differences between patients with preserved and reduced left ventricular ejection fraction - AHEAD registry

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Background The latest European heart failure guidelines define patients as those with reduced (HFrEF), mid-range, and preserved (HFpEF) left ventricular ejection fraction (LVEF; <40%, 40%-49%, and 50%, respectively). We investigated the causes of rehospitalisations/deaths in our institution's heart failure patients and focused on differences in the clinical presentation, risk profile, and long-term outcomes between the HFrEF and HFpEF groups in a real-life scenario.
Methods and Results
We followed 1274 patients discharged from heart failure hospitalisation in 2 centres. The mean patient age was 75.9 years, and men and women were represented equally. During the minimal follow-up of 2 years, 57% of patients were hospitalised for any cause, 24.9% for decompensated heart failure, and 43.3% for any cardiovascular cause. A total of 36.1% of patients died, either with prior (11.8%) or without prior (24.3%) heart failure rehospitalisation. Heart failure was also the most frequent cause of cardiovascular hospitalisation, followed by gastrointestinal problems, infections, and tumours for noncardiovascular hospitalisations. Patients with HFrEF had different baseline characteristics and risk profiles, experienced more hospitalisations for acute heart failure (28.6% vs 20.2%, p = 0.012), and had higher cardiovascular mortality (82.4% vs 63.5%, p < 0.001) when compared with HFpEF patients. Overall mortality and rehospitalisation rates were similar.
Conclusion: Within 2 years, half of the patients died and/or were hospitalised for acute decompensation of heart failure, and only one-third of the patients survived without any hospitalisation. HFrEF and HFpEF patients were confirmed to be different entities with diverse characteristics, risk profiles, and cardiovascular event rates.

P2123
Incidence and impact of renal dysfunction in patients with acute heart failure

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Introduction: During treatment of acute heart failure (HF), renal function is often worsened, leading to a complex clinical course. In addition, renal impairment is a strong predictor of long-term adverse outcomes in patients with acute HF.
Purpose: To investigate the incidence of renal dysfunction in acute HF, the risk factors that are related to its appearance, and how it is affecting the patients' outcome.
Methods: We studied consecutive patients who were admitted to the hospital with acute HF during one year. Renal function was compared on the day of admission and the day of discharge from the hospital, and correlated with the various characteristics and risk factors.
Results: The sample consists of 259 patients, mean age of 77 ± 12 years, 61% men with mean duration of hospitalization 6 ± 4 days. A total of 16 deaths (6%) were observed. The etiology of HF was ischemic in half of patients, valvular in 21%, dilated in 9% and other or mixed etiology in 20%. The mean creatinine clearance (GFR) on admission was 54 ± 28 ml / min and on discharge 49 ± 28 ml / min (9% decrease, p <0.01). 49 patients (19%) had a GFR drop ≥ 20%. Patients with GFR drop during hospitalization were associated with the incidence of death (r = -0.16, p = 0.04) and anemia (r = 0.27, p = 0.04). Independent prognostic factors for renal dysfunction during hospitalization were ischemic cardiomyopathy, age, prolonged hospitalization, use of aldosterone antagonists, low T3, low T4 and high C-reactive protein on admission.
Conclusion: Deterioration of renal function in acute HF is not a rare phenomenon and is associated with anemia and death. Factors such as ischemic cardiomyopathy, age, duration of hospitalization seem to play a role, and caution is needed in these patients to prevent its occurring.

Coronary Artery Disease

P2124
Comparison of outcomes of patients with ST-elevation myocardial infarction with vs without hypothyroidism

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Introduction: Close link between thyroid hormonal status and cardiovascular disease is apparent by the significant effects of hypothyroidism, both subclinical and overt, on the cardiovascular system. The aim of this research is to draw comparison analysis of rates of revascularization, Length of stay, in-hospital mortality and

incidence of cardiogenic shock in patients with ST-Elevation Myocardial Infarction (STEMI) with and without hypothyroidism.
Methods: The study examined National Inpatient Sample (NIS) database ,which is the largest database for hospital admissions in United states, from years 2007-14 for all hospital admissions with acute STEMI using ICD9 codes. We compared baseline characteristics of the two groups using parametric and non-parametric tests for continuous variables and Chi-Squares test for dichotomous variables. Multivariate logistic regression was used to analyze the odds of revascularization (Percutaneous Coronary Intervention (PCI) and Coronary Artery Bypass Graft (CABG)), cardiogenic shock and in-hospital mortality. We adjusted for age, sex, race, payer, income quartiles, hospital location, region, size and teaching status. In addition, our study also accounted for multiple comorbidities during our analysis.
Results: Hypothyroidism was present in 170,918 of 1,887,055 (9.06%) patients in the STEMI population. Patients with hypothyroidism were more elderly (mean 73.67 vs 65.00 p<0.001) and were more likely to be women (65.54% vs 34.11%, p<0.01). They were also more likely to have multiple comorbidities e.g. Anemia, Arthritis, Depression, Congestive Heart Failure, Diabetes Mellitus and related complications, Hepatitis C, Coagulopathy, Hypertension, Lymphoma, Chronic Kidney Disease, Valvular disease, Peripheral Vascular Disease and Neurological Disease (p<0.001 for all). In addition, they were also more likely to have a history of CABG procedure (6.01% vs 4.35% p<0.001) but were less likely to have alcohol use disorder and weight loss (p<0.001 for both). They were also less likely to be diagnosed at teaching hospital (44.40% vs 48.38%, p<0.01) and had lower income quartiles. Median length of stay was longer (LOS) for patients with Hypothyroidism (median 4.00 vs 3.00 p<0.001). After adjustment, STEMI patients with hypothyroidism had greater in-hospital mortality (odds ratio 1.24, CI 1.19-1.27 p<0.001). They were also less likely to undergo revascularization (odds ratio 0.60, CI 0.58 to 0.61 p<0.001). Both PCI and CABG procedures had lower occurrences in hypothyroid group (PCI-odds ratio 0.63, CI 0.62 to 0.65 p<0.001, CABG-odds ratio 0.78 CI 0.74 to 0.82 p<0.001). However, hypothyroid group was less likely to develop cardiogenic shock (odds ratio 0.91, CI 0.88 to 0.95, p<0.001).
Conclusions: Hypothyroidism confers greater odds for in-hospital mortality and is associated with lower likeliness to receive revascularization in the setting of a STEMI

P2125

Effect of cardiac rehabilitation on the cardiac structure and function in patients with acute myocardial infarction

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Backgrounds: Cardiac rehabilitation (CR) is one of option to improve symptoms and survivals in patients with acute myocardial infarction (AMI). However, there are little information about the structural change of the heart according to the CR. Thus, we studied the cardiac structural and functional change after CR.
Materials and methods: We retrospectively reviewed all consecutive AMI patients from January 2012 to October 2015. Baseline clinical data were obtained from their medical records and echocardiographic data were acquired from their stored images.
Results: Of total 944 patients (mean age 63.7±12.4 years old, 709 males) including 531 patients with ST-segment elevation MI, we analyzed 410 patients (mean age 63.7±11.7 years old, 302 males) with follow-up echocardiographic examinations during the mean duration of 19.6±16.3 months. We divided our study group into 2 groups according to the presence of CR (group 1 with CR, n=333, group 2 without CR, n=77). At baseline, there was no significant difference of echocardiographic parameters between 2 groups. At follow-up echocardiographic examination, group 1 showed significantly lower left atrial volume index (31.4±38.8ml/m2, P=0.005), lower E/E' ratio (11.3±6.5 vs 13.2±6.9, P=0.043) and lower TR Vmax (2.6±0.5 vs. 2.8±0.5m/sec, P=0.014). However, there were no statistical significance in the systolic echocardiographic parameters.
The presence of CR is a significant prognostic marker in the prediction of all cause mortality in the univariate analysis (HR=0.258, 95% CI=0.123-0.542. P<0.001) and in the multivariate analysis after adjustment of age, gender, Killip class and LV ejection fraction (hr=0.376, 95% CI=0.173-0.817, P=0.013)
Conclusion: In this study, CR was associated with the improvement of diastolic function and better survival in patients with AMI.

P2126

Long-term prognostic impact of post-discharge heart failure after ST-segment elevation myocardial infarction

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Background/aim: Heart failure (HF) is relatively common complication of ST-elevation myocardial infarction (STEMI) and can be transient (typically resolved by hospital discharge) or persistent (post-discharge). It was shown that early post-discharge HF is a strong independent predictor for 1-year mortality. The aim of this study is to analyze the prognostic impact post-discharge HF after STEMI on long-term mortality.
Method: we analyzed patients included in our Clinical Center STEMI Register hospitalized between 2006 and 2011 year. All patients were treated with primary PCI. Patients presenting with cardiogenic shock were excluded. Echocardiographic examination was performed before discharge and left ventricular ejection fraction (EF) was assesed using bi-plane method. Patients were divided in two groups accocrding to the presence of HF symptoms at 30-day visit (New York Heart Association- NYHA class): without HF (NYHA class 1) and with post-dscharge HF (NYHA class ≥2). The follow-up period was 6 years. A landmark analysis beyond 30-days was performed to analyse the prognostic impact of post-discharge HF on 6-year mortality.
Results: Of 3033 patients included in the Register, 2895 (95.4%) were alive at 30 days, among whom 232 (8.1%) had HF; 200 patients with HF (86.2%) were in NYHA class 2 and 32 patients with HF (13.8%) were in NYHA class 3. As compared with patients without HF, those with post-discharge HF were older, more commonly women and presented more often with Killip class II and III; thay had more frequent previous myocardial infarction, diabetes, reduced baseline kidney function, longer pain duration, multivessel coronary disease on initial angiogram and post-procedural flow TIMI<3. Pre-discharge EF was lower in patients with HF as compared with patients without HF (36.44%, IQR 28.30%-45.12% vs 49.62%, IQR 42.20%-57.40%, p<0.001). In multivariable logistic regression analysis independent predictors for post-discharge HF were lower EF HR 1.04 (95%CI 1.02-1.08), p<0.00, Killip class II and III at presentation HR 2.54 (95%CI 1.84-3.92), p=0.003, post-procedural TIMI<3 HR 2.07 (95%CI 1.12-3.89), p=0.023 and older age (years) HR 1.02 (95%CI 1.01-1.04), p=0.001. Mortality between 30 days and 6-year was significantly higher in patients with post-discharge HF as compared with patients without HF (11.9% vs 3.55%, p=<0.001). In Multivariable Cox regression analysis post-discharge HF was an independent predictor for 6-year mortality - HR 2.21 (95%CI 1.82-3.17), p=0.004. Other independent predictors were lower EF (HR 1.02, 95%CI 1.01-1.06, p<0.001) and older age (HR 1.05, 95%C 1.03-1.07, p<0.001).
Conclusion: The presence of early post-discharge HF after STEMI is independently associated with more than 2-times increase in long-term mortality. This finding is consistent with previous findings and underscores the importance of introducing treatments that improve clinical outcome in patients with HF as soon as possible.

P2127

Comparison of eplerenone and spyronolacton effects in prevention of left ventricular remodeling and development of heart failure in patients after STEMI

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Background: The development of post-infarction remodelling of the left ventricle in patients with ST segment elevation myocardial infarction (STEMI) is an urgent problem of cardiology, as its development worsens the prognosis. Soluble ST2 (sST2) is a marker of fibrosis, which plays a significant role in the development of myocardial remodelling. Antagonists of mineralocorticoid receptors affect the development of myocardial fibrosis and improve the left ventricle remodelling (LV).
Purpose: Compare eplerenone and spironolactone efficacy in preventing LV remodelling and development of heart failure in patients after STEMI with elevated sST2
Methods: 103 STEMI patients were screened (72.8% male and 27.2% female), mean age was 61.85±12.23 years. The levels of sST2 were determined during the first day of hospitalization. A group of 56 patients with sST2 ≥35 ng / ml and stored LV. The examined patients were divided into two groups: the first received eplerenon, and the second one - spironolactone
Results: After 6 months of observation, the groups with remodeling of LV and without it were compared. The blood serum sST2 in the remodeling group was 50.35 [27.17-103.20] ng / ml and 28.02 [21.75-34.70] ng / ml in the group without LV remodelling (p <0.015) Multivariate logistic analysis revealed a significant effect of sST2 on the development of LV remodelling after 6 months of observation (β = -0.079; OR: 0.924; 95% CI 0.8624 - 0.9902; p = 0.025). To study the significance of sST2 in predicting the onset of LV remodelling, ROC analysis was performed. The level of more than 44.5 ng / ml allows to predict the development of LV remodelling, AUC = 0.707, (95% CI 0.533-0.882; P = 0.0198), with a sensitivity of 85.7% and a specificity of 57.1%.
Eplerenon significantly lowered sST2: from 116.00 [36.91-193.41] to 44.24 [29.52-83.96] (p = 0.039), in the spironolactone group, no significant changes in sST2 occurred. In the group of patients receiving spironolactone there was an increase of end-diastolic volume (EDV) from 117,00 ± 27,64 ml to 143,06 ± 47,12 ml (p = 0,014), but eplerenone prevented EDV LV incresaing. The studied drugs did not effect on ejection fraction (EF) LV. In addition, in the eplerenone group, the distance of the 6-minute walk test (6MWT) augmented from 411.3m to 524.4m (p = 0.048), there were no 6MWT changes in the spironolactone group.

Conclusions: The increased sST2 serum level is a prediction of LV remodelling. The use of eplerenone in patients after STEMI with an elevated sST2 level has the advantage of spironolactone using. Eplerenone significantly decrease sST2 level, prevents the development of abnormal left ventricular remodelling and increases the tolerance to physical activity after 6 months of observation.

P2128

Long-term results of coronary artery bypass surgery in patients with Q-myocardial infarction and postinfarction angina

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Purpose: To study the long-term results of coronary artery bypass surgery (CABG) in pts with Q - myocardial infarction (Q-MI) complicated by early postinfarction angina.
Methods: The study involved 104 patients with Q-MI complicated by postinfarction angina underwent CABG on pump. The mean age was 57.4±6.4 years, arterial hypertension was detected in 76 patients (73%), type 2 diabetes was detected in 34 patients (32.7%). The baseline of EF LV was 44.5±6.6%. Class of heart failure (NYHA) amounted 2.75±0.12. All pts were performed general blood analysis, determination the levels of troponin I, BNP, C-reactive protein, myeloperoxidase, von Willebrand factor, fibrinogen, antithrombin III; 6-minute walk test, ECG, Echocardiography. The average number of affected arteries was 3.2±1.4. All pts underwent CABG on pump. CABG with reconstructive operations were performed in 23 (21.7%) pts. The average number of anastomoses were 2,9±1,4.
Results: in the early postoperative period, acute heart failure developed in 26 (25%) pts, perioperative myocardial infarction developed in 5 (4.8%) patients. 6 patients died (5.8%). The NYHA class of heart failure significantly decreased at discharge to 1.7±0.04, and after 12 months it was 1.8±0.01.
Preoperative adaptive remodeling of the myocardium of the left ventricle was 50 (48%) pts, non-adaptive type in 54 (52%) pts. After 1 year of follow-up showed an increase in the number of patients with type adaptive remodeling of the myocardium to 72 (of 73.5%) pts, non-adaptive type was preserved in 26 (26.5%) pts.
Repeated cardiovascular events developed in 42 pts (42.8%) during the 10-year follow-up period: recurrent angina in 26 (26.5%) pts, repeated myocardial infarction in 8 (8.2%) pts, and progression of HF in 26 pts (26.5%). Died 7 (7.1%) pts with baseline EFLV ≤ 35%. The HF class (NYHA) was 2.1±0.01 from 10 years of observation. The main independent predictors of cardiovascular risk for the 10 year follow-up period were baseline EF LV ≤ 35%, wall motion index>2 points, BNP>1500 pg/ml.
Conclusions: Cardiovascular events were recorded in 42.8% pts with Q – MI and postinfarction angina who underwent CABG on pump during a 10-year follow-up period, mainly in pts with initial non adaptive type of LV myocardial remodeling, progression of heart failure and baseline EF LV ≤ 35%, wall motion index>2 points, BNP>1500 pg/ml.

P2129

Mid-term follow-up after Coronary Bypass Surgery in low ejection fraction patients including preoperatively treated with levosimendan

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Background: Pharmacological preparation for coronary bypass surgery in patients (pts) with low left ventricle ejection fraction (LVEF), especially including levosimendan (L), aimed at compensating chronic heart failure (CHF), is known to improve early operative results. There is a need for more data regarding mid-and long-term results.
Purpose: to evaluate 6-months follow-up data after revascularization in pts with low LVEF who were prepared to surgery by base therapy + L and in pts who received only base therapy since it was enough to compensate for CHF.
Methods: Non-randomized prospective study. 42 pts (90% - mal; mean age 61±7years) with multivessel coronary disease, postinfarction zone, LVEF≤35%, proven viable myocardium were operated in 2016-17. All were treated with loop diuretic, MRA, ACEI/ARB and beta-bloker for several weeks preoperatively. Those who steel had at least one of four signs: orthopnea, pulmonary congestion by -ray, 6min-walk-distance < 300m, or BNP ≥ 400pg/ml, - received levosimendan infusion (12.5mg for 24 h,no bolus), 2 days before surgery (group L, n=22). The rest were in the comparison group (group C, n=20).
Results: are presented in the table "6 months after surgery".
The overwhelming majority in both groups showed a significant clinical improvement: an increase in 6 min-distance, reduced need for diuretic, BNP decrease were recorded; almost no hospitalizations, no mortality was registered. However, the dynamics of LVEF and EDD turned out to be hardly noticeable: LVEF increased by 4,5% and 5,7%, EDD decreased by 1,5% and 0% in groups L and C respectively.
Conclusion: We regard this data as a revascularization effect, which was successful, including due to accurate medical preparation with L. At this time interval, a significant increase in LVEF was not observed.

6 months after surgery

	Group L, n-22	Group C, n-20
Angina, n (%)	0 (0%)	2 (10%)
CHF hospitalization, n (%)	1 (4.5%)	0 (0%)
Signs of sever CHF, n (%)- orthopnea- 6 min-walk-distance≤300m- pulmonary congestion by X-ray- BNP≥400pg/ml	1 (4.5%)4 (18%)1 (4.5%)2 (9%)	0 (0%)2 (10%)1 (5%)0 (0%)
Loop diuretic dose as before surgery or above, n (%)	2 (9%)	2 (10%)
Median BNP (IQR), pg/mlBefore6 months after	282 (153;618)218 (156;367)	164 (112;383)140 (131;165)
Median LVEF (IQR),%Before6 months after	33.5 (30;35)35.0 (30;39)	35.0 (32;35)37.0 (33;42)
Median end-diastolic dimension (IQR), mmBefore6 months after	66 (65;71)65 (62;67)	65 (61;69)65 (55;68)

CHF- chronic heart failuer; LVEF - left ventricular ejection fraction

P2130

Dynamics of functional condition in patients with NSTEMI depending from hospital treatment strategy.

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Purpose. The aim of the present work is the evaluation of the functional status of patients with NSTEMI with the test of 6-minute walking depending on the treatment strategy in acute period within 6 months of observation
Methods. Were examined 77 patients (63.6% women) with NSTEMI aged 50 to 79 (average 64,1 ± 1,0) years. The level of troponin I (Tp I), which was determined not earlier than 3 hours after the onset or exacerbation of pain in all patients was higher reference upper limit of normal (> 2.0 ng / mL). The median of Tp I in the group was 7.1 ng / ml, interquartile magnitude - 5.4 and 22.9 ng / ml.
Stratification of patients according to a GRACE ACS Risk Assesment in 48.1% were defined as high risk (>3% and> 140 points on the scale) and 33.8% - as moderate risk of fatal consequences in the near future (1-3% 140-109 points a scale). Low risk (<1% <109 points on the scale) registered by us only in 18.2% of patients.
All of research corresponding to the principles of the Declaration of Helsinki of the World Medical Association.
Results. The analysis of dynamics of functional status of patients with NSTEMI after the test of 6-minutewalking depending on the treatment strategy in acute within 6 months of observation. Were proved that percutaneous angioplasty in patients with NSTEMI in the acute period accompanied with a significant increase functional status of patients within 3 and 6 months, characterized by a significant increase in the value of the distance traveled by 10.6% and 23.9% respectively (p <0 , 0001) and a decrease in the average functional class (FC) of heart failure (HF) of 16.2% and 27.9% respectively (p<0.002). In patients with NSTEMI, which in the acute period did not receive invasive treatment, the positive dynamics of the functional status of patients had not received, were recorded only a tendency to increase the value of the distance traveled by 1.2% (p = 0.13) on the 3rd and tendency to reduce the rate to 0.5% (p = 0.51) in the 6th month. A significant decrease in the average FC HF in these patients is determined only for 3 months by 7.9% (p= 0.04), while the 6th month registered only a tendency to decrease in 1.7% (p = 0.78) compared with the original value.
Conclusion. It is proved that percutaneous angioplasty in patients with NSTEMI in the acute period accompanied
by a significant increase functional status of patients within 3 and 6 months, characterized by a significant increase in the value of the distance from 364 to 402 m (+ 10.6%, p<0.0001) at 3rd and from 364 to 450 m (+23.9%, p <0.0001) at 6 months according to test 6-minute walk and a decrease in the average FC from 1.97 to 1.65 (- 16.2%, p = 0.001) on the 3rd and from 1.97 to 1.42 (-27.9%, p <0.0001) at the 6th month follow-up.

P2131

Use of aspirin as primary prevention prior to an acute coronary syndrome

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Introduction: The use of aspirin as primary prevention of cardiovascular events in certain subgroups of patients is currently controversial. This study aimed to evaluate the prognostic impact of prior use of AAS as primary prevention in patients with an acute coronary syndrome (ACS).

Methods: This was a retrospective study of patients with non-fatal ACS between October 2010 and November 2017. We excluded patients with prior history of myocardial infarction (MI), percutaneous or surgical coronary revascularization, stroke and peripheral arterial disease. The endpoints evaluated were MI, stroke, decompensation of heart failure (DHF), major bleeding and all-cause mortality, at a median follow-up of 42 months (IQR 24-59).

Results: A total of 444 patients were selected, 72.5% were male, with a mean age of 65.0±13.5 years old, and 11.7% was previously medicated with aspirin. This group had more patients with history of arterial hypertension (86.5% vs 54.1%, p<0.001) and diabetes (40.4% vs 24.2%, p<0.05), less smokers (7.7% vs 24.7%, p<0.05), without significant differences in dyslipidemia (61.5% versus 47.4%, p=0.133). Compared to patients who were not treated with aspirin, during hospitalization, a higher incidence of new-onset atrial fibrillation occurred (15.4% vs. 4.6%, p<0.05). There were no differences in the overall treatment prescribed at discharge between the two groups.

In a multivariate analysis, we haven't found any statistically significant differences for any of the proposed endpoints, namely MI (HR 1.1, 95% CI 0.4-3.6), stroke (HR 1.0, 95% CI 0.2-5.1) and DHF (HR 1.0, 95% CI 0.5-2.4). There was even a tendency for greater overall mortality (HR 1.7, 95% CI 0.9 -3.4) as well as for major bleeding (HR 1.8, 95% CI 0.8 -4.0).

Conclusion: In this study the use of aspirin as primary prevention prior to an ACS did not hold any long-term beneficial effect, as it couldn't reduce, in an independent and significant manner, the incidence of ischemic or hemorrhagic events.

P2132

Coronary revascularization does not improve echocardiographic ejection fraction or serum NT-proBNP levels but may improve left ventricular diastolic function in patients with developed heart failure.

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Introduction: Chronic heart failure is a major problem in cardiology because of its high mortality, increasing number of hospitalizations and enormous expenses for its treatment. Survival rate is worse than that of breast cancer in women and prostatic cancer in men. The most common reason for chronic heart failure is ischemic heart disease. Percutaneous coronary intervention (PCI) and coronary artery bypass grafting (CABG) are two of the therapeutic options when coronary artery disease is present.

Purpose: The aim of this study was to assess the impact of coronary revascularization (PCI and CABG) on ejection fraction, serum NT-proBNP levels ant left ventrical diastolic function in patients with chronic heart failure and stable coronary artery disease.

Methods: Twenty-three female and male patients (mean age 62 ±12 years) with chronic heart failure NYHA class II-IV and stable angina pectoris CCS class III were included in this study. Coronary arteriography was performed and coronary artery disease was established in all of them. Nineteen patients (82.6%) were revascularized by PCI and 4 patients (17.4%) were referred to a cardiothoracic surgery for CABG. Prior to revascularization measurements of echocardiographic ejection fraction and diastolic function, serum NT-proBNP levels, and evaluation of NYHA class were performed. On six-month follow-up visit the same parameters were reassessed. Student's t-test for dependent samples was used for the statistical analysis of the results.

Results: There was a significant reduction in ejection fraction (53.4±7.3% vs. 49.8±6.6%, P<0.001) six months after revascularization and significant reduction in E/e' (11.85 vs. 9.59, p<0.05). Serum NT-proBNP levels (1748±2673 pg/ml vs. 1522±1285 pg/ml, p=0.69) and NYHA class failed to show any statistically significant difference.

Conclusions: Our study provides evidence that coronary revascularization does not have positive impact on ejection fraction, serum NT-pro-BNP levels and NYHA class but may improve left ventricular diastolic function evaluated by E/e' on six-month follow-up.

P2133

Impact of the baseline systolic dysfunction on the long-term outcomes of elective percutaneous coronary interventions

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Purpose To investigate the effect of baseline systolic dysfunction on long-term outcomes of coronary artery disease in patients after elective percutaneous coronary interventions (PCI).

Methods An retrospective observational study included 162 patients referred for elective percutaneous coronary intervention (PCI). The first group included 141 patients with left ventricular ejection fraction (LV EF) ≥50% according to ultrasound of the heart before PCI. The second group included 21 patients with baseline LV EF less than 50%. Outcomes of interventions were assessed 6 years after the index PCI, by analyzing medical records and telephone interviews. The primary endpoint of the study was the frequency of death from cardiovascular causes. The secondary endpoints were total mortality, the incidence of major adverse cardiovascular and cerebral events (MACCE), incidence of nonfatal acute myocardial infarction (AMI).

Results

6 years after index PCI, death from cardiovascular events was recorded in 10.9% of patients in the observed cohort (7% in the first group and 38.9% in the second, p = 0.0002). Total mortality during this period was 14.4% (10.9% in the first group and 41.2% in the second, p = 0.003). MACCE were registered in 39.9% of patients (36.2% in the first group and 66.7% in the second, p = 0.026). AMI developed in 10.1% of patients (7.3% in the first group and 31.3% in the second, p = 0.01). It was shown that the baseline decrease in LV EF 50% is associated with an unfavorable course of the disease in the long-term period (6 years) after planned PCI, and is a predictor of the development of the fatal cardiovascular events (OR = 8.41; 95% CI [2.63– 26.97]; p = 0.000), total mortality (OR = 6.19; 95% CI [2.01–19.04]; p = 0.000), MACCE (OR = 3.61; 95% CI [1 , 27–10.25], p = 0.012); AMI (OR = 5.62; 95% CI [1.44–21.99]; p = 0.006).

Conclusion Baseline systolic dysfunction is a predictor of general and cardiovascular mortality, as well as major adverse cardiovascular events in the long-term period after elective PCI.

P2134

In-hospital results of Coronary Artery Bypass Grafting in patients with low left ventricular ejection fraction: focus on preoperative medical prepare, experience in the use of levosimendan

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BACKGROUND: Low cardiac output syndrome (LCOS) – the main complication of coronary artery bypass grafting (CABG) in patients with low left ventricular ejection fraction (LVEF). Preoperative levosimendan, added to standard therapy for chronic heart failure (HF), promotes compensation, thus it's expected to reduce LCOS risk and to accelerate recovery.

PURPOSE: to evaluate CABG outcomes and postoperative parameters of patients (pts) with LVEF≤35% who was treated only standard therapy for CHF and who additionally received levosimendan.

METHODS: Non-randomized prospective study. 42 pts with multivessel coronary disease, extensive postinfarction zone and proven viable myocardium included; 90% - mal, mean age = 61±7 years. All pts received medication for CHF - loop diuretic, MRA, ACEI/ARB, beta-bloker - for at least 1 month preoperatively. Those who had at least one of the four criteria: 6min-walk-distance < 300m, orthopnea, pulmonary congestion by radiography or BNP ≥ 400pg/ml, - received levosimendan as infusion of 12.5mg for 24 h (no bolus), 2 days before surgery (group 1, n=22). The others made up the comparison group (group 2, n=20). Median (IQR) BNP (pg/ml) was 282 (153;618) and 164 (112; 383), median (IQR) LVEF was 33,5% (30;35) and 35,0% (32;35), median (IQR) LV end-diastolic dimension (mm) was 66 (65;71) and 65 (61;69) in groups 1 and 2 respectively.

RESULTS: problems during pre-perfusion period occurred less frequently in group 1 (p>0,05); the other parameters were comparable. The results are presented in the table.

CONCLUSION: It is reasonable to support the preoperative therapy with levosimendan in patients with low LVEF scheduled for CABG in cases if signs of CHF persist despite standart medication; at this rate the results of the surgery and the in-hospital period parameters are expected to be the same as in patients with clinically compensated CHF.

IN-HOSPITAL RESULTS		
	Group 1, n - 22	Group 2, n - 20
Pre-perfusion period- Urgent cardiopulmonary bypass (VF, AV-bloc, LCOS),n (%)- Need for inotropic support, n (%)	2 (9%) 15 (68%)	3 (15%) 11 (55%)
Perfusion/post-perfusion period- Median inotropic index by the end of the operation (IQR)- Median trachea intubation time (IQR), h- Median Inotropic index in 24 hours after CABG (IQR)- Median Length of inotropic support (IQR), h	5 (5;10) 8.0 (6;14) 4 (4;8) 67.0 (25;108)	5 (4;5) 7.5 (6;14.5) 4 (0;6) 67.5 (4;118)
Post-surgical in-hospital data- Median Length of intensive care (IQR), h- Median Length of hospital stay (IQR), days- Mortality, n	45 (45;48) 9 (7;10)0	45 (44;48) 9 (7;11)0

VF - ventricular fibrillation; LCOS- low cardiac output syndrome;CABG - coronary artery bypass grafting

P2135

Platelet aggregation test with adenosine diphosphate in prevention of early coronary stent thrombosis

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The coronary artery stenting is a common and effective endovascular treatment for various forms of coronary artery disease. In most cases prescribed dual antiplatelet therapy helps prevent stent thrombosis. However, the effectiveness of dual antiplatelet therapy is rarely monitored. Despite there are 0.6-2% chances in the first year of having stent thrombosis with high mortality rate after coronary artery stenting. Aim: to study the effectiveness of platelet aggregation management in early coronary stent thrombosis prevention in patients with unstable angina.Materials and methods. The study included 215 patients with unstable angina. All patients were randomized in II groups. There were 112 patients in group I and 103 patients - in group II. Group I had the platelet aggregation managment based on platelet aggregation test with adenosine diphosphate and group II had not. Percutaneous coronary intervention with stenting perfomed in both groups.
The odds ratio for the development of early coronary stent thrombosis in patients with unstable angina with platelet aggregation management compared with the patients without platelet aggregation management is 3.36 ($p < 0.05$).Conclusion. The study shows the importance of platelet aggregation management in the prevention of early coronary stent thrombosis in patients with unstable angina

P2136

Heart failure control in patient with coronary artery disease

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Introduction: Coronary artery disease (CAD) has been steadily raising in the past few years and enhanced survival fueled by better medication and revascularization techniques has placed it as one of the primary risk factors for developing heart failure (HF). Therefore, it is essential for patients suffering from HF to have a good adherence to their treatment.
Purpose: The aim of our study was to investigate the prevalence of HF in the CAD population as well as evaluate the compliance of patients towards guideline recommendations.
Methods: We have enrolled 194 consecutive patients who have undergone PCI or CABG for acute myocardial infarction or unstable angina or stable angina between October 2016 and June 2017. Out of this lot we have selected 160 patients who developed heart failure. We have interviewed these patients regarding their medication and lifestyle and have determined their ejection fraction (EF).
Results: Out of the population with heart failure, 76.8% had a preserved EF, while 15.6% had an intermediate EF and 7.5% a reduced EF. However just over half of the patients with intermediate EF (64%) were taking an angiotensin converting enzyme (ACE) inhibitor or an angiotensin receptor blocker (ARB). The most used medication was Ramipril (43.7%), followed by Zofenopril (31.2%), Valsartan (6.2%) and Olmesartan (6.2%). In the group with reduced EF 50% of these patients were on ACE inhibitor or ARB treatment, which included Zofenopril in 66.6% of the cases, Ramipril in 33.3% of the cases and Valsartan in 33.3% of the cases. Moreover, 59% of the entire population with heart failure were not currently taking Spironolactone.
Conclusions: We have noticed that patients at very high cardiovascular risk are poorly controlled regarding their heart failure medication which might be explained by non-adherence to treatment. Awareness should be raised among patients to ensure better compliance regarding medication adherence.

Valvular Heart Disease

P2137

Usefulness of balloom aortic valvuloplasty in the management of patients with aortic stenosis

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The introduction of Transcatheter Aortic Valve Implantation (TAVI) has generated a renewed interest in the treatment of patients with severe aortic stenosis. The aim of our study was to analyze the indications and survival of patients with severe aortic stenosis treated with balloon aortic valvuloplasty (BAV).
Methods: Between 2005 and 2017, 159 consecutive patients with severe aortic stenosis were treated with BAV at our center. Three cohorts of patients were identified according to the definitive treatment performed: A) bridge to TAVI n = 67 B) bridge to surgical aortic valve replacement (AVR) n = 70 and C) medical-palliative treatment n = 22.
Results: The mean age of patients was 76.8±8 years, and had a high surgical risk, (mean logistic EuroSCORE 24.17±14%, and EuroSCORE II 9.01±6. There were differences in the gender, according to definitive planned therapy, being the most prevalent female sex for TAVI compared with AVR and palliative therapy (53.9% vs. 31.3% vs. 40%, $p = 0.012$). Highlight that 33 patients (20.8%) were in cardiogenic shock. The success of the procedure was 96.9%. Two patients died during the procedure. In-hospital mortality was 17.6% and occurred mainly in patients with cardiogenic shock [OR = 9.84 (95% CI 3.91-24.7) $p < 0.001$]. The rate of major events was 14.6%. The mean survival in patients to bridge TAVI was 51 months (95% CI 42-60.2), to AVR was 83 months (95% CI 58.9-107.6) and medical-palliative treatment was 6.2 months (95% CI 3.208- 9.26), log Rank 102, $p < 0.001$. Frailty was an independent predictor of late mortality [HR=4.310 (95% CI 1.98-9.38), $p < 0.001$).
Conclusion: In our series, the number of BAV has increased due to the introduction TAVI. The procedure is safe and the mean survival was acceptable for the population of patients receiving subsequent definitive treatment. Cardiogenic shock conditions in-hospital mortality, and the frailty of patients (based on the Fried scale) is a predictor of late mortality that should be considered in the clinical evaluation

P2138

Predictors of heart failure after aortic valve replacement in 2,500 patients

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Introduction: Heart failure after aortic valve replacement (AVR) is a highly lethal complication, which might be prevented by avoiding the development of its modifiable predictors.
Methods: A retrospective analysis was performed of 2,500 consecutive patients, who underwent AVR from 1987 to 2017. Patients with a mitral valve or mechanical valve in any position were excluded. Concomitant procedures such as CABG, mitral and tricuspid valve repair were included. Preoperative parameters under investigation are listed in the results section. Statistical analysis included an univariate chi-square analysis (first step). To identify independent predictors, significant univariate categorical variables were entered in a multivariate logistic regression analysis (second step).
Results: Postoperative heart failure has a hospital mortality of 58.5% (mortality of all patients: 4.6%). Predictors of postoperative heart failure are age > 80, chronic pulmonary and renal disease, high NYHA class, preoperative heart failure, permanent pacemaker, need for non-elective surgery, additional cardiac procedures, atrial fibrillation ($p<0.001$ in all cases), diabetes ($p=0.002$) and coronary artery disease ($p=0.015$). Seven predictors could be identified (table)

Heart failure is also associated with other postoperative events, including infective endocarditis bleeding, arrhythmias, atrial fibrillation, conduction defects, myocardial infarction, delirium, renal and pulmonary complications, increased need for blood products, prolonged mechanical ventilation and length of stay in the intensive care unit (p<0.001 in all cases).
Conclusions: Most predictors are not modifiable except for the development of preoperative heart failure and need for non-elective surgery. Once aortic valve disease has become symptomatic, early referral could prevent these developments and improve postoperative results.

predictors for postoperative CHF

Preop predictor	Odds ratio	95% confidence interval	p-value
Age > 80y	1.92	1.26 - 2.92	0.002
FEV1<70%	2.03	1.36 - 3.28	0.004
CKD	2.08	1.35 - 3.20	0.001
NNES	2.12	1.10 - 4.09	0.026
CHF	1.55	0.98 - 2.43	0.059
PCI	1.81	1.08 - 3.02	0.024
AF	1.70	1.10 - 2.63	0.017

AF: atrial fibrillation; CHF: congestive heart failure CKD: chronic kidney disease; FEV1: forced expiratory value - 1 second; NNES: need for non-elective surgery; PCI: percutaneous coronary intervention

P2139
Hemostatic system changes in infective endocarditis patients before and after surgical heart valves operation

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The particular interests are the features of hemostasis in patients with infective endocarditis (IE) in the early postoperative period after heart valvular correction. There isn't frequency established the development of disseminated intravascular coagulation syndrome (DIC syndrome) in the postoperative period and its involution after surgical treatment and which y hemostasis changes are generally happen.
Materials and methods: we included 65 patients with IE: 52 men and 13 women. Control group (CG n = 35), whose anti-inflammatory and anticoagulant therapy was traditionally performed; the main group (MG n = 30), in whom anti-inflammatory and anticoagulant therapy was prescribed taking into account the complications of the early postoperative period.
Results: we was found that in the preoperative period there was a DIC syndrome: MG in 33% cases and 34% in the CG. 1st and 2nd stages of DIG were noted in an equal 50% of cases among MG patients. Among the CG patients, the 1st stage of DIC was noted in 58% of cases, the 2nd stage in 42%. In the preoperative period patients of both groups had moderately disturbances in the 2nd and 3rd phases of the coagulation cascade (thrombin formation and fibrinogenesis), platelet link along with moderate activation of spontaneous fibrinolysis. For patients with IE characterized by an increase in the blood markers of thrombinemia D-dimer (MG - 874±1141 ng/ml and CG - 1096±1704 ng/ml, p = 0.56) and fibrinogen (MG - 4.4±1,5 g/l and CG - 4.1±1.4 g/L, p=0.45) and one of the markers of plasminemia (D-dimer or plasminogen). Thus, for the detection of hypercoagulability in the preoperative period in patients with IE it is determine in complex fibrinogen, D-dimer and plasminogen. decrease in blood plasma levels of natural anticoagulants (PC and PS) was registered predominantly in patients with chronic hepatitis B or C. In general, the PC in groups was 98 ± 22% in the MG, and 118 ± 32% in the CG, p = 0.012, and PS was 107 ± 26% in MG and 114 ± 40% in CG, p = 0,45
Conclusion On the 1st day after the operation, the DIC-syndrome begins to progress in patients with IE. Significant disturbances are revealed in the system of natural anticoagulants, platelet link, as well as thrombinemia and plasminemia markers.

