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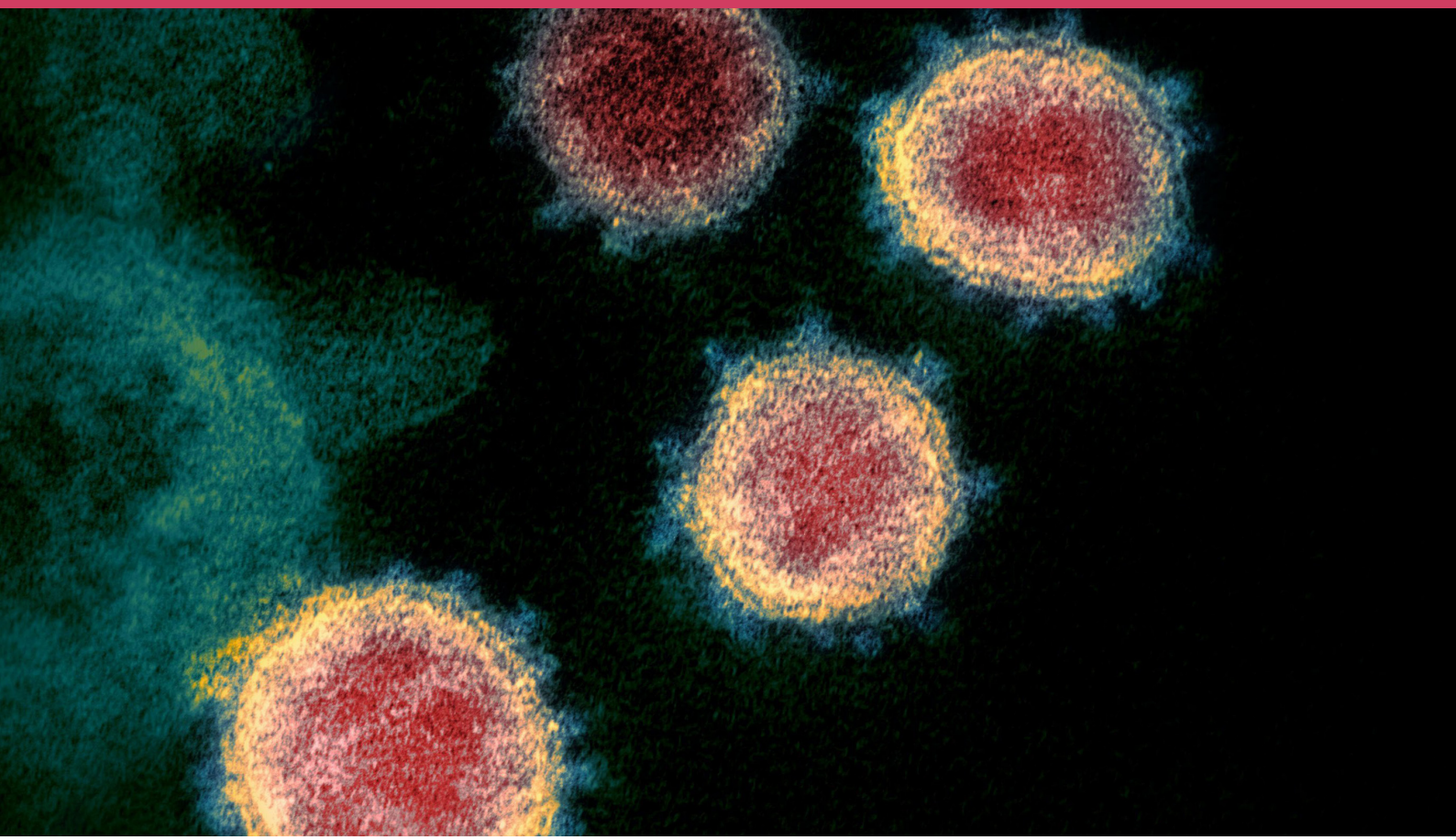

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ANNUAL MEETING OF THE SWISS SOCIETY OF CARDIOLOGY, 2020: ABSTRACTS

The SSC/SSCS – SSP/SSTS Joint Annual Meeting Davos 2020 has been cancelled due to the situation regarding COVID-19.

After very careful deliberation and consideration, a decision was made by the Swiss Society of Cardiology, the Swiss Society of Cardiac Surgery, the Swiss Society of Pneumology, the Swiss Society of Thoracic Surgery in accordance with the congress presidents to cancel the SSC/SSCS – SSP/SSTS Joint Annual Meeting in Davos in June 2020.

Accepted cardio-related abstracts (Abstract submission topics 8-14) are published in this supplement to Cardiovascular Medicine, the official journal of the Swiss Society of Cardiology, the Swiss Society for Angiology, the Swiss Society of Hypertension and the Swiss Paediatric Cardiology Society.

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PHYSIOLOGY / PHYSIOPATHOLOGY / CELLULAR AND MOLECULAR BIOLOGY

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Aquaporin-1: a H_2O_2 transporter that modulates aging-associated platelet/endothelial dysfunction in atherothrombosis

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Introduction: Aging is associated with development of cardiovascular diseases, including atherothrombosis. Aquaporin-1 (AQP1) is a water channel that may transport hydrogen peroxide (H_2O_2). Regarding to the role of oxidative stress in atherothrombosis, we hypothesized that AQP1 modulates aging-associated platelet/endothelial dysfunction.

Methods: Human aortic endothelial cells (HAEC) from passages 4 (young) to 15 (senescent) were probed for AQP1 and the phospho/total proteins (AMPK, acetyl-coA-carboxylase (ACC), caveolin-1 and eNOS) by immunoblotting. Endothelial cells were transfected with constructs containing H_2O_2 biosensor HyPer targeted to cell nucleus or cytosol followed by fluorescence imaging. The transcriptional levels of pro-inflammatory/pro-atherogenic vs. anti-inflammatory/atheroprotective genes in the cells were assessed by qRT-PCR. Human blood samples were taken and treated with or without AQP1 inhibitor (Bacopaside II, 10 μM) to examine the platelet adhesion and rolling velocity on vWF under shear flow (100 dyn/cm^2). Also, latelet aggregation in response to collagen (2 μM), ADP (1 μM) and TRAP (1 μM) were recorded.

Results: First, the senescence of HAEC was adjusted by a significant increase in β-galactosidase activity from passage 5 to 15. Immunoblot analyses showed that aging leads to significant increases in AQP1 intensity and phosphorylation of caveolin-1 (Tyr14) and ACC (Ser79), along with decreases in phosphorylation of eNOS (Ser1177) and AMPK (Thr172) ($P < 0.01$, $n > 6$). Fluorescence imaging documented a robust H_2O_2 production in the senescent endothelial cell cytosol, but not nucleus, and activated TNF-α gene, whereas the transcription of hemoxygenase-1 gene enhanced in the young cells ($P < 0.01$). AQP1 inhibition reduced platelet adhesion and thrombus formation, and elevated platelet rolling velocity on vWF under shear flow ($P < 0.01$). Also, a decrease was found in platelet aggregation in response to AQP1 inhibition ($P < 0.05$).

Conclusion: These studies, for the first time, demonstrate that aging induces AQP1 expression in endothelial cells and platelets, and modulates the dephosphorylation of AMPK/eNOS. This may increase the risk of platelet/endothelial dysfunction and production of pro-coagulant/pro-inflammatory factors via ACC activation. Thus, AQP1 inhibition could potentially be exploited as a new therapeutic strategy for age-related atherothrombosis.

Disclosure: Nothing to disclose

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Bile acids promotes a healthy quiescent endothelial cell metabolism

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Introduction: Endothelial cells (ECs) are the gatekeepers of vascular health and EC metabolism plays an important role in cardiovascular patho-physiology. Upregulation of glucose uptake and anaerobic glycolysis is characteristic of dysfunctional ECs, while fatty acid oxidation characterizes metabolically quiescent healthy ECs. Bile acids (BA) are signaling molecules increasingly recognized as regulators of metabolic homeostasis, known for their antioxidant capacity. After bariatric surgery, circulating BA increase and are important mediators of post-surgical vaso-protective benefits.

Methods: Primary human aortic endothelial cells (HAECs) were used to assess functional and metabolic alterations *in-vitro* after 24-hour BA treatment, using extracellular flux analyzer, radioactive glycolysis and proliferation assay, caspase-3 activity and DAF-2 stain to assess NO-production.

Results: After RYGB, total circulating BA are up to 5 times higher compared to obese controls. Overnight treatment of HAECs with 50μM cholic acid (CA) and chenodeoxycholic acid (CDCA), two of the most abundant BA, at circulating concentrations observed post-bariatric surgery shows a significant downregulation of oxygen consumption and lactate production, a marker of anaerobic glycolysis, in response to glucose administration compared to vehicle-treated, indicating a quiescent endothelial phenotype. Furthermore, endothelial proliferation, measured by rate of radioactive thymidine incorporation into DNA, is also significantly decreased after BA treatment of ECs. CA- and CDCA-treated ECs significantly downregulate apoptosis and increase endothelial NO and H_2S production, suggesting that treated cells are functioning better than vehicle-treated controls. ECs treated with BA show an upregulation of fatty acid synthase enzyme mRNA, and seem more dependent on fatty acids for energy production, as assessed by substrate flux analysis. ECs dependency on protein to produce ATP is not altered by BA treatment. Further, EC pro-inflammatory activation induced by TNF-a results in significant upregulation of anaerobic glycolysis, that can be rescued by concomitant incubation with CA and CDCA.

Conclusion: BA treatment of ECs promotes the acquisition of a more quiescent phenotype, blunting glycolysis as a main generator of energy, and enhancing fatty acid oxidation. BA treatment is able to blunt TNF-a induced anaerobic glycolysis in EC, supporting a potential therapeutic anti-inflammatory benefit.

Disclosure: Nothing to disclose

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Assisted reproductive technologies induced left ventricular hypertrophy progresses to heart failure in mice

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Introduction: More than 6 million persons generated by assisted reproductive technologies (ART) are living worldwide and currently, these techniques account for up to 5% of all births in developed countries. ART induces epigenetic dysregulation of the eNOS gene responsible for premature vascular aging and arterial hypertension in mice and probably in humans (Circulation 2012; 125:1890-96; J Clin Invest 2013; 123:5052-60; JACC 2018; 72:1267-1274). We previously found that ART induces left ventricular hypertrophy in young mice, but there is no information on how cardiac function evolves during lifetime.

Methods: We, therefore, assessed cardiac morphology and function in 6- and 18-month-old male ART and control mice (n = at least 10 animals/group) by echocardiography (Vevo 3100, Visual Sonics).

Results: The major new findings were that 1) 6-month old mice as expected displayed left ventricular hypertrophy (3.95±0.52 vs. 3.21 ± 0.32 mg/kg of body weight, $P < 0.01$, ART vs. Ctrl), whereas left ventricular function was preserved (LVEF 48.4±4 vs. 48.3±3 %, $P = 0.96$). 2) and, most importantly, 18-month old mice, in addition to ventricular hypertrophy which remained unchanged ($P > 0.1$), now also displayed left ventricular dysfunction (LVEF 43.9±5.1 vs. 49.1±5.1 %, $P = 0.013$, ART vs. Ctrl) and marked end-diastolic (84.3±23.3 vs. 60.3±12.9 μl, $P = 0.01$, ART vs. Ctrl) and end-systolic (42.7±16.4 vs. 26.0±7.1 μl, $P < 0.01$, ART vs. Ctrl) left ventricular dilatation.

