

Magyar absztraktok – ESC Kongresszus 2017

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Detection of myocardial involvement in patients with systemic sclerosis by cardiac 18F-FDG PET/CT and speckle tracking echocardiography

Abstract: P2424

Detection of myocardial involvement in patients with systemic sclerosis by cardiac 18F-FDG PET/CT and speckle tracking echocardiography

Authors:

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Topic(s):

Nuclear Cardiology (SPECT and PET)

Citation:

European Heart Journal (2017) 38 (Supplement), 495

Background: Cardiac involvement is a common complication in connective tissue diseases particularly in systemic sclerosis (SSc). In SSc the immuno-inflammatory damage leads to myocardial fibrosis and consequent myocardial dysfunction. The development of overt myocardial manifestation is recognized as powerful adverse prognostic factor.

Purpose: To assess the diagnostic utility of cardiac 18F-FDG PET CT in patients with SSc, and to evaluate simultaneously the underlying mechanical changes in the affected myocardium using 2 Dimensional Speckle Tracking Echocardiography (STE).

Methods: 17 patients with connective tissue diseases (13 patients with SSc and 4 patients with suspected giant cell arteritis, age: 57,3±10, 77% female) where enrolled in the prospective study. All patient underwent 18F-FDG PET CT of the myocardium assessing 18-FDG uptake in kBq/cc. Within 24 hours all patients underwent comprehensive echocardiography focusing on

left ventricular myocardial mechanics applying STE. The recommended 17 segment model was used to assess the 18F-FDG activity and for the calculation of myocardial strain too. The strain values were measured offline by available speckle tracking software (EchoPac PC version 108.1.4, GE Healthcare, Horten, Norway).

Results: Among 17 patients 5 patients (29%) showed significantly increased 18F-FDG activity ($18,6 \pm 6,8$ kBq/cc vs. $7,77 \pm 3,4$ kBq/cc, $p < 0,01$). In patients where the 18F-FDG uptake was increased, we measured decreased global left ventricular longitudinal strain values ($19,4 \pm 2,7\%$ vs. $13,4 \pm 8\%$, $p < 0,01$, Figure 1). We found negative correlation between strain and 18-FDG uptake ($p < 0,05$, $r = -0,54$) In 4 patients where the indication of the 18F-FDG PET CT was arteritis, we didn't observe pathological 18-FDG uptake ($4 \pm 0,2$ kBq/cc), and left ventricular strain values were also in physiological range ($21,5 \pm 2\%$). This observation supports that among connective tissue diseases myocardial involvement mostly affects patients with SSC.

Conclusion: 18F-FDG PET CT is a promising imaging tool to detect active myocardial involvement in patients with SSC. In the active condition of the myocardial involvement STE provides a simple, non-invasive modality to detect subtle mechanical changes in myocardium.

Left ventricular longitudinal strain value in patients with normal and increased 18-FDG uptake

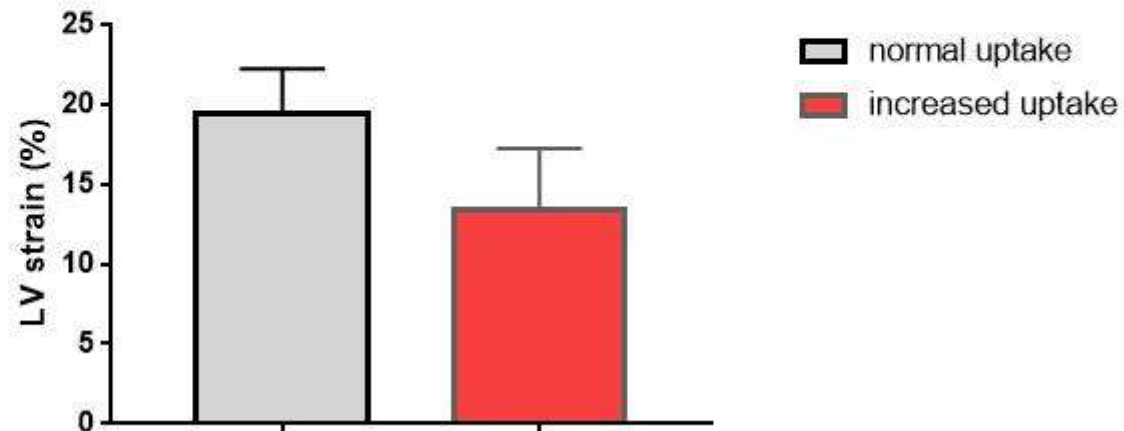


Figure 1 LV strain-FDG uptake

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Cardiac fingerprints of histiocytic infiltration - Common cardiac characteristics in a diverse, multisystemic histiocytic disease - Single center data over a 12-year period

Abstract: P6303

Cardiac fingerprints of histiocytic infiltration - Common cardiac characteristics in a diverse, multisystemic histiocytic disease - Single center data over a 12-year period

Authors:

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Topic(s):

Tumors of the heart

Citation:

European Heart Journal (2017) 38 (Supplement), 1349

Erdheim-Chester disease (ECD) is a rare, multiorgan non-Langerhans histiocytic disorder, the exact prevalence of the disease is unknown and the cardiovascular manifestation could be underestimated due to the occult nature of the signs and symptoms. Cardiac magnetic resonance imaging (CMR) is a standard technique to assess and characterize of a suspected cardiac tumor, because of unrestricted field of view, high temporal resolution and non-invasive tissue characterization.

Between January 2005 and January 2016 at the Heart and Vascular Center of the Semmelweis University we performed 9168 cardiac CMR scans, in 4.5% (412 cases) with the suspicion of intra/pericardiac tumors. We performed our institutional multiparametric CMR imaging protocol to evaluate the signal properties, morphologic characteristics (localisation, size, infiltrative nature, presence of pleural/pericardial effusions) of a suspected cardiac mass. In axial and oblique planes cine movies, T1-and T2-weighted, fat-suppressed triple inversion recovery images were performed. First pass perfusion images, early and late gadolinium enhancement (LGE) images were also performed in the same planes.

During the 12-year-period CMR findings suggested cardiac ECD in four patients (3 male, age: 48.5 ± 12.0 years old). The referring diagnoses were lipomatous hypertrophy of the interatrial septum and right atrial mass evaluated by echocardiography.

In all cases the histiocytes infiltration is mainly affected the right atrial wall, the interatrial septum and the interventricular sulcus (Figure). In half of the cases the aortic wall was also involved and had a special morphology, the coated aorta sign (Patient A and D). Pericardial effusion could also be detected in two cases (Patient B and C). After CMR examination all patients had a histologically proven diagnosis of ECD and underwent on detailed medical check-up looking for extracardiac histiocytic infiltration. Extracardiac manifestations were the following: neurological involvement (n=2) (exophthalmus, chromophobe cell macroadenoma), renal involvement (n=1), multifocal osteolysis (n=1), histiocytic soft tissue mass (n=3) in various localisation (retroperitoneal, gastrointestinal, skeletal muscle). During follow-up (668.4 ± 427.8 days) 3 patients died of the progression of the disease, the overall survival rate was 2 years and 4 months after the diagnosis.

The diagnosis of ECD is challenging and cardiac manifestation suggest poor prognosis. Special morphological CMR findings could raise the suspicion of histiocytic infiltration. Besides single case reports national and international registers are needed for the better understanding of ECD.

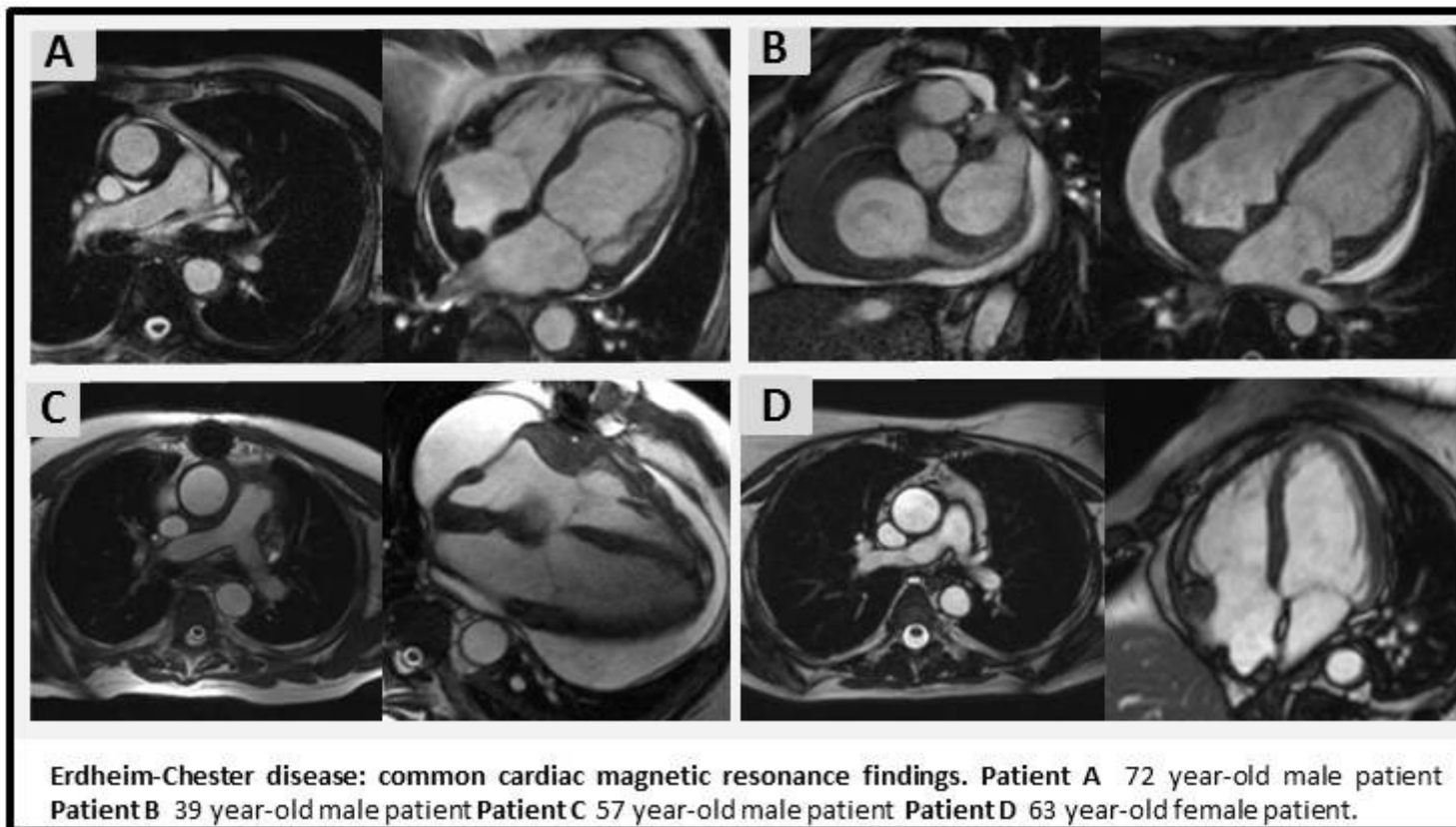


Figure 1

C. Czibalmos¹, I. Csecs¹, A. Toth¹, F.I. Suhai¹, B. Horvath¹, Z. Dohy¹, L. Szabo¹, O. Kiss¹, N. Sydo¹, T. Simor², B. Merkely¹, H. Vago¹, ¹Semmelweis University Heart Center - Budapest - Hungary, ²University of Pecs Heart Institute - Pécs – Hungary:

Overlapping features - Differentiation of arrhythmogenic right ventricular cardiomyopathy and athlete's heart using cardiac magnetic resonance imaging

Abstract: P1532

Overlapping features - Differentiation of arrhythmogenic right ventricular cardiomyopathy and athlete's heart using cardiac magnetic resonance imaging

Authors:

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Topic(s):

Sports cardiology

Citation:

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According to European literature data arrhythmogenic right ventricular cardiomyopathy (ARVC) is a major cause of life-threatening arrhythmias in young athletes. In highly trained athletes the diagnosis is complicated because of overlapping features such as elevated right ventricular end-diastolic volume index (RVEDVi). The revised Task Force criteria (TFC) contains no cut-off values for professional athletes.

Our goal was to determine cardiac magnetic resonance (CMR) parameters which can help to differentiate ARVC from athlete's heart.

Between 2010 and 2015 CMR examination was performed on 465 patients due to the suspicion of ARVC. In 38 patients (38.6±10.3y, 25 male) ECG abnormalities, arrhythmias, family history, histology and/or CMR parameters fulfilled revised TFC. Additionally 65 professional athletes (members of the Hungarian national water polo, canoeing or rowing team) free of complaint (27.1±3.7y, 40 male) were examined by CMR. We evaluated left and right ventricular end-systolic, end-diastolic and stroke volume index, ejection fraction and left ventricular mass.

We established derived parameters such as ejection fraction ratio (LVEF/RVEF) and end-diastolic volume ratio (LVEDV/RVEDV). Area under the ROC curves (AUC) of RVEF, RVEDVi and the derived CMR parameters were analysed and compared.

There was no significant difference between RVEDVi of ARVC patients and athletes in both males and females (m:131.1±12.4 vs 126.4±11.8 ml/m²; f:113.1±10.2 vs 130.1±32.8 ml/m²). RVEF was significantly lower in ARVC patients compared to athletes (m: 55.9±3.9 vs 45.5±7.5%; f:57.7±4.7 vs 42.9±13.5, p<0.001). LVEDV/RVEDV and LVEF/RVEF of both male and female patients showed significant difference compared to the athlete's group (p<0.05).

AUC of RVEF and LVEF/RVEF was significantly higher compared to AUC of RVEDVi in both gender (p<0.05), suggesting that these parameters can help to distinguish ARVC and athletes' heart, but RVEDVi can not.

In 5 athletes (28±4.1y, 4 male) ARVC was diagnosed based on CMR findings (RV wall motion abnormality, late gadolinium enhancement, RVEF), ECG abnormalities, arrhythmias and family history. RVEF and LV/RVEF were in the pathological range in 4 and 5 cases, respectively.

Consequently, in highly trained healthy athletes RVEDVi is in the range of major TFC, while RVEF and LV/RVEF could be useful parameters in differential diagnosis.

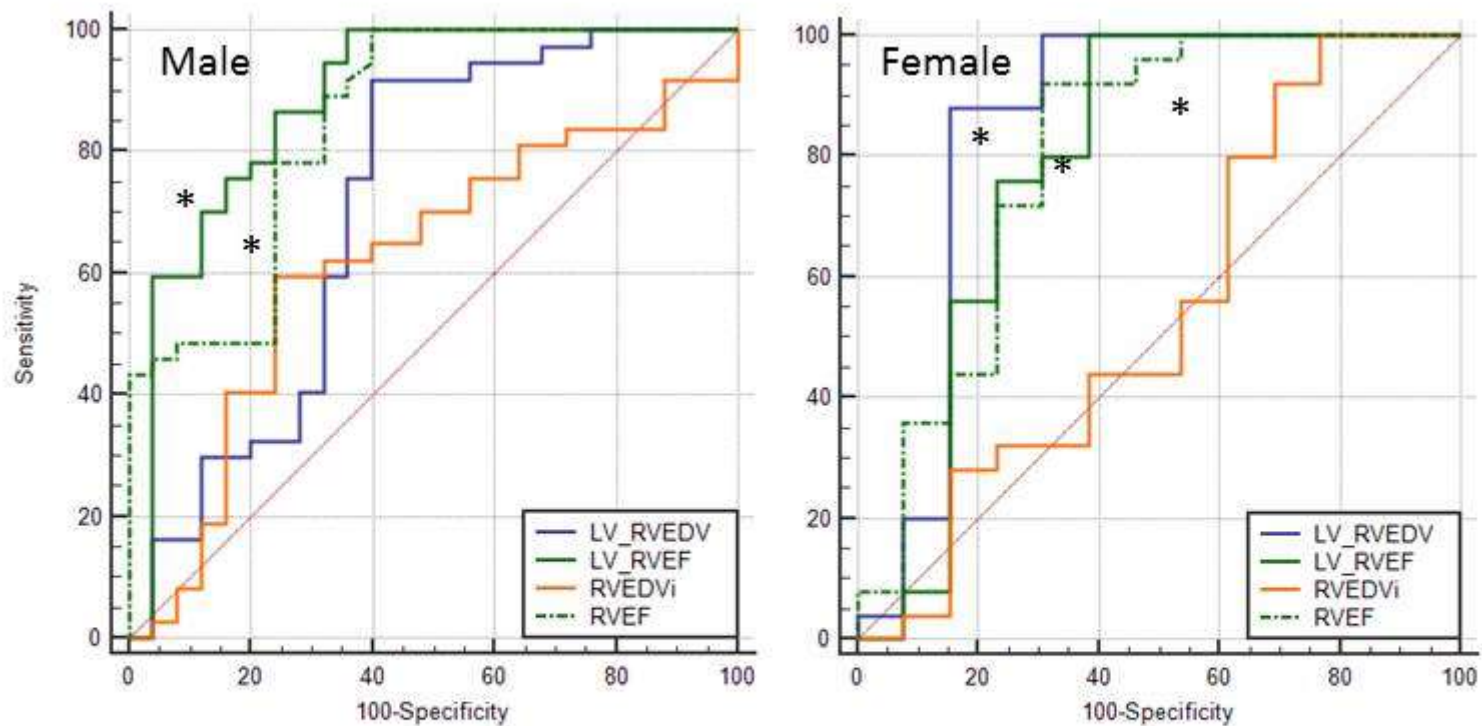


Figure: Receiver Operating Characteristic curves visualizing correct identification of ARVC among male and female subjects and comparison between the areas below the ROC curves of different CMR parameters.

* significantly different from RVEDVi

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A decade of testing arterial stiffness parameters: key results and insights

Abstract: P623

A decade of testing arterial stiffness parameters: key results and insights

Authors:

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Topic(s):

Cardiovascular disease in primary care

Citation:

European Heart Journal (2017) 38 (Supplement), 115

Introduction: The overall goal of our investigations was to prove that the new oscillometric device provides a reliable and feasible alternative to measuring arterial stiffness parameters noninvasively in the clinical practice. We used arterial stiffness parameters to identify preclinical organ damage, to determine cardiovascular (CV) risk in different diseases. We also followed changes of similar stiffness parameters due to age or physical exercise in young healthy volunteers.

Methods: Serial measurements of stiffness parameters (aortic pulse wave velocity (PWV_{ao}), and aortic augmentation index (AIX_{ao}) were performed noninvasively, using Arteriograph. We first determined the reference values of PWV_{ao} and AIX_{ao} in a large (3374 subjects) healthy population aged between 3–18 years, to analyse the physiological background of the observed age-related changes. We also determined the effect of single-bout exercise on aortic stiffness parameters in 108 young male subjects (mean age: 14.2±3.4 years). We investigated relationship between increased arterial stiffness and asymptomatic carotid atherosclerosis (ACA) and also compared central (ao) and local carotid (car) stiffness parameters in 361 patients. Further, we investigated the prognostic information provided by oscillometrically measured PWV_{ao} in 4146 healthy subjects during a follow-up period that lasted 5.5 years on average. In the clinical practice we first established a novel method for the continuous, 24-hour ambulatory measurement of stiffness parameters and the applied it to patients with verified obstructive sleep apnea syndrome (OSA).

Results: We found that mean PWV_{ao} values increased from 5.5±0.3 to 6.5±0.3 m/s (p<0.05) in boys and from 5.6±0.3 to 6.4±0.3 m/s (p<0.05) in girls. The increase, however, was not constant, and the values exhibited a flat period between the ages of 3 and 8 years in both genders. Moreover, between the ages of 3 and 8 years, the brachial SBP and mean blood pressures increased continuously and gradually, whereas the PWV_{ao} remained unchanged. In young sportsmen we found significant increase of PWV_{ao} which was measured after dynamic exercise compared to those values which were measured at rest (8.06±0.55 m/s vs. 5.82±0.14 m/s; p<0.001). In patients with ACA PWV_{ao} (9.3±1.6 vs 7.9±1.3 m/s, p<0.001) and AIX_{ao} (27.6±14.6 vs 24.1±14.1%; p=0.118) were significantly different than subjects without ACA. In a stepwise logistic regression analysis PWV_{ao} (1.88 [1.44; 2.50], p<0.001) remained independently associated with ACA. PWV_{ao} was associated with a 1.49-fold increased risk for the primary composite endpoint non-fatal MI, stroke or all-cause mortality; the risk for all-cause mortality was increased 1.71-fold.

Conclusion: Our findings encourage practitioners to apply single, serial and 24-hour measurements of arterial stiffness parameters in clinical practice in patients with CV diseases.

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Progression of vascular changing and hypertensive retinopathy during bradykinin B1 receptor antagonist treatment in SHR rats

Abstract: P6050

Progression of vascular changing and hypertensive retinopathy during bradykinin B1 receptor antagonist treatment in SHR rats

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Topic(s):

Hypertension, other

Citation:

European Heart Journal (2017) 38 (Supplement), 1272

Introduction: It is well known that currently used non-steroidal anti-inflammatory drugs have adverse effects on cardiovascular morbidity and mortality. NSAIDs are increasingly employed in ophthalmology to reduce miosis and inflammation, manage scleritis, and prevent and treat cystoid macular edema associated with cataract surgery. In addition, they may decrease postoperative pain and photophobia associated with refractive surgery and may reduce the itching associated with allergic conjunctivitis. NSAIDs also have therapeutic effects on diabetic retinopathy. In the present work we investigated the effects of a new analgesic compound, the bradykinin B1 receptor antagonist test substance, FGY-1153 on the progression of hypertensive retinopathy of spontaneously hypertensive rats (SHR) as a promising substituent of disadvantageous NSAIDs in cardiovascular regards.