P2140
A systematic review on the LAmbre atrial appendage closure device

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Background: Percutaneous closure (LAAC) of the left atrial appendage (LAA) has emerged as an efficacious preventive procedure for patients with non-valvular atrial fibrillation (NVAF) and considerable bleeding risk. The LAmbreTM LAA-occluder is a novel device characterized by full retrievability, repositionability during the implantation process, and the characteristic umbrella with hooks directed towards the LAA, which act synergistically to prevent from LAA perforation. In this systematic review, we summarized the safety and therapeutic success of LAAC using the LAmbreTM occluder evaluating the published data.
Methods & Results: A systematic search of the literature retrieved n=10 publications, encompassing n=403 NVAF patients treated with a LAmbreTM LAAC, with relevant data regarding safety and therapeutic success of the procedure. The majority of the publications were prospective monocenter observational registries, while 4/10 publications were multicenter registry publications. The mean age was 73.6 + 4.0 years, 58% of the treated patients were male, and their mean LVEF was 56.9 ± 5.3%. The mean CHA2DS2-VASc Score was 4.0 + 0.9, and the HAS-BLED score was 3.4 + 0.5. The reported implant success was 99.7%, with a mean procedure time of 45.4 ± 18.7 min, and a mean fluoroscopy time of 9.6 ± 5.9 minutes, with mean contrast agent volume of 96.7 ± 0.7 ml per LAAC procedure. The anticoagulation regime was switched to DAPT post procedure in the majority of the patients (96.8%). Partial recapture was reported in 45.5%, full recapture was done in 25.6%, and resizing of the device was undertaken in 3.6% of the patients, respectively. Major complications were reported in 2.9%, with 0.3% mortality, 1.7% pericardial tamponade, 0.3% stroke, and 0.6% major bleeding complications. During follow up at 6 or 12 months, major adverse cardiovascular events were reported in 3.3%: Stroke or TIA in 1.7%, thrombus formation on the device in 0.7%, and residual flow >5 mm in 1.0 %. No major bleeding or device embolization events were reported. In some publications, the favorable implant properties of the LAmbreTM for difficult anatomies such as shallow or multilobular LAA anatomies were described.
Conclusions: This systematic review on the LAmbreTM LAA-occluder n=403 NVAF patients from various centers and countries summarizes an excellent implant success rate, low periprocedural complications, favorable implant properties for difficult LAA anatomies, and promising follow up clinical outcome. Further larger prospective multicenter registries and randomized trials are warranted to scrutinize the value of LAmbreTM LAA-occluder, comparing its feasibility, safety and efficacy with other LAAC devices.

P2141
Increase of MitraClip and further structural heart disease procedures at a tertiary center by enhanced awareness, standardized screening and interdisciplinary networks

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Background: Heart failure patients are often eligible for interventional procedures for structural heart diseases (SHD). Transcatheter mitral valve repair by MitraClip (TMVr-MC) and left atrial appendage closure (LAAC) are important procedures within structural heart disease (SHD) programs. The identification of eligible patients may depend among others on the awareness for these SHD procedures, standardized screening, as well as on interdisciplinary networks for the identification of eligible patients.
Methods & Results: We retrospectively analyzed the number of procedures carried out at a tertiary cardiology center before and after (since 2018) the implementation of a program enhancing awareness for these rather infrequent SHD indications, standardized screening in the echocardiography department and on the wards, as well as the setup of interdisciplinary networks for the improved identification of eligible patients. The set up of this enhanced focus on SHD was directed by the new temporary chief of the department of the tertiary center. The new focus was enhanced by the introduction of related regular continuous education courses for the doctors both at the department of cardiology and in further in-house departments (e.g. internal medicine, emergency department, cardiac surgery; external courses for allocating centers), and the foundation of interdisciplinary networks especially for LAAC indications (with departments of neurology, gastroenterology and nephrology). The numbers of TMVr-MC and LAAC procedures were varying in the years before 2018, and low. After the implementation of the above mentioned program for identifying eligible patients, the numbers increased substantially in this ward for both TMVr-MC (p=0.0058) and LAAC (p=0.0021). Compared with the procedures of 2017, in 2018 we increased the volume of TMVr-MC by 522%, and of LAAC by 1,950 %.
Conclusions: Our data confirm the impressive effects of the implementation of enhanced awareness for the SHD procedures among others by continuous education, standardized screening in the echocardiography department, as well as by introducing interdisciplinary networks for the identification of eligible patients for these rather infrequent SHD indications. These data support also for heart failure patients the importance of enhanced screening and education strategies for SHD indications, also comprising interdisciplinary networks.

P2142

Impact of percutaneous mitral repair with MitraClip on the natural history of severe mitral regurgitation

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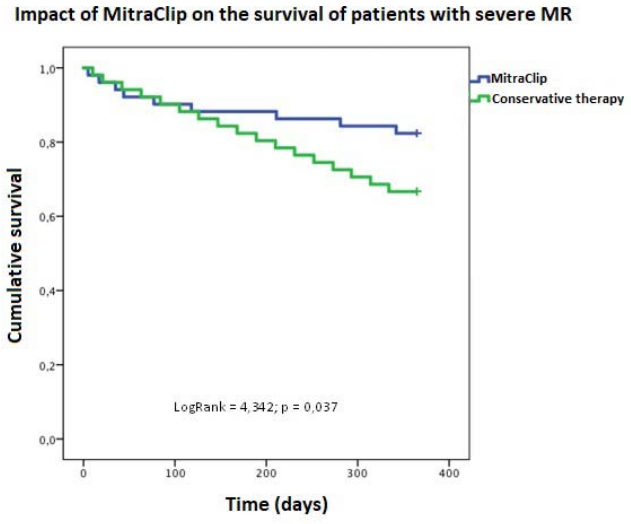
Background: severe mitral regurgitation (MR) under conservative management is associated with high morbidity and mortality. Percutaneous mitral valve repair, with MitraClip System is a complement to medical therapy in patients with surgical contraindication. Recent studies question the impact of this system on mortality.
Purpose: to evaluate the prognostic impact of mitral valve repair with MitraClip in the natural history of severe MR.
Methods: prospective, single-center registry of consecutive patients (pts) undergoing percutaneous MR repair with MitraClip system from 2013 to 2018. Demographic, clinical and echocardiographic data were analyzed. Anticipated 1-year mortality was estimated based on the Seattle Heart Failure Model score (Seattle HF score). Kaplan-Meier curves were analyzed for comparison of predicted mortality (by Seattle HF score) and our sample mortality.
Results: 51 procedures (mean age 71.8 ± 13.5 years, 30 males) were performed in pts with symptomatic MR, grade III or IV. 14 pts (27.5%) had primary MR and 37 (72.5%) had secondary MR.
The mean left ventricular ejection fraction was 39.0 ± 14.1%. The success rate per patient was 92.0% and the complication rate was 7.7% (n=4; 2 procedure failures, 1 pericardial effusion and 1 vascular complication).
During a mean follow-up of 615 ± 613 days, there were 14 hospitalizations due to cardiac cause (27.5%) and 17 deaths (33.3%), 9 of which occurred in the first year(17.6%).
According to the Seattle HF score the predicted mean mortality at the end of one year for the sample studied under conservative therapy was 33.1% ± 16.7%, corresponding to 17 deaths. Based on predicted mortality, there was a statistically significant reduction of 8 deaths (LogRank = 4.342, p = 0.037, relative risk reduction of 44.0%).
Conclusion: the percutaneous MR treatment was a safe and effective procedure, with an additional impact on the vital prognosis of pts with severe MR, presenting a relative reduction of mortality risk of more than 40% at 1 year. This reduced real-world experience, with a majority of patients with functional MR, suggests a reduction in mortality that will be in line with the COAPT Trial results.



Graphic 1

P2143

one year mortality outcomes in patients with aortic stenosis and reduced left ventricular ejection fraction undergoing tavr procedure

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Intraduction: In this study we aimed to investigate the association between baseline LVEF and one year mortality of patients after TAVR and also describe the most appropriate patients for TAVR procedure in reduced LVEF with AS.
Method: Records of 133 patients who underwent TAVR in two heart centers were evaluated into two groups (Group 1 (LVEF >40%)(n=82), Group 2 (LVEF < 40)) (n=51). We examined rates of 1-year mortality and clinical parameters.
Results: Baseline characteristics of patients were paired. Over the first year of follow-up after TAVR, patients with LV dysfunction had similar rates of death with patients who had preserved LVEF. Procedural success, complication rates and in-hospital mortality rates were similar in both groups. (table 1) Aortic peak and mean gradients were correlated with 1- year mortality (r=0.180, p=0.038;) (r=0.178, p= 0.04). LVEF was significantly increased after TAVR procedure in group 2 patients (p<0.01). Logistic regression analyses showed that 1-year mortality was related to patient's age (t=-2,31, p=0.02), creatinine levels (t=-3,34, p<0.01) and pulmonary artery systolic pressure (SPAP) (t=-2,61, p=0.01).
Conclusion — In our study LVEF was increased in HF patients after TAVR. This might be reflect myocardial reserve and it is important for post procedural period and could be protected earlier stages of HF patients with AS. By the time myocardial necrosis and irreversible myocardial damage will be seen therefore mortality rates are increased. Early periods of AS in HF would be most effective time for TAVR. As a conclusion some parameters like patients' age, creatinine levels, and SPAP are important as LVEF in patients with AS undergoing TAVR.

Comparison results of two groups.

	Group 1 (LVEF≥40%)	GROUP 2 (LVEF<40%)	T-Test (p)
1 year mortality (n)	17/82	9/51	0.564
Age (year)	77.6±6.2	75.3±8	0.105
LVDD1 (mm)	48.2±5.2	55.2±6.3	<0.01
LVEF (') (before)	53.9±6.5	32.3±6	<0.01
Aortic PGR (mmhg)	82.9±17.8	72.7±19	0.005
Aortic MnGR (mmhg)	49.9±10.7	43.4±11.9	0.004
AVA (cm^2)	0,74±0.14	0.67±0.15	0.019
SPAP (mmhg)	48.9±15.7	52±11.8	0.24
Euro1 score	27.7±10.5	36.7±13.3	0.008
LVEF2 (%)(after)	54.9±6.9	41.7±9.4	<0.01
Creatinine (mg/dl)	1.1±0.5	1.1±0.5	0.6

P2144

Patients with prosthetic valve endocarditis admitted in non-reference centers may substantially benefit from infectious diseases specialist wisdom in antibiotic regimen selection

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Background. The fatal outcome of prosthetic valve endocarditis (PVE) was improved over time due to changes in management strategies. The optimal treatment approach involves now multiple hospital specialists but in the early 21st century, infectious disease (ID) physicians were the ones who effectively combined bactericidal antibiotic to determine antimicrobial clearance and adequately cure the infection.
Purpose. To identify whether PVE patients admitted in non-reference centers may benefit from an initial medical strategy established by an infectious disease physician with antibiotic regimens that not fulfill cardiologist guidelines necessarily.
Method. Retrospective study which included 56 with early and late PVE patients admitted in two non-reference centers over 5 years period contemporary with The International Collaboration on Endocarditis-Prospective Cohort Study. Heart failure symptoms were present in 69% of early PVE and 41 % in late PVE. Demographic,

clinical, laboratory and echocardiographic findings were analyzed at baseline and after exclusion of patients lost to follow up.
Results. 36 men and 20 women included in this study had 54.64±11.34 years (28–74y) at baseline. They had either early PVE (n=29) or late PVE (n=27). Antibiotic therapy (AT) established by ID specialist generated the cure of the disease in71% cases with an in-hospital death rate of 2% and a rate of referral to early surgery of 21,4%. Full antibiotics course duration was 33.55 ± 12.8 days. Combined therapy (medical and surgical) determined an excellent outcome in 90.4% patients at the end of full antibiotic cure. The positive outcome does not depend on the type of antibiotic selection (multivariate analysis) even if they are not per cardiologists guidelines. Moreover the ID physician changed frequently antibiotic type due to intolerance of some AT (Oxacilline, p=0.035; Vancomycin, p=0.005). Imipenem+Amikacin when combined, they determine less adverse effects, a shorter time to fever disappearance (p=0.004). There was no relationship between heart failure presence or aggravation and the type of antibiotic regimen. Conclusion. Irrespective of PVE type or etiology, decision making process for antibiotic treatment conducted by infectious disease specialist determine a high rate of PVE cure and reduce mortality directly attributable to infection.

P2145
Current characteristics of infective endocarditis in a developing country: a prospective cohort study

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Objective: The epidemiology and the clinical features of infective endocarditis(IE) has changed substantially over past few years in the developing countries. We aimed to explore the current trends and outcomes of IE in a tertiary care hospital in Karachi, Pakistan.
Methods: Prospectively collected data was analyzed from the National Institute of Cardiovascular Diseases (NICVD) registry from June 2017 to April 2018.The primary outcome was length of hospital stay, and in-hospital mortality was the secondary outcome. Fisher's exact test was used to compare categorical variables, while Mann Whitney or Kruskal Wallis tests were used to compare continuous variables. Univariate and multivariate logistic regression was conducted to identify predictors of in-hospital mortality.
Results: A total of 49 patients were included, of which 33 were males (67.3%). The mean age of the participants was 28.1 years. Length of stay ranged from 1 to 92 days. Upon univariate analysis, male sex was found to be associated with longer length of stay (median 24.0 days) than female sex (median 11.0 days) (p=0.008). Of the 33 (67.3%) patients with positive blood cultures, streptococcus viridans (24.2%) was found to be the most common individual pathogen. Only cerebral complications (p<0.001), indication of surgery/procedure (p<0.017), and positive valve or lead culture (p<0.002) were identified as independent predictors of length of stay. Eight patients died during hospital stay, leading to an in-hospital mortality rate of 16.3. Conclusion: Independent predictors for length of hospital stay in patients with IE in our study were cerebral complications, indication of surgery/procedure, and positive valve or lead culture. A relatively high mortality rate of 16.3% was detected

Myocardial Disease

P2146
Myocardial fibrosis and long-term outcome after septal myectomy in hypertrophic cardiomyopathy

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Background: Diastolic dysfunction, life-threatening rhythm disturbances and sudden cardiac death are associated with myocardial fibrosis in patients (pts) with hypertrophic cardiomyopathy (HCM). We assumed that the long-term outcome after septal myectomy depends on myocardial fibrosis severity.
Materials and methods: 47 pts (m:f 18:29) undergoing septal myectomy for HCM and 30 healthy pts as control group were included. ECHO, contrast enhancement cardiac MRI, histology specimens (obtained at septal myectomy) analysis, circulating fibrosis biomarkers (TGFß1, MMP-2,9, TIMP-1, galectin-3, sST2, CITP, PICP, PIIINP, NT-proBNP) were performed. Pts with HCM were examined before surgery, as well as 7 days, 6 and 12 months after surgery.
Results: The mean value of maximum LVOT gradient was 88 (55; 192) mm Hg, maximum wall thickness - 22±3 mm in pts with HCM. The extent of late gadolinium interventricular septum enhancement ranged from 32 to 53%. Square of myocardial fibrosis by histological data was 13.9±6.9%. Increased serum PICP, PIIINP, galectin-3, sST2, TGFß1 levels were revealed in pts with HCM in comparison with the controls. Increased CITP level was associated with myocardial fibrosis by histological assay (r=0.356; p=0.028) and TIMP-1 level was related with wall thickness (r=0.502; p<0.001). Nevertheless, level MMP-9 was increased. Male pts had a higher level of TIMP-1 (p = 0.004), level of sST2 (p = 0.0008) and risk of SCD (=0.028) in compare with female pts. Pts with severe myocardial fibrosis had a negative prognosis of left atrium size reduction.
Conclusion: Circulating fibrosis markers can be used for risk stratification in pts with HCM. Myocardial fibrosis is mainly determined factor in the long-term outcome in pts with HCM after septal myectomy.

Clinical characteristics of patients

	Patients with HCMM±n=47	The control groupM±n=30
Age, years	55±9	51,5±5
Galectin-3,ng/ml	8.26±2.06	6.07±1.43
MMP-2,ng/ml	255±81	312 ± 95
MMP-9,ng/ml	1153(683; 1569)	283(249;509)
TIMP-1,ng/ml	161±51	146±38
CITP,ng/ml	0.467 (0.273;0.677)	0.311 (0.269;0.415)
PIP,ng/ml	69 (33;199)	28 (17;59)
PIIINP,ng/ml	12.3 (8.6;30)	11 (8.4;12.7)
TGF-β1,mg/ml	21 (12.8;25)	13 (12;18.6)
sST2,pg/ml	19.6 (15.7;26.3)	15.4 (11.8;18.5)

P2147
Etiological structure of phenocopies of hypertrophic cardiomyopathy in different age groups

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Introduction . Etiology of hypertrophic cardiomyopathy (HCM) can be heterogeneous, with sarcomeric gene disease as the leading cause in up to 60% of the patients, and with a number of phenocopies in about 5%–10% of the patients. However, publications reflecting the etiological structure of phenocopies of HCM in different age groups are not enough.
Purpose. To study the etiological structure of phenocopies of HCM in different age groups of patients of the North - West region of Russia.
Methods. The study included 321 patients with HCM. The standard clinical-laboratory and instrumental methods of diagnosis idiopathic HCM and phenocopies of HCM were applied.
Results. Of the 153 studied elderly patients with HCM: idiopathic HCM was diagnosed in 85% of the cases (n = 131), phenocopies of HCM were found in 15% of the patients (n = 22). In the etiological structure of phenocopies of HCM in the elderly patients, transthyretin amyloidosis was observed in 10% of the cases: 6% (n = 9) of the patients were affected by wild-type of transthyretin amyloidosis, 4% (n = 6) — hereditary transthyretin amyloidosis (Val30Met-amyloidosis (n=2) and not Val30Met-amyloidosis (n=4)). The second most common phenocopy of HCM is AL-amyloidosis (4%, n=6). Acromegalic cardiomyopathy was verified in 1 patient (1%).
In the middle age group idiopathic HCM was diagnosed in 85% of the cases (n = 86), phenocopies of HCM were found in 15% oh the patients: isolated cardiac sarcoidosis - in 3% (n = 3), AL-amyloidosis - in 11% (n=11) and hereditary transthyretin amyloidosis - in 1% (n=1) of the cases.
At the young age group of the patients, idiopathic HCM was observed in 92% of the cases (n=62), phenocopies of HCM were diagnosed in 8% of the patients: Danone disease — in 2% (n = 1), isolated cardiac sarcoidosis — in 2% (n = 1) and AL-amyloidosis — in 4% (n = 3) of the cases.
Conclusions. Idiopathic HCM prevails in all age groups. Etiological structure of phenocopies of HCM in the elderly patients is represented mainly hereditary and wild-type of transthyretin amyloidosis. At the young age group are more common glycogen storage diseases. AL-amyloidosis is found in all age groups of patients.

P2148

Analysis of ICD therapies in patients with hypertrophic cardiomyopathy

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Background: Patients suffering from Hypertrophic cardiomyopathy (HCM) are at an increased risk of sudden cardiac death (SCD). In Malta, there are approximately 150 patients with HCM being followed-up at the Inherited Cardiomyopathy Clinic of which 19 have had an Implantable Cardioverter Defibrillator (ICD) implanted.
Purpose: To retrospectively analyse the risk of SCD and ICD therapies delivered in patients with HCM at our Hospital, Malta.
Method: Data Collection was done using IT systems used in the Department of Cardiology (CVIS). The HCM Risk-SCD calculator was used appropriately to calculate risk of SCD at 5 years.
Results: Locally, 19 patients with HCM have had an ICD inserted. 69% were males and 31% were females. The mean age at device implantation was 50 years. ICDs were inserted in 2 patients <16years of age, in 1 patient with Fabry's disease and in 3 patients for secondary prevention. For the other 13 patients, the HCM Risk SCD calculator was used to calculate risk of SCD at 5 years. 5 patients had >6% risk of SCD at 5 years meaning that ICD insertion should be considered whereas 8 patients had 4-6% risk of SCD at 5 years meaning that ICD insertion may be considered. Cardiac MRI was used in most borderline cases to decide regarding ICD insertion. 15.7% (n=3) had appropriate therapies for VT; n=2 had SCD risk>6% and n=1 had SCD risk 4-6% (SCD risk 5.92%) at 5 years. One patient received anti-tachypacing (ATP) and shock therapies whereas the other two patients received only ATPs. 15.7% (n=3) had inappropriate therapies for AF. 15.7% (n=3) had complications related to device insertion including upper limb thrombosis, upper limb swelling and lead dislodgement.
Conclusion: ICD therapies are effective in terminating ventricular arrhythmias leading to SCD in patients with HCM. Identifying patients at risk of SCD is still an ongoing challenge. 15.7% have received appropriate therapies for VT.

P2149

Is 24-hour Holter ECG monitoring a useful baseline assessment for the detection of arrhythmias in patients with peripartum cardiomyopathy?

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Background: Peripartum cardiomyopathy (PPCM) is an important cause of pregnancy-associated heart failure, which occurs in previously healthy women towards the end of pregnancy or within the first five months post-partum. The 12-lead ECG is frequently abnormal in patients with PPCM. These abnormal ECG features predominantly include waveform abnormalities such as T wave inversion and a prolonged QT interval. However, data on arrhythmias remain sparse in this population. We aimed to evaluate whether 24-hour Holter ECG monitoring in addition to a routine 12-lead ECG recording is useful to detect arrhythmias in PPCM.
Methods and Results: Eleven consecutive, consenting patients with PPCM were prospectively enrolled, of which two women presented during pregnancy. In addition to clinical, echocardiographic and electrocardiographic data, a 24-hour Holter ECG was performed for all patients. This cohort had a median age of 32.25 years (IQR 26.35-35.65) and BMI of 27.77 kg/m2(IQR 24.04-37.18). Baseline clinical assessment recorded a median systolic blood pressure of 114mmHg (IQR 103-104) and diastolic blood pressure of 72mmHg (IQR 69-87). Overall, the left ventricle was dilated (LVEDD 63mm) with severely reduced left ventricular ejection fraction (median LVEF 31%, IQR 25-35). The 12-lead ECG recorded sinus tachycardia in more than half the cohort (median QRS rate of 88). With a median QTc interval of 451ms (IQR 411-470), a third of this cohort presented with a prolonged QTc interval. The average heart rate on Holter monitoring ranged between 73 and 119. Whereas none of the patients had any episodes of bradycardia, the average time in tachycardia on Holter monitoring was 30% (IQR 13-39). None of the 12-lead ECGs or Holter recordings found evidence of atrial fibrillation, supraventricular tachycardia or atrioventricular blocks. The Holter ECG recorded non-sustained ventricular tachycardia (VT) in two patients, both of which had a prolonged QTc interval on their baseline ECG and an LVEF of <35%. Subsequent management included an implantable cardioverter-defibrillator in the one patient and cardiac transplantation in the other. The three patients that were readmitted for heart failure during the study period had a significantly higher average time in tachycardia on Holter (44.33% ±26.41 versus 25.63% ±19.06). There was a poor correlation between the QRS rate on the 12-lead ECG and the average heart rate on Holter recordings (Spearman's rho 0.267, P=0.430).
Conclusion: Holter monitoring may be more accurate than the 12-lead ECG in defining the extent of sinus tachycardia. This is important as sinus tachycardia has been shown to be associated with poor outcome in PPCM. Moreover, the Holter ECG was able to detect non-sustained VT in two patients, which influenced clinical decision making. Our findings highlight the importance of a larger study to evaluate the vulnerability of this population to the development of arrhythmias and its impact on long-term outcome.

P2150

Cardiomyopathies due to primary myodystrophies in the russian cohort of patients: clinical, morphological, genetic diagnostics and outcomes

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Purpose: to analyze the clinical signs, follow-up and outcomes of cardiomyopathies in different genetically verified and unspecified primary myopathies in the Russian cohort of patients.
Methods: the study included 9 patients, five male and four female, with cardiac involvement (predominantly by the phenotype of dilated cardiomyopathy, DCM) in the primary myodystrophies, mean age 31.4 ± 13.8 years (16 to 63), which was 4% in total cohort of 220 patients with DCM. The examination included the investigation of the anti-heart antibodies, the genome of viruses, creatine phosphokinase, EchoCG, Holter monitoring, cardiac MSCT (n=7), MRI (n=3), electroneuromyography (n=5), neurologic study (n=7), endomiocardial biopsy (n=1), explanted heart examination (n=3), skeletal muscle biopsy (n=1), autopsy (n=1), direct Senger's sequencing of the genes LMNA, DES, EMD, MYBPC3, TAZ, TPM1, LDB3, MYL2, ACTC1, MYL3, MYH7, TNNI3, TNNT2.
Results. Pathogenic mutations were detected in 7 patients: in 3 patients from unrelated families in the DES gene, in 2 in the LMNA gene and in 2 members of the same family in the EMD gene. De novo mutation was diagnosed in 2 out of 7 patients. In 1/3 patients (2 with mutations in the DES gene and 1 with the unknown genetic nature of the disease), a noncompact myocardium was detected. The mean age of cardiomyopathy debut was 28 [18; 30] years. Chronic heart failure 3-4 NYHA class was diagnosed in 88.9%. The average LV EDD was 6.0 [5.3; 6.5] cm, EF 30% [19; 41.5]. Desminopathy was characterized by a pronounced body mass deficit, a decrease in the voltage of the QRS complexes and left bundle branch block. Lamino- / emerinopathies were characterized by a progressive AV block and sick sinus syndrome. In all forms there is a high frequency of unstable (77.7%) and stable ventricular tachycardia / ventricular fibrillation (44.4%). Associated myocarditis caused decompensation in half of the patients (EF 22.0 ± 7.9% v 44.5 ± 16.3% in patients without myocarditis, p <0.05). ICD / CRTD are implanted in 2 / 3 patient, a dual chamber pacemaker - in one patient. The rate of appropriate shocks was 60.0%. In one case, the ICD was replaced by CRTD due to the increase in heart failure. At the time of follow-up 29 [6; 45] months three patients died due to heart failure and three patients underwent successful heart transplantation (66.7% in total). Three women with mutations in DES, LMNA and EMD genes are alive and free from transplantation (all three successfully survived pregnancy). Conclusions. Target DNA-diagnostics is highly informative in this category of patients (77.8% efficiency). DCM in verified myopathies should be considered as an indication for the implantation of cardioverter-defibrillators or CRTD (if there are the indications for continuous stimulation), preferably before pacemakers. The prognosis of cardiomyopathy in primary myodystrophies is unfavorable, especially in men and in the patients with the unknown genetic nature of the disease.

P2151

Familial acute myocarditis or inherited dilated cardiomyopathy antigen-triggered debut? The role of genetics in understanding disease.

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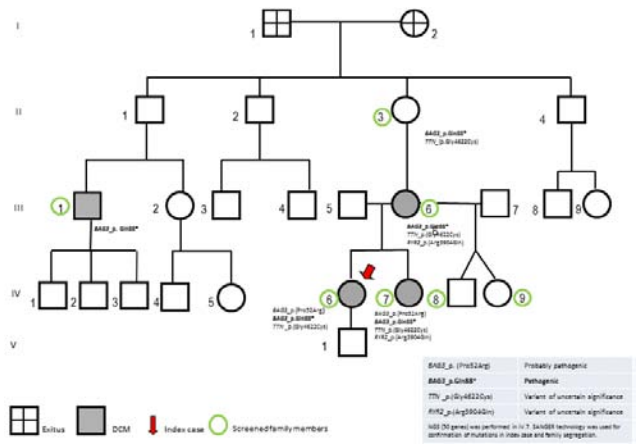
A familial dilated cardiomyopathy (DCM) manifested as cardiogenic shock (CS) is presented.The first case occurred in 2004 when the family member IV.6 was admitted for acute heart failure (HF) at the age of 15. Being previously asymptomatic, she presented a 15-day course of abdominal pain, nausea and vomiting followed by progressive shortness of breath. Severe biventricular impairment with dilated left

ventricle (LV) was present at admission. HF rapidly progressed to CS in spite of inotropic and intraaortic balloon pump (IABP) therapy requiring a biventricular assist device (BiVAD). Diagnosis suspicion was fulminant myocarditis as biopsy showed severe myocardial neutrophilic infiltration. She received heart transplantation (HTx) 9 days after BiVAD implant.In 2005, a cousin of her mother (III.1) was admitted at the age of 38 due to a 45-day onset of progressive HF preceded by fever and myalgias. At admission, he was in CS with severe LV impairment and dilatation. He was transplanted 2 days after in INTERMACS 2 situation. No myocarditis signs were observed in the explanted heart.Nine years later, in 2016, the sister of the index case (IV.7) was admitted due to CS at 17 years old. Echocardiography showed severe LV dilatation and dysfunction. Rhinorrhoea and dry coughing had been present 15-days before. An LV assist device was implanted (INTERMACS 2) and she received HTx after 12 days. No signs of myocarditis were observed at pathology. At that time, familial disease suspicion raised and genetic study was performed (see figure). The 4 affected members carried the same variant p.Gln88* in the BAG3 gene, previously reported as pathogenic. The 2 sisters also had a novel variant -p.(Pro52Arg)- in BAG3, classified as probably pathogenic. In addition, two other variants in the TTN (VI.6 and IV.7) and RyR2 (IV.7) genes were identified, and both classified of uncertain significance.Family screening showed that the mother of cases IV.6 and IV.7 (III.6) carried the pathogenic variant BAG3_p.Gln88*, and the variants in TTN and RYR2. The screening at 45 years old demonstrated DCM and HF (NYHA II). The grand-mother of cases IV.6 and IV.7 (II.3), carried BAG3_p.Gln88* and the variant in the TTN gene. Clinically assessment at the age of 67 ruled out DCM.More than 60 genes have been reported as disease-causing in inherited DCM. Pathogenic variants in the BAG3 gene have been associated to an aggressive course of DCM. Interesting features are observed in this family; DCM appeared at very young ages, specifically in 2 individuals (15 and 17 years-old). Early onset and myocarditis-like presentation may be partially explained by compound heterozygous mutations in BAG3 and/or combination with other genes (TTN and/or RyR2). It is of notable interest that all 3 cases that progressed to CS had previous symptoms of viral infection suggesting an infectious antigenic trigger that activates the disease in genetically predisposed patients.



P2152

Clinical, echocardiographic and laboratory profile of dilated cardiomyopathy with and without atrial fibrillation.

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Introduction: Atrial fibrillation (AF) is the most common chronic arrhythmia in heart failure. The epidemiology, pathology and clinical significance of AF in dilated cardiomyopathy (DCM) is poorly defined.
Methods: Between January 2010 and October 2018 we analysed hospital records of 373 DCM patients. Patients were divided according to the presence or absence of AF.
Results: AF was present in 118 patients (31.6%). Patients with AF were older, had larger BMI and worse NYHA class, larger left and right atrial areas (LAA and RAA), pulmonary arterial systolic pressure (PASP) and lower tricuspid annular plane excursion (TAPSE) [Table 1]. However, both groups did not differ in terms of ejection fraction (EF), left ventricle end-diastolic diameter (LVEDd), and NT-proBNP and troponin (hs-TnT) levels. The predictive value of those parameters were assessed in univariate and multivariate logistic regression analyses. Only age and RAA were found to be AF predictors in multivariate analysis. The diagnostic accuracy of the predictive model comprised of those two parameters was 0.774 [95%CI 0.721-0.827; p<0.05].
Conclusions: Almost one-third of unselected DCM patients had AF. Most clinical and echocardiographic parameters differentiate patients with and without AF. However, only age and RA area were found to be independent AF predictors. Interestingly, EF and NT-proBNP were similar in both groups.

Table 1

	Baseline characteristics			Univariate regression	Multivariate regression
	With AF (n=118)	Without AF (n=255)	p-value	p-value	p-value
Age [years]	58.6 ± 12.0	51.7 ± 14.1	<0.001	<0.001	0.04
BMI [kg/m2]	29.0 ± 4.2	26.6 ± 5.8	0.03	0.08	
NYHA	2.7 ± 0.8	2.4 ± 1.2	0.006	0.04	0.58
LVEDd [mm]	66.2 ± 9.9	66.4 ± 10.2	0.81		
PASP [mmHg]	36.0 ± 13.0	31.5 ± 14.2	0.002	0.03	0.38
EF [%]	26.8 ± 9.9	26.4 ± 10.2	0.48		
TAPSE [mm]	16.5 ± 4.7	20.0 ± 10.4	<0.001	<0.001	0.27
LAA [cm2]	33.1 ± 8.8	27.8 ± 7.7	<0.001	<0.001	0.56
RAA [cm2]	27.1 ± 7.7	20.6 ± 7.3	<0.001	<0.001	<0.001
hs-TnT [ng/ml]	1.77 ± 8.4	1.73 ± 12.1	0.39		
NT-proBNP [ng/ml]	3549.7 ± 5237.8	3865 ± 9098.2	0.12		

P2154

Left ventricular functional reserve is a main determinant of exercise capacity in patients with idiopathic dilated cardiomyopathy

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Objectives:
Myocardial mechanics and ventricular dyssynchrony are frequent findings in idiopathic dilated cardiomyopathy (IDCM). We hypothesized that IDCM patients have differentially abnormal systolic function reserve limiting their exercise capacity and related to cardiac phenotype. We investigated whether exercise capacity is independently related to contractile reserve as measured by 2D strain imaging in (IDCM).
METHODS: 30 IDCM patients(39.1±12 years) and 33 healthy individuals underwent resting and peak exercise echocardiography using 2D-strain imaging. Peak longitudinal strain(sys), strain rate(SRsys,SRe, SRa) were measured in apical views. Circumferential (circ) sys, LV twist were analyzed from short axis views. LV systolic dyssynchrony was measured from regional longitudinal strain curves as SD of TTP (time from beginning of Q wave on ECG to peak sys) between 12 segments. The differences between resting and peak exercise values were analyzed (Δ) and the functional reserve is calculated as Δ /resting value.
RESULTS: The absolute values of longitudinal sys and SRsys were significantly smaller in IDCM patients than control at segmental and global level both at rest and at peak exercise (P < .001). Functional reserve was markedly impaired in IDCM(sys: 7±6% versus 28±5% SRsys: -39±11% versus 40±12%; SRe : -26±10% versus 48±9% SRa -6±14 versus 21±22 %; %Circ strain: 22.4±9.3 versus 33.4±50%) compared to control group (P < .0001). LV mechanical dyssynchrony (TTP-SD) was marked in IDCM at rest and amplified at peak stress (68±35, 104±70 ms) compared to control (28±17, 21±12 ms) P < .000. Exercise capacity in IDCM showed direct correlation to both systolic and diastolic reserve(P < .01).Multivariate regression analysis demonstrated that reserve in early diastole, SRe (β 0.501; P=0.001) and late diastole , SRa (β:0.722; P=0.007) were independent predictor of exercise capacity.
CONCLUSION: IDCM patients have limited systolic and diastolic function reserve and more dynamic dyssynchrony with exercise compared to healthy individual. However functional reserve during diastole remains the principle and independent predictor of exercise capacity in this population.

P2155

New insights into genetic architecture of recent onset dilated cardiomyopathy by whole-exome sequencing

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Background: Recent-onset dilated cardiomyopathy (DCM) is a disease of heterogeneous aetiology and clinical outcomes ranging from complete recovery of left ventricular (LV) systolic function to rapid progression to end-stage heart failure or sudden cardiac death. A substantial proportion has genetic determination. Recognition of the genetic component, particularly in patients with recent-onset DCM or their asymptomatic relatives, could improve risk stratification and thus diagnostic and therapeutic management.Purpose:In this pilot study, we are first to assess the genetic architecture of recent-onset dilated cardiomyopathy in the Czech Republic by whole-exome sequencing and correlate genotype with LV reverse remodelling, a marker of favourable prognosis.

Methods:This multi-centre prospective observational study enrolled 83 patients with recent-onset DCM with a history of symptoms less than 6 months for whole-exome sequencing. All patients underwent 12-month clinical and echocardiographic follow-up. LV reverse remodelling was defined as an absolute increase in LV ejection fraction > 10% accompanied by a relative decrease of LV end-diastolic diameter 10% at 12 months.

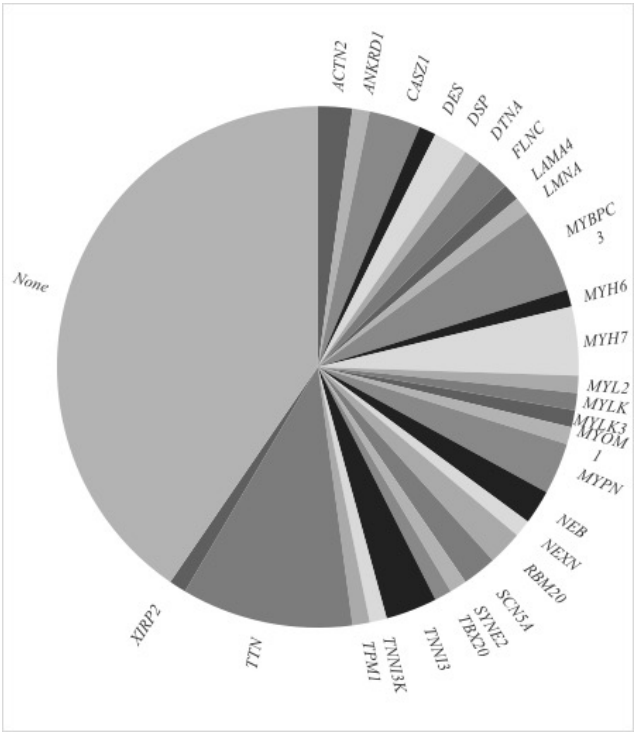
Results: We identified disease-related variants in 45 patients (54%). Left ventricular reverse remodelling occurred in 28 patients (34%), most often in carriers of isolated titin truncated variants, followed by individuals with a negative result and carriers of other disease-related variants (56% vs. 42% vs. 19%, P 0.041).

Conclusion:A substantial proportion of recent-onset DCM cases has a monogenic or oligo-genic genetic background. Carriers of non-titin disease-related variants are less likely to reach LV reverse remodelling at 12- months, which could be seen as a negative prognostic marker of disease development. Thus, genetic testing could contribute to better prognosis prediction and individualized treatment of patients with recent onset DCM. Further studies are needed to assess the relationship between genotype and hard clinical outcomes.

Genotype and LV reverse remodelling

	Exome negative or non- conclusive(n=38)	Isolated titin truncating mutation(n=9)	Other variant or combination(n=36)	P value
12 months Δ LVEF absolute(%)	16 (6-23)	15 (9-34)	6 (3-15)	0.036*
12 monthsΔ LVEF > 10 points (n= 44; 53%)	24 (63%)	7 (78%)	13 (36%)	0.019*
12 monthsΔ LVEDD < -10%(n= 34; 41%)	18 (47%)	6 (67%)	10 (28%)	0.058
Δ LVEF > 10 points and Δ LVEDD < -10%(n=28;34%)	16 (42%)	5 (56%)	7 (19%)	0.041*

Relationship between results of whole-exome sequencing and LV reverse remodellingn – number, ΔLVEF – change of left ventricular ejection fraction, Δ LVEDD – change of left ventricular end-diastolic diameter



Disease-related gene variants

P2156

QRS dispersion in dilated cardiomyopathy, clinical and echocardiographic correlations

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Introduction: QRS dispersion is the difference between the maximum and minimum QRS complex duration measured on standard ECG. It has been suggested that an increased QRS dispersion is a marker of inhomogeneous ventricular depolarization and it could be associated with negative prognosis in different clinical settings: ischemic heart disease, heart failure, cardiomyopathies.