Conclusion: We show for the first time that ART, in addition to causing premature vascular aging and arterial hypertension, induces left ventricular hypertrophy, which progresses to heart failure in older mice. We speculate that ART-induced premature atherosclerosis and arterial hypertension in humans may have similar long-term consequences on cardiac morphology and function that may predispose to premature cardiovascular morbidity and mortality.

Disclosure: Nothing to disclose

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Bronchial thermoplasty (BT) induced epithelial heat shock proteins secretion reduces cell types specific airway remodeling in severe asthma

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Background: Bronchial thermoplasty (BT) is a therapy for severe asthma which reduces airway remodeling, hospitalization, exacerbation, and steroid use. Although histopathological studies confirmed reduced asthma airway wall remodeling, limited details of the mechanism are known. Reduced HSP60 expression by epithelial cells was reported earlier.

Objectives: 1) characterize BT induced cell type specific HSP secretion by human primary bronchial epithelial (HBEC) and airway smooth muscle cells (ASMC). 2) investigate the effect of HSP70 and 90 on airway remodeling.

Methods: HBEC and ASMC were isolated from 20 patients with severe asthma prior to BT. Experimentally, BT was mimicked by exposing primary human cells to 65°C for 10 seconds. HSPs secretion, cell proliferation, cell cycle regulator, cell remodeling marker were evaluated by immunohistochemistry, Western-blot, and immunofluorescence.

Results: Experimental BT induced cell type specific secretion of HSP40, HSP70 and 90 by HBEC, but not by ASMC. The latter only released HSP60 as a result of heat induced cell damage. Exogenous recombinant human HSP70, or HSP90 activated HBEC proliferation and wound repair, while reducing ASMC proliferation and cell remodeling. These cell type specific proliferation-regulating effects of HSP were reflected by the expression of the cell cycle inhibitor $p21^{Waf1/Cip1}$, and the proliferation marker Ki67. HSP70 and HSP90 increased E-cadherin expression by HBEC, but both HSPs reduced the expression of α-smooth muscle actin, fibronectin, and collagen type-I by ASMC. These cell type specific effects of HSP70 and 90 were also reflected in cell signaling through AKT→mTOR→p70S6K pathway and C/EBP-β→PRMT1 and lead to corresponding mitochondria activity.

Conclusion: BT reduces airway wall remodeling by stimulating the secretion of HSP70 and HSP90 by epithelial cells, thereby improving epithelium repair and inhibiting smooth muscle cell activity.

Disclosure: Nothing to disclose

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TNFα induces endothelial dysfunction in rheumatoid arthritis via LOX-1 and arginase 2: reversal by monoclonal anti-TNFα antibody infliximab

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Introduction: Chronic inflammatory diseases such as rheumatoid arthritis (RA) are associated with increased cardiovascular (CV) risk. In patients with RA, endothelium-dependent responses are impaired. However, the molecular mechanisms causing endothelial dysfunction (ED) and vascular disease in RA are still incompletely understood. We studied ED in TNFα transgenic mice that develop RA and characterized the molecular mechanisms involved.

Methods: Two transgenic mouse lines developing mild or severe form of RA were used to study disease progression. Endothelial function was assessed in both lines and controls at different time points using organ chamber myograph. Transgenic mice were also randomly receiving anti-TNFα treatment starting before the onset of ED. Quantitative PCR, Western blotting and ELISA assays were used for investigating molecular mechanisms.

Results: Endothelium-dependent vasorelaxation to acetylcholine was impaired in both lines. This was associated with increased TNFα levels and LOX-1 expression and in turn activated arginase 2 (Arg2) expression via direct binding of transcription factor NFκB to *Arg2* promoter. This led to reduced vascular cGMP levels due to reduced NO bioavailability in transgenic mice. Treatment with anti-TNFα antibody infliximab reduced TNFα levels and improved ED in both lines, paralleled by decreased expression of LOX-1 and Arg2 activity. Similarly, increased TNFα, LOX-1 and ARG2 plasma levels in RA patients were markedly reduced by infliximab.

Conclusion: Here we show that RA induced by TNFα overexpression leads to a time- and dose-dependent ED due to increased expression of LOX-1 receptor and increased Arg2 activity, while anti-TNFα treatment reduced LOX-1 expression and Arg2 activity in RA mice. Moreover, anti-TNFα therapy with the monoclonal antibody infliximab also reduced LOX-1 levels and ARG2 activity in RA patients. These translational results highlight the fact that TNFα-induced inflammation itself leads to ED that may explain the increased CV risk of RA patients.

Disclosure: Nothing to disclose

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The plant derived omega 3 fatty acid alpha linolenic acid prevents age-dependent arterial stiffness and improves diastolic function in mice

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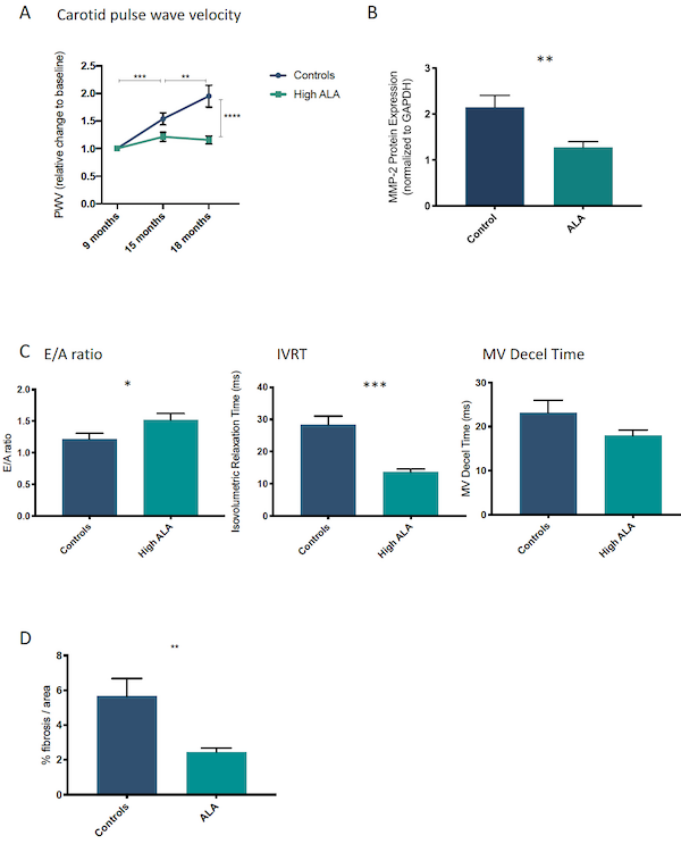
Background: Cardiovascular diseases are strongly age-dependent and their prevalence rises with the numbers of elderly people. Arterial stiffness underlies the process of vascular ageing and could be mediated by similar mechanisms as heart failure with preserved ejection fraction (HFpEF) - another often-debilitating age-dependent disease. Fish-derived omega-3 fatty acids (n3-FA) have been described to decrease cardiovascular events in high risk populations. Little is known on the effects of the plant-derived n3 FA alpha-linolenic acid (ALA). More insight is urgently needed, because of the lower costs and greater global supply of ALA. Thus, we aimed to investigate the effects of a long-term dietary intervention with ALA on age-dependent arterial stiffness and diastolic function in a mouse model of ageing.

Methods: C57BL/6 wildtype males were either fed an ALA-rich (high ALA) or a respective control diet for 12 months, starting from 6 months of age. At 9, 15 and 18 months, arterial stiffness was assessed by measuring pulse wave velocity (PWV) in the right common carotid artery using a Vevo 3100 system (VisualSonics, Fig.1A). At 18 months, diastolic function was assessed echocardiographically. Matrix-Metalloproteinase 2 (MMP-2) protein levels were assessed in carotid lysates of ALA-fed or control mice using western blot. Cardiac histology determined percentage of cardiac fibrosis.

Results: Arterial stiffness steadily and significantly increased in controls over time, while ALA prevented said increase (Fig 1A). MMP-2-expression, as a mediator of arterial stiffness via degradation of elastic fibers, was decreased in carotid arteries of ALA-fed mice (Fig 1B). Diastolic function was improved in ALA-fed versus control mice (Fig 1C). Interestingly, cardiac fibrosis as an underlying feature of diastolic dysfunction was reduced by ALA diet (Fig 1D).

Conclusion: We demonstrate that long-term dietary supplementation of the plant-derived ALA fully prevents the development of age-dependent arterial stiffness via reduced expression of MMP-2 and improves diastolic function in old age by decreasing cardiac fibrosis. This study demonstrates beneficial physiological effects of ALA and outlines this plant-derived n-3 fatty acid as a cost-efficient and safe measure for primary prevention of debilitating cardiovascular diseases, such as stroke and HFpEF.



[Figure 1]

Disclosure: Nothing to disclose

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Distinct dietary α-linolenic acid-dependent shifts in the fecal microbiome composition suppresses aging-associated inflammatory responses and thrombus formation

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Introduction: Aging is associated with compositional alterations in the fecal microbiome. The microbiota-derived trimethylamine-N-oxide (TMAO) correlates with arterial thrombotic events, e.g. myocardial infarction and stroke, the leading causes of mortality worldwide. Furthermore, n-3 FA α-linolenic acid (ALA) has been shown to be protective against thrombosis and the associated pathologies. Therefore, we hypothesized that long-term dietary ALA supplementation protects against the aging-associated microbiome dysbiosis, and reduces inflammatory and thrombotic responses.

Methods: 24 week-old male C57BL/6 mice were fed either a high ALA (7.3g%) or low ALA (0.03g%) diet for 12 months. We examined the compositional changes of fecal microbiota of the animals treated with high vs. low ALA via 16S rRNA gene sequencing. The plasma levels of TMAO and its precursors choline and betaine, and LPS were measured by ELISA method. Additionally, the platelet aggregation in response to stimulation by thrombin, along with, thrombus formation on collagen under high-shear flow conditions (to mimic blood flow in stenosed arteries) was investigated, respectively.

Results: Genomic analysis showed that the abundance of phylum Proteobacteria and family desulfovibrio were reduced in the aged high ALA-treated mice ($P < 0.01$ and $P < 0.001$, respectively). However, microbial diversity of Bacteroidetes or Fermicutes and Bacteroidetes/Fermicutes ratio did not demonstrate a significant change between high vs. low ALA groups. Interestingly, the dietary intake of high ALA increased the abundance of Lachnospiraceae ($P < 0.01$) that may exert anti-inflammatory effects. Moreover, high ALA decreased the plasma levels of TMAO and its precursor choline, but not betaine. The pro-inflammatory cytokine TNF-α showed a significant reduction ($P < 0.01$), whereas plasma IL-1β did not change significantly following high ALA supplementation. An increase in the thrombus formation on collagen under high-shear flow ($P < 0.01$) and thrombin-induced platelet aggregation ($P < 0.05$) were found in the aged mice.