Methods: The test substance was administered in rat chow test diet containing a concentration of 120 ppm or 400 ppm of FGY1153, or control diet containing no active ingredient. The treatment started at the age of 11 weeks and lasted for 26 weeks. We investigated the hypertensive organ damages on heart (previously reported), carotid artery, aortic segments and the retina with light microscopy, immunohistochemistry, electron microscopy and Western blot analysis.

Results: The intima-media thickness of great vessels and the amount of vascular wall collagen content did not decrease significantly in treated animals. The whole retina (OLM-ILM) and ONL was thicker in the FGY120 compared to the FGY400 and Control groups. However, no major alteration could be found in cell number of GCL/100 µm retina length in the examined groups. The number of cells in the GCL/100 µm in normal 3 months old animals is around 7, thus it can be supposed that the hypertensive condition per se reduces this number; aging may have an additional effect on this parameter. In the number of TUNEL-positive cells (n=1–2 section in each group) no differences could be observed in the Control and the FGY-1153-treated retinas. Increased GFAP immunoreactivity was observed in the entire width of the SHR retinas compared to WKY and FGY120 retinas. In the FGY400 group the GFAP-level was elevated compared to the FGY120 group, but was less strong than in the SHR group.

Summary: Both doses of FGY-1153 have been found retinoprotective; the lower dose seemed to be more effective. These effects were more prominent in the inner retina. The slight changes in the neurochemical makeup of retinal cells indicate that the alterations in the hypertensive retina may be due to a slowly developing excitotoxicity. The protective effect was manifested in retaining the integrity of the retinal tissue and ultrastructure, and decreasing apoptosis.

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Gender differences in right ventricular function of athlete's heart

Abstract: P1538

Gender differences in right ventricular function of athlete's heart

Authors:

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Topic(s):

Sports cardiology

Citation:

European Heart Journal (2017) 38 (Supplement), 322

Funding Acknowledgements:

Heart and Vascular Center of Semmelweis University

Longitudinal shortening is considered to be the most important motion determining right ventricular (RV) function. However, the radial direction ("bellows" effect) can gain particular importance in certain conditions. Our aim was to quantify the longitudinal and the radial components of RV performance using three-dimensional (3D) echocardiography and assess their relative contribution to RV function in normal subjects versus elite female and male athletes.

Fourteen female and 15 male elite athletes competing in sport disciplines of combined exercise nature, and 14 age-matched healthy female volunteers were enrolled. Beyond conventional echocardiographic protocol, full volume datasets were acquired using multi-beat reconstruction from 4 or 6 cardiac cycles. Using dedicated software for RV 3D and speckle tracking analysis (4D RV-Function 2), 3D beutel model was created and exported volume-by-volume throughout the cardiac cycle. Beside end-diastolic (EDV) volume and total ejection fraction (TEF), we quantified longitudinal (LEF) and radial ejection fraction (REF) by decomposing the motion of each vertex of the reconstructed 3D beutel model along three orthogonal axes and omitting the other two directions.

EDV was higher in both athlete group compared to controls (female athletes vs male athletes vs controls; 98 ± 25 vs 91 ± 21 vs 68 ± 26 mL, ANOVA $p < 0.05$). TEF was higher in female athletes compared to both groups (63 ± 3 vs 48 ± 3 vs $53\pm 3\%$, $p < 0.05$). LEF and tricuspid annular plane systolic excursion (TAPSE, conventional measure of RV longitudinal function) were similar. REF/TEF ratio was significantly higher in female athletes compared to both male athletes and controls (54 ± 8 vs 47 ± 11 vs $45\pm 10\%$, $p < 0.05$).

Current results suggest that there are considerable gender differences in terms of right ventricular function of athlete's heart. The increased ejection fraction of female athletes is attributable to the supernormal radial motion of the RV.

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Improved outcome in critical congenital heart disease by use of alternative to palliative arterial shunts

Abstract: P6045

Improved outcome in critical congenital heart disease by use of alternative to palliative arterial shunts

Authors:

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Topic(s):

Paediatric cardiology, other

Citation:

European Heart Journal (2017) 38 (Supplement), 1271

Introduction: Paediatric cardiac surgery now has low mortality (1.7% overall in our unit) so palliative procedures have to be very safe to be an effective alternative. Historically this was often a modified Blalock-Taussig shunt (MBTS) but nowadays significant adverse outcome is recognised with this operation. With newer and possibly safer alternative catheter based interventions we wished to reduce the complication rate by avoiding shunt operations for duct dependent congenital heart disease (CHD).

Purpose: We wished to continuously improve the outcomes in this important group of children with CHD

Methods: We studied all children who entered our service from 2002–2016 with duct dependent pulmonary circulation. They were divided into three time periods and also groups depending on cardiac anatomy. Analysis of data collected prospectively and at each time interval was undertaken of disease related outcomes and complications. Adverse outcome was noted if there was shunt failure (blockage, redo or additional MBTS) or death. Results are presented with median (interquartile range) and p values (Kruskal-Wallis). Complexity and morbidity was tracked with the Aristotle or Sata score post-operatively.

Results: 196 neonates were admitted with duct dependent pulmonary blood flow during the study period. 142 children underwent first MBTS with reducing frequency, 60 children underwent MBTS at 17 (6.5–49) days in 2002–2006 (period A, 4.82% of the total surgical programme), 51 from 2007–2011 at 8.5 (6–34) days (period B, 3.21% of the total) and 31 from 2012–2016 at 12 (8–19) days (period C, 1.8% of the total - $p < 0.0001$). The rest underwent catheter intervention. Overall, 41 had pulmonary atresia / intact ventricular septum, 39 had pulmonary atresia / ventricular septal defect, 57 had severe Tetralogy of Fallot, 21 had functionally single ventricle, 12 had complex transposition and 26 had other complex anatomies (such as isomerism). Adverse outcome rate from MBTS was constant during the study period at about 40%. Alternative intervention (such as outflow tract stent, duct stent, or Sano shunt) was undertaken in increasing numbers, so that total adverse outcome fell from 40.6% to 24.5%. In addition, morbidity fell from 6.6 (Aristotle) and 4.8 (Sata) overall to 3.7 (Aristotle) and 3.1 (Sata) ($p < 0.01$ for both).

Conclusion: A program of audit, planning and altered interventional strategy was effective in reducing adverse outcome in an era of developing interventional techniques. MBTS, now regarded as high risk, should be avoided except when there is no catheter interventional alternative. The overall results have improved and complication rates have been shown to fall markedly by diagnosis as a result of reduction in BT shunt operations.

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The role of CMR versus conventional diagnostic markers in myocardial infarction with non-obstructed coronary arteries (MINOCA)

Abstract: P551

The role of CMR versus conventional diagnostic markers in myocardial infarction with non-obstructed coronary arteries (MINOCA)

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Topic(s):

Cardiovascular Magnetic Resonance (CMR)

Citation:

European Heart Journal (2017) 38 (Supplement), 93

Objectives: Definite diagnosis of patients with myocardial infarction with non-obstructed coronaries (MINOCA) has a vital role in management. MINOCA represents a diagnostic challenge, and CMR could play an important role in establishing the underlying aetiologies. Robust evidence of the role of CMR in MINOCA is lacking. Our goal was to evaluate the role of CMR in patients presenting with MINOCA, comparing with the conventional diagnostic markers.

Methods: In this observational registry study, consecutive patients with MINOCA referred for CMR were analysed. (between September 2011 and January 2016). 402 consecutive patients (mean age 56±17 yrs, 52% male) were identified. 1.5T CMR was performed using a comprehensive protocol including cines, T2-weighted, and late gadolinium enhancement (LGE) sequences. Patients were grouped into 4 categories based on their CMR diagnosis: myocardial infarction (MI), myocarditis, cardiomyopathy (CM) and normal CMR. For statistical analysis we used Graphpad Quickcalc version.

Results: In 106 (26%) cases, the CMR scan was normal, myocardial infarction was reported in 105 (26%), cardiomyopathy in 94 (23%), myocarditis in 97 (24%) cases. Scans were performed after the admission in a median of 37 (IQR: 7–56) days. The mean BMI was 26±5, and 19% (77/402) of the patients presented with ST-segment elevation on the presentation ECG. Myocarditis was less common in females (23%) as compared to normal scans (51%), to cardiomyopathy (63%) or to MI (55%), p<0.001. Myocarditis group was younger than any other group. Troponin T levels can be seen in the table. The performance of conventional diagnostic markers individually or together to make the final diagnosis was poor compared to CMR.

Conclusion: In a large cohort (largest to date) of consecutive patients with MINOCA, CMR established a definitive diagnosis in 73% of cases with subsequent important clinical implications. CMR has an inevitable role in finding the definite diagnosis and thereby guiding in the proper therapy for patients with MINOCA.

Table 1. Results: Characteristics and comparison

	Total (n=402)	MI (n=105)	Myocarditis (n=97)	Cardiomyopathy (n=94)	Normal (n=106)	P
Mean age (SD)	56 (17)	62 (12)	43 (18)	64 (12)	54 (16)	a (<0.001), c (0.001), d (<0.001), e (<0.001) f (<0.001)
Female sex %	48	55	23	63	51	a (<0.001), d (<0.001), e (<0.001)
Troponin T ng/L median	478	668	900	423	182	b (0.041), c (<0.001), d (0.001), e (<0.001)

Pairwise comparison: a, MI vs Myocarditis; b, MI vs Cardiomyopathy; c, MI vs normal; d, Myocarditis vs cardiomyopathy; e, Myocarditis vs normal; f, Cardiomyopathy vs normal. STEMI: ST elevation myocardial infarction; LVEF: left ventricular ejection fraction; RWMA: regional wall motion abnormality; LGE: late gadolinium enhancement.

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Mortality rates in hypertensive subjects with peripheral arterial disease: detection of a J-curve phenomenon

Abstract: P3227

Mortality rates in hypertensive subjects with peripheral arterial disease: detection of a J-curve phenomenon

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On behalf: ERV study group

Topic(s):

Peripheral artery disease - Pathophysiology, epidemiology, diagnosis

Citation:

European Heart Journal (2017) 38 (Supplement), 653-654

Background: Determination of asymptomatic organ damage is important in cardiovascular risk stratification, and has a great impact on the treatment of hypertension. The measurement of the ankle-brachial index (ABI) is an accepted method for the detection of asymptomatic peripheral arterial disease (PAD). Abnormal ABI is accepted as a marker of cardiovascular risk that predicts adverse cardiovascular outcomes.

Purpose: The assessment of mortality rates during the follow-up period of the ERV program in hypertensive patients with abnormal ABI (PAD patients).

Methods: The Hungarian ERV program is a large-scale, multicenter, observational study with a cross-sectional and a longitudinal part. The first period of the study was conducted from April 2007 to September 2008 in 55 hypertension outpatient clinics in Hungary and the prospective phase was ended in April 2014. In all patients ABI was measured and cardiovascular outcomes were collected in the 5 years follow-up period.

Results: In the 21892 enrolled hypertensive patients (50–75 years of age), the prevalence of PAD (ABI ≤ 0.9) was 14.4%. In 9.4% of the subjects high ABI (>1.3) was measured. Among these hypertensive subjects the five years cumulative death ratio in both gender was twice as high in PAD patients compared to those without PAD (17.4% vs 7.4% in men, $p < 0.001$; 9.8% vs 4.2% in women, $p < 0.001$). The cumulative death ratio was significantly higher in patients with high ABI, as well. The relative risk of cumulative death was higher in case of low ABI compared to patients with normal ABI values both in men (RR: 2.32; $p < 0.001$) and in women (RR: 2.32; $p < 0.001$).

In hypertensive PAD patients mortality increased in both genders in patients with systolic blood pressure below 120 mmHg and above 160 mmHg compared to systolic blood pressure 130–139 mmHg ($p < 0.001$ and $p < 0,01$) and in men below diastolic pressure 70 mmHg and above 90 mmHg compared to diastolic blood pressure 80–89 mmHg ($p < 0.001$ and $p < 0.01$).

Conclusion: Low ABI is a strong predictor of mortality in hypertensive patients. In hypertensive PAD patients, the J-curve shape phenomenon between blood pressure and mortality was firstly described in our analysis. Its existence and the potential causality needs further analysis.

G. Fogarassy¹, A. Vathy-Fogarassy², L. Hornyak³, T. Forster⁴, ¹Balatonfured State Cardiology Hospital - Balatonfured - Hungary, ²University of Pannonia, Department of Computer Science and System Technology - Veszprem - Hungary, ³Ferenc Csolnoky Hospital, Oncology Centre - Veszprem - Hungary, ⁴University of Szeged, Second Department of Internal Medicine and Cardiology Centre - Szeged – Hungary:

Risk factors for heart failure after doxorubicin chemotherapy for breast- or colorectal cancer

Abstract: 1958

Risk factors for heart failure after doxorubicin chemotherapy for breast- or colorectal cancer

Authors:

G. Fogarassy¹, A. Vathy-Fogarassy², L. Hornyak³, T. Forster⁴, ¹Balatonfured State Cardiology Hospital - Balatonfured - Hungary, ²University of Pannonia, Department of Computer Science and System Technology - Veszprem - Hungary, ³Ferenc Csolnoky Hospital, Oncology Centre - Veszprem - Hungary, ⁴University of Szeged, Second Department of Internal Medicine and Cardiology Centre - Szeged - Hungary,

Topic(s):

Cardiotoxicity of drugs

Citation:

European Heart Journal (2017) 38 (Supplement), 406

Funding Acknowledgements:

Hungarian Government through the project VKSZ 12-1-2013-0012 - Competitiveness Grant

Background: Development of dilated cardiomyopathy (DCM) after anthracycline chemotherapy is mainly influenced by anthracycline cumulative dose. Based on published data, doxorubicin treatment under cumulative dose of 450 mg/m² is considered to be associated with a low incidence of heart failure (HF). Patients older than 65 years are more susceptible for anthracycline-related DCM. Risk factors for development of HF after anthracycline treatment is still not known in details. Dexrazoxane may have a protective effect against cardiotoxicity, but its role remained equivocal.

Purpose: Our purpose was to assess the incidence of HF after doxorubicin therapy and to identify the risk factors for HF.

Methods: With use of the anonymized financial database of the Hungarian National Health Insurance Company we performed a retrospective nation-wide study. Study subjects and outcome events were defined with the International Classification of Diseases (ICD) codes. We enrolled all the patients who had histological confirmation for breast- or colorectal carcinoma between 1st January 2004 and 31st December 2015. 164 640 patients met these inclusion criteria. We excluded the subjects who did not have a minimum 3-year long preceding period documented without any chemotherapy, or assignment of I50 (HF) and I420 (DCM) ICD codes before index chemotherapy. HF outcome event was defined by assignment of I50 ICD code at hospital discharge, or in autopsy report. HF event incidence was only analysed at the subjects with at least 3-year follow-up data or reaching the event earlier. We used multivariate binary stepwise logistic regression to calculate odds ratios (OR) for HF. Oncology state was considered as potential confounding factor.

Results: 3298 doxorubicin-treated patients were eligible for HF analysis. We found 6.2% cumulative incidence for HF. Incidence was essentially influenced by doxorubicin cumulative dose and age. Doxorubicin cumulative dose over 300 mg/m² was proven independent predictor for HF (for dose 301–400 mg/m² OR: 1.40, p=0.083, for dose over 400 mg/m² OR: 2.29, p=0.008). Risk of HF was elevated with older age: OR for HF at age 50–59 was 2.95, at age 60–69 was 4.02 and at age over 70 was 5.69, compared to those under 40. No other chemotherapy, besides doxorubicin, was found to have cumulative dose-dependent effect on HF. Diabetes mellitus (OR: 1.47), capecitabine (OR: 2.47), 5-fluorouracil (OR: 1.43), bevacizumab (OR: 2.41) and carboplatin (OR: 1.88) were also proven independent variables with significant association with HF (p values <0.05). Presence of trastuzumab, taxanes, cyclophosphamide and dexrazoxane had no significant impact on the HF outcome event.

Conclusion: We found significant elevation of HF incidence with increasing age, even over 50 years and with doxorubicin cumulative dose over 300 mg/m². Completing the treatment with pyrimidine-analogues, platinum-containing drug (carboplatin) and bevacizumab was associated with higher risk for HF.

L.A. Geller¹, Z. Sallo¹, L. Molnar¹, T. Tahin¹, S.Z. Szilagy¹, I. Osztheimer¹, E. Zima¹, A. Apor¹, A.I. Nagy¹, N. Szegedi¹, K.V. Nagy¹, B. Merkely¹, ¹Semmelweis University, Cardiovascular Center - Budapest – Hungary:

10 years experience of the efficacy and safety of the transeptal endocardial left ventricular lead implantation - An alternative technique in special cases of failed cardiac resynchronization therapy

Abstract: P5470

10 years experience of the efficacy and safety of the transeptal endocardial left ventricular lead implantation - An alternative technique in special cases of failed cardiac resynchronization therapy

Authors:

L.A. Geller¹, Z. Sallo¹, L. Molnar¹, T. Tahin¹, S.Z. Szilagy¹, I. Osztheimer¹, E. Zima¹, A. Apor¹, A.I. Nagy¹, N. Szegedi¹, K.V. Nagy¹, B. Merkely¹, ¹Semmelweis University, Cardiovascular Center - Budapest - Hungary,

Topic(s):

Cardiac resynchronisation therapy

Citation:

European Heart Journal (2017) 38 (Supplement), 1165

Introduction: CRT implantation is a gold standard in chronic heart failure patients with left bundle branch block. Optimal transvenous left ventricular (LV) lead positioning might be challenging or in some cases impossible.

Objectives: The aim of this study was to investigate the very long term effectiveness, feasibility and safety of transeptal endocardial left ventricular lead implantation (TELVLI) in severe heart failure patients.

Methods: TELVLI was performed in 51 patients (42 men, 69±7 years, NYHA III-IV stage) between 2007 and 2017. Intracardiac ultrasound was used to guide the transeptal (TS) puncture in 26 pts. In 33 cases, the transeptal puncture was performed via the femoral vein, and in the other 18 cases, the transeptal puncture and also the LV lead placement were both performed via the subclavian vein. The site of the puncture was dilated with a 6mm (the first 3 pts), later with an 8 mm balloon (48 pts). After the puncture of the left subclavian vein, an electrophysiological (EP) deflectable CS catheter was introduced into the CS sheath. The CS catheter was used to reach the left atrium and after it the left ventricle through the dilated transeptal puncture hole. The site of the latest activation was mapped with the EP catheter. At the latest LV activation site 65 cm active fixation bipolar lead was screwed into the LV wall, at the site of the latest activation.

Results: The lead was fixed in the left ventricle in all cases with good pacing threshold ($0,82\pm 0,5$ V; 0,4 ms). Puncture complication, pericardial effusion was not seen. Due to the intraoperatively started anticoagulation, pocket haematoma was observed in three (6%) and needed evacuation in one case (2%). Follow-up was longer than one month in 50 patients [median 29 (IQR 9–40) months]. Significant improvement of NYHA was observed in all but one case (98%), the 6 month control LV EF was 30% (IQR 27–33%) vs. 36% (IQR 32–41%). Early lead dislocation was noticed in three cases (6%), reposition was performed in all cases. Explantation of the system was necessary because of pocket infection in four cases (8%), in three of these TELVLI was carried out successfully 3 months later, in one patient 22 months later. All patients were maintained on anticoagulation therapy with INR between 2.5–3. Three thromboembolic complications (2 non-disabling stroke – 4%, 1 TIA – 2%) were noticed during the follow up. 28 patients were lost, one of them died five years after the implantation in renal failure, the other patient died in malignant tumor 4 years after the implantation, 26 patients died due to the progression of the heart failure in average 15 months after the implantation.

Conclusion: Long term follow up proved a long term positive effect on LV EF. The stroke rate is similar to the CHF patient's historical data (3,5–5% during 5 years). TELVLI approach seems to be a very promising alternative technique even in long term when transvenous implantation failed.

Dezso Gelleri¹, Laszlo Lenard², D.R. Gyula Feke¹, ¹Bacs-Kiskun County Teaching Szent Kereszt Hospital of Szeged, Department of Cardiac Rehabilitation - Kalocsa - Hungary, ²Heart Institute - Pécs – Hungary:

Long-term follow-up of patients with rheumatic heart disease: a 41-year prospective and retrospective study between 1975 and 2016

Abstract: 4112

Long-term follow-up of patients with rheumatic heart disease: a 41-year prospective and retrospective study between 1975 and 2016

Authors:

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Topic(s):

Rheumatic heart disease

Citation:

European Heart Journal (2017) 38 (Supplement), 849

Background: The population of patients (pats.) with rheumatic heart valve disease almost disappeared in Central Europe; however, it is well known that this disease was rather common in the 1960s and 70s in this region. Our aim was to monitor the natural history of those not treated and those treated with valve replacement. Our method was as follows: 161 pats. collected between 1975 and 1976 were followed prospectively till 1996, then retrospectively from 1997 to 2016 (Group A).