Objectives: We analyzed the correlates of QRS dispersion in an unselected group of dilated cardiomyopathy patients.

Methods: We included 90 patients (72 men, 65,7 ± 12 years). We performed standard echocardiography and measured serum creatinine, sodium and potassium. QRS dispersion was measured from standard 12-lead ECGs, using a computerized method.

Results: Mean LVEF was 27,8 ± 9,5%. Mean QRS duration was 115,4 ± 31,6 ms. Maximum QRS duration was 129,6 ± 49,4 ms and minimum QRS duration was 83,4 ± 36,3 ms. Mean QRS dispersion was 46,1 ± 23,8 ms, median – 41,1 ms. Using a cut-off value of 50 ms for QRS dispersion we identified patients with lower LVEF (25,4 ± 10,2% vs. 29,1 ± 9%, p Mann-Whitney = 0,023) and lower potassium (4,4 0,5 mmol/l vs. 4,7 0,8 mmol/l, p Mann-Whitney = 0,034). QRS dispersion correlated strongly with maximum QRS duration (r = 0.717, p < 0.0001, Pearson correlation).

Conclusion: In patients with dilated cardiomyopathy QRS dispersion correlated with LVEF and serum potassium level. Its independent value is questionable due to the strong correlation with QRS maximum duration.

P2157

Genetic screening of patients with dilatated cardiomyopathy assessed by next-generation sequencing

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Background: Dilated cardiomyopathy (DCM) is a myocardial disease characterized by left or both ventricular dilation and reduced systolic function. One quarter of the cases are inherited with autosomal dominant pattern, caused by mutations in the genes encoding for cytoskeletal-, sacomer/Z-band-, nuclear membrane or intercalated disc proteins. Involvement of the titin gene could be the most frequent.
Aim: In our work molecular genetic analysis was carried out in patients with DCM using a new method, called Next-Generation Sequencing.
Patients and methods: Twenty-one patients with dilated cardiomyopathy (11 female, 10 male, avg. age: 43±21 year) were assessed by genetic screening. Genotyping was performed by Next-Generation Sequencing and validated by capillary sequencing. During next-generation sequencing we performed the targeted resequencing of 103, known causative cardiomyopathy genes. Target region covered 500.000 base pairs.
Results: Pathogenic or likely pathogenic genetic variants were identified in 6 patients (6/21, 29%) during our genetic examination. Four of them affected the titin gene (TTN, Ser8519*, Thr18527fs, Val18616fs, Glu13828fs), one affected beta myozin heavy chain gene (MYH7, Arg904Cys), and one affected the desmoplakin gene (DSP, Leu1669fs). All of the TTN variants were novel and were predicted to lead to truncation of the protein (stop codon or frame-shift).
Summary: Our findings show that causative genetic variants could be identified in 30% of Hungarian patients with DCM. Most of them affect the TTN gene.

Hypertension

P2158
Sympathetic Renal denervation in patients with refractory arterial hypertension: 2-years follow-up

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Funding Acknowledgements: Russian Academic Excellence Project 5-100

Aim: to evaluate the efficacy of the sympathetic renal denervation procedure in patients with refractory arterial hypertension and heart failure.
Methods: the study included 72 patients with refractory arterial hypertension. We used randomization in 2 main groups: the Group I (n=36) included patients, who underwent denervation procedure of the main trunk of the renal artery and the Group 2 (n=36) - included patients who underwent denervation procedure in main trunk and also in second-order renal arteries. Additionally, patients were divided into 2 subgroups: the subgroup A (n=30) included patients, who underwent denervation procedure with a SYMPLICITY catheter, and the subgroup B (n=42) - included patients who underwent denervation procedure with a VESSIX catheter. Also, the renal denervation procedure efficacy, in patients with chronic heart failure (CHF) was analyzed. In all groups, 24-hour blood pressure monitoring, echocardiography and a 6-minute walk test were monitored. Inclusion criteria: refractory hypertension, age of patients 18-85 years, systolic blood pressure (SBP) ≥140/90 mmHg and ≥130/90 mmHg in patients with diabetes mellitus, functioning kidneys, renal arteries ≥40 mm in diameter and the length of the site up to the first bifurcation of at least 20 mm, absence of stenoses in the renal arteries, GFR≥40 ml/min/1.73m^2, suitable anatomy of the renal arteries for endovascular procedure.
Results: 24 months result after the denervation procedure was demonstrated significantly decreased SBP in patients of both groups. In group I, it was, compared with pre-operative data (174.9±1.6 vs. 151.7±2.3 mmHg, respectively; p<0.05), and in group II - 181.9±2.1 vs. 140.4±3.8 mmHg, respectively; p<0.05). However, when comparing SBP values between groups, SBP in group I was significantly higher, than in group II (151.7±2.3 vs. 140.4±3.8 mmHg, respectively; p<0.05). In addition, the average number of drugs in group I was decreased to 2.1±0.8 after 24th month, and in group II - to 1.4±0.6 (p<0.05). When comparing SBP value in subgroup A and subgroup B, the average daily SBP also significantly difference and amounted to 147.8 ± 1.8 vs. 138.4 ± 3.2 mmHg, respectively; p <0.05). Among the all patients included in the study, 38 patients were with CHF. The 6-minute walk test results, compared with pre-operative data, showed a significant improvement and amounted to 321.24 ± 83.22 vs. 212.42 ± 54.72m, respectively; p <0.05.
Conclusions: the sympathetic renal denervation may be regarded as an effective method of treatment of patients with resistant hypertension, as well as patients with concomitant chronic heart failure. Performing denervation in the arteries of the second order, significantly improves the prognosis of patients, and in patients with concomitant heart failure significantly increases the quality of life and exercise tolerance.

P2159
Oxidative stress levels in obese hypertensive patients versus obese normotensive patients

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Background: Since the vascular wall is an important source of reactive oxygen species (ROS), oxidative stress has emerged as a putative pathogenic factor in the development of hypertension. NADPH oxidase, xanthine oxidase and mitochondrial dysfunction are involved in the increased production of superoxide anion. The uncoupled endothelial nitric oxide synthase (eNOS) produces nitric oxide, which combined with superoxide forms peroxynitrite, a molecule that interferes with the actions of eNOS and leads to an even higher generation of superoxide, entertaining a vicious cycle. The adipose tissue, which is generally well represented in hypertensive patients, is another source of ROS, mainly via adipokine production and maintenance of a low-grade chronic inflammatory state. Purpose: Our purpose was to measure OS levels in obese hypertensive subjects and normotensive subjects vs. controls. Methods: Oxidative stress levels were evaluated from a single drop of capillary blood via the FORT (Free Oxygen Radical Testing; normal range: ≤ 2.3 mmol/L H2O2) assay. Antioxidant levels were evaluated via the FORD (Free Oxygen Radical Defense; normal range: 1.07 – 1.53 mmol/L Trolox) assay. Unpaired t-test was employed to assess differences between groups. Results: We enrolled 35 obese hypertensive patients (mean age 64.26 ± 8.29 years), 19 obese normotensive patients (mean age 59.63 ± 8.71 years) and 20 non-obese normotensive controls (mean age 64.10 ± 2.26 years). Hypertensive obese subjects registered higher FORT (3.30 ± 0.41 vs. 2.99 ± 0.29; p=0.0057) and lower FORD (0.62 ± 0.16 vs. 0.73 ± 0.14; p=0.017) values vs. obese normotensive subjects. Hypertensive obese and normotensive obese patients depicted higher FORT and lower FORD values vs. controls (p<0.001) (Table 1). In hypertensive obese patients, FORT values correlated positively with BMI, LDL-cholesterol, total cholesterol, total cholesterol/HDL-cholesterol ratio and uric acid values and negatively with age. FORD values evolved oppositely (Table 2).
Conclusions: Obese hypertensive subjects recorded higher FORT and lower FORD values vs. obese normotensive subjects, implying that hypertension is associated with higher levels of oxidative stress. Oxidative stress levels were increased in both obese hypertensive and obese normotensive patients vs. controls. In obese hypertensive subjects, ROS levels correlated positively with lipid values, BMI, uric acid and negatively with age. Total antioxidant levels evolved oppositely. Although aged subjects have higher ROS values and lower antioxidant levels, the negative correlation between age and ROS levels and the positive correlation between antioxidant levels and age suggest that the relationship between ageing, obesity and hypertension is complex and needs further investigation in larger studies.

	FORT	*FORD*
Controls	2.16±0.38	1.41±0.44
Obese	2.99±0.29	0.73±0.14
Obese & Hypertensive	3.30±0.41	0.62±0.16

Variable 1	*Variable 2*	*Pearson's correlation coefficient (r)*
FORT	Age	– 0.41
FORT	BMI	+ 0.36
FORD	HDL/total cholesterol ratio	– 0.36
FORT	Total cholesterol	+ 0.35
FORT	HDL/total cholesterol ratio	+ 0.34
FORD	Age	+ 0.32
FORD	Uric acid	– 0.29
FORD	Total cholesterol	– 0.28
FORT	LDL-cholesterol	+ 0.27
FORD	BMI	– 0.26
FORD	HDL-cholesterol	+ 0.22
FORT	Uric acid	+ 0.22
FORT	HDL-cholesterol	– 0.12
FORD	LDL-cholesterol	– 0.10
FORD	Triglycerides	– 0.05
FORT	Triglycerides	– 0.03

P2160

The effect of initial pulse pressure on heart failure readmission in hypertensive octogenarian patients presenting acute myocardial infarction treated with percutaneous coronary intervention

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Background: We aimed to evaluate if initial blood pressure (BP) index was predictive for clinical outcomes in hypertensive octogenarian patients treated with percutaneous coronary intervention (PCI) for acute myocardial infarction (AMI).

Methods: Among 13104 AMI patients who underwent PCI in a nationwide registry (November 2011 to December 2015), 901 hypertensive octogenarian (defined as ≥80 years) patients without cardiogenic shock were analyzed. The study endpoints were the composite events (cardiac death, non-fatal MI, any revascularization, stroke, or heart failure re-admission) and their components during follow-up.

Results: Composite events, all-cause death, and cardiac death occurred in 210 (23.3%), 186 (20.6%), and 141 patients (15.6%), respectively, during a median follow-up of 359 days. Cox proportional model showed that high initial pulse pressure (PP) was significantly associated with lower risk of composite events (hazard ratio [HR] 0.987, 95% confidence interval [CI] 0.977-0.998), all-cause death (HR 0.989, 95% CI 0.978-1.000), cardiac death (HR 0.981, 95% CI 0.968-0.994), and heart failure readmission (HR 0.968, 95% CI 0.937-1.000). On receiver operating characteristic curve analysis, the optimal cutoff value of PP for composite events was 42 mmHg (sensitivity 0.42; specificity 0.70; area under the curve 0.568). Compared to the patients with PP <42mmHg, those with PP ≥42mmHg had fewer composite events (29.3% vs. 20.4%, HR 0.662, 95% CI 0.503-0.872). However, systolic BP, diastolic BP, and mean arterial pressure at admission were not associated with any study endpoints.

Table 1. Association of clinical outcome

	Systolic BP	Diastolic BP	Pulse pressure	MAP
All-cause death	0.997 (0.989-1.004)	1.007 (0.994-1.019)	0.989 (0.978-1.000)	1.001 (0.990-1.012)
Cardiac death	0.994 (0.985-1.002)	1.008 (0.994-1.022)	0.981 (0.968-0.994)	0.999 (0.987-1.012)
Non-fatal MI	0.987 (0.968-1.007)	1.004 (0.973-1.035)	1.002 (0.984-1.021)	0.993 (0.966-1.021)
Any revascularization	1.000 (0.986-1.015)	0.999 (0.974-1.025)	1.001 (0.981-1.022)	1.000 (0.978-1.022)
Stroke	1.003 (0.980-1.025)	1.030 (0.993-1.068)	0.983 (0.947-1.019)	1.017 (0.984-1.051)
Heart failure re-admission	1.000 (0.987-1.013)	0.997 (0.974-1.020)	0.968 (0.937-1.000)	0.998 (0.979-1.018)
Composite events	0.996 (0.990-1.003)	1.007 (0.995-1.018)	0.987 (0.977-0.998)	1.001 (0.991-1.011)

Conclusions: In this study, high initial PP was associated with improved clinical outcomes in hypertensive octogenarian patients with AMI undergoing PCI.

P2161

Skin autofluorescence is associated with arterial stiffness measured by pulse wave analysis in a general population

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Introduction: Advanced glycation end products (AGE) have been implicated in vascular stiffness in diabetes and renal disease, but the associations between chronic AGE accumulation and vascular stiffness in a general population are less extensively explored.

Purpose: We examined the associations of long-lived collagen cross-linked AGE measured by skin autofluorescence (SAF) and arterial stiffness measured as augmentation index (AIx) using Pulse Wave Analysis in a healthy, general population.

Methods: SAF was measured using AGE Reader® in 1005 subjects (mean age 51.6 ± 8.1 years; 53.7 % females, 5.9% subjects with diabetes) in the Malmö Offspring Study. Augmentation index was measured using the novel, validated oscillometric device SphygmoCor XCEL.

Results: After adjusting for age, sex, body mass index, systolic blood pressure, smoking status, renal function, diabetes status andanti-hypertensive treatment, each 1 SD increment in SAF was associated with increased AIx (β 0.77, p=0.009, Table 1). Figure 1 illustrates AIx within quartiles of SAF.

Conclusion: This cross-sectional, observational study identifies associations between elevated AGE-levels measured by skin autofluorescence and arterial stiffness measured by Pulse Wave Analysis in a general population independently of diabetes and renal function. This suggests that SAF could be used as a screening tool for non-diabetic subjects at increased cardiovascular risk.

Associations of Aix and SAF

	β	p
Skin autofluorescence (AU)	0.76	0.010
Age (per one year)	0.54	<0.001
Sex (male)	12.2	<0.001
Smoking status (yes/no)	0.35	0.070
Systolic blood pressure (per 1 mmHg)	0.22	<0.001
BMI (per 1 kg/m2)	-0.04	0.561
eGFR (per mL/min/1.73 m^2)	-0.03	0.400
Diabetes status (yes/no)	-0.59	0.617
Antihypertensive treatment (yes/no)	1.19	0.125

Values are unstandardized beta coefficients. BMI=body mass index; eGFR=estimated glomerular filtration rate.

P2162

Chemerin in prognosis of heart failure development in hypertensive patients with obesity and diabetes mellitus

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Background: The deterioration of heart function in hypertensive patients with concomitant pathology, particularly with diabetes mellitus type 2 and obesity, is a significant problem of cardiology. Chemerin is a marker associated with inflammation and metabolic syndrome, and possibly can play a significant chain in the development of heart failure signs.

The aim is to find the link between increased chemerin concentration and the deterioration of heart function in obese hypertensive patients with diabetes mellitus type 2 (DM2T).

Methods: 72 hypertensive patients were enrolled (61.8% females and 38.2% female), mean age was 58.73±11.54 years, systolic blood pressure – 156.18 ± 7.7 mmHg, diastolic blood pressure – 92.97 ± 4.51 mmHg, HbAc1 – 7.35 ± 2.41 %, BMI – 32.56 ± 3.11 kg/m2. The serum chemerin level was measured at the beginning and after one-year follow-up period by ELISA.

Results: After 12 months of observation, the groups with decreased 6MWT and without it were compared. The serum chemerin in the heart failure group was 298.75 [212.64 - 393.92] ng/ml and 128.02 [91.82-169.11] ng/ml in the group without heart failure signs (p <0.035) Multivariate logistic analysis revealed a significant effect of chemerin on the development of heart failure after one –year follow-up time (OR: 0.912; 95% CI 0.794 - 0.988; p = 0.039). ROC analysis showed that the level of more than 183.5 ng / ml allows to predict the development of heart failure deterioration, AUC = 0.73, (95% CI 0.53-0.882; P = 0.047), with a sensitivity of 85.7% and a specificity of 63.1%.

Conclusions: The increased chemerin serum level is a predictor of heart failure. The study found the possibility of chemerin usage as additional marker for stratification of the obese hypertensive patients with DM2T.

P2163

The use of natriuretic peptides in predicting renal and cardiovascular outcomes after renal stenting in high-risk renal artery stenosis patients

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Introduction: Controversial data were gathered in the literature concerning the use of B-type natriuretic peptide (BNP) in the prediction of renal function preservation and blood pressure (BP) control after renal revascularization. Recently, the marker's predictive value in assessing the morbi-mortality in renal artery stenosis (RAS) patients was suggested.

Purpose: The current analyses aimed to evaluate the role of BNP in the prediction of primary (renal function improvement, BP control) and secondary (severe renal complications and major adverse cardiac events - MACE) clinical outcomes after renal stenting in selected hypertensive patients with significant RAS.

Methods: There were prospectively enrolled 78 hypertensive patients diagnosed with significant uni- and bilateral RAS, subsequently resulting in 3 groups (34-unilateral, 28-bilateral RAS and 16-RAS in solitary kidney). Clinical, biological and echocardiographic parameters were comparatively evaluated between groups at admission and 12 months' after renal stenting. Renal function' and BP evolution after stenting were evaluated at 12 months. Secondary outcomes were assessed after a mean follow-up period of 24.27±12.16 months. Regression logistic analysis - univariate and multivariate (stepwise Likelihood ratio method) was used in order to define the independent predictors for major outcomes.

Results: BNP and lnBNP (logarithmic value of corresponding BNP) did not correlate neither with the evolution of BP nor with renal function improvement after renal revascularization. Multivariate logistic regression analysis confirmed baseline lnBNP as an unique independent predictor for major renal events (area under the receiver-operating characteristics curve was 0.95 (95% CI, 0.83-1.01, p=0.002). The same analysis for MACE prediction confirmed 5 independent predictors assessed 12 month' after stenting: BP non-responder, lnBNP level, left ventricular (LV) dysfunction, antiplatelet therapy and smoking. The accuracy of the model was 86.8%, while lnBNP alone as an unique predictor of MACE, provided 76.3% of the accuracy of the multi-parametric model.

Conclusions: The present findings demonstrated that BNP is not a reliable predictor for renal function improvement and BP control after renal revascularization in patients with significant renal artery stenosis, but could be a valuable biomarker in the assessment of long term (4 years follow-up) major adverse renal events and major adverse cardiac events.

P2164

Adropin as prognostic factor in heart failure development in hypertensive patients

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Background: The low levels of adropin is associated with higher cardiovascular events, coronary atherosclerosis, endothelial dysfunction, herewith there is study evidenced that augmented adropin is associated with heart failure severity. The aim of the study was to investigate the predictive role of adropin serum levels in the development of heart failure severity in hypertensive patients.

Methods: 137 patients (males – 65 (47%), age 61.07 ± 12.03) with diagnosed essential hypertension were enrolled into this study. 64 hypertensive patients had concomitant diabetes mellitus type 2. Serum levels of adropin were measured by ELISA. 6-minute walk test (6MWT) was done to assess exercise tolerance. The severity of heart failure was evaluated by functional classes (FC) according to the New-York Heart Association (NYHA) classification.

Results: Serum levels of adropin, were significantly lower in patients with NYHA III functional class than those with FC I heart failure in the group of patients with only hypertension (mean adropin level: 3.11 [1.98-4.11] vs. 4.01 [3.89-5.87] ng/ml, p=0.039). Meanwhile, there were no significant differences in adropin concentrations between heart failure III FC and FC I in patients with hypertension associated with diabetes mellitus type 2 (2.71 [1.53-3.97] vs. 3.09 [2.31-4.15] ng/mL, p=0.069). Logistic regression demonstrated that adropin level was independent predictor for severity of heart failure with cutoff level <3.47 ng/ml specificity – 67% sensitivity – 87% AUC=0.71, p<0.041, CI 95%: 0.41-0.89, p=0.041).

Conclusions: The study confirms that serum adropin can be considered as prognostic factor for heart failure severity in hypertensive patients in one-year period.

Cardiovascular Disease in Special Populations

P2165

Clinical features of immune checkpoint inhibitor-related cardiotoxicity

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Background Immune checkpoint inhibitors (ICI) are increasingly used for a range of various cancers more frequently over the last years. Seven different agents are currently licensed by the FDA and EMEA. There is an emerging problem with cardiotoxicity secondary to ICIs.

Methods: We reviewed 47 patients referred to our Cardio-Oncology service over a 90 months period. The principal reason for referral was suspected ICI-medicated cardiotoxicity. All patients underwent clinical review, measurement of cardiac biomarkers, electrocardiography, echocardiography and cardiac MRI. 11 patients were excluded as six had non-cardiac diagnoses (non-cardiac chest pain, vasovagal syncope), in 3 we found ischaemic heart disease prior to ICI exposure & two referrals were for cardiac metastasis.

Results: Total of 36 patients received either single or dual ICI therapy: Pembrolizumab n=12 (33 %), Pembrolizumab + Nivolumab n=1 (2.7%), Nivolumab n=4 (11%), Atezolizumab n=3 (8.3%), Avelumab n=2 (5.5%), Ipilimumab n=2 (5.5%), Ipilimumab + Nivolumab n=12 (33.5%). The underlying malignancies warranted immunotherapy include: Metastatic melanoma in 15 patients (42%), non-small cell lung cancer in 7 cases (19.4%), 5 had renal cell carcinoma and 3 other urothelial cancers (14% and 8.3%, respectively), stomach cancer, breast, ovarian, mesothelioma in 1 patient each (2.7%) and skin cancer in 2 cases (5.5%).

The median patient age was 62 years (range 29-80). 64% were male and 47% had a prior cardiac illness: hypertension (n=11, 31%), AF (n=6, 16.7%), tricuspid regurgitation (n=1, 2.7%) and mitral regurgitation (n=1, 2.7%). Concentrations of brain natriuretic peptide (BNP) and troponin were increased in 26 (72%) and 4 (11%) of patients, respectively. The most frequent complications were myocarditis in 30.5% of patients (n=11), non-inflammatory left ventricular impairment in 19.4% of patients (n=7) [the median LVEF=46% (range 40-49%)] and palpitations in 14% of cases (n=5), 2 had microvascular ischaemia (5.5%) and 3 had pericarditis (8.3%). Also we identified some different arrhythmias: atrial fibrillation and atrial tachycardia in 1 patient each (2.7%) including those due to ICI-mediated thyroiditis and complete atrioventricular block in 1 case. Concomitant signs of myositis were present in 2.7% of patients.

Conclusion: ICI-mediated cardiotoxicity is a growing problem. With the increasing use of such agents to treat various malignancies, clinicians should be aware of cardiotoxicity in the form of myocarditis, pericarditis, conduction disease as well as non-inflammatory left ventricular impairment and arrhythmia. Measurement of cardiac troponin and BNP might be considered as useful screening biomarkers.

P2166

Does a clinical scientist led cardio-oncology clinic improve surveillance for cardio-toxicity for patients receiving trastuzumab compared to oncology services alone?

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Background Cardiac dysfunction as a side effect of Trastuzumab is well documented and reliable surveillance of cardiac function is recommended. Transthoracic Echocardiography (TTE) is a common modalities used for this but coordinating timings for sequential follow up between separate Oncology and Cardiology departments can be challenging.

Purpose To compare the consistency of serial TTE performed for patients reviewed within a clinical scientist led cardio-oncology service and those manged by oncology services alone.

Method Patients identified as receiving Trastuzumab between January 2016 and June 2018 were reviewed. Two groups were identified, those seen in a scientist led cardio-oncology clinic (Group 1) and those seen only in oncology clinics (Group 2). The period between consecutive TTEs was calculated within each group. In line with local and international guidelines serial TTE surveillance within 4 monthly intervals using 3D TTE was considered appropriate follow up. In addition other modalities of evaluating left ventricular ejection fraction (LVEF) were listed.

Results 191 patients were reviewed with 154 in Group 1 (95% Female, Ave age 57yrs), and 37 in Group 2 (73% female Ave age 69yr). 98 % of patients in Group 1 received appropriate follow up compared to 5% in Group 2 (Figure 1). There were variations in modalities used in reporting LVEF within Group 2 across serial studies including a visual assessment with a 5% range, Simpsons Biplane, Teicholz and 3D. In comparison evaluation of LV function in Group 1 used one consistent modality which was 3D TTE.

Conclusion Patients seen in a clinical scientist led cardio-oncology clinic had more consistent surveillance of left ventricular function during treatment with Trastuzumab when compared to those seen by oncology services alone. Furthermore these clinics utilised one consistent modality of reporting LVEF providing greater accuracy and more reliable side by side comparison of studies making the identification of cardio-toxicity easier.

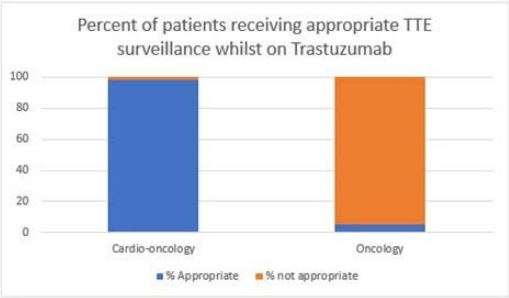

Figure 1. Comparison between the percentage of patients receiving appropriate TTE surveillance in a cardio-oncology clinic and oncology clinic

P2167

The prevalence of elevated heart rate in oncology patients: a risk factor revisited.

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Background: Among patients with established cardiovascular disease, an elevated heart rate is a marker of all-cause mortality. Chemotherapy, radiotherapy, and their subsequent side effects such as nausea, vomiting, intravascular depletion from decreased P.O. intake and fluid loss such as diarrhea, fever, hypoxemia, cardiovascular autonomic dysfunction, pain, in addition to psychosocial stress and anxiety result in a chronic state of increased sympathetic activity and thus elevated heart rate. Recently, a long-term prospective cardiovascular follow-up study showed that in patients with colon, pancreatic and non-small cell lung cancer a heart rate > 75 b.p.m is an independent predictor of mortality. To our knowledge, no study has reported the prevalence of elevated heart rate among the oncology population.
Purpose: To evaluate the prevalence of elevated heart rate in the cancer inpatient population.
Methods: We performed an analysis on the first 200 oncology patients from our retrospective cross-sectional study on "The heart rate prevalence and prognostic significance among oncology patients admitted to the inpatient oncology service" from January 1, 2017 till December 31, 2017. All oncology patients ≥ 18 years old admitted for more than 48 hours at the inpatient oncology service were included. Only patients admitted for fever or febrile neutropenia, sepsis or in septic shock were excluded. Data were collected from the electronic healthcare records after IRB approval. We evaluated patients' heart rate at admission, the first 24 hours and at discharge. For this analysis, an elevated heart rate is defined as a HR >75 b.p.m.
Results: The 200 patients analyzed were 89 (44.5%) females and 111 (55.5%) males with a mean age of 54±16 yrs. 51.5% of the patients were admitted for chemotherapy administration, 23 (11.5%) for chemotherapy adverse events, 34 (17%) for pain and cancer related complications, 13 (6.5%) for infections, and 27 (13.5%) for other reasons. 52 (26%) of patients were receiving at admission a heart rate lowering medication such as beta-blocker, calcium channel blocker and/or Ivabradine. Among patients receiving a heart rate lowering medication, 35 (67.3%) had an elevated heart rate; meanwhile, among patients not receiving a heart rate lowering medication, 119 (80.4%) had an elevated heart rate. The heart rate at discharge did not significantly differ from that on admission with 69% of patients having elevated heart rate on discharge. Conclusion: Among admitted oncology patients, there is a very high prevalence of elevated heart rate even in those on rate lowering medications. This may signify a higher mortality rate among this group of patients. Further research is needed to evaluate the heart rate effect on mortality and cardiovascular complications. This may have future implications on rate lowering interventions among this population.

P2168

Endovascular treatment of ischemic heart disease in patients with blood cancer

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Improvement of the treatment setting for oncohematological diseases allowed to improve the treatment results, to increase the life expectancy, to change life quality. This is one of the factors explaining the tendency of the increase in the incidence of coronary heart disease with oncological disease combination.
Materials and methods. Our study included two-stage treatment of 54 patients with coronary artery disease and blood cancer. The average age was 64 ± 11.63 years. The 1st stage was performed percutaneous coronary intervention, the 2nd - the treatment of oncopathology (11 patients underwent surgical treatment, 43– chemotherapy/radiation therapy). All patients were prescribed double antiplatelet therapy before revasciarization (acetylsalicylic acid at a dose of 100 mg/day and clopidogrel at a dose of 75 mg /day). Immediately before myocardial revascularization the level of platelet aggregation was assessed by the method of light transmission aggregometry of platelets with adenosine diphosphate (the target level of platelet aggregation before performing percutaneous coronary intervention is less than 45%).We chose the stent type individually based on the duration of the surgical intervention by the reason of cancer, anatomy of the coronary arteries and the nature of coronary arteries atherosclerotic lesions.If surgical intervention was planned for 1 month after percutaneous coronary intervention, then bare-metal stents were preferred. There were no intraoperative and hospital mortality and also no mortality cases due to coronary artery disease during the 1st year after percutaneous coronary intervention.All patients received dual antiplatelet therapy for at least 1 month before performing surgical treatment of oncopathology if bare-metal stents was implanted and 3 months - if drug-eluting stents. Dual antiplatelet therapy was stopped 5–7 days before the surgical treatment replaced by unfractionated heparin to prevent thrombotic and hemorrhagic complications. After the surgery dual antiplatelet therapy was restarted in 6-48 hours. During the 1st year after percutaneous coronary intervention the recurrent angina was observed in 2 patients. Hemodynamically significant 'in-stent' restenoses were identified on the coronary angiography. In 1 patient the recurrent angina occurred 4 months after myocardial revascularization with bare-metal stent implantation. In the 2nd patient the recurrent angina was observed 11 months after previously performed percutaneous coronary intervention with drug-eluting stent.Conclusion. Percutaneous coronary intervention is an effective and safe method of myocardial revascularization in patients with coronary artery disease and oncopathology. The use of endovascular myocardial revascularization in cancer patients reduces the risk of developing cardiovascular complications during the oncological treatment.

P2169

Cardio-renal interaction in young patients with Type 1 Diabetes Mellitus

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Objectives: To study relationship between kidney injury and early markers of left ventricular dysfunction in young patients with Type 1 Diabetes Mellitus (DM) without ischemic heart disease (IHD) and arterial hypertension (AH).
Materials and methods: In 90 patients with Type 1 DM without IHD and AH, mean age 29.1 ± 8.2 years, 57% of men, disease duration of 6.7 [2; 11] years, early markers and associated clinical signs of heart injury were studied. All patients were performed treadmill test, as well as NT-proBNP, CKD-EPI, albumin/creatinine tests. Echocardiography included a standard study of EF (Simpson method) and longitudinal systolic function of the left ventricle (GLS) using speckle tracking method.
Results. A total of 58 (64.4%) patients had optimal GFR> 90 ml/min/1.73 m2, 27 (30%) patients had a slight decrease in GFR (from 60 to 89 ml/min /1.73 m2), 3 (3,3%) - moderately reduced GFR (45-49 ml/min/1.73 m2) and 2 (2.2%) - significantly reduced GFR (30-44 ml/min/1.73 m2). Twenty five patients (28.2%) had optimal albuminuria, 54 (60%) - moderately increasde; 9 (10%) - highly and 2 (1.8%) considerably highly increased albuminuria. In 24 (26.6%) patients GFR was over 120 ml/min /1.73 m2. These patients significantly differed in diabetes duration (2.2 years vs 7.2 years, p <0.001) and in HbA1c value (10.9% vs 9.7%), compared to patients with GFR <120ml/min/1,73 m2. Subclinical systolic LV dysfunction, defined as GLS<20%, was observed in 67.7% (61/90), diastolic LV dysfunction - in 10 (16.4%) patients.
Multivariate regression analysis showed that albuminuria is one of independent factors, which determine diastolic dysfunction of LV- E/E '(β = 0.22, p <0.001),

together with age (β = 0.36, p <0.001) and female sex (β = 0.24, p <0.004), and that GFR closely correlates with GLS (r = 0.28, p <0.006).
Conclusions. Close associations between albuminuria and diastolic function and between GFR and longitudinal systolic function of the left ventricle were revealed in young patients with type 1 DM without IHD and AH.

P2170

Clinical impact of acute kidney injury in patients with acute coronary syndrome

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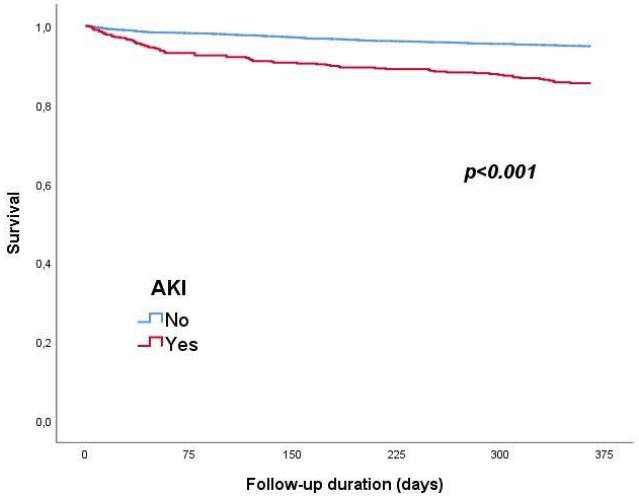
On behalf of: Registo Nacional de Síndromes Coronárias Agudas, Sociedade Portuguesa de Cardiologia

Introduction: Kidney dysfunction is often found in hospitalized patients and is usually associated with a worse prognosis. In an acute coronary syndrome (ACS) it can arise not only due to the disease itself but also due to the associated procedures. This study aimed to evaluate the clinical consequences of acute kidney injury (AKI) in patients hospitalized for ACS.
Methods: Retrospective study of patients with ACS included consecutively in a multicenter national registry between October/2010 and October/2018, whom serum creatinine was evaluated at the admission and whom maximum value was also evaluated during hospitalization. We excluded patients with history of chronic kidney disease, creatinine at admission ≥1.4mg/dL and maximum creatinine reached after the 7th day of hospitalization. KDIGO criteria were used for the definition of AKI. In addition to the in-hospital complications we also evaluated mortality rate and hospital readmission during a one-year follow-up.
Results: A total of 10979 patients were selected, of which 11.3% met criteria for AKI. In this group there were more female patients (35.5% vs 25.5%, p<0.001) and they were older (72±12 vs 64±13 years, p<0.001). Patients with AKI had generally a higher number of comorbidities, including hypertension (76.1% vs 64.6%, p<0.001), diabetes mellitus (34.3% vs 27.4%, p<0.001), stroke (10.3% vs 5.9%, p<0.001), peripheral artery disease (7.0% vs 3.9%, p<0.001) and chronic obstructive pulmonary disease (6.8% vs 4.2%, p<0.001).
Patients with AKI showed up more often in Killip class ≥2 (29.4% vs 8.4%, p<0.001). ST-segment elevation myocardial infarction (STEMI) was more frequent in patients with AKI (45% vs 41.5%, p=0.019).
Patients with AKI had worse left ejection fraction (47±12% vs 53±12%, p<0.001). During coronariography AKI patients used more often the femoral artery access (23.6% vs 18.2%, p<0.001). Multi-vessel disease was more common in this group (59.8% vs 47.5%, p<0.001) but angioplasty was less performed (65.4% vs 69.4%, p=0.004).
An analysis adjusted for potential confounders demonstrated that the rate of in-hospital complications was significantly higher in the group with AKI: re-infarction (OR 1.77, 95% CI 1.09-2.88), stroke (OR 1.89, 95% CI 1.03-3.45), major bleeding (OR 2.93, 95% CI 1.95-4.41) and death (OR 5.18, IC 95% 3.61-7.44). During the one-year follow-up, in a multivariate analysis, there was a higher mortality rate (HR 1.66, 95% CI 1.22-2.24) and hospital readmission (HR 1.35, 95% CI 1.11-1.65) in patients with AKI.
Conclusions: In this study we found that AKI is more common in patients with more comorbidities. AKI was independently and significantly associated with higher in-hospital complications and higher mortality during a one-year follow-up.



AKI Kaplan Meier Curves for Mortality

P2171

Anemia and cardiovascular mortality in dialysis patients.

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INTRODUCTION: Anemia is a common complication of uremia, while cardiovascular disease is a major cause of death in dialysis patients, accounting over 40% of the mortality. Association between anemia and mortality risk may be mediated through cardiovascular disease, malnutrition, and inflammation. The aim of this study was to evaluate the presence of anemia and its association with cardiovascular mortality and morbidity in patients with end stage renal disease on peritoneal and hemodialysis treatment.
METHODS: A case control study was conducted in the Dialysis Center enrolling all patients on chronic dialysis (HD and PD) older than 18 years who had more than 3 months in therapy with a follow up 2 years. Two-dimensional echocardiography was performed by a single experienced cardiologist who was blinded to all clinical details of patients. The echocardiography was performed 2-24 h after the dialysis session, and the measurements of diameters and volumes were done according to AEE recommendation
RESULTS: Our dialysis population studied consisted in 122 pts, 78 pts (61%) on hemodialysis, mean age 53.4±14.5 years and mean time on therapy was of 40.4 ± 14.4 months. Left ventricular hypertrophy was present in 86.7% of patients; concentric hypertrophy was found in 64 (49.1%) and eccentric hypertrophy in 48 patients (37.2%). Patients with left ventricular hypertrophy were further divided into tertiles according to their left ventricular mass index where was found significantly increasing severity of anemia, in the third tercile through three groups with increasing LVMi p=0.03. Cardiovascular mortality during follow up was 15.5% (19 events).
Multivariable analysis showed that Hb <11g/dl [OR=.1.26; 95% CI, 1.01 to 1.48, p=0.041
C-reactive protein (OR, 1.06; 95% CI, 1.01 to 1.10; P = .01), pulse pressure (OR, 1.01; 95% CI, 1.0 to 1.26; P = .046), and left ventricular mass index (OR, 1.03; 95% CI, 1.01 to 1.21; P = .03) were independent risk factors for cardiovascular mortality.
CONCLUSION: Anemia is associated with increased left ventricle mass index and Hb < 11g/dl is a risk factor for survival in patients with end stage renal disease on dialysis treatment.

