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Cor et Vasa

WITH SUPPLEMENT

Kardio

Cor et Vasa, the journal of the Czech Society of Cardiology and Czech Society for Cardiovascular Surgery, publishes 6 times a year and covers all aspects cardiology, angiology, cardiovascular surgery, cardiovascular imaging, pediatric cardiology, hypertension, cardiovascular prevention and some aspects of interventional radiology.

It features editorial, original articles, review articles, as well as short communications from clinical and experimental cardiology. Beginning 2012, *Cor et Vasa* has also been publishing summaries (5 000 words) of the European Society of Cardiology guidelines, developed by leading Czech experts in the field.

Its supplement, *Cor et Vasa* Kardio offers book reviews, abstracts from elected congresses and conferences, elections and discussions, polemics, commentaries, information from the Czech Society of Cardiology, Czech Society of Cardiovascular Surgery and European Society of Cardiology as well as topical international news items.

Contributions appear in the Czech, Slovak or English language.

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Cor et Vasa

S PŘÍLOHOU Kardio

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Obsahuje úvodníky, původní sdělení, přehledové články i krátká sdělení z klinické a experimentální kardiologie. Počínaje rokem 2012 jsou v *Cor et Vasa* publikovány také souhrny (5 000 slov) z doporučených postupů Evropské kardiologické společnosti, připravené předními českými odborníky.

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Cor et Vasa

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MARKERS OF IRON DEFICIENCY IN PATIENTS WITH HEART FAILURE DECOMPENSATION

Bakošová M[1], Godava J[2], Honek T[2], Hude P[2], Ozábalová E[2], Poloczková H[3], Bedáňová H[4], Němec P[4], Máchal J[5], Krejčí J[3]

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Type: clinician's oral presentation, topic: heart failure, transplantation, circulatory assist devices

Introduction: Iron deficiency (ID) is one of the most common comorbidities in patients with heart failure (HF) regardless of the presence of anaemia. It is more common in individuals with acute decompensation.
Purpose: To analyse the specific parameters expressing the presence of ID. To compare these parameters between groups with and without acute HF decompensation.
Patients and methods: We included 98 patients who were followed or hospitalized in our clinic from January to August 2023. We divided patients into two groups; a group of stabile ambulatory patients and the second group of patients hospitalized with HF decompensation. Standard tests including the parameters of iron metabolism were monitored. In addition, the soluble transferrin receptor (sTfR) was evaluated. ID was defined as a transferrin saturation (T-sat) value <20%, or ferritin <100 µg/ml.
Results: ID was present in 59% of all stabile ambulatory patients, and in 66% of hospitalized patients. In the group of outpatients, ferritin value was 111.45 (51.70–345.40) µg/mL, T-sat was 0.21 (0.128–0.269). In the group of hospitalised patients, ferritin was 156.85 (66.98–314.72) µg/mL and T-sat 0.163 (0.012–0.24). The sTfR values in outpatients group were 1.60 (1.25–2.09) mg/L, in hospitalization group 1.64 (1.33–2.12) mg/L. Serum iron was 13.65 (7.83–18.40) µmol/L in outpatient group and 10.25 (8.13–16.30) µmol/L in hospitalization group.
Conclusion: ID was present in majority of the patients with HF, more in the group with acute decompensation. Patients with decompensation tend to have higher ferritin as a marker of inflammation. Other parameters like T-sat, sTfR or serum iron seem to be more appropriate for the diagnosis of ID, especially in decompensated patients.

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EARLY DISCHARGE IN SELECTED ACUTE CORONARY SYNDROME PATIENTS AFTER INTERVENTIONAL TREATMENT: A SINGLE-CENTER EXPERIENCE

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Type: clinician's oral presentation, topic: acute coronary syndromes

Background: Utility of risk stratification in acute coronary sydrome (ACS) patients is well established. Efficient identification of low-risk patients may reduce the hospitalization time without compromising their prognosis.
Aim: To create and implement universal protocol for selection low-risk ACS patients after interventional treatment.
Methods: Based on retrospective analysis of 932 single-center ACS patients (from 10/2018 to 12/2020) we identified several parameters highly associated to 30-day survival. Unifying these parameters showed (retrospectively) ability to select low-risk ACS patients with 100% survival rate in 30 days. We created a simple, universal protocol and implemented it into clinical practice. Prior hospital discharge, a proper education by experienced nurse was performed.
Results: In 2-year period (7/2021–7/2023) we selected 98 low-risk ACS patients and discharged them from hospital within 72 hours. In 89 patients telephone follow-up was completed at 30-day with 100% survival rate. Currently, in 39 patients (39%) 1-year follow-up was completed, 5.1% (n = 2) had history of CABG and 10.3% (n = 4) history of MI.
64% (n = 25) were men and 82% (n = 32) presented with MI (STEMI in 25.6%, n = 10). Rehospitalization occured in 15.3% (n = 6). All patients had 100% survival rate in 1 year after ACS. We compared hospitalization time of low-risk ACS patients in 1-year period before (10/2018–10/2019, group A, n = 86) and after (7/2021–7/2022, group B, n = 60) implementation of protocol into clinical practice. Median hospitalization time in Group A was 2 days compared to 1 day in Group B, p = 0.467, in MI patients

median was 4 days in Group A (n = 51) and 3 days in Group B (n = 36), $p = 0.062$.
Conclusion: Selection of low-risk ACS patient treated by PCI is feasible and safe. Proper protocols can reduce hospitalization stay and may reach 100% 30-day and 1-year survival rate

IMMUNE SYSTEM CHANGES AFTER COVID-19 CORRELATES WITH MARKERS OF CARDIOVASCULAR DAMAGE

Bendíčková K[1], Andrejčinová I[2], Blažková G[2], Papatheodorou I[2], Bosáková V[2], Skotáková M[3], Panovský R[4], Opatřil L[4], Vymazal O[2], Kovačovicová P[3], Helán M[5], Hortová-Kohoutková M[2], Frič J[2]

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Type: clinician's oral presentation, topic: secondary prevention

COVID-19 is associated with strong immune response leading to inflammation, subsequently affecting multiple organs including cardiovascular system. Dysregulated immune response can persist over time and put patients at a higher risk of developing cardiovascular disease (CVD). Here we investigated correlations between humoral and cellular immune system markers together with markers of cardiovascular damage during COVID-19 onset and subsequent recovery. We analysed blood samples of 22 hospitalized COVID-19 patients at three timepoints (acute, 1 and 6 months after COVID-19) in order to track the impact of COVID-19 to long-term decline of the cardiovascular system fitness and eventual development of CVD. Specifically, we performed multi-parametric immunophenotyping of peripheral blood leukocytes by flow cytometry, protein analysis of plasma, and using our established intracellular flow cytometry protocol, we measured NF-κB activity in monocytes.
Our results suggest long-term changes in the immune system including significant changes in the frequency of CD^{16+} monocytes in post-acute COVID-19. Furthermore, increased level of proinflammatory cytokines (e.g., IL-23) significantly positively correlates with the plasma level of markers of cardiovascular damage. These finding may serve as a base for novel immune-related markers, which could be used for the stratification of COVID-19 patients at a high risk of CVD for further therapy.

The research was supported by the Ministry of Health of the Czech Republic, grant nr. NU22-A-121.

NEW METHOD OF COMPRESSION AFTER CORONARY ANGIOGRAPHY AND INTERVENTION FROM PROXIMAL AND DISTAL RADIAL APPROACHES IN RANDOMIZED COMPARISON WITH STANDARD COMPRESSION – ANALYSIS OF 500 PATIENTS

Bernat I[1], Horák D[2], Jirouš Š[2], Buchnerová A[2], Lerchner T[2], Rokytová R[2], Rokyta R[2]

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Type: clinician's oral presentation, topic: interventional cardiology

Background: Duration and intensity of the radial artery compression after interventional procedures affect the occurrence of postprocedural local complications. We investigated the use of standard mechanical compression and its combination with kaolin-impregnated gauze patch as a new method of hemostasis.
Methods: Five hundred consecutive patients (66±8 years, 75% males) after coronary angiography (70%) and intervention (30%) from the proximal (PRA) and distal radial (DRA) approaches were analyzed. Compression was performed by mechanical inflatable device (TR Band) with or without kaolin gauze – 170 versus (vs.) 170 patients in proximal groups and 80 vs. 80 patients in distal groups. Time to hemostasis and access site complications were analyzed.
Results: Baseline characteristics were similar in all four groups – proximal with kaolin (PK+) and without kaolin (PK–), distal with kaolin (DK+) and without kaolin (DK–). Time to hemostasis was 57±20 min in PK+ vs 83±19 min in PK– group and 48±12 min in DK+ vs. 63±12 min in DK– group (both $p < 0.001$). Compression times in distal groups were significantly shorter in comparison with proximal groups ($p < 0.001$). Hematomas grade I (<5 cm) were more often in PRA – 20% vs 7% in DRA and similarly as grade II (<10 cm) – PRA 4.4% vs 0.6% in DRA (both $p < 0.001$). Only two patients with PRA had hematomas grade III (>10 cm). No patient had postprocedural radial artery occlusion.
Conclusions: The use of the new combined method of radial artery hemostasis was associated with shorter compression time both in PRA and DRA in comparison with standard only mechanical compression. DRA was associated with shorter compression time in both groups compared to PRA and almost absence of any local complications. Local hematomas were dominantly observed in patients with PRA. There were no radial artery occlusions in this analysis.

MORTALITY IN HYPERTROPHIC CARDIOMYOPATHY IS INDEPENDENT OF GENOTYPE

Bonaventura J[1], Rowin E[2], Chin M[3], Puchnerová V[4], Polaková E[4], Votýpka P[5], Macek Jr. M[6], Koethe B[3], Veselka J[4], Ošťádal P[4], Maron B[2], Maron M[2]

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Type: clinician's oral presentation, topic: myocardial and pericardial diseases

Background: Hypertrophic cardiomyopathy (HCM) patients with a pathogenic mutation are considered at greater risk of HCM-related adverse events (AE) than patients without the pathogenic mutation. Nevertheless, the relationships between genotype status and outcome have not been entirely resolved.
Methods: Consecutive patients (n=1468) with HCM diagnosis underwent genetic testing focused on HCM-related genes. Patients with pathogenic or likely pathogenic (P/LP) variants were considered genotype positive (G+), and those without P/LP variants or a variant of uncertain significance (VUS) were considered genotype negative (G-). Patients were followed for 9.6 ± 8.2 years for clinical outcomes.
Results: Of 1468 HCM patients, 1156 (79%) were G– and 312 (21%) were G+. Over the follow-up, 135 (9%) patients died, including 33 (2%) from HCM-related causes (sudden death, embolic stroke, heart failure, surgery: heart transplant or myectomy). Sudden death events (appropriate ICD shocks, aborted cardiac arrest, and sudden death) were more frequent in G+ patients (1.7%/year) than in G– patients (0.5%/year) (HR 1.94; 95% CI 1.21–3.11; p = 0.01). All-cause mortality was higher in G– patients compared to G+ patients (0.8%/year vs. 0.3%/year; p< 0.01), but after age adjustment, it did not differ between the groups (0.7%/year G– vs. 0.6%/year G+; p = 0.35). HCM-related mortality was similar between G– vs. G+ HCM patients (0.3%/year vs. 0.3%/year; p = 0.87). In a multivariable analysis, age at diagnosis was an independent predictor of all-cause and HCM-related mortality (p <0.0001 for both), HF and SD events (p = 0.03 for both), while genotype was not.
Conclusions: In this large consecutive genotyped cohort, all-cause and HCM-related mortality was unrelated to genotype status.

ASSESSING LEFT VENTRICULAR FUNCTION BY GLOBAL LONGITUDINAL STRAIN ONE YEAR AFTER ST ELEVATION MYOCARDIAL INFARCTION

Caunite L[1,2,3], Galloo X[1,4], Myagmarjdorj R[1], Laenens D[1], Nabeta T[1], Yedidja I[1,5,6], Kuneman JH[1], van Rosendael SE[1], Bax JJ[1,7], Ajmone Marsan N[1]

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Objectives: Aim of this study was to explore changes in left ventricular global longitudinal strain (LV GLS) one year after STEMI and its potential prognostic value.
Materials and methods: Data were analyzed retrospectively from an ongoing STEMI registry. Patients with previous myocardial infarction, heart failure history, suboptimal image quality or missing follow-up were excluded. Transthoracic echocardiography was performed during the index hospitalization and one year after STEMI. Relative LV GLS (Δ GLS) change was calculated. The endpoint was all-cause mortality.
Results: The study population consisted of 1409 patients (mean age 60±11 years; 1059 [75%] men). Of all patients surviving at least one year after STEMI, a total of 87 patients died after a median follow-up of 69 (IQR 38–103) months. At one-year follow-up LVEF improved from 50±8% to 53±8% (p <0.001) and LV GLS improved from 14±4% to 16±3% (p <0.001). Median ΔGLS was 14 (IQR 0.5–32)%. Optimal cut-off for Δ GLS was established on penalized spline curve as –7%. Cumulative 10-year survival was 91% in patients with Δ GLS >–7% versus 85% in patients with Δ GLS ≤–7% (p = 0.001). On multivariate Cox regression analysis Δ GLS ≤–7% remained independently associated with the endpoint after adjustment for age, troponin T, kidney function, chronic obstructive pulmonary disease, wide QRS complex, TAPSE and baseline LV GLS (HR 2.5 [95% CI 1.5–4.1]; p <0.001).
Conclusions: Significant improvement in LV GLS one year after STEMI has additional prognostic value on top of baseline LV GLS, clinical risk factors and right ventricular function.

DYNAMICS OF CIRCULATING MIRNAS IN ACS PATIENTS DURING CARDIAC REHABILITATION

Dlouhá D[1], Mrázková J[1], Hucková P[1], Wohlfahrt P[2], Jenča D[2], Suchánek P[1], Lánská V[3], Piťha J[2]

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Type: clinician's poster, topic: atherosclerosis

Background: Physical activity (PA) is the basis of cardiac rehabilitation. MicroRNAs (miRNAs) are posttranscriptional gene regulators involved in the pathogenesis of atherosclerosis. Our study aimed to monitor the dynamics of nine pre-selected circulating miRNAs in patients during cardiac rehabilitation.

Methods: A total of 30 patients (women = 10%; age = 52.7±10.8 years) with ACS were included in the study. PA (including a number of steps per day and a number of steps during brisk walking) of patients from intervention group was monitored using smart watches for three months. In the control arm, patients received general recommendations for PA after MI. Plasma was collected at the time of ACS, and then 1st, 3rd, 6th, and 12th month after ACS. Completely 5 follow-up (FU) samples were measured in each patient. Twelve pre-selected circulating miRNAs were measured using quantitative PCR.
Results: Biochemical parameters such as glycemia, TC, LDL- C, and triglycerides declined during FU time points (all p <0.0001) as well as systolic blood pressure (p = 0.03). From anthropometrical parameters active body mass declined (p <0.04) and metabolic rate increased (p <0.02) during FU time points. We observed an increasing trend in the quantity of miR-142 (p = 0.001) during FU time. At the time of ACS, patients with non-STEMI ACS (N = 12) had higher levels of miR-92a (p = 0.03) compared to STEMI. Multiple linear regression identified a strong inverse correlation between VO_2/kg and miR-155; miR-146a and miR-21 (all p <0.02). Active body mass was negatively correlated with miR-155, miR-126 (p <0.0001) and with miR-130a (p <0.03). Metabolic rate was inversely correlated with miR-155 (p <0.007) and with miR-146a (p <0.05).
Conclusion: Our study has shown that circulating miRNAs can reflect changes in metabolism and vascular endothelial cells during cardiac rehabilitation.

SMALL RNA SEQ PROFILE IN PATIENTS WITH AND WITHOUT FAMILIAL HYPERCHOLESTEROLEMIA TREATED WITH PCSK9 INHIBITOR

Dlouhá D[1], Hucková P[1], Blaha V[2], Chytilová Š[3], Bláha M[4], Hubáček J[1]

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Type: clinician's poster, topic: atherosclerosis

Background: Heterozygous familial hypercholesterolemia (HeFH) is relatively frequent (1 : 300), life-threatening genetic disorder characterized by an elevated serum level of low-density lipoprotein cholesterol and accelerated atherosclerotic cardiovascular diseases. Small RNAs are non-coding molecules known to play a pivotal role in posttranscriptional regulation of gene expression. The aim of our study was to compare miRNA Seq profile in HeFH and non-FH patients under PCSK9 inhibitor (PCSK9i) treatment.
Methods: From 30 patients (age 62±9.6 years; women 33.3%) involved in the study, eight subjects were genetically diagnosed as HeHF (age 56.3±14.5; men 14.3%). Plasma samples were collected before the start of PCSK9i treatment, and then at 3rd, 6th, and 12th month of treatment. Total RNA was extracted from plasma, miRNA sequencing libraries were prepared and examined by the next-generation sequencing.
Results: Totally 103 differently expressed miRNAs (DE-miRNAs; Padj <0.05) were detected between HeFH vs. non-FH patients across follow-up time points (FUs). Fifteen DE-miRNAs between HeFH vs. non-FH were found in all FUs. In a total group of subjects, concentration of 24 miRNA significantly changed (p <0.05) during one year of PCSK9i treatment. 309 genes as potential targets of DE-miRNAs between HeFH vs. non-FH, and 254 validated genes of DE-miRNAs, if both groups analyzed together, were identified. GSEA identified these targets are involved mainly in FoxO signaling, PI3K-Akt signaling, TGF-beta signaling and EGFR tyrosine kinase inhibitor resistance pathways (all FDR q-value <0.05).
Conclusions: Circulating miRNome is affected both by FH genotype as well as by PCSK9i treatment. Potentially influenced genes to be regulated by DE-miRNAs are members of signaling pathways related to extracellular matrix regulation, inflammation, and vascular pathology.