Results: The 161 pats. were diagnosed with the following conditions: mitral stenosis: 53, mitral regurgitation: 26, mitral stenosis and regurgitation (both): 22, aortic stenosis: 6, aortic regurgitation: 18, both: 14, multivalvular: 22. The female/male ratio was 96/65 (1.5). 106 pats. (66%) were class I-II and 55 (34%) were class III-IV by NYHA classification. The mean age was 35.9 (± 6.9) years. By the end of 1976, the patient population dropped to 151 with 6 deceased and 4 lost, and the proportion of pats. operated on was 36/151 (23.8%), including 3 with artificial valves. Long-term follow-up commenced in 1977 with 151 pats. By 1979, the number of pats. decreased to 113 with 82 (73%) in class I-II and 31 (27%) in class III-IV. The female/male ratio was 69/44 (1.6). The proportion of pats. operated on was 31/113 (27.4%), including 14 with artificial valves. By 1988, the number of pats. with artificial valves (Group B)

reached 50 with 32 pats. (64%) in class I and 18 (36%) in class II, i.e. fit for work. The mean age was 49.4 (± 8.4) years. In 1996, the number of pats. shrank to 39 due to death and the female/male ratio was 2.0. Between 1975 and 1996, the 50 pats. in Group B encountered 60 mechanical and 10 biological heart valves due to multiple replacement cases and replacements between 1988 and 1996. Between 1988 and 1996, the mortality rate in pats. who also carry biological valves was 6/10 (0.6) vs. 11/60 (0.18; $p < 0.05$) in pats. with exclusively mechanical valves. The survival rate in Group B, which was mathematically estimated till 2008 based on the mortality rate of the group between 1988 and 1996, was in good correlation with the actual rate. On the final closure of the study in 2016, there were only 5 women alive. The mean age was 72.0 (± 9.5) years with a maximum of 84 and a minimum of 56. 3 of the 5 pats. carried an unreplaced single tilting-disc valve, one of which was 40 years old. In 2014, a thorough search revealed an unoperated 71-year-old patient in Group A with mitral stenosis (mitral area = 1.5 cm^2).

Conclusions: Survival rates and quality of life in treated rheumatic heart valve disease patients (especially females) with artificial valves are favourable. Biological valves were unsatisfactory even if replacement was successful. In rare cases, patients with rheumatic mitral valve stenosis may live for almost forty years without an operation. Group survival can be mathematically estimated several years ahead in homogeneous groups of rheumatic patients.

A. Janosi¹, P. Ofner¹, T. Ferenci², ¹Gottsegen Gyorgy Hungarian Institute of Cardiology - Budapest - Hungary, ²Obuda University, John von Neumann Faculty of Informatics, Physiological Controls Group - Budapest – Hungary:

Treatments and outcomes of myocardial infarction patients with ST elevation versus new or probably new left bundle branch block

Abstract: P4648

Treatments and outcomes of myocardial infarction patients with ST elevation versus new or probably new left bundle branch block

Authors:

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On behalf: Hungarian Myocardial Infarction Registry

Topic(s):

ACS - STEMI

Citation:

European Heart Journal (2017) 38 (Supplement), 990

Background: Patients with typical chest pain and ST elevation or left bundle branch block on the presenting ECG should be treated with urgent revascularization. However, we have limited data comparing the characteristics and prognosis of these two patient groups.

Purpose: Our aim was to investigate clinical features and prognosis of patients according to presenting ECG: ST elevation versus new or probably new left bundle branch block (nLBBB).

Methods: Between 1 January 2014 and 30 June 2015 we enrolled 18091 patients (pts) in our National Registry of Myocardial Infarction which is a mandatory, on-line database: 7937 pts had ST-elevation myocardial infarction (STEMI), 9757 pts had non-ST elevation MI (NSTEMI) and 397 pts had nLBBB on presenting ECG. Characteristics were univariately compared with Mann-Whitney U test and Monte-Carlo test and survival time was multivariately modeled with Cox proportional hazards model.

Results: Clinical characteristics, comorbidities and hospital treatment are summarized in Table 1. Thirty-day and one-year mortality of patients with ST elevation treated with primary PCI were lower compared to patients with nLBBB on presenting ECG and treated with primary intervention (8.5% and 14.7% versus. 17.8 and 27%). In the multivariate model, the presenting ECG was a significant predictor of survival (HR=1.32 (95% CI: 1.07–1.62), p=0.0085 for nLBBB vs. ST elevation); the most important further predictors were: age, PCI, systolic blood pressure and heart rate at admission and serum creatinine. The presenting ECG did not significantly modify the effect of PCI (p=0.5426 for interaction).

Conclusion: Acute myocardial infarction patients with nLBBB have a poor prognosis when compared to myocardial infarction patients with ST elevation.

Table 1. Clinical characteristics, comorbidities and hospital care of patients with acute myocardial infarction according to the presenting ECG at the time of hospital admission

	ST elevation (n=7937)	nLBBB (n=397)	p
Age (year±SD)	64.6±13.1	71.7±12.1	
Men (%)	54,7	61,5	p=0.007
Diabetes mellitus (%)	26.9	38.6	p<0.001
Hypertension (%)	73.9	80.9	p=0.002
Previous MI (%)	17.6	25.5	p<0.001
Previous stroke (%)	7.9	13.7	p<0.001
Coronarography (%)	87.4	71.6	p<0.001
Primary PCI (%)	78.7	57.9	p<0.001

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Quantitative follow-up of cardiac allograft vasculopathy in heart transplanted patients using coronary CT angiography

Abstract: P2390

Quantitative follow-up of cardiac allograft vasculopathy in heart transplanted patients using coronary CT angiography

Authors:

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Topic(s):

Computed Tomography (CT)

Citation:

European Heart Journal (2017) 38 (Supplement), 485

Purpose: Cardiac allograft vasculopathy shows high inter-patient variations in heart transplanted (HTX) patients and has poor prognosis if diagnosed within few years after HTX. Coronary CT angiography (CTA) detects CAV with excellent accuracy. We sought to assess the feasibility of quantitative characterization and follow-up of CAV in HTX patients using coronary CTA.

Methods: 30 patients (21 males, age 55 [IQR: 50; 60] years) underwent 256-slice coronary CTA one year after HTX and an additional coronary CTA as part of the routine yearly follow-up at our institution. We quantified total vessel wall volume to assess CAV in all coronaries up to 2 mm luminal diameter using a semi-automated software, at the first year CTA and at the follow-up scan. Fixed threshold settings were used to assess various wall components: calcified (>350 HU), non-calcified (75–350 HU) and low-attenuation non-calcified tissue (<75 HU).

Results: Median follow-up was 414 [IQR: 376; 737] days. Total lumen volume did not change between baseline and follow-up studies, $p=0.147$. Total vessel wall volume showed 7.2% [IQR: 5.8; 10.2] growth, as overall vessel wall volume increased from 445 [IQR: 349; 604] to 534 [IQR: 390; 728] mm³ ($p<0.001$). Non-calcified and low-attenuation non-calcified tissue volumes showed significant progression (393 [IQR: 250; 481] vs. 451 [IQR: 278; 575] mm³, $p=0.001$ and 12 [IQR: 5; 22] vs. 21 [IQR: 7; 47] mm³, $p=0.002$, respectively), while calcium volume did not change between baseline and follow-up CTAs (81 [IQR: 22; 131] vs. 68 [IQR: 21; 93] mm³, $p=0.229$).

Conclusion: Quantitative follow-up of CAV is feasible with coronary CTA in HTX patients. CAV progression within the first years after HTX is mainly attributable to non-calcified tissue.

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Radiomic features of high risk coronary atherosclerotic plaques in coronary CT angiography

Abstract: P534

Radiomic features of high risk coronary atherosclerotic plaques in coronary CT angiography

Authors:

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Topic(s):

Computed Tomography (CT)

Citation:

European Heart Journal (2017) 38 (Supplement), 88

Introduction: Positive remodeling (PR), low attenuation (LA), spotty calcium (SC) and the napkin-ring sign (NRS) have been associated with major adverse cardiac events. PR, LA, SC are semi-quantitative plaque features, and require quantitative measurements, while the NRS is a qualitative parameter showing a distinct morphology. The NRS is described as: a non-calcified plaque cross-section with a central area of low CT attenuation that is apparently in contact with the lumen, which is surrounded by a ring-like higher attenuation plaque tissue. The reproducible identification of NRS is challenging since it relies solely on qualitative image interpretation. Radiomics is the process of extracting various different quantitative features from a given pathology to describe morphology. Therefore, our aim was to assess whether radiomic features are capable to identify the NRS.

Methods: We included 20 patients (mean age: 63.8±8.9, 20% female), 10 with NRS plaque and 10 matched patients with non-NRS lesions. We matched the patients and plaques based-on plaque localization, plaque type and stenosis severity. Coronary lesions were segmented and voxels containing the vessel wall were exported as a DICOM dataset. Radiomic features were calculated on the exported datasets. Radiomic feature values were compared between the two groups using Wilcoxon signed-rank test. Diagnostic accuracy was described using the Area Under the Curve (AUC) of Receiver Operating Characteristics calculations.

Results: Overall, 15608 quantitative features were calculated for each lesion. 4619 (29.6%) parameters showed significant difference between the two groups at a $p < 0.05$ level, 1270 (8.1%) at $p < 0.01$. In total, 2834 (18.3%) of the calculated parameters had a AUC value greater than 0.8, 510 (3.3%) had a value greater than 0.9 and 83 (0.5%) had an AUC value greater than 0.95.

Conclusions: To the best of our knowledge, this is the first study to demonstrate the feasibility of calculating radiomic features on coronary lesions. Based on our results, radiomics seems to be a promising new technique capable of quantifying lesion morphology and identifying high-risk coronary plaques.

A. Komocsi¹, M. Simon¹, A. Janosi², ¹University of Pecs, Heart Centre - Pécs - Hungary, ²Gottsegen Gyorgy Hungarian Institute of Cardiology - Budapest – Hungary:

Gender difference in mortality after acute myocardial infarction. Does later call for help in women define survival?

Abstract: P5592

Gender difference in mortality after acute myocardial infarction. Does later call for help in women define survival?

Authors:

A. Komocsi¹, M. Simon¹, A. Janosi², ¹University of Pécs, Heart Centre - Pécs - Hungary, ²Gottsegen Gyorgy Hungarian Institute of Cardiology - Budapest - Hungary,

Topic(s):
ACS - STEMI

Citation:
European Heart Journal (2017) 38 (Supplement), 1202-1203

Aims: Women may have worse survival after myocardial infarction (AMI). Risk factors and delays to intervention may be different between genders. We aimed to investigate the influence of time-delays on survival among percutaneous coronary intervention (PCI) treated STEMI cases in a nation-wide AMI registry.

Methods and results: Between March 1, 2013 and March 1, 2015, we collected clinical characteristics of PCI treated STEMI cases from the interventional cardiology centers of Hungary. The risk of all-cause mortality at 1 year were compared between genders. Risk factors were analyzed in univariate and age balanced bivariate Cox regression models. Importance of delays from pain onset to intervention were analyzed in the entire cohort as well as after propensity score (PS) matching.

A total of 7726 patients with STEMI were registered. (37% female). Times till balloon inflation were longer in women with STEMI (mean difference (MD) 3.8±1.7 hours, p<0.05) dominated by longer prehospital delay (MD: 2.4±1.1 hours, p<0.05). Unadjusted mortality risk was higher among women Hazard Ratio: 1.51, p<0.001. However, this difference disappeared if age was included in the model (HR 0.97 p=0.66 for female gender, HR: 1.95 p<0.001 for age).

Furthermore, in the PS matched sample balanced for major risk factors (n=4972), the time to intervention and prehospital delay were not significantly different (p=0.13 and p=0.05, respectively) and female gender was not significantly associated with mortality (HR 1.0 p=0.9 for female gender, HR 2.00 p<0.01 for age)

Conclusions: Data from nation-wide registry of acute MI patients does not support existence of a significant gender difference in time to intervention. Apparent higher mortality of women in non-balanced sample may be explained by different age and clinical risk profile of female cases.

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Long-term clinical outcome of patients after de novo vs. upgrade cardiac resynchronization therapy: a high volume, single center experience

Abstract: P5491

Long-term clinical outcome of patients after de novo vs. upgrade cardiac resynchronization therapy: a high volume, single center experience

Authors:

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Topic(s):

Cardiac resynchronisation therapy

Citation:

European Heart Journal (2017) 38 (Supplement), 1172

Background: Biventricular (CRT) upgrade affects about 10% of patients who have undergone implantable cardiac defibrillator (ICD) or conventional pacemaker (PM) implantation. However the current guidelines do not provide a comprehensive recommendation for upgrade.

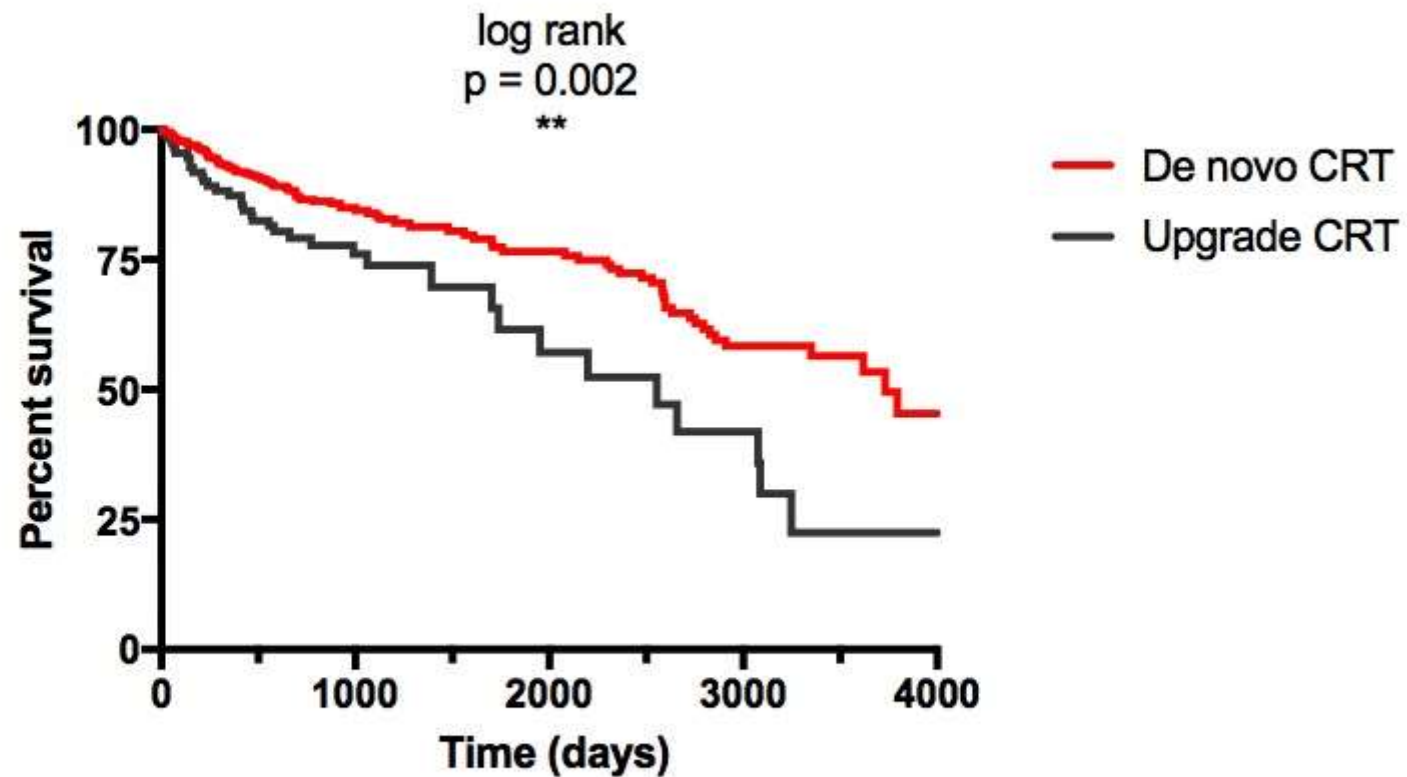
Purpose: We evaluated long-term outcomes of patients who were upgraded to CRT from a conventional PM or ICD and compared to de novo implantations in our high-volume, single-centre experience.

Methods: Symptomatic (NYHA II-IV class) heart failure patients with decreased ejection fraction ($EF \leq 35\%$) and wide QRS (≥ 120 ms) were collected in a retrospective registry from 2003 to 2016. Primary endpoint was all-cause mortality, secondary endpoint was echocardiographic response. Kaplan-Meier and Cox regression analyses were used.

Results: From 110 upgraded and 431 de novo CRT implanted patients 131 reached (35 CRT-upgrade, 96 de novo CRT) the primary endpoint during the mean follow up time of 3.8 years. Patients in the upgrade CRT group were older (de novo 65 vs. upgrade 71 yrs; $p < 0.01$), had higher serum creatinine level (de novo 103 vs. upgrade 122 $\mu\text{mol/l}$; $p < 0.01$) and atrial fibrillation (de novo 31% vs. upgrade 51%; $p = 0.002$). Univariate analysis showed patients in the upgrade CRT group had 83% higher risk of all-cause mortality compared to de novo CRT patients (HR 1.83; 95% CI: 1.24–2.70; $p = 0.02$). However multivariate analysis did not show a significant difference between patients in the upgrade vs. de novo CRT groups (HR 1.49; 95% CI: 0.93–2.38; $p = 0.10$), after adjusting for relevant clinical covariates. When echocardiographic response was evaluated, improvement of left ventricular ejection fraction was similar in the two groups 8 months after the procedure (absolute LVEF increase in de novo 9% vs. upgrade 7%; $p = 0.16$).

Conclusions: However patients referred for CRT upgrade shows a higher risk of all cause mortality, it is derived from comorbidities, while their clinical response seems similar compared to de novo CRT patients.

De novo CRT vs. Upgrade CRT



Patients at risk

de novo CRT	431	176	96	51	10
upgrade CRT	110	42	14	8	2

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De novo implantation vs. upgrade cardiac resynchronization therapy: a systematic review and meta-analysis

Abstract: P5475

De novo implantation vs. upgrade cardiac resynchronization therapy: a systematic review and meta-analysis

Authors:

A. Kosztin¹, M. Vamos², D. Aradi¹, R. Schwertner¹, A. Kovacs¹, K.V. Nagy¹, E. Zima¹, L. Geller¹, G. Duray³, V. Kutyifa⁴, B. Merkely¹, ¹Semmelweis University, Heart Center - Budapest - Hungary, ²JW Goethe University - Frankfurt am Main - Germany, ³Military Hospital, Department of Cardiology - Budapest - Hungary, ⁴University of Rochester, Cardiology Division - Rochester - United States of America,

Topic(s):

Cardiac resynchronisation therapy

Citation:

European Heart Journal (2017) 38 (Supplement), 1167

Background: Patients with conventional pacemakers or implanted defibrillators are often considered for cardiac resynchronization therapy (CRT).

Aims: Our aim was to summarize the currently available evidences regarding the clinical benefits of upgrade procedures.

Methods: A systematic literature search was performed from studies published between 2006 and 2016 in order to compare the outcome of CRT upgrade vs. de novo implantations. Data on all-cause-mortality and heart failure events were systematically analysed with results on NYHA functional class, QRS narrowing and echocardiographic parameters.

Results: A total of 17 reports were analysed comprising 6628 CRT recipients, of whom 4549 patients underwent a de novo and 2079 an upgrade procedure. All-cause mortality was similar after CRT upgrade compared to de novo implantations (RR 1.10, 95% CI 0.99–1.22, p=0.08). The risk of heart failure was higher in the de novo group (RR 1.15, 95% CI 1.04–1.27, p=0.01). There was no significant difference in clinical response after CRT upgrade compared to de novo implantations in terms of improvement in left ventricular ejection fraction, (Δ EF de novo - 6.85% vs. upgrade -9.35%; p=0.235), NYHA class (Δ NYHA de novo -0.74 vs. upgrade -0.70; p=0.737) and QRS narrowing (Δ QRS de novo -9.6 ms vs. upgrade -29.5 ms; p=0.485).

Conclusions: Our systematic review and meta-analysis of currently available studies reports that CRT upgrade is associated with similar risk for all-cause mortality compared to de novo resynchronisation therapy. Benefits on left ventricular reverse remodelling and functional capacity improved similarly in both groups suggesting that CRT upgrade may be safely and effectively offered to patients in routine practice.

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Impact of non-cardiovascular disease burden on thirty-day hospital readmission in heart failure patients

Abstract: P606

Impact of non-cardiovascular disease burden on thirty-day hospital readmission in heart failure patients

Authors:

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Topic(s):

AHF - Epidemiology, prognosis and outcome

Citation:

European Heart Journal (2017) 38 (Supplement), 110

Background: Predictors of 30-day hospital readmission in heart failure (HF) hospitalized patients have been extensively studied however there are no specific data on the role of non-cardiovascular risk factors to identify patients with readmissions.

Methods: We analyzed the effect of non-cardiovascular disease burden by frequency of ICD-9 code categories on HF readmissions among HF hospitalizations from January 1st, 2007 to June 30th, 2014, at our Medical Center. We modeled the probability of readmission within 30 days as a function of demographic and clinical covariates. Variable selection was carried out using a bootstrap LASSO procedure in a randomly assigned training set with 1000 bootstrap samples, and tested in the validation set. Odds ratios and confidence intervals are reported using the validation set, adjusted for age, sex, and race.