P2172

Echocardiographic predictors of interatrial block in patients with severe chronic kidney disease

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Introduction: Interatrial block (IAB), defined as a conduction delay between the right and left atrium, is manifested on the electrocardiogram as a prolonged P-wave duration. Large number of studies recently have been published regarding the prevalence of IAB and its associations with the risk of atrial fibrillation, ischemic stroke, and left atrial dilatation. Cardiovascular diseases are the leading causes of mortality in chronic kidney disease (CKD). Previously, higher prevalence of IAB was reported in patients with CKD as compared to healthy controls. In this study, we aimed to investigate echocardiographic predictors of IAB in patients with severe CKD.
Methods: This study enrolled a total of 155 patients [male: 95 (61.3%), mean age: 56.3±12.8 years] with severe CKD (glomeruler filtration rate <30mL/min). Patients with atrial fibrillation were excluded. IAB was defined as P wave duration of ≥120 ms with or without presence of notching. All patients were evaluated by transthoracic echocardiography.
Results: Electrocardiography revealed IAB in 54 patients. The baseline demographic characteristics of the patients with and without IAB were similar in both groups. Left atrial diameter (LAD), left ventricular end-systolic and end-diastolic diameters, interventricular septal thickness, posterior wall thickness, left ventricular mass, left ventricular mass index (LVMI), and the prevalence of left ventricular hypertrophy were found to be significantly increased in patients with IAB. Increased LAD (OR=1.119; 95%CI: 1.019-1.228; p=0.019) and LVMI (OR=1.036; 95%CI: 1.003-1.070; p=0.031) were found to be independent predictors of IAB (Figure 1). In the receiver operating characteristic curve analyses, LAD values above 38 mm predicted IAB with a sensitivity of 75%, and a specificity of 65% (AUC= 0.750; 95%CI: 0.669-0.831; p<0.001) and LVMI values above 104.5 g/m2 predicted IAB with a sensitivity of 74%, and a specificity of 72% (AUC= 0.741; 95%CI: 0.662-0.819; p<0.001).

Conclusion: A significant association exists between the presence of IAB and echocardiographic parameters related to left ventricular hypertrophy and left atrial dilatation. The presence of IAB may be used as an electrocardiographic marker of cardiac remodelling in patients with severe CKD.

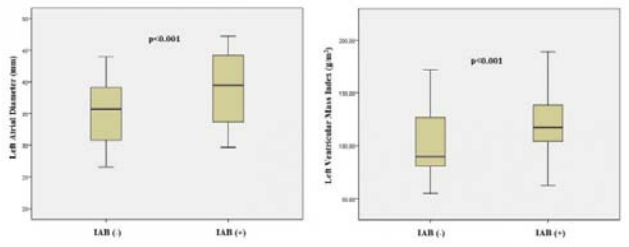

Figure 1

P2173

Electrocardiographic predictors of the future development of atrial fibrillation in patients with end-stage renal disease

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Background: Atrial fibrillation (AF) is a common cause which leads to adverse cardiovascular outcome. It is unclear what predicts future AF in patients with ESRD.
Purpose: We investigated the electrocardiographic predictors for future development of AF in patients with ESRD who had never documented AF.
Methods: We enrolled 226 patients with ESRD who has performed transthoracic echocardiography. We excluded the 16 patients who had been received a diagnosis of AF, and 210 patients (130 males, mean 62 ±13 years) were analyzed. We reviewed the patients' medical records, and analyzed the echocardiography and electrocardiography. The frontal QRS-T angle was calculated from the 12-lead electrocardiogram, and the patients was divided into tertiles (0-21, 22-56, and 57-180).
Results: During a mean follow-up period of 911±725 days, AF occurred in 24 (11.4%) patients. The patients with AF development was older (68±12 vs. 61±14 years, p=0.038). There were no differences in history of hypertension, diabetes, stroke, coronary artery disease between two groups. On the Kaplan-Meier survival analysis, AF development was tended to be higher in patients with increased QRS-T angle pulmonary HTN (p=0.068 by log-rank test). The 1st tertile group (QRS-T angle>56) was an independent predictor of future AF event in multivariate analysis (hazard ratio, 2.373; 95% confidence interval, 1.023-5.503; p=0.044).
Conclusion: In patients with ESRD, increased QRS-T angle predicts an increased risk of future AF development.

Precictors of new onset AF

	Univariate analysis	Multivariate analysis				
Variables	HR	95% CI	P value	HR	95% CI	P value
Age, year	1.043	1.004-1.083	0.032	1.040	0.999-1.083	0.055
Male gender	0.746	0.307-1.813	0.518			
Hypertension	0.738	0.172-3.160	0.683			
Diabetes	0.602	0.265-1.364	0.224			
History of CAD	2.292	1.010-5.201	0.047	2.309	1.007-5.296	0.048
EF, %	0.996	0.954-1.040	0.861			
LA volume index, mm^3/m^2	1.019	0.994-1.045	0.137			
E/e'	0.969	0.908-1.033	0.329			
LV mass index, g/m^2	1.006	0.998-1.015	0.140			
QRS duration, ms	1.022	1.000-1.045	0.051	1.019	0.997-1.042	0.087
Corrected QT, ms	1.005	0.994-1.017	0.342			
1st tertile of QRS-T angle	2.126	0.928-4.871	0.075	2.373	1.023-5.503	0.044

Cox regression analysis for predicting new-onset atrial fibrillation

P2174

Relationship between echo parameters and reduced LV longitudinal strain in end stage renal disease patients undergoing hemodialysis with preserved LV systolic function

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Background. In patients with end-stage renal disease (ESRD), cardiovascular diseases are the most common and life-threatening comorbidities. Purpose. The aim of our study was to evaluate changes of left ventricle (LV) longitudinal strain (LS) and to determine the role of clinical and echocardiographic parameters for the reduced LV LS in patients with ESRD undergoing hemodialysis (HD) and preserved LV systolic function. Methods. The conventional echocardiography was performed to 70 patients with preserved LV EF (>50%) who were divided into two groups: HD group – patients with ESRD undergoing HD (n=38) vs. controls – patients with normal kidney function (GFR>90mL/min/1.73m2) (n=32). LS was analysed using 2D speckle-tracking echocardiography. LV LS >-20% was defined as reduced. Pearson correlation and multivariate regression analyses were performed to evaluate the relationship between clinical and echocardiographic parameters and reduced LV LS. The value of p<0.05 was considered as statistically significant. Results. There were no significant differences of clinical characteristics, comorbidities and LV EF between groups (p>0.05). HD group had significantly lower LV LS than control group (-21.94±3.35 vs -24.04±1.97, p=0.003). Correlation analysis revealed significant moderate relation between LV LS and right ventricle (RV) LS (r=0.6, p<0.001). Multivariate regression analysis showed that LV myocardial mass index was significantly related to LV LS reduction (p=0.025) (Table1). Conclusion. ESRD is associated with reduced LV LS in patients with preserved LV EF. Significant relation was revealed between LV LS and RV LS (p<0.001), as well as, LV myocardial mass index (p=0.025). Conflict of interest. None.

Table1

Univariate analysis	Multivariate analysis					
LV strain reduction						
	OR	CI (95%)	p value	OR	CI (95%)	p value
Age	1.089	1.012-1.172	0.023	1.001	0.927-1.082	0.650
HD duration	1.001	1.000-1.001	0.548			
LV EDDi (mm/m2)	0.841	0.360-1.962	0.688			
LV MMi (g/m2)	1.188	1.002-1.408	0.047	1.054	1.007-1.103	0.025
E/E'	1.034	0.630-1.697	0.039	1.043	0.828-1.314	0.722
LAVi (ml/m2)	0.699	0.440-1.178	0.124			
TAPSE (mm)	0.551	0.258-1.109	0.944			
RV GLS (%)	2.547	0.847-7.660	0.096			

OR - odds ratio, CI - confidence interval, HD - haemodialysis, LV - left ventricle, EDDi - end diastolic diameter index, MMi - myocardial mass index, LAVi - left atrium volume index, TAPSE -tricuspid annular plane systolic excursion, RV GLS- right ventricle global longitudinal strain.

e-Cardiology/Digital Health

P2175

Clinical impact of non-invasive telemonitoring in patients with chronic heart failure

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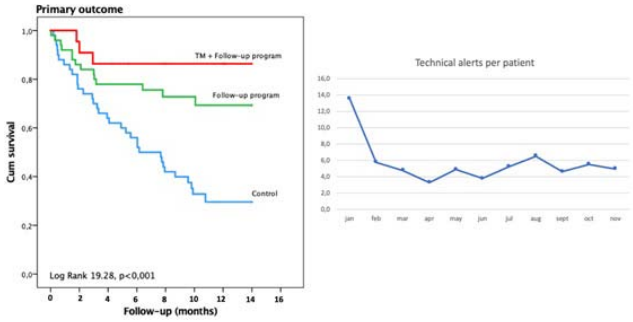
On behalf of: RICA-HF Team

Introduction: Non-invasive remote monitoring of patients with heart failure (HF) may be useful in the early detection of signs and symptoms of decompensation, allowing therapeutic optimization and avoiding rehospitalization.
Objectives: To assess the efficacy of telemonitoring (TM) integrated in a protocol-based follow-up program (PFP) of patients with HF.

Methods: Prospective and single center study of patients (pts) discharged from hospital after an episode of decompensated HF, with nested-case control design. Three groups of pts were considered: a group of 50 pts integrated in a PFP after hospital discharge, another group of 25 pts who integrated the PFP together with a telemonitoring program (TM), and a control group of 50 pts who were discharged before the PFP had been put into practice.
Pts in the 3 groups were matched according to age, NYHA at discharge and ejection fraction (EF).
The TM group included only patients with HF and reduced EF plus ≥1 HF hospitalization in the last year. In these pts, biodata were evaluated remotely and generated clinical alerts whenever altered in relation to the limits defined for each patient, with evaluation by the clinical team 24/7.
TM success was assessed by primary outcome (death or hospitalization from any cause) at 12 months, using Cox regression and Kaplan-Meier survival analysis.
Results: Patients included concomitantly in PFP and TM were 65.7 ± 9 years-old, 76% were male, median EF 25% (IQR 20-30), median NTproBNP 2707pg/mL (IQR 590-3947), 84% were in NYHA II or III, 52% had dilated cardiomyopathy, and the mean follow-up time was 9.5 ± 4.5 months.
During the TM program, alerts were generated mainly because of changes in heart rate and systolic blood pressure. However, only in 3% were clinical alerts confirmed. During the program there has been a significant reduction in technical alerts per patient, which were due to difficulties in the measurement or in transmission of the biodata, demonstrating a learning process of the patients, and also decreasing the team workload.
At 12-months of follow-up, a higher success rate regarding the primary outcome was observed in the TM group vs. the control group (86% vs. 32%, HR 0.17, 95% CI 0.05-0.56, p= 0.001), with a relative risk reduction (RRR) of 83%. This reduction was superior to that demonstrated with the PFP alone (72% vs. 32%, HR 0.36 95% CI 0.19-0.67, p= 0.001), which presented RRR of 64%. Similar results were found in rehospitalization for HF (Log Rank p=0.016), all-cause rehospitalization (Log Rank 0=0.016) and death (Log Rank p<0.01).
Conclusions: When integrated into a structured clinical follow-up program, TM is associated with a marked reduction in mortality, readmissions for HF, and rehospitalization for any cause, compared to usual follow-up. This study further suggests that the addition of a TM program to a protocol-based follow-up program of pts with HF can improve results already considered optimized.



P2176

Hybrid telerehabilitation in heart failure patients (TELEREH-HF) a randomized, prospective, open-label, parallel group, controlled, multi-center trial -study design and description of the intervention

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Funding Acknowledgements: TELEREH-HF study is supported by the National Centre for Research and Development, Poland grant number STRATEGMED1/233547/13/NCBR/2015

Background Current guidelines strongly recommend exercise training as an important component of heart failure (HF) management. Despite this, there are large regional disparities in access to rehabilitation both in Poland and in Europe. One of the possibilities to solve this problem is to introduce hybrid telerehabilitation (TR) in HF patients (pts). Purpose The primary objective of the TELEREH-HF trial is to determine whether introducing a novel hybrid model of TR in HF will significantly increase days alive and out of hospital when compared with usual care. The secondary objectives are to assess the effects of a hybrid TR compared to usual care on all-cause and cardiovascular mortality and all-cause, cardiovascular and heart failure hospitalization. The tertiary analyses will include: evaluation of the safety, effectiveness, quality of life (QoL), depression, anxiety, pts acceptance of and adherence to a hybrid TR. Methods The TELEREH-HF study is designed as a randomized (1:1), prospective, open-label, parallel group, controlled, multi-center (5 centers) trial among 850 clinically stable HF pts after a hospitalization incident, NYHA I-III, LVEF≤40%. Eligible pts were randomized to either hybrid TR+usual care (telerehabilitation group[TG]) or to usual care only (control group[CG]) and are followed for a maximum of 24 months. The TG pts underwent a 9-week hybrid TR program consisting of an initial stage (1 week) conducted at hospital and a basic stage (8-week) home-based TR five times weekly. The goals of the initial stage are: a baseline clinical examination, education, individual planning of exercise training and performing a few monitored educational training sessions. The TG pts received a device for remote supervision of the exercise training (telemonitoring ECG, blood pressure, weight). The primary study outcome is the number of days alive and out of hospital (DAOH) in the 12 months following the end of the preliminary 9-week training program. Secondary outcomes assessed at 12 months include all-cause and cardiovascular mortality, all-cause, cardiovascular and heart failure hospitalization. Secondary outcomes assessed at 9 weeks include: the effectiveness based on peak oxygen consumption in cardiopulmonary exercise test and the distance in 6-minute walking test; the QoL based on SF-36 Survey; the depression based on Beck inventory; the anxiety based on STAY; the acceptance based on questionnaire and the adherence based on the percentage of pts who carried out the prescribed exercise training.
Results All pts were randomised and completed the intervention (TG) and observation (CG) period. The follow up is now in progress. The results will be available in 2019/2020.
Conclusion The TELEREH-HF trial will provide novel data on the effect of the hybrid TR on days alive and out of hospital, hospitalization and mortality in HF pts and safety, effectiveness, QoL, depression, anxiety and pts acceptance of and adherence to this intervention.

P2177

VECTOR-HF: The first human experience with a wireless left atrial pressure monitoring system for patients with heart failure

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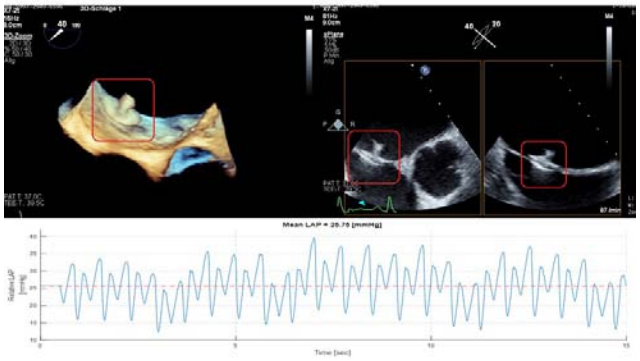
Funding Acknowledgements: H2020

Background: Invasive pressure-guided therapy has been shown to improve outcomes in patients with heart failure (HF). Thus far, only right-sided pressure sensors have shown clinical efficacy and safety.
Purpose: We hereby describe the first human experience with a novel battery-less and wireless left-sided pressure monitoring system, directly assessing left-atrial pressure (LAP) in an ambulatory setting. In pre-clinical studies, it was shown to enable accurate and safe measurement of LAP.
Methods: The V-LAP left atrial monitoring systEm for patients with Chronic sysTOlic and diastolic congestive heart failuRe first-in-human (VECTOR) study is a prospective, multicenter, single arm, open-label clinical trial to assess the safety, performance and usability of the V-LAP system in patients with heart failure. The V-LAP wireless sensor is implanted using a trans-septal access, under angiographic and echocardiographic guidance. The system includes an external unit, which both powers the implant and collects data via radio frequency communication upon activation, designed to be operated on a daily basis. We hereby describe the first case/s implanted.
Results: At this point in time, there has been one implantation of the V-LAP performed in a 52-year-old male patient who suffered from non-ischemic cardiomyopathy, with symptoms corresponding to NYHA Class III. The patient was admitted repeatedly for exacerbations of HF, and demonstrated elevated NT-ProBNP levels. He was therefore considered a candidate for the monitoring system, to enable optimal medical therapy. The procedure was performed in a trans-femoral, trans-septal fashion, under mild sedation, with a successful implantation of a V-LAP and calibration for pressure measurement. There were no intra-procedural complications, procedure time was less than one hour, deployment time of the device took less than 6 minutes from sheath insertion to implant disengagement (see 3D Echo image below) and that the patient was discharged home early morning the day after the procedure. During discharge the patient performed independently LAP measurements using the external system that were captured in the data display software at the hospital via a cloud-based system (please see below LAP waveforms measured).
Conclusions: In the first-in-human case, the implantation of the novel wireless left atrial pressure sensor V-LAP was feasible, safe, and showed good accuracy and precision. We now await both short and long-term efficacy and safety outcomes of the device in this patient and others, with the hopes of optimizing care for patients with HF.



Patient DE-01-01 Echo and LAP wave forms

P2178

Wearable multi-sensor platform with 7 days-ECG

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Background Today you either get a fitness tracker out of the consumer health products' world easy to apply but with seriously limited informative value, or you go for a medical product like a traditional Holter ECG with proven validity but limited suitability for daily use. There is a need for serious monitoring of vital data beyond pulse rate and counting steps, data which could be integrated in a professional setting.
Approach As a spin-off of the digilog ('Digital and analog companions of an ageing society') project (funded by the Federal State of Brandenburg, Germany), we developed a wearable multi-sensor platform with a 7 days-ECG implemented. The device is glued to the thorax and does not have any cables; you even can have a shower with it. You get a full-disclosure ECG with 3 leads. We tested validity and reliability with 200 patients and compared the results in a subset to a simultaneously applied conventional (24 h) Holter ECG.
Results Drop-out rate (mainly due to operating errors or technical problems) was 3 % (6/200). Acceptance by patients and referring doctors was excellent. Atrial fibrillation was detected in the 7 days-devices more often and more reliable than in the 24 h-Holter ECGs. Detected heart rates, ectopic beats and atrial fibrillation were comparable. The rate of artifacts was significantly lower in the wearable group.
Conclusions A wearable multi-sensor platform with a 7 days-ECG implemented was successfully tested as proof-of-concept and compared to conventional Holter ECG.

P2179

Young computer-literate health care professionals have the greatest expectations for heart failure telemonitoring

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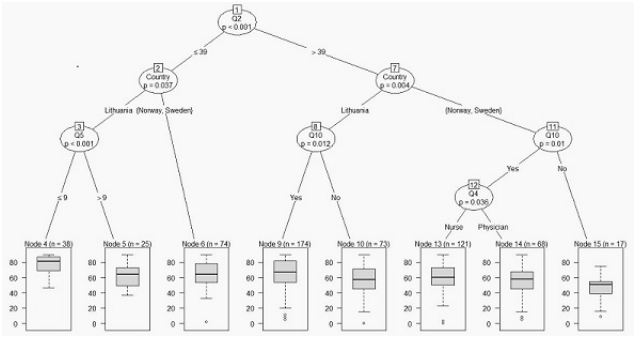
On behalf of: NordForsk
Funding Acknowledgements: Nordic Program on Health and Welfare. Pr. No 76015

Background: The attitude and expectations of health care professionals (HCPs) for using remote telemonitoring (TM) in patients with heart failure (HF) may be important for implementation of the remote care into clinical practice.
Objective: To identify the characteristics of HCPs who have high expectations for TM of HF patients.
Design and Methods: Data from a cross-sectional survey examining HCPs' expectations of non-invasive HF telemonitoring was performed nationwide in three Nordic Baltic countries. Participants were cardiologists and nurses working with HF patients in 41 hospitals in Lithuania (n=310), 57 hospitals in Norway (n=226) and 61 hospitals in Sweden (n=120).
The degree of expectations for TM was calculated as the sum of the 10 items (each score from 0–10) listed as reasons for TM such as reducing admissions/readmission, improving patient self-care, reducing the workload on the HF clinics, reducing costs, etc. Thus, the maximal score could be 100, consistent with the highest expectations for TM. A regression tree analysis was performed, with a continuous target variable of expectations for TM and HCPs' characteristics as input variables. Age, sex, country, discipline (nurse or cardiologist), years of post-graduate experience, familiarity with TM and experience with computer programs were all entered as input variables.
Results: The regression tree analysis (Figure 1. Regression tree showing HCPs' characteristics with the highest expectations for telemonitoring of heart failure patients) revealed that HCPs who were younger (under 39 years of age), and among them Lithuanians with a work experience of up to 9 years, had the highest expectations. Meanwhile, among HCPs that were older (above 39 years old) those who had longer experience with software such as Word, PowerPoint and Excel, showed the highest expectation level. In this group, the Norwegian and Swedish nurses had significantly higher expectations than physicians in those two countries.
Conclusion: Age, work experience, computer skills and profession have influence on the level of expectations for heart failure telemonitoring. These findings may be important for future interventions to implement non-invasive telemonitoring.
Legend of Picture: Central lines represents median scores, boxes represent the 25th and 75th percentiles, and whiskers extend to the lowest data point within 1.5 IQR of the lower quartile and the highest data point within 1.5 IQR of the upper quartile. Dots represent extreme values.
Inputs: Country; Q1 (Sex); Q2 (Age); Q4 (What is your current job?); Q5 (How many years of postgraduate experience do you have?); Q10 (Do you have experience with software such as Word, PowerPoint, Excel?); Q15 (Are you familiar with heart failure telemonitoring?).
Output: the sum of all scores chosen in the question about reasons for TM and expressed as median value with IQR.



Regression tree

P2180

The place of telemedicine in the management of heart failure in community medicine: general practitioner perceptions of a regional telemedicine platform in Normandy, France

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Background: Telemedicine provides a solution to the challenges posed by the ageing population and the low density of medical services in rural areas. Telemedicine is particularly appropriate for following chronic patients with unpredictable course. Telemedicine programmes for monitoring patients with heart failure (HF) have been established in France in recent years, but little is known about how they are used by general practitioners (GP). The Suivi Clinique A Domicile (SCAD) is a regional telemedicine platform in Normandy open to all GPs and community cardiologists to promote monitoring and empowerment of HF patients after hospitalisation. Patients provide data to the system daily and are receiving advices for diet, treatment and physical activity self-management. In addition, an alert is automatically triggered if values depart from the normal range allowing dedicated HF-nurses to intervene. The SCAD platform has been shown to reduce the need for emergency hospitalisation.Purpose: To evaluate perceptions of GPs concerning the utility of the SCAD platform.

Methods: An on-line survey was sent to all GPs in Normandy in May 2018 by the regional GP association (URML). This was a multiple-choice questionnaire asking 10 questions about awareness and perceptions of the SCAD platform. Data were analysed separately for Lower Normandy, where GPs had been able to include patients in SCAD since 2015, and Upper Normandy, where the platform had not yet been opened to GPs.
Results: 137 GPs participated in the survey (69 in Lower Normandy and 68 in Upper Normandy). Most of these (70.1%) had less than five patients with unstable HF in their practice. In Lower Normandy, 52/69 GPs (75.4%) were aware of the SCAD platform, 14.5% used it for their patients, 52.2% considered the platform useful and 76.0% would like to include patients in it. In Upper Normandy, 49/68 (62.1%) were aware of the platform, but 58.8% did not know if it would be useful. However, 66.7% would like to include patients. In both areas, the platform was considered most useful for following key clinical variables of their patients at home (64.0% overall), for teaching patients to self-monitor and detect warning signs (66.0%) and the availability of a nurse for monitoring alerts and contacting the GP (58.0%). Aspects of the platform that could be improved were to be better informed about SCAD (62.0% overall), to have access to the data on their patients held in the platform database (48.0%), and to train the patients better and to develop patient education (40.0%) and to enrol patients independently of the hospital (20.2%).
Conclusion: GPs in Normandy are interested in using telemedicine for managing patients with HF even though only a minority have any practical experience with the available platform. Better information on the SCAD platform could encourage GPs to become actively involved in telemonitoring. The programme could also be adapted to allow GPs to include patients directly.

P2181
Awareness study of patients with arterial hypertension

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Important aspects of the organization of medical care for patients with arterial hypertension (AH) are the motivation of patients for treatment, their compliance with the recommendations for modification of lifestyle and regimen of medical therapy. In most countries, only 12% of the patients with hypertension are diagnosed, the therapy is prescribed and the target blood pressure is reached.
The question of using the information obtained as a result of monitoring, on the processes of making management decisions in the field of quality management of medical aid remains inadequately studied. To improve the effectiveness of medical care for patients with AH, it is necessary to determine the degree of patient adherence to treatment by monitoring their level of awareness.
Purpose: to analyze the results of medical and social studies of the level of awareness of dispensary patients with AH in Sumy city regarding the course of their disease, implementation of preventive measures, diagnosis, treatment.
Material and methods of research. They conducted questionnaires, measurements of pressure, preventive conversation with patients regarding lifestyle modification and risk factors. 2100 patients were interviewed. Of these, men comprised 29.3%, women 70.7%. By age, the audience was distributed as follows: 18-34 years - 7.3%; 35-59 y. - 29.9%; 60 and over - 62.7%.
Results. Most of the respondents exercise control over arterial pressure. Thus, 63% of patients constantly monitor pressure; 29% periodically measure it; 8% - did not measure during the year at all. The following data testify to the high level of advisory support for patients: the vast majority of respondents - 97% - confirm receipt of detailed information about their illness in the clinic. Drug treatment was prescribed in 93% of patients. However, despite the high level of awareness of the patients, the results of the survey indicated an inadequate level of their responsibility for their own health. Only 48% of respondents regularly take medications, 33% - regularly take medication; 19% - do not accept at all. The main causes of irregular drug intake are the following: 48% - I forget, 27% - high cost of medicines, 14% - I do not want, 11% - does not help. According to the results of the survey, 29% of patients with arterial hypertension had crises in the analyzed period. 12% of the respondents called the district doctor, 5% - ambulance, 11% - were inpatient treatment. During the year, 42% of the respondents dispensary patients visited a district doctor more than two times; 10% - 2 times; 16% - one time; 32% - never asked a doctor.
Conclusions. Patients with AH in Sumy are aware of the course of their illness. The main reason for unsatisfactory performance of the doctor's recommendations is that the patients indicate: 'I forget', 'I have no time', 'I do not want to'. A system of constant reminders for the need for control of pressure, treatment, and a healthy lifestyle is needed.

Basic Science

P2182
Daily monitoring parameters of arterial stiffness and central aortic pressure in patients with ankylosing spondylitis

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Background. In recent years the increased arterial stiffness in Ankylosing Spondylitis (AS) was shown. However today this issue has not been adequately studied.
Purpose: To investigate the central aortic pressure and arterial stiffness parameters during daily monitoring in patients with AS.
Methods. 49 patients with AS (mean age 39.6 ± 10.6, 38 men, 11 woman) were examined. AS Disease Activity Score (ASDAS-CRP) was 3.11±0.55. Duration of AS was 5.87 ±4.76 years. X-ray stage sacroiliac joints (according Modified New York Criteria) was 2.59±1.42. The control group included 24 healthy nonsmokers. The groups were similar in age, sex and daily peripheral blood pressure parameters. 10 patients with AS had history of arterial hypertension, however, at the time of inclusion in this study their blood pressure was stabilized. 18 patients with AS had smoking history, the smoking index was 18.05±11.57 pack-years. The ambulatory (daily) monitoring of the peripheral, central aortic pressure and parameters of arterial stiffness were made by device with Vasotens technology. This device uses an oscillometric method of blood pressure measurement with automatic calculation of aortic pressure parameters. For statistical analysis we used Mann-Whitney criteria and Spirmen correlation method. The study was based on GCP principles.
Results. Increased levels of aortic systolic blood pressure (SBP) (114.8±12.4 vs 106.9±6.9, =0.006), aortic diastolic blood pressure (DBP) (78.5±9.3 vs 68.7±11.1, = 0,0001) were determined in patients with AS. Patients with AS demonstrated the increase of minimum, medium and maximum pulse wave velocity (PWV) compared to healthy individuals on 7.44% (p = 0.048), 15.78% (p = 0.0001) and 26.17% (p = 0.0001), respectively. Ambulatory Arterial Stiffness Index (ASI) in patients Ankylosing Spondylitis was higher compared with control group on 59.09% (p=0,002). Subendocardial viability ratio (SERV) medium per day was lower compared with control group on 9.4% (p=0,0001). PWV medium per day was directly correlated with total cholesterol (r= 0,41; p=0,026). SERV maximum per day was negative correlated with X-ray stage of sacroiliitis (r= 0,38; p=0,008). SERV medium per day was negative correlated with C-reactive protein (r= - 0,40; p=0,017), and with ASDAS-CRP (r= - 0,43; p=0,003). Smoking index was directly correlated with aortic SBP minimum per day (r= 0,49; p=0,044), aortic SBP medium per day (r= 0,52; p=0,032), aortic pulse pressure minimum per day (r= 0,55; p=0,021), aortic augmentation pressure (r= 0,62; p=0,017). The aortic blood pressure profiles were non-dipper on 57,15%, dipper on 30,61%, over-dipper and night-piker on 6,12% respectively in patients with AS.
Conclusions: Increasing indicators of arterial stiffness were determined in patients with AS. The relationship between clinical and laboratory data and arterial stiffness parameters was demonstrated. The aortic non-dipper type was dominated in the patients with AS.

P2183
Prothrombotic state as a causative of impaired left ventricular diastolic function in patients with primary antiphospholipid syndrome

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BACKGROUND: Cardiovascular manifestations, encountered in antiphospholipid syndrome, may develop as consequence of thrombophilia mediated by antiphospholipid antibodies and accelerated atherosclerosis as well. Our study aims to assess the impairment of left ventricular diastolic performance, as an early evidence of myocardial involvement in primary antiphospholipid syndrome (PAPS).
METHODS: We analyzed 100 APS patients, average age 47.70±13.14. Anticardiolipin antibodies (aCL IgG/IgM), anti-ß2 glycoprotein-I (anti-ß2GPI IgG/IgM) and lupus anticoagulant (LA) were determined. Abnormal cutoff values (more than half) for left ventricular diastolic dysfunction (LVDD) were septal e′ < 7 cm/sec, lateral e′ < 10 cm/sec, average E/e′ ratio > 14, LA volume index > 34 mL/m2 , and peak tricuspid regurgitation velocity > 2.8 m/sec. Results were compared to 45 healthy, age and sexmatched controls.
RESULTS: LVDD was significantly more prevalent in PAPS patients comparing to healthy controls (24.8% vs 2.2%, p=0.001). It was significantly related to age, body mass index, hyperlipidemia, venous thromboses and LA positivity in PAPS patients (p=0.0001, p=0.008, p=0.039, p=0.001, p=0.047 respectively). Patients with PAPS had higher LAVI (29.76±6.40 ml/m2 vs 26.62±7.8 ml/m2, p=0.012). Higher isovolumic relaxation time, lower lateral Ee velocity and lower lateral E/Ee ratio were seen in PAPS compared to controls (p=0.0001, p=0.020, p=0.038, respectively).

CONCLUSION: Echocardiography and LVDD recognition identifies preclinical cardiac involvement in PAPS patients, especially in those with venous thromboses and LA positivity. Given that LVDD is a main determinant of heart failure with preserved ejection fraction, timely recognition of prothrombotic state presence, seems to be mandatory

P2184

Echocardiographic differences between early- and late anthracycline-induced cardiotoxicity reveals a distinct cardiomyopathy phenotype

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Background: Anthracycline-induced cardiotoxicity (AIC) can be classified to be an early effect (diagnosed <1 year after treatment; EAIC) or late effect (diagnosed >1 year after treatment; LAIC) of cancer treatment. Previous studies suggest that the success of conventional heart failure treatment in patients with AIC is dependent on the timing of treatment initiation.
Objectives: We hypothesize that echocardiographic parameters of cardiotoxicity, such as left ventricular dysfunction and –dilatation, are more pronounced when there is a delay in AIC diagnosis.
Methods: At our cardio-oncology outpatient clinic, we identified 106 newly diagnosed patients with AIC the last 3 year, of which 59 patients were diagnosed within 1 year after treatment (EAIC) and 47 > 1 year after treatment (LAIC). Left ventricular dimensions (end-diastolic volume (EDV); end-systolic volume (ESV)), 3D left ventricular ejection fraction (LVEF) measurements were performed on the echocardiography on which the diagnosis of AIC was confirmed.
Results: Median time [range] between last administration of anthracyclines and diagnosis of AIC was 4.0 [0.2 – 10.6] months for EAIC and 55.7 [12.7 – 445.2] months for LAIC. Overall, 33/106 (31%) patients showed increased end-diastolic volume, against 82/106 (77%) patients in which end-systolic volume was increased. There were no significant differences in left ventricular volumes between the two groups (EDV: EAIC 63.9 ± 14.5 ml/m2; LAIC 63.6 ± 18.2 ml/m2; p=0.941 || ESV: EAIC 36.1±10.0 ml/m2; LAIC 36.7±13.2ml/m2; p=0.784). Mean LVEF was comparable between groups, with a mean LVEF of 43.7±5.6% for EAIC, and 43.0±6.0% for LAIC (p=0.546). There was no correlation between LVEF and time between treatment and diagnosis of AIC (r=-.187; p=0.055).
Conclusion: In our study we have found that the echocardiographic phenotype of EAIC and LAIC were comparable. In contrast to other causes of dilated cardiomyopathy, prolonged left ventricular dysfunction due to anthracyclines does not seem lead to dilation of the left ventricle.

P2185

Association of expression of steroid receptors with development of chemotherapy induced cardiotoxicity in Patients with breast cancer

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Background The expression of estrogen receptor (ER) and progesterone receptor (PR) in tumor cell has prognostic value and is crucial to determine treatment strategy in breast cancer. The protective functions of these steroid hormone in cardiovascular disease are mediated via their receptors that exist in heart and vessels. Nevertheless, the relation between steroid receptor profile and development of chemotherapy induced cardiotoxicity (CIC) have not been clearly demonstrated.
Methods.
Forty one consecutive patients (mean age=54.4±8.9 years) with breast cancer who undergone chemotherapy were included. Baseline echocardiography was performed within 1 day before chemotherapy and was followed up 3month after start of chemotherapy. The CIC was defined as a decrease of left ventricular ejection fraction (LVEF) by 5% or more to less than 55% in the presence of symptoms of HF or an asymptomatic decrease in LVEF by 10% or more to less than 55%. ER and PR status were evaluated and their expression was accessed by quantitative percent on an immune-histochemical method.
Results: Seven patients (17% of study population) was developed CIC in 3 month follow up. Not only prevalence of clinical risk factors, including hypertension, diabetes, dyslipidemia and obesity, but also administrated chemo agents were not different between patient with and without CIC. The baseline LVEF and global longitudinal strain (GLS) of LV were not different between patients with and without CIC (LVEF: 60.3+7.3% vs 61.8+5.1%, P=0.497 and GLS: -18.2+3.5% vs -19.7 2.9%, P=0.232).
The prevalence of positive both receptors was higher in patients with CIS, but that were not significant (ER-85.7% vs 64.7% P=0.399 and PR-85.7% and 70.6%, P=0.651, respectively). However, in patients with CIC, the expressions of ER and PR were significantly increased than in patients without CIC (figure 2). In total study population, ΔGLS was related ER expression (r=-0.317, P=0.047) and it had a favorable trend to associate with PR expression (r=0.-276, P=0.081).
Conclusion: From these finding, the association of quantity of expression of steroid receptors with the development of CIC might be supposed. Further study is necessary to elucidate this result in large population with long term follow up.

Figure 1. The comparison of changes of LVEF and GLS between patients with and without CIC

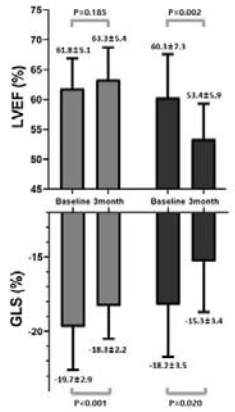
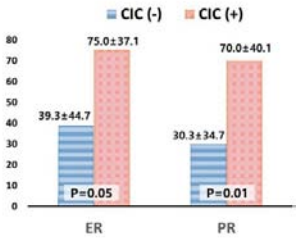


Figure 2. The differences of expression of both steroid receptors between patients with and without CIC



P2186

Hand grip strength testing in cancer patients

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Background: Many cancer patients develop sarcopenia and cardiovascular dysfunction. Maximum Hand grip strength (HGS) is a simple and quick measurement to test for possible cardiovascular dysfunction and sarcopenia – but a consensus on the exact methodology for the assessment of maximum HGS is missing.
Purpose: To prospectively test how many trials are needed to determine maximum HGS and its correlation with body composition parameters, appetite and CV disease status.
Methods: From September 2017 to December 2018, we prospectively enrolled 113 patients with histologically confirmed cancer without significant cardiovascular disease (age 62±14yrs, 46% men, body mass index (BMI) 25.2±5.1kg/m2) and 25 controls (age 57±10yrs, 36% men, BMI 25.1±3.4kg/m2). The cancer group consisted of 6 non-small cell lung cancers (5%), 7 colorectal cancers (6%), 19 breast cancers (17%), 6 other cancers (5%), and 75 lymphoma patients (66%). At baseline, with a digital hand dynamometer, maximum HGS was tested 4x on the preferred arm and 3x on the non-preferred arm and transthoracic echocardiography was performed.
Results: Cancer patients demonstrated lower maximum HGS than controls (30.7±12 vs 38.9±14kg, p=0.0028). Subgroup analysis by sex showed higher maximum HGS in male vs female in cancer patients and controls (39.3±11 vs 23.4±6kg, p<0.0001; 54.1±11 vs 30.4±5kg, p<0.0001). Maximum HGS on the preferred arm was reached during the 1st/2nd/3rd/4th trial in 36/19/17/9% of cases and on the non-preferred arm during 1st/2nd/3rd trial in 12/5/2%. 81% of patients reached their maximum HGS on their preferred arm and 19% on their non-preferred arm. Patients with NYHA grade 3/4 (23% of patients) compared to NYHA grade 1/2 (77%) showed lower maximum HGS (26.6±8.8 vs 32.0±12.5kg, p=0.0436). In regression analysis, cancer patients' maximum HGS correlated with upper arm (r=0.323, p=0.0006), forearm (r=0.348, p=0.0002), thigh (r=0.319, p=0.0007), calf (r=0.203, p=0.0333) circumference, appetite (visual analogue scale from 0-100, r=0.294, p=0.0022), left ventricular internal diameter end diastole (LVIDd, mean: 46±5mm, r=0.341, p=0.0024), and mean E/e' ratio (mean: 9.2±3.5, r=-0.268, p=0.0150). Ejection fraction and E/A ratio did not show significant correlation with maximum HGS.
Conclusion: Maximum HGS should be tested 4x on the preferred arm and 3x on the non-preferred arm. Maximum HGS was reduced in cancer patients and correlated with upper arm, forearm, thigh, calf circumference, appetite, LVIDd and mean E/e' ratio.