Conclusion: These studies demonstrate that an ALA-rich diet makes positive compositional alterations in the aging-associated fecal microbiome dysbiosis that leads to the suppression of inflammatory and thrombotic responses. Hence, long-term dietary ALA supplementation may be exploited as a nutritional antithrombotic strategy during aging.

Keywords: Microbiome; α-linolenic acid; Inflammation; Thrombosis

Disclosure: Nothing to disclose

ELECTROPHYSIOLOGY / PACEMAKERS / ARRHYTHMIA

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Increased failure rates of Microport/Sorin Beflex and Vega pacemaker leads compared to Medtronic CapSureFix Novus 5076 leads

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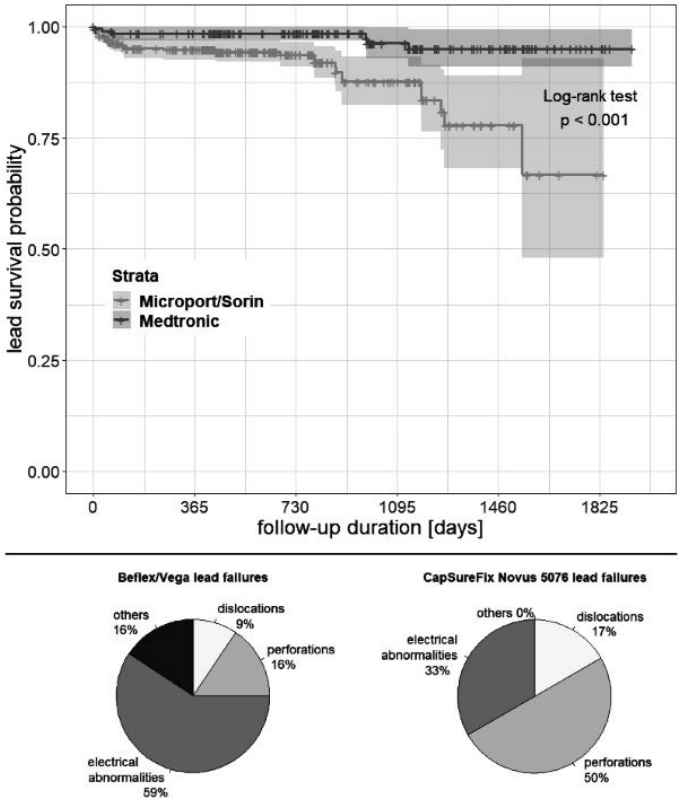
Introduction: Pacing leads constitute the Achilles heel of conventional pacemakers, as failures are relatively common. Post-market surveillance by the manufacturers may overestimate lead performance due to underreporting of certain failure mechanisms. For most pacemaker leads, a 3-year survival rate of >99% has been reported. However, true lead performance may be lower. The aim of this study was to compare the Microport (formerly Sorin/Livanova) Beflex and Vega pacemaker leads to the Medtronic CapSureFix Novus 5076 lead to analyse their real-life performance.

Methods: We analysed the performance of the Microport/Sorin and Medtronic leads implanted at our centre between January 2014 and January 2018. All interventions were performed by electrophysiologists. Only de-novo right atrial and right ventricular lead implantations were included. Lead failures were identified during outpatient follow-up visits and pacemaker interrogation. Failures were defined as any lead issues requiring re-intervention (e.g. lead dislocations, cardiac perforations, electrical abnormalities such as lead noise or high pacing thresholds).



[Kaplan-Meier survival estimates of the two pacemaker leads.]

Results: A total of 382 Microport/Sorin and 203 Medtronic leads were included for the performance analysis (371 RV and 214 RA leads). The mean age of the observed patient cohort was 74.9±13.0 years and 36% of the patients were females. Median follow-up was 20.4 months (interquartile range 13.8-33.3 months). In the Kaplan-Meier analysis, the overall failure rate of the Microport/Sorin lead was worse compared to the Medtronic lead (p <0.001, reasons for lead failures and Kaplan-Meier survival estimates with point-wise 95%-confidence intervals are shown in the figure). Cumulative failure rates after 1, 2 and 3 years were 5.2% vs. 1.5%, 6.3% vs. 1.5% and 12.4% vs. 3.7% (Microport/Sorin vs. Medtronic).

Conclusion: The observed performance of the Microport/Sorin Beflex and Vega pacemaker lead does not reflect the performance reported by the manufacturer at our centre. Moreover, it is significantly worse than the one from a competitor.

Disclosure: Nothing to disclose

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Comparison of the long-term performance of the quadripolar IS-4 and the bipolar IS-1 left ventricular lead for cardiac resynchronization therapy

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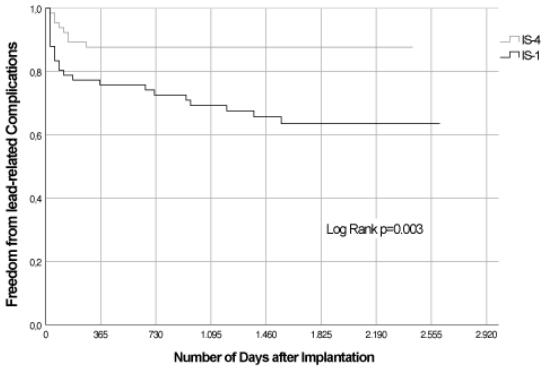
Introduction: The implantation of left ventricular (LV) leads for cardiac resynchronization therapy (CRT) and the management of lead-related complications can be challenging. The introduction of the quadripolar IS-4 LV lead may have facilitated the implantation procedure and may have reduced lead-related complications. Data of long-term follow-up (FU) comparing the IS-4 lead with the IS-1 LV lead are rare and conflicting.

Methods: Adults with an indication for a CRT-Defibrillator or CRT-Pacemaker, a successful endovascular IS-4 or IS-1 LV lead implantation, and a minimal FU of three years were included in this retrospective study. The combined primary endpoint was freedom from lead-related complications defined as (i) occurrence of persisting high pacing threshold (>2.75V/0.4ms), (ii) unresolved phrenic nerve stimulation, (iii) LV lead dislodgement/disruption, (iv) the necessity of re-interventions affecting the LV lead, and (v) LV lead deactivation/explantation. Secondary endpoints were all singular complications and all-cause mortality.

Results: Eligible for the study were 133 patients (IS-4 n = 66; IS-1 n = 67) with a mean FU of 4.03±1.93 years. Baseline characteristics of both patient groups did not differ significantly. Freedom from lead-related complications was higher in patients with an IS-4 lead as compared to an IS-1 lead (Figure 1; 87.9% vs. 65.7%; p = 0.002). The secondary outcomes showed a higher rate of LV lead dislodgement/disruption (4.5% vs. 17.9%; p = 0.015) in the IS-1 patient group and more patients suffered from unresolved phrenic nerve stimulation with an IS-1 lead (3.0% vs. 13.4%; p = 0.029). LV lead deactivation/explantation during FU and LV lead-related re-interventions were fewer in case of an IS-4 lead (4.5% vs 22.4%; p = 0.003; 6.1% vs. 17.9%; p = 0.036, respectively). The rate of persisting high pacing thresholds and all-cause mortality did not differ (4.5% vs. 9.0%; p = 0.492; 22.7% vs. 25.4%; p = 0.721, respectively).

Figure 1: Kaplan Meier Analysis of Primary Endpoint



Kaplan Meier survival curves in the quadripolar IS-4 lead group (IS-4) and the bipolar IS-1 lead group (IS-1). The x-axis shows days of follow-up and the y-axis shows freedom from lead-related complications (cumulative survival). IS-1 = bipolar IS-1 patient group; IS-4 = quadripolar IS-4 patient group.

Conclusions: The quadripolar IS-4 LV lead showed in this retrospective study a better long-term performance than the bipolar IS-1 lead.

Disclosure: Nothing to disclose

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Effects of cardiac resynchronisation therapy in patients with left bundle branch block and residual conduction

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Aim: To evaluate whether left bundle branch block with residual conduction (rLBBB) is associated with worse outcomes after cardiac resynchronisation therapy (CRT).

Methods: All consecutive CRT implants at our institution between 2006 and 2013 were identified from our local device registry. Pre- and post-implant patient specific data were extracted from clinical records.

Results: A total of 690 CRT implants were identified during the study period. Prior to CRT, 52.2% of patients had true left bundle branch block (LBBB), 19.1% a pacing-induced LBBB (pLBBB), 11.2% a rLBBB, 0.8% a right bundle branch block (RBBB), and 16.5% had a nonspecific intraventricular conduction delay (IVCD) electrocardiogram pattern. Mean age at implant was 67.5 years (standard deviation [SD] = 10.6), mean left ventricular ejection fraction (LV EF) was 25.7% (SD = 7.9%), and mean QRS duration was 158.4 ms (SD = 32 ms). After CRT, QRS duration was significantly reduced in the LBBB ($p < 0.001$), pLBBB ($p < 0.001$), rLBBB ($p < 0.001$), RBBB ($p = 0.04$), and IVCD groups ($p = 0.03$). LV EF significantly improved in the LBBB ($p < 0.001$), rLBBB ($p = 0.002$), and pLBBB ($p < 0.001$) groups, but the RBBB and IVCD groups showed no improvement. There was no significant difference in mortality between the LBBB and rLBBB groups. LV EF post-CRT, chronic kidney disease, hyperkalaemia, hypernatremia, and age at implant were significant predictors of mortality.

Conclusion: CRT in patients with rLBBB results in improved LV EF and similar mortality rates to CRT patients with complete LBBB. Predictors of mortality post-CRT include post-CRT LV EF, presence of CKD, hyperkalaemia, hypernatremia, and older age at implant.

Keywords: Cardiac resynchronisation therapy, heart failure, left bundle branch block, left bundle branch block with residual conduction

Disclosure: Nothing to disclose

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Ethanol infusion into the vein of marshall for left atrial tachycardia management: first experience at a Swiss tertiary care center

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Introduction: The ligament of Marshall is an epicardial vestigial fold containing the vein of Marshall (VOM) and the Marshall bundle. It runs epicardially along the mitral isthmus and can bridge endocardial activation. Ablation of the mitral isthmus line is notoriously difficult. Chemical ablation of this region by ethanol infusion into the VOM is an alternative strategy.

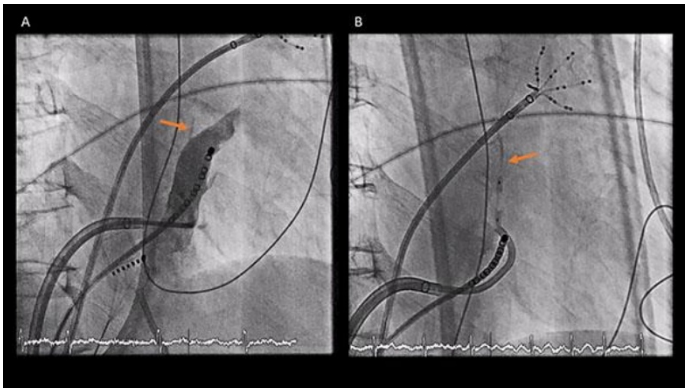
Methods: In June 2019, we started ethanol infusion into the VOM for mitral isthmus line ablation in selected patients. We cannulated the coronary sinus with a steerable sheath and placed a left internal mammary artery catheter into the great cardiac vein to perform an angiography. If a suitable VOM was present, we positioned an angioplasty guide wire with a preloaded angioplasty balloon into the proximal VOM. After proximal balloon occlusion and selective angiography of the VOM, we injected 96% ethanol into the VOM. Both before and after chemical ablation, we generated a 3D left atrial voltage map with a multipolar catheter.