Results: A total of 4061 patients with HF hospitalizations were identified, 793 of them (20%) were readmitted within 30 days. The strongest predictor for 30-day readmissions was hospital admission in the prior year ($p < 0.001$). Digestive system diseases increased the risk for readmission by 16% for each additional diagnosis ($p = 0.046$), while respiratory diseases and genitourinary diseases showed a trend towards a higher risk of readmissions with increasing burden of such co-morbidities ($p = 0.07$ and 0.09) (Figure).

Conclusions: In patients with HF hospitalization, prior admissions predicted 30-day hospital readmission. Diseases of the digestive system increase 30-day hospital readmission rates. Assessment of non-cardiovascular disease burden in HF patients could serve as an additional risk marker for 30-day hospital readmissions.

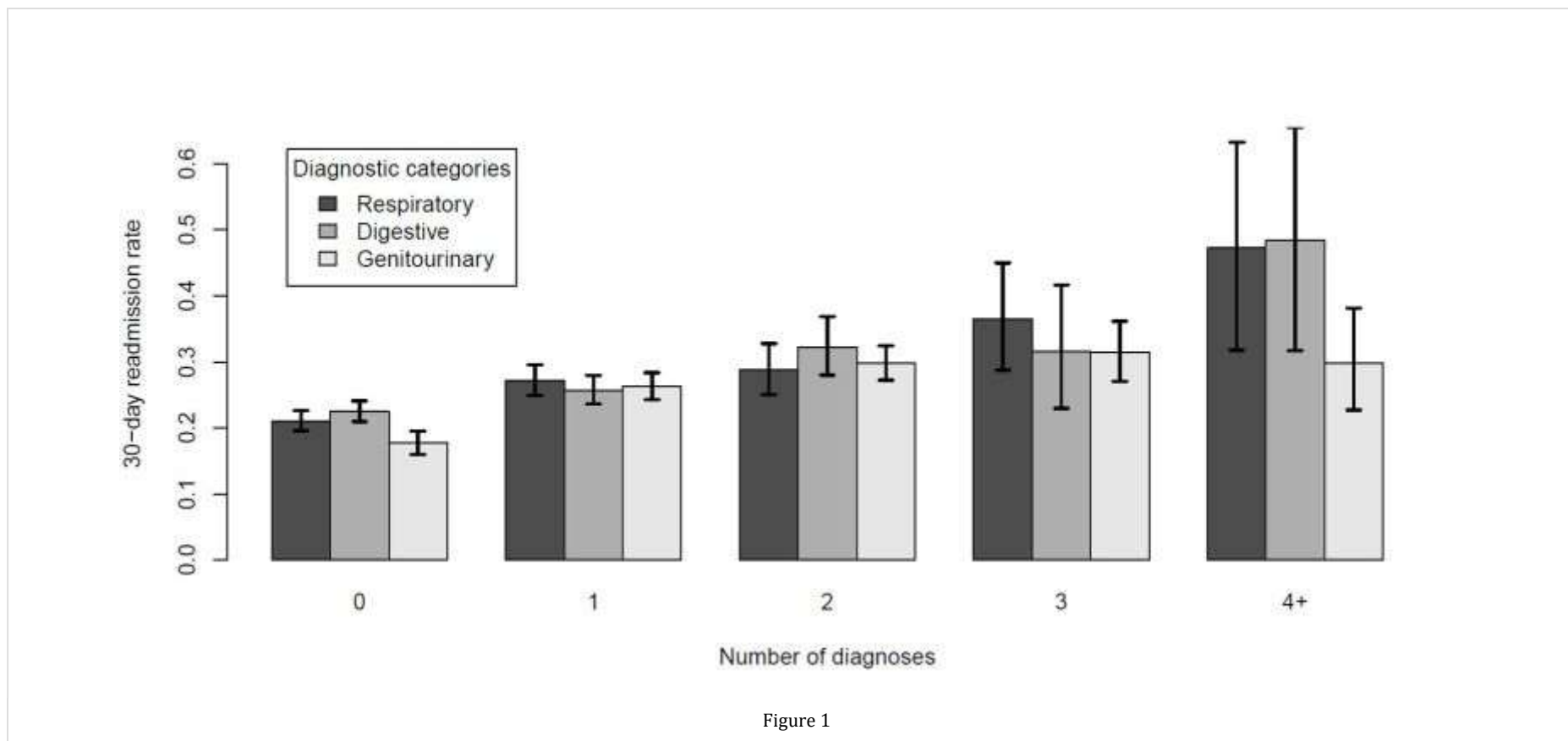


Figure 1

V. Kutyla¹, K. Vermilye¹, U. Daimee¹, S. McNitt¹, H. Klein¹, A. Moss¹, I. Goldenberg¹, ¹University of Rochester Medical Center, Cardiology Division - Rochester - United States of America:

Extended wearable cardioverter defibrillator use in patients at-risk for sudden death

Abstract: P6417

Extended wearable cardioverter defibrillator use in patients at-risk for sudden death

Authors:

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Topic(s):

Sudden cardiac death

Citation:

European Heart Journal (2017) 38 (Supplement), 1384

Background: Arrhythmia events and outcomes in patients using the wearable cardioverter defibrillator (WCD) for longer than 90 days have not yet been investigated. We aimed to assess arrhythmia events and outcomes in patients with extended WCD use, enrolled in the WEARIT-II registry.

Methods: We analyzed arrhythmia events and outcomes such as ejection fraction [EF] improvement, or ICD implantation, in patients with WCD use ≤ 90 days vs. >90 days in the WEARIT-II registry. Our analyses was further stratified by the etiology of cardiomyopathy (ischemic [ICM] vs. non-ischemic [NICM] vs. congenital/inherited heart disease).

Results: There were 981 (49%) patients with WCD use >90 days (median 120 days), and 1019 patients with WCD use ≤ 90 days. Extended WCD use patients were more likely to non-ischemic (50% vs. 43%, $p < 0.001$). During WCD use, there were 28 patients (2.7%) with sustained VT/VF events in the WCD use ≤ 90 days group, and an additional 13 patients (1.3%) in the WCD use >90 days group, highlighting the value of extended WCD use. Non-sustained VT events, and supraventricular events had similar incidences during short and extended WCD use (12 vs. 16, and 26 vs. 46 patients, $p > 0.05$). One-third of the patients with extended WCD use further improved their EF during follow-up (Figure). This was similar in ischemic and non-ischemic cardiomyopathy, while congenital/inherited heart disease patients were more often implanted with an ICD, regardless of WCD wear time.

Conclusion: In the WEARIT-II registry, patients with extended WCD use >90 days remained at risk for ventricular and atrial arrhythmia events, while one-third of them further improved their EF, avoiding the need for an ICD implantation. The wearable cardioverter defibrillator could further improve risk stratification for an ICD even after the typical 90 day wear period.

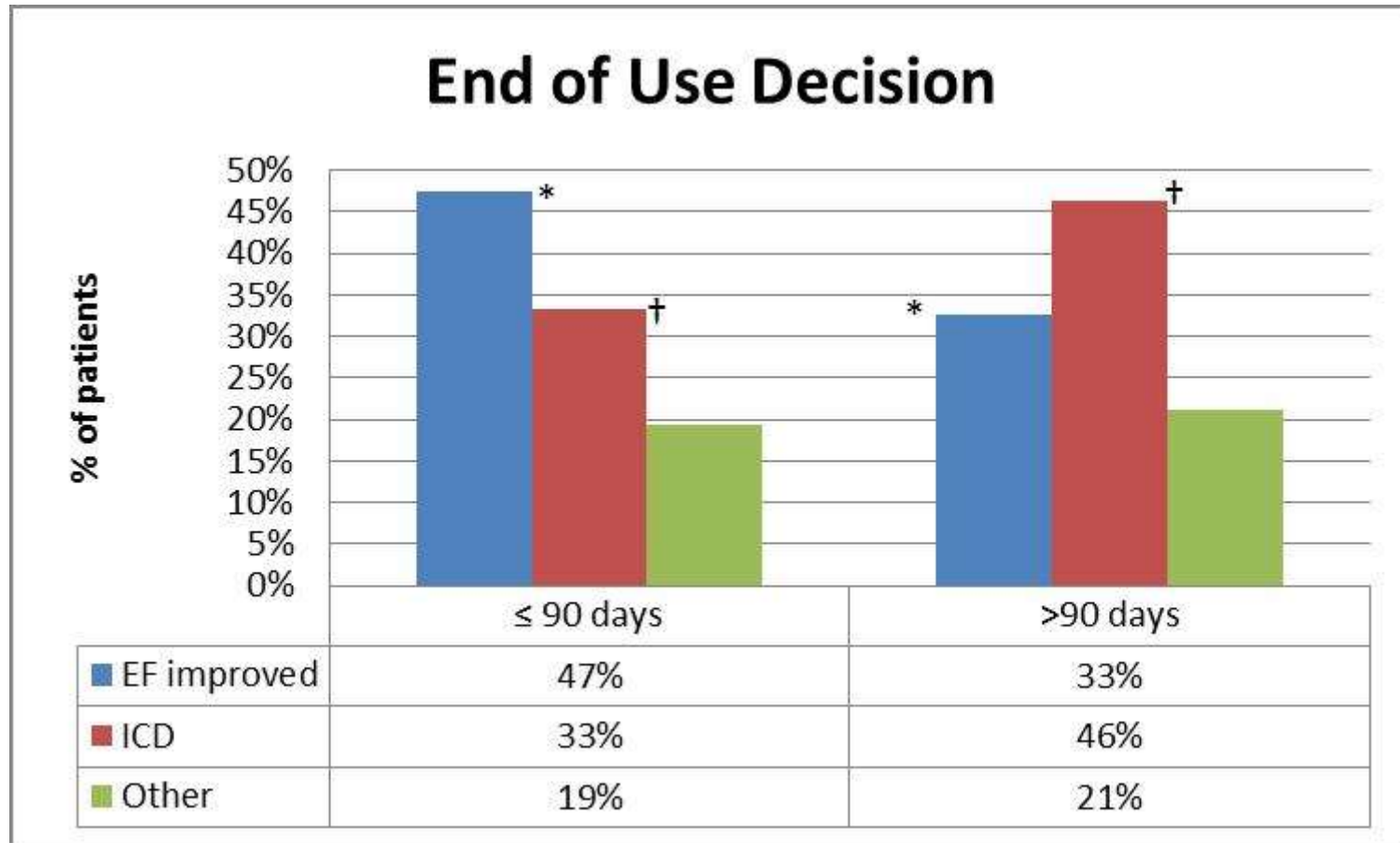


Figure 1

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Late diastolic radial motion is the main determinant of right ventricular filling in heart transplant recipients

Abstract: P2081

Late diastolic radial motion is the main determinant of right ventricular filling in heart transplant recipients

Authors:

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Topic(s):

CHF - Transplantation

Citation:

European Heart Journal (2017) 38 (Supplement), 424

Previous investigations confirmed the maintained, however, mechanically altered systolic function of the right ventricle (RV) in patients underwent heart transplantation (HTX). On the other hand, changes in RV diastolic function in this population may be of high clinical interest as well.

Our aim was to quantify the overall contribution of longitudinal and radial components of diastolic RV wall motion in HTX patients compared to healthy volunteers.

47 HTX recipients (median of 258 days after HTX) were enrolled in the study, and 29 age- and gender matched healthy volunteers (CTL) served as the control group. Full volume datasets of the RV were acquired and 3D beutel models were created and exported volume-by-volume. Beyond conventional echocardiographic parameters, such as RV end-diastolic volume (EDV), we have determined the early (E) and late (A) diastolic filling volumes as well. Using our custom method, we were able to decompose the motion of the RV along the three orthogonal axes and quantify the relative contribution of radial and longitudinal motion to the two phases of diastolic filling (E[rad], E[long], A[rad], A[long]) and also the overall contribution of these components (Dia[rad] and Dia[long]).

Compared to CTL, HTX patients have significantly higher EDV (HTX vs. CTL 96±28 vs. 79±26 mL, p<0.01). In the CTL group, the early diastolic filling volume was significantly higher, while in HTX patients the late diastolic filling was more dominant (E: 21±9 vs. 28±10 mL A: 20±12 vs. 11±5 mL, both p<0.01) suggesting impaired relaxation. The overall effect of longitudinal motion to diastolic filling is significantly lower in the HTX group, however, an increased radial contribution is present (Dia[long]: 10±8 vs. 14±4 mL; Dia[rad]: 23±8 vs. 17±7 mL, both p<0.001). Using multivariate analysis, in healthy volunteers the RV filling volume was mainly determined by E[rad] ($\beta=0.56$), E[long] ($\beta=0.45$) and A[long] ($\beta=0.34$), however, the late diastolic radial filling had a minor role (A[rad] $\beta=0.18$; overall $R^2=0.93$). In contrast to these findings, in HTX patients the late diastolic radial filling became far dominant (A[rad] $\beta=0.63$), followed by the other three components of RV filling (E[rad] $\beta=0.51$; E[long] $\beta=0.34$; A[long] $\beta=0.21$; overall $R^2=0.93$). Interestingly, all four parameters were independent predictors of diastolic filling volume in both study groups, referring to the separate physiological origin of these components.

Our findings suggest a remarkable functional shift in RV diastolic function in HTX recipients. While in healthy volunteers the longitudinal relaxation is superior, in HTX patients the late radial filling became dominant. Longitudinal and radial motion both in early and late diastole are independently predict the RV diastolic filling in HTX and in healthy as well, implying separate mechanisms behind these filling components.

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Early, combined heart failure therapy attenuates doxorubicin cardiomyopathy in rats

Abstract: P4356

Early, combined heart failure therapy attenuates doxorubicin cardiomyopathy in rats

Authors:

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Topic(s):

Cardiotoxicity of drugs

Citation:

European Heart Journal (2017) 38 (Supplement), 899

Funding Acknowledgements:

Supported by Krka and Amgen pharmaceuticals. D. Czuriga is supported by the János Bolyai Research Scholarship of the Hungarian Academy of Sciences.

Background: Doxorubicin (DOX) is a widely used chemotherapeutic agent with well known cardiotoxic side effects. High doses of DOX are commonly used to induce cardiomyopathy in experimental animal models of heart failure (HF). However, less data are available regarding the cardiotoxicity of therapeutic DOX doses, analogous with human oncotherapy.

Purpose: Our aim was to establish a rodent model of cardiomyopathy demonstrating early myocardial injury induced by repeated iv. DOX injections, with concentrations (ccs) extrapolated from consecutive cycles of human oncotherapy. In addition, we tested prophylactic (PRE) and delayed (POST) combined HF therapies in order to prevent DOX induced adverse myocardial changes.

Methods: We used 12-week-old male Wistar rats and divided them into 4 subgroups. Blood pressures (BP) and heart rate (HR) were monitored during the study by the tail-cuff method. DOX ccs were calculated from human doses of existing chemotherapy protocols and were corrected to the body surface of rats. After baseline echocardiography (echo), animals in the PRE group received a daily combination of bisoprolol (2.5 mg/kg), perindopril (2 mg/kg) and eplerenone (6.25 mg/kg) before, while those in the POST group 1 month after DOX treatment. Drugs were applied in a mucous vehicle by oral gavage. Positive controls received both DOX treatment and a drug-free vehicle (D-CON), while negative controls received drug-free vehicle only (CON).

DOX exposure was carried out by injecting 1.5 mg/kg DOX into the tail veins of the animals on 6 occasions. Follow-up echo was carried out 1 and 2 months after DOX treatment. DOX induced ultrastructural changes were validated by in vitro electron microscopic (EM) measurements.

Results: Systolic and diastolic BP, as well as HR were significantly lower in the PRE group, compared to all other groups. Follow-up echo revealed a gradually reducing ejection fraction (EF) in the D-CON and POST animals over the 2-month-period compared to CON (64.3 ± 3.5 and $67.4\pm 4.7\%$ vs. $72.4\pm 3.2\%$, $p=0.0001$), while no significant drop in the EF was observed in the PRE group ($79.2\pm 6.4\%$). At 2 months, a restrictive filling pattern was observed in the D-CON and POST groups but not in the CON and PRE animals. DOX induced a significant increase in the isovolumetric relaxation time, which could not be attenuated by either the PRE or POST treatment. EM measurements revealed pronounced myocardial damage in the D-CON group, which was partially attenuated in the PRE and POST groups.

Conclusions: We successfully established a rodent model to examine the cardiotoxicity of DOX chemotherapy. Prophylactic, but not post-exposure supportive treatment was capable of attenuating the DOX induced systolic and diastolic dysfunction. Our model seems eligible for future investigations to further elucidate cardiotoxic side effects of DOX, as well as for the development of early drug intervention protocols to eliminate myocardial injury induced by DOX chemotherapy.

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Real world experience of novel on-site coronary CT derived fractional flow reserve algorithm for the assessment of intermediate stenoses

Abstract: P5820

Real world experience of novel on-site coronary CT derived fractional flow reserve algorithm for the assessment of intermediate stenoses

Authors:

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Topic(s):

Computed Tomography (CT)

Citation:

European Heart Journal (2017) 38 (Supplement), 1229-1230

Background and purpose: Fractional flow reserve derived from coronary CT angiography (FFR-CT) is a novel tool for diagnosing ischemic coronary lesions. The aim of this prospective study was to evaluate the diagnostic performance of a novel on-site rapid FFR-CT algorithm as compared to invasive FFR as the gold standard, and to determine whether FFR-CT diagnostic performance is affected by inter-observer variations in lumen segmentation.

Methods: We enrolled 44 consecutive patients (64.6±8.9 years, 34% female) with 60 coronary atherosclerotic lesions who underwent coronary CT angiography (CTA) and invasive coronary angiography (ICA) in two centres. An FFR value of ≤0.8 was considered significant. Coronary CTA scans were evaluated by two expert readers, who manually adjusted the semi-automated coronary lumen segmentations for effective diameter stenosis (EDS) assessment and on-site FFR-CT simulation.

Results: The mean FFR-CT value was 0.77±0.15 while the mean EDS was 43.6±16.9%. The sensitivity, specificity, positive predictive value and negative predictive value of FFR-CT vs. EDS with a cut-off of 50% were the following: 90.5%, 71.8%, 63.3% and 93.3% vs. 52.4%, 87.2%, 68.8% and 77.3%. FFR-CT demonstrated significantly better diagnostic performance as compared to EDS (AUC: 0.89 vs. 0.74 respectively; p<0.001). The FFR-CT AUCs of the two readers did not show any significant difference (0.89 vs. 0.88; p=0.74).

Conclusion: On-site FFR-CT simulation is feasible and has better diagnostic performance than anatomical stenosis assessment. The diagnostic performance of the FFR-CT simulation algorithm does not depend on the readers' semi-automated lumen segmentation adjustments.

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Genetic and environmental effects on eutopic and ectopic adipose tissue quantities: a classical twin study

Abstract: 2852

Genetic and environmental effects on eutopic and ectopic adipose tissue quantities: a classical twin study

Authors:

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Topic(s):

Prevention - metabolic syndrome, obesity and nutrition

Citation:

European Heart Journal (2017) 38 (Supplement), 608

Funding Acknowledgements:

The study has received funding from the EFSD (European Foundation for the Study of Diabetes). Global Genomics Group contributed funding for CT imaging

Background: Different adipose tissue compartments (eutopic adipose tissues) and ectopic lipid accumulations may play a role in the pathomechanism of type 2 diabetes and cardiovascular diseases.

Purpose: We sought to investigate the genetic and environmental influences on the volume of eutopic adipose tissues (epicardial adipose tissue - EAT, abdominal subcutaneous adipose tissue - SAT, abdominal visceral adipose tissue - VAT) and ectopic lipid accumulation (hepatic lipid accumulation - NAFLD, pancreatic lipid accumulation - NAFPD) among adult monozygotic (MZ) and dizygotic (DZ) twin pairs.

Methods: As a total, 101 adult twin pairs (202 twin subjects, 64.4% women, 122 MZ and 80 DZ same-gender twin subjects, age: 65.2±9.4 years) underwent low-dose native CT imaging. Co-twin correlations between the siblings were analysed in MZ and DZ pairs separately. Next, genetic structural equation A-C-E models were used to model the magnitude of genetic and environmental factors influencing the different fat compartments.

Results: EAT volume was predominantly determined by genetic factors (rMZ = 0.81, rDZ = 0.32; 80% genetic and 20% environmental effect). Nearly similar determinations were found in SAT volume (rMZ = 0.80, rDZ = 0.68; 78% genetic and 22% environmental effect) and in abdominal VAT volume (rMZ = 0.79, rDZ = 0.48; 70% genetic and 30% environmental effect). None of the volumetric phenotype of EAT, SAT and VAT proved to be completely independent of the other two. The phenotypic appearance of NAFLD was predominantly influenced by environmental factors (rMZ = 0.34, rDZ = 0.16; 34% genetic and 66% environmental effect) similarly to that of NAFPD (rMZ=0.498, rDZ=0.080; 41% genetic and 59% environmental effect).