P2187

Echocardiographic phenotype and long-term prognosis in patients with light-chain cardiac amyloidosis

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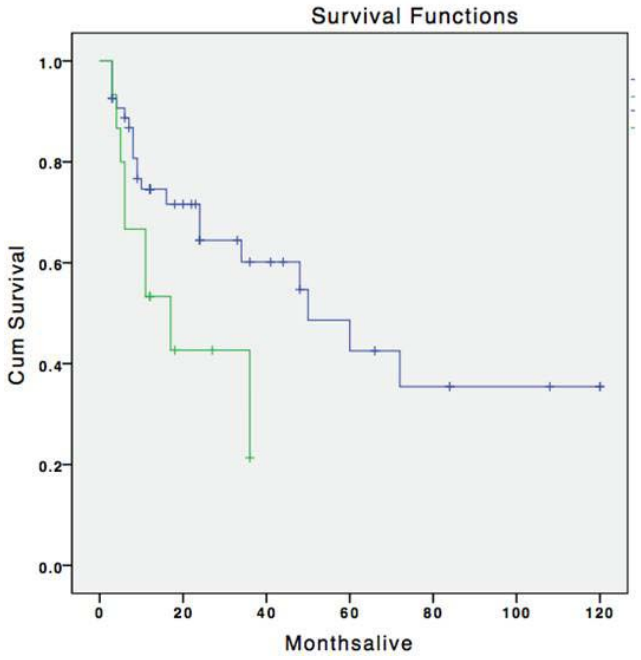
Background/Introduction: Light-chain cardiac amyloidosis (CA) associates with a poor prognosis. No data exist about the prognostic impact of the different remodeling patterns observed in heart echo in CA patients.
Purpose: To investigate whether different remodeling phenotypes are related with long-term prognosis in patients with CA.
Methods: Consecutive patients with light-chain CA followed in our cardio-oncology unit were prospectively recruited. Remodeling pattern was characterized at baseline heart echo after calculating relative wall thickness (RWT) and left ventricular mass index (LVMI). An RWT>0.42 and LVMI≤95 for women or ≤115 for men characterized a concentric remodeling pattern (CR), whereas an RWT>0.42 and LVMI>95 for women and >115 for men characterized a concentric hypertrophy pattern (CH). NT-proBNP as well as k and l chains were also assessed. All patients were treated by the oncologists with appropriate chemotherapy regimen.
Results: In total, 73 patients with a mean age of 65±2 years were followed from 6 to 120 months. From those, 57 patients presented with a CR pattern and 16 with a CH pattern. The CH phenotype associated with better survival rates (p=0.04, figure 1). There was no difference in left ventricular ejection fraction, diameters, NT-proBNP and light chain levels between CR and CH groups. Higher E/E' values were found in the CH group (18.9±2 vs 13±0.9, p=0.009).
Conclusions: Concentric hypertrophy associates with a better long-term prognosis in patients with CA.



Remodeling phenotype and survival

P2188

Evidence for a cardiac metabolic switch in patients with Hodgkin's Lymphoma

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Aims: Our aim was to investigate the glucose uptake in cancer patients suffering from different entities, using 18F-FDG PET-CT scans. Further, to identify potential variables altering cardiac and skeletal muscle glucose metabolism.
Methods and results: We retrospectively analysed cardiac and skeletal muscle 18F-FDG uptake in Onco-PET-CT scans conducted between 2014 and 2018 from 337 consecutive adult patients suffering from Hodgkin's lymphoma, non-Hodgkin's lymphoma, and non-lymphatic cancer (thyroid carcinoma, bronchial carcinoma, and malignant melanoma). Univariate logistic regression models were created for increased cardiac and skeletal muscle 18F-FDG uptake using cancer entity, sex, age, previous radiation, previous chemotherapy, diabetes, obesity, serum glucose levels, renal function, and thyroid function as parameters. High serum glucose levels were accompanied by lower absorption rates in both cardiac and skeletal muscle. Hodgkin's lymphoma was associated with an increase in cardiac uptake. Decreased skeletal muscle 18F-FDG uptake was noted in elderly and obese patients. In multivariate models, Hodgkin's lymphoma patients showed higher 18F-FDG uptake, while non-Hodgkin's lymphoma patients did not differ significantly from non-lymphatic cancer patients. High serum glucose levels and prior chemotherapy were both associated with a significantly decreased cardiac 18F-FDG uptake. Notably, prior chemotherapy did not influence FDG uptake in skeletal muscle to the same extent. Obesity and older age were both significantly associated with decreased gluteal 18F-FDG uptake.
Conclusion: Our data provide first evidence for a metabolic alteration in patients with Hodgkin's lymphoma related to cardiac glucose uptake in humans. This effect seems to be independent from skeletal muscle metabolism.

P2189

Early detection of cardiotoxicity in breast cancer patients: red flags according to a traffic lights - like coding system after long-term experience at a referral centre

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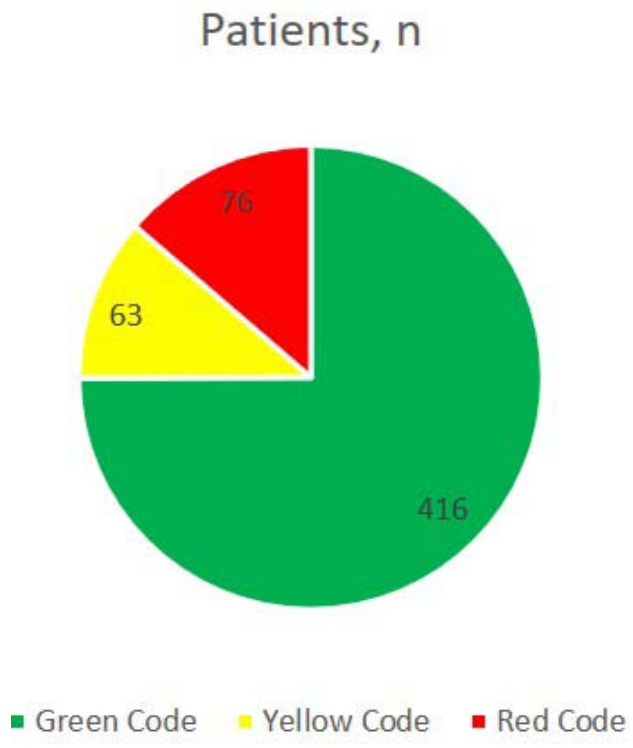
Background: breast cancer treatment (adriamycin, cyclophosphamide) or its association to trastuzumab for HER 2 positive breast cancer, can produce cardiotoxicity (CTX) and lead to the transient or permanent stop of oncologic treatment. In some cases patients remain with some degree of left ventricular dysfunction (LVD) in the long term.
Purpose: to design a red flags coding system to label the patients according to the magnitude of LVD and to early detect and treat CTX associated to breast cancer treatment.
Methods: we performed an echocardiographic evaluation at baseline and every 3 months during the first year, and then every 4 months along follow up. We assessed left ventricular ejection fraction (LVEF) by Simpson's method, global longitudinal strain rate and tissue Doppler velocity (lateral wall of the left ventricle). We assigned patients to one of three groups of CTX according to a traffic lights- like coding system: red code patients showed a >10 percentage points drop of their LVEF from baseline, an LVEF <55% or had heart failure symptoms; yellow code patients showed an LVEF drop between 5 to 10 percentage points along treatment; green code patients showed a non-significant LVEF drop of <5 percentage points.
Results: between January 2010 to April 2017, we assessed 555 consecutive breast cancer patients (mean follow up period 22 ± 35,2 months). Table shows the three different groups of patients and their echocardiographic results, need to start cardiologic treatment and the impact on their oncologic treatment (the need to transient or permanently stop it).
Conclusions: classification of breast cancer patients according to a traffic lights – like coding system along their oncologic treatment let us identify patients in terms of their LVD behavior. Patients in the red code group showed the highest need of stopping oncologic treatment and of starting neurohormonal antagonists for their LVD. This system allowed us to early detect patients who develop LVD along their oncologic treatment and follow up period and to concisely communicate the CTX associated to breast cancer treatment to the oncologists.

Results

	Green Code	Yellow Code	Red Code	p
Baseline LVEF (% ± SD)	63±4	64±5	65±6	<0,005
LVEF drop at nadir (% points ± SD)	4±1	7,4±2,5	16±6,6	<0,0005
Time to nadir LVEF (months ± SD)	14±12	13±8	23,4±2	<0,0005
Oncologic Treatment Withdrawal (%)	0	0	12	<0,002
New enalapril use (%)	1,6	5	42	<0,0012
New beta blockers use (%)	3	23	73	<0,002

LVEF: left ventricular ejection fraction



Traffic lights distribution of patients

P2190

First preliminary demographic data of the referrals from a university hospital Cardio-Oncology outpatient clinic

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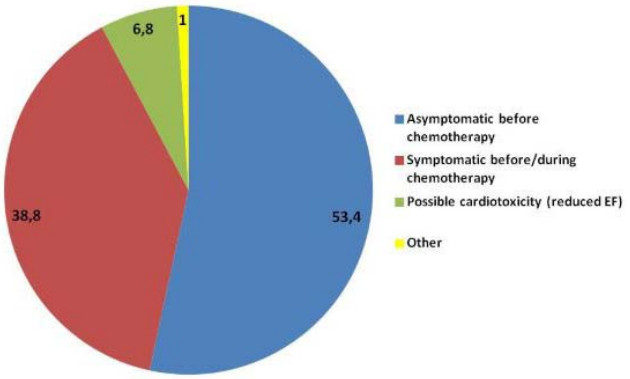
Background/Introduction: The management of patients with cancer is complex and requires a multidisciplinary team approach involving oncologists, surgeons, radiologists and clinical cardiologists. To meet this need Cardio-Oncology units have been recently developed worldwide.
Purpose To report demographic data from all the referrals to a Cardio-Oncology outpatient clinic of a tertiary university hospital.
Methods From January 2016 to December 2018 all Oncology patients referred to our Cardio-Oncology unit were included. The following clinical and laboratory data were recorded at baseline visit and analyzed: gender, age, predisposing risk factors for cardiotoxicity (PFC), reason for referral (RFR), ejection fraction (EF), end diastolic diameter (EDD), end systolic diameter (ESD), biochemical parameters, oncology history and therapies and cardiological diagnostic and therapeutic plan.
Results A total of 88 patients (mean age of 64.7 years, 52.3% female) were included. The most common RFR was consultation before chemotherapy in high risk asymptomatic patients (53.4%) (figure 1). From the patients' oncology history, the most frequent malignancy was amyloidosis (47.1%) and the second most common breast cancer (14.9%). The most frequent PFC were: hypertension (30.7%), diabetes mellitus (19.3%), hypercholesterolemia (18.2%), smoking (18,2%) and coronary artery disease (13.6%). The mean EF of the study population was 46.9%, the mean EDD 48mm, and the mean ESD 33.3mm. The most common diagnostic tests ordered before chemotherapy included: heart ultrasound with strain (36%), 24-hour Holter monitoring (24%) and myocardial perfusion imaging (24%). Before chemotherapy, beta blockers were prescribed in 28% and diuretics in 32% of patients.



Reason for referral

Conclusions Oncology patients referred for consultation to a tertiary Cardio-Oncology unit present with a constellation of PFC. Further diagnostic work-up and drug adjustment are warranted for at least one third of the patients before chemotherapy.

P2191

Cardio-toxicity among sarcoma patients: a cardio-oncology registry

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Background: Chemotherapy induced cardio-toxicity has been recognized as a serious side effect since the first introduction to anthracycline (ANT). Cardio-toxicity among breast cancer patients is well studied but the impact on sarcoma patients is limited, even though they are exposed to higher ANT doses. The commonly used term for cardio-toxicity is cancer therapeutic related cardiac dysfunction (CTRCD), defined as a left ventricular ejection fraction (EF) reduction of >10%, to a value below 53%.
Objectives: To estimate the prevalence of CTRCD among sarcoma patients, to perform risk stratification for its development and evaluate whether CTRCD is associated with mortality.
Methods: Data were collected as part of the International Cardio-Oncology Registry (ICOR), enrolling all patients who were evaluated in the cardio-oncology clinic at our institution. All sarcoma patients were enrolled and divided into two groups - CTRCD group vs. "EF preserved" group.
Results: Among 43 consecutive patients, 6 (14%) developed CTRCD. Elevated left ventricular end systolic diameter (p=0.007), high levels of Red Blood Cell Distribution Width (p=0.044) and platelets (p=0.023) and a trend of lower Global Longitudinal Strain (p=0.092) were observed among the CTRCD group. During follow-up, 2 (33%) patients died in the CTRCD group vs 3 (8.1%) patients in the "EF preserved" group. In a multivariate analysis, adjusted to age and EF, CTRCD remained a significant predictor for mortality (p=0.039).
Conclusions: CTRCD is an important concern among sarcoma patients, regardless of baseline risk factors, and is associated with mortality. Echocardiography and blood parameters may provide an early diagnosis of cardio-toxicity.

Basic Science and Translational

P2193

Heart failure with reduced ejection fraction is characterized by systemic NEP downregulation

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Background. Neprilysin (NEP) inhibition is beneficial in heart failure with reduced ejection fraction (HFrEF) however pathophysiologic alterations in HF nor the contribution of different organ systems are not elucidated. The aim of this study was to investigate differential NEP expression (mRNA levels), NEP content (protein concentrations), and enzymatic NEP activity of various tissues in a translational model of chronic heart failure.
Methods. Ten pigs were randomized either to control- or HF-groups at an age of three months (n=5 each). The HF-group underwent reperfused myocardial infarction of 90 minutes via percutaneous balloon occlusion of the mid-LAD. At day three and at six months cMRI was performed. At six months the animals were sacrificed and tissues of the main organs and different cardiac regions were harvested. NEP concentrations and activity were measured from fresh-frozen samples using a specific ELISA (R&D systems,UK) and a fluorimetric peptide-cleavage-assay, NEP expression was determined from RNA-later samples by performing duplex qPCR. NEP concentrations and activities were equally determined in plasma and liquor samples. Relative values for all organs were pooled and compared by a non-parametric test and linear regression models were calculated between NEP expression, concentration and activities.
Results. cMRI confirmed myocardial infarction with a scar area of 21.5%(IQR:20.2-22.4) of the LV at day 3 and a higher end-diastolic volume of 100.8ml(IQR 95.2-110.2) and reduced LV EF of 41.8%(IQR:41.3-44.1) at 6 months of the HF-group compared to 79.0ml(IQR:78.9-82.9) and 53.0%(IQR:51.8-55.0) of controls. NEP expression was downregulated and translated into reduced protein concentrations and activity for the sampled organ systems in HF animals [p=0.003,p=0.005 and p=0.013] (Figure1A). Control and HF hearts showed clearly detectable NEP measures with different patterns for ventricles and atria. NEP concentrations and activity between plasma and liquor samples were comparable. Tissue NEP expression and tissue NEP concentrations showed modest correlation [R2=0.284,p<0.001], tissue NEP concentrations and tissue NEP activity however an excellent correlation [R2=0.727,p<0.001]. Again, plasma NEP concentrations and activity could not be correlated to their tissue equivalents (Figure1B). NEP kidney levels were 20- to 100-fold higher compared to all other organs, as also observed in immunohistochemistry (Figure1C).
Conclusions. The condition of HF is characterized by a systemic downregulation alongside reduced concentrations and activity of NEP in various organs. The success of ARNI in HFrEF might lie in the enhancement of the already initiated pathophysiological counter-regulation of natural NEP action. The regular function of the ubiquitous membrane-bound NEP is located at the tissues, and since plasma NEP concentrations and activities seem not to reflect tissue levels they might not serve well as a biomarker.

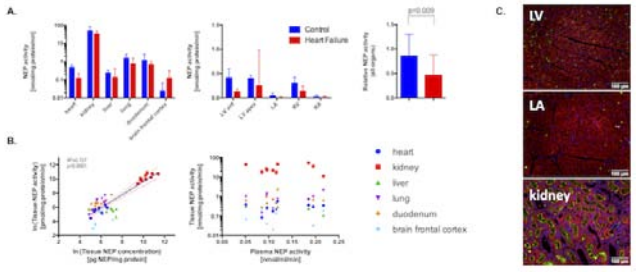

Figure1

P2194

Metabolic signature of fibrotic remodeling in heart failure: role of galaninergic system

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BACKGROUND: Myocardial fibrotic remodeling is a prominent feature of advanced heart failure (HF), however, the mechanisms underpinning fibrosis progression and the modern therapeutic options remain elusive.
OBJECTIVES: This study examined the role of galaninergic system in the progression of HF and evaluated whether galanin can reverse pre-established metabolic remodeling of fibrotic hearts in an experimental model of HF.
METHODS: Male C57Bl/6 mice were subjected to pressure overload for 5 weeks to induce HF. One week after surgery, the mice received vehicle or galanin for 4 weeks. Cardiac fibrosis, metabolism and function were analyzed.
RESULTS : In a mouse model of pressure overload-induced HF, chronic galanin treatment counteracted pre-established myocardial fibrotic remodeling, inflammatory responses and promoted a cardioprotective phenotype in mice. Analysis of myocardial energy metabolism demonstrated galanin-mediated reactivation of fetal-like metabolic phenotype associated with reduced mitochondrial fatty acid oxidation and increased glucose oxidation in fibrotic hearts. In vitro, galanin reversed TGFß-promoted cardiac fibroblast pro-fibrotic phenotyoe through FoxO1 pathways. In addition, using in vivo knock out of galanin receptor 2 (GalR2), we demonstrated that GalR2 deficiency promotes pro-fibrotic myocardial remodeling.
CONCLUSION: These findings identify novel mechanistic insights into cardiac fibrotic remodeling and open new perspectivefor the therapy of HF.

P2195

Atorvastatin preserves cardiac contractility via reducing matrix metalloproteinase-2 isoforms expression in a diabetic heart model

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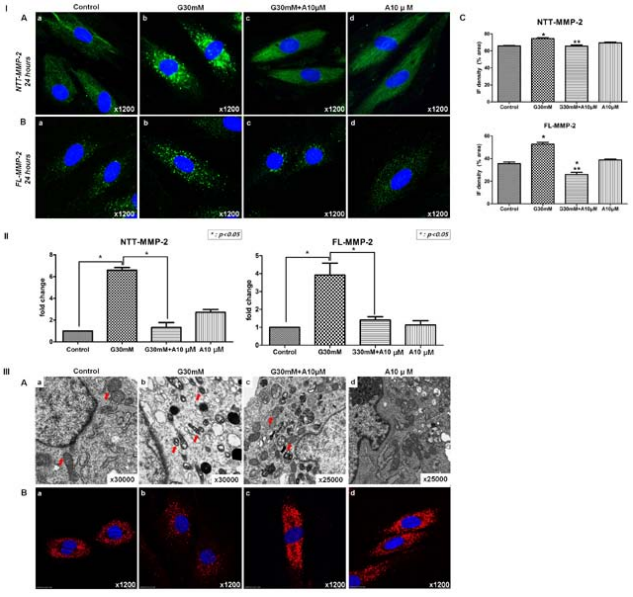
Background: Matrix metalloproteinase -2 (MMP-2) is increased in diabetic cardiomyopathy (DM CMP).We previously reported MMP-2 intracellular isoforms are also elevated in animal model. Some study showed atorvastatin alleviated experimental DM CMP by suppressing apoptosis and oxidative stress beyond lipid-lowering effect. Purpose : We investigated whether atorvastatin can alleviate DM CMP by reducing intracellular MMP-2 isoform expression.
Methods: Rat cardiomyoblasts (H9C2 cells) were tested to determine whether atorvastatin treatment after high glucose could reduce the expression of the two isoforms of MMP-2. For the in vivo study, we used the streptozotocin murine model of Type I DM and age-matched controls. The changes of each MMP-2 isoform in the diabetic mice hearts were determined using quantitative real-time polymerase chain reaction (qRT-PCR). Immunohistochemical stains were conducted to identify MMP-2 isoform expression. Echocardiography was performed to compare and analyze the changes in cardiac function induced by diabetes and atorvastatin.



Expressions of the two MMP2 isoforms i

Results: Quantitative RT-PCR and immunofluorescence staining showed that the two MMP-2 isoforms strongly induced by high glucose stimulation were attenuated

by atorvastatin treatment in H9C2 cells. Although no definite histologic features of diabetic cardiomyopathy were observed in diabetic mice, left ventricular systolic dysfunction observed in diabetic heart was also normalized by atorvastatin treatment by echocardiographic evaluation. These findings accompanied reduced TUNEL staining and mitochondrial morphological change in atorvastatin treated diabetic group. Quantitative RT-PCR and IHC staining showed this abnormal cardiac function was accompanied with the increases in the mRNA levels of the two isoforms of MMP-2 and attenuated with atorvastatin treatment. Conclusion: Atorvastatin attenuated deterioration of cardiac dysfunction induced by diabetic condition by reducing expression of two isoforms of MMP-2 in vitro and in a Type I diabetes heart model. The roles played by these isoforms and atorvastatin treatment in diabetic cardiomyopathy require further study.

P2196

MicroRNAs expression profile in advanced heart failure patients: perspectives for risk stratification

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BACKGROUND: Early diagnosis and risk stratification of patients with advanced heart failure (HF) remain a challenge. Circulating microRNAs (miRNAs) have shown promising results as biomarkers for HF, whereas little is known about their role in advanced stages.
PURPOSE: In this study, we assessed if a peculiar miRNA expression pattern identifies stable advanced HF patients compared with healthy subjects and whether it may be related to prognosis.
METHODS: Consecutive patients hospitalized for HF in our intensive care unit were screened. Inclusion criteria were the following: age >18 years old, patients presenting an ischemic or idiopathic cardiomyopathy, and fulfilling the 2007 ESC criteria for advanced HF. Blood samples were collected at ambulatory level in stabilized patients 1 month after hospital discharge. An equal number of healthy volunteers were recruited matched by age and sex. RNA was extracted from plasma and miRNA libraries for next-generation sequencing (NGS) were prepared. miRNAs resulting differentially expressed between the two groups were identified through bioinformatic software (p-value < 0.05) and then correlated with patients' clinical prognostic parameters and outcome.
RESULTS: Between January 2016 and July 2018, 32 patients were enrolled (mean age 60.4 years, 59% ischemic cardiomyopathy, mean EF 24%) and matched with 32 healthy controls. During a mean follow up of 9±5 months, there were 5 (16%) CV death, 6 (19%) heart transplantations and 3 (9%) LVAD implantations. After NGS sequencing we found a different expression profile in 58 miRNAs between patients and controls. Among patients, those with VO2 max < 14 ml/min/kg showed higher levels of miR-22-5p/24-3p/942-5p than those with higher VO2 max values (p 0.003; 0.026; 0.012 respectively), while levels of miR-1271-5p/139-5p/326 were significantly lower in patients with LV end diastolic diameter > 61 mm than in those without LV enlargement (p 0.009; 0.006; 0.017 respectively).No specific miRNA showed a significant correlation with mortality or the composite outcome of CV death, heart transplantation and LVAD implantation.
CONCLUSION: Advanced heart failure patients show a specific miRNAs expression pattern compared to healthy controls. A subgroup of these miRNAs was associated with predictors of worse prognosis such as low VO2 max or dilated LVs, though not with worse outcome. Further research is needed to create a miRNA risk stratification model in this setting.

P2197

Efficacy of combination therapy with empagliflozin and baseline drugs in postinfarct heart failure in normoglycemic rats

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Sodium-glucose co-transporter 2 inhibitor empagliflozin (Empa) reduces death from cardiovascular causes, death from any cause, hospitalisation rate for heart failure in patients with diabetes mellitus type 2. In our previous publications comparative efficacy monotherapy of Empa for chronic heart failure (CHF) relative baseline drugs was shown (second stage).
Purpose. In this study (3 stage) we continued to study the cardial effects of Empa in combinations for treatment normoglycemic rats with experimental CHF.
Methods. CHF in 50 rats was simulated via permanent ligation of the left coronary artery. After second stage (previous experiment) surviving animals in addition received second medicine (angiotensinconverting enzyme inhibitor, ß-blocker and aldosterone antagonist) (tabl.1). After 3 months of the combination therapy, status of cardiovascular system by echoCG was analyzed.
Results. Analyzing the third stage, we will stop on such factors as: survivance, growth rate of left ventricular shortening fraction (FS) and left ventricular ejection fraction (EF) in comparison with the previous stage (fig. 1). At this rate, the maximum survivance (90%) was observed in groups of animals receiving an Empa with accession of a fosinopril and classical therapy of a fosinopril with accession of a bisoprolol, encore while the semi-annual survivance of animals with CHF without treatment was 70% (natural mortality was estimated). In comparison with the second stage, FS animals without treatment decreased by 16.22%. In groups of treatment (with the second on the fifth) FS increased by 2.36%, 0.59%, 4.32%, 4.06% respectively. EF practically grew by 6% at animals without treatment, decreased by 15.32% in the group receiving an bisoprolol and an Empa, and increased by 13.38%, 28.59%, 48.08% at animal groups 2, 3, 5 respectively. In summary, addition of an Empa to means of standard therapy has positive pharmacological effect.

Design of therapy

1ststage	2ndstage	3rdstage
CHFformation- 30 days	Monotherapy- 90 days	Addition second medicine-90 days
Group 1 (CHF)		
Group 2 (CHF + empagliflozin)	+ fosinopril	
Group 3 (CHF + fosinopril)	+ bisoprolol	
Group 4 (CHF + bisoprolol)	+ empagliflozin	
Group 5 (CHF + spironolactone)	+ empagliflozin	

CHF - chronic heart failure

Group /Measurement	Survivance , %	ΔFS, %	ΔEF, %
№ 1	70%	-16,22	+5,98
№ 2	90%	+2,36	+13,38
№ 3	90%	+0,59	+28,59
№ 4	80%	+4,32	-15,32
№ 5	80%	+4,06	+48,08

FS – left ventricular shortening fraction; EF – left ventricular ejection fraction.

3rd stage results

P2198

The LXR-agonist AZ876 attenuates cardiac damage in an isoproterenol induced HFpEF-like cardiomyopathy model

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Introduction: In a pressure-mediated model of heart failure with reduced ejection fraction (HFrEF) it has been shown that targeting the Liver X Receptor (LXR) in the heart led to a significant reduction of cardiac fibrosis and improvement of cardiac function.
In this study we aim to investigate the pharmacological effect of the novel LXR-agonist AZ876 in an isoproterenol induced HFpEF-like cardiomyopathy model on subendocardial fibrosis and cardiac function using advanced speckle tracking echocardiography.
Methods: Male 129SV mice were fed the LXR-agonist (20 μmol/kg/day) for 11 days. Starting from day 6 mice were injected with the nonselective β-agonist isoproterenol (ISO) for 4 consecutive days to induce diastolic dysfunction with subendocardial fibrosis in the presence of preserved systolic function. One day after the last ISO injection mice were characterized by conventional echocardiography as well as by speckle tracking echocardiography.

Results: ISO treatment led to a marked impairment of global longitudinal strain (GLS) (VEH vs. ISO, -19.07±1.27 vs. -15.43±1.76, **p≤0.01) which was significantly improved by the LXR-agonist (ISO vs. ISO/LXR-agonist., -15.43±1.76 vs. -19.05±3.66, **p≤0.01). Other strain parameters (radial, circumferential) were not regulated. Ejection fraction, a crucial parameter for systolic function, was affected neither by ISO nor by the LXR-agonist. Histological examination also revealed a significant reduction of ISO-induced subendocardial fibrosis in the LXR-agonist treated group.
Conclusion: This study shows that the LXR-agonist AZ876 attenuates subendocardial damage and improves GLS parameters in an HFpEF-like mouse model. Pharmacological LXR activation may provide a promising approach for the prevention and therapy of HFpEF.

P2199
Tenascin-C may accelerate left ventricular remodeling and function after myocardial infarction by enhancing hypertrophy

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Tenascin C (TN-C) is considered to play a pathophysiological role in maladaptive left ventricular remodeling. Yet, the mechanism underlying TN-C-dependent cardiac dysfunction following myocardial infarction remains elusive. The present study was designed to investigate the effect of hypoxia and hypertrophic stimuli on TN-C expression in H9c2 cells and its putative regulation by epigenetic mechanisms, namely DNA promoter methylation. In addition, rats subjected to myocardial infarction (MI) were investigated. H9c2 cells were subjected to oxygen glucose deprivation (OGD), incubated with Angiotensin II (Ang II) or human TN-C (hTN-C) protein. Hypertrophic and fibrotic markers, TN-C promoter methylation and TN-C protein levels were assessed by ELISA. TN-C mRNA expression was markedly increased by both, OGD and Ang II ($p<0.01$, respectively). In addition, Ang-II-dependent TN-C upregulation was explained by reduced promoter methylation ($p<0.05$). Cells treated with hTN-C displayed upregulation of BNP, Mmp2, β-MHC, integrin $\alpha 6$ and integrin $\beta 1$. In vivo, plasma and myocardial TN-C levels were increased 7 days post myocardial infarction (MI; $p<0.05$, respectively). In conclusion, both, hypoxic and hypertrophic stimuli, lead to epigenetically-driven TN-C upregulation and subsequent impairment in cardiomyoblasts. These findings might enlighten our understanding on maladaptive left ventricular remodeling and direct towards a strong participation of TN-C.

P2200
Excitation-secretion coupling in ventricular cardiomyocytes

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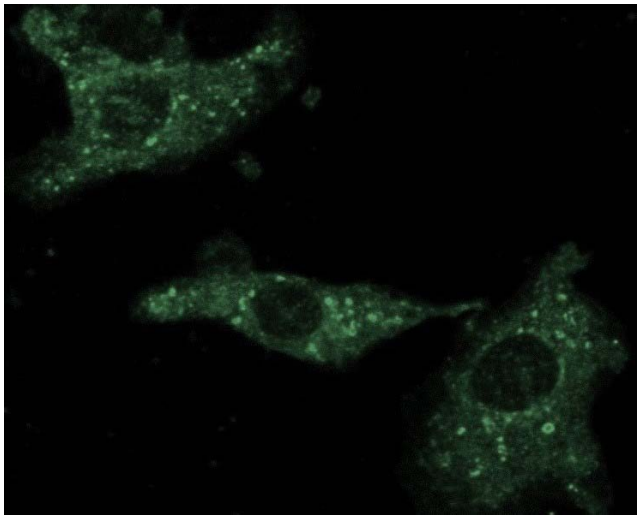
Funding Acknowledgements: German Cardiac Society, Berlin Health Insitute

Introduction The heart secretes hormones and can be considered as an endocrine organ. However, little is known about the mechanisms of secretion. In neuronal cells, a regulated pathway of exocytosis is well described. Parallels between neurons and cardiomyocytes can be expected since both belong to the group of excitable cells. Thus, it is feasible to believe excitation-secretion-coupling is a mechanism that also exists in cardiomyocytes.
Purpose We hypothesize that a calcium regulated pathway of brain natriuretic peptide (BNP) secretion exists in ventricular cardiomyocytes.
Methods We isolated neonatal rat ventricular myocytes from 2-day-old Wistar rats. Briefly, hearts were removed and ventricles dissected from atrias. Dissociation of ventricular cardiomyocytes was achieved by sequential digestion with trypsin. After pre-plating for 1 hour at 37°C, myocytes were seeded on gelatin coated wells. BNP ELISA (Abnova) was performed with measuring BNP concentrations in collected cell lysates and their corresponding supernatants. Immuno-fluorescence was conducted using following antibodies: synaptobrevin 1:250, goat anti-rabbit Alexa488 1:1000 (Life Technologies). Cells were visualized via confocal microscope (Zeiss).
Results We could show via immunofluorescence that ventricular cardiomyocytes express synaptobrevin (figure), which can be found in neurons and endocrine cells and is a marker protein of secretory vesicles that undergo calcium regulated exocytosis. When stimulating cardiomyocytes with 1 μM angiotensin II (Ang II) for 2h, which has been shown to activate inositol 1,4,5-trisphospate (IP3) and increase calcium release from intracellular stores into cytoplasm, we could see an increase in BNP secretion as described in the literature. Interestingly, the ratio of BNP secretion/production increased under Ang II stimulation (189 ± 54% normalized to vehicle control, p=0.05), indicating that Ang II induced increased exocytosis and thus BNP release. Moreover, ratio of BNP secretion/production returned back to baseline after 4h of Ang II stimulation (113 ± 18% normalized to control, p=0.25).
Conclusion We showed that ventricular cardiomyocytes exhibit a vesicle protein involved in calcium regulated exocytosis. Ang II, which increases intracellular calcium, led to increased BNP secretion in relation to production. Moreover, a time dependency could be observed. Based on these data, we propose that a calcium dependent, regulated way of exocytosis exists in cardiomyocytes. Further studies are ongoing to elucidate this mechanism.



Synaptobrevin staining

P2201
Reduced mitochondrial aldehyde dehydrogenase-2 activity and protein levels in left ventricular myocardium of dogs with Heart Failure

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Background: Heart failure (HF) promotes an increase in oxidative stress that leads to a build-up of reactive aldehydes such as 4-hydroxynonenal (4-HNE) that contribute to cardiomyocyte injury and death and to progressive global left ventricular (LV) dysfunction. Aldehyde dehydrogenases (ALDHs) are key enzymes that play a pivotal role in eliminating toxic aldehydes by catalyzing their oxidation to non-reactive acids. Mitochondrial ALDH2 plays a pivotal role in combating oxidative stress by reducing the cellular aldehyde load. This study examined protein levels of 4-HNE and ALDH2 as well as ALDH2 activity in LV myocardium of dogs with coronary microembolization-induced HF (LV ejection fraction ˜30%).
Methods: LV tissue from 7 HF dogs and from 6 normal (NL) dogs was used in the study. Using LV tissue extracts, 4-HNE-protein adducts levels were quantified using a commercially available Elisa kit and expressed as ng/mg protein. Protein levels of ALDH2 and porin, an internal loading control, were determined in isolated mitochondria by Western blotting coupled with Chemiluminescence. Band intensity were expressed in densitometric units (du). ALDH2 activity in isolated mitochondria was determined by measuring the conversion of propionaldehyde to propionic acid and the enzyme specific activity was expressed as nmol NADH formed/min/mg protein.
Results: Porin protein levels were unchanged in HF dogs compared to NL dogs (0.24 ± 0.01 vs. 0.26 ± 0.02 du, $p<0.05$). 4-HNE protein adducts levels were significantly increased in HF dogs compared to NL dogs (399 ± 35 vs. 185 ± 21 du, $p<0.05$); whereas ALDH2 protein levels were significantly decreased in HF dogs compared to NL dogs (0.49 ± 0.02 vs. 1.16 ± 0.10 du, $p<0.05$). ALDH2 activity was significantly decreased in HF dogs compared to NL dogs (51 ± 3 vs. 108 ± 4 nmol NADH/min/mg, $p<0.05$).
Conclusions: In LV myocardium of dogs with chronic HF, ALDH2 protein levels and activity are decreased in the face of elevated burden of aldehydes (e.g. 4-HNE) paving the way for enhanced cellular injury, death and progressive LV dysfunction. Drugs that increase the activity of ALDH2 may be useful in the treatment of patients with chronic HF.

P2202

Characterization of kidney function in a canine model of cardiorenal syndrome

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Background: The co-existence of renal insufficiency in patients with heart failure (HF) often referred to as "cardiorenal syndrome" (CRS), carries a poor prognosis. Understanding the pathophysiology of CRS and the need to develop new therapeutics that address this complex syndrome are often hindered by lack of appropriate animal models. In the present study, we provide further characterization of kidney function in a chronic canine model of CRS developed in our laboratories to help define the differences in this model when compared to a canine model of HF with preserved renal function.

Table

	NL	HF	CRS
Baseline pCr (mg/dL)	0.81 ± 0.01	0.91 ± 0.08	1.21 ± 0.04*
Urinary Protein (ml/dL)	83 ± 8	81 ± 32	172 ± 27*
Urinary NGAL (ng/ml)	2.6 ± 0.3	2.6 ± 0.2	5.7 ± 0.3*
Urinary KIM-1 (ng/ml)	34 ± 4	33 ± 4	98 ± 12*
Plasma Cystatin-C (ng/ml)	1.5 ± 0.2	1.8 ± 0.1	3.9 ± 0.2*

*=p<0.05 vs. NL and HF

Methods: Studies were performed in 15 dogs with coronary microembolization-induced HF. In 8 of the 15 dogs, CRS was produced by performing a unilateral nephrectomy and by applying a stenosis to the contralateral renal vein to simulate elevated venous pressures. LV ejection fraction (LVEF), urinary protein, urinary kidney injury molecule-1 (KIM-1) and neutrophil gelatinase associated lipocalin (NGAL) and plasma cystatin-C were measured in all 15 dogs and in 6 normal dogs. Each dog was also given a diuretic challenge (DC) consisting of an intravenous injection of 80 mg of furosemide and pCr was measured before and one hour after the injection.
Results: LVEF was similar in HF dogs and CRS dogs (34±1 vs. 33±2 %). Urinary protein, pCr, NGAL, KIM-1 and cystatin-C were similar in NL and HF dogs but increased significantly in CRS dogs (Table). DC had no effect on pCr in HF (0.84±0.06 vs. 0.90±0.07 mg/dL) but increased significantly in CRS dogs (1.21±0.04 vs. 1.41±0.04 mg/dL, p<0.05).
Conclusions: Results of the study indicate that the canine model of CRS manifest similar abnormalities seen in patients with HF and compromised renal function. The CRS model may be useful for exploring pathophysiological aspects of CRS and can serve a tool for assessing the effects of therapeutic/pharmacologic interventions targeting patients with HF and compromised renal function.

P2203

Cardiac mitochondrial alterations in a mouse model of Fabry Disease

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Background: Fabry disease (FD) is a genetic disorder caused by deficiency of α-Gal A activity with intralysosomal accumulation of globotriaosylceramide (GB3). Fabry patients show cardiac involvement developing left ventricular hypertrophy and dysfunction (LVHD). However, the pathogenesis of Fabry cardiomyopathy remains unclear. Beside GB3 accumulation, impairment of energetic metabolism is hypothesized as putative mechanism for LVHD, and mitochondrial dysfunction is suggested by the reduced activity of mitochondrial respiratory chain observed in fibroblast from FD patients. Purpose: To explore the pathogenetic mechanism of cardiac dysfunction in FD evaluating the role of mitochondria. Methods: The recently described hR301Q α-Gal A transgenic (Tg)/mα-Gal A knockout (KO)] that lacks endogenous GLA but expresses a human R301Q GLA transgene under the control of the human GLA promoter was used as a model of FD. On cardiac tissue, we evaluated cell area through WGA staining. Living cardiomyocytes were isolated by Langendorff system and single cell contractility analysis was performed by MUSCLEMOTION software. The levels of BNP, SerCa, PGC-1α, Tfam and NRF1 were evaluated by Real-time PCR while the levels of Mitofusin 2 (MFN2) and Citochrome C (Cit C) by western blot on mitochondrial and cytosolic extract, respectively. Results: In cardiac tissue from FD mice (FD-M) we observed an increase of cardiac cell area compared to wild-type tissue. The size of the single cardiomyocytes (CM) isolated from FD-M was also increased, confirming the cardiac cell hypertrophy in our model. Accordingly, the transcription levels of BNP and SerCa were higher in the hearts of FD mice respect to wild type. To evaluate cardiac cell performance, single cell contractility under field stimulation was recorded. In basal condition, FD-M CM showed higher contractility than wild type cells. However, an impaired contractile response to adrenergic stimulation was recorded for FD-M CM. To verify whether the observed phenotype was linked to mitochondrial dysfunction we explored mitochondrial health. Mitochondrial biogenesis was impaired in FD-M hearts concurrently with altered expression of the master regulators PGC-1α, Tfam and NRF1. Moreover, increased levels of MFN2 on mitochondria from FD-M hearts suggest that also mitochondrial fusion is affected. In the extracts from FD-M hearts, we observed an increase cytosolic levels of Cit C, marker of a mitochondrial damage and permeabilization.
Conclusions: Cardiac cell hypertrophy was observed in FD-M hearts together with alterations in mitochondrial biology, suggesting that the LVHD could be a compensatory response to the reduced contractile force due to inadequate energy supply from dysfunctional mitochondria.