Case #	Gender	Age	Indication	Previous mitral isthmus ablation	Ethanol infusion into VOM	Mitral isthmus block during infusion	Additional RF ablation to VOM	Mitral isthmus block	Complications
1	m	65	Perimitral flutter	yes	4 ml	yes	no	yes	none
2	w	63	Persistent AF, mitral isthmus	yes	6 ml	yes	no	yes	Pericardial effusion
3	m	32	Perimitral flutter	yes	6 ml	no	endocardial	yes	none
4	m	52	Perimitral flutter	yes	9 ml	yes	no	yes	VOM dissection
5	m	55	Persistent AF, mitral isthmus	no	9 ml	no	endocardial	yes	Pericarditis
6	m	53	Perimitral flutter	yes	3 ml	yes	no	yes	none
7	m	71	Perimitral flutter	no	3 ml	yes	no	yes	none
8	m	73	Persistent AF, mitral isthmus	no	5 ml	no	endo- and epicardial	yes	none

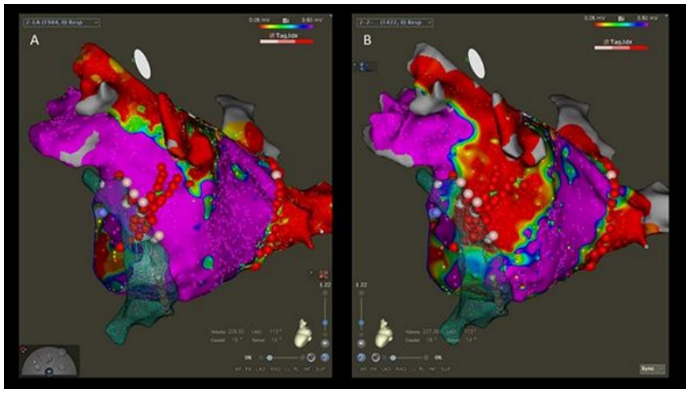
[Summary of all successful VOM cases: AF = atrial fibrillation, RF = radiofrequency, VOM = vein of Marshall]

Results: We attempted VOM ethanol ablation in 10 patients (7 male; median age 59 years). The indication was perimitral flutter in 5 patients, VOM-related tachycardia in one, and mitral isthmus ablation as part of a persistent atrial fibrillation ablation strategy in 4. In 7 patients, radiofrequency ablation of the mitral isthmus line was attempted before VOM ethanol ablation and was not successful. A VOM was present in all patients. VOM dissection occurred in two patients (20%) during cannulation, precluding ethanol infusion in one (small VOM). In another patient with a small VOM we did not attempt ethanol ablation. In the remaining 8 patients (80%), a mean of 5.6±2.4 ml of ethanol was infused into the VOM. Chemical ablation terminated perimitral flutter in 3 of 5 patients (60%) and blocked the mitral isthmus line in 5 of 8 patients (63%). Additional, limited radiofrequency ablation after VOM ethanol ablation, targeting the valvular side of the mitral isthmus line in the remaining 3 patients resulted in mitral isthmus block in all 8 patients. Post procedurally, we observed a small pericardial effusion in two patients, mild pericarditis in one and groin hematoma in one. Figure 2 shows an examplary voltage map before and after chemical ablation of the VOM.

Conclusion: Chemical ablation of the VOM is feasible. With additional radiofrequency ablation, acute mitral isthmus block is achieved in the majority of patients. Long-term success of this approach will need to be assessed.



[Angiography (RAO 30°) within the great cardiac vein (A) and selective angiography (B) after proximal balloon occlusion to visualize the VOM (arrow)]



[Voltage map of left atrium (CARTO Biosense Webster, left posterior-caudal view) before (A) and after (B) ethanol infusion into VOM]

Disclosure: A. Haeberlin is co-founder and CEO of Act-Inno AG, consultant of Cairdac and has received travel/educational grants from Medtronic and Spectranetics/Philips. J. Seiler´s spouse is an employee of Boston Scientific. F. Noti has received travel grant from Abbott, Medtronic, Boston Scientific and Spectranetics. H. Tanner has received travel grant from Abbott and educational grant from Biosense Webster. T. Reichlin has received speaker/consulting honoraria or travel support from Abbott/SJM, Astra Zeneca, Brahms, Bayer, Biosense-Webster, Medtronic, Pfizer-BMS and Roche and he has received support for his institution's fellowship program from Biosense-Webster, Biotronik, Medtronic, Abbott/SJM and Boston Scientific. L. Roten has received speaker honoraria from Abbott and Medtronic. The other authors have nothing to disclose.

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Age and sex specific prevalence of overt and silent atrial fibrillation, primary results from the prospective STARFIB cohort study

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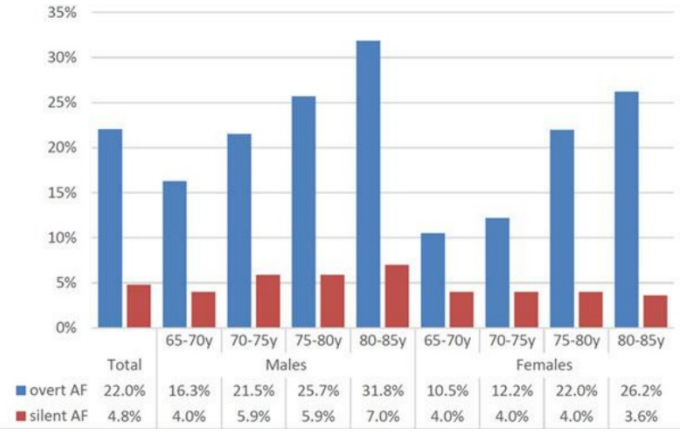
Introduction: Patients with atrial fibrillation aged >65 years should receive anticoagulation to prevent acute ischemic stroke. However, many patients may not benefit from such stroke prevention because atrial fibrillation is silent.

Methods: The STARFIB study was a hospital-based, prospective cohort study. Consecutive patients aged 65-85 years admitted to the inpatient service were included into the study. A complete chart review was performed to identify patients with an established diagnosis of atrial fibrillation (herein after referred to as overt atrial fibrillation). Patients without overt atrial fibrillation were invited to undergo three 7-day continuous Holter ECGs separated by 2 month intervals to screen for silent atrial fibrillation. It was prespecified to include 100 patients for each sex and each of the following age groups: 65-70; 70-75; 75-80; and 80-85 years.

Results: Between January 2015 and February 2019, a total of 11'470 consecutive patients were admitted. Atrial fibrillation was already known in 2'529 patients, corresponding to a prevalence of overt atrial fibrillation of 22.0% (95% confidence interval [CI] 21.3% to 22.8%). The prevalence of overt atrial fibrillation was significantly higher in men (25.1%; 95% CI 24.0% to 26.2%) than in women (19.2%; 95% CI 18.2% to 20.2%; p <0.001) and increased significantly with age in both sexes (p <0.001 for both; Figure). Of 8'944 patients without overt atrial fibrillation, 795 patients (9% of the population without overt atrial fibrillation) underwent screening for silent atrial fibrillation, evenly distributed for sex and age groups. The median cumulative Holter ECG time per patient was 500 hours (IQR 375; 504). Overall, we found 38 cases of silent atrial fibrillation, corresponding to a prevalence of 4.8% (95% CI 3.5% to 6.5%). The prevalence of silent atrial fibrillation was higher in men than in women (5.7% [95% CI 3.8% to 8.4%] vs. 3.8% [95% CI 2.3% to 6.2%]) and appeared to increase with age in men, but not in women (Figure). Of the 38 cases with silent atrial fibrillation, 15 (39.5%) were found during the first 7-day Holter ECG, 5 (13.2%) during the second, 9 (23.7 %) during the third, and 9 (23.7%) through means other than a Holter ECG.

Conclusions: In a large hospital-based patient population, we found a prevalence of overt and of silent atrial fibrillation of 22% and 5%, respectively. The prevalence of both overt and silent atrial fibrillation was higher in men compared to women.



[Prevalence of overt and silent atrial fibrillation]

Disclosure: Tobias Reichlin has received research grants from the Goldschmidt-Jacobson Foundation, the Swiss National Science Foundation, the Swiss Heart Foundation, the European Union, the Professor Max Cloëtta Foundation, the Cardiovascular Research Foundation Basel, the University of Basel and the University Hospital Basel. He has received speaker/consulting honoraria or travel support from Abbott/SJM, Astra Zeneca, Brahms, Bayer, Biosense-Webster, Medtronic, Pfizer-BMS and Roche. He has received support for his institution's fellowship program (Inselspital Bern) from Biosense-Webster, Biotronik, Medtronic, Abbott/SJM and Boston Scientific. Laurent Roten has received speaker/consulting honoraria from Abbott and speaker/consulting honoraria and a research grant from Medtronic. Hildegard Tanner has received a travel grant from Abbott.

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Feasibility, safety and efficacy of tailoring ablation index to left atrial wall thickness (LAWT) during atrial fibrillation ablation. The "Ablate By-LAW" study

C. Teres, D. Soto-Iglesias, B. Jauregui, D. Penela, A. Ordóñez, A. Berruezo

Heart Institute, Teknon Medical Center, Barcelona, Spain

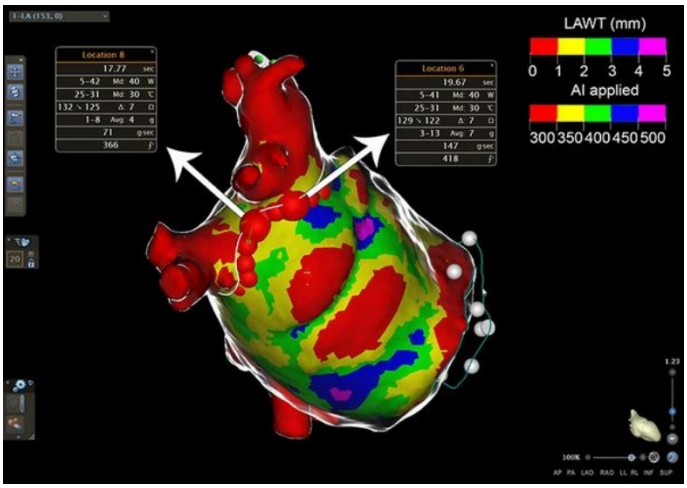
Background: Radiofrequency (RF) ablation of paroxysmal atrial fibrillation targeting specific criteria for ablation index (AI) results in durable PV isolation. Left atrial wall thickness (AWT) is a known determinant of lesion depth. Ablation parameters have never been adapted to AWT. We aimed to determine if adapting AI to AWT is feasible, effective and safe.