ELECTROPORATION OF CARDIOMYOCYTES IN-VITRO IN 2-D CULTURE

Fišerová I[1], Novák M[2], Kvapil D[1], Martínková S[1], Trnka J[1], Toušek P[3], Osmančík P[3], Vrba D[2], Vrba J[2], Fišer O[2]

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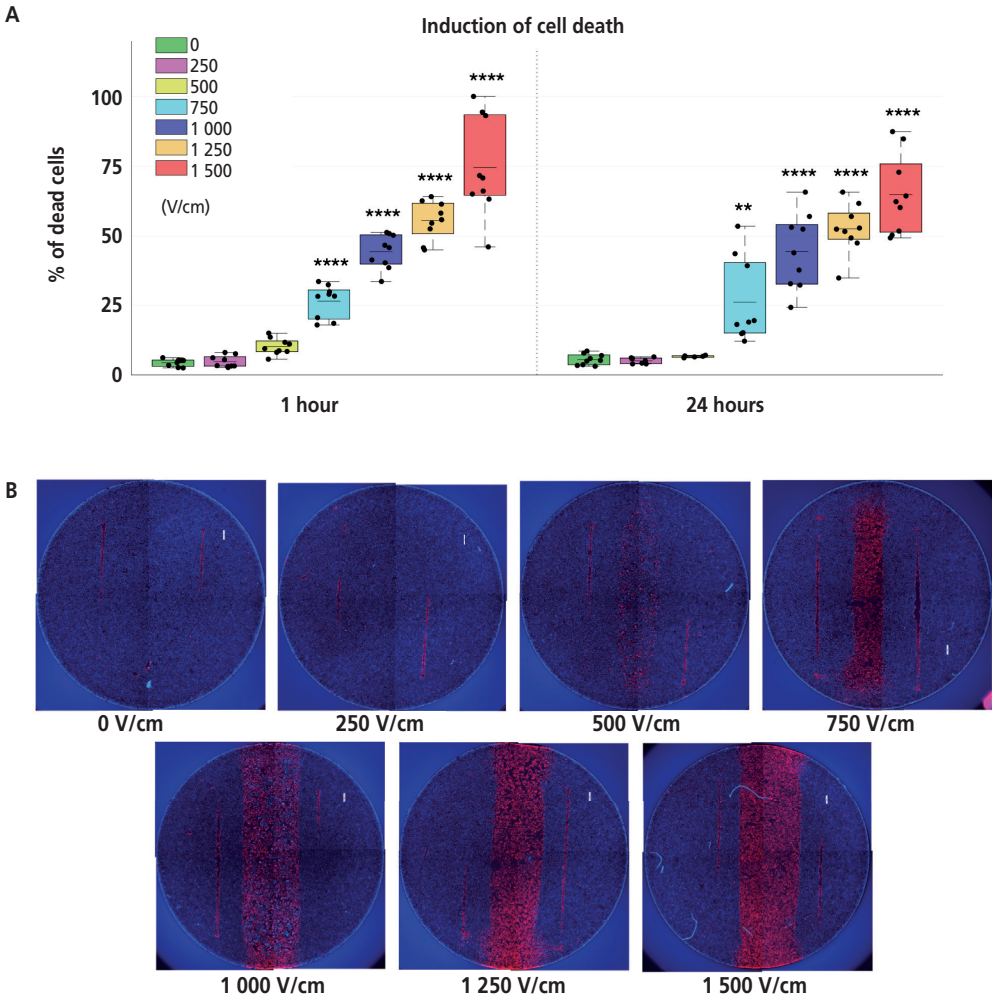
Type: clinician's oral presentation, topic: rhythm disorders, pacing

Aim: Electroporation is a bioelectrical technique that applies short electrical pulses to create pores in the cytoplasmic membrane of cells. This method facilitates entry of large molecules into cells without induction of cell death (reversible electroporation) or induces cell death (irreversible electroporation). The aim of this study is to investigate electroporation protocols that can induce both types of electroporation in adherent cardiomyocytes.
Methods: A tumor line of murine cardiomyocytes was used for this study. Electroporation was conducted using a commercial TONAPULSE electrical pulse generator equipped with an electrode plate (TONAGENA, CZ). Cardiomyocytes were exposed to a burst consisting of 216 bipolar pulses lasting 2 µs, with 5 µs pauses in between of the pulses. Each burst was repeated 20 times with a 1 second pause between. Applied electric fields ranged from 250 V/cm to 1500 V/cm. The ratio of viable to non-viable cells was assessed at 1 hour and 24 hours post-electroporation with fluorescent microscopy.



Results: Electric fields of 250 and 500 V/cm (induced reversible electroporation) did not result in a higher rate of cell death. With increasing of electric field, cell death was induced. Electric field 750 V/cm induced cell death in 27±6 % of cardiomyocytes, while 1000 V/cm resulted in 44±6 %, 1250 V/cm in 56±7 %, and 1500 V/cm in 75±18 % (Fig. 1, 2). Similar ratio of cell death was observed after 24 hours.
Conclusion: The electric field for reversible electroporation – 250 and 500 V/cm did not induce cell death. However, electric fields for irreversible electroporation – 750 to 1500 V/cm resulted in cell death. This experiment validates the feasibility of achieving either reversible or irreversible electroporation in 2D cultures of cardiomyocytes, depending solely on the strength of the applied electric field.

THE ATTICUS RANDOMIZED CONTROLLED TRIAL

Geisler G

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Type: clinician's oral presentation, topic: rhythm disorders, pacing

Background: Rivaroxaban and dabigatran were not superior to aspirin in patients with embolic stroke of undetermined source (ESUS). It is unknown whether apixaban is superior to aspirin in ESUS patients with risk factors for cardio-embolism.
Methods: Multicenter, randomized, open-label, blinded-outcome trial of apixaban (5 mg twice daily) compared with aspirin (100 mg once daily) initiated within 28 days after ESUS in patients with at least one predictive factor for atrial fibrillation or a patent foramen ovale. Cardiac monitoring was mandatory and aspirin treatment was switched to apixaban in case of atrial fibrillation detection. The primary outcome was any new ischemic lesion on brain MRI during 12-month follow-up. Secondary outcomes included major and clinically relevant non-major bleeding.
Results: 352 patients were randomized to receive apixaban (178 patients) or aspirin (174 patients) at a median of 8 days after ESUS. New ischemic lesions occurred in 23 (13.6%) participants in the apixaban group and in 25 (16.0%) in the aspirin group (adjusted odds ratio 0.79; 95% CI, 0.42 to 1.48; p = 0.57). Major and clinically relevant non-major bleeding occurred in 5 and 7 participants (one-year cumulative incidence, 2.9 and 4.2) (hazard ratio

0.68; 95% CI, 0.22 to 2.16). Serious adverse event rates were 43.9 per 100 person-years on apixaban and 45.7 on aspirin. ATTICUS was terminated after a prespecified interim analysis due to futility.
Conclusions: Apixaban treatment was not superior to cardiac monitoring-guided aspirin in preventing new ischemic lesions in an enriched ESUS population.

Funded by Bristol-Myers Squibb/Pfizer and Medtronic; ATTICUS ClinicalTrials.gov number, NCT02067182.

VALIDATION OF THE CARDIOMETABOLIC--BASED CHRONIC DISEASE (CMBCD) MODEL IN U.S. ADULTS

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Type: clinician's oral presentation, topic: primary and secondary prevention

Background: The Cardiometabolic-Based Chronic Disease (CMBCD) model is a four-stage driver and complication-based chronic approach. It was designed as an actionable strategy, advocating for earlier intervention.
Aim: To validate the CMBCD model by examining risk for CVD and all-cause mortality.
Methods: Data from the National Health and Nutrition Examination Surveys (NHANES) of the US (1999–2012) was linked to mortality files until 2015. Adults aged 40–74 years were analyzed. The CMBCD model is divided into 4 stages: 1 – risk, 2 – predisease, 3 – disease, and 4 – complications. Kaplan-Meier survival curve estimates and Cox regression models were calculated.
Results: 7261 subjects were included, mean age of 53.5±0.18 years, followed by 8.1 years. There were 160 CVD and 811 all-cause deathly cases. The cumulative rates for CVD and all-cause mortalities rates were 2.5 and 12.9 per 1000 person-years, respectively. The cumulative CVD-mortality rates for each CMBCD stage were without risk/stage 1, 0.8; stage 2, 1.1; stage 3, 1.7; and stage 4, 6.3, per 1000 person-years.
Conclusion: Subjects with complications presented a higher risk of mortality than those without it. These results highlight the relevance of early detection and intervention using a complication-based chronic approach.

PROGNOSTIC USEFULNESS OF NONINVASIVELY ASSESSED RIGHT VENTRICULAR–PULMONARY ARTERY COUPLING IN PATIENTS WITH RECENTLY DIAGNOSED UNEXPLAINED LV SYSTOLIC DYSFUNCTION

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Type: clinician's oral presentation, topic: imaging techniques in cardiology (echocardiography, nuclear cardiology, MRI, CT)

Introduction: The ratio of tricuspid annular plane systolic excursion/systolic pulmonary artery pressure (TAPSE/PASP) measured by echocardiography has been proposed as a noninvasive index of right ventricular–pulmonary artery coupling with prognostic implications in heart failure patients.
Aim of the study: To assess the prognostic usefulness of TAPSE/PASP ratio in patients with recently diagnosed unexplained LV systolic dysfunction.
Methods: We retrospectively assessed echocardiographic, laboratory, and clinical data in 133 patients with recently diagnosed unexplained LV systolic dysfunction (55±11 years, 72% males) with symptoms lasting <6 months. A comprehensive echocardiographic examination was performed at the time of diagnosis including the evaluation of TAPSE and PASP, respectively.
Results: During a median follow-up of 5 years, 23 subjects died (17% of total initial study population). In univariate analysis, overall survival was associated with right atrial (RA) area, RA pressure, tricuspid regurgitation grade, E/e´, PR interval duration and BNP level, but not with TAPSE/PAPS ratio (p = 0.215). In multivariate analysis of echocardiographic parameters, only RA area was found to be independently associated with mortality (p <0.05). TAPSE/PASP was not associated with prognosis.
Conclusions: TAPSE/PASP ratio is not associated with survival in patients with recently diagnosed unexplained LV systolic dysfunction. RA area appears to be a significant echocardiographic predictor of 5-year survival in these individuals.

OUTCOMES OF PATIENTS WITH MYOCARDIAL INFARCTION AND CARDIOGENIC SHOCK TREATED WITH CULPRIT VESSEL-ONLY VERSUS MULTIVESSEL PRIMARY PCI

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Type: clinician's oral presentation, topic: interventional cardiology

Introduction and objectives: Multivessel primary percutaneous coronary intervention (pPCI) is still often used in patients with ST-elevation myocardial infarction (STEMI) and cardiogenic shock (CS). The study aimed to compare the characteristics and prognosis of patients with CS-STEMI and multivessel coronary disease (MVD) treated with culprit vessel-only pPCI or multivessel pPCI during the initial procedure.
Material and methods: From 2016 to 2020, 23,703 primary PCI patients with STEMI were included in a national all-comers registry of cardiovascular interventions. From them, a total of 1,213 (5.1%) patients had cardiogenic shock and MVD at admission to the hospital. Initially, 921 (75.9%) patients were treated with CV-pPCI and 292 (24.1%) with MV-pPCI.
Results: Patients with 3-vessel disease and left main disease had a higher probability of being treated with MV-pPCI than patients with 2-vessel disease and patients without left main disease (28.5% vs. 18.6%; p <0.001 and 37.7% vs. 20.6%; p <0.001). Mechanical circulatory support systems were more often used in patients with MV-pPCI. 30-day and 1-year all-cause mortality rates were similar in the CV-pPCI and MV-pPCI groups (odds ratio 1.01; 95% CI 0.77 to 1.32; p = 0.937 and 1.1; 95% CI 0.84 to 1.44; p = 0.477). The presence of 3-vessel disease and use of ECMO were the strongest adjusted predictors of a 30-day and 1-year mortality.
Conclusions: Our data from a large all-comers registry suggest that selective use of MV-pPCI does not increase the all-cause mortality rate in patients with CS-STEMI and MVD in comparison with CV-pPCI.

STENT SELECTION FOR PRIMARY ANGIOPLASTY AND OUTCOMES IN THE ERA OF POTENT ANTIPLATELETS. DATA FROM THE MULTICENTER RANDOMIZED PRAGUE-18 TRIAL

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Type: clinician's oral presentation, topic: interventional cardiology

Drug-eluting stents (DES) are the recommended stents for primary PCI. This study aimed to determine why interventional cardiologists used non-DES and how it influenced patient prognoses. The efficacy and safety outcomes of the different stents were also compared in patients treated with either prasugrel or ticagrelor. Of the PRAGUE-18 study patients, 749 (67.4%) were treated with DES, 296 (26.6%) with bare-metal stents (BMS), and 66 (5.9%) with bioabsorbable vascular scaffold/stents (BVS) between 2013 and 2016. Cardiogenic shock at presentation, left main coronary artery disease, especially as the culprit lesion, and right coronary artery stenosis were the reasons for selecting a BMS. The incidence of the primary composite net clinical endpoint (EP) (death, nonfatal MI, stroke, serious bleeding, or revascularization) at seven days was 2.5% vs. 6.3% and 3.0% in the DES, vs. with BMS and BVS, respectively (HR 2.7; 95% CI 1.419–5.15, p = 0.002 for BMS vs. DES and 1.25 [0.29–5.39], p = 0.76 for BVS vs. DES). Patients with BMS were at a higher risk of death at 30 days (HR 2.20; 95% CI 1.01–4.76; for BMS vs. DES, p = 0.045) and at one year (HR 2.1; 95% CI 1.19–3.69; p = 0.01); they also had a higher composite of cardiac death, re-MI, and stroke (HR 1.66; 95% CI 1.0–2.74; p = 0.047) at one year. BMS were associated with a significantly higher rate of primary EP whether treated with prasugrel or ticagrelor. In conclusion, patients with the highest initial risk profile were preferably treated with BMS over BVS. BMS were associated with a significantly higher rate of cardiovascular events whether treated with prasugrel or ticagrelor.

ROUTINE ULTRASOUND USE IN CONSECUTIVE PATIENTS CATHETERIZED VIA DISTAL RADIAL ACCESS

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Type: clinician's oral presentation, topic: interventional cardiology

Distal radial access (DRA) in cardiac catheterizations is alternative to conventional radial access (cTRA). It has distinct advantages over cTRA. Among other substantial reduction of radial artery occlusion. However puncture is more laborious with higher crossover rate and takes more puncture attempts. Patients w/o palpable DRA are deemed to be ineligible for DRA puncture. Prevalence of those patients in population remains unknown. Ultrasound (US) is widely recognized as useful tool to gain vascular access. However, among inteventionalists using radial access is from various reasons grossly underused.
To estimate proportion of patients not feasible for DRA cannulation we included consecutive patients irrespective of DRA palpation presence in our project. All punctures were performed with US in order to perform cannulation also in subjects w/o palpable DRA.
Results: We have evaluated 100 consecutive stable patients scheduled for cardiac catheterization irrespective of absence or presence of DRA pulsation and performed US guided puncture. We have collected data about DRA diameter, success rate, and other standard demographic and procedural data.
Overall success rate of sheath insertion was 94%. Proportion of subject w/o palpable DRA was 11%. Notably, in those patients with US guidance were 9 successful sheath insertions (84%). Mean puncture attempts were 1.8 and median 1.
Rate of DRA w/o palpable pulsation is nonselected population around 10%. Using systematic US guidance can be successful arterial sheath insertion achieved in approximately 80% of such patients.
Conclusion: Overall success rate (≥90%) in nonselected population is high enough to support hypothesis that DRA can become a primary access site. Systematic US guidance for DRA puncture is clinically feasible and allows gaining arterial access in patients where palpation method inherently fails.

PLASMA NUCLEIC ACIDS AS POTENTIAL PREDICTORS OF STATIN ASSOCIATED MUSCLE SYMPTOMS

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Type: clinician's oral presentation, topic: pharmacotherapy

Introduction: Statin-associated muscle symptoms (SAMS) are the most common undesirable side effect (USE) of widely indicated statin therapy. So far, appropriate biochemical markers allowing early prediction and confirmation of the causal association between SAMS and statin use are missing. Plasma cell-free nucleic acids (miRNAs, nucleic and mitochondrial DNAs) could be promising new markers of muscle damage.
Methods: Using quantitative PCR, we analyzed plasma concentrations of three muscle-specific miRNAs (133a-3p, 1-3p, and 23a-5), nucleic DNA (markers at IL-6 and FTO genes) and mitochondrial DNA (two independent markers) in a total of seventeen adult subjects (13 men and 4 women) with acute coronary events who were treated with statins after (but not before) the event. One sample was available before statin treatment and three samples during the first year of statin treatment. Because of the variance in cell-free nucleic acid concentrations, values were compared to the untreated sample (arbitrary standardised values of 1.00 for each subject/marker analyzed).
Results: Seven of seventeen (i.e. 41%) subjects reported different degrees of SAMS on treatment. The relative change of unadjusted concentrations (significant at $p < 0.05$ in two cases) of all three miRNAs analyzed was (when compared with the first examination) different in subjects with SAMS (e.g., miRNA 1-3p; $1.00 \rightarrow 1.06 \pm 0.28 \rightarrow 1.07 \pm 0.25 \rightarrow 1.10 \pm 0.40$) compared with subjects without ($1.00 \rightarrow 1.43 \pm 0.52 \rightarrow 1.54 \pm 0.74 \rightarrow 1.52 \pm 0.69$). Changes of cell free DNAs in time were independent on SAMS presence.
Conclusion: Concentrations of regulatory miRNAs (but probably not cfDNA) may be markers of muscle damage induced by statin treatment.

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BIVENTRICULAR INVOLVEMENT IN ARRHYTHMOGENIC RIGHT VENTRICULAR CARDIOMYOPATHY

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Type: clinician's oral presentation, topic: myocardial and pericardial diseases

Background: Despite arrhythmogenic right ventricular cardiomyopathy (ARVC) being a predominant right ventricle (RV) disease, concomitant left ventricle (LV) involvement has been recognized. Diagnosis is made through the 2010 Task force criteria (TFC), which are RV-centric, and has yet to include strain measurement. Our aim was to assess the utility of global longitudinal strain (GLS) of RV and LV for risk stratification of these patients.
Methods: 204 patients who met the TFC for the ARVC spectrum were included. Patients were categorized based on a cut-off of GLS –18% for impairment in both ventricles. Outcome was a composite of all-cause mortality, arrhythmic events, ICD therapy and heart failure.

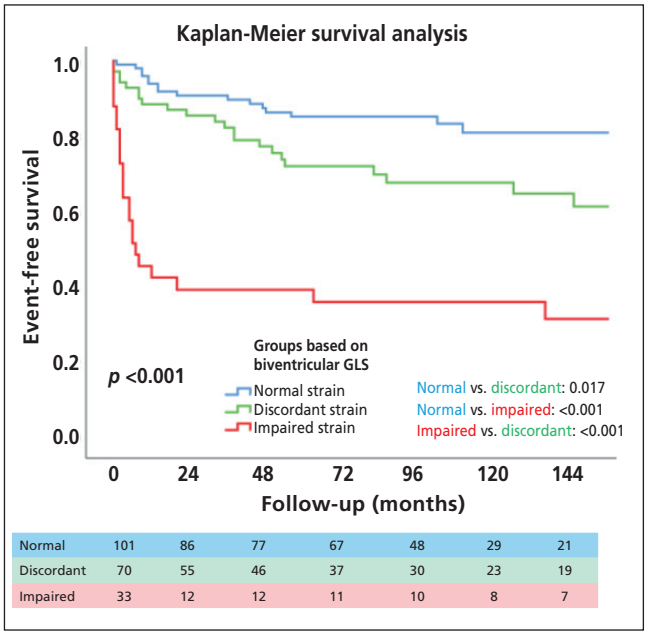

Fig. 1 – Kaplan-Meier survival analysis according to GLS stratification

Results: Patients (age 41±17 years, 55% males) were divided into impaired, discordant (either RV or LV impaired), and normal strain groups. During a follow-up of 87 [24–136] months, 60 (29%) experienced the combined outcome, and a significant difference in event-free survival was observed (p<0.001) between the 3 groups (Fig. 1). In the multivariate analysis, the GLS grouping remained associated with outcome (HR 2.398, 95% CI 1.065–5.395, p = 0.040) after adjusting for age, gender, history of syncope and definite ARVC diagnosis. In a sub-analysis on definite and borderline ARVC patients, GLS grouping remained an independent predictor of events (p = 0.027).
Conclusion: In ARVC patients, biventricular involvement by strain analysis has additional prognostic value, with outcomes differing if either the RV, LV or both are affected.