Conclusions: The quantities of different eutopic adipose tissue compartments have predominant genetic influence. On the contrary, development of ectopic lipid accumulation in the liver and in the pancreas is driven by environmental rather than genetic factors

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Gender differences in cardiovascular exercise adaptation in a rat model

Abstract: P1537

Gender differences in cardiovascular exercise adaptation in a rat model

Authors:

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Topic(s):

Sports cardiology

Citation:

European Heart Journal (2017) 38 (Supplement), 321-322

Introduction: Physical activity increases the microcirculation of muscles. As a result of regular sport, segmental remodeling can be observed in the wall of the arteries.

Purposes: Our hypothesis is that “athlete's heart” is associated with the complex remodeling of the arteries manifested as “athlete's artery”. Our aim was to study the morphological remodeling, reactivity and gender differences of exercise adaptation in muscular arteries in a rat model.

Methods: In our experiment, we studied the biomechanical features of gracilis arteries, which supply the adductor muscle, on 12 male and 12 female Wistar rats after a 12-week swimming training program. In the swimming group (6 male and 6 female rats), swimming time was increased to 200 minutes per session 5 days per week, while the control group (6 male and 6 female rats) swam 5 minutes a day 5 days a week. After preparation of the arteries, we studied their reactivity to pressure ($\Delta\mu\text{m}$ 0–150 mmHg) with a microangiometer in normal Krebs and noradrenalin medium. External and internal diameter and wall thickness were measured on videomicroscope images. Differences were tested with 2-way ANOVA. Significance was set at $p < 0.05$.

Results: Male and female trained groups had lower body weight (male: $417.5 \pm 27.6\text{g}$ vs. $470.5 \pm 21.0\text{g}$ and female: $283.1 \pm 13.3\text{g}$ vs. $289.2 \pm 14.8\text{g}$, $p < 0.001$) and higher heart weight (male: $1.64 \pm 0.24\text{g}$ vs. $1.59 \pm 0.09\text{g}$ and female: $1.27 \pm 0.10\text{g}$ vs. $1.09 \pm 0.05\text{g}$, $p < 0.001$) compared to controls. In the male control group, the external diameter of gracilis artery was the smallest and significantly smaller compared to the female controls ($177.3 \pm 21.0\mu\text{m}$ vs. $245.5 \pm 10.7\mu\text{m}$, $p < 0.0001$) and the swimming males ($177.3 \pm 21.0\mu\text{m}$ vs. $229.2 \pm 26.7\mu\text{m}$, $p < 0.001$). Male controls have the greatest wall thickness which was significantly greater compared to the female controls ($25.9 \pm 2.4\mu\text{m}$ vs. $16.9 \pm 1.4\mu\text{m}$, $p < 0.001$). There was no difference in wall thickness between male and female swimming groups. In line with our results of the artery morphology, the reactivity to pressure in the noradrenalin medium was the lowest in male controls compared to the other groups. Distensibility was significantly higher in swimming groups compared to controls.

Conclusions: As a result of regular exercise, structural and functional remodeling can be observed on gracilis artery, as “athlete's artery”. Male trained rats showed more pronounced vascular adaptation to exercise with increased external diameter and decreased wall thickness versus trained females. Differences in proportion of muscle and elastic fibers, and hormonal and autonomic mechanisms may be responsible for these characteristic vascular adaptation changes.

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Long-term follow up of a pacemaker-mediated programmable hypertension control therapy

Abstract: P5853

Long-term follow up of a pacemaker-mediated programmable hypertension control therapy

Authors:

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On behalf: BackBeat

Topic(s):

Hypertension: Device treatment and intervention

Citation:

European Heart Journal (2017) 38 (Supplement), 1240

Funding Acknowledgements:

The Study was founded by BackBeat Medical, Inc.

Background: Despite prescription of multi-drug regimens, many patients with hypertension continue to have systolic blood pressures (SBPs) above guideline-recommended levels. We recently demonstrated that a pacemaker-based programmable hypertension control (PHC) therapy employing a sequence of variably timed short and long atrio-ventricular intervals reduces office and ambulatory SBP by ~11 and 16 mmHg, respectively after 3 months of therapy.

Purpose: The purpose of this study was to test the long-term durability of early PHC results.

Methods: 27 patients with an indication for a dual chamber pacemaker with office SBP>150 mmHg despite stable medical treatment with ≥2 antihypertensive drugs for >2 months were implanted with a Moderato™ implantable pulse generator (BackBeat Medical, New Hope, PA, USA). Subjects were followed for 1 month with conventional pacing (to ensure persistence of office SBP >140 mmHg) and then had PHC therapy activated. 21 patients agreed to follow beyond the 3 month study period with active PHC therapy and were seen at 6, 12 and 18 months; 12 of these patients have reached 24 months follow up.

Results: Patients (mean age 72±7 years, LVEF 63±5%) had office SBP of 165±10/79±10 mmHg despite an average of 3.3 antihypertensive medications. Office and ambulatory SBPs decreased by 8±13 and 5±12 mmHg (p<0.05), respectively, during the initial run-in period with conventional pacing. Following subsequent PHC activation, average office SBP decreased significantly during the entire follow up period (Figure). At 18 months, SBP decreased 14±15 mmHg and diastolic BP decreased 7±9 mmHg (both p<0.002) compared to respective pre-

activation values. Heart rate decreased by 8 ± 11 bpm during the active period ($p=0.002$). Average LVEF did not change ($-1 \pm 6\%$, $p=ns$), but LV end-diastolic volume decreased by 17 ± 28 ml ($p=0.036$). Similar effects were noted in the 12 patients reaching 24 months.

Conclusions: In patients requiring a dual chamber pacemaker and elevated SBPs despite appropriate medical therapy SBP decreased significantly during long-term follow up even after accounting for an initial drop during the initial run-in period. LV function remained unaltered and end-diastolic volume decreased. Heart rate also decreased suggesting reduction in sympathetic tone. These data support the durability and safety of PHC therapy. A prospective, randomized, double-blind study has been initiated.

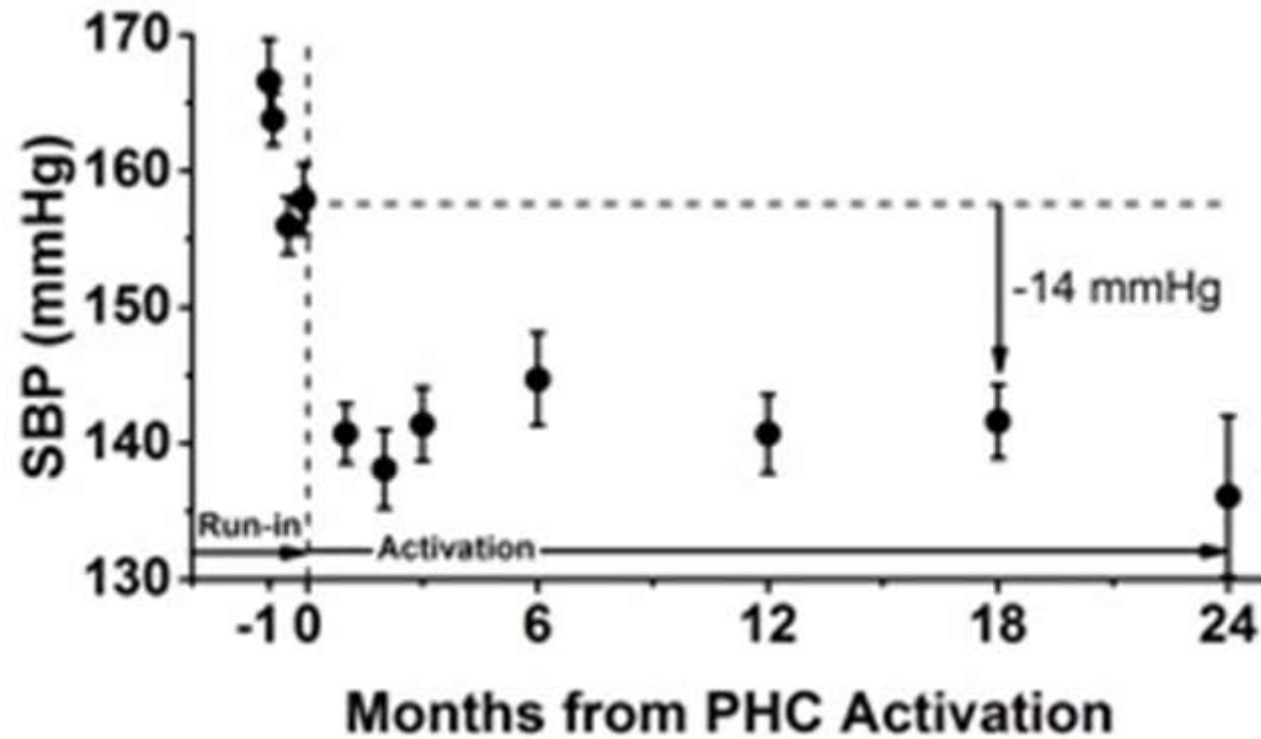


Figure 1

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Human pluripotent stem cells-derived endothelial cells for vascular tissue engineering

Abstract: P2547

Human pluripotent stem cells-derived endothelial cells for vascular tissue engineering

Authors:

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Topic(s):

Cellular Biology - Stem cells and cell therapy

Citation:

European Heart Journal (2017) 38 (Supplement), 533-534

Human embryonic stem cells-derived endothelial cells (hESC-EC) and human induced pluripotent stem cells-derived endothelial cells (hiPSC-EC) can serve as suitable sources of vascular constructs. The aims of this study were to culture hESC-EC and hiPSC-EC in 2D and 3D cell cultures, analyse gene and protein expression profiles in these cultures and test properties of the cells.

In this study we have used human aortic segments to decellularize those in 2% sodium dodecyl-sulphate (SDS) and 0.05% sodium azide-containing solution after a washing period in phosphate buffered saline (PBS). At the end of the process samples were purified in antibiotics-containing PBS in order to remove the remaining detergent and cell debris. For tissue engineering hESC-ECs (H7 hESC line, WiCell, USA) and hiPSC-ECs (ReproCELL, Japan and IMR-90-4) were grown in 2D cultures in endothelial cell growth medium (EGM2) or on fibronectin-coated 300 µm thick 3D aortic segments. For the 4-day recellularisation process 5000 cells per cm² were used in a 96-well cell culture plate. Recellularisation process was followed by anti-human CD31 endothelial cell marker staining step. In order to quantify the extent of recellularisation and to standardize tissue engineering an ImageJ based algorithm was developed. Before and after the reendothelisation process, samples were homogenised and proteomics and polymerase chain reaction (PCR) were used to assess the expression of arterial, venous and common endothelial markers (EphrinB2, Notch1, Notch2, Dll4; EphB4, FLT4; and C31, VE-Cadherin, respectively).

Protein expression from the 3D tissue engineered endothelial cells is altered and secretion of the angiogenesis associated proteins (VEGF, Angiopoietin-2) was increased. Significant increase was observed in the expression of endothelial markers due to 3D cell culturing (hiPSC-EC Dll4 138.76±60.91; hESC-EC Notch2 4211.73±2303.39; EphrinB2 9306.16±199.29 fold changes; n=3; p<0.001). During the recellularisation there is a marked increased specification and maturation in stem cells-derived endothelial cells.

This suggests a direct regulatory role of the extracellular matrix on endothelial specification. These results also show that the recellularisation protocol developed here enables the generation of 3D vascular endothelial structures.

A.A. Molnar¹, A. Kovacs¹, M. Kolossvary¹, B. Lakatos¹, A.D. Tarnoki², D.L. Tarnoki², P. Maurovich-Horvat¹, G. Jermendy³, P. Sengupta⁴, B. Merkely¹, ¹Semmelweis University, Heart and Vascular Center - Budapest - Hungary, ²Semmelweis University, Department of Radiology and Oncotherapy - Budapest - Hungary, ³Bajcsy-Zsilinszky Hospital, 3rd Department of Internal Medicine - Budapest - Hungary, ⁴Mount Sinai School of Medicine, Zena and Michael A Wiener Cardiovascular Institute - New York - United States of America:

Common genetic background of left ventricular global longitudinal strain and diastolic function: new insights into the understanding of heart failure with preserved ejection fraction?

Abstract: P1446

Common genetic background of left ventricular global longitudinal strain and diastolic function: new insights into the understanding of heart failure with preserved ejection fraction?

Authors:

A.A. Molnar¹, A. Kovacs¹, M. Kolossvary¹, B. Lakatos¹, A.D. Tarnoki², D.L. Tarnoki², P. Maurovich-Horvat¹, G. Jermendy³, P. Sengupta⁴, B. Merkely¹, ¹Semmelweis University, Heart and Vascular Center - Budapest - Hungary, ²Semmelweis University, Department of Radiology and Oncotherapy - Budapest - Hungary, ³Bajcsy-Zsilinszky Hospital, 3rd Department of Internal Medicine - Budapest - Hungary, ⁴Mount Sinai School of Medicine, Zena and Michael A Wiener Cardiovascular Institute - New York - United States of America,

Topic(s):

Echocardiography - Other

Citation:

European Heart Journal (2017) 38 (Supplement), 292-293

Purpose: Genetic effects in the determination of left ventricular (LV) function are less investigated. The present study was performed to determine the heritability of LV function and possible common genetic and environmental background of LV functional phenotypes, as assessed by advanced echocardiographic parameters in a cohort of Caucasian twins.

Methods: Eighty six twin pairs were recruited (52 monozygotic and 34 same-sex dizygotic twin pairs, mean age 56±9 years). Siblings with obstructive coronary artery stenosis proved by coronary CTA or siblings with any cardiomyopathy or severe valvular disease were excluded. Beyond conventional echocardiographic parameters, global longitudinal (GLS), circumferential strains, apical counter-clockwise, basal clockwise rotation and longitudinal early diastolic strain rate were measured by speckle tracking analysis.

Results: The univariate genetic and environmental effects model showed high genetic component in the variance of LV systolic deformation (62–77%) and low heritability of LV diastolic functional parameters (31–46%) after adjustment for age and sex. Cholesky decomposition was carried out to derive the magnitude of covariation between the investigated functional phenotypes and to estimate the proportion of shared and unique genetic and environmental factors. Despite high heritability of LV systolic parameters, no shared genetic or environmental background can be presumed between these parameters (p=0.99). Even though LV diastolic parameters showed low genetic determination, we found a significant common latent phenotype responsible partially for the heritability of these parameters (p<0.001). Furthermore, GLS and LV diastolic function showed also common heritability (p<0.001).

Conclusion: Our work demonstrated high heritability of LV systolic function in Caucasian twins. These findings support further investigation of potential candidate genes determining LV functional phenotypes. GLS shares common genetic and environmental background with diastolic function, nevertheless, this relation is absent between GLS and other parameters of systolic

myocardial deformation. This points at the importance of systolo-diastolic coupling and may give further insights into the understanding of such pathologies, where mild reduction of GLS is associated with overt diastolic dysfunction (i.e heart failure with preserved ejection fraction).

K.V. Nagy¹, N. Szegedi¹, G. Szeplaki¹, T. Tahin¹, I. Osztheimer¹, S. Herczeg¹, Z. Sallo¹, B. Merkely¹, L. Geller¹, ¹Semmelweis University, Heart and Vascular Center - Budapest – Hungary:

Predictors of long-term mortality in patients undergoing ischaemic or non-ischaemic ventricular tachycardia ablation

Abstract: P806

Predictors of long-term mortality in patients undergoing ischaemic or non-ischaemic ventricular tachycardia ablation

Authors:

K.V. Nagy¹, N. Szegedi¹, G. Szeplaki¹, T. Tahin¹, I. Osztheimer¹, S. Herczeg¹, Z. Sallo¹, B. Merkely¹, L. Geller¹, ¹Semmelweis University, Heart and Vascular Center - Budapest - Hungary,

Topic(s):

Ventricular arrhythmias

Citation:

European Heart Journal (2017) 38 (Supplement), 172

Background: Radiofrequency (RF) ablation is an effective treatment in patients with ventricular tachycardia (VT). There is remarkable clinical and scientific interest on identifying factors predicting outcome after VT ablation. Our aim was to determine predictors of long-term all-cause mortality in patients undergoing VT ablation at our Clinic.

Methods: Between 1st of January 2009 and 31st of December 2015 VT ablation was performed in 151 patients with sustained monomorphic VTs (125 men (83%), age 66 [57–74], EF 30% [20%–40%]). 69% of patients had ischaemic heart disease. During the procedure after activation and voltage mapping of the left ventricle (LV), substrate ablation and late potential elimination were performed. 13 patients underwent epicardial ablation (9%). Clinical, echocardiographic, procedural and follow up data was collected and analysed retrospectively. Ablation was considered successful, if during the follow period no re-ablation was needed.

Results: During the median follow up of 728 (331–1483) days 60 patients died (39.7%). Overall VT free survival was 67.5%. Re-ablation was performed in 16 patients (10.5%). During multivariate Cox analysis, after adjustment of relevant clinical covariates, amiodarone intake (HR: 0.45, CI: 0.24–0.85, p=0.01), more severe mitral regurgitation (HR: 1.44, CI: 1.05–1.97, p=0.02) and right ventricular function characterised by TAPSE (Tricuspid annular plane systolic excursion) (HR: 0.68, CI: 0.49–0.94, p=0.01) were independently associated with all-cause mortality. Kaplan-Meier curves showed significantly lower survival in patients on Amiodarone treatment (p<0.001), deteriorated RV function, with TAPSE less, than 17mm (p=0.002) and severe MI (p<0.001).

Conclusion: VT is a potentially life threatening arrhythmia. Besides of ICD implantation ablation is an effective and safe treatment tool. Based on our results Amiodarone treatment, reduced RV function and more severe mitral regurgitation were independent predictors of long-term all-cause mortality.

B.T. Nemeth¹, C. Matyas¹, Z.V. Varga², T. Radovits¹, B. Merkely¹, P. Pacher², ¹Semmelweis University Heart Center - Budapest - Hungary, ²National Institutes of Health, National Institute on Alcohol Abuse and Alcoholism - Rockville, MD - United States of America:

Characterization of a novel mouse model of hepatic cardiomyopathy

Abstract: 41

Characterization of a novel mouse model of hepatic cardiomyopathy

Authors:

B.T. Nemeth¹, C. Matyas¹, Z.V. Varga², T. Radovits¹, B. Merkely¹, P. Pacher², ¹Semmelweis University Heart Center - Budapest - Hungary, ²National Institutes of Health, National Institute on Alcohol Abuse and Alcoholism - Rockville, MD - United States of America,

Topic(s):

Cardiovascular development, anatomy and pathology

Citation:

European Heart Journal (2017) 38 (Supplement), 2-3

Funding Acknowledgements:

Support: NIH intramural program

Introduction/Purpose: Hepatic failure/cirrhosis induces distinct cardiovascular changes described as cirrhotic/hepatic cardiomyopathy. Accurate quantification of this phenomenon, however, is problematic to achieve due to the complex changes affecting both the heart and the vasculature of the animals. We aimed in our current experiments at accurately quantifying functional and structural cardiac changes in mice subjected to 14 days of bile duct ligation (BDL), which is a well-established procedure to evoke hepatic failure/cirrhosis in rodents.

Methods: The common bile duct was ligated and severed in young adult mice (n=8). Sham operated animals (n=8) served as controls. At the end of the 14-day observational period, echocardiographic and pressure volume (PV) measurements were carried out in all animals. In addition to our functional evaluation, heart samples were snap-frozen in liquid nitrogen or were fixed in 10% paraformaldehyde to investigate microscopic changes as well.

Results: Our echocardiographic measurements showed a significant decrease in systolic and diastolic left ventricular internal diameter (LVIDs and LVIDd, respectively), stroke volume (SV), cardiac output (CO) and estimated left ventricular mass (LVM) (LVIDd: 3.70±0.04mm vs. 2.64±0.18mm, LVIDs: 2.45±0.08mm vs. 1.30±0.23mm, SV: 28.89±1.32µl vs. 13.40±0.38µl, CO: 15.10±1.12ml vs. 6.18±0.31ml, LVM: 107±4mg vs. 65±11mg, p<0.05), while wall dimensions did not change and systolic functional parameters were found to be paradoxically increased (ejection fraction: 57±2% vs. 74±6%, fractional shortening: 34±2% vs. 52±5%, p<0.05) in our BDL mice compared to control. In contrast, the more sensitive PV measurements revealed both systolic (end-systolic elastance [Ees]: 13.43±0.83mmHg/ml vs. 5.95±0.53mmHg/ml, preload recruitable stroke work [PRSW]: 109.6±7.9mmHg vs. 76.5±7.7mmHg, p<0.05) and diastolic (time constant of left ventricular relaxation [tau]: 5.28±0.04ms vs. 6.75±0.20ms, maximal rate of pressure decrement [dP/dtmin]: -9949±690mmHg/s vs. -7588±474mmHg/s, p<0.05)

dysfunction accompanied by systemic hypotension (87 ± 2 mmHg vs. 67 ± 6 mmHg, $p<0.05$) in BDL mice. Histologic examination showed atrophy of the individual cardiomyocyte (average cross sectional area: $3622\pm 251\mu\text{m}^2$ vs. $2256\pm 103\mu\text{m}^2$, $p<0.05$) and significantly increased collagen area ($21800\pm 1835\mu\text{m}^2$ vs. $33522\pm 2044\mu\text{m}^2$ per visual field, $p<0.05$) in our BDL mice.

Conclusions: Hepatic cardiomyopathy is characterized by systemic hypotension accompanied by both systolic and diastolic dysfunction. The observed cardiomyocyte atrophy and increased left ventricular fibrosis corroborate our functional findings.