Methods: 86 patients referred for paroxysmal AF ablation. AWT maps were derived from the multidetector computed tomography as the local distance between the LA endo and epicardium. The WT map was fused with the LA anatomy using CARTO-merge. AWT was categorized into 1mm-layers and AI was titrated to the AWT as follows: Thickness <1 mm: 300; 1-2 mm: 350; 2-3 mm: 400; 3-4 mm: 450; >4 mm: 500. Max inter-lesion distance was set at 6 mm. AI settings were: catheter stability: min time 3 s, max range 4 mm; force over time: 25%, min force 3 g; lesion tag size: 3 mm. The circumferential ablation line was designed in a personalized fashion to avoid thicker regions.

Results: 86 patients [56 (54.9%) male, age 60 ± 11 years] with mean LVEF 60±5 %; Mean LA diameter 38 ± 5 mm; Mean AWT 1.36 ± 0.63 mm; Mean AI 352 ± 36 on the RPVs and 356 ± 36 on the LPVs; Overall RF time was 15 ± 3 min; Procedure time was 60 min (IQR 51-69). Fluoroscopy time was 57 s (IQR 34-93). First pass isolation was obtained in 82 (95.3%) of the RPVs and 80 (93%) of the LPVs.

Conclusion: The present study, assessing a personalized protocol that adapts AI to AWT during AF ablation, improves procedure efficiency by

minimizing ablation and procedure time with a high rate of first pass isolation, as compared to previous PV ablation protocols. Further studies are needed to evaluate the long-term results of this approach.



[Atrial wall thickness map with Visitag depicting AI adapted to LAWT]

Disclosure: Nothing to disclose

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Left atrial wall thickness evaluation during atrial fibrillation ReDo procedures

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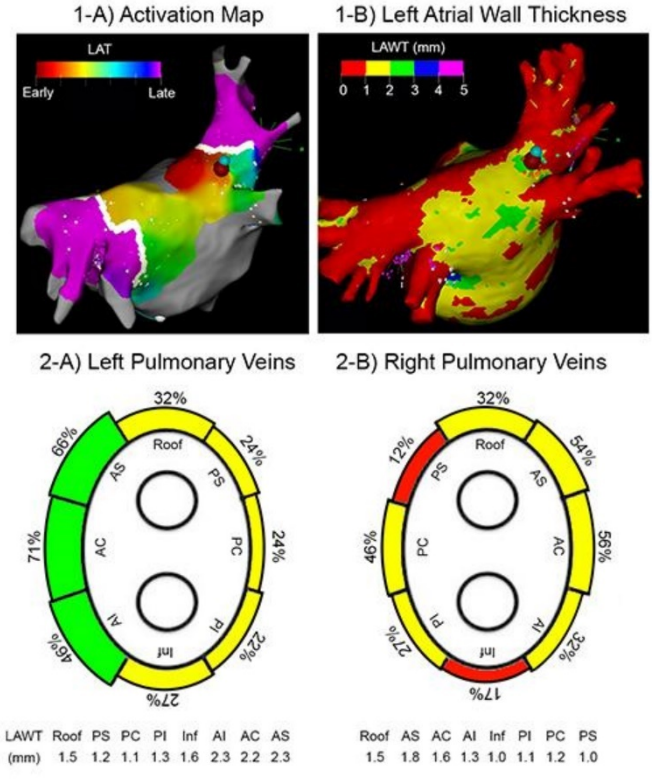
Background: Pulmonary vein (PV) reconnections due to gaps on ablation lines are responsible for atrial fibrillation (AF) recurrences. We analyzed the left atrial wall thickness (LAWT) of PV line gaps at AF redo ablation.



[LAWT and Local Activation Maps showing the reconnection point. Mean PV segment thickness and reconnection percentages.]

Methods: 41 consecutive patients referred for AF redo procedure were included. LAWT maps were computed from the multidetector computed tomography (MDCT) as the local distance between the LA endo and epicardium. Each PV line was subdivided into 8 segments and mean LAWT was computed. During the procedure, the local gap was defined as the earliest activation site at the reconnected segment of the circumferential PV line (Figure 1A & 1B).

Results: 41 patients [31 (75.6%) male, age 60±10 y]; Mean LAWT was 1.36 ± 0.20 mm. Mean PV line WT was higher in left PVs than in the right PVs 1.68 ± 0.57 vs. 1.31 ± 0.39 mm p <0.001. Mean WT of the reconnected points was 44% higher than the mean WT of the segment where the reconnection was located. Mean reconnection point WT was at the 87th percentile of the circumferential line in the LPVs and at the 76th percentile in the RPVs. The reconnected point WT was higher in the LPVs than RPVs 2.13 ± 1.14 vs. 1.47 ± 0.48 mm p <0.001. The most frequent location for reconnections was the left anterior carina (71%), with a mean WT of 2.24 ± 0.91mm; and the right anterior carina (56%) with a mean WT of 1.57 ± 0.62mm (Figure 2A & 2B).

Conclusion: Reconnection points were more frequently present in the thicker segments of the PV line. The most frequently reconnected segments were the left and right anterior carinas. Atrial wall thickness maps derived from MDCT are useful to guide AF redo procedures.

Disclosure: Nothing to disclose

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Tailored loW voltagE zonEs ablaTion using contact force sensing technology in patients with persistent atrial fibrillation (TWEET-AF): a pilot study

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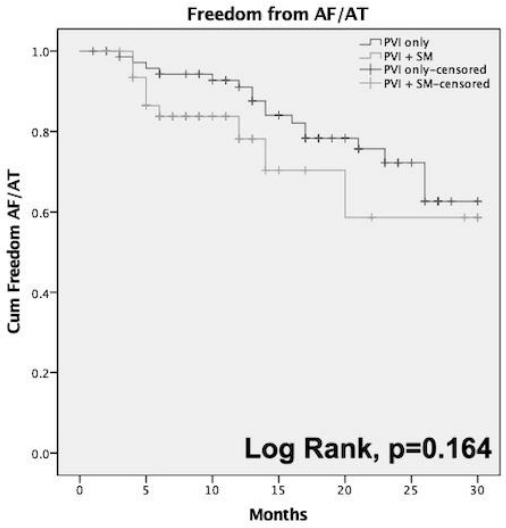
Introduction: Although pulmonary vein (PV) isolation (PVI) is very effective in paroxysmal atrial fibrillation (AF), in patients (pts) with persistent AF, PVI often is not sufficient. Many studies suggested that low voltage zones (LVZs) outside of the PV might be involved in the complex mechanisms perpetuating AF. However ablation strategies involving substrate modification (SM) did not show additional benefits in persistent AF pts. Those studies were performed before the introduction of contact force technology, and the most likely explanation for these results could be the inability to achieve effective transmural lesions and continuous linear ablation. We hypothesized that the use of contact force technology would improve ablation efficacy. Therefore, we analyzed the long-term outcome after two different ablation strategies in pts with persistent AF depending on whether there was evidence of LVZs in the left atrium or not.

Methods: The presence of LVZs were defined as sites of >3 adjacent low-voltage points <0.5 mV during electrophysiology study. Depending on the location of the LVZ, mainly linear ablation was performed. Catheter ablation was performed using TactiCath™ or SmartTouch™ ablation catheters aiming at contact values ≥10g <20g and FTI >400g/s. Ablation was performed in a temperature-controlled fashion with energy of 30W except at the posterior wall (20-25W).

Results: 121 consecutive pts with persistent AF (46 female, median age 66 [59-72] years, mean duration of AF 16 [7-73] months, CT derived LA volume index 66 [56-75]ml/m^2) were included: pts without LVZs underwent PVI alone (n = 74), in pts with LVZs, PVI + SM (n = 47) was performed (mitral Isthmus line in 2, supero-septal line in 39, and roof line in 47; bidirectional block was achieved in 100%, 97%, and 100%, respectively). After a median follow-up of 13 [6-21] months, 86% of pts without and 78% with substrate were in sinus rhythm, mainly without antiarrhythmic drugs (89% PVI only, 84% PVI + SM) (Figure).

Conclusions: In patients with persistent AF without LVA, PVI alone leads to excellent 2-year freedom from AF. In pts with LVZs, additional substrate modification with CF sensing technology is associated with improved success rates compared to previous studies.



[Figure]

Disclosure: J.C. Geller is a consultant for Abbott/St. Jude Medical, Medtronic, Biotronik, Biosense Webster, Boston Scientific, Boehringer Ingelheim, Daiichi Sankyo, Pfizer, and has received speaker fees from AstraZeneca, Bayer, Boehringer Ingelheim, Daiichi Sankyo, Pfizer, Sanofi Aventis, Biotronik, Boston Scientific, Medtronic, and Abbott/St. Jude Medical. M. Frommhold has received speaker fees from Bayer and Daiichi Sankyo. S. Raffa is a consultant for Medtronic, Abbott/St. Jude Medical and has received speaker fees from Abbott/St. Jude Medical and Daiichi Sankyo. Other authors: No disclosures.

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Efficiency of the RADPAD® No Brainer® surgical cap in reducing head and brain exposure during pacemaker and defibrillator implantation

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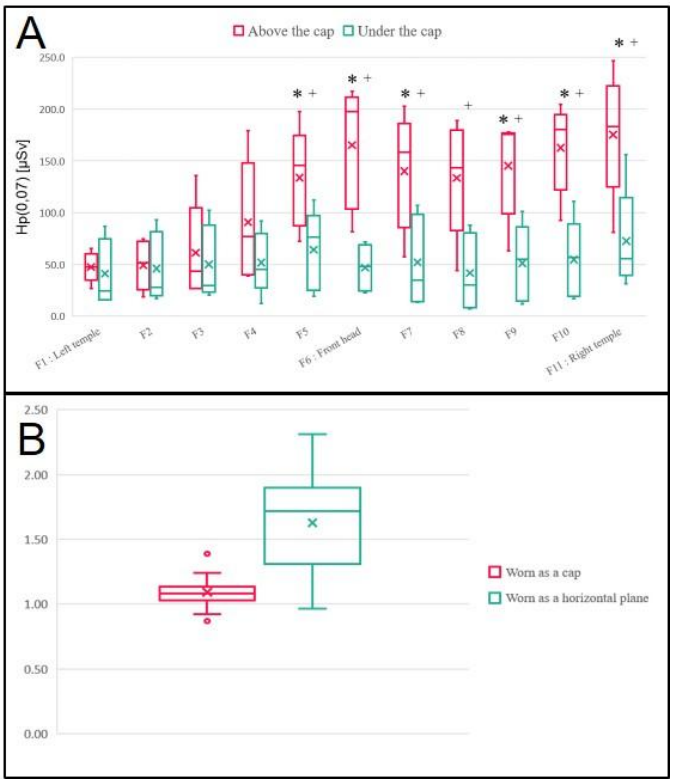
Introduction: The RADPAD® No Brainer® cap is marketed as a protective gear that significantly reduces operator's brain exposure to scattered radiation. The efficiency of the RADPAD® No Brainer® in reducing brain exposure in clinical practice remains, however, unknown to date. Our study investigates the RADPAD® No Brainer® efficiency in reducing brain radiation exposure.