EXAMINING THE EFFECTS OF HYPERBARIC OXYGEN THERAPY ON THE CARDIOVASCULAR SYSTEM AND OXIDATIVE STRESS IN INSULIN-TREATED AND NON-TREATED DIABETIC RATS

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Type: clinician's oral presentation, topic: hypertension

Background: This study explored the effects of hyperbaric oxygen therapy (HBOT) on the cardiovascular system and oxidative stress in streptozotocin-induced diabetic rats. Wistar albino rats were divided into four groups: DM group (diabetic rats), DM+HBOT group (diabetic rats exposed to HBOT for 1 h daily, five days a week, at 2.8 atmosphere absolute [ATA] with 100% oxygen for two weeks), DM+INS group (diabetic rats treated with neutral protamine hagedorn [NPH] insulin at a dosage of 3–5 U/day), and DM+HBOT+INS group (diabetic rats treated with both NPH insulin and HBOT for two weeks).
Methods: Evaluations included glycemic control, oxidative stress parameters, and cardiac function measurements.
Results: NPH insulin treatment reduced blood glucose levels, although normoglycemia was not achieved. The DM+HBOT+INS group demonstrated the lowest pro-oxidative marker levels. NPH insulin treatment improved cardiac function, and combination therapy effectively restored cardiac function in diabetic animals.
Conclusions: NPH insulin treatment reduced hyperglycemia and improved cardiac function in diabetic rats. The combined approach of NPH insulin and HBOT resulted in decreased pro-oxidative markers. These findings provide valuable insights for managing cardiovascular complications and oxidative stress in diabetes.
Keywords: hyperbaric oxygen therapy; neutral protamine hagedorn (NPH) insulin; streptozotocin; type 1 diabetes (T1D)

NATURAL HISTORY OF NON-SURGICAL COMPLETE ATRIOVENTRICULAR BLOCK IN CHILDREN AND PREDICTORS OF PACEMAKER IMPLANTATION

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Type: clinician's oral presentation, topic: pediatric cardiology

Objectives: We aimed to evaluate natural course and predictors of pacemaker (PM) implantation in a nation-wide cohort of pediatric patients with non-surgical complete atrioventricular block (CAVB).
Background: Data on natural history of CAVB in children are scarce and criteria for PM implantation are based on low levels of evidence.
Methods: All children with CAVB in absence of structural heart disease presenting between 1977–2016 were retrospectively identified yielding 95 subjects aged median 4.05 years at first presentation with follow-up median 0.80 (IQR 0.02–6.82) years. PM implantation was performed according to available guidelines. Serial 24-hour Holter recordings and echocardiograms were reviewed. Predictors of PM implantation performed >1 month after first presentation were evaluated.
Results: Minimum and mean 24-hour heart rates (HR) and maximum RR intervals had a non-linear correlation with age (p <0.0001 for all). Left ventricular size was moderately increased and shortening fraction normal in the majority throughout follow-up. PM implantation was performed

in 62 patients (65.3%) reaching guidelines criteria. Mean 24-hour HR at presentation was a predictor of subsequent PM implantation (HR = 0.938, CI 0.894–0.983, p = 0.003 per unit increase) regardless of presentation age. Patients presenting with a mean 24-hour HR >58 BPM (>75 centile) had high probability of freedom from PM within the subsequent 5 years (91.7 vs 44.4%, p <0.001).
Conclusions: Pediatric patients with CAVB showed age-dependent decrease in HR, moderate LV dilation and preserved LV function. Probability of subsequent PM implantation could be predicted by the HR profile at presentation defining a low-risk group and allowing for individualized follow-up.

EFFECTS OF SELECTIVE ENDOTHELIN TYPE A RECEPTOR BLOCKADE IN EXPERIMENTAL HEART AND RENAL FAILURE: STUDIES ON RATS WITH AORTO-CAVAL FISTULA AND 5/6 NEPHRECTOMY

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Type: clinician's oral presentation, topic: Kardio 35 – original research article

Purpose: Evaluation of the effect of selective endothelin type A (ETA) receptor blockade on the course of (1) volume-overload heart failure (HF) and (2) volume-overload HF combined with chronic kidney disease (CKD).
Methods: (1) HF was induced by aorto-caval fistula (ACF) in hypertensive Ren-2 renin transgenic rats (TGR). (2) ACF-induced HF was combined with CKD induced by 5/6 nephrectomy (5/6 Nx) in HanSD normotensive rats. Selective ETA receptor blockade was achieved by atrasentan. Other groups received trandolapril (ACEi), a combination of atrasentan and trandolapril, or a placebo (water). The follow-up period was 20 weeks. Cardiac functions were assesed by echocardiography and invasive pressure / volume analysis of LV. Albuminuria and histological indexes of tubulosclerosis and glomerulosclerosis were measured as parameters of renal impairment.
Results: (1) None from untreated ACF TGR was alive after day 79. Both atrasentan and trandolapril treatment improved the survival rate, to 56% and 69%, combined ACEi and ETA receptor blockade to 52% (not a significant difference) and they suppressed the development of LV remodeling, lung congestion, and improved LV systolic contractility compared to their untreated counterparts. (2) The final survival in the untreated group was 15%. The treatment with atrasentan or trandolapril alone and the combined treatment improved the survival rate to 64%, 71%, and 75% (not a significant difference). The combined treatment exerted the best renoprotection (albuminuria, renal glomerular and tubulointerstitial injury).
Conclusion: The treatment with selective ETA receptor antagonist improves cardiac functions, delays the onset of decompensation, and increases the survival rate of volume-overload HF in TGR and in HanSD with ACF-induced HF combined with 5/6 Nx-induced CKD, in which it also enhanced renoprotective action.

STRUCTURAL AND FUNCTIONAL ALTERATIONS OF THE CARDIOVASCULAR SYSTEM IN PARKINSON'S DISEASE

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Type: clinician's oral presentation, topic: varia

Background: The known influence of the Parkinson's disease (PD) on the cardiovascular system is mainly the autonomic dysfunction which is manifested in postural hypotension, chronotropic insufficiency, and reduced heart rate variability. Other effects, e.g. stress response, arrhythmia occurrence, and changes in heart morphology, are still the object to clarify.
Objectives: To study the heart rate and blood pressure reaction during exercise, advanced measurements of heart volumes and mass using cardiac magnetic resonance (CMR) and occurrence of arrhythmias in PD patients.
Methods: Thirty PD patients (19 men, mean age 57.5 years), without previous history of cardiac disorders underwent bicycle ergometry, ECG Holter monitoring and CMR. The parameters from ergometry and CMR were compared with controls (24 subjects for ergometry, 20 for CMR).
Results: PD patients had lower systolic blood pressure (SBP) at rest 117.8 vs 128.3 mmHg; p <0.01; and also lower peak SBP after exercise: 155.8 vs 170.8 mmHg; p <0.05, and lower increase of heart rate (HR) during exercise: 49.7 vs 64.3 beats per minute (BPM); p <0.01.
Conclusion: Our study used combination of functional and structural assessment and showed that PD is associated with deterioration of blood pressure and heart rate response to exercise, increased myocardial mass and heart volumes compared to controls, and also a high prevalence of atrial fibrillation.

SEX-LINKED DIFFERENCES IN CARDIAC ATROPHY AFTER MECHANICAL UNLOADING INDUCED BY HETEROTOPIC HEART TRANSPLANTATION

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Type: clinician's oral presentation, topic: heart failure, transplantation, circulatory assist devices

There is no information about possible sex-related differences in unloading-induced cardiac atrophy. We aimed to compare the course of unloading-induced cardiac atrophy in intact (without gonadectomy) male and female rats, and in animals after gonadectomy, in order to obtain insight into the influence of sex hormones on this process. Heterotopic heart transplantation (HT) was used as a model for heart unloading. Cardiac atrophy was assessed as the weight ratio of heterotopically transplanted heart weight (HW) to the native HW on days 7 and 14 after HT in intact male and female rats. In separate experimental groups, gonadectomy was performed in male and female recipient animals 28 days before HT and the course of cardiac atrophy was again evaluated on days 7 and 14 after HT. In intact male rats, HT resulted in significantly greater decreases in whole HW when compared to intact female rats. The dynamics of the left ventricle (LV) and right ventricle (RV) atrophy after HT were quite similar to that of whole hearts. Gonadectomy did not have any significant effect on the decreases in whole HW, LV, and RV weights, with similar results in male and female rats. Our results show that the development of unloading-induced cardiac atrophy is substantially reduced in female rats when compared to male rats. Since gonadectomy did not alter the course of cardiac atrophy after HT, similarly in both male and female rats, we conclude that sex-linked differences in the development of unloading-induced cardiac atrophy are not caused by the activity of sex hormones.

MID-TERM RESULTS OF A NEWLY INTRODUCED NATIONWIDE PEDIATRIC HEART TRANSPLANTATION PROGRAM

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Type: clinician's oral presentation, topic: transplantation

Background and aim: Heart transplantation (HTx) is an effective treatment of terminal heart failure in children. Comprehensive pediatric nationwide HTx program was introduced in 2014 in the Czech Republic. The aim was to evaluate its mid-term characteristics and outcomes of the program.
Methods: Retrospective observational study including all patients who underwent HTx from the beginning of the HTx program from June 2014 till December 2022. Data from the institutional database were used for descriptive statistics and survival analysis.
Results: A total of 30 HTx were performed in 29 patients with congenital heart disease (CHD, N = 15, single ventricular physiology in 10 patients, median 4 prior cardiac surgeries per a patient) and cardiomyopathy (CMP, N = 14). Median age at HTx was 10.2 years (IQR 2.5–14.4) and median time spent on the waiting list was 84 days (IQR 42–228). Ten patients were bridged to HTx by durable left ventricular assist devices (LVADs) for a mean duration of 104 (SD 89) days.
There was 1 early and 1 late death during median follow-up of 3.3 (IQR 1.3–6.1) years. Survival probability at 5 years after HTx was 93%. Two patients underwent retransplantation (one of them in an adult center). Significant rejection-free survival at 1, 3, and 5 years after HTx was 76%, 63%, and 63%, respectively.
Conclusions: The introduced pediatric HTx program reflects the complexity of the treated population, with half of the patients having complex CHD and one-third being bridged to HTx by LVADs. Mid-term results are comparable to worldwide data and show excellent survival and modest rejection-free survival.
The data confirm the possibility of establishing a successful nationwide pediatric HTx program in a relatively small-population country with well-developed pediatric cardiovascular care.

LONG-TERM CARDIOVASCULAR OUTCOMES AFTER SEVERE BURN INJURY

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Type: clinician's oral presentation, topic: heart failure, transplantation, circulatory assist devices

Background: Severe burn injury (BI) leads to hypermetabolic response which can persist for several years and cause many late complications including cardiovascular (CV) disease. The aim of this study was to assess the CV outcomes of the patients with severe BI two years after their hospital discharge.

Methods: In this prospective cohort study, we included adult patients with burns >30% of total body surface area (TBSA), which were followed up during discharge, one year and two years after discharge. The controls included laboratory tests and cardiac magnetic resonance imaging (MRI). Furthermore, a cardiac MRI was performed in a control group which consisted of healthy volunteers.
Results: We enrolled 16 patients in this study. The average age was 44.2±12.7 years; the burnt area was 47%±14.7% TBSA. The most common CV adverse events during acute hospitalization were signs of heart failure and arterial hypertension which was observed in 6 patients (both 37.5%), followed by arrhythmia which developed in 3 patients (18.8%), 1 patient required cardiopulmonary resuscitation due to circulatory arrest.
Laboratory results showed significant difference in NT-proBNP levels comparing discharge and second follow-up (82.6±61.4 ng/l vs 60.1±94.7 ng/l, $p = 0.033$).
Cardiac MRI showed no difference in ejection fraction (EF). The only significantly different MRI parameter was the left ventricular end-diastolic volume index (LVEDVI) which was lower comparing the second follow-up to health controls (59.2±15.5 ml/m^2 vs 75.4±16.0 ml/m^2, $p = 0.046$).
Conclusion: The preliminary data show that patients after severe BI develop increased myocardial wall stress, presented by higher levels of NT-proBNP two years after the BI. Combining this finding with the decrease of the LVEDVI, we assume that BI leads to its decreased compliance resulting in heart failure with preserved EF.

ASSOCIATION BETWEEN HIGH-INTENSITY LIPID-LOWERING THERAPY AND ATHEROSCLEROTIC PLAQUE CONTENT CHANGES ASSESSED BY IMAP-IVUS AND NEAR-INFRARED SPECTROSCOPY IN PATIENTS WITH PREMATURE ATHEROSCLEROSIS

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Type: clinician's oral presentation, topic: pharmacotherapy

Background: The benefits of high-intensity lipid lowering therapy including PCSK9 inhibitors treatment have been well-established by randomized, controlled trials. Intravascular imaging such as near-infrared spectroscopy (NIRS) and iMAP-intravascular ultrasound (iMAP-IVUS) can provide information about plaque composition. Our study aimed to evaluate plaque composition in very high cardiovascular risk patients receiving high-intensity lipid-lowering therapy.
Methods: In our study patients received statin and/or ezetimibe in maximum tolerated dose. If LDL-C was >1.8 mmol/l, inclisiran was added to the therapy. After 15 months patients were classified in two groups – those who reached LDL-C target <1.8 mmol/L and those who did not. Plaque composition was assessed at the baseline and after 15 months.
Results: 37 patients had undergone IVUS/NIRS investigation. After 15 months the mean LDL-C level decreased from 2.70 mmol/L to 1.79 mmol/l and 25 patients reached a target of <1.8 mmol/L. In the group that reached target – NIRS imaging LCBImax4mm decreased from 184.00 (±160.07) to 62.72 (±142.19) with $p = 0.001$. In patients with LDL-C >1.8 mmol/L, LCBImax4mm changed from 211.16 (±167.76) to 125.04 (±152.21) with no statistically significant difference, $p = 0.074$. In iMAP-IVUS results necro-lipidic core in the <1.8 mmol/L group changed from 78.50 mm^3 (±42.77) to 84.77 mm^3 (±46.03), $p = 0.422$. Additionally, second group's necro-lipidic core changed from 97.43 mm^3 (±58.04) to 89.40 mm^3 (±49.03), with $p = 0.066$.
Conclusion: Our study showed that after 15 months of high-intensity lipid-lowering therapy patients who reached LDL-C levels <1.8 mmol/L, showed lower LCBImax4mm and total LCBI.

ASSOCIATION OF LEFT VENTRICULAR DILATATION PATTERNS WITH MORTALITY IN PATIENTS WITH MODERATE AND MODERATE–SEVERE AORTIC REGURGITATION

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Background: Recent studies suggested that in aortic regurgitation (AR) volumetric measures may better reflect left ventricular (LV) remodeling than linear dimensions. The aim of this study is to identify the differences in LV remodeling based on volumetric and linear measures and their association with outcome.
Methods: 904 patients (57±18 years, 60% male) with moderate and moderate–severe AR were included and classified into 3 groups based on the presence of LV end-systolic volume index ≥45 ml/m^2 and LV end-systolic diameter index ≥20 mm/m^2: normal, discordant dilatation (one positive criterion) and concordant dilatation (Fig. 1A). The primary endpoint was all-cause mortality (153, 17%).
Results: In multivariate analysis, age (HR 1.06, 95% CI 1.05–1.07, p <0.001), NYHA class 3–4 (HR 1.7, 95%CI 1.15–2.65, $p = 0.009$), LVEF ≤55% (HR 1.7, 95% CI 1.15–2.43, $p = 0.006$), time-dependent aortic valve surgery (AVS) (HR 0.54, 95% CI 0.36–0.8, $p = 0.002$) and the presence of discordant (HR 1.62, 95%CI 1.05–2.5, $p = 0.029$) or concordant dilatation (HR 2.7, 95% CI 1.7–4.3, p <0.001) were associated with outcome. Concordant dilatation showed worse survival (Fig. 1B), but benefited more from AVS based on a landmark analysis (p <0.001).

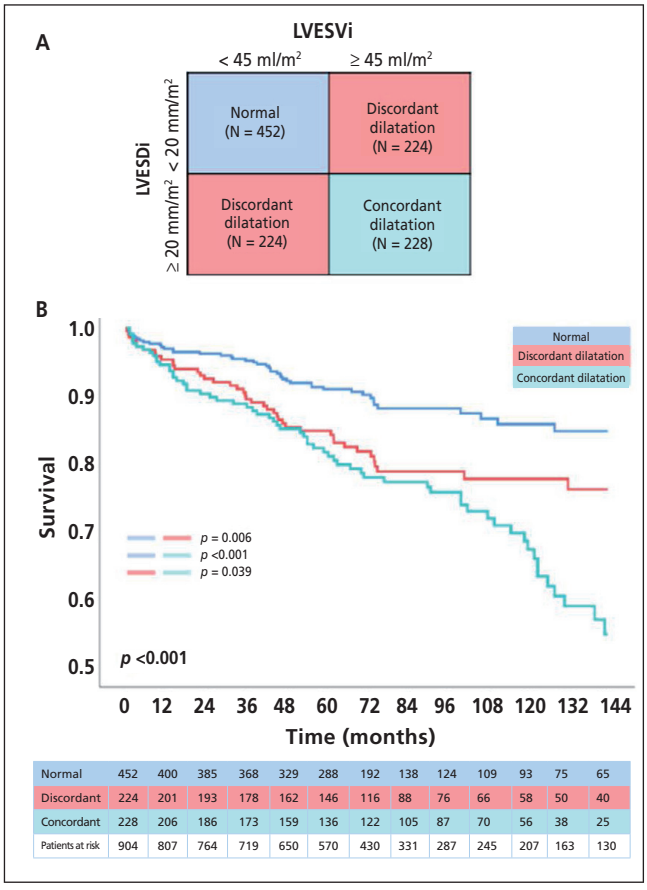

Fig. 1 – (A) Groups categories according to LV dilatation patterns. (B) Kaplan–Meier curves for all cause mortality.