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Speckle tracking derived right atrial strain parameters show strong correlation with phasic volume indices in systemic sclerosis patients

Abstract: P5236

Speckle tracking derived right atrial strain parameters show strong correlation with phasic volume indices in systemic sclerosis patients

Authors:

A.B. Nogradi¹, A. Porpaczy¹, F. Molnar¹, T. Minier², L. Czirjak², A. Komocsi¹, R. Faludi¹, ¹Heart Institute of PTE - Pecs - Hungary, ²Department of Rheumatology and Immunology, PTE - Pécs - Hungary,

Topic(s):

Echocardiography - Ventricular and atrial function

Citation:

European Heart Journal (2017) 38 (Supplement), 1092-1093

Background: Right atrial (RA) size and function is a novel focus of research in conditions involving the right heart, such as systemic sclerosis (SSc). Parameters of the RA function may serve as additional markers of the disease progression, may show potential prognostic value or reflect functional capacity. Several methods such as volumetric measurements with two- or three-dimensional echocardiography or cardiac MRI, and the novel method of speckle tracking echocardiography are used for the assessment of the RA function. Nevertheless, the new, speckle tracking derived parameters of the RA reservoir, conduit and contractile function have never been validated against the classical phasic volume indices. The aim of our study was to evaluate the correlation between volumetric and 2D speckle tracking derived strain parameters of the RA phasic function in systemic sclerosis patients.

Patients, methods: 70 patients with SSc (age: 57 ± 12 years, 64 female) were investigated. Patients with pulmonary arterial hypertension, atrial fibrillation or significant left sided valvular disease were excluded. RA reservoir (ϵ_R), conduit (ϵ_{CD}) and contractile (ϵ_{CT}) strain were measured with 2D speckle tracking technique. Using the atrial borders created for speckle tracking analysis, RA volume curves were generated by the same software. RA volumes were measured at three points of the cardiac cycle: maximal RA volume (V_{max}) just before the opening of the mitral valve; minimal RA volume (V_{min}) at the closure of the mitral valve; and the volume preceding atrial contraction (V_p), at the beginning of P wave. The following phasic volume indices of the RA function were calculated: total emptying fraction (TEF) as $(V_{\text{max}} - V_{\text{min}} / V_{\text{max}}) \times 100$; expansion index (EI) as $(V_{\text{max}} - V_{\text{min}} / V_{\text{min}}) \times 100$; active emptying fraction (AEF) as $(V_p -$

$V_{min}/V_p) \times 100$; passive emptying fraction (PEF) as $(V_{max} - V_p / V_{max}) \times 100$. TEF and EI have been assumed to reflect RA reservoir function while AEF and PEF are the parameters of the RA contractile and conduit function, respectively. Intraobserver variability of RA volume and strain measurements was assessed with the intraclass correlation coefficient.

Results: Intraclass correlation coefficients were 0.93, 0.90 and 0.88 for RA V_{max} , V_{min} and V_p , and 0.91, 0.96 and 0.91 for reservoir, contractile and conduit strain, respectively. RA reservoir strain showed a strong correlation with EI ($r=0.705$, $p=0.000$) and TEF ($r=0.704$, $p=0.000$) while RA conduit strain with PEF ($r=0.546$, $p=0.000$). RA contractile strain correlated significantly with AEF ($r=0.691$, $p=0.000$). (Figure 1)

Conclusion: 2D speckle-tracking echocardiography is feasible in the detection of the phasic changes in RA function. Intraobserver variability data for the strain parameters were similar as those observed for the RA volumetric indices. Speckle tracking derived strain parameters showed strong correlation with the identical phasic volume indices in our SSc population.

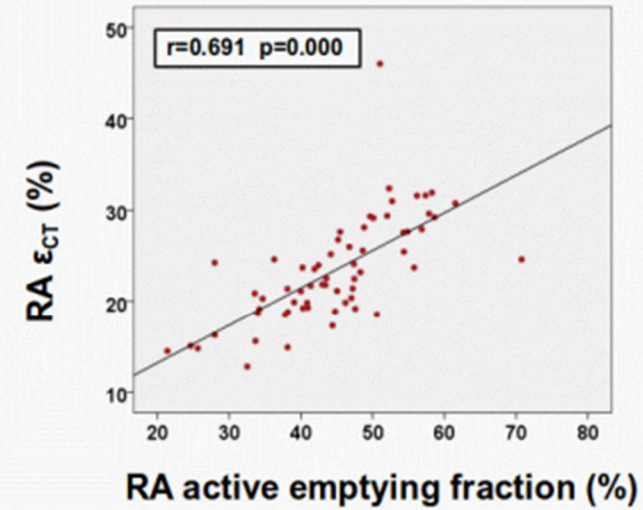
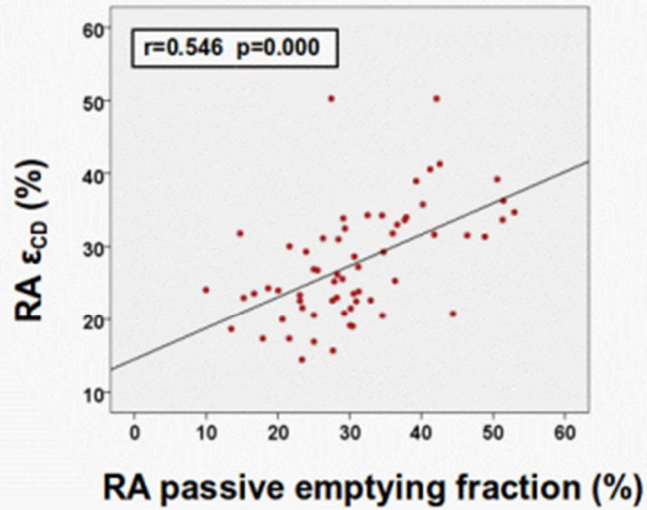
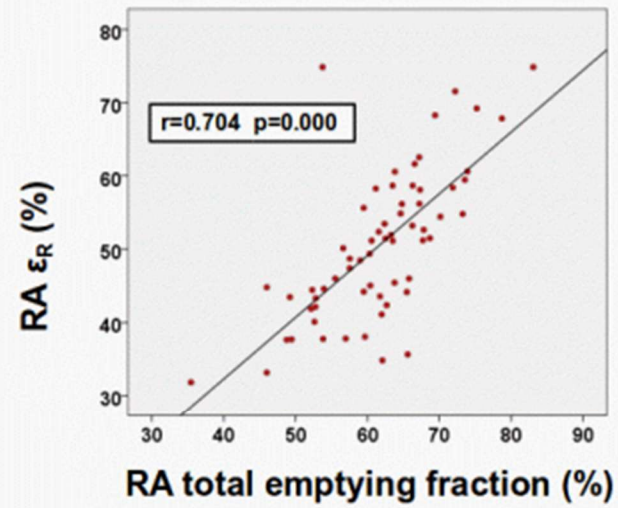
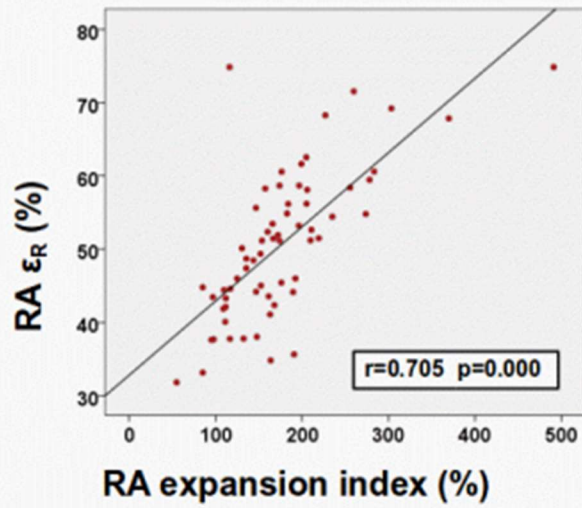


Figure 1

A. Olah¹, B. Bodi², J. Tamas², M. Torok¹, C. Matyas¹, A.A. Sayour¹, E. Urban¹, D. Kellermayer¹, M. Ruppert¹, B. Barta¹, K. Stark¹, B. Merkely¹, Z. Papp², T. Radovits¹, ¹Semmelweis University, Heart and Vascular Center - Budapest - Hungary, ²University of Debrecen, Department of Cardiology, Division of Clinical Physiology - Debrecen – Hungary:

Characterization of myocardial sarcomerodynamics and myocardial sarcomeric protein alterations in a rodent model of athlete's heart

Abstract: P3988

Characterization of myocardial sarcomerodynamics and myocardial sarcomeric protein alterations in a rodent model of athlete's heart

Authors:

A. Olah¹, B. Bodi², J. Tamas², M. Torok¹, C. Matyas¹, A.A. Sayour¹, E. Urban¹, D. Kellermayer¹, M. Ruppert¹, B. Barta¹, K. Stark¹, B. Merkely¹, Z. Papp², T. Radovits¹, ¹Semmelweis University, Heart and Vascular Center - Budapest - Hungary, ²University of Debrecen, Department of Cardiology, Division of Clinical Physiology - Debrecen - Hungary,

Topic(s):

Sports cardiology

Citation:

European Heart Journal (2017) 38 (Supplement), 830

Funding Acknowledgements:

National Research, Development and Innovation Office (NKFIH) of Hungary (K 120277)

Background: In contrast with pathological myocardial hypertrophy, long term exercise-induced cardiac enlargement is associated with functional amelioration. Thus understanding the cellular and molecular processes leading to physiological hypertrophy induced by exercise training might provide a novel therapeutic approach to prevent or treat heart failure. In vivo hemodynamic characterization of athlete's heart in small animal model was previously provided by our research group. Although numerous experimental studies have been designed to deeply understand the underlying mechanisms in exercise-induced myocardial hypertrophy, our knowledge still appears to be insufficient.

Purpose: We aimed at determining left and right ventricular (LV and RV) cardiac sarcomeric modifications at cellular and molecular levels in a rat model of athlete's heart and additionally, examining the reversibility of the observed alterations.

Methods: Young rats were divided into control (Co) and exercised (Ex) groups. Trained rats swam 200 min/day for 12 weeks. To investigate reversibility, detrained rats remained sedentary for 8 weeks after completion of the training protocol. LV morphology was examined by echocardiography, while in vivo hemodynamic properties were provided by LV pressure-volume analysis. Force assessments on isolated permeabilized cardiomyocytes and molecular biological measurements (qRT-PCR, Western blot) were applied to reveal underlying mechanisms.

Results: Echocardiographic and post mortem measured heart weight data confirmed training-induced cardiac hypertrophy, while pressure-volume analysis revealed increased LV contractility in the hearts of exercised rats. The Ca²⁺-activated force production of isolated LV and RV cardiomyocytes was improved (Factive: LV 28.0±1.4 kN/m² Ex vs. 15.8±0.8 kN/m² Co, P<0.05; RV 16.8±1.1 kN/m² Ex vs. 12.1±1.0 kN/m² Co, P<0.05) along with increased Ca²⁺ sensitivity and rate constant of force redevelopment in trained rats. Ca²⁺-independent passive tension did not differ between the groups. Exercise training did not affect myocardial gene expression of α- and β-myosin heavy chain (MHC) and cardiac troponin I. Cardiac troponin I phosphorylation was decreased (cTnI relative phosphorylation level: LV 0.66±0.06 Ex vs. 1.00±0.02 Co, P<0.05; RV 0.65±0.05 Ex vs. 1.00±0.03 Co, P<0.05), whereas the phosphorylation of titin and cardiac myosin binding protein-C was not altered in physiological hypertrophy. Complete reversibility of the observed alterations was detected in detrained rats.

Conclusions: Exercise-induced hypertrophy is associated with increased Ca²⁺-activated force and Ca²⁺ sensitivity of force production of LV and RV cardiomyocytes, which might be associated with hypophosphorylation of cardiac troponin I. Cellular and molecular alterations regressed completely after 8 weeks of detraining.

B.K. Lakatos¹, A. Kovacs¹, A. Olah¹, A. Lux¹, C.S. Matyas¹, B.T. Nemeth¹, D. Kellermayer¹, L. Szabo¹, S.Z. Braun¹, B. Merkely¹, T. Radovits¹, ¹Semmelweis University Heart Center, Cardiovascular Imaging Group - Budapest – Hungary:

Regular physical exercise to prevent age-related decline of diastolic function

Abstract: P2523

Regular physical exercise to prevent age-related decline of diastolic function

Authors:

B.K. Lakatos¹, A. Kovacs¹, A. Olah¹, A. Lux¹, C.S. Matyas¹, B.T. Nemeth¹, D. Kellermayer¹, L. Szabo¹, S.Z. Braun¹, B. Merkely¹, T. Radovits¹, ¹Semmelweis University Heart Center, Cardiovascular Imaging Group - Budapest - Hungary,

Topic(s):

Sports cardiology

Citation:

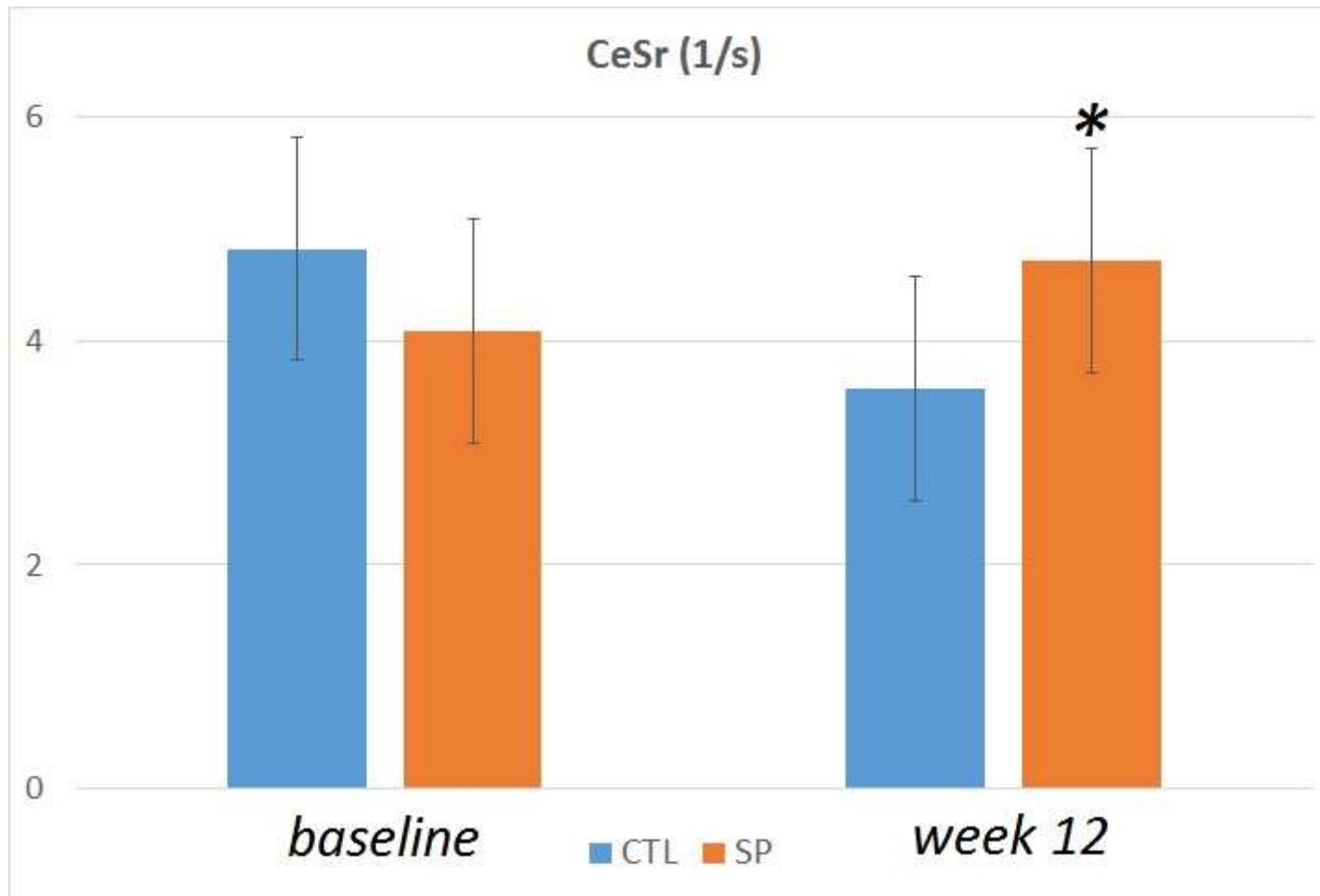
European Heart Journal (2017) 38 (Supplement), 526-527

Previously, our research group characterized the supernormal left ventricular (LV) systolic function in a rat model of athlete's heart using speckle-tracking echocardiography (STE). Nevertheless, human data suggested that regular physical activity may prevent the age-related decline of diastolic function as well. In our current experiments, we aimed at confirming the beneficial effects of regular physical exercise on diastolic function in a rat model using STE.

Rats were divided into trained (n=12) and control (n=12) groups. Trained rats swam 200 min/day for 12 weeks, while control rats swam 5 min/day. Echocardiography was performed at baseline and at 12 weeks using a 13MHz linear transducer to obtain LV short-axis recordings for STE analysis (GE EchoPAC). Global circumferential systolic strain rate (CSrS) and early diastolic strain rate (CSrE) were measured along with isovolumetric relaxation time (IVRT).

Conventional echocardiographic measurements showed the development of physiological LV hypertrophy in the trained group (trained vs. control; LV mass index: 2.41 ± 0.09 vs. 2.03 ± 0.08 g/kg, $p < 0.05$). Systolic function improved significantly in response to physical exercise in trained rats (baseline vs. 12 weeks; CSrS: 3.49 ± 0.64 vs. 5.13 ± 0.77 1/s, $p < 0.05$), while the systolic strain rate was unchanged in the control animals (CSrS: 3.91 ± 0.64 vs. 3.64 ± 0.65 1/s, $p = \text{NS}$). In the control group, CSrE and IVRT indicated significant decrease in diastolic function after the 12-week period (CSrE: 4.82 ± 1.19 vs. 3.58 ± 1.04 1/s $p < 0.05$; IVRT: 18.35 ± 1.89 vs. 21.85 ± 2.18 , $p < 0.001$), however, both parameters remained normal in the trained group (CSrE: 4.08 ± 1.12 vs. 4.72 ± 1.16 1/s; IVRT: 18.97 ± 2.65 vs. 19.56 ± 2.48 ; both $p = \text{NS}$), resulting in significant differences between the exercised and the control rats at the end of the training period (both $p < 0.05$).

In control rats, aging resulted in decreased diastolic strain rate and increased IVRT along with preserved systolic function. However, in physiological LV hypertrophy induced by exercise training diastolic strain rate and IVRT values remained normal, confirming that regular physical exercise may prevent age-related decline of diastolic function.



Control vs. Trained Strain Rate

A. Palinkas¹, A. Katona², A. Varga², I. Ungi², K. Kakonyi², R. Sepp², A. Thury², E. Palinkas², A. Kallai¹, B. Nyuzo³, I. Csaszar¹, ¹Health Care Center of Csongrad County, Internal Medicine Department - Hodmezovasarhely - Hungary, ²University of Szeged, 2nd Department of Internal Medicine and Cardiology Center - Szeged - Hungary, ³Hospital of Bacs-Kiskun County, Internal Medicine - Kiskunfelegyhaza – Hungary:

Effect of chronic total occlusion of right coronary artery on the flow velocity profile of left anterior descending coronary artery

Abstract: P5247

Effect of chronic total occlusion of right coronary artery on the flow velocity profile of left anterior descending coronary artery

Authors:

A. Palinkas¹, A. Katona², A. Varga², I. Ungi², K. Kakonyi², R. Sepp², A. Thury², E. Palinkas², A. Kallai¹, B. Nyuzo³, I. Csaszar¹, ¹Health Care Center of Csongrad County, Internal Medicine Department - Hodmezovasarhely - Hungary, ²University of Szeged, 2nd Department of Internal Medicine and Cardiology Center - Szeged - Hungary, ³Hospital of Bacs-Kiskun County, Internal Medicine - Kiskunfelegyhaza - Hungary,

Topic(s):

Echocardiography - Other

Citation:

European Heart Journal (2017) 38 (Supplement), 1096-1097

Background: Transthoracic Doppler echocardiographically (TTDE) determined diastolic coronary low velocities (DCFV) are widely used for diagnosis of significant coronary artery stenosis (CAS). However, those factors influencing such DCFV are not well studied.

Aim: To evaluate of the effect of chronic total right coronary artery occlusion (CTRCAO) on the TTDE derived DCFV spectrum of the proximal left anterior descending coronary artery (LAD).

Methods: We enrolled 23 patients [16 male (70%), mean age 59±10 years] with CTRCAO and without stenosis of LAD and 13 [5 male (38%), mean age 62±10 years] age matched control subject without cardiovascular disease. All patients underwent a PCI attempt aiming the opening of the CTRCAO. All patients and control subjects underwent detailed TTDE at the beginning of the study. Patients with successful CTRCAO PCI underwent a repeated DCFV assessment by TTDE. DCFV were assessed by TTDE interrogating the proximal LAD. Peak (PDCVF) and velocity-time integrals (DCFVTI) of the DCFV spectrums were measured.