Methods: Five electrophysiologists performing device implantations over a 2-month period wore the RADPAD® cap with two strips of 11 thermo-luminescent dosimeters pellets covering the front head both above and under the shielded cap. Phantom measurements were performed to further investigate brain dose distribution.

Results: Our study showed that the right half of the front head's operator was the most exposed region during left subpectoral device implantation (panel A, red box plots). The RADPAD® cap attenuated the skin front head exposure by a factor of 2.6 [2 ; 6.6] (panel A, green box plots). However, phantom measurements showed that the RADPAD® cap did not provide any protection to the brain compared to control conditions (attenuation factor 1.1 [1.0 ; 1.1], panel B, red box plot). The RADPAD® cap worn as a horizontal protruding plane below the chin, however, reduced brain exposure by a factor of 1.7 [1.3; 1.9] (panel B, green box plots).

Conclusion: During device implantation, the RADPAD® No Brainer® decreased skin front head exposure but had no impact on brain dose distribution. The RADPAD® No Brainer® worn as a horizontal plane below the chin reduced brain exposure. This finding confirms that the brain exposure comes from upwards patient's scattered radiation.



[Figure]

Disclosure: Nothing to disclose

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Association of omega-3 fatty acids with type of heart rhythm in patients with atrial fibrillation

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Background: Atrial fibrillation (AF) increases the risk of ischemic stroke, particularly in patients with persistent or permanent AF. In experimental studies, Omega-3 fatty acids (n-3 FAs) were shown to have anti-arrhythmic properties, influencing heart rate, heart rate variability and cardiac remodelling. Its effects on AF however remain unclear, with epidemiological and clinical studies showing mixed results.

In this study, we examined the association of the n-3 FAs eicosapentaenoic acid (EPA), docosapentaenoic acid (DPA), docosahexaenoic acid (DHA) and alpha-linolenic acid (ALA) with rhythm type (paroxysmal vs. persistent / permanent AF) and resting heart rate in patients with AF.

Methods: In this cross-sectional sub-study of the Swiss atrial fibrillation (Swiss-AF) cohort study, we determined whole blood n-3 FAs by gas chromatography according to the HS-Omega-3 Index methodology in 2369 patients with AF. Total and individual n-3 FAs were correlated with type of AF as binary outcome (persistent/permanent vs. paroxysmal AF) and heart rate. Analyses were corrected for sex, age, BMI, smoking, alcohol intake, family history of AF, physical activity, hypertension, diabetes, chronic kidney disease, coronary artery disease, deep vein thrombosis, thyroid disease, obstructive sleep apnoea syndrome, beta blocker and antiarrhythmic drugs.

Results: 1060 (44.7%) patients with paroxysmal, 720 (30.4%) patients with persistent and 589 (24.9%) patients with permanent AF were identified. After adjustment, no statistically significant associations were found, however a pattern of lower risk for persistent/permanent AF with higher levels of EPA (odds ratio [OR] 0.85, 95% confidence interval [CI] 0.60 - 1.20) and a pattern of higher risk for persistent/permanent AF with higher DPA (OR 1.24, 95% CI 0.90 - 1.73) was detected. No association was found with DHA (OR 0.97, 95% CI 0.86 - 1.09), ALA (OR 0.94, 95% CI 0.44 - 2.01) and total n-3 FAs (OR 0.97, 95% CI 0.90 - 1.05) (Figure 2). A lower HR was associated with higher total n-3 FAs (OR 0.99, 95% CI 0.98 - 1.00) and DHA (OR 0.99, 95% CI 0.97 - 1.00) but not with EPA, DPA or ALA.

Conclusions: Higher levels of n-3 FAs were not associated with the prevalence of permanent or persistent AF but with a lower heart rate in patients with AF largely treated with beta-blockers and antiarrhythmic drugs.

Disclosure: Nothing to disclose

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Tracking the efficiency of ablation in persistent atrial fibrillation using intracardiac dominant frequency and left-to-right atrial gradient

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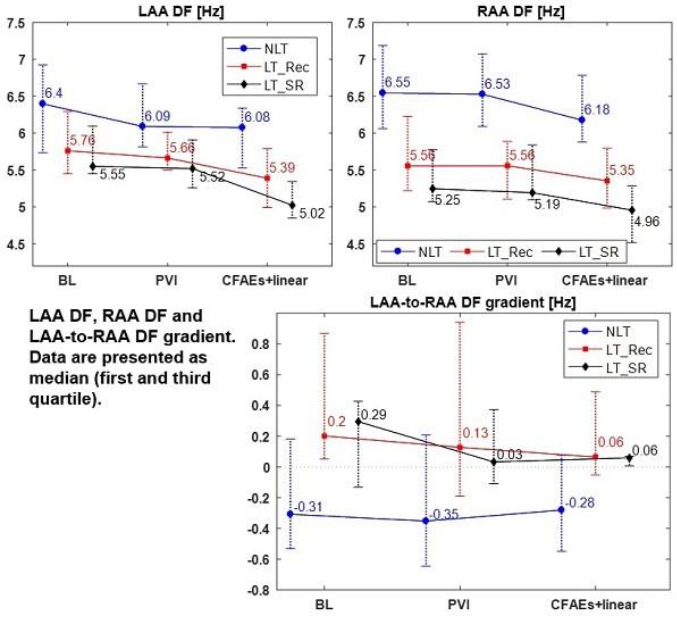
Introduction: We previously reported that patients (pts) with persistent atrial fibrillation (peAF) unresponsive to catheter ablation (CA) exhibit high bi-atrial intracardiac dominant frequencies (DF) and negative left-to-right DF gradient at baseline (BL). In this study, we hypothesized that bi-atrial DFs and left-to-right DF gradient can track the efficiency of CA en route to peAF termination.

Methods: In 40 consecutive pts (61±8 y, sustained AF 19±11 m), pulmonary vein isolation (PVI) and left atrium (LA) ablation were performed until peAF termination. Synchronous recordings were made from catheters positioned into the left atrial (LAA) and the right atrial appendage (RAA) at BL, during PVI, and during CFAEs and linear ablation. DF was defined as the highest peak within the power spectrum.



LAA DF, RAA DF and LAA-to-RAA DF gradient. Data are presented as median (first and third quartile).

[LAA DF, RAA DF and LAA-to-RAA DF gradient]

Results: peAF was terminated within the LA in 70% (28/40, LT) of the pts, while 30% (12/40, NLT) were not. Over a mean follow-up of 34±14 months, all NLT pts had a recurrence, while LT pts presented a recurrence in 71% (20/28, LT_Rec) and remained in sinus rhythm (SR) in 29% (8/28, LT_SR). The figure shows that: (a) all three groups displayed a gradual bi-atrial organization during CA as shown by decreasing DF values, but the LT_SR pts exhibited the highest relative changes in DF from BL ($p < 0.05$, $\Delta LAA = -11\%$); (b) the LAA-to-RAA DF gradient already disappeared after PVI in LT_SR pts, while LT_Rec pts displayed a more gradual decline and NLT pts no significant change.

Conclusion: Extensive LA ablation in peAF decreases both bi-atrial DFs and left-to-right DF gradient. The strong reduction of the LAA-to-RAA DF gradient after PVI in LT_SR pts is suggestive of a significant contribution of the PVs in driving peAF.

Disclosure: Nothing to disclose

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Causes of recurrences after stereotactic radio-ablation for refractory ventricular tachycardia

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Introduction: Stereotactic radio-ablation (STAR) has been recently introduced for the management of ventricular tachycardia (VT) refractory to antiarrhythmic drugs (AADs) and catheter ablation (CA). VT recurrences were reported after STAR but the mechanisms remain unknown. We report causes of recurrence after STAR for refractory VT.

Methods: From 09.2017 to 01.2020, 12 patients (pts) (66±8y, LVEF 44±14%) suffering from refractory VT were enrolled. The underlying cardiopathy was ischemic in 3, inflammatory in 3 and idiopathic in 6 pts. Before STAR, an invasive electro-anatomical mapping (Carto3) of the VT substrate (VT-sub) was performed. A mean dose of 22±2Gy was delivered to the VT-sub using the Cyberknife® system.

Results: The ablation volume was 24±7cc and involved the interventricular septum (IVS) in 10, the infero-basal left ventricle (LV) in 2, the LV apex in 1 and the antero-basal LV in 4 pts. After a median follow-up of 9±7 months, VT burden decreased by 78% (mean value, from 89 to 20 VT/semester). Out of the 12 pts, 9 (75%) presented some form of VT recurrence (table): 1) that spontaneously resolved in 2 pts; 2) remote from the VT-sub in 2 cases; 3) managed with AADs that had failed before STAR in 2 cases; 4) within the treated VT-sub in 3 cases. In the latter 3 cases, one recurrence came from the antero-basal LV adjacent to the circumflex artery (mean dose 14 Gy), and two were located within the treated IVS (one displaying marked fibrosis, and one with sarcoidosis (mean dose 20 and 21 Gy respectively)). Only 4/12 (33%) pts required additional CA.

Case	STAR Localizazion	Sustained VT reucrrence	Recurrence localization	Time to VT recurrence	Treatment of VT recurrence	Dosimetry at site of recurrence (Gy)
1 10 11	IVS,IVS and RVOT, IVS and antero-basal LV	No	None	NA	NA	NA
3 5	IVS and infero-basal, LV LV apex	Yes	ICD recordings only	12 months,4 months	No Treatment. Spontaneous resolution	NA
6 7 12	IVS, IVS and antero-basal LV, IVS and antero-basal LV	Yes	ICD recording only, ICD recording only, Infero-basal IVS	13 months, 6 months, 1 week	Amiodarone. No recurrence since	NA, NA, 19.5 (9.3-23.4)
2 4 8 9	IVS, IVS and antero-basal LV, antero-basal LV, IVS and infero-basal LV	Yes	Antero-basal LV, Infero-basal LV, adjacent circumflex artery, postero-lateral basal LV	4 months, 7 months, 7 months, 6 months	CA procedure. No recurrence since	8.2 (3.6-15.2), 21.7 (17.8-23.3), 14.4 (9.9-20.2), 3.4 (1.2-17.6)

Conclusion: STAR appears to be an efficient tool for the management of refractory VT, leading to a strong VT burden reduction. Recurrences may still occur at sites remote from the irradiated volume, within the IVS or in under-dosed sites adjacent to critical structures.