Conclusion: In moderate and moderate-severe AR, the presence of LV dilatation documented by linear and/or volumetric methods was independently associated with increased mortality. Combining both methods for assessment of LV remodeling may improve risk stratification of these patients.

MONITORING OF VOLUME STATUS USING A NOVEL SENSOR FOR THE ASSESSMENT OF INFERIOR VENA CAVA AREA AND COLLAPSIBILITY IN A PATIENT WITH HFREF RECEIVING ADVANCED HEART FAILURE THERAPIES

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Type: clinician's oral presentation, topic: heart failure, transplantation, circulatory assist devices

Background: A novel sensor designed to measure inferior vena cava (IVC) area over time was used in this study (FIRE1). The system consists of the implantable sensor and an external belt, which is worn around the patient's abdomen for a minute per day. The resonant frequency of the sensor is detected externally by the belt. The results provide an accurate measurement of IVC area and collapsibility index.
Case study: A patient, 48-year-old male, had six years history of chronic HFrEF due to idiopathic dilated cardiomyopathy. The patient had stable NYHA class III symptoms at the time of enrolment in the study. The patient met the criteria for the study using this novel sensor, which was implanted in January 2020 and the system measured the changes in the patient's IVC area over time on a daily basis. The patient was admitted to hospital because of worsening of heart failure with symptoms and signs of low cardiac output and congestion due to slow ventricular tachycardia under the ICD detection in September 2021. The patient was dependent on inotropes and referred to an advanced heart failure therapy centre. Finally, the patient received an LVAD (HeartMate 3) as a bridge to heart transplant in October 2021. The patient stayed in the study and has continued to acquire daily sensor readings. The patient underwent successfull heart tranplantation on 26th March 2023.
Results: We report the changes of IVC area and collapsibility index as assessed at time of worsening of heart failure, after LVAD implantation and after heart transplantation.
Conclusion: In this case study, the changes in IVC area and collapsibility index as assessed by a novel sensor system appeared to have predictive value of the subject's deterioration towards advanced therapies, and subsequently responded positively post LVAD implantation and heart transplant.

HOW INFERIOR VENA CAVA COLLAPSIBILITY INDEX FROM A NOVEL IMPLANTABLE SENSOR CORRELATES WITH ESTIMATED PLASMA VOLUME AND NT-PROBNP: A STUDY IN PATIENTS WITH CHRONIC HEART FAILURE

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Type: clinician's oral presentation, topic: heart failure, transplantation, circulatory assist devices

Background: A new wireless implantable sensor can measure inferior vena cava (IVC) area and collapsibility index and was invented for remote monitoring in heart failure.
Study objective: To evaluate the relationship between IVC collapsibility, estimated plasma volume, and NT-proBNP concentration in patients with chronic heart failure (CHF).

Patients and methods: A novel sensor was implanted in six CHF participants of the First in Human Clinical Investigation of the FIRE1 System in Heart Failure Patients (FUTURE-HF) in our cardiac center. The collapsibility index of the IVC was recorded on each clinic follow-up visit. Patient's weight was recorded and hemoglobin, hematocrit, and NT-proBNP were analyzed from the blood samples. An estimated plasma volume (ePV) was calculated by the Tetsuko formula. The correlation of parameters was evaluated by Pearson's correlation coefficient.
Results: A total number of 58 measurments were analysed. The mean ePV was 7713.5 ml (median 7465 ml), the mean collapsibility index (CoI) was 46.5% (median 42.2) and the mean NT-proBNP level was 1122.7 (median 988) ng/l. Statistically significant inverse correlation of collapsibility index (CoI) and estimated plasma volume was found (ePV and CoI, r = –0.35, p = 0.0076). The correlation of NT-proBNP with CoI was not statistically significant (r = –0.12, p = 0.31). It was expected that IVC CoI is accompanied by early volume increase and that its reduction preceeds rise in NT-proBNP – a sign that pronounced strain is exerted on the cardiac muscle.
Conclusion: The collapsibility index of the inferior vena cava as assessed by a novel implantable sensor correlated with a biomarker of hemoconcentration, showing a statistically significant inverse correlation with plasma volume, and thus may provide a promising tool to evaluate volume status in heart failure patients in their homes.

RISK OF ATRIAL FIBRILLATION AND CARDIOVASCULAR HOSPITALISATION ONE YEAR AFTER DISCHARGE FOR COVID-19

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Type: clinician's oral presentation, topic: rhythm disorders, pacing

Objective: To evaluate the incidence of atrial fibrillation and cardiovascular hospitalisation during one year after severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) COVID-19 with the necessity of in-hospital care.
Methods: Source of the data was the National Register of Reimbursed Health Services in the Czech Republic. The one-year incidence of newly developed atrial fibrillation and cardiovascular hospitalisation after COVID-19 hospitalisation from 1-Sep-2020 to 31-Dec-2020 was analysed in the Czech Republic (population 10.7 million). A control group was selected from the general population matched for sex and age in 1 : 5 ratio (case-control matching) without admission to the hospital for COVID-19 in the respective period. Patients who died within the first 30 days after COVID-19 admission were excluded.
Results: The study groups consisted of 27,975 patients and 139,875 controls, both without a history of atrial fibrillation or cardiovascular hospitalisation. The incidence of atrial fibrillation was 1.7% vs 0.7% (HR = 2.55 [95% CI: 2.27–2.86], p <0.001) and incidence of cardiovascular hospitalisation was 3.2% vs 1.6% (HR 2.06 [95% CI: 1.91–2.22], p <0.001). There is also a several-fold higher risk of death in the patient group (11.3% vs 2.6%; HR = 4.65 [95% CI: 4.44–4.88], p <0.001).
Conclusion: The incidence of newly developed atrial fibrillation is 2.6 times higher during one year after discharge for hospitalisation for COVID-19 compared to matched general population. The risk of cardiovascular hospitalisation doubled over the same period. The risk of death is 4.7 times higher. Despite matching, there are many limitations to the analysis and the causality is unproven. The necessity of hospitalisation for COVID-19 is a more likely marker of frailty than an independent risk factor.

AL AMYLOIDOSIS AS THE CAUSE OF HYPERTROPHIC CARDIOMYOPATHY IN A 76-YEAR-OLD FEMALE PATIENT

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Type: clinician's poster, topic: myocardial and pericardial diseases

In cardiology, hypertrophic cardiomyopathy is an "umbrella diagnosis" including, in differential diagnosis, a relatively long list of conditions/diseases. Generally, hypertrophic cardiomyopathy is caused by mutation of sarcomere proteins or deposition of various molecules in the myocardium, e.g., in storage diseases, transthyretin amyloidosis, or AL amyloid deposition in primary amyloidosis. Accurate identification of the cause of myocardial hypertrophy requires a precise differential diagnostic process and, not infrequently, interdisciplinary collaboration of the cardiologist and hematologist or clinical geneticist. The aim of this case report is to describe the process of differential diagnosis in a female patient with *de novo* heart failure and myocardial hypertrophy, with AL amyloidosis eventually confirmed as the cause of hypertrophic cardiomyopathy.

PULMONARY PERFUSION IN LONG-TERM SURVIVORS OF COVID-19 RELATED SEVERE ARDS TREATED BY EXTRACORPOREAL MEMBRANE OXYGENATION

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Type: clinician's oral presentation, topic: pulmonary hypertension

Introduction: COVID-19 is considered to be a hypercoagulant state with an increased risk of developing venous thromboembolic events (VTE). Whether severe COVID-19 infection requiring ECMO support leads to chronic pulmonary perfusion abnormalities and chronic thromboembolic pulmonary disease/hypertension remains unclear.
Purpose: To evaluate chronic pulmonary perfusion abnormalities in long-term survivors of COVID-19 related severe ARDS treated by ECMO. The incidence of VTE during the acute phase was assessed.
Methods: At least 3 months after ECMO explantation, pulmonary perfusion was examined by V/Q SPECT or V/Q planar scintigraphy.
Results: There were 172 COVID-19 patients treated by ECMO at General University Hospital in Prague between March 2020 and November 2021 and only 80 of them were successfully explanted. We enrolled 37 patients after ECMO explantation (27% female, mean age 52 years). The median duration of ECMO support was 12 days. In 24 (65%) patients in the acute phase, VTE was recorded (23 patients developed ECMO cannula-related DVT, 5 of them also had a pulmonary embolism and 1 central catheter-associated DVT). Acute pulmonary embolism was verified by CT angiography in 2 patients before ECMO implantation, in 2 patients during ECMO, and in 1 after ECMO explantation. The median duration between ECMO explantation and assessment of pulmonary perfusion was 420 days. No segmental or larger mismatched perfusion defects have been detected in any of the patients.
Conclusion: In long-term survivors of COVID-19 related severe ARDS treated by ECMO, despite frequent acute VTE, no sequelae suggesting chronic pulmonary perfusion abnormalities were detected.

CONDUCTION SYSTEM PACING PRESERVES BOTH ELECTRICAL AND MECHANICAL INTERVENTRICULAR SYNCHRONY – A UHF-ECG VALIDATION STUDY

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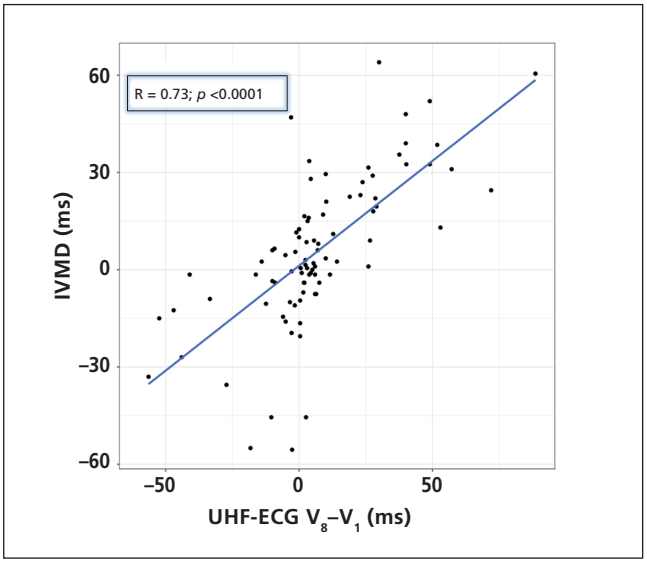
Type: clinician's oral presentation, topic: pacing

Background: Interventricular mechanical delay (IVMD) is an established echocardiographic risk factor for pacing-induced cardiomyopathy development. Ultra-high-frequency ECG (UHF-ECG) is a non-invasive tool visualizing the ventricular activation sequence.
Aims: To compare UHF-ECG interventricular dyssynchrony with echocardiography and to establish interventricular dyssynchrony related to conductive system pacing (CSP) and right ventricular pacing (RVP).
Methods: 54 patients with advanced AV conduction disease, without organic heart disease, and preserved LV systolic function were prospectively included. Thirty-three had RVP, and twenty-one had CSP. CSP included both His bundle pacing (n = 5) and left bundle branch area pacing (n = 16). UHF-ECG and echocardiography were obtained at the baseline and after 1 year of pacing. IVMD was manually calculated from standard echocardiographic projections. E-DYSV8-V1 was automatically calculated as a time difference between activation in V8 (LV free wall) and V_1 electrode (RV free wall).
Results: Both groups had similar baseline clinical characteristics and similar preimplant IVMD and e-DYSV8-V1. While interventricular dyssynchrony was not changed during CSP (mean change –0.37±4.8 ms, p = 0.94 for IVMD and –1.7±3.7 ms, p = 0.98 for e-DYSV8-V1), it was significantly increased with RVP (mean change +29.3±4.6 ms, p = 0.0001 for IVMD and +26.1±5.1 ms, p = 0.0001 for e-DYSV8-V1). There was a strong overall correlation between IVMD and e-DYSV8-V1 in all studied ventricular rhythms (R = 0.73, p = 0.0001).
Conclusions: UHF-ECG expresses the interventricular dyssynchrony noninvasively by measuring the activation difference between V_8–V_1 chest leads. RV myocardial pacing increases interventricular dyssynchrony, while CSP doesn't.



THE ANTIDIABETIC DRUGS AND MAO-RELATED OXIDATIVE STRESS: MAKE NEW FRIENDS BUT KEEP THE OLD

Muntean D

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Type: clinician's oral presentation, topic: varia

The global burden of cardiometabolic pathologies is expected to increase in the near future with most of related cardiovascular deaths occurring in low- and middle-income countries. The major pathomechanisms that underlie these pathologies are chronic oxidative stress and low-grade inflammation, which promote each other in a vicious circle leading to both disease progression and the occurrence of complications. Heart failure, the end-stage of cardiometabolic diseases, is regarded as a "systemic mitochondrial cytopathy" since mitochondria are the major sites of reactive oxygen species (ROS) generation. Monoamine oxidase (MAO) with two isoforms, MAO-A and MAO-B, located at the outer mitochondrial membrane, has emerged in the recent years as a constant enzymatic source of deleterious ROS in the diseased cardiovascular system whose expression and/or activity is increasing with the age. Moreover, inflammation is responsible for age-independent increase in MAO expression. A large body of research demonstrated the role of antidiabetics in improving the outcome of non-diabetic and diabetic patients with cardiovascular diseases yet the underlying pathomechanisms remain elusive. Metformin, the central pillar of therapy in type 2 diabetes, is the "good old drug" with incompletely understood pleiotropic effects, including the antioxidant, which are responsible for the cardiovascular protection and anti-ageing properties. The sodium-glucose-cotransporter 2 inhibitors (SGLT-2i) are novel antidiabetic drugs which exert cardiovascular protection in the absence of diabetes via partially elucidated off-target effects. Here we provide evidence that MAO is a novel target of both classic and new antidiabetics in the human cardiovascular system.

CLINICAL CHARACTERISTICS AND OUTCOME OF PATIENTS WITH ACUTE MYOCARDIAL INFARCTION AND PRE-EXISTING LEFT HEART VALVULAR DISEASE

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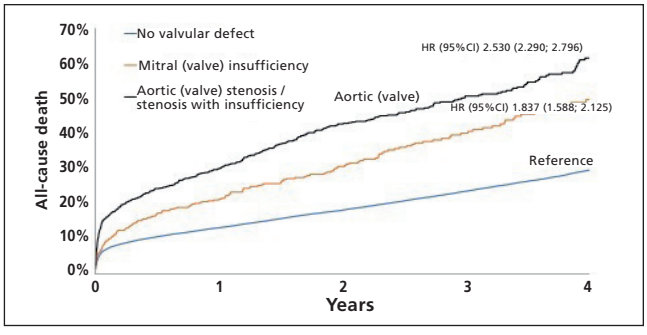
Type: clinician's oral presentation, topic: acute coronary syndromes

With aging population and rising prevalence of cardiovascular risk (CV) factors, the global number of patients with acute myocardial infarction (AMI) and left valvular heart disease (VHD) is expected to increase substantially. We aimed to analyze the impact of pre-existing significant mitral regurgitation (MR) and aortic stenosis (AS) on clinical characteristics and outcome of AMI. The analysis is based on national registry of AMI enriched by National Registry of Reimbursed Health Services. Among 47,436 AMI-patients admitted during 2017–2021 selected VHD was documented in 1,445 (3.0%) patients; 510 (35.3%) with MR, 869 (60.1%) with AS. Patients with VHD (compared to/without) had worse CV risk profile – older (mean [SD]) age 73.9 (10.6) vs. 65.6 (12.5) ys, more previous PCI 23.5% (vs. 14.9%), CABG 23.4% (vs. 5.3%), higher comorbidity (diabetes 27.6% vs. 20%, CKD 11.9% vs. 5%); p <0.001 for all comparisons. NSTEMI was the most frequent manifestation in 58.9% of VHD patients (vs. 41.3% without, p<0.001). Patients with VHD had a wider extent of coronary artery disease with multivessel disease 61.5% (vs. 53.6%) and left main disease 10.9% (vs. 5.5%), a higher proportion of TIMI 3 before PCI in 48.8% (vs. 38.0%), and with more frequent ≤80% IRA – stenosis in 20.0% (vs. 13.1%); p <0.001 for all comparisons. The presence of VHD fundamentally affects the short- and long-term prognosis (Fig. 1). The AS patients had the highest prevalence of diabetes (30.1%), the highest risk of Killip ≥3 (OR 1.78; 95% CI 1.48–2.15), and need of mechanical ventilation (OR 1.29; 95% CI 1.04–1.59), and the highest risk of death.

Conclusion: Preexisitng significant VHD modifies the risk profile, presentation, and prognosis of AMI patients. AS patients have the worst prognosis, which may point to the need for earlier planning of valvular intervention, especially in those with current coronary disease.



PREDICTORS OF PROGNOSIS IN CARDIOGENIC SHOCK COMPLICATING INITIALLY ACUTE MYOCARDIAL INFARCTION

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Type: clinician's oral presentation, topic: acute coronary syndromes

Despite modern treatment methods, cardiogenic shock mortality complicating acute myocardial infarction (CS-AMI) remains high. The study of factors affecting CS-AMI outcomes is essential.

Data from the National Registry of AMI from 2016 to 2020 were evaluated. Of 50,745 patients with AMI 2,822 patients (5.6%) had initially CS (72.6% men, mean age 67.6 [12] yrs). The study analyzed the predictive value of such traditional cardiovascular risk factors related to the MI (sex, age, previous PCI or CABG, renal failure, MI localization, reperfusion delay time), comorbidities, the state on admission (mechanical ventilation, resuscitation), the extent of CAD and procedural success (the number of affected vessels, TIMI flow before and after PCI), and such untraditional factors as season, weekday, and day time. Multivariable analysis was used to identify independent predictors of prognosis in patients with CS-AMI.

The 30-day mortality was 50.7%. As independent predictors of prognosis were identified age (older than 80 yrs, OR 4.97; 95% CI 3.73–6.61), resuscitation (1.34; 1.07–1.67), mechanical ventilation (1.39; 1.10–1.75), 3-vessel disease (1.39; 1.12–1.72), left main disease (1.26; 1.01–1.57), and post-procedural TIMI flow <3 (1.14; 0.79–1.66). The higher mortality was shown during a) autumn (54.2%) and winter (51.8%), b) weekend (51.45%) (vs. working week [50.03%]), c) working hours (49.3%) (vs. the after-working hours [47.6%]), but their predictive value wasn't confirmed in a multivariate analysis.

Conclusions: Mortality of CS-AMI patients is significantly and independently influenced by factors confounding their circulatory instability, such as resuscitation and respiratory failure, the extent of coronary disease, and the success of reperfusion therapy. The independent impact of comorbidity and non-traditional factors on the prognosis of these patients has not been confirmed.