P2204

Hydrogen sulfide modulates calcium handling in cardiac mitochondria to maintain their function and helps heart to resist calcium overload

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Introduction: Heart failure is a pathological condition that occurs as a result of various heart diseases and is associated with reduced cardiac pumping function and defects in excitation-contraction coupling, due to abnormal function of calcium handling and oxidative stress. Often this process is characterized by cytoplasmic and following mitochondrial calcium overload, which launches the mitochondrial pore opening, leading to dissipation of the mitochondrial membrane potential, uncoupling of oxidative phosphorylation, loss of ATP and necrosis. It is known that there are gaseous regulatory molecules that are synthesized endogenously and mediate different physiological processes in the cells. One of them is hydrogen sulfide that acts as vasodilator, antioxidant, antiapoptotic agent in cardiovascular system. But little is known about its influence on calcium homeostasis of mitochondria and cardiac resistance to calcium overload.
Methods: We used 5-7 months Wistar male rats. Cardiodynamic parameters such as LVP, dP/dT, heart rate, coronary flow and oxygen consumption were registered using Langendorf isolated rat heart. Calcium load was carried by adding of CaCl2 in perfusion solution every 10 minutes (concentration range from 1,7 to 12,5 mmol/l). Rat heart mitochondria were isolated using differential centrifugation method. Calcium accumulation in isolated organelles was studied by flow cytometry analysis and dye Fluo 4-AM. The functions of electron transport chain were estimated using oxygraph high-resolution respirometry.
Results: Exogenous NaHS (10-6 – 10-7 mol/l) increased Ca2+ accumulation in rat heart mitochondria in 1,68 and 2,54 times respectively (extramitochondrial Ca2+ concentration was 100 μmol/l). At the same time inhibitors of mitochondrial H2S synthesis enzymes led to decrease calcium accumulating capacity of isolated mitochondria. The inhibition of endogenous H2S formation in vivo impairs the function of the electron transport chain, due to the lowering of rate of oxygen consumption in the states V2, V3 and V4 by Chance, as well as indicators of RCR and ADP/O. It was also shown that inhibition of mitochondrial H2S-synthesis enzyme had a negative influence on initial cardiodynamic parameters. In particular, the LVP decreased twice and the rate of contraction and relaxation of myocardium also reduced by half. Coronary blood flow decreased by 1,12 times, while the heart rate was tended to increase. We found that the hearts of experimental animals developed less powerful reaction under the calcium overload that manifested in reduced parameters of LVP, coronary flow and heart work intensity. Also in vivo inhibition of H2S synthesis causes the increase of the rate of .O2- and .OH-radicals generation both in mitochondria and plasma, indicating an intensification of free radicals formation process with a decrease in H2S content.
Conclusion: H2S takes part in calcium handling in cardiac mitochondria which influence the heart function.

P2205

Inhibition of cystathionine gamma-lyase can prevent cardiac dysfunction after focal cerebral ischemia

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The aim of work is to investigate the effect of inhibition of cystathionine gamma-lyase on cardiac function in focal cerebral ischemia. The study was conducted on

adult (6 months) male Wistar rats. The model of focal cerebral ischemia was as result from middle cerebral artery occlusion during 60min. The focal cerebral ischemia was confirmed by morphology. DL-Propargylglycine (inhibitor of cystathionine gamma-lyase) and L-cysteine were administered intraperitoneally before 40 minutes of focal cerebral ischemia was performed. The functional cardiohemodynamic indicators registered via microcatheter and Pressure-Volume System. It was found that the focal cerebral ischemia led to decrease in the parameters of the pumping function of the heart (the stroke volume decreased by 48,4%, cardiac output decreased by 59% after 60 min cerebral ischemia. Pretreatment of DL-Propargylglycine and L-cysteine prevents the decline of the pumping function of the heart during focal cerebral ischemia in rats: the stroke volume didn't change significantly, even increased by 16%, and the cardiac output increased by 11,6%. We demonstrate the diastolic dysfunction after focal cerebral ischemia. The end-diastolic myocardial stiffness increased by 3,8 times after 60 min focal cerebral ischemia. We have shown that pretreatment of DL-Propargylglycine and L-cysteine prevent the change of the end-diastolic myocardial stiffness and partly improved the active isovolumic relaxation of LV: dP/dt min and the time constant of isovolumic relaxation (tau) after 60 min focal cerebral ischemia.
Thus, inhibition of cystathionine gamma-lyase can prevent the pumping function disturbances and decreased diastolic heart function disorders after focal cerebral ischemia.

P2206
Myocardial iron homeostasis and hepcidin expression in a rat model of chronic heart failure at different levels of dietary iron intake

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Background: Systemic iron deficiency is present in up to 50% of patients with chronic heart failure (HF) and it is associated with impaired exercise tolerance and poor prognosis. Myocardial iron deficiency (MID) in HF patients has recently been described; however, its causes and consequences remain unknown.
Purpose: We examined impact of HF and dietary iron content on systemic iron status, myocardial iron content, cardiac structure, function, expression of iron regulator hepcidin and other iron-related genes and survival in well-defined rat HF model induced by volume overload due to aorto-caval fistula (ACF).
Methods: 8-week old male Sprague Dawley rats fed defined synthetic diets with low, normal or high iron content underwent needle ACF/sham operation (HF/controls, n = 28/30). After 21 weeks, we performed echocardiography and laboratory analyses. Separate animal cohort served for survival analysis.
Results: MID developed in HF animals (myocardial iron content was 10% to 20% lower compared to healthy controls, $p<0.05$ for normal and high iron diet group). In pooled data, there was positive relation of left ventricular (LV) function (fractional shortening, r=0.40, p=0.002) and inverse relation of pulmonary congestion (lung/body weight, r=-0.47, p=0.003) to myocardial iron content. Iron suplementation did not normalize myocardial iron content; however, it improved survival (nearly 70% at 26th week in high iron diet group vs. 30% in normal iron diet group, $p<0.05$). Cardiac hepcidin was markedly upregulated in HF animals compared to controls (>3-fold, $p<0.05$). It was not related to systemic or cardiac iron levels, but strongly correlated with markers and parameters of heart injury (natriuretic peptide A, r=0.82; LV fractional shortening, r=-0.66; heart/body weight, r=0.74, $p<0.0001$ for all). Identical iron-independent pattern was observed for several iron-related gene expression.
Conclusions: In rat HF model, MID is not caused by defective iron absorption or decreased systemic iron levels, but rather by intrinsic myocardial iron deregulation. Altered cardiac hepcidin and other iron-related gene expression is driven by iron-independent stimuli. Although the mechanisms of MID development remain incompletely understood, myocardial iron content enhancement may improve cardiac function and survival.

P2207
Determination of the mechanisms of ATRA mediated suppression of cardiac hypertrophy

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Pathway analyses of proteomic studies in guinea pig and rat hearts subjected to pressure overload-induced hypertrophy and heart failure (HF) suggest altered retinoid signaling may be a causal contributor to HF progression. This observation is bolstered by our recent studies, where we demonstrated that cardiac levels of all-trans retinoic acid (ATRA) deficient in human patients with non-ischemic HF. This led us to reconsider an old observation that ATRA blocks hypertrophy induced by the α-adrenergic agonist phenylephrine (Phe) in neonatal rat ventricular myocytes (NRVMs). With cross-sectional area (CSA) as an index of hypertrophy, we show, consistent with prior work, that ATRA suppresses Phe-induced increases in NRVM CSA by average of 70%. RT-PCR studies show that ATRA also blunts Phe-induced increases in atrial natriuretic peptide (ANP) gene expression. We then tested the pan-CYP26 inhibitor talarozole (Tala) to raise endogenous ATRA levels, and observed that Tala similarly inhibited Phe-induced increases in NRVM CSA ($p<0.001$) and ANP expression in a dose dependent manner. ATRA functions biologically through a class of ligand-dependent transcription factors called retinoic acid receptors (RARs) of which there are three isoforms, α, β and γ. To determine through which RARs ATRA and Tala mediate their anti-hypertrophic effects, we used antagonists against each RAR isoform. Initial studies show that the RARβ antagonist LE135 (1 μ M) fully blocked the action of ATRA ($p<0.0001$), while initial studies with the RARα and RARγ antagonists (BMS 195614 (1 μM) and MM 11253 (1 μM)) failed to significantly mitigate CSA suppression. This would suggest that RARβ is the primary RAR responsible for eliciting the anti-hypertrophic program. However, initial studies with NRVMs virally transduced with siRNA against RARα, β and γ support the more likely conclusion that each RAR may play a role in hypertrophy suppression. Ongoing studies aim to corroborate these findings with Tala mediated hypertrophy suppression. These studies will provide key insights into the mechanisms by which ATRA dysregulation contributes to HF pathogenesis and may aid in the development of more specific therapeutic targets.

P2208
H2S donor (NaHS) improves diastolic function during aging by oxidative stress suppression and constitutive NO synthesis stimulation

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Background. Aging is associated with diastolic dysfunction, which comes before the changes in systolic function and increases risk of heart failure. One of the mechanisms that contributes to age-dependent diastolic dysfunction is the reduction of nitric oxide (NO) bioavailability, caused by diminished NO synthesis and by augmented NO scavenging with superoxide anion (2•-) during oxidative stress.
Purpose. The purpose of the study was to investigate the effect of NaHS, an hydrogen sulfide (H2S) donor on oxidative stress, constitutive NO synthesis and diastolic function during aging.
Methods. Cardiohemodynamic parameters were studied using the Millar pressure-volume (P-V) conductance catheter system in vivo. Left ventricular diastolic function was assessed from the changes in the maximum rate of pressure decline (dP / dtmin), the time constant of active ventricular relaxation (Tau g), end-diastolic pressure (EDP), and end-diastolic stiffness (EDS). The pools of H2S, rate of 2•- -, •OH generation, level of H2O2, the activity of constitutive NO-synthesis (cNOS) and pools of nitrite anion (NO2-) were determined in heart tissue by spectrophotometric method.
Results. It was found the impaired diastolic function in old rats: 1) decrease of dp/dtmin by 33%; 2) 3-times increase of EDP; 3) increase of Tau g by 44%. In the heart tissue of old rats we found decreased pools of H2S (by 1.9 times). It was accompanied with increase of the rate of 2•- (by 3.7 times) and •OH (by 4.1 times) generation and increase pools of H2O2 (by 1.4 times). Simultaneously with oxidative stress we found the reduction of constitutive NO synthesis. It was evidenced by decrease of cNOS activity (by 2.1 times) and reduction of NO2- pools (by 1.6 times), which is the marker of constitutive NO synthesis.
The NaHS injection improved diastolic function in old rats (dP/dtmin increased by 20% and the Tau g decreased by 13%). The mechanisms of NaHS action included the increase of H2S pools (by 3.3 times), which leads to inhibition of oxidative stress, due to decrease of the rate of 2•- and •OH generation (by 7.5 and 1.7 times respectively) and decrease of H2O2 pools (by 4.1 times). Simultaneously after NaHS injection we noted the increase of cNOS activity (by 2.5 times) and NO2- pools (by 3.8 times).
Conclusions. Thus, NaHS restores H2S levels in heart tissue of old rats. It leads to inhibition of oxidative stress and increase of constitutive NO synthesis. These both effects cause the restoration of NO bioavailability and improvement of diastolic function during aging.

P2209
Transcriptome sequencing revealed the upregulation of pathways that control regeneration and calcium handling in skeletal muscles of heart failure patients undergoing exercise rehabilitation program

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BACKGROUND: In heart failure (HF) metabolic alterations are detected not only in heart but also in skeletal muscle tissue that results in reduction of exercise capacity, quality of life, muscle wasting and worthening of prognosis. Exercise training is the most proved strategy to reduce muscle disorders in HF but not all patients respond to it and molecular mechanisms behind beneficial effects remain unknown.
PURPOSE: In this work RNA-Seq analysis was employed to uncover signaling pathways that contribute to beneficial effects of exercise training programs in HF patients.MEHTODS: Five HF male patients NYHA II-III functional class who responded to rehabilitation program were enrolled in the study (Table 1). The individual training intensity was determined at 90% of lactate inflection point (LIP). The skeletal muscle biopsies were taken before and after of 12 weeks of training. RNA was purified and libraries were prepared for RNA sequencing on Illumina MiSeq. Raw data were mapped using STAR 2.5 to hg38 genome. Mapped reads were count with featureCounts program, differential expression analysis was carried out using R package DESeq2, top 12,000 most expressed genes were chosen. Gene set enrichment analysis was made using the fgsea R package and GO database.
RESULTS: Transcriptome sequencing analysis revealed that exercising training results in significant upregulation of the molecular pathways that control skeletal muscle cell differentiation (NES=2,p=1.1e-04); muscle contraction (NES=1.75,p=3.9e-04); release of sequestered calcium ion into cytosol (NES=2;p=2.2e-04); potassium ion import across plasma membrane (NES=2.17;p=1.9e-05); ATP hydrolysis coupled proton transport (NES=1.99;p=3.4e-04). Downregulation of pathways that control protein neddylation (NES=-2;p=4.7-04) and hydrogen peroxide catabolic process (NES=-2;p=1.5e-04) was also detected.
CONCLUSION: Our data provide the new insight on potential targets for treatment and prevention of HF-induced skeletal muscle disorders and wasting.

Table 1

Patient	LVEF (%)	ET1(Arbitrary units)	VO_2 peak ml/min/kg	QOL(Arbitrary units)
HF-1	25/32	6/12	14,6/16,5	55/63
HF-2	20/25	12/25	13,6/12,5	82/77
HF-3	40/40	17/41	22,5/22,7	45/29
HF-4	25/40	19/27	16,2/18,4	60/44
HF-5	24/20	15/32	11/13,3	47/35

LVEF1- left ventricular ejection fraction; ET1 - exercise tolerance; before VO2 peak - peak oxygen uptake; QOL - quality of life testing (before/after training).

P2210

Gonadectomy alters the effect of preconditioning training on the development of a hypoxic pulmonary hypertension in female rats

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Introduction . It is known that physical activity can affect patients with pulmonary hypertension in different directions. The effect depends on gender, age, rate of disease progression, kind of exercises, etc. The purpose of this study was to study the effect of ovariectomy on the development of hypoxic pulmonary hypertension in rats with different degrees of preconditioning training.
Methods. Female Wistar rats were used. Half of rats were ovariectomized (O). After 2 weeks 2 groups ovariectomized and 2 groups with preserved ovaries rats began to undergo daily exercise preconditioning. For exercise preconditioning animals were subjected to exercise training by swimming for a period of 2 weeks to hypoxia. There were two training protocols. According to the first training protocol, rats was with aerobic swimming during 30 min/day without additional weight (hEx0). Another group undergoing training was with swimming during 15min/day with additional weight equal to 4% of body weight (hEx4). The other groups were not trained (and hC). 14 days after the start of exercises all rats except half untrained were exposed to hypoxia (h) 10h/day, 2wk. with 10% in hypobaric chamber. Two weeks after the onset of hypoxia under urethane (1,2 g/kg) systolic right ventricle pressure (SRVP) was measured as indices of hPH. Right ventricular (RV) hypertrophy was calculated as RV weight /rat b. w.
Results. Two weeks after the onset of hypoxia all groups of rats developed hPH with different extent of the disease. Hypoxia was accompanied by an increase in SRVP from 39,1±2,3 to 54,0± 2,0 mm Hg for C and hC groups and from 33,8±2,4 to 59,0±3,5 mm Hg between OC and OhC groups (p<0,05). Aerobic exercise resulted in an increase in SRVP from 54±2 (hC) to 67±4 (hEx0) mm Hg and decrease in SRVP from 59,0±3,5(OhC) to 50,6±1,5 (OhEx0) mm Hg. Thus, SRVP in OhEx0 animals was 25% lower than in hEx0 (p<0,05). The increase in training intensity (hEx4 groups) caused caused a decrease in SRVP by 40% in the hEx4 group compared to the hEx0 group (p<0,05) up to group for rats with preserved ovaries but not for gonadectomized. Thus, gonadoectomy increased SRVP in rats exercising with additional weight by 32% (p<0,05). Between hypoxic rats of all groups were not difference in RV hypertrophy.
Conclusions. Preventive effect on the increase in SRVP in female rats with hypoxic pulmonary hypertension with preserved ovaries provide an intense exercises with additional weight, but for ovariectomized rats - aerobic physical activity.

P2211

Analysis of whole blood viscosity and gastrointestinal response between low dose aspirin, clopidogrel, and cilostazol single pill in rabbit model (AGACCI trial)

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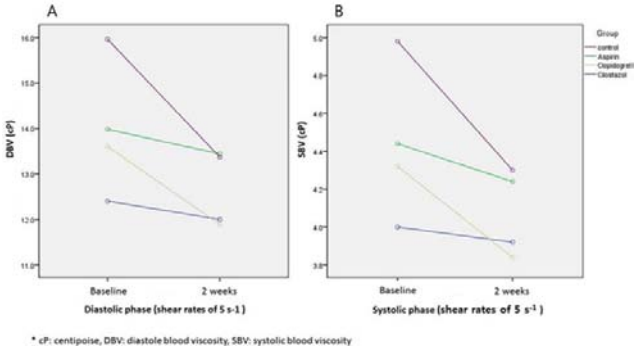
Background: Cardiovascular atherosclerotic disease is associated with hemorheologic properties such as whole blood viscosity (WBV). There are limited studies for efficacy of antiplatelet agents including aspirin, clopidogrel, and cilostazol on WBV and safety on stomach.
Objectives: This study was performed to evaluate the hemorheologic effect and gastric safety of three major antiplatelet agents.
Methods: A total of forty male rabbits (New Zealand White, 2.8-3.2kg in weight) were randomly assigned to three treatment groups and fed orally for two weeks; vehicle (carboxymethyl cellulose), aspirin (20mg/kg/day), clopidogrel (15mg/kg/day), and cilostazol controlled release (CR) (40mg/kg/day) respectively. Before and after administration of regimen, complete blood cell count (CBC), prothrombin time (PT)/activated partial thromboplastin time (aPTT), blood viscosity test, global platelet function test (PFT) were done. WBV at shear rates of 5 s-1 (diastolic blood viscosity; DBV) and 300 s-1 (systolic blood viscosity; SBV) were measured at baseline and two weeks. WBVs were adjusted to a hematocrit of 45%. At the end of experiment, stomach autopsy were performed in all scarified animals to evaluate the gastric response to drugs.
Results: WBVs in clopidogrel and cilostazol CR group were significantly decreased after 2 weeks treatment (clopidgorel [difference of DBV 0.26±1.84, p=0.013; difference of SBV 0.28±0.53 cP, p=0.007]; cilostazol [difference of DBV: 1.32±2.16, p=0.005; difference of SBV: 0.48±0.60, p=0.017] by Wilcoxon t-test, Figure 1-A and B). However, there is no change of WBV in aspirin group. In addition, the changes of CBC, PT/aPTT, and PFT were not consistent in all treatment groups. On gross inspection of stomachs, hemorrhagic spot, erosion, or ulcer lesions were more frequently observed in aspirin group than in clopidogrel and cilostazol group (ulcer lesion: 4 in aspirin, 1 in clopidogrel, 0 in cilostazol)
Conclusion: Clopidogrel and cilostazol CR treatment are associated with lowering WBV in rabbit model. Gastric response of cilostazol CR looks better than that of aspirin or clopiodgrel. Future clinical research would be warranted to validate these results.



Viscosity of diastole and systole phase

P2213

Pulmonary inflammation and vasculature remodeling in a model of heart failure with preserved ejection fraction: effects of ranolazine

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Background: Pulmonary vascular disease is gaining attention in the setting of heart failure with preserved ejection fraction (HFpEF) but the pathobiology of pulmonary hypertension (PH) in HFpEF is not clear. In HFpEF, an increase in late Na+ current (INa) in cardiomyocytes leads to increased diastolic tone. Ranolazine (RAN), by selectively inhibiting Ina, can improve myocyte relaxation and release diastolic tension.
Purpose: We aimed at studying lung involvement in HFpEF and testing the effects of RAN.
Methods: Dahl salt-sensitive rats were fed a high salt diet for 5 weeks to induce hypertension and received RAN for the following 8 weeks. Hemodynamic parameters were assessed invasively and by echocardiography. Isolated heart and lung preparation was used for lung hemodynamics.
Results: With unaltered systolic function, diastolic parameters changed in high salt animals. Decreased dP/dt min, increased LVEDP, a longer time constant and a steeper slope of the end-diastolic pressure-volume relationship were present. Analysis of pulmonary tissue showed increased levels of NF-κB, TNFα, E-selectin and VCAM-1, documenting pulmonary inflammation and endothelial activation. These effects were partly counteracted by RAN. Recruitment of inflammatory cells to the lungs is a key event of lung injury. In high salt rats the increase in myeloperoxidase levels and neutrophil infiltration were inhibited by RAN. High salt rats showed an increase in endothelin 1 expression and a reduction in endothelial NOS levels. Importantly, pulmonary vascular hemodynamics revealed pre-capillary resistance as a prominent component responding to RAN.
Conclusions: Our data point the concept that in HFpEF setting, mixed pre- and post-capillary nature of PH may represent not only an indicator of severity of underlying disease but also an attractive therapeutic target.

Clinical Case

P2214

Right ventricular assist device (RVAD): An adjuvant therapy in variety of cardiovascular procedures

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Background: Right ventricular assist devices (RVAD) have been utilized in the treatment of post-cardiotomy right ventricular failure and as an adjunct to left ventricular assist device (LVAD) implantation with reasonable success.
Purpose: In this case series, we describe outcomes of seven patients treated at our institution with RVAD support for post-cardiotomy RV failure, as an adjunct to LVAD implantation, and as prophylactic RV support for LVAD patients undergoing elective ventricular tachycardia (VT) ablation procedures.
Methods: Retrospective analysis from 7/2017 to 9/2018 of the seven case series of patients who were supported by temporary right ventricular assist device. Laboratory findings and outcomes were analyzed using descriptive statistics.
Results: Demographics, pertinent clinical details, and outcomes are summarized in Table 1. Three patients (pts) were treated with RVAD support for post-cardiotomy RV failure; of these, one died of intracranial hemorrhage on the 6th post-operative day. The remaining 2 pts were successfully decannulated after 33 and 26 days of RVAD support, respectively, and ultimately discharged from the hospital. Two pts received RVAD support as an adjunct to LVAD implantation; both of these pts were successfully decannulated with improved RV function after 22 and 13 days. Finally, 2 pts had prophylactic RVAD placement prior to an elective VT ablation procedure; again, these 2 pts were weaned from RVAD support successfully on the 21st and 6th post-procedure days. Post-cardiotomy patients required longer duration of RVAD support (median 26 days) than LVAD pts (median 17.5 days) and pts receiving RVAD support for VT ablation (median 13.5 days). These pts also had, in general, more post-operative complications including acute renal failure and need for tracheostomy. Notably, the post-operative course of pts receiving RVAD support for elective ablation procedures was relatively uncomplicated. This anecdotal finding may support wider use of prophylactic RVAD support in this population, although certainly warrants further investigation. The peak bilirubin values were again higher for the post-cardiotomy group (4.6 mg/dL) compared to the LVAD and VT ablation groups (4.2 mg/dL and 2.7 mg/dL, respectively). This likely represents the overall higher clinical acuity of the post-cardiotomy patient population.
Conclusion: Our experience supports the notion that early or prophylactic RVAD support may be of particular benefit in certain clinical situations, as patients in our series who received RVAD support in conjunction with LVAD implant or in preparation for VT ablation had fewer complications and shorter duration of support than the post-cardiotomy group. While these findings merit further investigation, our series confirms that RVAD support is a durable, feasible option for prolonged right ventricular support in a variety of clinical scenarios, successfully bridging many patients to full recovery.

P2215

Off pump implantation of HeartMate III LVAD and closure of patent foramen ovale in patient with HIT

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A 55 year old male presented to his primary care physician with exertional breathlessness, an irregular pulse and a systolic murmur. He had no past medical history of note. He was found to be in atrial fibrillation. Echocardiography revealed severe mitral regurgitation due to P2 leaflet prolapse and preserved left ventricular systolic function. Coronary angiography was normal. He was scheduled for mitral valve surgery and was not anti-coagulated given that the anticipated waiting time for surgery was short.
In the week prior to surgery, he presented to his local hospital with an acute ST segment elevation myocardial infarction. Emergency coronary angiography revealed an occluded left anterior descending coronary artery, presumably due to thromboembolism. He underwent primary angioplasty but only TIMI-2 flow was restored. The procedure was complicated by cardiogenic shock, with renal and liver injury. He was stabilized with inotropic and IABP support, then transferred to our hospital for assessment.
He remained IABP dependent, with recurrent pulmonary oedema when augmentation was reduced. Repeat echocardiography showed severe left ventricular systolic dysfunction and severe mitral regurgitation (Fig. 1). To complicate matters, he developed heparin-induced thrombocytopenia (HIT) and was treated with Argatroban. Our cardiac surgeons felt that isolated mitral valve surgery would be unacceptably high risk.
We elected to implant a HeartMate III left ventricular assist device (LVAD) as a bridge to heart transplantation. The procedure was performed without cardiopulmonary bypass in order to avoid administration of heparin. At the time of surgery, there was evidence of a very small patent foramen ovale (PFO) on trans-oesophageal echocardiography (TOE) but this was not closed.The early post-operative period was complicated by progressive arterial desaturation and repeat TOE showed a significant right to left shunt across an enlarged PFO (Fig. 2). It was clear that the PFO required closure, but we wished to do this without cardiopulmonary bypass. A mini-thoracotomy was performed and the PFO was closed by careful placement of a suture through the inter-atrial septum from outside the heart under TOE guidance. This resulted in immediate recovery of oxygenation. The patient made an excellent recovery from this point forwards.
Conclusions: 1) LVAD may be implanted off-pump without heparin and this strategy is attractive in patients with HIT. 2) Any inter-atrial defect must be closed at the time of LVAD implantation due to the risk of post-operative right to left shunting. 3) It is possible to close a PFO from outside the heart during off-pump LVAD implantation with TOE guidance.

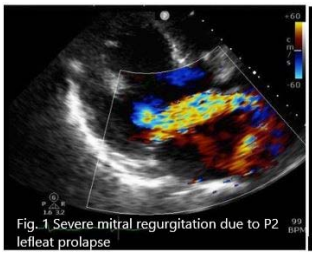
Fig. 1 Severe mitral regurgitation due to P2 lefleat prolapse

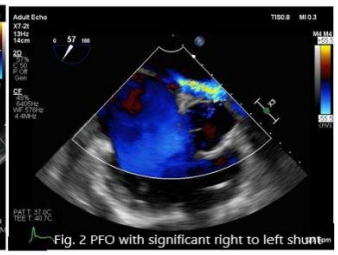
Fig. 2 PFO with significant right to left shunt

P2216

Interpretation of blood pressure (BP) values using noninvasive blood pressure measurement in patients with continuous-flow left ventricular assist device (LVAD) - clinical problem

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Introduction The Management of hypertension in patients with LVAD is an important aspect of care due to the increased risk of fatal complications (CMP, LVAD thrombosis). However, noninvasive blood pressure measurement in patients with LVAD with continuous flow can offer many clinical pitfalls. The Doppler ultrasound method is still used in most centers, as the automated BP monitor is not successful in measuring up to 50% of cases due to the artificial reduction of pulse pressure. However, even the Doppler method is loaded with problems in interpretation of measured values (medium or systolic BP, i.e. MAP vs. SBP), which can lead to significant clinical consequences.
Case description: 69-year old patient with terminal heart failure, indicated for LVAD (HeartWare) implantation as destination therapy in May 2016. After implantation was stable, without any serious difficulties. During follow-up visits, BP values measured by Doppler were repeatedly 90-100 mm Hg. The aortic valve opening was 1:1, LVAD was with normal parameters. Since the BP values were considered as MAP, antihypertensive therapy was up-titrated. We reached the reduction of MAP to 80-85 mm Hg, the patient was asymptomatic, LVAD with normal flow again, antihypertensive medication remained unchanged. After following 2 years the patient was stable, without any complications. We did not record any major clinical or echocardiographic changes, MAP was still around 80 mm Hg. We left the antihypertensive medication unchanged. In December 2018 the patient experienced syncope with craniotrauma and underwent decompression craniotomy. In stable condition and after gradual recovery, the values of BP measured by Doppler ultrasound were repeatedly 100–110 mm Hg after previous reduction of antihypertensive therapy. Because of craniotrauma and the necessity of exact BP measurement and exact management of antihypertensive therapy, we added an invasive BP measurement. The arterial line BP values were 100-110/60-65 mm Hg. This result means that BP values obtained by Doppler method were exactly SBP in our case.
Discussion: This clinical problem (noninvasive BP measurement in patients with continuous flow LVAD and interpretation of obtained values - MAP vs. SBP) is documented in the story of our patient. It might be possible, that hypotension was one of the syncope contributing factors. We recommend that BP values in patients with LVAD should not be determined by a single isolated method, but that haemodynamics should be assessed in a comprehensive manner by a combination of several methods. The hopes are new monitors, developed specifically for non-invasive BP measurements in patients with LVAD. An individual comparison of the accuracy of each methods in a given patient at a time just before the end of the invasive monitoring of TK may be clinically beneficial.

P2217
With and without you: LVAD unplugged

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We present the case of 64-year-old man previously implanted with left ventricular assist device (LVAD) for end-stage heart failure (HF), who survived three months after deliberately unplugging the device.
The patient suffered from ischemic heart disease due to anterior myocardial infarction, resulting in ejection fraction =18%. He soon developed symptoms of advanced HF, but was diagnosed with colon cancer (pT2 N0 M0) during heart transplant work-up. He underwent surgery and was considered to be free of disease 6 months later. In November 2014 he was implanted with an LVAD HeartMate 2 device, with uneventful initial course.
Later, despite psycho-social follow-up had deemed favorable previous to the implant, he developed psychopathic behavior including deliberate withdraw of medication (anticoagulants, anti-neurohormonal drugs, etc), which was later re-assumed. Besides, due to poor hygienic conditions, he soon developed exit site infection that led to multiple hospitalizations.
Four years after surgery, and despite medical warning, the patient decided to unplug device batteries, therefore causing the pump to stop. Two weeks later he was hospitalized for HF and treated with iv diurethics. Laboratory did not show a significant increase in LDH. A CT scan showed no evidence of pump thrombosis (considering the limitations of the technique); a transesophageal echo showed laminar flow into apical cannula and no thrombosis (figure 1). Despite that, due to high thrombo-embolic risk and the impossibility to definitely exclude thrombosis inside the pump, the medical team decided not to re-connect the device. According with psychiatric evaluation, we considered contraindicated HTx as well as a new surgery for substitution of the LVAD.
The patient died three months after unplugging his LVAD apparently because of progressive HF. Autopsy did not reveal any thrombosis of the device neither any sign of systemic embolism.

P2218
Idarucizumab for urgent reversal of dabigatran before orthotopic heart transplantation

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Background: The use of dabigatran in patients with atrial fibrillation enlisted for heart transplantation has been limited by unpredictable timing of surgery and high bleeding risk.
Case presentation: A 58-year old male patient on dabigatran for atrial fibrillation was enlisted for heart transplantation due to advanced heart failure. Upon notification of suitable heart donor, we prepared patient for surgery. The last dose of dabigatran was 16 hours prior to the haemocoagulation blood tests. We recorded prolonged APTT, TT and confirmed the presence of dabigatran at 31,3ng/ml. Before general anesthesia and extracorporeal circulation we received two boluses of 2,5 mg idarucizumab. Surgery and postoperative period were without complications.
Conclusions: Idarucizumab was associated with an affective hemostasis in the setting of heart transplantation, which allows the use of dabigatran in patients with atrial fibrillation on heart transplant waiting list.

Parameters of haemocoagulation

Parameters	16 hours after dabigatran use	4.5 hours after idarucizumab administration	24 hours after idarucizumab administration	Reference values
Prothrombin test(%)	62.3	53.2	51.0	70.0 - 130.0
Prothrombin test(PT-R)	1.33	1.48	1.53	0.8 - 1.2
APTT (s)	32.2	30.3	27.1	22.0 - 28.0
APTT (R)	1.24	1.17	1.04	0.8 - 1.2
Thrombin time(s)	53.6	20.6	17.7	0.0 - 22.0
dTT (ng/ml)	31.3	n.a.	n.a.	n.a.
Antithrombin III	91.3	77.4	81.8	75.0 - 125.0
Fibrinogen(g/l)	2.91	2.96	3.69	1.8-3.5

APTT – activated partial thromboplastin time, dTT – diluted thrombin time, n.a. – not applicable

P2219
Heart transplant for acute heart failure in kearnes sayre syndrome

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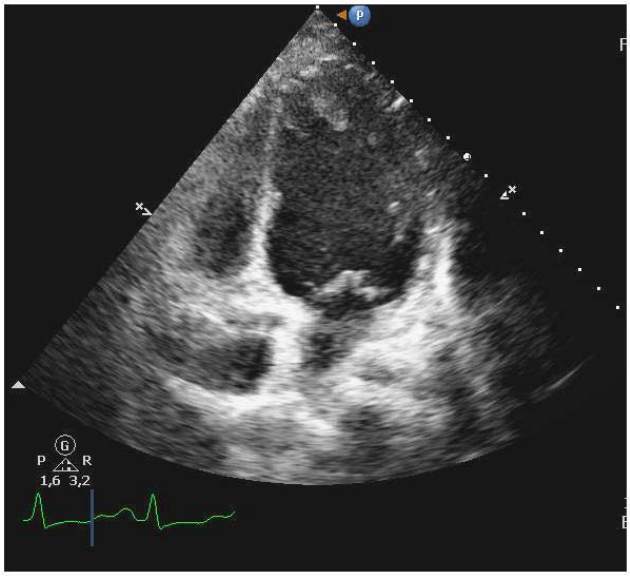
INTRODUCTION: Acute onset of congestive heart failure is an expression of a rare form of dilated cardiomyopathy secondary to Kearnes Sayre Syndrome (KSS) (mitochondrial disease). We describe the case of a young patient affected by this syndrome, that underwent orthotropic heart transplant.
CASE PRESENTATION: a 16 year-old male has been admitted to coronary care unit for a first acute onset of heart failure on Sep 2018. He was affected by KSS, a mitochondrial disease, characterized by pigmentary retinopathy, ophthalmoplegia, epileptic seizures in therapy with levetiracetam, moderate myopathy, early stage of kidney tubulopathy and blindness, in absence of heart involvement during cardiological follow-up. He had a normal growth and development. At admission, physical examination revealed a blood pressure of 105/70 mmHg, tachycardia with heart rate of 123/bpm, jugular venous distention. Laboratory findings were significant for BNP of 988 pg/mL and troponin hs of 114 ng/L. A echocardiogram showed a dilated and hypokinetic left ventricle with an ejection fraction of 11%. In the left apex, three mobile pedunculated thrombotic masses were visible. There was also evidence of right-sided heart failure with increased pulmonary hypertension (PAPs 55 mmHg). During the hospitalization, he was treated by intravenous diuretics and heparin, and referred for heart transplant. In absence of contraindication by neurologist and nephrologist, he underwent orthotropic heart transplant, without complications. Currently, after 4 months, he has not heart transplant rejection in therapy with cyclosporin, mycophenolate and cortisone. Examination of the explanted heart revealed a dilated left ventricle with apical thrombotic material adherent to a focal thickened and activated endocardial border. The posterior wall appeared

thinned and with a greater proportion of transmural interstitial and replacement fibrosis. Cytoplasmatic vacualizations were present in subendocardial myocardiocytes. Electron microscophic examination showed heart muscle cells with attenuated myofibrils arranged in parallel arrays and separated by a proliferation of several mitochondria (interfibrillar mitochondriasis), with morphologic abnormalities as swollen mitochondria with abnormal cristae and some globular electron-dense material.
DISCUSSION: KSS is a rare disease that belongs to a group of neuromuscular disorders know as mithochondrial encephalomyopathies. Progressive cardiomyopathy is a possible cause of mortality in KSS patients. Rare cases of heart transplant in KSS patients are reported in literature, but they resulted life-saving.
CONCLUSIONS: In consideration of the multiple organs involvement, the decision for heart transplant in patients affected by mitochondrial encephalomyopathies as treatment option is arguing and should be assessed case-by-case.



four chamber view

P2220

Multiple cerebral infarcts in Chagas cardiomyopathy with Left Ventricular reduced Ejection Fraction : A Case report.

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Background: Chagas disease (CD) is a vector-borne illness caused by the Trypanosoma cruzi parasite that primarily affects heart and/or digestive system. It is the third most common parasitic infection worldwide. The 40% of these patients develop a chronic form of the disease, that usually generate cardiomyopathy, cardiac arrhythmias and mural thrombus. Ischemic Stroke (IS) has been linked to CD, especially in the chronic form. Stroke recurrence has been estimated at 20% of patients, and secondary prevention measures include chronic anticoagulation in cardioembolic chagasic stroke. Deaths related to these complications have been described in 31-52% of cases. No evidence exists about the use of trypanocidal drugs in patients with chagasic stroke.
Case Summary: A previously healthy male with no vascular risk factors, presented a first cerebral vascular event at 57 years old, confirmed with MRI established in right middle cerebral artery territory. Echocardiography, carotid USG, 24h Holter monitoring and hematology and rheumatology labs were performed with no abnormalities; during his evolution he had significant recovery of the symptoms; however, at 60 and 63 years old, two other episodes of IS were documented, again with undefined etiology. It remained asymptomatic until 67 years old, when he presented a fourth IS with language alterations and left hemiparesis.
When he arrived at our Institute a new approach was performed. Basic lab studies were normal, except for dyslipidemia with LDL 118 mg/dL despite of high-intensity statin therapy. EKG showed left ventricular axis deviation, 24h Holter monitoring appeared normal, Transthoracic Echo showed left ventricle dilated and inferior wall hypokinesia, LVEF was 35%. NT-proBNP was 500 pg/mL. Coronary angiography appeared normal. MRI showed extensive fibrosis with mixed pattern with LVEF 34% and RVEF 40%, increase in lateral trabeculation with third apical half predominance. T. cruzi antibodies were ordered, with positive results, two positive confirmatory ELISA against T. cruzi (4.45 and 12.04). After revealing the IS etiology, we initiated optimal medical treatment for heart failure, non-Vitamin K antagonist oral anticoagulant (NOAC) and antichagasic drug, Nifurtimox, with an incredible clinical and functional improvement.
Conclusion: Ischemic stroke can be a rare manifestation of chagasic cardiomyopathy, which is why we strongly suggest that patients from endemic regions of Chagas disease should be screened for anti-T. cruzi antibodies when there is no other explanation for cerebral thromboembolism. Although we present a case where functional and clinical improvement was achieved with medical therapy, additional future studies are needed to assess if anti chagasic treatment is beneficial on these patients to guidelines recommendations.