Results: The mean Rentrop collateral grade was 2.2±0.7 in CTRCAO patients. Both DCFV parameters were significantly higher in CTRCAO patients before PCI compared to control subjects (PDCVF: 74.9±31.9 vs. 45.8±15.6 cm/sec, p<0.01; DCFVTI: 21.8±6.3 vs 14.5±7.9 cm/sec, p<0.05). The PCI was successful in 18 patients (78%). PDCVF and DCFVTI decreased significantly after successful PCI of CTRCAO when compared to DCFV values measured before interventions (Table).

Conclusion: Presence of CTRCAO is accompanied by elevated DCFV profile of the non-diseased LAD coronary artery. Successful PCI of CTRCAO results in significant decrease of LAD DCFV values.

□

	Before CTRCAO PCI	After CTRCAO PCI	p value
Peak LAD DCFV (cm/sec)	72.8±31.4	52.2±20.6	p<0.01
VTI of LAD DCFV (cm)	22.4±4.1	15.2±7.7	p<0.05

Results are expressed as mean \pm SD; CTRCAO = chronic total right coronary artery occlusion; DCFV = diastolic coronary flow velocity; VTI = velocity time integral; PCI = percutan coronary artery intervention.

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Paradoxical hemodynamic response in patients hypertrophic cardiomyopathy evaluated by supine bicycle stress echocardiography

Abstract: P561

Paradoxical hemodynamic response in patients hypertrophic cardiomyopathy evaluated by supine bicycle stress echocardiography

Authors:

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Topic(s):

Echocardiography - Stress testing

Citation:

European Heart Journal (2017) 38 (Supplement), 96

Background: Hypertrophic cardiomyopathy (HCM) patients with hemodinamically significant (HS) left ventricular outflow tract obstruction (LVOTO) may show paradoxical hemodynamic response to exercise (PHRE) consisting of a decrease of LVOTO during dynamic stress test. However the prevalence, the mechanism and the clinical significance of such response is not systematically studied.

Aim: To define alterations in the magnitude of LVOT gradient during semi-supine exercise Doppler echocardiography (SEDE) in patients with HCM.

Patients and method: After a comprehensive echocardiographic study 106 patients [57 (54%) males, mean age: 47 \pm 13 years] with HCM underwent a multistage symptom limited SEDE. The SEDE protocol started at 25 W with increments of 25 W every 3-minute stage. Peak LVOT gradient was measured by conventional Doppler echocardiography at baseline, and at the peak of exercise. Hemodynamically significant LVOT obstruction was defined as presence of peak LVOT gradient \geq 30 mmHg. PHRE was defined when the HS resting LVOTO decreased \geq 30 mmHg.

Results: HS resting LVOTO was not present in 46 (43%) patients. SEDE was completed without any complication in all patients. HS LVOT obstruction developed during SEDE in 9 out of 46 patients (20%) without significant resting LVOT obstruction. Analysis of the whole group of HCM showed that resting LVOTO increased significantly at peak exercise (52 \pm 46 vs. 80 \pm 68 Hgmm, p<0.001). Six patients (10%) out of the 60 patients with HS LVOTO at rest demonstrated PRHE during SEDE, in whom the LVOTO decreased significantly (103 \pm 37 vs. 66 \pm 12 Hgmm, p<0.001). PRHE did not show any significant relationship with clinical, resting echocardiographic and exercise stress data.

Conclusion: Resting LVOT gradient may significantly decrease during dynamic exercise in patients with HCM. The prevalence of this PHRE is relatively low. Further studies are needed to clarify the mechanism and clinical significance of PHRE in patients with HCM

A. Pandur¹, B. Banfai¹, B. Radnai¹, J. Betlehem¹, ¹University of Pecs, Institute of Emergency Care and Pedagogy of Health - Pecs – Hungary:

Are the risk stratification's methods effective to diagnose pulmonary embolism in patients with heart failure?

Abstract: P3375

Are the risk stratification's methods effective to diagnose pulmonary embolism in patients with heart failure?

Authors:

A. Pandur¹, B. Banfai¹, B. Radnai¹, J. Betlehem¹, ¹University of Pecs, Institute of Emergency Care and Pedagogy of Health - Pecs - Hungary,

Topic(s):

CHF - Assessment and diagnosis

Citation:

European Heart Journal (2017) 38 (Supplement), 699

Background/Aims: Pulmonary embolism is connected with high morbidity and mortality. Prognostic assessment is important for the management of patients with pulmonary embolism. Pulmonary embolism often has a nonspecific clinical presentation. The use of diagnostic testing in an attempt to avoid missing the potentially life-threatening diagnosis increases both cost and use of medical resources. Various score systems exist to evaluate the probability of pulmonary embolism, which can be used for risk stratification, to get the most accurate diagnosis. The aim of our study was to review the evidence for existing prognostic models in acute pulmonary embolism and determine validity and usefulness for predicting patient outcomes.

Materials and methods: We performed a retrospective analysis of pulmonary embolism in three Hungarian emergency departments. Data from 519 patients were included for this retrospective analysis. The Wells, Geneva, Padua score systems were used to reevaluate retrospectively the risk of pulmonary embolism. The diagnosis of pulmonary embolism was accurate, when the CT verified it. We allowed the weighted probability of the score systems. We analyzed which score system is the most specific for the risk stratification of pulmonary embolism in our cases. Data were analyzed with a SPSS 20.0 statistical software. In our study, chi-square test, Independent-Samples T-test, ANOVA, correlation interpretation were performed. P values of <0.05 were considered to be statistically significant.

Results: 238 (45,8%) men and 281 (54,2%) women patient-documentation were participated in the study. 156 patients got into the ED due to heart failure. In 68 cases (43,5%) the CT verified pulmonary embolism. Padua score indicated in 16 cases (p=0,2), Geneva score in 29 cases (p=0,05) and Wells score in 6 cases (p=0,1) a high probability of pulmonary embolism, from the 68 cases, where the CT is positive for PE.

Conclusions: Our study showed that Genfi score (which was calculated from the patients complaints, medical history and physical examination) had the closest correlation with the diagnosis. Finally we can conclude that risk-evaluation is indispensable in acute heart failure because pulmonary embolism can be in the background as the root cause.

A. Porpaczy¹, A.B. Nogradi¹, N. Varga¹, T. Minier², L. Czirjak², A. Komocsi¹, R. Faludi¹, ¹University of Pecs, Heart Institute - Pecs - Hungary, ²University of Pecs, Department of Rheumatology and Immunology - Pecs – Hungary:

Left atrial stiffness is a robust predictor of the elevated NT-proBNP levels in systemic sclerosis patients with preserved left ventricular ejection fraction

Abstract: P2076

Left atrial stiffness is a robust predictor of the elevated NT-proBNP levels in systemic sclerosis patients with preserved left ventricular ejection fraction

Authors:

A. Porpaczy¹, A.B. Nogradi¹, N. Varga¹, T. Minier², L. Czirjak², A. Komocsi¹, R. Faludi¹, ¹University of Pecs, Heart Institute - Pecs - Hungary, ²University of Pecs, Department of Rheumatology and Immunology - Pecs - Hungary,

Topic(s):

Echocardiography - Ventricular and atrial function

Citation:

European Heart Journal (2017) 38 (Supplement), 422

Left ventricular (LV) diastolic dysfunction and heart failure with preserved ejection fraction are common in systemic sclerosis (SSc) and are associated with poor prognosis. NT-proBNP is a biomarker showing strong correlation with LV filling pressure. The enlargement of the left atrium (LA) is an early and reliable indicator of the elevated LV filling pressure and is also an independent predictor of raised NT-proBNP levels. Less is known, however, about the relationship between LV filling pressure and LA function. Thus we aimed to investigate the effect of the LV filling pressure on the parameters of the LA mechanics as assessed by 2D speckle tracking technique in SSc patients with preserved LV ejection fraction. NT-proBNP served as a non-invasive measure of the LV filling pressure.

Methods: 72 SSc patients (age: 57±11 years) were enrolled. Patients with pulmonary arterial hypertension, atrial fibrillation or significant valvular disease were excluded. Doppler parameters of the mitral inflow (E, A) were measured. Early-diastolic myocardial longitudinal velocities (e') were measured on the lateral and septal mitral annulus and averaged. E/e' ratio was calculated. LA reservoir, conduit and contractile strain were measured with 2D speckle tracking technique. LA volume curves were generated by the same software. Results obtained in apical 4-, and 2-chamber views were averaged. Vmax, Vmin, Vp values were measured and indexed for body surface area. LA stiffness was calculated as ratio of E/e' to reservoir strain. Elevated LV filling pressure was defined as NT-proBNP>400 pg/ml. Since NT-proBNP values did not show normal distribution, logarithmic transformation was performed. Receiver-operating characteristic (ROC) curves were used to examine the diagnostic performance of the echocardiographic parameters in predicting elevated LV filling pressure.

Results: NT-proBNP level was 181.4±153.9 pg/ml. lnNT-pro-BNP showed significant correlations with Vmax index (r=0.285; p=0.015), Vmin index (r=0.281; p=0.017), Vp index (r=0.270; p=0.022), LA stiffness (r=0.431; p=0.000) and LA reservoir strain (r=-0.238; p=0.044). NT-proBNP>400 pg/ml was found in 7 patients. The cut off value of LA stiffness to predict elevated filling pressure was determined as 0.269 with a sensitivity of 85.7% and specificity of 76.6% (AUC: 0.826). (Figure 1A) AUC values for the other parameters were 0.785, 0.757, 0.741, 0.723 for reservoir strain, Vmin index, Vmax index, Vp index, respectively. (Figure 1B)

Conclusion: In our SSc patients, both LA reservoir strain and stiffness showed higher discriminative strength in identifying patients with elevated NT-proBNP levels compared with the LA volume index values. LA stiffness was the most robust predictor of the elevated NT-proBNP levels. Although validation studies on larger samples are required, our data suggest, that Vmax index may be replaced by LA stiffness if we intend to recognize patients with elevated LV filling pressure.

Figure 1A

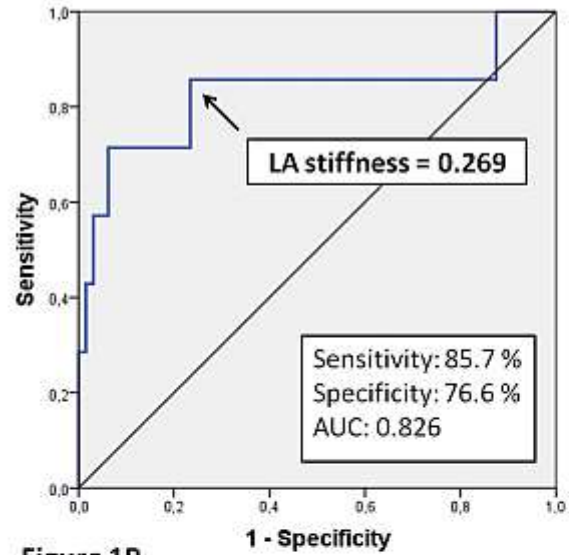
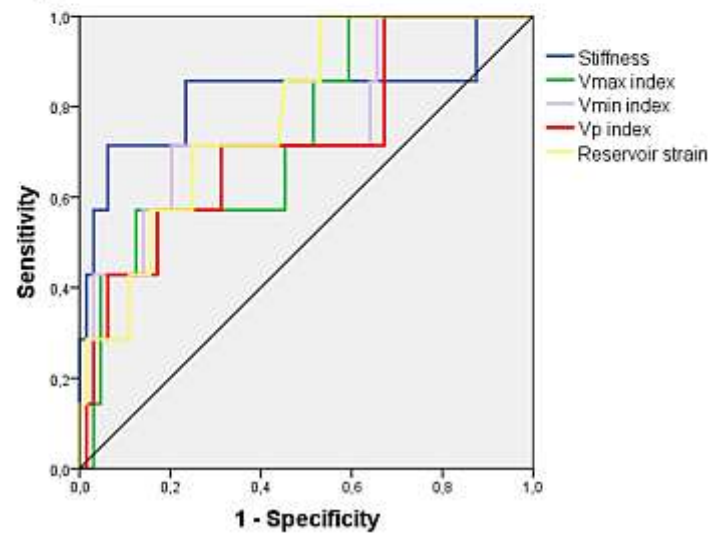


Figure 1B



T. Radovits¹, A. Olah¹, C. Matyas¹, B.T. Nemeth¹, M. Ruppert¹, T.I. Orban², A. Apati², B. Sarkadi², B. Merkely¹, ¹Semmelweis University, Heart and Vascular Center - Budapest - Hungary, ²Hungarian Academy of Sciences, Research Centre for Natural Sciences, Institute of Enzymology - Budapest – Hungary:

Hemodynamic characterization of a transgenic rat strain stably expressing the calcium sensor protein GCaMP2

Abstract: P4476

Hemodynamic characterization of a transgenic rat strain stably expressing the calcium sensor protein GCaMP2

Authors:

T. Radovits¹, A. Olah¹, C. Matyas¹, B.T. Nemeth¹, M. Ruppert¹, T.I. Orban², A. Apati², B. Sarkadi², B. Merkely¹, ¹Semmelweis University, Heart and Vascular Center - Budapest - Hungary, ²Hungarian Academy of Sciences, Research Centre for Natural Sciences, Institute of Enzymology - Budapest - Hungary,

Topic(s):

Basic Science other

Citation:

European Heart Journal (2017) 38 (Supplement), 936

Background: The importance of calcium homeostasis and signaling has been intensively investigated in various tissues. A novel transgenic rat strain has recently been generated that stably expresses the genetically engineered calcium sensor protein GCaMP2 (containing a calmodulin-based calcium sensor and a fluorescent protein) in different cell types including cardiomyocytes (Sci Rep 2015; 5:12645). This animal model offers a unique possibility to directly examine calcium signaling in cells, tissues and organs, thus it might be a useful tool for assessing the effects of drugs and pathophysiological states on cardiac calcium homeostasis.

Purpose: In order to investigate whether the expression of the GCaMP2 protein itself affects cardiac function, in the present work we aimed at characterizing in vivo hemodynamics by left ventricular (LV) pressure-volume analysis in the GCaMP2 transgenic rats strain.

Methods: GCaMP2 transgenic rats (GCaMP2 group, n=10) and age-matched Sprague-Dawley control animals (Co group, n=10) were investigated. In vivo hemodynamic characterization was performed by LV pressure-volume analysis, obtaining both conventional hemodynamic parameters as well as sensitive, load-independent functional indices.

Results: Post-mortem heart weight data showed increased heart weight in the GCaMP2 group compared to controls (heart weight to tibial length ratio: 0.26±0.01 GCaMP2 vs. 0.23±0.01g/cm Co, p<0.05), suggesting myocardial hypertrophy. We detected elevated mean arterial pressure (MAP: 137.6±3.1 GCaMP2 vs. 127.9±3.1mmHg Co, p<0.05) in transgenic rats. LV systolic function was not altered in transgenic rats as indicated by conventional parameters (ejection fraction, stroke volume, dP/dtmax) and load-independent, sensitive indices (end-systolic pressure-volume relationship, preload recruitable stroke work). Regarding diastolic function we found a marked deterioration of LV active relaxation in GCaMP2 animals (Tau: 16.8±0.7 GCaMP2 vs. 11.7±0.6ms Co, p<0.001; dP/dtmin: -9641±247 GCaMP2 vs. -10781±420 mmHg/s Co, p<0.05). Parameters of LV stiffness were found to be unchanged in transgenic rats.

Conclusions: Our data indicated myocardial hypertrophy, arterial hypertension and impaired LV active relaxation along with unchanged systolic performance in the heart of transgenic rats expressing the GCaMP2 fluorescent calcium sensor protein. Myocardial expression of this genetically engineered calcium sensor protein might interfere with physiological calcium handling, resulting in the observed characteristic changes in the heart. While there were no significant changes in calcium handling in primary cardiac cell cultures (Sci Rep 2015; 5:12645), special caution should be taken when using this rodent model in cardiovascular pharmacological and toxicological studies. In addition, this rat may be a useful model for studying calcium handling in cardiac hypertrophy.

Z. Ruzsa¹, K. Bihari², E. Palinkas², S. Nardai¹, B. Nemes¹, B. Merkely¹, ¹Semmelweis University, Heart Center - Budapest - Hungary, ²County Hospital of Kecskemet - Kecskemet – Hungary:

Transradial carotid artery stenting using mesh stents in acute carotid syndrome

Abstract: P4306

Transradial carotid artery stenting using mesh stents in acute carotid syndrome

Authors:

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Topic(s):

Carotid disease

Citation:

European Heart Journal (2017) 38 (Supplement), 883

Background: Acute carotid syndrome is defined as a set of signs and symptoms linked to neurological deficits (TIA or ischemic stroke) caused by carotid occlusive disease. Endovascular treatment is a viable alternative of the surgical endarterectomy in acute carotid syndrome, but the timing is controversial because the intervention can convert the ischemic stroke into haemorrhagic one and the intervention can cause distal embolization.

Aim: Our aim was to investigate the outcomes of the transradial carotid artery stenting in ACS and to compare the results with the elective carotid artery stenting (CAS).

Methods: The clinical and angiographic data of 290 consecutive patients high risk for carotid endarterectomy treated by CAS with cerebral protection between 2013 and 2016 were evaluated. We have compared the patient interventional data and procedural outcomes between the patients underwent elective and acute carotid artery stenting. ACS patients were treated with newly designed mesh stents (Roadsaver, CGuard). Several parameters were evaluated: Primary endpoint: angiographic outcome of the CAS and MACCE. Secondary endpoint: fluoroscopy time and X Ray dose, procedural time, cross over rate to another puncture site, rate of access site complications and hospitalisation in days.

Results: Procedural success was achieved in 278 elective and 16 ACS patients (100%). The cross over rate was 1.4% in the elective and 0% in the ACS group (p=ns). Major access site complication was encountered in 1 (0.3%) elective and 0 (0%) ACS patient, and the rate of minor access site complication was 8 (2.9%) and 0 (0%) (p=ns), respectively. The incidence of MACCE was 1.4% in the elective and 0.0% in the ACS group (p=ns). Procedure time [1609±465.4 vs. 1673 [1581–1765] sec, p=ns), fluoroscopy time [522.3 [351.1–693.4] vs. 536.5 [496.5–

576.5] sec, p=ns), radiation dose (877.2 [568.4–1186] vs. 782.2 [658.6–905.9] mGy, p=ns), contrast consumption (106.4 [92.3–120.7] vs. 111.5 [105.9–117.2] mGy, p=ns), was not significantly different.

Conclusions: The transradial approach for acute carotide artery stenting has the same efficacy and safety as the elective transradial approach with using mesh stents.

Z. Ruzsa¹, Z. Vamosi², G.Y. Barczy¹, K. Toth², N. Kovacs², E. Zima¹, D. Becker¹, B. Merkely¹, ¹Semmelweis University, Heart Center - Budapest - Hungary, ²County Hospital of Kecskemet - Kecskemet – Hungary:

Catheter directed thrombolysis and mechanical thrombectomy in submassive pulmonary embolism

Abstract: P1622

Catheter directed thrombolysis and mechanical thrombectomy in submassive pulmonary embolism

Authors:

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Topic(s):

Acute pulmonary embolism

Citation:

European Heart Journal (2017) 38 (Supplement), 349

Introduction: Percutaneous thrombectomy and catheter directed thrombolysis (CDT) represent well established techniques for the treatment of submassive pulmonary embolism (SPE). The purpose of CDT is to dissolve thrombus in the main and distal pulmonary branch.

Methods: Clinical, interventional and echocardiographic data from 72 consecutive patients with SPE who were treated with CDT were evaluated. Diagnosis was made by transthoracic ultrasound and computer tomography. Primary end-points were: technical success, major cardiac and cerebral events (MACCE) and invasive pulmonary pressure. Secondary end-points: rate of procedural and access site complications. The access site for CDT was the femoral vein. CDT was done with Alteplase (10 mg bolus and 1 mg/h maintenance dose) over a pig-tail catheter for 24 hours. After 24 hours, control pulmonary angiography was performed and manual thrombectomy was performed when the thrombus burden was flow limiting or the systolic pulmonary pressure has not decreased by 25% or to normal level. Postoperatively, patients were treated with systemic anticoagulation, compression hose, and interval follow-up.

Results: 72 patients were treated with a mean age of 59.0±16.5 years. CDT was successful after the first post-operative day in 65 patients (90.3%) but in 7 patients (9.7%) thrombus aspiration and fragmentation was performed after failed thrombolysis due to failed thrombolysis. The mean CDT time in SPE was 28.9±9.9 hour. In 4 patients (5.5%) caval filters were

implanted. Technical success was 95.8%. Invasive pulmonary pressure has been dropped from 57.60 [32.0–66.0] to 39.58 [19.0–46.0] Hgmm ($p < 0.001$). MACCE and mortality rate at one year was 9.72% and 6.9%, respectively. Access site complications were encountered in 9 patients (12.5%) (5 major and 4 minor).

Conclusion: Submassive pulmonary embolism has excellent results with catheter directed thrombolysis, however additional mechanical thrombectomy and angioplasty is necessary in some patients to achieve good clinical outcome.