THE REVERSIBILITY OF CARDIAC DAMAGE AFTER TRANSCATHETER AORTIC VALVE IMPLANTATION AND SHORT-TERM OUTCOMES

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Type: clinician's oral presentation, topic: varia

Background: Aortic stenosis (AS) is the most common valvular disease in aging population and causes extra-valvular cardiac damages along with valve deterioration. Recently, the staging based on extent of damage was proposed and its reversibility after transcatheter aortic valve implantation (TAVI) was studied. Accordingly, we pursued to explore cardiac damage using this staging and to propose a short-term prognosis in real-world population.

Methods: Patients with severe AS who underwent TAVI were analysed retrospectively. Patients were classified into five stages based on the presence and extent of cardiac damage by echocardiographic measurements at baseline and 6 months after TAVI. Clinical endpoint was all-cause mortality.

Results: 734 patients with severe AS (mean age 79.8±7.4 years, 54.5% male) were included. Thirty-five (4.8%) patients did not have any cardiac damage (stage 0), 84 (11.4%) patients had LV damage (stage 1), 210 (28.6%) patients had left atrial and/or mitral valve damage (stage 2), 223 (30.4%) patients had pulmonary vasculature and/or tricuspid valve damage (stage 3) and 182 (24.8%) patients had right ventricular damage. Kaplan-Meier survival curves before and after TAVI were both significant (Fig. 1). On multivariable analysis, cardiac damage was significantly associated with all-cause mortality. At 6 months after TAVI, 40.7% of patients improved at least 1 stage, 36.1% patients stabilized in the same stage and 13.4% showed worsening of at least 1 stage.

Conclusions: The proposed staging is crucial for the optimal timing for valve replacement and demonstrates the impact of TAVI could bring improvement except for patients at stage 4.

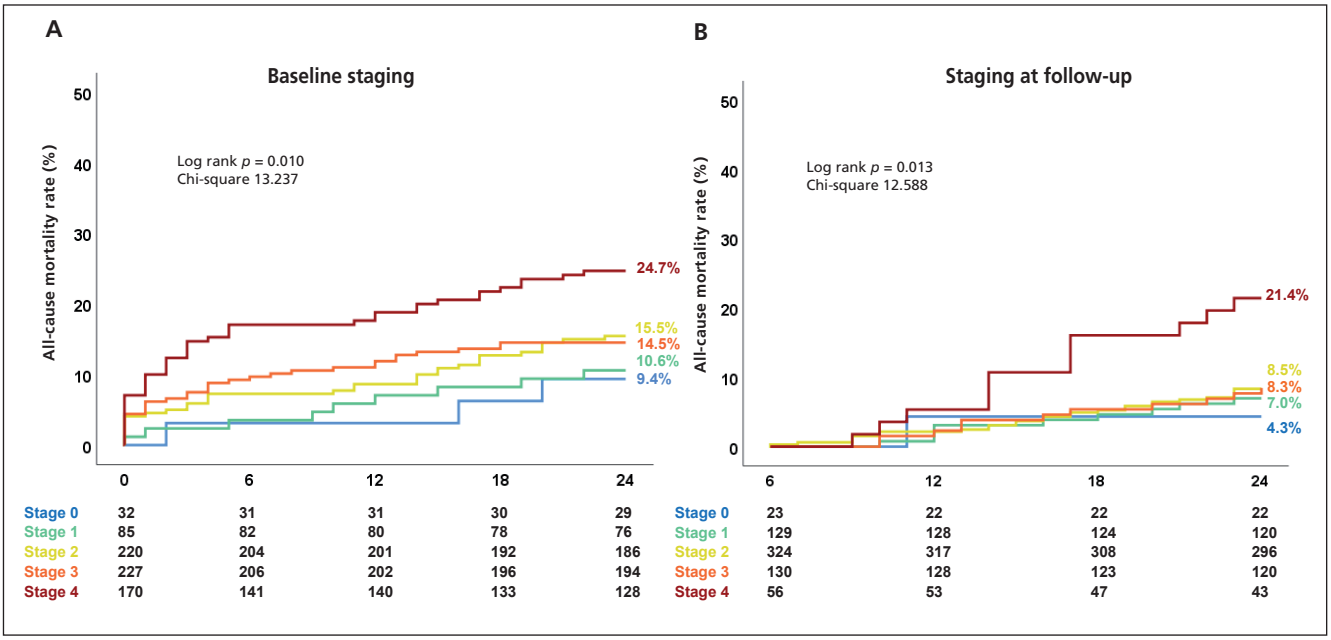

Fig. 1 – Kaplan-Meier survival curves for all-cause death according to cardiac damage assessed at baseline (A) and follow-up (B).

EFFECT OF STIMULATION FREQUENCY ON LEFT VENTRICULAR DYSSYNCHRONY IN HEART FAILURE PATIENTS TREATED WITH CARDIAC RESYNCHRONIZATION THERAPY

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Type: clinician's oral presentation, topic: heart failure, transplantation, circulatory assist devices

Background: Limited data exist that higher biventricular (BiV) pacing rate acutely reduces remaining left ventricular (LV) dyssynchrony in cardiac resynchronization therapy (CRT) recipients.
Purpose: The main objective of this study was to quantify the effect of lower and higher paced heart rate on LV dyssynchrony in HF patients treated with BiV stimulation.
Methods: LV mechanical dyssynchrony was assessed by systolic stretch index (SSI) and 12-segment standard deviation model (12-SD) at 4-device setting: atrio-ventricular BiV and right ventricular (RV) pacing, both at 70 and 90 bpm. LV electrical dyssynchrony was evaluated using vectorcardiography.
Results: 28 patients with class I indication for CRT (67±8 years, 16 males, NYHA class 2.0±0.4, LVEF 28±10%) were enrolled. SSI did not change with BiV pacing at 90 bpm compared to 70 bpm (4.7±2.1 vs. 5.4±2.5, p = 0.14), whereas significantly increased at 90 bpm compared to 70 bpm with RV stimulation (7.3±2.7 vs. 11.0±4.7, p = 0.002). There were no significant changes in 12-SD between 70 and 90 bpm in either pacing mode. In CRT responders, there was no change in SSI with BiV pacing between 70 and 90 bpm, whereas there was a significant increase in SSI with higher BiV stimulation in CRT non-responders (Fig. 1). Similarly, there was a trend to decrease in 12-SD in CRT responders with BiV pacing, whereas there was a trend to increase in 12-SD with higher BiV pacing in CRT non-responders. There was no change in QRS area with higher BiV pacing, whereas with higher RV pacing there was a trend to increase.

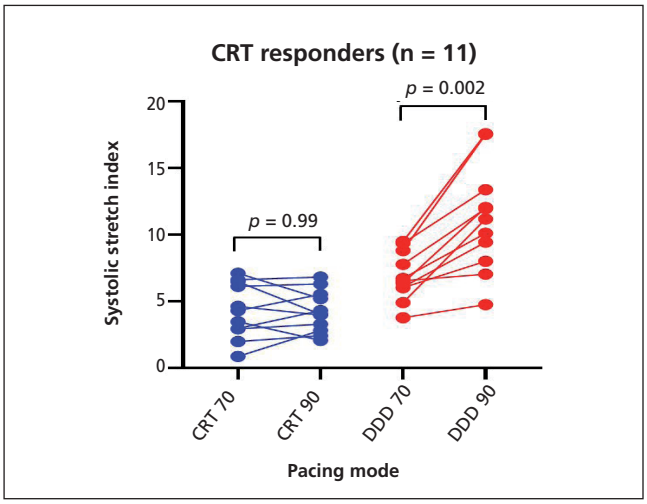

Fig. 1 – 6M SSI CRT responder subgroup individual

Conclusions: In CRT responders, BiV stimulation of higher frequency maintains LV mechanical synchrony, whereas higher frequency RV stimulation increases LV mechanical dyssynchrony. Heart rate should be taken into account when evaluating mechanical dyssynchrony using echocardiography in CRT recipients.

IDENTIFICATION OF PLASMATIC MARKERS PREDICTIVE OF LEFT VENTRICULAR RECOVERY IN RECENT-ONSET DILATED CARDIOMYOPATHY USING NON-TARGETED PROTEOMIC APPROACH: PILOT RESULTS

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Type: clinician's oral presentation, topic: heart failure, transplantation, circulatory assist devices

Introduction: Recent onset dilated cardiomyopathy (RODCM) represents a diagnostic and therapeutic challenge – some patients achieve complete recovery of left ventricular (LV) function during treatment, while the others not. No easily accessible clinical or laboratory parameters exist to enable prognostic stratification. Untargeted proteomics of plasma may yield such novel protein markers. The study aimed to identify novel proteins differentially expressed between RODCM patients with and without LV function recovery after six months.
Methods: A total of 30 consecutive patients diagnosed with RODCM were included in the study. According to the endomyocardial biopsy results, patients were divided into patients with biopsy-confirmed inflammation in the myocardium (myocarditis, n = 17) and those without inflammation (dilated cardiomyopathy, n = 13). All patients underwent echocardiographic examination at the time of diagnosis and after six months. During the examination in the 6th month, the recovery of LV function was assessed using echocardiography, and patients were divided into those with recovery (increase in EF >50%, n = 11) and those without recovery (n = 19). Untargeted proteomics of plasma were performed at the Proteomics Facility of the CEITEC MU using mass spectrometry.
Results: We identified a signature of differentially expressed proteins between patients with and without LV recovery, including (5 most altered): vinculin, leucine-rich alpha-2-glycoprotein, serglycin, cholinesterase, and lumican. We did not identify protein signatures related to the inflammation in the myocardium.
Conclusion: Mass spectrometry of the plasma is a suitable method for identifying novel protein-based biomarkers. The current panel of proteins will now be extended to the larger cohort and validated to test its diagnostics/prognostic performance.

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PREDIABETES IN STEMI PATIENTS – INCIDENCE AND POPULATION CHARACTERISTICS

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Type: clinician's oral presentation, topic: acute coronary syndromes

Introduction: Prediabetes is a metabolic disease characterized by a disorder of glucose homeostasis. Despite the growing evidence of an increased risk of cardiovascular disease, pharmacological treatment of prediabetes is currently not universally recommended.
Objectives: To determine the proportion of patients with prediabetes in the group of patients with STEMI, to describe their characteristics and to compare them with the population of diabetes and without impaired glucose metabolism.
Methodology and results: The cohort consists of 2254 consecutive patients admitted to our clinic in 2012–2020 with the initial diagnosis of STEMI. According to glycated hemoglobin values and previous antidiabetic medication, patients were divided into three groups: patients with diabetes (N = 604, 26.8%, Ø HbA_{1c} = 62.9±17.7 mmol/mol), patients with prediabetes (N = 408, 18.1%, Ø HbA_{1c} = 43.8±1.6 mmol/mol) and patients without glucose metabolism disorders (N = 1242, 55,1%, Ø HbA_{1c} = 37.01±3.0 mmol/mol). We compared baseline characteristics, laboratory values, LVEDP, LVEF and number of vessels with stenosis over 50%. The results are presented in the Table 1.
Conclusion: Patients with prediabetes make up 18.1% of STEMI patients admitted to our clinic. Compared to patients without known disorders of glucose metabolism, patients with prediabetes showed significantly higher levels of urea, uric acid and CRP. Moreover, multivessel disease incidence and LVEF were similar to the diabetes subgroup. The prognosis of patients with prediabetes, including the risk of MI, PCI/CABG, stroke and mortality in comparison with diabetics and patients without impaired glucose metabolism will be the subject of the further study.

	Diabetes	Prediabetes	Without	p1	p2	p3
Age (yrs, ± SD)	68,3±11,8	66,9±11,7	63,4±13,2	0,06	**<0,001**	**<0,001**
Male (%)	63,2%	67,4%	74,2%	0,17	**<0.001**	**0,01**
BMI (kg/m2, SD)	29,7±5	28,7±5	27,4±4,1	**0,011**	**<0.001**	**<0.001**
Urea (mmol/l ± SD)	7,2±3,9	6,2±2,5	5,7±2,3	**<0,001**	**<0,001**	**<0,001**
Creatinine (µmol/l ± SD)	100,1±54,7	90,1±28,7	87,3±35,6	0,11	**<0,001**	0,05
Glu-Adm (mmol/l ± SD)	13,8±5,6	9±2,7	8,2±2,6	**<0,001**	**<0,001**	**<0,001**
Hb (g/l ± SD)	137,6±18,5	140,5±15,8	142,8±16,5	**0,01**	**<0,001**	**0,03**
hsTnT (ng/l ± SD)	4664,7±8913,9	4403±6658,5	4043±5457,4	0,41	0,47	0,76
NTproBNP (pg/ml ± SD)	5370,4±7986,7	3709,2±5760	2980,2±4699,7	0,11	**<0,001**	0,05
UA (µmol/l ± SD)	365,4±113,8	362±100,1	335,3±95,3	0,65	**<0,001**	**<0,001**
Glu-Fast2 (mmol/l ± SD)	10,1±3,8	6,9±1,5	6,4±1,5	**<0,001**	**<0,001**	**<0,001**
TAG (mmol/l ± SD)	2,3±1,8	2±1,7	1,9±1,3	**<0,001**	**<0,001**	0,07
CRP (mg/l ± SD)	66,5±88,15	51,1±73,3	42,3±64,7	**<0,001**	**<0,001**	**<0,001**
LVEDP (mmHg ± SD)	20,9±8,5	19±7,6	19,1±7,4	0,85	0,06	0,11
LVEF (% ± SD)	50,5±11,2%	52,3±10,3	52,3±10,1	0.9	**0,01**	**0,03**
No.Vessels						
1 (%)	33,3%	41,7%	49,2%	**0,02**	**<0.001**	**<0.001**
2 (%)	33,1%	30,4%	32%			
3 (%)	33,6%	27,9%	18,8%			

p1 = Diabetes vs. Prediabetes
p2 = Diabetes vs. Without
p3 = Prediabetes vs. Without

Glu-adm = Glucose Level at Admission, Hb = Hemoglobin, hsTnT = High-sensitive Troponin, NTproBnp = N-terminal Fragment of B Natriuretic Peptide, UA = Uric Acid, Glu-Fast 2= Fasting Glucose at Day 2, TAG = Triacylglycerole, CRP = C-reactive Protein at Day 3, LVEDP = Left Ventricle End-diastolic Pressure, LVEF = Left Ventricle Ejection Fraction, No. Vessels = number of vessels with stenosis over 50%

Categorical data are described by absolute and relative frequencies, continuous data by means of mean and standard deviation
Statistical significance of differences evaluated by the Chi-square test of maximum likelihood for categorical data and by the Kruskal-Wallis and Mann-Whitney U test for continuous data

DEVELOPMENTAL ASPECTS OF CARDIAC ADAPTATION TO INCREASED WORKLOAD

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Type: clinician's oral presentation, topic: varia

Abstract
The heart is capable of extensive adaptive growth in response to the demands of the body. When the heart is confronted with an increased workload over a prolonged period, it tends to cope with the situation by increasing its muscle mass. Adaptive growth response of the cardiac muscle changes significantly during phylogenetic and ontogenetic development. Cold-blooded animals maintain the ability of cardiomyocyte proliferation even in adults. On the other hand, the extent of proliferation during ontogenetic development in warm-blooded species shows significant temporal limitations: whereas fetal and neonatal cardiac myocytes express proliferative potential (hyperplasia), after birth proliferation declines and heart grows almost exclusively by hypertrophy. It is, therefore, understandable that also regulation of the cardiac growth response to the increased workload differs significantly during development. The pressure overload (aortic constriction) induced in animals before the switch from the hyperplastic to hypertrophic growth leads to a specific type of the left ventricular hypertrophy which, in contrast with the same stimulus applied in adulthood, is characterized by hyperplasia of cardiomyocytes, capillary angiogenesis, and biogenesis of collagenous structures, proportional to the growth of myocytes. These studies suggest that timing may be of crucial importance in neonatal cardiac interventions in humans: early definitive repairs of selected congenital heart disease may be more beneficial for long-term results of surgical treatment.

EXTRACORPOREAL MEMBRANE OXYGENATION IN THE THERAPY OF CARDIOGENIC SHOCK: ONE-YEAR OUTCOMES OF THE ECMO-CS TRIAL

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Type: clinician's oral presentation, topic: acute states in cardiology, acute coronary syndromes

Introduction: In the Extracorporeal Membrane Oxygenation in the Therapy of Cardiogenic Shock (ECMO-CS) trial, immediate initiation of extracorporeal membrane oxygenation (ECMO) did not show any benefit at 30 days in comparison to early conservative strategy. We evaluated clinical outcomes at one year.
Methods: ECMO-CS trial randomized 117 patients with severe or rapidly progressing cardiogenic shock to either immediate initiation of ECMO or early conservative strategy that permitted downstream use of ECMO in case of failure of conservative therapy. Secondary endpoints analyzed at one year included composite of death, resuscitated cardiac arrest or implantation of another mechanical circulatory support, individual components of the composite endpoint, duration of mechanical ventilation, intensive care unit (ICU) stay, and hospital stay. In addition, a post hoc subgroup analysis was performed.
Results: At one year, the composite endpoint occurred in 74.1% of patients in the ECMO group and in 79.7% of patients in the early conservative group (HR 0.83, 95% CI 0.55–1.25, p = 0.29). All-cause death occurred in 69.0% of subjects in the ECMO arm in 71.2% of patients in the early conservative arm (HR 1.02, 95% CI, 0.66–1.58, p = 0.93). The median durations of mechanical ventilation, ICU stay, and hospitalization were comparable. Significant interaction with treatment strategy and one-year mortality was observed in subgroups by baseline mean arterial pressure (≤ 60 mmHg: HR 0.54, 95% CI 0.26–0.99, p = 0.001) and shock index (>1.3: HR 0.48, 95% CI 0.24–0.96, p = 0.02).
Conclusion: Among patients with cardiogenic shock, immediate initiation of ECMO did not improve clinical outcomes at one year in comparison to early conservative strategy. However, immediate ECMO initiation might be beneficial in patients with more severely compromised hemodynamic status.