P2221

Stress-induced cardiomyopathy after exposure to wildfire

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Introduction: It has been described that intense psychological stress may result in myocardial damage and left ventricular dysfunction, known as Takotsubo cardiomyopathy.
Case presentation: An 80-year-old woman presented to the Emergency Department of our hospital due to chest pain after exposure to the wildfire in Mati, Attica, on July 23rd 2018. In addition to smoke inhalation, she had stayed in the sea for about 4 hours before she was eventually rescued.
The patient had a history of arterial hypertension and dyslipidemia (on irbesartan and atorvastatin). The physical examination did not show any abnormal findings from the heart or other organs. Blood pressure was 128/69 mmHg and heart rate was 75 bpm. The electrocardiogram showed sinus rhythm, RBBB (preexisting), ST segment elevation ≤1 mm and negative T waves in leads I and aVL. Laboratory tests showed an increase in cardiac troponin I (maximum value = 7.161 ng / ml, with a normal reference value of <0.04 ng / ml). Thansthoracic echocardiogram showed a significant reduction in left ventricular (LV) systolic function (EF≍ 35%) with severe hypokinesis of the apex, apical-mid anterior wall and apical-mid-anterior intraventricular septum. The patient underwent coronary angiography which revealed normal coronary arteries. She was discharged on medical therapy (irbesartan, metoprolol, eplerenone, atorvastatin and acetylsalicylic acid).
Conclusion-outcome: The patient remained asymptomatic. Transthoracic echocardiogram, performed one month after her discharge from the hospital, showed normal LV systolic function without regional wall motion abnormalities. It is concluded that this represents a case of cardiomyopathy caused by intense psychological stress, due to exposure to a natural disaster.

P2222

A rare and dangerous presentation of alcoholic cardiomyopathy

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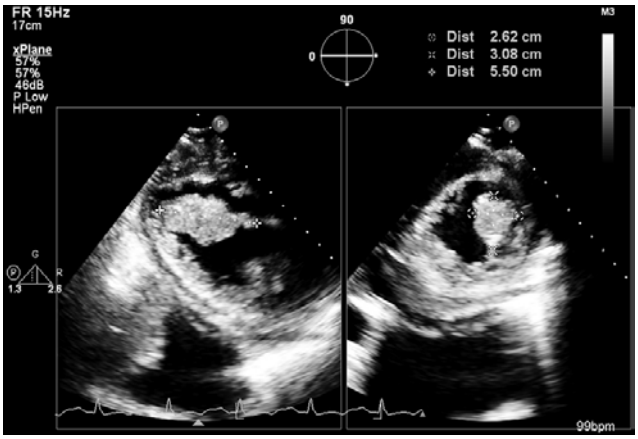
Introduction and case report description: A left ventricular thrombus is a serious complication that can occur after a myocardial infarction or due to cardiomyopathy. This complication is more commonly associated with a large anterior STEMI due to occlusion of the left anterior descending artery, and usually occurs five to six days after a myocardial infarction. However, it is important to remember that this complication can also occur due to cardiomyopathy and heart failure.
A 38-year-old male no past medical history presented to a rural emergency department with sudden severe chest pain, along with several months of slowly worsening peripheral edema. The patient drank 12 to 18 bottles of beer daily for the past 6 months. An electrocardiogram showed ST elevation in leads II, III, and aVF. He was given tenecteplase, along with aspirin, clopidogrel, and IV heparin, and then transported to a hospital with access to percutaneous coronary intervention. The patient developed new aphasia and right hemiparesis during his assessment on arrival to the larger hospital.
Description of the problem and differential diagnosis: A Code Stroke was called, and the patient's head CT did not show an intracranial bleed. Point-of-care ultrasound showed reduced left ventricular function with an ejection fraction of 19% and a large apical thrombus measuring 5.5 x 3.1 x 2.6 cm.
The patient's neurological symptoms resolved with anticoagulation after 5 days. Serial echocardiograms showed a decrease in thrombus size. After four weeks, the heparin was switched to warfarin and the patient was discharged in a stable condition.

The patient's significant long-term alcohol use resulted in alcoholic cardiomyopathy, as indicated by the several months of progression of lower extremity edema and severe left ventricular dysfunction on echocardiogram. The ventricular dysfunction resulted in reduced blood flow, which is one of the components of Virchow's triad, and contributed to the formation of the large apical thrombus. Eventually part of the clot broke off the thrombus, occluded the right coronary artery, and caused the inferior STEMI. Shortly after, another piece of the thrombus broke off and resulted in a cardioembolic stroke to the left middle cerebral artery.
Conclusions and implications for clinical practice: In patients who have multiple simultaneous illnesses, it is important to evaluate for a unifying diagnosis, such as in this case where the patient's alcoholic cardiomyopathy resulted in a thrombus formation, which caused both the inferior STEMI and the ischemic stroke.This case also highlights the clinical benefits of being proficient in performing a point-of-care ultrasound because a bedside echocardiogram by the receiving physician only took a few minutes and found the left ventricular dysfunction and large thrombus. This finding, along with the clinical history, resulted in a unifying diagnosis for this patient's medical condition.



Echocardiogram Showing Large Thrombus

P2223

Predominant cardiac involvement in laminopathy diagnosed at pretransplant assessment

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Introduction: Clinical presentation of laminopathies is variable, ranging from predominant muscular disease in Emery- Dreyfuss muscular dystrophy /EDM/ to isolated cardiac involvement with early conduction disease, progressive heart failure and ventricular tachyarrhythmias.
Case description:
A 16-year-old girl with a negative family history of heart disease was referred to our department in February 2018 due to rapid progression of left ventricular systolic dysfunction (from ejection fraction 40% to 28%) and atrial tachyarrhythmias. Previously, she was followed by pediatric cardiologists and underwent endomyocardial biopsy to exclude myocarditis, genetic testing and repeated cardioversions due to atrial tachyarrhythmias. Despite amiodarone therapy, atrial fibrillation and atypical atrial flutter persisted and the patient was repeatedly hospitalised for congestive heart failure with the necessity for inotropic support after initial examination in our department. In the search for etiology of heart failure, we noticed mild elbow contractures with otherwise normal neurological status and normal values of serum creatinkinase of 2.59 ukat/l. Genetic testing revealed pathogenic (Class 4), de novo mutation in lamin A/C gene (LMNA:c241T>G, p.Tyr81Asp). Clinical diagnosis was made of Emery-Dryefuss myopathy with predominant cardiac involvement. The patient was listed for heart transplantation in June 2018 and one month later successfully transplanted. At this period, family screening is being performed.
Conclusion: This case-report demonstrates that laminopathy should be considered in patients with progressive non-ischemic heart failure even in the absence of myopathy. The correct diagnosis may have important prognostic implications for the family of the proband.

P2224

The effects of phrenic nerve stimulation on heart rate variability: a case study

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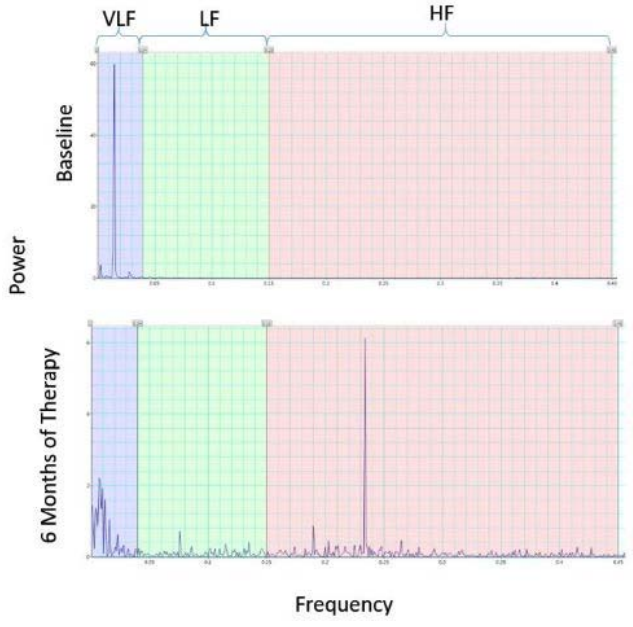
Funding Acknowledgements: Respicardia

Introduction: Frequency based heart rate variability (HRV) measures are one method of measuring autonomic function and sympatho-vagal balance via subtle changes in R-R interval timing. The proportions of these measures describe the autonomic function and sympatho –vagal balance of a patient and are reflected in Total Power (TP), and Very Low Frequency (VLF), Low Frequency (LF) and High Frequency (HF) power. Heart failure patients with reduced Ejection Fraction (HFrEF) exhibit high levels of sympathetic drive, depressed baroreceptor responsiveness (LF), and decreased vagal tone (HF via respiration). Central sleep apnoea (CSA), a co-morbid condition often seen in HFrEF patients, contributes to increased sympathetic drive and is manifested by increases in the VLF component. Treatment of CSA using the remedē® System has been shown to be effective in restoring a normal breathing pattern and may also contribute to improved autonomic function and sympatho–vagal balance.
Purpose: To describe changes in HRV measures after 6 months of phrenic nerve stimulation experienced by a patient with reduced ejection fraction (EF) and CSA.
Methods: The remedē® System pivotal trial assessed the effectiveness of unilateral phrenic nerve stimulation in treating moderate to severe CSA. In this analysis, overnight attended polysomnography studies performed at baseline (BL) and at 6 months of treatment (6M) were divided into 5-minute segments and the EKG was analysed by segment using an automated algorithm in Lab Chart (v8.1) HRV module. All segments were reviewed to ensure accuracy and consistency in the analysis. Here we present a single case of a trial participant that had an EF $\leq$ 40%, was in normal sinus rhythm, and demonstrated an improvement in CSA as evidenced by a reduction in the Apnoea-Hypopnoea Index from 49 to 9 events/hour at 6M.
Results: The figure below shows the median values of the 5 minute segments for the VLF, LF and HF components of the HRV Measures. At BL (n=90, 5 min. segments) the total power is dominated by the VLF content while at 6M (n=84, 5 min. segments) the total power decreases by 20% and VLF decreases by 69% (Figure 1). Additionally, LF and HF power increased by 207 and 247% respectively, demonstrating decreased sympathetic drive.
Discussion: In this case study, CSA improved at 6 months with phrenic nerve stimulation and the improvement corresponded to changes in magnitude and content of frequency domain HRV measures that suggest improved autonomic function and sympatho-vagal balance. Further analysis is required in a larger sample of patients to validate this unique finding.



Change in HRV with therapy

P2225

A rare case of heart failure with preserved ejection fraction in Erdheim Chester syndrome, at the crossroad of many possible causes

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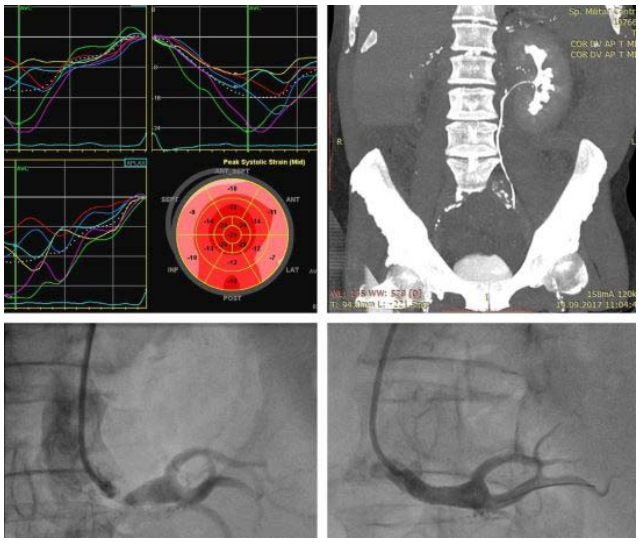
Introduction We present the case of a 71 year old man, asymptomatic until 2017 when he was admitted to hospital for recurrent pleurisy. CT scan shows pleurisy and pericarditis and also bilateral periaortic and perirenal dense, fibrotic tissue, highly suggestive for Erdheim Chester disease. Perirenal biopsy was made, histological examination showing histiocyte inflitrations that expressed CD68 / PGM1 fascine and factor XII.Also,he had a history of borderline coronary atherosclerosis.
Patient management In February 2018, he develops progressive shortness of breath, fatigue and severe uncontrolled hypertension. Lab test showed progressive kidney failure (creatinine level of 2.5 mg/dl, relative to 1.5 mg value in 2017). TTE showed normal size cardiac cavities, preserved systolic function (LVEF 50-55%),inferobasal hypokinesia and infiltrated pericardial layer. Contrast angioCT reveals massive infiltration in the arterial aortic wall, significant left renal artery stenosis and no flow in the right kidney artery, with subsequent renal atrophy. Renal arteriography confirmed severe left renal artery stenosis and a 7 mm stent is implanted. At 48h after stent implantation, creatinine was 1.3 mg/dl. At discharge, arterial blood pressure values are decreasing, requiring lower dose of antihypertensive drugs, and functional capacity was remarkably improved. During followup, the patient developed severe leuco-thrombocytosis, bone marrow biopsy and genetic testing established the diagnostic of chronic myeloid leukemia. Cytoreductive treatment with hydroxyurea was started, but after two weeks, general status was not improved, with frequent episodes of paroxysmal dyspnea, elevated blood pressure, markedly high NTproBNP levels (12943 pg/ml) and an echocardiographic LVEF of 50%, with diastolic dysfunction and mild pericardial effusion. Optimization of HF therapy and stopping hydrea led to a reduction of NT proBNP levels (5292 pg/ml) and constant echocardiographic findings. However, while receiving hidroxicarbamide and imatinibe for the hematologic malignancy, several milder decompensations of heart failure episodes reoccurred.
Problems, possible differential diagnosis: Concerning the heart failure symptoms, we can make a differential diagnosis between myocardial ischemia (but with no angina, no new hypokinesia and no cardiac necrosis biomarkers), diastolic disfunction with increased filling pressure due to marked elevated arterial hypertension and chronic kidney disease, myocardial injury due to hystiocitar infiltration or cardiotoxicity of oncologic treatment for leukemia.
Conclusions : Erdheim Chester syndrome is a rare non-Langerhans cell histiocytosis that most commonly affects adults, often a fatal disease, with multi-organ damage and rapid progression, therefore diagnostic precocity is a key element. HF with preserved ejection fraction can have multiple causes in this setting (pericarditis, aortitis and medium size vasculitis, hematologic changes).



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P2226

A case of infectious endocarditis associated with Laubry-Pezzi syndrome

TH Thai Hao Phan[1]
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Introduction: Charles Laubry and Cesare Pezzi described the clinical features of Laubry-Pezzi syndrome in 1921 in a patient with ventricular septal defect (VSD) with aortic regurgitation caused by aortic valve prolapse. The syndrome may eventually lead to dilatation of the aortic sinus related to the involved leaflet, resulting from a lack of continuity of the aortic media and annulus. Laubry and Pezzi syndrome is a rare but serious complication of ventricular septal defect that increase the infectious endocarditis risk. We reported a case of infectious endocarditis associated with Laubry-Pezzi syndrome.
Case Report:
A 29-year-old Vietnamese, nonsmoker, nonalcoholic, non-diabetic, normotensive man from a province presented with dyspnea on lying, two-week fever. In the physical examination, edema in both lower limbs. Crepitant rales in both lungs. Apex beat shifted outwardly and below the 5th intercostal space, in the anterior axillary line. A 3/4 grade diastolic murmur at at third left intercostal space and an holosystolic murmur of a 4/6 degree at the fourth-sixth left intercostal space level, with radiation to the right lower sternal border. Heart rate: 113 bpm. Blood pressure: 130/60 mmHg. spO2 :98% (air room).
Results: Electrocardiogarphy showed sinus tachycardia with left ventricular enlargement. Chest X-ray: cardiac shadow was large, redistribution of pulmonary blood flow. Echocardiography: left-right shunt subaortic VSD (8mm), severe aortic valve regurgitation, prolapsing of the right coronary, a ruptured abcess with diameter 12x11mm in right coronary cusp, left ventricular EF: 63%, PASP: 45mmHg. Cardiac MSCT: subaortic VSD 10mm, a ruptured abcess with diameter 12x11mm in right coronary cusp. Sinus valsalva dilation diameter # 45mm. Normal coronary arteries. Infectious endocarditis associated with Laubry-Pezzi syndrome was diagnosed. After 28 days of antibiotic of infectious endocarditis, surgical procedure modified Bentall was performed and the ventricular septal defect was closed with a Dacron patch. After operation patient's postoperative course was uneventful with improvement of heart function.
Discussion: The Laubry-Pezzi syndrome is a rare congenital hearth disease . It was reported for the first time by Laubry & Pezzi in 1921, its prevalence is 0.013 to 0.3%. Nearly always diagnosed in children and teenagers, since it is a congenital disease. In this congenital heart diaseases surgical indication, appropriate timing of surgery and operative technique are still matter of debate owing to its rare incidence among overall population.
Conclusion The Laubry-Pezzi syndrome is rare congenital heart disease leading to a significant alteration of cardiac hemodynamic. Bacterial endocarditis combined with Laubry-Pezzi syndrome have a poor prognosis needing observation and strict preventive precautions when a favoring factor is present. The surgical treatment is necessary and must be performed as soon as possible.

P2227

A case of cerebral emboli complicating infective endocarditis caused by Abiotrophia defectiva

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Background: Abiotrophia defectiva is a rare cause of endocarditis. However, some studies have estimated that this organism is responsible for 5-6% of all cases of Infective endocarditis. Endocarditis caused by A.defectiva carries greater morbidity and mortality than endocarditis caused by other streptococci. It is characterized by the occurrence of certain complications such as congestive heart failure, embolization and an increased rate of surgical interventions. We report a case of cerebral emboli complicating infective endocarditis caused by Abiotrophia defectiva.
Case presentation: A 32-year-old male patient with no history of heart disease presented to the hospital with high fever over 3 weeks, fatigue and headache. On the third day of hospitalisation, left facial paralysis developed and neck stiffness. Physical examination show a holosystolic murmur 3/6 grade in apex and left side paralysis. Fundoscopic examination was normal. Laboratory investigations were as follows: WBC 10.9 x 109/L, Hemoglobin: 11.5 g/dl, Platelets: 326x109/L and CRP: 48.3mg/L. Three sets of blood cultures were obtained. Blood cultures grew a gram positive coccobacillus which was phenotypically identified as Abiotrophia defectiva.Transthoracic echocardiography revealed a 2×0.5 cm-sized vegetation on the anterior mitral valve leaflet and a 1.5x0.7cm-sized vegetation on the posterior mitral valve leaflet and severe mitral regurgitation, LV ejection fraction was 64%. Cranial computed tomography revealed an infarct in the right parietotemporal lobe. A diagnosis of cerebral emboli complicating infective endocarditis due to Abiotrophia defectiva was made. Treatment, with ceftriaxon and vancomycin, was administered for 4 weeks. Mechanical valve replacement was required after starting the antibiotic therapy. The patient had a favorable outcome on follow up.
Discussion: Abiotrophia defectiva is a rare pathogen of infective endocarditis and in some cases embolization occur. Our patient was unaware of having any cardiac

disease and the diagnosis of infective endocarditis is only considered after the development of embolic episodes. Dental procedures or dental caries are thought to be associated with the onset of infective endocarditis caused by Abiotrophia defectiva. Prompt attention to correct identification of this pathogen and surgical treatment of mitral valve must be given careful attention by the attending physican.
Conclusion: A.defectiva is a recognized cause of endocarditis. Clinicians should be aware of this organism and its pathogenic potential. Proper identification of this pathogen is important to achieve a better outcome.

P2228
Flail mitral valve resulting in multiorgan failure

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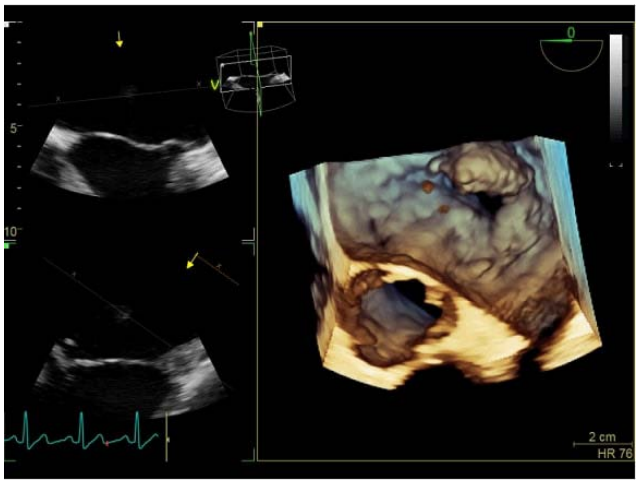
Funding Acknowledgements: No funding

Introduction: Mitral valve prolapse is a common echocardiographic finding affecting approximately 2,4 % of the general population and is usually asymptomatic accompanied by mild to moderate valve regurgitation. However in rare cases myxomatous degeneration can lead to severe valve regurgitation either chronically or acutely secondary to superimposed chordae tendinae rupture requiring urgent cardiothoracic management.
Case presentation: α 66 year old woman was admitted to the Emergency Department of our Hospital due to progressive paroxysmal nocturnal dyspnea and orthopnea. Her personal history included known moderate mitral regurgitation, chronic atrial fibrillation, chronic obstructive pulmonary disease under oxygen therapy, arterial hypertension and dyslipidemia. Ausculation revealed a third cardiac tone, an holosystolic murmur irradiating to the base of the heart and crackles on both pulmonary bases. The electrocardiogram depicted atrial fibrillation with increased ventricular response. Chest X-ray highlighted right moderate pleural effusion and signs of pulmonary congestion. Transthoracic echocardiography was performed and demonstrated a mitral valve with myxomatous degeneration and a flail posterior cusp accompanied by severe mitral regurgitation with an eccentric jet directed posteriorly and mild left atrial dilatation. The left ventricle manifested hyperdynamic contractibility and pulmonary pressures were only mildly elevated. Coronary angiography followed that depicted an atheromatous coronary network with non-obstructive lesions. In the following hours, the patient became hemodynamically unstable with tissue hypoxia and progressive deterioration of her renal function requiring immediate support with inotrope and vasoconstrictive agents as well as placement of an intraaortic ballon counterpulsation pump. The patient was subsequently transferred to a specialized cardiothoracic center, where she underwent successful valvuloplasty of the mitral valve. However, her general clinical status has deteriorated, thus leading to lethal multiorgan failure.
Conclusion/Discussion: Cases of myxomatous mitral valve degenaration and proptosis, even if the regurgitation is mild or moderate initially, can acuterly worsen due to chordae tendinae rupture. Acute severe mitral regurgitation imposed on chronic disease is a medical emergency with high morbidity and mortality leading to multiorgan failure and non-reversible cardiogenic shock.



Flail posterior mitral valve leaflet

P2229
Anterolateral papillary muscle rupture with non obstructive coronary artery disease

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BACKGROUND Papillary muscle rupture is an uncommon, potentially fatal condition that frequently results in acute severe mitral regurgitation (MR) and life-threatening cardiogenic shock. Survival depends on prompt recognition and surgical intervention.
CASE PRESENTATION A previously asymptomatic 62-years-old man with unremarkable past medical history, presented to the prehospital emergency team with acute pulmonary edema, without chest pain, less than 30 minutes long; Rapid evolution in cardiac arrest in pulseless electrical activity with return of spontaneous circulation within 6 minutes of cardiopulmonary resuscitation; Transported to the emergency room intubated with orotracheal tube, PaO2/FiO2 ratio <50, BP 86/55 mmHg. Initial
EKG showed supraventricular tachycardia with inverted T wave V4-V6; Laboratory tests revealed Urea/Creatinine 137/5.6 mg/dL, CK 317U/L, T troponin 0.272 ng/mL. Transthoracic echocardiogram showed severe mitral regurgitation (MR) due to possible flail leaflet and hyperdinamic left ventricle (LV). To better characterize the MR mechanism, it was performed a transesophageal echocardiogram that revealed papillary muscle rupture and already moderate LV systolic dysfunction, without any mass/vegetation/thrombus; After insertion of an intra-aortic balloon pump, the patient underwent emergent coronary angiography that showed nonobstructive coronary artery disease and was immediately transferred to a cardiothoracic department. Admitted for emergency surgery less than six hours after the onset of symptoms. At surgical inspection, it was observed rupture of the anterolateral papillary muscle (APM). The patient underwent mitral valve replacement with biologic valve;
Pathology demonstrated acute ischemia of the underlying myocardium. The postoperative period was complicated by the need of inotropic support, prolonged mechanical ventilation and nosocomial pneumonia. Postoperative echocardiography showed no MR. The patient was discharged 29 days later to a medical recovery unit and he is now back to his normal life, without major limitations.
DISCUSSION We have described an unusual presentation of acute MR due to isolated APM rupture in the absence of obstructive artery disease. The papillary muscles are subendocardial structures, and even a small area of myocardial infarction can cause papillary muscle ruptures. Therefore, we cannot exclude the possibility of spontaneous reperfusion, coronary spasm or embolic phenomenon as possible diagnosis hypotheses.

P2230
Heart metastasis of a mandibular cancer

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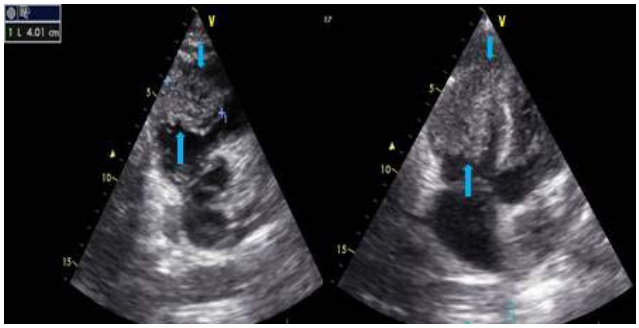
Introduction: Secondary malignant heart tumors are rare but much more common than primary tumors. These metastases affect more often the pericardium than the endocardium and generally consist of carcinomas. Owing to their topography and prevalence, carcinomas of lung and breast are the most common tumors originating cardiac metastases.
We report a rare case of cardiac metastasis of a mandibular cancer.
Observation: A 41-year-old woman had undergone surgery for left mandibular cancer followed by radio and chemotherapy. She presented to the emergency room for acute dyspnea. Physical examination found signs of right-sided heart failure. The blood pressure was 90/60 mmHg with a heart rate of 130 bpm. The electrocardiogram showed sinus tachycardia at 130 bpm associated to an incomplete right



TTE : biventricular infiltration

bundle branch block with diffuse repolarization abnormalities. Cardiac echocardiography showed bi ventricular infiltration at the mid and apical segments with a large thrombus in the right ventricle partially enclosing the tricuspid valve. It has also demonstrated a circumferential pericardial effusion and pulmonary arterial hypertension. A computed tomography angiogram confirmed the bi ventricular tumor infiltration and demonstrated proximal pulmonary embolism. Lung, liver and bone metastases have also been noted. The patient was put on a palliative treatment associated to a curative heparin therapy. She died 25 days later.
Conclusion: Heart metastases are fortunately rare because of a reserved prognosis. Cardiac ultrasound is the key examination for screening and follow-up.

P2231
Acute massive pulmonary embolism treated with surgical embolectomy

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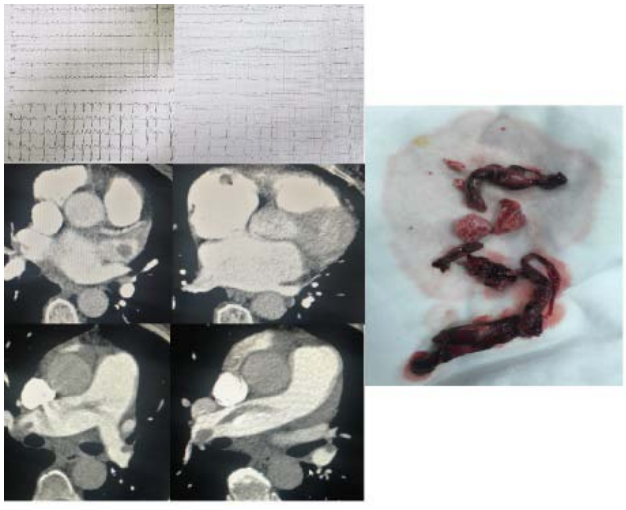
Introduction: Massive pulmonary embolism(PE) is a life-threatening condition with a high early mortality rate despite diagnostic and therapeutic advances.A multidisciplinary approach with rapid diagnosis and early surgery is crucial in order to enhance survival in high-risk patients with acute massive PE.Case report:A 62y.o woman presented to the ER complaining of palpitations started less then 6h ago with no chest pain or dispnea and was diagnosed with high rate paroxysmal atrial fibrillation(HR¯120/min).The ECG showed AF with no specific changes,the troponin I(TPI) level was negative and a TTE revealed mildly dilated left atrium.Other lab results were within normal range(TBC and blood chemistry).Past medical history included HTN and diabetes type 2 for 10 years and 6 months respectively both on regular treatment and obesity.Also 2 months ago she was diagnosed with Hashimoto thyroiditis and close monitoring of TSH was recommended,but no treatment.An ECG performed at that visit showed sinus rhythm.Enoxaparin for anticoagulation and amiodarone i/v for cardioversion were started.After 24 h the pt was still in AF,with a controlled heart rate and no complains.However ECG changes were noticed(evolutive T negative waves in leads D1,D2,aVL,V3-V6).A D-Dimer was requested and came back negative,O2 saturation was 97%.The asymptomatic patient was transferred to the Cardiology ward for further evaluation.TPI remained negative.Due to cardiac risk factors and ECG changes,coronary angiography was performed and resulted normal.Electrical cardioversion was considered. The TSH level was undetectable. Both TEE and pulmonary angio CT were requested prior.Because of the ECG changes the CT was performed first and showed central and peripheric bilateral pulmonary artery clots present also in both atria auricles.Due to the massive thromboembolism(PE) unfractioned heparin was immediately started(aPTT 50-70s).A new TTE showed a PAP of 50 mmHg.Approximately 10h after heparin infusion,the pt developed dyspnea,tachypnea,cough,pleuritic pain and fever(temp 39.5-40C).Considering the deteriorating conditions she was consulted with a cardiac surgery team in order to perform an emergency surgical pulmonary embolectomy(ESPE) despite the high risk.Within 24h,the pt underwent ESPE of the right and left pulmonary branches after incision of the pulmonary artery,as well as a clot embolectomy of the right and left atria auricles.She was put on an iv heparin regimen and recovered well.She was discharged 2weeks later in good condition,a PAP of 40 mmHg,on acenocoumarol with persistent AF.1.5 years later she is in NYHA classI,no readmission for PE,in sinus rhythm taking rivaroxaban.Discussion:We present the case of a pt with massive PE who underwent surgical embolectomy within 24h with signs of hemodinamic instability.Despite late surgery timing,she made a good recovery with no complications.The inhospital mortality rate remains high(25-30%)even in the most specialized centers.



ECGs, angio CT and removed clots

P2232
Clinical case of cystic medionecrosis of pulmonary arterial trunk as a probable cause of thrombosis of its branches in 81-year-old woman

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At the present time, there is no clear ideas of the etiological, pathogenetic, clinical and morphological features of such a rare process as cystic pulmonary medionecrosis of the pulmonary artery.
A 81-year-old patient was hospitalized to the cardiology clinic with a diagnosis of thromboembolism of the branches of the pulmonary artery due to compliance complaints of cough, hemoptysis and dyspnoe. Patient had a long history of arterial hypertension and paroxysmal atrial fibrillation without anticoagulants. A few months before hospitalization, nausea, vomiting, sub febrile temperature and weight loss appeared, which was regarded by the family doctor as an exacerbation of chronic pancreatitis. According to the survey, an intermediate risk of developing PE on the Wells scale and the Geneva scale was revealed, an increase in the level of D-dimer. High pulmonary artery pressure, signs of right ventricular overload were found by echocardiography. According to the results of computed tomography of the lungs, there was an impression of recurrent thromboembolism of small branches of the pulmonary artery with multiple pulmonary infarctions. Cancer of pancreas was suspected after investigation. Patient was treated by anticoagulants, antibiotics, diuretics and fresh-frozen plasma due to development of disseminated intravascular coagulation. The patient died suddenly, the autopsy revealed that the probable cause of thrombosis of large and small branches of the pulmonary artery was the degeneration of the muscular fibers of the wall of the pulmonary artery by the type of cystic medionecrosis, possibly viral etiology (HSV-1 PCR positive). The disease proceeded against the background of a pancreatic body tumor 1N00 , sluggish purulent pancreatitis with the development of the syndrome of disseminated intravascular coagulation.
Patient's diagnosis was HSV-1-associatated cystic medianecrosis of pulmonary artery truncus with formation of massive sub-occlusive thrombi and invasive (-1N00) high-different pancreas body cancer (glandular papillary, squamous) with numerous intraorgan cancerous emboli

P2233
Case with successful interventional treatment with local thrombolysis for high-risk pulmonary embolism in a patient with multiple blood transfusions after gastrointestinal bleeding

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A 58 year old male was admitted in a surgery with a clinical signs of hemorrhagic shock due to gastrointestinal bleeding. From laboratory tests - hemoglobin 23 g/l (normal range 130-180 g/l). Laparotomy and sutura were performed because of bleeding gastric ulcer. In the perioperative period he received 11 bags of red blood cells and 11 bags of fresh frozen plasma. He was stabilized hemodynamically. On 12th postoperative day he presented with acute breathlessness, hypoxemia, chest pain and severe hypotension. ECG - sinus tachycardia and new right bundle branch block. Transthoracic echocardiography (TTE) showed a dilatated right ventricle, severe tricuspid regurgitation and pulmonary hypertension (mean PAP about 50 mmHg), a sign of McConnell. A Doppler ultrasound of the lower extremities ruled out deep venous thrombosis. The patient was transferred to cardiology department. Regarding diagnostic scores pulmonary embolism (PE) is most likely diagnosis. Pulmonary angiography revealed PE with thrombotic masses in bilateral main pulmonary arteries. Because of high risk for bleeding in our patient we choosed to perform a catheter-mediated thrombus fragmentation and a local thrombolysis with 50 mg of alteplase. During the hospitalization the patient was optimal anticoagulated, without bleeding, on proton-pump inhibitor. Within 1 week he recovered completely and was discharged on a DOAC (apixaban 5 mg twise/daily) for a 3-month period. One month later the patient was asymptomatic. Control TTE was with decreased pulmonary pressure and normalized right ventricle size.

Discussion: Acute pulmonary thromboembolism is a postoperative complication that is particularly common in operated patients, but in this case we may discuss also the role of the massive blood transfusions and immobilization after operation. Selecting an optimal treatment for PE is challenging. Thrombolytic therapy and catheter embolectomy are common therapeutic interventions. Although thrombolysis is effective, it can cause bleeding, especially after surgery.
Conclusion: We present a rare case of PE due to multiple blood transfusions with high risk for bleeding (recent operation and gastrointestinal bleeding within previous 3 weeks) in which percutaneous intervention with local thrombolysis is the safest and most effective treatment.

P2234
Pulmonary embolism after ablation of supraventricular tachycardia

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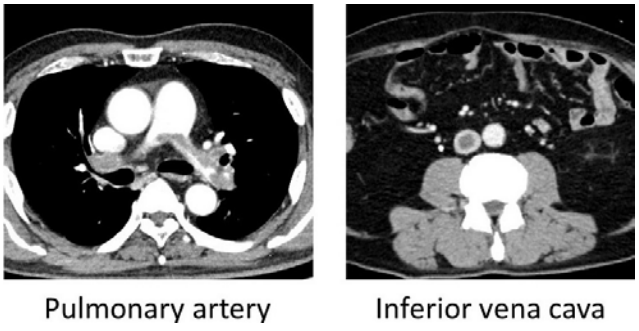
Background: Radiofrequency catheter ablation has become established as an effective therapy for the treatment of supraventricular tachycardia. The risk of thromboembolism is little and anticoagulation is unnecessary in usual cases. However we experienced severe thromboembolism after catheter ablation.
Case Report: A 62-year-old man was referred for recurrent syncope. Electrophysiological study was performed from the left femoral vein using 10Fr sized Trio Sheath. Atrioventricular nodal reciprocating tachycardia was induced and a significant decrease in blood pressure occurred. Radiofrequency current was successfully delivered at the slow pathway. After catheter ablation, hemostasis at the left femoral venous access site was provided by manual compression. After a week, he felt dyspnea on walking and came to our hospital. Echocardiography showed pressure overload of the right ventricle and thrombus was seen on the branch of the pulmonary artery. Many thrombus appeared in the inferior vena cava from left femoral vein on contrast enhanced CT. There was a wide range of thrombus, thrombolytic therapy was performed. Subsequently, thrombus was reduced and right ventricular pressure overlord was improved.
Conclusion: Usually anticoagulation is unnecessary for ablation of supraventricular tachycardia. However we showed the case with severe pulmonary embolism after catheter ablation. The possibility of the thrombus must be considered in any cases.



Thrombus on CT

P2235
Rare cause of desaturation in a patient with decompensated chronic heart failure

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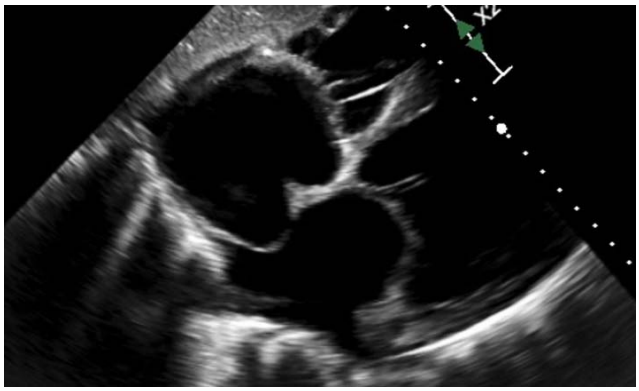
Clinical presentation. 78-year old male was admitted to our institution due to progressive shortness of breath. He had known LV dysfunction and congestive heart failure and recent hospitalisation for a previous decompensation. On admission he appeared to be drifting away, while desaturating down to 67% on pulseoxymetry. There was bilateral pitting oedema below the knees. Notably, no significant crackles were heard in the lung bases and CXR was not consistent with significant lung congestion. The patient was put on oxygen supplementation and intravenous furosemide. His BP was stable throughout the hospital stay.
Clinical investigations and diagnostic process. Labs were unremarkable except creatinine of 94 umol/L consistent with CrCl of 50ml/min and PaO2 of 50mmHg from arterial blood gases. Despite the intravenous furosemide the patient was not improving even after further dosage escalations. EKG showed LAHB and AV-block grade 1. We performed transthoracic echocardiography, which revealed a large LV with EDV of 300ml, LV EF of 30% and moderate AR and MR. There was biatrial dilation, moderate TR, dilated RV and estimated systolic PAP was nearly 100mmHg. Notably, the interatrial septum was bulging from right to left and there was a small eccentric RtoL shunt through it, which was evident on colour doppler. We performed compression ultrasound on lower limbs, which revealed bilateral femoropopliteal DVTs and confirmed our suspicion of VTE. CTPA revealed bilateral pulmonary embolism. Patient was classed as high intermediate risk by PESI score. He was put on therapeutic dosage of LMWH and remained stable and gradually improving. However, he insisted of leaving the hospital against our medical advice on day 3 from the diagnosis of PE. We decided to commence NOAC (rivaroxaban 2x15mg for 3 weeks than 20mg) and to discharge him. Several weeks later there was marked improvement in his clinical status. He was no longer limitied by shortness of breath, there was no longer evidence of pulmonary hypertension on transthoracic echocardiography and the interatrial septum was no longer bulging into left atrium.
Conclusions and implications for clinical practice. Patients with chronic heart failure are prone to thrombotic events. This is especially true during periods of prolonged bed rest and decompensations. When unexplained breathlesness, desaturation or out of proportion pulmonary hypertension are present VTE should be excluded.