Z. Ruzsa¹, B. Nemes¹, I. Ungi², J. Toth³, A. Katona², A. Huttli¹, B. Olivier⁴, B. Merkely¹, ¹Semmelweis University, Heart Center - Budapest - Hungary, ²University of Szeged - Szeged - Hungary, ³County Hospital of Kecskemet - Kecskemet - Hungary, ⁴Quebec Heart and Lung Institute - Quebec – Canada:

Invasive treatment of the critical hand ischaemia: long term results

Abstract: P5213

Invasive treatment of the critical hand ischaemia: long term results

Authors:

Z. Ruzsa¹, B. Nemes¹, I. Ungi², J. Toth³, A. Katona², A. Huttli¹, B. Olivier⁴, B. Merkely¹, ¹Semmelweis University, Heart Center - Budapest - Hungary, ²University of Szeged - Szeged - Hungary, ³County Hospital of Kecskemet - Kecskemet - Hungary, ⁴Quebec Heart and Lung Institute - Quebec - Canada,

Topic(s):

Peripheral artery disease - Interventions

Citation:

European Heart Journal (2017) 38 (Supplement), 1086

Background: Critical hand ischemia (CHI) of the upper extremity is rarely encountered due to highly developed collaterals of the hand. The main cause of acute CHI (aCHI) is thromboembolic, while the main cause of chronic CHI is atherosclerosis (cCHI).

Purpose: The aim of this prospective registry was to assess the feasibility, safety and outcomes of percutaneous transluminal angioplasty and thrombolysis in the treatment of CHI.

Methods: 94 patients (age 60.7 ± 16.4 years) were treated with CHI between 2012 and 2015 in three cardiovascular centers. In aCHI the primary therapy was thrombus aspiration and local thrombolysis, while in cCHI balloon angioplasty and stent implantation. Stent implantation was done only in flow limiting dissections and significant recoil. The patients with clinical driven restenosis were treated with drug eluting balloons and drug eluting stents. We have examined the procedural and clinical success, the rate of major adverse events (MAE), target lesion revascularization (TLR) and vascular complications at one year and at long term follow up. All patients underwent Doppler ultrasonography and physical examination during follow up.

Results: Eighteen patients (19.2%) were treated with aCHI and 76 patients (80.8%) with cCHI. Clinical symptoms were: isolated rest pain in 84 (89.4%), digital ulcer or gangrene in 10 (10.6%) patients. The cause of CHI was atherosclerosis and/or thrombosis in 60 (63.1%), embolism in 10 (10.6%), trauma in 2 (2.1%), postprocedural 18 (19.1%) and vasculitis 4 (4.2%) patients. Technical and clinical success rate of the intervention was 95.7% (90/94) and 87.2% (82/94). Thrombolysis was done in 55.5% (10/18) of patients with aCHI and mechanical thrombectomy in 44.4% (8/18) 11 patients. Angioplasty was performed in subclavian (n=31, 33%) axillary (n=13, 13.8%), brachial (n=26, 27.6%), radial (n=30, 31.9%), ulnar (n=22, 23.4%), interosseal (n=3, 3.2%), palmar arch (n=9, 9.6%) and in one case in digital arteries (n=1, 1.1%). Stent implantation was done in 44 cases (46.8%). Multilevel (n=29, 30.8%), unleveled (n=6, 6.4%) and singular (n=59, 62.1%) dilatations were performed.

The rate of access site complication was 2.1%. Long term MAEs occurred in 66 patients (70.2%) at long term follow-up. Long term target lesion revascularization rate was 18%. In two patients thoracic sympatectomy was necessary and 2 patients underwent minor finger amputation (1.9%).

Conclusions: Angioplasty of the hand vessels for critical hand ischemia is a feasible and safe procedure with acceptable rates of technical success and hand healing. Major adverse events are frequent due to high rate of severe comorbidities.

G. Simonyi¹, T. Ferenczi², M. Medvegy³, E. Finta⁴, ¹St. Imre University Teaching Hospital, Metabolic Center - Budapest - Hungary, ²Obuda University, John von Neumann Faculty of Informatics, Physiologic Controls Group, - Budapest - Hungary, ³Flor Ferenc Hospital of County Pest, Cardiology - Kistarcsa - Hungary, ⁴St. Imre University Teaching Hospital, VIP Department - Budapest – Hungary:

Which is the best choice? One year persistence of ramipril, ramipril/amlodipin free and fixed dose combination therapy in hypertension

Abstract: P1654

Which is the best choice? One year persistence of ramipril, ramipril/amlodipin free and fixed dose combination therapy in hypertension

Authors:

G. Simonyi¹, T. Ferenczi², M. Medvegy³, E. Finta⁴, ¹St. Imre University Teaching Hospital, Metabolic Center - Budapest - Hungary, ²Obuda University, John von Neumann Faculty of Informatics, Physiologic Controls Group, - Budapest - Hungary, ³Flor Ferenc Hospital of County Pest, Cardiology - Kistarcsa - Hungary, ⁴St. Imre University Teaching Hospital, VIP Department - Budapest - Hungary,

Topic(s):

Hypertension - Drug treatment

Citation:

European Heart Journal (2017) 38 (Supplement), 359

Introduction: In the treatment of hypertension avoiding adverse cardiovascular complications to achieve target blood pressure is essential. The appropriate drug selection and if necessary to change to the combination therapy, patients adherence is important which may help fixed dose combination.

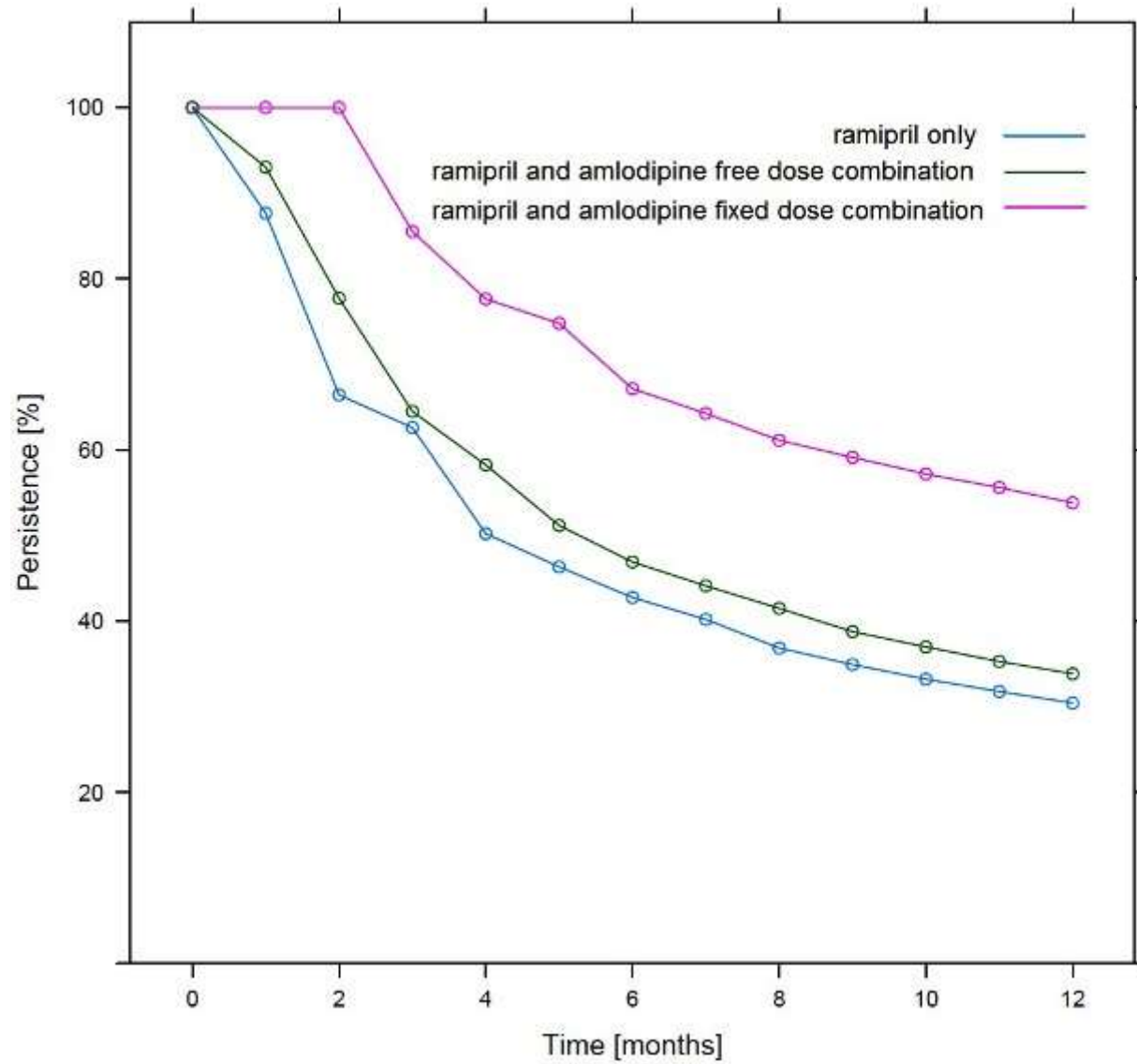
Aim: Our aim was to investigate the one year persistence of the ramipril and ramipril/amlodipine free and fixed dose combination in hypertensive patients.

Method: Prescriptions database of National Health Insurance Found in Hungary on pharmacy-claims between October 1, 2012 and September 30, 2013 was analysed. The authors identified patients who filled prescriptions for ramipril monotherapy, free and fixed dose combinations of ramipril/amlodipine prescribed for the first time in hypertensive patients who have not received similar drugs during one year before. To model the persistence, the apparatus of survival analysis was used, where “survival” was the time to abandon the medication. As it was available to month precision, discrete time survival analysis was applied: a generalized linear model was estimated with complementary log-log link function with the kind of drug being the only explanatory variable.

Results: 112.642 patients met the inclusion criteria. During the trial period, ramipril therapy or ramipril/amlodipine free and fixed dose combination was started in 82.251, 20.096 and 10.295 patients, respectively. One year persistence rate in patients with ramipril was 30%, 34% and 54% in patients with ramipril/amlodipine free and fixed dose combination. Considering only the 360-day study period, the mean duration of persistence was 189.9 days in patients on ramipril, 206.4 days on ramipril/amlodipine free and 270.6 on ramipril/amlodipine fixed dose combination therapy. The hazard ratio (HR) of discontinuation of amlodipine free dose combination compared to ramipril and was 1.15 [95% CI: 1.13–1.17, p<0.001] and 0.54 [95% CI: 0.53–0.56, p<0.001] with the use of the ramipril/amlodipine fixed dose combination.

Conclusions: There is a significant difference between the one year persistence of ramipril and ramipril/amlodipine free and fixed dose combination therapy in hypertension.

The result demonstrated ramipril/amlodipine fixed dose combination therapy has a better one year persistence rate. When the next step is necessary to achieve target blood pressure, ramipril/amlodipine fixed dose combination therapy is preferable.



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Prognostic impact of heart rate recovery in chronic heart disease

Abstract: P1334

Prognostic impact of heart rate recovery in chronic heart disease

Authors:

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Topic(s):

Exercise testing and training

Citation:

European Heart Journal (2017) 38 (Supplement), 258

Background: Abnormal HR recovery on exercise stress testing (defined as a decrease in the heart rate <13 bpm in the first minute of active recovery) is a powerful predictor of mortality in various patient cohorts; its prognostic impact in patients with chronic heart disease either coronary artery disease (CAD) or heart failure (HF) compared with controls without cardiovascular disease (CVD) has not been reported.

Purpose: We analyzed a large cohort of patients undergoing exercise testing to compare the prognostic impact of HR recovery in patients with CAD or HF versus patients without known CVD.

Methods: 101,455 non-imaging exercise tests performed on patients ages 30–89 years from 1993 to 2010 were analyzed. The final study cohort was limited to the first stress test on Minnesota residents for whom we had complete mortality ascertainment by Mayo Clinic patient records and the Minnesota Death Index. Patients were divided into 3 groups: no CVD, CAD without documented HF, and chronic HF (including both ischemic and non-ischemic). The effect of abnormal HR recovery on mortality was assessed using Cox regression analyses with adjustment for age, sex, and cardiorespiratory fitness (CRF).

Results: A total of 28,502 patients (67% men; age 54±12 years) were included: no CVD (n=22,806), CAD (n=5071) and HF (n=625). CAD and HF patients were older and more likely male than no CVD patients. The prevalence of abnormal HR recovery was 24% in no CVD, 50% in CAD, and 76% in HF. There were 4034 deaths (14%) over a mean follow-up of 12.2±5.2 years; mortality was 8%, 37%, and 54% in no CVD versus CAD versus HF. Adjusted hazard ratios for death according to abnormal HR recovery were very similar across the 3 groups: no CVD = 1.52 [1.37–1.68] versus CAD = 1.45 [1.30–1.61] versus HF = 1.45 [1.06–1.99]. Among the HF patients, only 24% have normal HR recovery, but it is strongly protective. Abnormal HR recovery predicted mortality equally well in men versus women, and further adjustment of the Cox model for BMI, diabetes, hypertension, current smoking, and beta blockade had essentially no effect

on the hazard ratio for abnormal HR recovery. We note that CRF (expressed % predicted) was significantly better in patients with normal versus abnormal HR recovery in all groups (97±21 versus 82±24 in non CVD; 93±22 versus 75±22 in CAD; 75±24 versus 57±23 in HF), which suggests that normalization of HR recovery may be one of the mechanisms by which improved CRF reduces mortality risk.

Conclusions: The prevalence of an abnormal HR recovery doubles in patients with CAD and triples in CHF patients compared to patients with no CVD, and is a strong predictor of mortality with the same risk adjustment in all 3 groups. Abnormal HR recovery predicts mortality independently across sex and after adjustment for multiple risk factors known to affect mortality. Improving CRF may be a potential strategy to improve HR recovery and reduce mortality risk.

Z. Pap¹, B. Sax¹, A. Assabiny¹, K. Racz², E. Nemeth², A. Kiraly¹, D. Becker¹, K. Monostory³, B. Merkely¹, ¹Semmelweis University Heart Center - Budapest - Hungary, ²Semmelweis University, Department of Anesthesiology and Intensive Care - Budapest - Hungary, ³Hungarian Academy of Sciences - Budapest – Hungary:

Investigation of tacrolimus metabolism through CYP3A enzymes after cardiac transplantation

Abstract: P2082

Investigation of tacrolimus metabolism through CYP3A enzymes after cardiac transplantation

Authors:

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Topic(s):

CHF - Transplantation

Citation:

European Heart Journal (2017) 38 (Supplement), 424

Introduction: Immunosuppressive regime, especially tacrolimus (TAC) dosing after cardiac transplantation (HTX) should be carefully tailored to avoid rejection, side effects and infection. TAC is metabolized by the CYP3A enzyme family. Polymorphism of these genes may lead to greatly differing TAC doses.

Purpose: Our aim was to investigate the correlation between CYP3A5 genotype and CYP3A4 mRNA expression and of the TAC dose required to achieve stable trough levels.

Methods: We included 54 consecutive transplanted patients, all treated with the same immunosuppressive regime (pharmacogenetic study performed: CYP1, n=35; not performed: CYP0, n=19).

Results: According to our results, 17% of the investigated patients showed CYP3A5*1/*3 heterozygous genotype which results in active CYP3A5 enzyme. The CYP3A5*3/*3 homozygous patients metabolize TAC solely through the CYP3A4 enzyme. In the latter group, 55% had low and 45% had normal CYP3A4 mRNA expression. The CYP3A5 heterozygous patients had a significantly higher TAC dose requirement to achieve therapeutic TAC trough level as compared to the CYP3A5*3/*3 homozygous patients (0.17 ± 0.06 vs. 0.11 ± 0.05 mg/kg, $p=0.03$), independently of their CYP3A4 mRNA expression. While the clinical application of these pharmacogenetic results were not obligatory for the treating physician, the CYP1 group had a significantly better renal function after HTX (worst post-HTX GFR: 52 ± 24 vs. 37 ± 24 ml/min/1.73m², $p=0.04$) and significantly lower need for dialysis (11% vs. 37%, $p<0.05$).

Conclusions: We may conclude, that the analysis of TAC metabolism, especially identifying CYP3A5*1/*3 heterozygous HTX patients may be an effective tool in optimizing TAC dosing. Application of the pharmacogenetic results may improve post-HTX renal function and may help in avoiding dialysis treatment.

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Athlete's heart or structural heart disease? - First Hungarian Structural Heart Disease and Aborted Sudden Cardiac Death Magnetic Resonance Registry in Athletes

Abstract: P4444

Athlete's heart or structural heart disease? - First Hungarian Structural Heart Disease and Aborted Sudden Cardiac Death Magnetic Resonance Registry in Athletes

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Topic(s):

Prevention - Epidemiology

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Sudden cardiac death (SCD) is the most common cause of death in athletes occurring usually during intensive training. Cardiac magnetic resonance (CMR) has a crucial role in the detection of structural myocardial abnormalities. Our aim was to investigate the etiology of SCD and to estimate the prevalence of myocardial structural heart diseases among Hungarian competitive athletes using CMR.

During a 6-year period (between January 2011 and January 2017) we performed CMR scans on 154 athletes (135 males, age: 28.7±12.5 y) with suspected structural myocardial disease. Ten athletes were investigated after aborted SCD.

CMR confirmed the diagnosis of structural myocardial disease in 40 athletes (26.0%) (38 male, age: 27±18 y): hypertrophic cardiomyopathy (HCM) in 9 cases (22.5%), arrhythmogenic right ventricular cardiomyopathy (ARVC) in 8 cases (20.0%), noncompaction (NCCMP) and dilated cardiomyopathy (DCM) in 2–2 cases (5.0–5.0%) (Figure). Subendocardial late gadolinium enhancement (LGE), reflecting myocardial scar/fibrosis, was typical of previous myocardial infarction (post AMI) in 2 cases. Nonischaemic LGE pattern was found in 15 cases (37.5%): patchy subepi-midmyocardial LGE suggesting previous myocarditis in 8 athletes, and with aspecific pattern in 7 athletes. Athletes with nonischaemic LGE had normal laboratory parameters without wall motion abnormalities, in their cases systemic diseases were ruled out. One athlete was diagnosed with Fabry-disease (2.5%), one with coronary artery abnormality (anomalous origin of the left main coronary artery from the right sinus of Valsalva) (2.5%). Regarding the 10 aborted SCD cases, CMR findings were the following: ARVC (n=3), aspecific LGE pattern (n=2), and no structural myocardium abnormality (n=5). In the last group two athletes were diagnosed with long QT-syndrome, one with Wolff-Parkinson-White-syndrome and one with Brugada-syndrome.

In our national CMR registry the most common structural alteration was nonischaemic fibrosis, the most common cardiomyopathy was HCM, and the leading cause of SCD in Hungarian competitive athletes was ARVC. The national registers are highly important for a better understanding the etiology and the geographical differences of SCD in athletes.

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Right ventricular failure due to acute thrombosis of the ascending aorta: successful treatment by right ventricular assist device

Abstract: 2840

Right ventricular failure due to acute thrombosis of the ascending aorta: successful treatment by right ventricular assist device

Authors:

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Topic(s):

AHF - Non pharmacological treatment

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Different types of short-term mechanical circulatory support (MCS) systems have become meaningful options in acute heart failure. Hereby, we report a case where a right ventricular assist device (RVAD) has saved a life of a woman with acute thrombosis of the ascending aorta.

We report a case of 49 years old woman without relevant medical history. She was admitted to a countryside hospital due to shortness of breath and hypotension. Blood pressure could not be measured on her left arm. Numbness in her left feet started for several days before. On her ECG, pathological Q waves, ST elevation and negative T waves were visible in the inferior and in V1 leads as well. Troponin I level were highly elevated (27299 ng/L). CTA scan was performed, however, the report was inconclusive and she was referred to our hospital as a potential type A aortic dissection. After admittance to our ICU, transesophageal echocardiography (TOE) was performed revealing a large (over 2 cm), mobile thrombus, which seemed like originating from the ostium of the right coronary artery (Figure). In line with the ECG and necroenzyme levels, TOE suggested severely decreased right ventricular (RV) function along with dilation and wall motion abnormality of the RV and moderate tricuspidal insufficiency. Left ventricular function was preserved with no wall motion abnormalities visible. Re-evaluation of the CTA images confirmed the the diagnosis of acute ascendent aorta thrombosis. Due to cardiogenic shock, acute surgical intervention was indicated. After median sternotomy, overt RV failure was visible. The thrombus was extracted in toto, the aortic wall and the coronary ostia were intact. However, the termination of cardiopulmonary bypass was unsuccessful attributable to right heart failure. Due to the lack of left ventricular dysfunction and good oxygenation and ventilation, multidisciplinary team decided to implant a right ventricular assist device (RVAD) as a part of a "bridge to recovery" strategy. Postoperative angiography revealed the occlusion of the left axillary and both femoral arteries, embolectomy had to be performed. The early postoperative days were aggravated by the need of fasciotomies, rhabdomyolysis and subsequent renal failure. Regular echocardiographic follow-ups showed the slow recovery of RV systolic function. After cautious decrease of RVAD flow, the device was explanted on the 14th day. Five days later she was discharged from ICU. Currently, she is at home, doing well. Further laboratory tests revealed the presence of antinuclear (ANA) and anti-chromatin antibodies (ACA), suggesting an underlying prothrombotic autoimmune disease.

In conclusion, RVAD may be a feasible and effective option in selected patients with acute right heart failure.



Multimodality imaging of the thrombus.