Disclosure: Travel expenses by Biosense Webster

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Is an approach of downgrading selected patients from CRT-D to CRT-P safe? Results with a mean follow-up of 3 years

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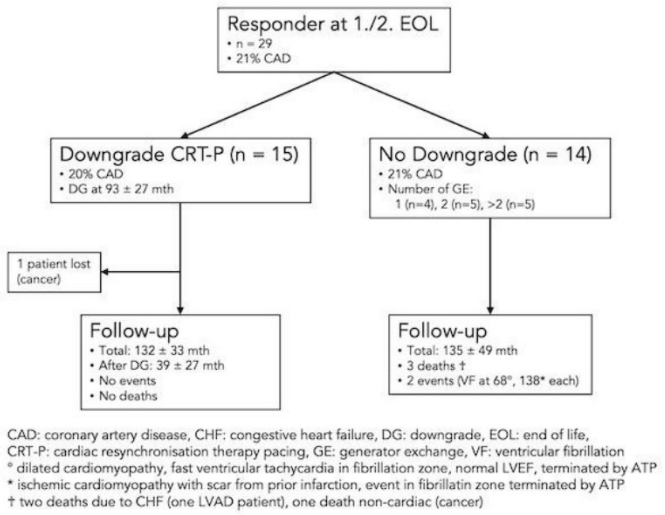
Introduction: In some patients with primary prevention, CRT can lead to "super-response" (i.e. improved left ventricular ejection fraction (LVEF) ≥ 50%). At the time of battery depletion, the question might come up whether downgrading from a CRT-D to a CRT pacemaker should be offered to such patients. Advantages include extended device longevity, lower costs and no risk of inappropriate shocks. Its obvious disadvantage might be the risk of occurrence of malignant arrhythmias despite normal LVEF. Few data exist on the outcome of patients in whom a downgrading was performed.

Methods: From our prospective ICD-cohort, we followed CRT-D patients who experienced super-response at the time of generator exchange (GE) and were candidates for a downgrade. Only patients with primary prevention and no arrhythmias beyond 18 months after implantation were considered (arrhythmias occurring within the first 18 months were considered as non-relevant as they occurred during cardiac remodelling). Vital status, mode of eventual death, hospitalisation for sustained ventricular tachycardia (VT) and relevant arrhythmias from device interrogation were determined in January 2020.



[Figure 1: Flowchart of responders]

	All patients	Responder with downgrade	Responder without downgrade
	n = 311	n = 15	n = 14
Male gender	260 (84%)	6 (40%)	9 (64%)
Age at implant [years]	66 +/- 10	68 +/- 9	56 +/- 13
LVEF at baseline [%]	26 +/- 7	25 +/- 5	22 +/- 6
LVEF before downgrade [%]	N/A	56 +/- 5	50 +/- 0
Non-ischemic cardiomyopathy	157 (50%)	12 (80%)	11 (79%)
Hypertension	201(65%)	8 (53%)	6 (43%)
Diabetes	85 (27%)	4 (27%)	2 (14%)
Chronic kidney disease (MDRD <60ml/min)	144 (46%)	7 (47%)	6 (43%)

[Table 1: Baseline characteristics]

Results: Baseline characteristics are presented in table 1. Twenty-nine patients experienced super-response at first or second GE. 52% were male, coronary artery disease (CAD) was present in 21%. 15 patients (52%) were downgraded to CRT-P (see figure 1). No sudden death, arrhythmic events or hospitalisation for VT occurred in the CRT-P group after a total follow-up of 132 ± 33 months, whereas 3 deaths (2 cardiac of which one LVAD, 1 cancer) and 2 events (dilated cardiomyopathy, fast VT, normal LVEF at 68 months; ischemic cardiomyopathy with scar and event in the fibrillation zone at 138 months) occurred in the CRT-D group.

Conclusion: During follow up of mean three years, downgrading selected patients from CRT-D to CRT-P is safe, although further prospective research is needed.

Disclosure: Nothing to disclose

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Pre-procedural burden of ventricular ectopy does not predict the outcome in patients with catheter ablation of idiopathic premature ventricular complexes

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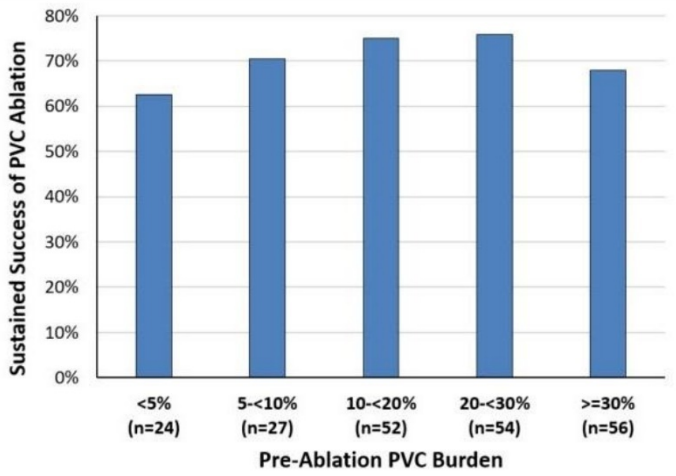
Introduction: Radiofrequency catheter ablation of idiopathic premature ventricular complexes (PVCs) is an effective method for eliminating symptoms and preventing or reversing arrhythmia-induced cardiomyopathy. However, a non-negligible proportion of patients experiences a recurrence after ablation. We aimed to study the predictive potential of pre-procedural PVC burden on 24-hour Holter ECG for sustained ablation success of idiopathic PVCs.

Methods: Patients with no evidence of structural heart disease undergoing catheter ablation of frequent and/or symptomatic PVCs were included in this retrospective observational multicenter study. All ablations were performed using a 3D-electroanatomical mapping system (CARTO 3, Biosense Webster). In all patients, Holter monitoring was performed before and 3-months after the procedure to determine the 24-hour PVC burden. Sustained ablation success was defined as a ≥ 80% reduction of the PVC burden. Patients undergoing ablation of either idiopathic sustained VT or PVCs in the context of PVC-induced VF were excluded because no reliable pre-ablation PVC burden is available in those.



[Rates of sustained PVC ablation success in groups based on pre-ablation PVC burden.]

Results: Overall, 214 patients were included. The median age was 53 years (IQR 41-65) and 46% of the patients were male. The median pre-ablation PVC burden was 20% (IQR 10-30), which was reduced to a post-ablation PVC burden of 0.3% (IQR 0-3.8%) as assessed after a median of 86 days post-ablation. Sustained ablation success was achieved in 71%. Pre-ablation PVC burden did not differ between patients with sustained ablation success and recurrence during follow-up (median 20% vs 20%, p = 0.89). When assessed according to pre-ablation PVC-burden categories of <5%, 5-10%, 10-20%, 20-30% and ≥30%, sustained ablation success was 63%, 70%, 75%, 76% and 68% (p>0.05). No differences in this association between PVCs originating from the right ventricle or the left ventricle were found.

Conclusion: Pre-procedural PVC burden is not predictive for sustained success after catheter ablation of idiopathic PVCs.

Disclosure: Nothing to disclose

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Activation mapping of the left atrial posterior wall - first in human experience using a novel esophageal mapping system

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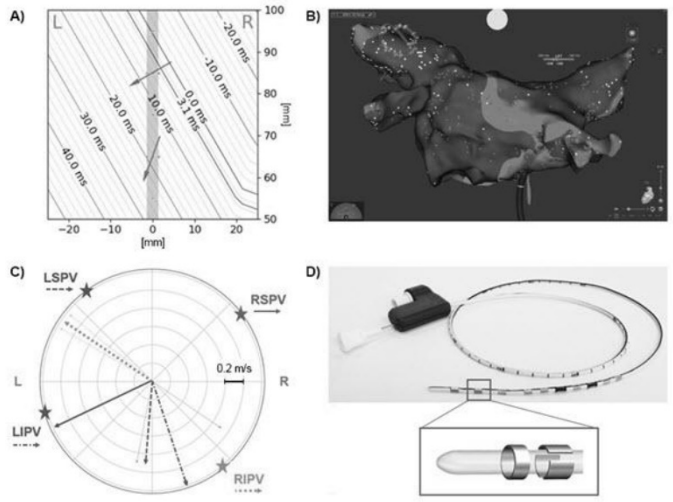
Introduction: Supraventricular arrhythmias are challenging to diagnose in surface electrocardiograms (ECGs). Esophageal ECGs offer a high atrial signal quality and might provide useful information in the diagnostic workup of supraventricular heart rhythm disorders. The aim of the study was to test the feasibility of a novel semi-invasive esophageal mapping system to reconstruct the electrical activation sequence on the left atrial posterior wall (LAPW).

Methods: A total of 46 patients undergoing an electrophysiological study and/or ablation procedure were prospectively enrolled from 12/2017 to 11/2018. Signals resulting from dedicated intracardiac pacing maneuvers were recorded using a newly developed esophageal ECG catheter (Figure 1D) with 3-dimensional electrode arrangement. Subsequently, an inverse model based algorithm was employed to reconstruct the activation sequence on the LAPW.

Results: Recording of esophageal ECGs was possible in all cases without complication. Non-invasive reconstruction of the LAPW activation sequence was successful in 64% of patients. An exemplary activation map from a 65 year old male undergoing pulmonary vein (PV) isolation for atrial fibrillation is shown in Figure 1A. The map represents a posterior-anterior view of the LAPW and depicts the activation sequence of a single beat during sinus rhythm. The gray line in the center symbolizes the esophageal ECG catheter while the arrows indicate the estimated propagation direction. The corresponding intracardiac activation map (CARTO, Biosense Webster, CA) is shown in Figure 1B. In the same patient, pacing from the PV ostia (stars) changed the propagation direction on the LAPW as shown in Figure 1C (median of 8 beats per location). The arrow length is proportional to the estimated conduction velocity (median [interquartile range] of all beats = 0.96 [0.92-1.15] m/s).



[Figure 1]

Conclusion: Semi-invasive reconstruction of the activation sequence on the LAPW from esophageal ECG recordings is feasible. Further studies are required to test the validity and reliability of the results.

Disclosure: Nothing to disclose

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An autoantibody profile detects Brugada syndrome and identifies abnormally expressed myocardial proteins

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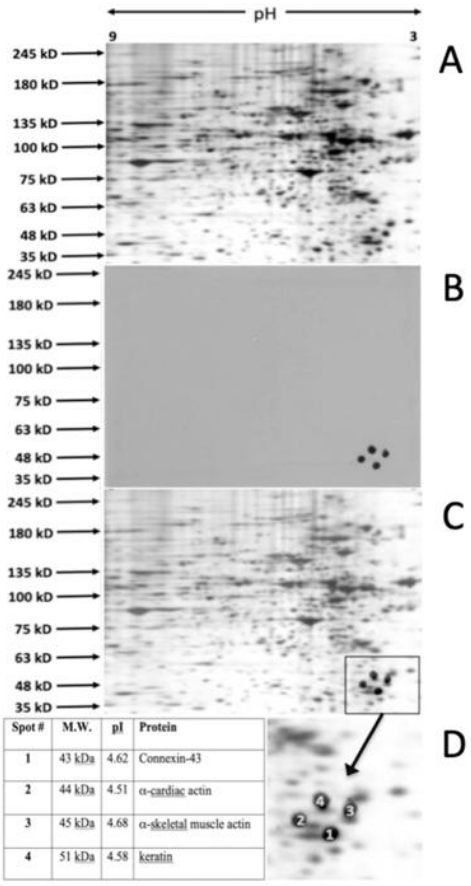
Introduction: Brugada Syndrome (BrS) is characterized by a unique ECG pattern and life-threatening arrhythmias. However, the type 1 Brugada ECG pattern is often transient, and a genetic cause is identified in less than 25%. We sought to identify an accurate blood test for BrS. As inflammation is seen in BrS, we evaluated whether autoantibodies can identify affected individuals.