INTRODUCING A NOVEL EX-VIVO CALCIFICATION MODEL FOR HUMAN AORTIC VALVES

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**Equal author contribution*

Type: clinician's oral presentation, topic: atherosclerosis

Background: Aortic stenosis (AS) is a narrowing of the aortic valve opening due to calcification and thickening of the leaflets. There are currently no effective pharmacological treatments for AS, and surgery or percutaneous interventions are the only therapeutic options. The cellular and molecular mechanisms underlying AS are complex and not fully understood due to the complexity and multi-factorial nature of AS and the absence of suitable test systems. In the current in-vitro models to study valvular calcification, isolated valvular interstitial cells (VICs) are cultured in 2D and in the absence of its native extracellular matrix. In addition, other cell types like valvular endothelial cells (VECs) and macrophages, which have been shown to impact the behavior of VICs, are absent.
Purpose: Our goal is to establish an ex-vivo calcification model for human aortic valves which maintains the original valve structure and cellular components.
Methods: Diseased aortic valves were harvested from patients undergoing aortic valve replacement. A 5mm × 7mm piece of this aortic valve tissue was dissected and embedded in agarose, then cut into 300 mm slices using a vibratome. In this way VICs remained in their valvular environment allowing the most native response of VICs to stimuli. The use of multiple slices from a single patient ensured proper internal controls. The slices were placed on a cell culture insert and cultured for 14 days. To induce calcification, the slices were cultured in the presence of 3 mM phosphate (n = 23). As a control, valvular slices were cultured in the absence of 3mM phosphate (n = 12). To validate if the calcification induced in the ex-vivo culture system can be molecularly modulated, the glucocorticoid dexamethasone was added to cultures containing 3mM phosphate (n = 8). The slices were assessed for the presence of calcification using Alizarin Red staining and for the presence of osteogenic and inflammatory markers using (Immuno) histochemistry.
Results: In the presence of 3mM Phosphate, 74% of the slices demonstrated calcification, whereas no calcification was observed in all slices cultured without 3mM Phosphate (p <0.0001). Furthermore, osteogenic genes such as Runx and alkaline phosphatase-1, as well as the inflammation marker NF-κB were expressed in the calcified slices. Dexamethason inhibited the calcification in the slices treated with 3 mM phosphate.
Conclusions: We developed a novel ex-vivo calcification model for human aortic valves in which the initiation and progression of aortic valve calcification can be studied. In addition, the calcification can be modulated at a molecular level providing a unique opportunity to uncover the molecular signaling pathways involved in valvular calcification and to test compounds facilitating pre-clinical translational studies.

WILL INTERMITTENT LEVOSIMENDAN ADMINISTRATION BRING BENEFITS IN ADVANCED HEART FAILURE?

Papp Z

Department of Cardiology, Faculty of Medicine, Hungary

Type: clinician's oral presentation, topic: heart failure, transplantation, circulatory assist devices

Advanced heart failure (AdHF) is a clinical condition in which patients suffer from severe and persistent symptoms of heart failure. Recurrent hospitalizations are frequently inevitable for AdHF patients, and intravenous inotropic therapy has an important role during haemodynamic stabilization. Preventing AdHF-related hospitalizations can improve life expectancy of AdHF patients. Additionally, an ongoing discussion focuses on the applicability of intermittent cardiotonic drug therapy either for the extension of symptom relief, before heart transplantation or mechanical left ventricular assistance device (LVAD) administration, or as palliation for patients who cannot be considered for the above mentioned invasive procedures. Nevertheless, the preventive use of conventional inotropes is limited by their added risk of increased mortality.
Levosimendan is an inodilator drug promoting cardiac contractility and peripheral circulation via calcium sensitization and vasodilatation. The combination of these actions results in a well-characterized haemodynamic response including enhancement of cardiac output and reductions in systemic blood pressure and pulmonary capillary wedge pressure. Repetitive/intermittent levosimendan administration in AdHF has also been motivated by the long-lasting haemodynamic effects after short-term infusions that are thought to relate to its active metabolite (OR-1896) with a relatively long half-life.
In this presentation I wish to overview the currently available preclinical and clinical data that can guide the use of repeated infusions of levosimendan in AdHF. Collectively, the results provide a solid basis for clinical efforts in finding the optimal conditions for intermittent use of levosimendan in patients with AdHF.

TAVI SURVIVAL PREDICTION BY ARTIFICIAL INTELLIGENCE EVALUATION OF PREPROCEDURAL COMPUTED TOMOGRAPHY SCANS

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Type: clinician's oral presentation, topic: Kardio 35 – original research article

Background: Sarcopenia is a serious systemic disease reducing overall survival. TAVI is selectively performed in patients with severe aortic stenosis who are not indicated for open cardiac surgery due to severe polymorbidity. Artificial intelligence-assisted assessment of body composition from available CT scans appears to be a simple tool to stratify these patients into low and high risk of all-cause mortality.
Methods: The segmentation of preprocedural CT at the L3 level in patients undergoing TAVI was performed using a neural network (AutoMATiCA) and the obtained parameters (area and density of intramuscular, visceral and subcutaneous fat and muscle) were analyzed using Cox univariate and multivariate models for continuous and categorical variables to determine the regression estimate of survival time. The study was approved by the ethics committee and registered on Clinical Trials (NCT05672160).
Results: 866 patients were included (median/IQR: age 79.7/74.9–83.3years; BMI 28.9/26.0–32.6). Survival analysis was performed on all automatically obtained parameters of muscle and fat density and area. Skeletal muscle index (SMI), visceral (VAT) and subcutaneous fat density (SAT) predict overall survival in patients after TAVI: SMI HR 0.987, 95% CI (0.976–0.997); VAT 1.016 (1.003–1.029) and SAT 1.015 (1.005–1.024), all $p < 0.05$.
Conclusions: Automatic assessment of body composition helps to estimate the increased risk of death from any cause in patients after TAVI and can thus help in the indication process and periprocedural care of these patients.

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LONG-TERM OUTCOMES OF CONVERGENT ABLATION FOR PERSISTENT AND LONG-STANDING PERSISTENT ATRIAL FIBRILLATION

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Type: clinician's oral presentation, topic: rhythm disorders, pacing

Single-stage hybrid radiofrequency ablation (hRFA) combines endoscopic epicardial and catheter endocardial ablation as a treatment for otherwise unsolvable long-term persistent atrial fibrillation (AF). We present the evaluation of outcomes at one center following hRFA.
Methods: A total of 60 patients aged 61.59±7.8 years underwent single-stage hRFA from April 2016 to March 2022 at the Centre for Cardiovascular and Transplant Surgery and St. Anne's University Hospital Brno, Czech Republic. This method includes thoracoscopic isolation of pulmonary veins and box lesion creation followed by catheter based verification of the effect of the surgical portion of the procedure in one procedure.
Baseline and follow-up data were prospectively recorded during scheduled follow-up. The primary outcome was freedom from AF on/off anti-arrhythmic drugs after a 12-month follow-up. Secondary outcomes included freedom from AF over the entire follow-up, freedom from anti-arrhythmic drugs, and freedom from any atrial arrhythmias, repeat ablation, and complications.
Results: The median duration of the procedure was 237 minutes and the median duration of hospitalization was 10 days. At the end of the procedure, 60 patients (100%) had sinus rhythm (SR). At the first follow-up after three months of surgery, 49 of 57 (85.9%) patients were AF-free, at the 6-month follow-up, 46 of 56 patients (82.0%) were AF-free. At the 12-month visit 41 of 55 (76.4%) patients were AF-free and at 24 months were 33 of the initial 53 patients (62.2%) event free. Seven patients were lost to follow-up. Acute complications were 1× left atrial perforation resolved successfully by suture and 1× transient ischaemic attack without permanent sequelae. Late complications involved one massive pulmonary embolization and an atrioesophageal fistula. There was no periprocedural myocardial infarction or stroke with permanent sequelae.
Conclusion: Single stage hybrid radiofrequency ablation is an effective and relatively safe mini-invasive method of treatment for long-term persistent atrial fibrillation with extremely enlarged LA.

ANTITHROMBOTIC MEDICATION AND COMPLICATIONS DURING ENDOVASCULAR TREATMENT OF POSTERIOR CIRCULATION STROKE

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Type: clinician's oral presentation, topic: interventional cardiology

Background: Posterior circulation stroke is one of the deadliest acute diseases. The effect of intravenous thrombolysis alone is minimal and the effects of endovascular (catheter) treatment do not achieve similar results as in anterior circulation stroke. The aim was to analyse the effect of thrombolysis on complication rates and patient outcomes.
Methods: We retrospectively analysed 85 consecutive patients with posterior circulation stroke treated by EVT (mean age 72 years, 38% females, 16% with known atrial fibrillation, 14% with prior stroke). Bridging thrombolysis before/during EVT was used in 42% patients and direct thrombectomy in 58%. Intubation was needed in 41% patients. Arteries occluded were basilar (71%), vertebral (14%) or posterior cerebral (15%). Patients in whom we were unable to obtain vital status after 3 months were considered mRS = 6.
Results: Successful recanalization was achieved in 67.4% patients treated by mechanical thrombectomy alone, with the bridging thrombolysis it was 75%. Patients that were administrated intravenous thrombolysis before procedure also had better clinical outcomes, clinical independence was observed in 38.9% of them vs. 26.5% in the mechanical thrombectomy alone group. Symptomatic intracranial haemorrhage was observed in 12.2% patients treated by mechanical thrombectomy and in 5.6% patients with bridging thrombolysis.
Conclusions: Our data support the use of bridging thrombolysis for patients with posterior circulation stroke scheduled to undergo immediate EVT. Thrombolysis did not result in increased rates of complications, but a trend to decreased complications was observed. Slightly worse outcome of patients treated by EVT alone may be affected by longer time delay from symptom onset to groin puncture. This requires confirmation by a larger study.

PULMONARY EMBOLISM RELATED REFRACTORY OUT-OF-HOSPITAL CARDIAC ARREST AND THE EXTRACORPOREAL CARDIOPULMONARY RESUSCITATION: PRAGUE OHCA STUDY POST-HOC ANALYSIS

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Type: clinician's oral presentation, topic: Kardio 35 – original research article

Background: Refractory out-of-hospital cardiac arrest (r-OHCA) in patients with pulmonary embolism (PE) is associated with poor outcomes. The role of extracorporeal cardiopulmonary resuscitation (ECPR) in this patient group is uncertain. This study aims to analyze clinical course, outcomes, and the effect of an invasive procedure, including ECPR, in a randomized population.

Methods: A post-hoc analysis of a randomized controlled trial (Prague OHCA study) was conducted to evaluate the effect of ECPR vs. a standard approach in r-OHCA. A subgroup of patients with PE-related r-OHCA was identified and procedural and outcome characteristics, including favorable neurological survival, organ donation, and complications, were compared to patients without PE.
Results: PE was identified as a cause of r-OHCA in 24 of 256 (9.4%) enrolled patients. Patients with PE were more likely to be women (12/24 [50%] vs. 32/232 [13.8%]; p <0.001) and presented more frequently with an initial non-shockable rhythm (23/24 [95.8%] vs. 77/232 [33.2%]; p <0.001), as well as more severe acidosis at admission (median pH [interquartile range]; 6.83 [6.75–6.88] vs. 6.98 [6.82–7.14]; p <0.001). Their favorable 180-day neurological survival was significantly lower (2/24 [8.3%] vs. 66/232 [28.4%]; p = 0.049), but the proportion of accepted organ donors was higher (16.7 vs. 4.7 %, p = 0.04).
Conclusion: r-OHCA due to PE has a different presentation and inferior outcomes compared to other causes but may represent an important source of organ donations. The ECPR method did not improve patient outcomes.

IS ATRIAL FIBRILLATION A MARKER OF POOR PROGNOSIS IN PATIENTS WITH HYPERTROPHIC CARDIOMYOPATHY?

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Type: clinician's oral presentation, topic: Kardio 35 – original research article

Introduction: Atrial fibrillation (AF) is a common arrhythmia in patients with hypertrophic cardiomyopathy (HCM). Prognostic value of AF in HCM patients is not clear and various studies report equivocal results. The aim of our study was to determine whether AF is a risk factor for mortality and morbidity in the HCM patients.
Methods: Total of 505 patients diagnosed with HCM between 1998 and 2022 in a tertiary cardiovascular centre were included in the study. The occurrence of AF, stroke, and death were analyzed and survival analysis using Kaplan–Meier method was performed.
Results: AF was diagnosed in 146 (29%) HCM patients. Patients with AF were significantly older at the initial visit (57.3±13.6 vs. 51.6±15.7 years, p <0.001) and had a longer follow-up (10.6±6.8 vs. 7.9±6.0 years, p <0.001) than patients without AF. All-cause mortality (30.8% vs. 16.4%, p <0.001), HCM-related death (10.3% vs. 3.3%, p <0.01), and the incidence of stroke (15.1% vs. 6.7%, p <0.01), was more frequent in the AF cohort than in patients without AF. Survival analysis showed no statistically significant difference in overall survival and the probability of stroke in patients with or without AF.
Conclusion: Patients with AF had lower survival and died more often from HCM-related causes than the patients without AF. However, the majority of HCM patients died from non-HCM-related causes. Although the incidence of strokes and mortality was higher in patients with AF, the difference was not statistically significant in survival analysis, probably due to different length of follow-up, overall low number of events, and limited size of our cohort.

CLINICAL AND ECHOCARDIOGRAPHIC PARAMETERS ASSOCIATED WITH OUTCOMES IN PATIENTS WITH MODERATE FUNCTIONAL MITRAL REGURGITATION

Sarrazyn C, Laenens D, Chua A, Lopez-Santi MP, Myagmardorj R, Nabeta T, Galloo X, Meucci MC, Fortuni F, Singh GK, Bax JJ, Ajmone Marsan N

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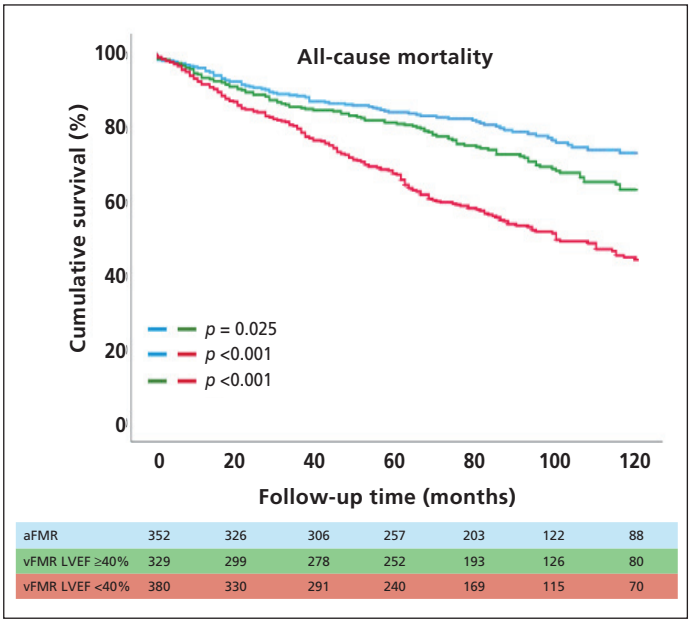
Type: clinician's oral presentation, topic: imaging techniques

Background: Significant functional mitral regurgitation (FMR) is associated with worse prognosis. However, data for moderate FMR alone is lacking. We explored clinical and echocardiographic parameters associated with worse outcome in these patients.
Methods: Patients with moderate FMR (n = 1061, mean age 69±11 years, 59% male) were retrospectively included and classified as atrial FMR (AFMR, n = 352), if mitral annulus dilatation and normal left ventricle ejection fraction (LVEF) and dimensions, or as ventricular FMR (vFMR, n = 709) in case of impaired LVEF and/or LV remodeling. vFMR was subdivided based on LVEF ≥40% (n = 329) and <40% (n = 380). The primary endpoint was all-cause mortality and the secondary endpoint was all-cause mortality and heart failure.
Results: Overall, 19% had NYHA class III–IV and 52% had atrial fibrillation. During a median follow-up of 82 (IQR 55–115) months, 397 (37%) died and 539 (51%) patients had heart failure or death. A significant difference for both endpoints was seen across the 3 groups (p <0.001, Fig. 1). In multivariable analysis, as compared to aFMR, vFMR LVEF ≥40% (HR: 1.528; CI 1.108–2.106, p = 0.010) and vFMR LVEF <40% (HR: 1.960; CI 1.434–2.679, p <0.001) were independently associated with both outcomes together (as detrimental) with NYHA class III–IV, age, male sex, diabetes, COPD, left atrial volume index and lower right ventricle pulmonary artery coupling index.
Conclusion: In moderate MR, symptoms and etiology of FMR have a significant association with outcome.



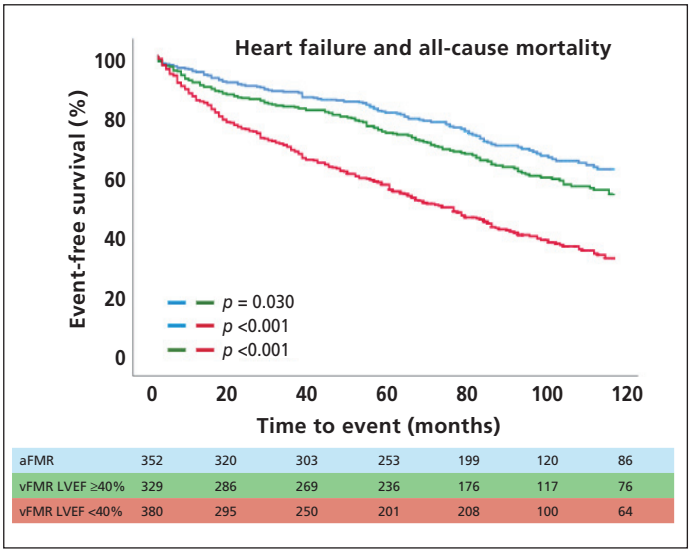


Fig. 1 – Kaplan–Meier survival analysis for all-cause mortality and composite endpoint of all-cause mortality and heart failure according to etiology and left ventricle ejection fraction.

INCREASED EXTRACELLULAR VOLUME IN THE VENTRICLES AFTER AORTIC VALVE REPLACEMENT IS NOT ASSOCIATED WITH A CHANGE IN CONDUCTION VELOCITY: A COMPUTATIONAL STUDY

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Type: clinician's oral presentation, topic: valvular diseases

Background: Extracellular volume (ECV) determined by magnetic resonance imaging (MRI) is considered a marker of diffuse myocardial fibrosis and a predictor of mortality. In aortic stenosis (AS), patient ECV increases after aortic valve replacement (AVR). The underlying cause of the ECV increase remains unclear. This study investigates the correlation of ECV with conduction velocity (CV), cell radius (R) and extracellular conductivity in AS patients.

Methods: MRI was performed on 12 AS patients (6 females, 6 males) before, and 3 months after AVR. All patients had a QRS ≤110 ms and no scar on late gadolinium enhanced MRI. Computational biventricular models were developed from the MRI data and were paced from 5 activation sites to resemble physiological pattern of ventricular depolarization. Simulations were performed to determine the parameters R and F (extracellular conductivity scaling factor) that matched the model to patient QRS and ECV. Right ventricular (RV) apex pacing was simulated, and CV was calculated from two points on the RV septum. Spearman's correlation coefficients were calculated to quantify the association between ECV, F, R, and CV. Differences between the time points were assessed by a Wilcoxon's test.

Results: Higher ECV was found in AS patients post-AVR than pre-AVR (Fig. A). No significant changes in QRS and CV were found between the time points (Figs B, C), suggesting there was no substantial increase in diffuse fibrosis. ECV was negatively correlated with R, and not correlated with CV and F (Table 1). In contrast, CV was positively correlated with R and negatively correlated with F (Table 1).

Conclusion: Increased ECV after AVR is not associated with a change in CV, suggesting no considerable increase in diffuse fibrosis. Histological studies should be performed to explain the underlying cause of increased ECV in AS patients.