IASbulgetoL

Presence of DVT on compression ultrasound in patients with suspected pulmonary embolism confirms the diagnosis at bedside. We believe that the main cause of desaturation in this case was the pulmonary embolism. The right-to-left shunt was caused by stretched PFO opened by the high right atrial pressure and had only partial contribution to the desaturation. Notably, this patient had bilateral DVT, which is rare. In such cases the usual signs of DVT can be masked or may affect both legs making the clinical diagnosis of DVT impossible.

P2236
Asymptomatic underwater swimmer with pulmonary hypertension and dilatation of right heart chambers - true or false?

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Background: Pulmonary hypertension (PH) is defined as increased pulmonary artery pressure (PAP) and is associated with high risk of heart failure and mortality in general population. PH may serve as an underlying condition in patients with cardiopulmonary arrest.
Problem: TTE findings of PH in asymptomatic athletes during cardiovascular screening may cause restriction from training and competitive activity. Additional invasive methods in some cases are more helpful with precise diagnostics and making decision concerning further sports career.
Clinical case: An elite 21 year old athlete specializing in underwater swimming with 12 years of sports experience was admitted to cardiac functional diagnostics department. He had no complaints, no shortness of breath, no decrease of exercise performance. He denied heart disease family history or sudden cardiac arrest cases in relatives. 12-lead ECG was normal with sinus bradycardia with HR 49 bpm, (normal finding in endurance athletes). Regular CPET in our sports lab confirmed high level of exercise performance (VO2max 62 ml/kg/min, Pmax 414 W) with no decrease during previous months. Routine cardiovascular athletes' TTE screening in 2016 revealed mild PH (rated PAP 47 mm Hg), mild RA enlargement of 60 ml,

III degree of tricuspid regurgitation with no valve or myocardium lesion. Periodical TTE studies in 2016-2017 years, conducted each 3-4 months, confirmed PH diagnosis. Measured PAP was from 40 to 54 mm Hg, right heart chambers dilatation: RA volume up to 74 ml, RV size (apical view) 47 mm. None of any other TTE abnormal findings were observed. Values of myocardium structure, global and regional segment contractile function of RV and LV were within the physiologic norm. The preliminary diagnosis, based on PAP values, was idiopathic PH. In compliance with eligibility guidelines for competitive athletes, this diagnosis is a contradiction to training and competitive activity. Athlete was deeply concerned about his future sports career, as he was preparing to important international competitions. He had been aware of possible complications and risks associated with cardiac invasive measurements before his consent was obtained. Medical consultation referred a patient to further diagnostic catheterization of PA. Follow-up catheterization of right heart chambers with Svan-Hanse catheter placement and central haemodynamics evaluation was performed. Undertaken examinations revealed normal values of PAP – 10 mm Hg. As HP diagnosis based on data from diagnostic cardiac catheterization is defined by a mean PA value of 25 mm Hg or more at rest, PH diagnosis was not confirmed. Finally, sports cardiologist admitted athlete to training and competitive activity.

Conclusions: TTE findings of PH and RA enlargement in swimmers may be explained by physiological response and specific adaptation to aquatic environment. Diagnosis of PH in experienced swimmers is better confirmed with the use of invasive methods.

P2237

Pulmonary hypertension in the setting of complex structural heart disease

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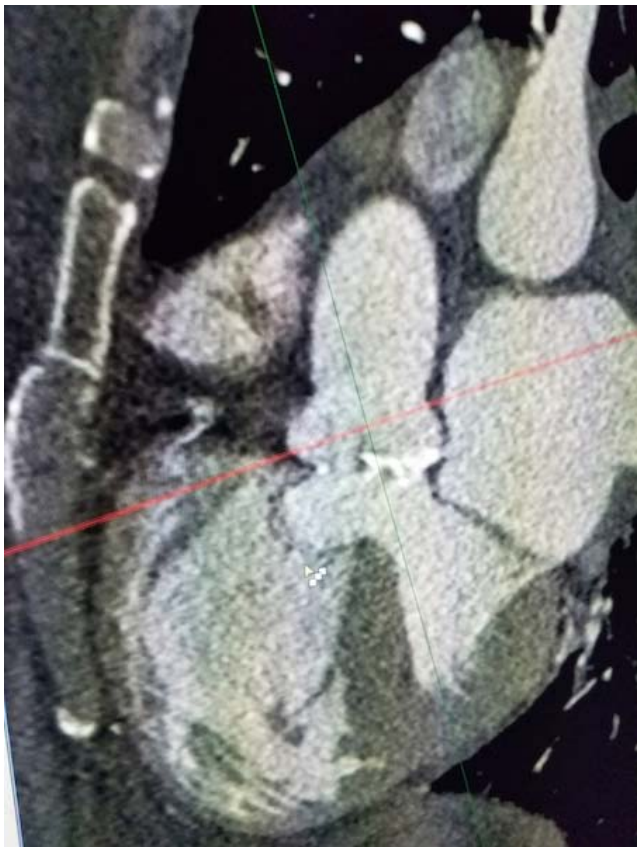
Case presentationA 76 yo female with a history of HTN, HLD, NIDDM, paroxysmal AF, restrictive VSD, and severe AS presented with decompensated heart failure. Cardiac findings included RV heave and 3/6 harsh, late peaking crescendo-decrescendo murmur. There was no digital clubbing or cyanosis. TTE revealed normal EF with severe pulmonary hypertension, RV dilation with severe dysfunction, and severe AS. Her perimembranous septum was aneurysmal, with a systolic jet velocity across the defect of 4.5 m/s. There was no obstructive coronary disease. Right heart catheterization demonstrated PAP of 96/38/57 mmHg, PVR of 7.2 WU, PCWP 23 mmHg, CI of 3.04, and Qp/Qs of 1.1.

Diagnostic ChallengesThe patient's PCWP and PVR were suggestive of mixed WHO group I and II pHTN due to longstanding AS and pulmonary vascular remodeling. The degree of reversibility was unknown. Her shunt fraction and PA pulsatility index were normal, suggesting the VSD was not causing significant shunting. She was high surgical risk and her aortic valve annulus was high risk for TAVR given continuity with the VSD and deficiency of ˜25% of the annulus. Of concern was the possibility that her elevated LVEDP was masking Eisenmenger physiology, and relieving the AS may cause significant hypoxia.

Management We proceeded with balloon aortic valvuloplasty (BAV) as bridge to decision. The BAV enabled assessment of the integrity of the aortic annulus and VSD, the pulmonary pressure response to LV unloading, and development of right to left shunting after a decrease in LVEDP. Successful BAV was performed, and the patient was discharged. Following improvement in both PA pressures and her symptoms, a TAVR was offered. A self-expanding valve was selected to minimize risk of annular rupture. After successful deployment, her PAP were 78/42/54 and PCWP 23. She was diuresed and discharged.

Conclusion Significant pulmonary hypertension complicating structural heart disease leads to distinct diagnostic and management dilemmas. We present a case of severe pulmonary hypertension and RV dysfunction in the setting of perimembranous VSD and severe AS. Our case highlights important points in management of such patients. First, careful evaluation of hemodynamics, including indices of RV function is paramount in guiding decision making in these patients. In our case, the preserved PAPi with minimal shunting suggested the VSD was not significantly contributing to the severe pulmonary hypertension. Second, BAV plays an important role in such complex patients as a bridge to decision and to determine potential response to TAVR. Third, although patients with WHO II pHTN can develop an irreversible pre-capillary component, such assessment can only be made following durable reduction in LVEDP. Lastly, interdisciplinary patient care is essential. Successful management of our patient involved input from a team consisting of pulmonology, structural cardiology, critical care cardiology and heart failure.



CT Processing

P2238

Heart transplantation in a child with Ebstein's Anomaly and primary cardiomyopathy

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The patient was diagnosed with the congenital heart desease: Ebstein's Anomaly and Wolf-Parkinson-White Syndrome at the age of 2 days. For several years reicuspidal regurgitation was II grade, myocardial contractility of left ventricular was > 53 % and she have been asymptomatic. The first symptoms of heart failure such as decline of exercise capacity, cyanosis and dyspnea by physical activity appeared only at the age of 14 years. Because of the progression of symptoms, it was decided to perform tricuspid valve replacement with bioprostetic vale Carpentier Edwards 31. Until that time the patient had already underwent 3 catheter ablations of multiple right-sided accessory AV connections. But by admission a girl was presented with significant heart failure (Class III NYHA) and reduced cardiac contractility with ejection fraction of left ventricular 25%. Such rapid heart failure progression was considered not only as end stage of congenital heart disease, but as a result of myocarditis or primary cardiac cardiomyopathy. Due to anamnesis, laboratory findings and further diagnostic procedures no evidence of inflammatory cardiomyopathy was revealed, but in our patient detected novel missense mutation in gene MYPNc.458A>G (p.Lys153Arg), wich have been linked to the pathogenesis of dilated cardiomyopathy. In that case correction of Ebstein's Anomaly was associated with a poor prognosis.For this reason she was listed for heart transplantation, wich was performed after 12 months on the waiting list. Since two years after transplatation the patient have had normal heart function, she have not got limitation in physical activity and herpsychological status have become good.

Each patient with congenital heart disease and significant heart failureneed of personified approach in management. Among patients with congenital heart disease associated with primary cardiomyopathy heart transplantation could be procedure of choice and show better prognosis in comparison with surgical correction of heart lesion.

P2239

A heart failure with brilliantly preserved ejection fraction.

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A 85 years old woman with shortness of breath and leg edema with proggresive intensity last three weeks is admited in the cardiology department. As significant comorbidities, the patient has arterial hypertension (although last months all the medication that she needed was discontinued due to tendency toward low blood pressure) and paroxysmal atrial fibrillation. As previous surgical background, the patient only refers a carpal tunnel syndrome surgery (in both sides). In the physical exam she has a blood pressure of 110/60 Hg mm, lung crackles in the lower third of both lungs and a systolic murmur in the aortic area with a very low second sound. After being admitted in the cardiology department an echocardiography was done, showing severe left ventricle hypertrophy. As seen in the image (picture A), the myocardium, showed a characteristic granular ang bright pattern. It also showed a moderate to severe aortic stenosis. Although she was in atrial fibrillation during the echocardiography, the transmitral Doppler showed signs of significantly elevated filling pressures as for example, the presence of L waves. Finally, the exam was completed with an analysis of longitudinal deformation of the left ventricle, showing a clearly depressed global longitudinal strain, with a base-apex gradient (preserved at the apex, picture D). With these findings a Tc-PYP scintigraphy was performed, showing moderate and difuse uptake of the radioactive tracer in both ventricles (as shown in the image C). To complete the diagnosis, a cardiac magnetic resonance was performed showing a subendocardial ring pattern of delayed enhancement (image B). The diagnosis of transthyretin cardiac amyloidosis was done.
Cardiac amyloidosis is clearly underdiagnosed entity, and sometimes differential diagnosis is really hard. Patients with cardiac amyloidosis are not always so "typical" as in this case. In fact, even a 5% of patients with history of aortic stenosis surgery may have also a cardiac amyloidosis. Maybe the use of myocardial deformation study and nuclear imaging can be useful solving this problem. Several studies have shown that nuclear imaging may be useful in the early diagnosis of this disease, even before that with echocardiography or cardiac magnetic resonance. Besides, new sequences of cardiac magnetic resonance may be very useful solving the problem of the differential diagnosis in left ventricle hypertrophy: The extracellular volume mapping. In cardiac amyloidosis hypertrophy is due to the deposit of amiloid in extracellular space. Because of that, the extracellular space is significantly increased in comparison with almost every other cause of left ventricle hypertrophy, making this sequence very useful in differential diagnosis.
CONCLUSION Transthyretin cardiac amyloidosis is a rare and very under-diagnosed disease. However these problems with the advance of cardiac imaging and the development of new treatments could change very soon.

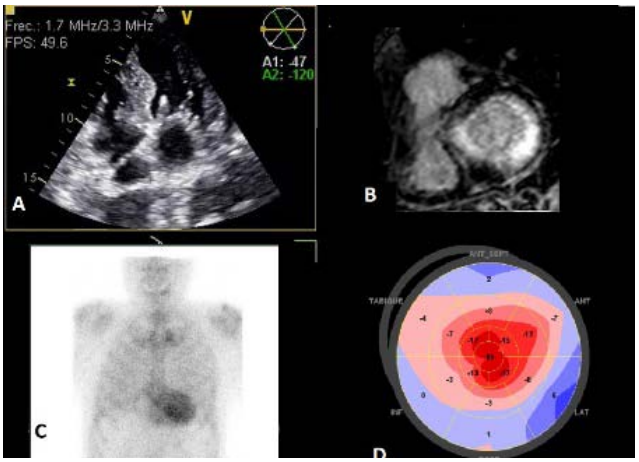

Image 1

P2240

Diastolic heart failure - As bad as it gets, before it gets better

S Sidonia Albu[1]; A Dumitrache[2]; C Ginghina[1]; B Popescu[1]; R Jurcut[1]
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Introduction: We report the case of a 43-year-old patient, known with professional exposure to dust, ex- smoker, who complains of fatigue, exertional dyspnea, night sweats and weight-loss for several months. The physical examination revealed axillary adenopathy and hepatosplenomegaly. His laboratory tests showed hypereosinophilia, trombocytopenia, polyglobulia and raised BNP levels. He was first evaluated by the haematologist and the suspicion of a myeloproliferative disease was raised.
Problem, patient management: His transthoracic echocardiogram revealed a cardiac mass attached to the apical and anterior wall of the left ventricle with a maximum thickness of 19 mm, a restrictive diastolic filling pattern, reduced myocardial velocities – all in favour of intrinsic cardiomyopathy. For a better evaluation, cardiac MRI was performed which showed a biventricular involvement (masses attached to the apical free wall of both ventricles- Image A, subendocardial late gadolinium enhancement of both ventricles), being highly suggestive of hypereosinophilic myocarditis. Different hematological tests in search for a possible etiology were performed (bone marrow biopsy and JAK2, BCR-ABL, PDGFR, c-MPL, CALR mutations), with negative results. A parasitologic panel obtained a positive Toxocara canis IgG result. The diagnosis of chronic eosinophilic leukemia was established by the haematologist. His treatment included corticotherapy, hydroxyurea, oral anticoagulation, betablocker and diuretics, which was well tolerated.
Questions, problems, possible differential diagnosis: The mechanism for hypereosinophilia in this case was uncertain at the beginning, with multiple possible causes : myeloproliferative syndrome/neoplastic disease (because of multiple organ involvement, laboratory tests), parasitic disease, allergic disease (previous professional exposure to dust). Also, it was decided to use a vitamin K antagonist, due to the uncertain benefits of novel anticoagulants in this setting.
Conclusions: Loeffler endocarditis is a condition resulting from various eosinophilic diseases, including parasitosis, drug hypersensitivity, systemic vasculitis or idiopathic hypereosinophilic syndromes.
"True" hypereosinophilic syndrome is considered rare. Sometimes, it proves to be challenging to ascertain the etiology, as it was in this case and it is also of great importance for establishing the prognosis.

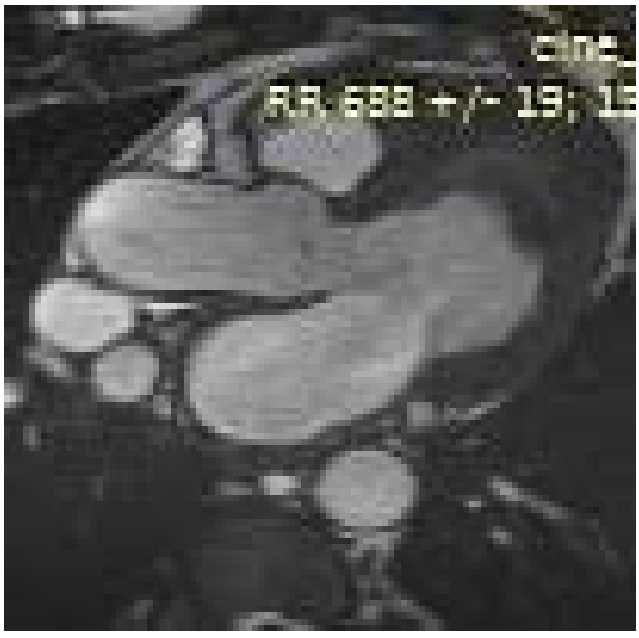

Image A

P2241

Takotsubo syndrome masking apical hypertrophic cardiomyopathy

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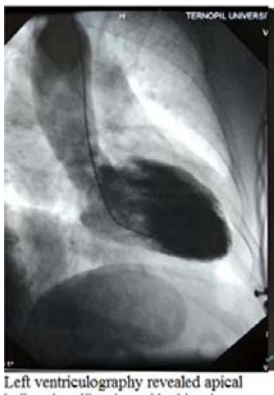
Apical akinesis and dilation without occlusive coronary artery disease presented by acute and usually reversible heart failure are typical signs of Takotsubo syndrome. Since other diseases can be masked under certain clinical presentation.
Case report . A 63 years old white woman presented with acute chest pain, palpitation and shortness of breath, induced by unexpected emotional stress. Her medical history included hypertension (BP 140-160/90 mm Hg) with irregular usage of antihypertensive drugs, extirpation of uterus for fibro-myoma 10 years ago. She had no known coronary artery disease. Her heart rate 105 beats/min; BP 110/85 mmHg; oxygen saturation 96% on room air. Physical examination revealed tachycardia and mild pitting edema in the lower extremities. An electrocardiogram

(ECG) showed sinus tachycardia with ST elevation 5 mm in V2-V6, pathological Q wave and ST elevation 2 mm in II, III, avF. Laboratory results included an elevated troponin T level of 886.3 pg/mL (normal <14 pg/mL), creatine phosphokinase MB – 31,6 Un/l (normal < 25,0 Un/l), NT-proBNP 2234 pg/ml (normal < 300 pg/mL). A transthoracic echocardiogram (TTE) showed a left ventricle ejection fraction - 45 % with hyperdynamic basal function but with a dilated, akinetic apex and lateral wall. Results of coronary angiography were normal. Left ventriculography revealed apical ballooning dilatation with akinesis.

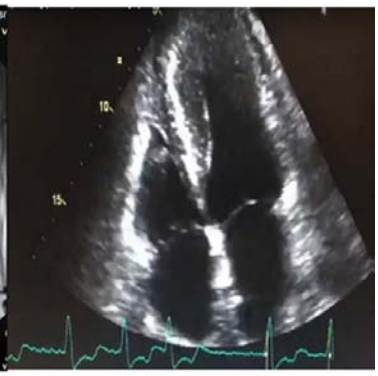
The diagnosis of Takotsubo syndrome was defined based on results of apical motion abnormalities of LV, preceded by a emotional stressful trigger, absence of culprit atherosclerotic coronary artery disease, new ECG abnormalities, positive troponin test and significantly elevated NT –pro BNP.

On the 12th hospital day, TTE showed no change in the apical ballooning and akinesis. The level of troponin T was decreased in dynamics: 58,0 – 22,5 -12,7 pg/mL. The ECG revealed positive dynamics: decreasing of ST elevation in anterolateral leads to 1,5 mm, absence of pathological Q wave and ST elevation in II, III, avF. The patient was discharged from the hospital on metaprolol and ramipril therapy.

The patient returned 3 weeks later for repeat TTE. The apical wall-motion abnormalities had resolved, and the LVEF had returned to normal 59 %. Newly apparent hypertrophy of the LV myocardium at the apex was onsistent with apical variant HCM. A contrast agent was administered, and no apical pouches, thrombi were found. The maximal LV wall thickness was 17 mm at end-diastole. The ECG showed repolarization changes and giant (>10 mm), inverted T waves in the anterolateral leads (particularly in leads V4 and V5). The patient was counseled in regard to the diagnosis of apical HCM. At her 2-month follow-up examination, she was asymptomatic. Apical HCM was masked by Takotsubo cardiomyopathy with apical ballooning. The apical HCM was not apparent until the apical myocardium had fully recovered and patient underwent repeat TTE.



Left ventriculography revealed apical ballooning dilatation with akinesis



TTE Apical 4-chamber view: localized hypertrophy of the LV apex

P2242

Accidentally discovered aortic dissection in young patient with left ventricular hypertrophy: hypertensive heart or hypertrophic cardiomyopathy?

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A 36-year-old male with positive family history of sudden cardiac death (his uncle's son died suddenly at the age of 25), hospitalized a month ago in a local hospital due to acute hypertensive cardiogenic pulmonary edema, was referred to our institution for further evaluation with suspicion of hypertrophic cardiomyopathy.

On admission patient was asymptomatic, without fatigue, exertional dyspnoea, chest pain or syncope. On physical examination his BP was significantly elevated (180/100 mmHg). The lungs were clear on auscultation, liver was not enlarged, jugular veins were normal, there was no oedema of lower extremities. Abdominal auscultation revealed vascular murmur in umbilical region.

The baseline level of NT-proBNP was 811.4 (range 0–125) pg/mL, and high-sensitivity cardiac troponin T was 20.2 (range 0–14) ng/L. The standard 12-lead electrocardiogram demonstrated sinus rhythm, left atrial enlargement and left ventricular (LV) hypertrophy with nonspecific ST segment and T-wave changes (Fig. 1A). No significant pathology was present on chest X-ray (Fig. 1B).

Transthoracic echocardiography revealed significant concentric LV hypertrophy with preserved LV ejection fraction (EF 70%) and moderately decreased global longitudinal strain (GLS-13.7%). There was mild dilatation of left atrium. Ascending aorta diameter was in normal range (Fig. 1C-D). Cardiac magnetic resonance (CMR) scan confirmed concentric LV hypertrophy with the maximal wall thickness of 18 mm at interventricular septum, and increased myocardial mass (LV mass index 124 ml/m2, range 59–92). Moreover, small areas of late gadolinium enhancement was found in LV segments (Fig. 1E-F).

Due to presence of vascular murmur in abdomen, ultrasound imaging was performed. The exam revealed abdominal aortic dissection (Fig. 1G-H). Patient was transferred to the computed tomography (CT) unit to confirm the diagnosis. Aortic dissection originated below renal arteries and involving common illiac arteries was detected (Stanford B). The presence of thrombi within the lumen created by the aortic dissection suggested chronic presentation. Patient was managed conservatively with strict blood pressure control and close follow up arranged.

We decided to perform genetic analysis. Currently we are awaiting the results in hope that it will help us to establish the diagnosis and differentiate hypertensive heart from hypertrophic cardiomyopathy.

In conclusion, aortic dissection typically presents with tearing chest pain and severe hemodynamic compromise. Painless dissection, like in this case, is relatively rare. Differential diagnosis between hypertensive heart and hypertrophic cardiomyopathy is crucial as it has direct therapeutic impact.

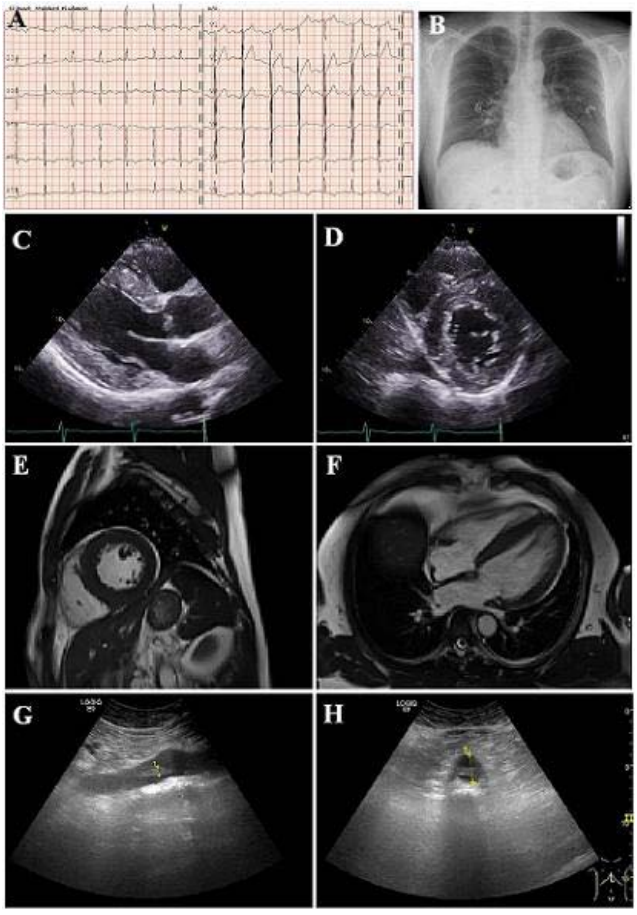

Figure1

P2243

Hypertrophic cardiomyopathy patients with co-existing pathology: the role of heart team

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Background. The experience of our Center shows that more and more patients with hypertrophic cardiomyopathy (HCM) require multi-disciplinary approach, e.g.

Heart Team, consisting of interventional surgeons, radiologists, cardiac surgeons and cardiologists.Introduction. 68-year-old male patient came in to the Center with complaints on chest pain, dyspnea on exertion, periodic dizziness and decrease in tolerance to physical activity. In 2013 he underwent the abdominal aneurysm repair. The data obtained from the instrumental studies are presented in Table 1. The following diagnosis was established: HOCM, moderate mitral regurgitation (MR), mild tricuspid regurgitation; ischemic heart disease, exertional angina, class II, multi-vessel coronary artery disease; thoracoabdominal aortic aneurysm, type B (DeBakey); state after abdominal aortic aneurysm repair (2013); heart failure (HF) with preserved EF, functional class II (HYHA).

The Heart Team made a decision to perform two-stage surgical correction. Stage 1 included off-pump CABG-4 of the LAD, Cx and D2 branches of the LCA with autovenous grafts, and on-pump transaortic septal myectomy of the IVS with 6 anomalous chordal attachments cutting, and mobilization of the papillary muscles. Stage 2 involved thoracoabdominal endovascular aortic repair (TEVAR) with 2 stent graft systems, 32-28 mm and 34-30 mm – 200 mm length each. The control angiography performed after surgery showed endoleak, type 1b due to kinking of the distal part of the aorta. As a result, it was decided to perform one more repair with stent graft system 36-36 mm–64 mm length. After the procedure, control angiography showed no significant paraprosthetic leak. Post-operative TEE showed: SPG on LVOT = 12 mmHg. EDV = 92 ml; ESV= 36 ml; SV= 58 ml; EF= 58%, IVS = 0,9 cm. No SAM of the anterior MV leaflet. Mild MR. No complications were observed in the post-operative period.

Conclusion. The treatment of HCM patients with co-existing diseases like coronary artery disease and thoracoabdominal aneurysm requires Heart Team. We suggest performing the surgical correction in such types of patients in two stages – off-pump CABG and on-pump septal myectomy as the fist stage, and TEVAR as the second one.

Table 1. Pre-operative results of the instrumental examination

TEE	Dilation of the thoracoabdominal aorta up to 5,6 cm. IVS = 3,2 cm, EDV=94 ml, ESV=39 ml, SV=61 ml, EF=65%, SPG on the LVOT at rest = 65 mmHg with SAM of the anterior MV leaflet
Heart catheterization	Multi-vessel coronary artery disease (atherosclerotic obstruction of LAD=75%. Cx=80%, D2=90%). SPG = 70 mmHg
Heart CT	Hemodynamically significant atherosclerosis of the coronary arteries; aneurysm of the thoracoabdominal aorta (Ø=6 cm); HOCM
MSCT of the abdominal cavity	CT-sings of fusiform aneurysm of the thoracoabdominal aorta (Ø=6 cm)

Cx - circumflex branch of the left coronary artery; D2 - diagonal branch of the left coronary artery; HOCM - hypertrophic obstructive cardiomyopathy; LAD - left anterior descending artery; MSCT - multi-spiral computer tomography; MV - mitral valve; SAM - systolic anterior motion; SPG - systolic pressure gradient.
Pre-operative results of the instrumental examination

The results of two stages of treatment

P2244

Heart failure aggravated by beta blockers. Could this suggest the etiology?

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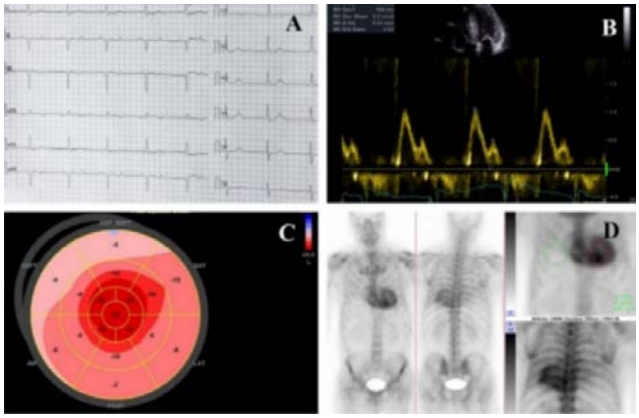
Cardiomyopathies (CM) are a heterogenous group of myocardial diseases associated with mechanical and/or electrical dysfunction due to various causes, most frequently genetic. Cardiac amyloidosis (CA) is a restrictive CM characterized by extracellular accumulation of misfolded protein fragments, most frequently classified by the amyloid precursor. Transthyretin amyloidosis (ATTR) results from accumulation of a protein (transthyretin), produced by the liver and is subdivided in 2 different types – wild type (wt) and hereditary (mt).

We present the case of a 42 yo patient with family history of heart failure (HF) and death at young age, evaluated in our clinic for aggravated dyspnea and fatigue in the last few weeks. The patient was recently diagnosed with HCM, and was started on beta-blocker (BB) therapy, which led to further worsening of his symptoms. The physical examination was unremarkable and the laboratory workup showed mild renal involvement and high levels of NTproBNP. The ECG showed synus rhythm with a 2:1 atrioventricular block (AVB), major RBBB and normal voltage, leading to interruption of BB, the patient reverting to normal conduction the next day (80 bpm). The patient had a 48 h ECG Holter monitoring that showed multiple and prolonged episodes of high grade and even complete AVB with a heart rate of 28 bpm, as well as episodes of nonsustained VT. The echocardiography showed severe biventricular hipertrophy, normal global systolic function (LVEF), but important longitudinal dysfunction with apical sparing and severe diastolic dysfunction with restrictive filling pattern.

Cardiac imaging, conduction disturbances as well as the patient's origin in a country region which has a high incidence of ATTRmt raised the suspicion of CA. Thus, his workup was completed by a neurologic evaluation that showed bilateral carpal tunnel syndrome and a bone-avid phosphate-based isotope nuclear scintigraphy with important myocardial uptake of the isotope which is highly suggestive for ATTR. The patient was implanted a bicameral ICD, with favorable evolution. He also received a low dose of furosemide and spironolactone, with no symptoms at discharge. Family screening included 2 maternal cousins with normal echocardiography.

Although a rare cause of HF, CA remains one of the main phenocopies in the differential diagnosis of HCM, patients often presenting important and dramatic symptoms. Awareness of this entity as a cause of cardiac hypertrophy is of paramount importance for following the lead. Clear recommendations for the choice between pacemaker vs ICD are not yet released, therefore the individual decision should be made based on available data and risk stratification. We stress the importance of a "red flags" based diagnosis (echocardiographic aspect, associated rhythm and conduction dysorders, poor tolerance of BB, neurologic involvement) and the importance of a careful family screening in rare genetic cardiovascular diseases.



P2245

Significance of left ventricular pronounced trabeculations in a patient with recurrent decompensated heart failure

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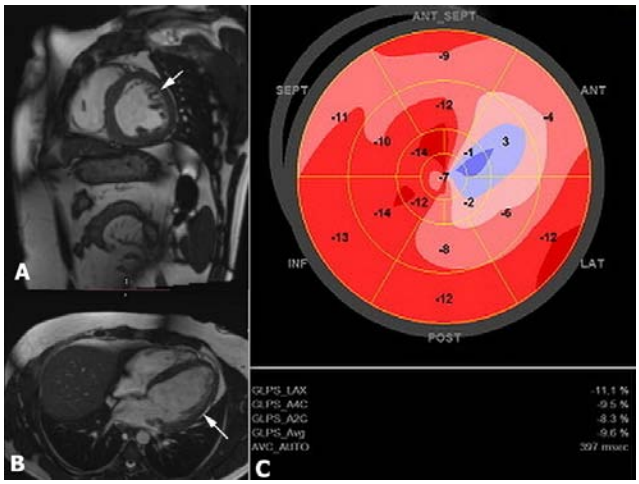
Introduction: Pronounced left ventricular (LV) trabeculations are described in dilated and hypokinetic left ventricles as well as in left ventricular non compaction (LVNC). It is unclear if this imaging findings are a distinct pathological entity, or an epiphenomena of LV remodelling.
Case presentation: A 33 year old male was admitted for recurrent decompensated heart failure, with a "wet and warm" profile. He mismanaged his diet and prescribed medications. He was diagnosed with dilated cardiomyopathy (DCM) 3 years before, when he first presented with acute heart failure and was diagnosed with a LV ejection fraction (EF) of 20% and apical thrombus considered to be secondary to myocarditis. Coronary angiography showed normal epicardial coronary arteries. Cardiac magnetic resonance (CMR), performed 4 months after the acute event, detected severely dilated LV, with an EF of 51%. CMR raised suspicion of non-compaction (LVNC), with multiple myocardial trabeculations which fulfill the LVNC criteria at the level of 7 segments, mainly at the apex, anterior, and antero-lateral walls of LV, with no thrombus, scar or fibrosis. At this admission, transthoracic echocardiography confirmed severely dilated LV, with an EDV index of 104 ml/m2, reduced ejection fraction, with an EF of 30%, and global hypokinesia. No thrombus was seen. Ratio of non-compacted /compacted layer was <2. We performed speckle tracking analysis with assessment of peak systolic longitudinal strain (PLS). PLS showed significantly reduced global longitudinal strain (-9.6%) and impaired regional PLS at the level of the anterior and antero-lateral apical and mid-segments (Figure). The patient was managed medically with improvement of symptoms.
Questions, problems or possible differential diagnosis: There is a considerable overlap between LVNC and other cardiomyopathies. Differentiation between LVNC and DCM remains challenging, being based on a careful clinical characterization and imaging (echocardiography and CMR). Complete recovery of cardiac function in a patient with LVNC is unlikely. Also, pathological conditions of volume overload are often associated with a LVNC-like phenotype. Although CMR revealed pronounced trabeculations suggestive for isolated LVNC, those criteria alone have poor specificity for LVNC being also present in asymptomatic population free from cardiovascular disease. Moreover, trabeculations are also describe in myocarditis with a regression after some time. Assessment of myocardial deformation patterns, despite overall hypokinesia with impaired global PLS, showed reduced deformation values in some segments, mimicking a post myocarditis pattern.
Conclusion and implications for clinical practice: Morphological criteria alone are necessary but insufficient for a correct diagnosis of LVNC in young patients with heart failure. Speckle tracking analysis may help to differentiate between the LVNC and pronounced trabeculations in DCM. However, a CMR follow up is mandatory.



P2246

Titin mutations - a role still to unriddle

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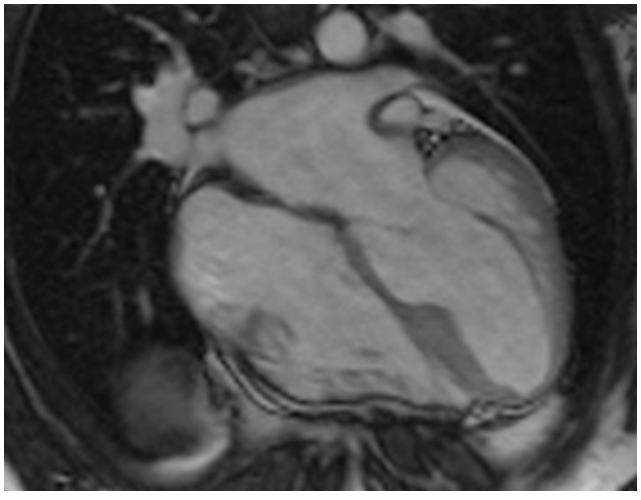
Titin is the largest protein in the human body. Mutations in the titin gene (TTN) - a sarcomeric protein - cause a broad spectrum of conditions involving the muscle. Dilated cardiomyopathy (CMD) is a primary myocardial disease with a variable natural history and clinical presentation. A genetic aetiology is demonstrated in about 30% of cases with the giant muscle protein TTN being recognized as the major gene causing CMD, mostly by heterozygous truncated mutations.
The present case refers to a 61-year-old female patient (pt) previously followed in Cardiology consultation due to restrictive perimembranous ventricular septal defect with mild left ventricular dysfunction (LVD) and paroxysmal atrial flutter under rhythm control. The pt reported a positive family history of myopathy and sudden death (acknowledged consanguinity among her parents).
She was clinically stable until may 2017; at this time, the pt presented palpitations and decompensated HF having been hospitalized. Echocardiogram showed mild LV dilation, inferoposterior and posterior-septal wall akinesia and hypokinesis of the remaining segments which conditioned severe depression of LVD and new onset right ventricle (RV) dysfunction without dilation. Cardiac catheterization showed angiographically normal coronary arteries; subsequent cardiac MRI revealed extensive septal fibrosis and fibroadipose infiltration suggesting non-ischemic myocardiopathy with severe LVD (but preserved RV function). She was discharged to the HF Clinic for therapeutic optimization and further aetiology workup. Follow-up was marked by difficult drug titration due to bradycardia and hypotension. A switch from ACE inhibitors to ARNI was attempted with clear functional class improvement (despite maintaining a low dose) and a cardio-defibrillator was implanted. Due to myopathy suspicion with persistently high CPK and predominantly proximal muscle weakness at lower limbs level, the pt performed a muscle biopsy that revealed severe changes in the myopathic pattern in which myofibrillar features were prominent. Regarding genetic evaluation, she was submitted to myofibrillar myopathies panel that was negative but mendeleoma identified two variants of uncertain significance in the titin gene (exon 7 and 246). Probable titinopathy with muscular and cardiac manifestations was assumed and the therapeutic and follow-up program were instituted according to.
Some mutations in the TTN gene that predominantly affect the heart muscle, others that affect only the skeletal muscle, and some that affect both. Moreover, truncated variants of the TTN gene are also present in up to 2% of the healthy population. It is suspected that these differences may be related to the location of the mutations in the gene and consequently how they affect the versions of titin that are produced in different muscles. Thus, the actual pathogenic role of these TTN variants remains unknown.



Cardiac MRI - fibroadipose infiltration