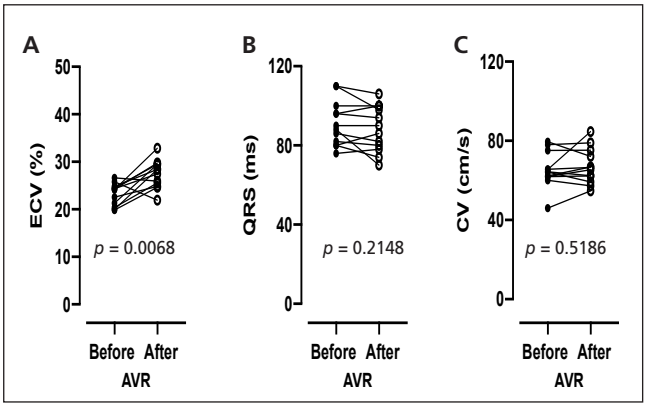

Fig. 1 – (A) Increased extracellular volume (ECV) was found in patients after aortic valve replacement (AVR). (B) No significant changes in QRS were observed between the time points. (C) No significant changes in conduction velocity (CV) obtained from the models were found between the time points.

This research was funded by the French National Research Agency (ANR) grants ANR-10-IAHU-04 and ANR-19-ECVD-0006 co-funded by the European Union's Horizon 2020 research and innovation program under the ERA-NET co-fund action No. 680969 (ERA-CVD: SICVALVES) and by Fondation Lefoulon-Delalande.

Table 1 – Spearman's correlation coefficients and respective *p*-values quantifying the association between extracellular volume (ECV), fibrosis factor (F), cell radius (R), and conduction velocity (CV)

	ECV	F	R	CV
ECV	–	–	–	–
F	*r = 0.09502* *p = 0.6587*	–	–	–
R	*r = –0.5267* *p = 0.0082*	*r = –0.1148* *p = 0.5933*	–	–
CV	*r = –0.2036* *p = 0.3399*	*r = –0.6702* *p = 0.0003*	*r = 0.5113* *p = 0.0107*	–

GDF-15 LEVEL CHANGES IN EARLY AND LATE PERIOD AFTER CATHETER ABLATION OF ATRIAL FIBRILLATION

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Type: clinician's oral presentation, topic: rhythm disorders, pacing

Introduction: GDF-15 (growth differentiation factor 15) is protein from transforming growth factor β (TGF-β) cytokine family. In patients with atrial fibrillation (AF) GDF-15 is a potent marker of bleeding adverse events in anticoagulated patients and a predictor of overall mortality. Aim of the study was to describe how catheter ablation of atrial fibrillation affects GDF-15 levels in early and late period and analyse impact of used technology.
Methods: We enrolled 48 patients (median 62 [50; 68] years, 30 males) undergoing radiofrequency catheter ablation (RFCA) of AF who underwent 6 sequential blood takes (before RFCA – baseline, right after RFCA [0 hr], 24 and 48 hours after RFCA, 90 and 180 days after RFCA) to analyse GDF-15 level. In parallel, other conventional biomarkers were obtained: N-terminal fragment brain natriuretic factor (NT-proBNP) and high sensitivity cardiac troponin T (TnT). The results were compared to 22 patients (median 63 [52; 65] years, 13 males) treated with pulsed field ablation (PFA).
Results: GDF-15 level peak was registered 48 hours after ablation with median (IQR) 1183 ng/l (824; 1988). After 90 days from ablation there still persisted higher GDF-15 levels in relation to input levels (p <0.05 in all comparisons). After 180 days, difference in GDF-15 levels lost statistical significance. When compared RFCA and PFA values, no significant difference in peak values was recognised. However, we have noticed significantly higher peak TnT in PFA group compared to RFCA (1001±589 vs. 458±202 ng/l; p <0,001).
Conclusion: Even though GDF-15 is considered as a non-specific biomarker reflecting general condition of patient, the levels are significantly affected by interventional treatment of AF. PFA seems to cause higher elevation of TnT than RFA.

CLINICAL PREDICTORS OF LONG-TERM MORTALITY AFTER FIRST ABLATION OF VENTRICULAR TACHYCARDIA IN PATIENTS WITH STRUCTURAL HEART DISEASE

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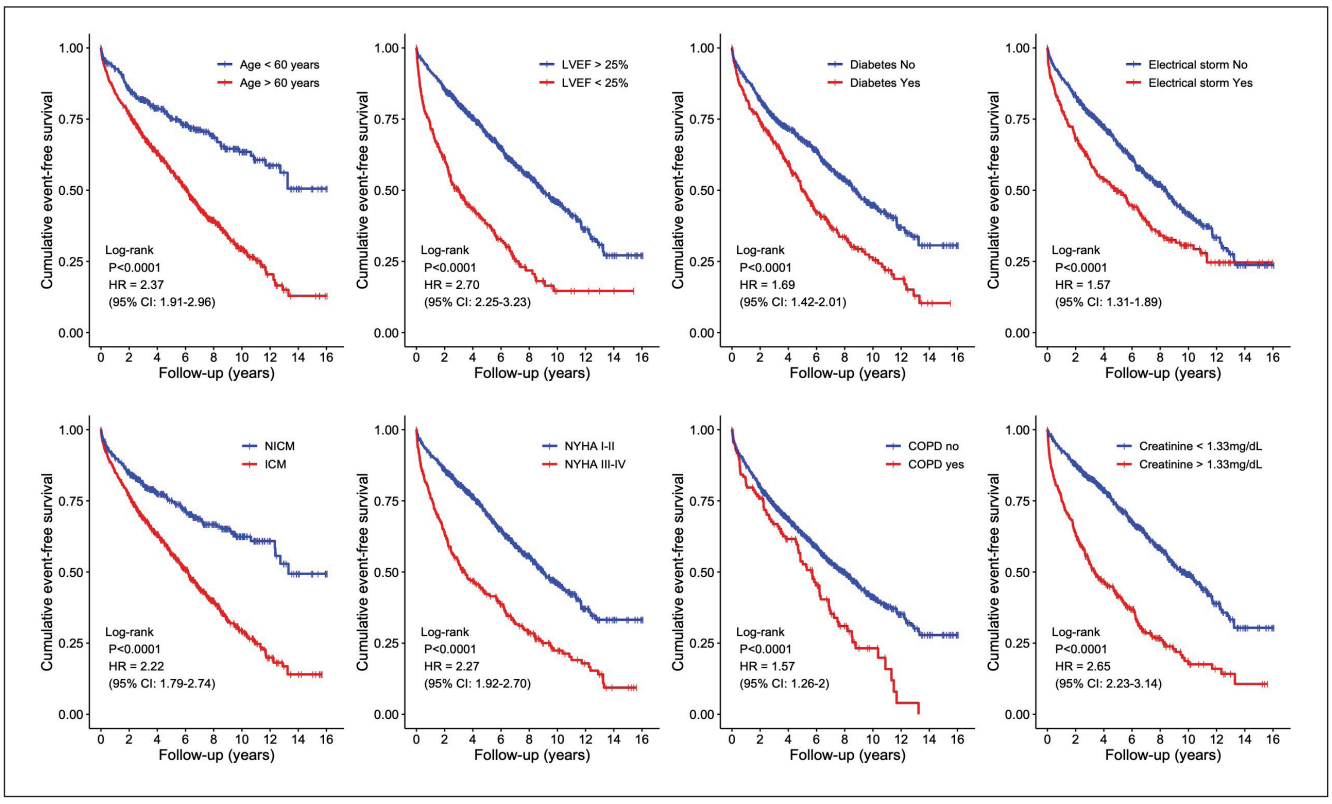
Type: clinician's oral presentation, topic: rhythm disorders, pacing

Background: Catheter ablation is a well-established treatment modality for a wide spectrum of ventricular tachycardias (VTs). However, in the presence of structural heart disease (SHD), the prognosis and long-term mortality remains poor.
Objective: The aim of this study was to investigate the predictors of all-cause mortality after SHD-VT ablation in a high-volume expert center.
Methods: We evaluated 1143 patients (age: 63±13 years, males: 87%, ICM: 67%, ES: 25%, NYHA Class: 2.1±1.0, LVEF: 34±13%, DM: 32%, COPD: 12%) who underwent first ablation for SHD-related VT between August 2006 and December 2020. Univariate and multivariate Cox-regression analyses were used to assess the predictors of all-cause mortality.
Results: At mean follow-up of 4.1 years (IQR: 2.0–7.2 yrs) an all-cause mortality was 48%. A total of 320 patients (28%) underwent repeated VT ablation. The averaged PAINESD score of our cohort was 11.4 ± 6.6 (median: 12, IQR: 6–17). Univariate Cox- regression analysis revealed eight parameters associated with poor mortality (Fig.). After multivariate adjustment, only age >60 years (HR: 1.82, 95% CI: 1.4–2.2, p <0.0001), ischemic cardiomyopathy (HR: 1.48, 95% CI: 1.1–1.8, p <0.001), NYHA class ≥III (HR: 1.6, 95% CI: 1.3–1.9, p <0.0001), a serum creatinine level >1.3 mg/dL (HR: 1.7, 95% CI: 1.4–2.0, p <0.00001), LVEF ≤25% (HR: 2.2, 95% CI: 1.8–2.6, p <0.00001) and diabetes mellitus (HR: 1.4, 95% CI: 1.1–1.6, p <0.001) were strong and independent predictors of mortality.
Conclusion: In a large cohort of patients after SHD-VT ablation, an advanced age, poor ejection fraction, ischemic cardiomyopathy, high NYHA class and diabetes mellitus but not electrical storm or COPD were independent and strong predictors of long-term all-cause mortality.



ACUTE CHANGE OF CARDIAC AUTONOMIC REGULATIONS AFTER THERMAL AND NON--THERMAL PULMONARY VEIN ABLATION

Stojadinović P[1], Wichterle D[2], Peichl P[2], Jansová H[3], Nejedlo V[3], Čihák R[2], Kautzner J[2]

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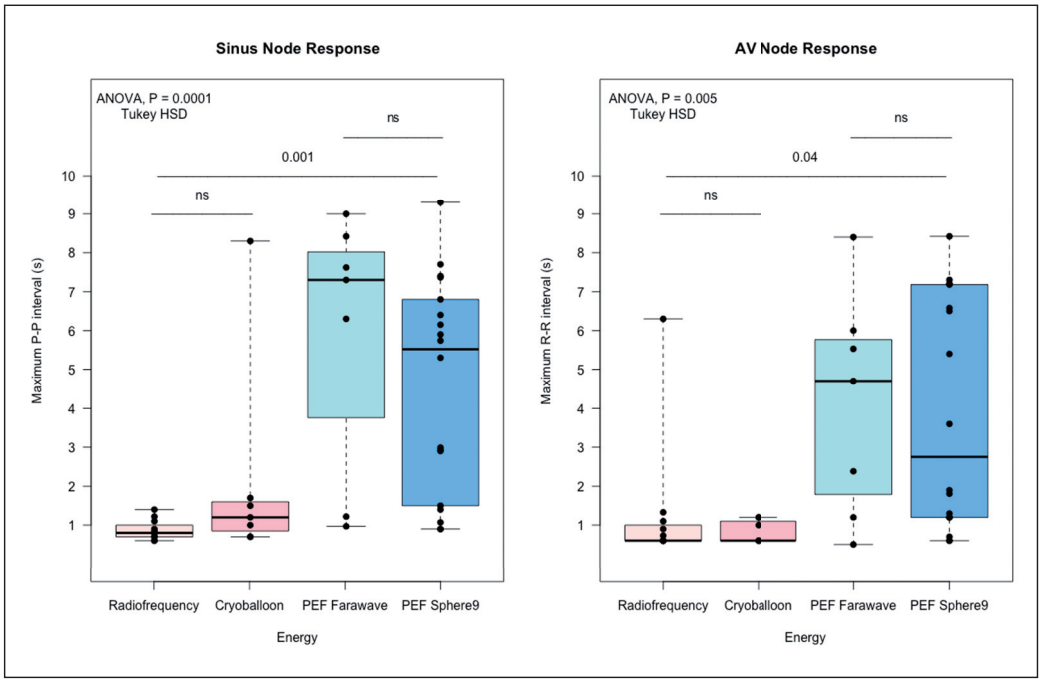
Type: clinician's oral presentation, topic: rhythm disorders, pacing

Background: Pulmonary vein isolation (PVI) by thermal energy results in collateral ganglionic plexi ablation. On the contrary, pulsed electric field (PEF) energy presumably spares neural tissue.
Objective: We investigated and compared the effect of PVI on parasympathetic input into the sinus node (SAN)



and AV node (AVN) when four different ablation strategies were used.
Methods: A study enrolled 49 patients who underwent PVI in general anesthesia (age 57 years, 71% males). In 17 patients, radiofrequency energy delivery by the irrigated-tip catheter was used for ablation while 7 patients were ablated using a cryoballoon catheter. In 7 patients, PEF energy was delivered using a single-shot Farawave catheter while 18 patients were ablated using Sphere9 catheter. Before and after PVI, the responsiveness of the SAN and AVN was assessed by extracardiac vagal nerve stimulation (ECVS) via a diagnostic catheter in the right internal jugular vein. Stimulation was delivered both in sinus rhythm and during atrial pacing. Reduction of response to ECVS was arbitrarily defined as a maximum induced pause of ≤1.5 s.
Results: At baseline, physiological response to ECVS (long sinus arrest and/or AV block) was demonstrated. After PVI, a substantial reduction of SAN response was observed in 21/24 (88%) patients after thermal PVI and 7/25 (25%) patients after non-thermal PVI (p = 0.0001). Similarly, a substantial reduction of AVN response was observed in 21/24 (88%) patients after thermal PVI and 9/25 (36%) patients after non-thermal PVI (p = 0.0003). The Figure shows on the continuous scale the post-PVI pauses in sinus rhythm (maximum P-P interval) and atrial pacing (maximum R-R interval) induced by ECVS.
Conclusion: Vagal responses of SAN and AVN are preserved in most AF patients after non-thermal PVI. This contrasts with the much stronger effect of thermal PVI.

MORTALITY OF PATIENTS WITH IMPLANTED PACEMAKER: LONG-TERM FOLLOW-UP DATA FROM CZECH NATIONAL PACEMAKER REGISTRY (REPACE)

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Type: clinician's oral presentation, topic: rhythm disorders, pacing

Aim: The aim is the long-term continuous monitoring of patients with an implanted pacemaker (PM) regarding real mortality and morbidity in relation to the standard population without PM, to predict the development of procedures and costs of care in the next ten years.
Methodology: The analysis is based on data managed by the Institute of Health Information and Statistics of the Czech Republic (ÚZIS ČR), which are collected within the framework of NZIS and national health registers.
Results: The analysis is performed on a population sample of 82,791 patients who underwent PM implantation for symptomatic bradycardia with standard indications according to the ESC guidelines. In 2020, there was a year-on-year decrease of 6%, in connection with the COVID-19 pandemic, increased mortality and the limitation of care provided. The annual share of reimplantations in the total number of performed procedures varies between 24% and 30%. In the years 2010–2021, almost 114 thousand pacemakers were implanted, of which 27.9% were single-chamber, 67.4% were double-chamber , and 4.6% were biventricular. A higher proportion of pacemakers are implanted in men (56.9% vs. 43.1% in women). This share is increasing over time: in 2010, the share of men was 55.3%, in 2021 it will be 57.8%. The average age of a patient at the time of initial pacemaker implantation is 76 years (75 years for men, 77 years for women). From 2010 to 2021, the average age of patients at primary implantation increased by 1 year from 75.3 years to 76.3 years. Patients with primary PM implantation in the years 2010–2021 (N = 82,791) according to the age of the patient at the time of the procedure - the length of survival is evaluated using the Kaplan–Meier method. . 5-year relative survival is 88.6% (overall survival: 60.6%), 10-year relative survival is 75.9% (overall survival: 32.7%).

LONG-TERM FATE OF AN UNSELECTED COHORT OF CONGENITAL LONG QT SYNDROME PATIENTS DIAGNOSED IN CHILDHOOD

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Type: clinician's oral presentation, topic: rhythm disorders, pacing

Objectives: Congenital long QT syndrome (LQTS) is genetically heterogeneous disorder with type-specific risk for major arrhythmic event (MAE). We performed a retrospective analysis of unselected cohort of LQTS patients diagnosed in childhood.
Methods: All paediatric patients (N = 224, female 119, 53%) diagnosed with LQTS between July 1985 and December 2021 at median age (IQR) 11.7 (6.5–14.2) years were included. Patients were followed-up for a median (IQR) of 8.8 (2.8–16.7) years.
Results: Reasons for presentation were LQTS related symptoms (N = 91, 40.6%), positive family history (N = 66, 29.5%), incidental finding of prolonged QTc (N = 37, 16.5%), positive pre-participation screening (N = 30, 13.4%). QTc interval was median (IQR) 482 (460–516) ms, the median (IQR) Schwartz score was 4.0 (3.0–5.0) points. Betablockers (BB) were administered in 202 patients (90.2%). Twelve patients died from cardiovascular cause (5.4%) yielding a 5/10/20 years survival probability of 97.2/94.7/91.5%. Freedom from MAE defined as either sudden cardiac death/arrest or appropriate ICD therapy was 92.9/87.7/83.5%. MAE was independently predicted by early presentation (HR 14.65, p = 0.0013), Schwartz score (HR 1.77, p = 0.0022), QTc (HR 1.018, p <0.001) and presence of LQTS3 (HR 34.54, p = 0.025). MAE burden

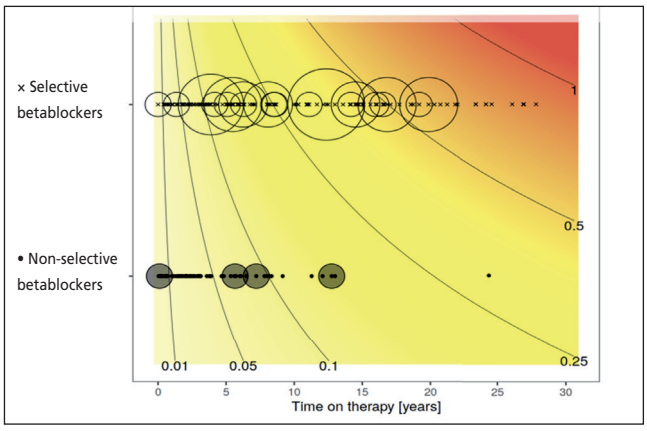

Fig. 1 – Effectivity of MAE prevention according to the type of betablockers.

decreased significantly in patients on non-selective BB in comparison to selective BB (Fig. 1) regardless of other variables (gender: HR 0.15, $p = 0.0121$, early presentation: HR 0.11, $p < 0.0001$, Schwartz score: HR 0.16, $p < 0.0001$, LQTS3: HR 0.15, $p = 0.0169$ and QTc: HR 0.14, p = 0.0096).
Conclusions: Patients with LQTS diagnosed in childhood had a long-term survival probability 91.5%. Early presentation, Schwartz score, genotype and QTc duration were major predictors of MAE. BB therapy has shifted to non-selective BB over time, which significantly decreased MAE burden.

LONG-TERM OUTCOMES OF PATIENTS WITH IMPLANTABLE CARDIOVERTER-DEFIBRILLATORS IMPLANTED IN CHILDHOOD: TRANSVENOUS VS. NON-TRANSVENOUS SYSTEM

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Type: clinician's oral presentation, topic: pediatric cardiology

Background: Implantable cardioverter-defibrillators (ICD) have been established as effective and safe therapy for prevention of sudden cardiac death in children. Controversy regarding ICD type (transvenous, T vs. non-transvenous, NT) led us to perform long-term analysis of outcomes in these two groups.
Methods: A nationwide cohort of all patients (N = 109, male 73, 67.0%) with ICDs implanted during childhood from 1993–2022 at median (IQR) age 14.3 (10.7–16.6) years was retrospectively studied. Patients were followed-up for a median (IQR) of 62.2 (27.1–127.3) months.
Results: 94 patients received T and 15 NT systems (pericardial coil in 11, pleural coil in 1 and subcutaneous coil in 3 patients). Totally subcutaneous ICD systems were not included. Patients with NT ICDs were significantly younger (median age 4.6 vs. 15.3 years, $p < 0.001$) at implant. Median follow-up was comparable with 67.4 months in NT and 61.0 months in T group, $p = 0.843$. There were 6 deaths (5.5%), all in patients with T systems, yielding a 5/10-year survival probability of 93.8/91.5%. Five years after ICD implantation freedom from appropriate therapy was 56.3/60.3% ($p = 0.886$) and from inappropriate therapy 85.7/88.8% ($p = 0.751$) in NT vs. T systems, respectively. A total of 37 surgical revisions for ICD related complications (except ERI enforced generator replacement) had to be performed in 32 patients (29.4%). None of the revisions in the NT group was associated with shock coil malfunction or strangulation of the heart in pericardial coil systems. Five years after implantation freedom from surgical revision in NT vs. T group was 72.7/73.7%, resp. ($p = 0.961$).
Conclusions: NT ICDs are as effective and safe as T ICDs in the treatment of malignant arrhythmias in children. Burden of surgical revisions is comparable.

THE IMPACT OF CARDIOGENIC SHOCK AND OUT-OF-HOSPITAL CARDIAC ARREST ON THE OUTCOME OF ACUTE MYOCARDIAL INFARCTION. NATIONAL LEVEL ANALYSIS

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Type: clinician's oral presentation, topic: acute coronary syndromes

Background: Cardiogenic shock (CS) and out-of-hospital cardiac arrest (OHCA) are critical cardiovascular events with profound implications for patient outcomes. This study aims to provide a national level analysis of predictors of CS and OHCA in acute myocardial infarction (AMI) patients and their effect on mortality.
Methods: The analysis is based on data from an all-comers national registry. The 2016–2020 period was chosen for standardized registry data, and 23,703 ST-elevation myocardial infarction (STEMI) patients were analyzed.
Results: We compared 4 subgroups of STEMI patients, A) without CS and OHCA (19,590), B) after OHCA (2,262), C) with CS (713), and D) after OHCA with CS (1,138). Patients after OHCA without CS had the lowest mean age, 62.0 (±12.6) years, while patients with CS without OHCA were the oldest, 68.8 (±11.8) years. Patients with CS without OHCA had the highest proportions of comorbidities, namely diabetes mellitus (25.0%), chronic kidney disease (6.0%), prior percutaneous coronary intervention (18.8%), and prior coronary artery bypass graft (5.3%). Mortality at 30 days was highest in CS patients complicated by OHCA (48.2%), followed by CS patients without OHCA (42.8%), patients with OHCA without CS (10.6%) and patients without CS and OHCA (4.0%). CS was the most robust predictor of 30-day mortality, odds ratio (OR) 6.627 (95% confidence interval [CI] 5.453; 8.054) for patients after OHCA and 10.352 (8.483; 12.634) for those without OHCA.
Conclusion: OHCA significantly altered the 30-day mortality risk after STEMI for both patients with and without CS. CS is the strongest predictor of 30-day mortality in STEMI, irrespective of OHCA. STEMI patients after OHCA and CS at admission are at the highest risk of death.

FRACTIONAL FLOW RESERVE IN ANOMALOUS AORTIC ORIGIN OF CORONARY ARTERIES TO EVALUATE HEMODYNAMIC CONSEQUENCES OF HIGH RISK ANATOMICAL FEATURES

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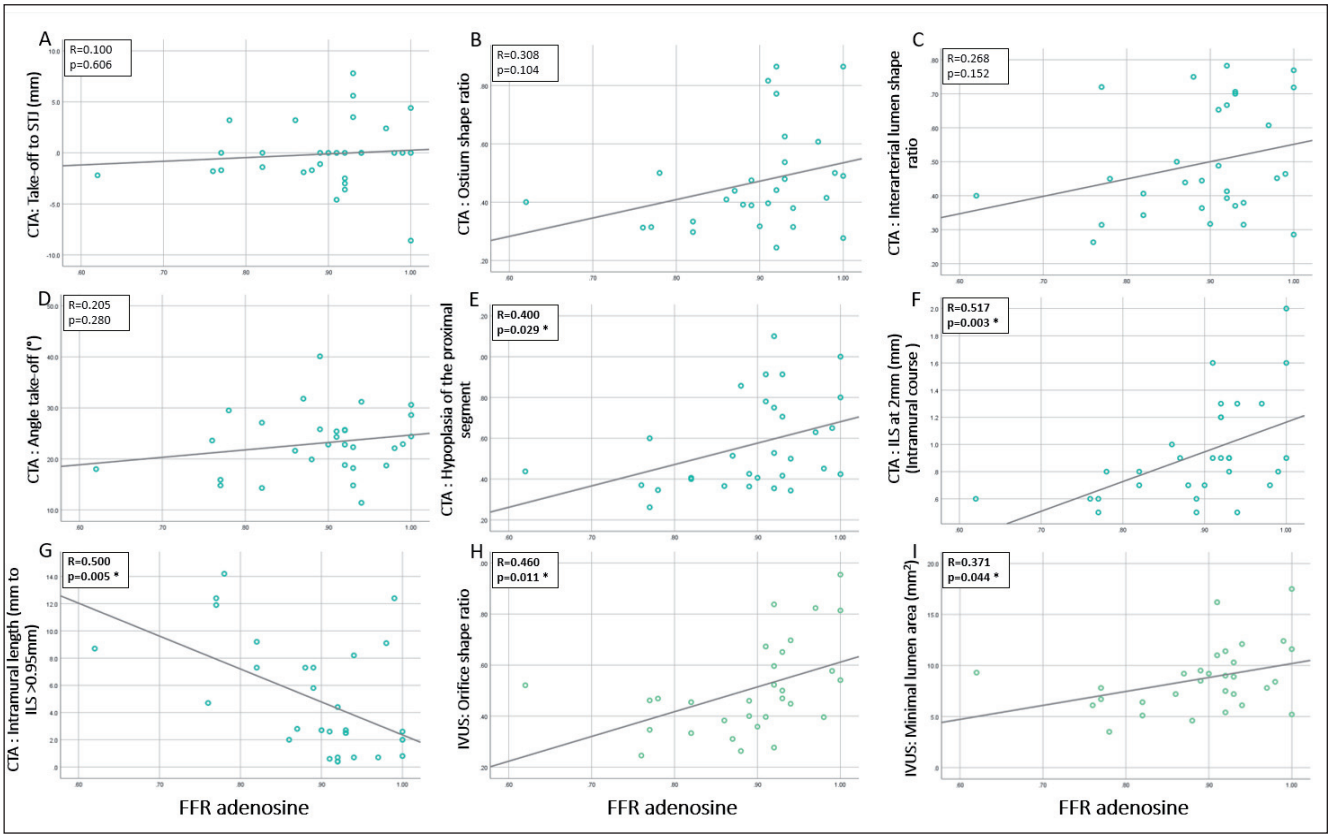

Fig. 1 – Scatterplots with Pearson's correlation coefficients displaying the relation between FFR adenosine and AAOCA high-risk anatomical features measured with CTA (A-G) and IVUS (H-I).
AAOCA – anomalous aortic origin of a coronary artery; CTA – computed tomography angiography; FFR – fractional flow reserve; ILS – interluminal space; IVUS – intravascular ultrasound.
Statistical significant relation is marked with *.

Introduction: In patients with anomalous aortic origin of a coronary artery (AAOCA) fractional flow reserve (FFR) can be performed for further risk stratification of myocardial ischemia and sudden cardiac death. The aim of this study was to evaluate the hemodynamic consequences (accessed with FFR) of the high-risk anatomical features in AAOCA.
Methods: In this prospective cohort study, all consecutive patients with AAOCA in whom diagnostic work-up according to the MuSCAT trial, including FFR, was performed between July 2020 and January 2023 in our tertiary AAOCA referral center, were included. Presence and length of the intramural segment was assessed using the interluminal space (ILS) on the CTA and orifice geometry using IVUS.
Results: Thirty patients, 57% female and mean age at AAOCA diagnosis of 48.7±15.3 years, were included. Twenty-seven (90%) patients presented with an anomalous aortic origin of the right coronary artery. FFR adenosine was measured in all patients (Fig. 1), and showed a significant relation with: 1. hypoplasia of the proximal segment on CTA (R = 0.400, p = 0.029); 2. the ILS at 2 mm from the ostium on CTA (R = 0.517, p = 0.003); 3. the length of the intramural course on CTA (R = 0.500, p = 0.005); 4. the orifice shape on IVUS (R = 0.460, p = 0.011) and 5. the minimal lumen area on IVUS (R = 0.371, p = 0.044).
Conclusions: FFR was significantly reduced in AAOCA with the following high-risk anatomical features: increased hypoplasia of the proximal segment on CTA, lower ILS at 2 mm from the ostium on CTA, longer intramural course on CTA, increased slitlike orifice shape on IVUS and lower minimal lumen area on IVUS. These anatomical high-risk features appear to be hemodynamically relevant in the pathophysiology of AAOCA.

COMPARISON OF NEURON-SPECIFIC ENOLASE, TAU-PROTEIN, NEURO-FILAMENT LIGHT CHAIN, GALECTIN-3 VALUES AND THEIR COMBINATION FOR EARLY OUTCOME PREDICTION IN CARDIAC ARREST SURVIVORS

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Type: clinician's oral presentation, topic: acute states in cardiology, acute coronary syndromes

Introduction: Early and precise prognosis determination in cardiac arrest survivors remains challenging despite multimodal approach. The aim of our study was to compare prognostic values of NSE with novel biomarkers serum tau protein (Tau), neuro-filament light chain (Nfl) and Galectin-3 (Gal).
Methods: Eligible subjects were out-of-hospital cardiac arrest survivors. Blood samples for the measurements of NSE, Tau, Nfl and Gal levels were drawn at 24 hrs (D1), 48 hrs (D2), 72 hrs (D3), and 96 hrs (D4) after hospital admission. Thirty-day neurological outcomes according to the Modified Rankin Scale (mRS) were evaluated as clinical endpoints, poor outcome was defined as mRS 4–6. Prognostic values of NSE, Tau, Nfl, and Gal for the prediction of poor outcomes were determined using ROC analysis.
Results: A total of 43 patients were enrolled in the present study. The comparison of ROC curves revealed significantly lower area under the curve (AUC) for Gal in comparison to other biomarkers at D2–4. Numerically, the highest AUC at D1 was observed for Tau and at D2, D3 and D4 for NSE. The highest sensitivity for the prediction of poor prognosis with 100% specificity was detected for Tau values at D1 (33.3%) or D2 (70.0%) and for NSE values at D3 (92.9%) or D4 (100%). Multiple logistic regressions revealed that combination of all four biomarkers may predict poor prognosis already at D1 with 100% specificity and 53% sensitivity (AUC 0.888, p <0.001).
Conclusions: Our results indicate that the novel biomarkers Tau and Nfl have comparable predictive value for clinical outcomes as NSE at 48 to 96 hrs after cardiac arrest. Gal values predict outcomes only at 24 hours. Combination of all four biomarkers could improve prognosis prediction with high predictive value already the first day.

THE R" WAVE IN V_1 AND THE NEGATIVE TERMINAL QRS VECTOR IN AVF COMBINE TO A NOVEL 12-LEAD ECG ALGORITHM TO IDENTIFY SLOW CONDUCTING ANATOMICAL ISTHMUS 3 IN PATIENTS WITH TETRALOGY OF FALLOT

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Type: clinician's oral presentation, topic: arrhythmias

Aims: Patients with repaired tetralogy of Fallot (rTOF) have an increased risk of ventricular tachycardia (VT), with

slow conducting anatomical isthmus (SCAI) 3 as dominant VT substrate. In patients with right bundle branch block (RBBB), SCAI 3 leads to local activation delay with a shift of terminal RV activation towards the lateral RVOT which may be detected by terminal QRS vector changes on sinus rhythm ECG.

Methods and results: Consecutive rTOF patients aged ≥16 years with RBBB who underwent electroanatomical mapping at our institution between 2017–2022 and 2010–2016, comprised the derivation and validation cohort, respectively. Forty-six patients were included in the derivation cohort (aged 40±15 years, QRS duration 165±23 ms). Among patients with SCAI 3 (n = 31, 67%), 17 (55%) had an R'' in V_1, 18 (58%) a negative terminal QRS portion (NTP) ≥80 ms in aVF, and 12 (39%) had both ECG characteristics, compared to only 1 (7%), 1 (7%), and 0 patient without SCAI, respectively.

Combining R'' in V_1 and/or NTP ≥80 ms in aVF into a diagnostic algorithm resulted in a sensitivity of 74% and specificity of 87% in detecting SCAI 3. The interobserver agreement for the diagnostic algorithm was 0.875. In the validation cohort (n = 33, 18 [55%] with SCAI 3) the diagnostic algorithm had a sensitivity of 83% and specificity of 80% for identifying SCAI 3.

Conclusion: A sinus rhythm ECG based algorithm including R'' in V_1 and/or NTP ≥80 ms in aVF can identify rTOF patients with a SCAI 3 and may contribute to non-invasive risk stratification for VT.

MUTATION IN PDGFRβ: A POTENTIAL NEW PATHOGENIC VARIANT FOR MITRAL VALVE PROLAPSE

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Background: Mitral valve prolapse (MVP) due to myxomatous degeneration is characterized by familial clustering, but few pathogenic genes have been identified. In a genetic screening program for MVP patients, we identified a platelet-derived growth factor receptor β (PDGFRβ)-E162K missense variant in a family with a bi-leaflet MVP phenotype in four affected family members. PDGFRβ is a receptor tyrosine kinase, which plays an important role in vascular development.

Purpose: In this study, we investigated whether the E162K substitution in PDGFRβ could lead to mitral valve abnormalities.

Methods: To assess the functional effects of the missense variant, proliferation and migration assays were performed using HeLa cells overexpressing wild-type (WT) or mutant PDGFRβ. Immunostainings were performed to determine PDGFRβ expression in the diseased valves from a family member undergoing surgical operation and from additional patients operated for MVP. Mouse models were created with the mouse equivalent of the human PDGFRβ-E162K variant (PDGFRβ-E161K) using CRISPR/CAS9. The variant was not lethal and a total of 12 homozygous PDGFRβ-E161K$^{-/-}$ mice, 11 heterozygous PDGFRβ-E161K$^{+/-}$ mice, and 7 WT mice were subjected to transthoracic echocardiography. In addition, histology was performed in all 30 mice to detect potential valvular defects.

Results: Stimulated HeLa cells expressing PDGFRβ-E162K showed reduced proliferation and migration, suggesting a loss of function of the mutant receptor. PDGFRβ was expressed in human diseased mitral valves. Echocardiographic evaluation revealed a significant larger mitral valve annulus diameter in both PDGFRβ-E161K$^{+/-}$ and PDGFRβ-E161K$^{-/-}$ compared to WT (WT: 1.97 mm; PDGFRβ-E161K$^{+/-}$:2.13, p = 0.031; PDGFRβ-E161K$^{-/-}$: 2.42 mm, p <0.0001). Histological data in PDGFRβ-E161K$^{-/-}$ mice showed significant leaflet thickening in the free edge (FE) of the posterior mitral valve leaflet (PMVL) compared to WT (WT: 72.34 µm; PDGFRβ-E161K$^{-/-}$: 109.6 µm, p = 0.040) and a larger leaflet area of the PMVL compared to WT (WT: 25280 µm²; PDGFRβ-E161K$^{-/-}$: 44494 µm², p = 0.020). Moreover, an altered organization of the extracellular matrix reminiscent of the myxomatous degeneration in MVP was observed. To investigate whether these alterations are present at birth, neonatal hearts were subjected to histological and morphometric analyses. Both mutant lines showed no differences compared to WT.

Conclusions: The PDGFRβ-E162K variant is associated with familial MVP and alters the function of PDGFRβ. Mice harboring this mutation display mitral valve defects, which were not expressed in mutant neonatal hearts, indicating that it is acquired during life.

MYOCARDIAL WORK IN VENTRICULAR PREEXCITATION

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Type: clinician's oral presentation, topic: rhythm disorders, pacing

Background: Ventricular preexcitation alters electromechanical activation sequence and may induce left ventricular (LV) contractile discoordination and pathologic remodelling in selected cases.

Aim: To evaluate LV myocardial work before and after accessory pathway (AP) ablation in patients with WPW preexcitation and to compare them to normal controls.

Methods: 20 paediatric pts. with the WPW syndrome/pattern underwent myocardial work evaluation using

speckle tracking echocardiography before and 24 hrs. after catheter ablation (N = 17/20 pts.) and were compared to 20 healthy individuals. 3D electroanatomical mapping system EnSite Precision™ was used to localize APs during EP study.

Results: Before ablation LV ejection fraction (EF; mean 53.8 vs 59.2 %, $p = 0.004$) and global work efficiency (WE; median 92.5 vs 95.0%, $p < 0.001$) were lower in patients vs controls. Global WE correlated negatively with QRS duration ($p = 0.028$) and delta to R interval ($p = 0.002$). Segmental WE increased with distance from AP insertion from median 87.0% at AP location to 98.0% in distant segments ($p < 0.001$). After successful ablation both LVEF and global WE tended to normalize. Segmental WE was almost equally distributed among LV segments.

Conclusions: Ventricular preexcitation induces significant LV myocardial work inefficiency in segments adjacent to AP which correlates with the degree of preexcitation and tends to normalize early after ablation. The amount of wasted work may be considered when assessing the potential for pathologic LV remodelling or discussing the indication for prophylactic ablation.

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