Methods: For antibody (Ab) discovery, human ventricular myocardial proteins were solubilized and separated by isoelectric focusing and molecular weight on 2-dimensional (2D) gels, and used to discover Abs by plating with sera from patients with BrS and control subjects. Target proteins were identified by mass spectrometry. BrS subjects were defined based on a consensus clinical scoring system. We assessed discovery and validation cohorts by 2D gels, Western blots and ELISA. We performed immunohistochemistry on myocardium from BrS subjects vs. control.



Spot #	M.W.	pI	Protein
1	43 kDa	4.62	Connexin-43
2	44 kDa	4.51	α-cardiac actin
3	45 kDa	4.68	α-skeletal muscle actin
4	51 kDa	4.58	keratin

Figure 1 (**A**) 2D gel of normal myocardial proteins separated by their isoelectric point and molecular weight and identified by silver nitrate staining. (**B**) After exposure to serum from a patient with BrS, washing, and staining with anti-human IgG, human BrS autoantibodies were bound to four specific proteins. (**C**) Overlap of proteins and antibodies. (**D**) Protein spots 1 to 4 were assessed by mass spectrometry, and four protein targets were identified: α-cardiac actin, α-skeletal muscle actin, keratin-24 and connexin-43.

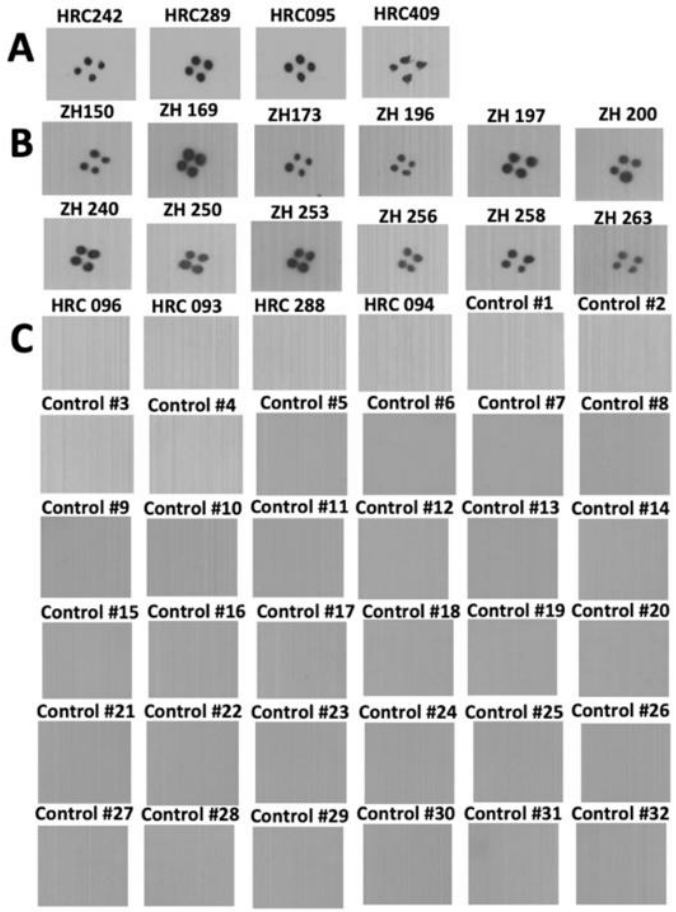


Figure 2 (**A**) 2D blots from the discovery cohort (The Hospital for Sick Children); (**B**) Validation cohort (University hospital Zurich) demonstrates consistent and specific antibodies to four myocardial proteins in BrS subjects (Shanghai Score ≥ 3.5). (**C**) No autoantibodies are present in control subjects.

Results: All (4/4) 2D-gels exposed to sera from BrS patients demonstrated specific Abs to four proteins, confirmed by MS to be α-cardiac actin, α-skeletal actin, keratin and connexin-43, versus 0/4 control subjects. All (18/18) BrS subjects from our validation cohorts demonstrated the same Abs, confirmed by Western blots, versus 0/32 additional controls. ELISA optical densities for all Abs were elevated in all BrS subjects compared to controls. In myocardium obtained from BrS subjects, each protein, as well as SCN5A, demonstrated abnormal protein expression in aggregates.

Conclusion: A biomarker profile of autoantibodies to four cardiac proteins is highly sensitive and specific for the detection of BrS, irrespective of genetic cause. The four involved proteins, α-cardiac actin, α-skeletal actin, keratin, and connexin-43, along with the *SCN5A*-encoded $Na_v1.5$ alpha subunit are expressed abnormally in the myocardium of patients with BrS.

Disclosure: Nothing to disclose

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SCN5A overlap syndromes: moving from theory to practice

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Introduction: New evidences for overlapping mixed phenotypes among hereditary arrhythmic syndromes associated with SCN5A mutations have recently led to coin the novel clinical entity of "SCN5A Overlap Syndromes" (SOS). We investigated prevalence and phenotypic expression of SOS among patients (pts) carrying SCN5A mutations diagnosed at our center.

Methods: From January 2005 to December 2019, we identified SCN5A mutations in 14 pts who underwent genetic testing at our center. Six pts were tested due to congenital long QT syndrome (LQTS) suspicion, while the remaining ones after diagnosing Brugada syndrome (BS).

Results: We detected SOS in 9 (64%) SCN5A mutation carriers (MCs). Five (36%) pts presented with BS coupled with cardiac conduction defects (CCD) including: first degree atrio-ventricular block (AVB) in all of them and associated right bundle branch block in 2 pts. One patient (7%) expressed type 3 LQTS coupled with CCD. Two (14%) pts, from the same family and harboring the same SCN5A mutation, expressed a variable phenotype. The first one developed BS and severe sinus node dysfunction (SND) associated with CCD and atrial fibrillation (AF) in the context of a probable atrial myopathy. The second pt presented BS associated with CCD. Finally, two (14%) pts, belonging to the same family and segregating the same SCN5A mutation, expressed a heterogeneous phenotype with QT prolongation (type 3 LQTS) associated with BS. Table 1.

Conclusions: SOS represents an undenied novel clinical entity among SCN5A MCs. We found a high SOS prevalence (64%) in our patients segregating SCN5A mutations. The most frequent overlapping phenotype associates BS with CCD. Further mixed expressions may include type 3 LQTS associated with BS or CCD and BS coupled with severe SND, CCD and AF. Of note, variable phenotypes may affect pts harboring the same SCN5A mutation in the same family.

Number of patients	Sex	Cardiac Conduction Defects	Brugada Syndrome	Other	Mutation
2	M, M	I° atrioventricular block + right bundle branch block	Yes	No	c.5447_5448insGCCACTTTGCCGA; c.4222G>A
3	M, M, M	I° atrioventricular block	Yes	No	c.1603C>T; c.664C>T; c.4437+5G>A
1	M	I° atrioventricular block	No	Type 3 Long QT Syndrome	C.5350G>A
1	F	I° atrioventricular block + infra-nodal conduction delay	Yes	Sinus node dysfunction and atrial fibrillation	c.4222G>A
2	F, F	No	Yes	Type 3 Long QT Syndrome	c.5467T>C
3	F, M, F	No	No	Type 3 Long QT Syndrome	p.Y1767C; c.1231G>A; C.5350G>A
2	M, M	No	Yes	No	c.3840+1G>A; c.844C>G

[Patients' clinical phenotypes]

Disclosure: Nothing to disclose

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First-in-world assessment of outcomes of catheter ablation for atrial arrhythmias in arrhythmogenic right ventricular cardiomyopathy

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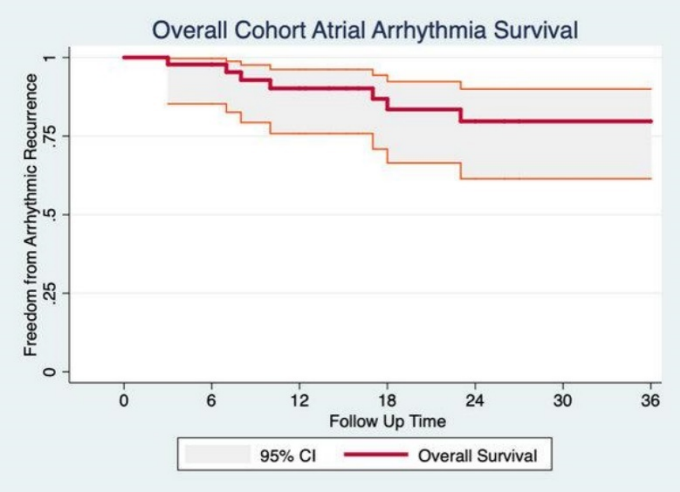
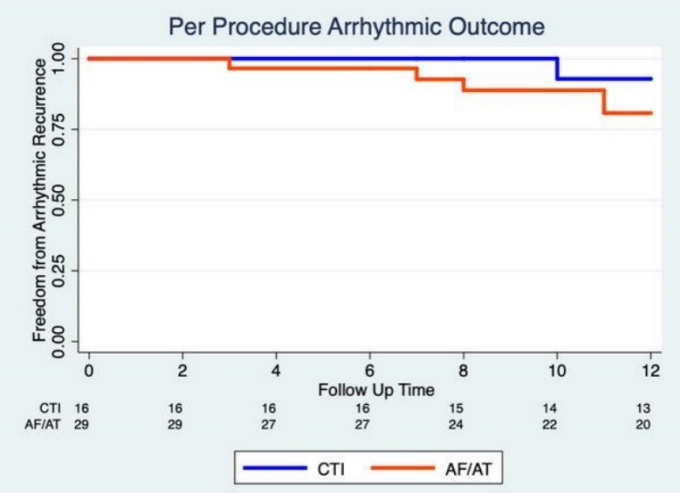
Introduction: Arrhythmogenic right ventricular cardiomyopathy (ARVC) is a genetically inherited disease characterized by fibro-fatty infiltrations

(FFI). FFI in ARVC patients usually originates in the ventricles, but recent imaging studies showed FFI at the atrial level as well. Effectiveness of catheter ablation (CA) for atrial arrhythmias (AA) in this subset of patients is currently unknown. Aim of our study is to describe acute and long-term effectiveness of CA for AA in ARVC patients.

Methods: Nine ARVC registries from Europe, US, and China were retrospectively searched for ARVC patients undergoing CA for AA (namely: atrial fibrillation (AF), atrial tachycardia (AT), and cavo-tricuspid dependent atrial flutter (CTI-FL)). Baseline, procedural, and long-term outcome data were collected.



[Figure1]



[Figure2]

Age at diagnosis, years (mean+/-s.d.)	40.6 +/- 13.7
Male, n (%)	30 (86)
CHA2DS2VASc, median [IQR]	1 [1-2]
HAS-BLED, median [IQR]	1 [0-2]
Definite diagnosis 2010 ITFC, n (%)	31 (89)
Age at Ablation, years (mean+/-s.d.)	48.2+/-14.8
Follow up time, years (median [IQR])	36 [14-74]
Overall arrhythmias recurrence rate, %	27%
Left sided arrhythmias recurrence rate, %	31%
CTI-depending flutter recurrence rate, %	19%

[Table1]

Results: Thirty-five pts (86% male, median CHA2DS2-VASc 1 [1-2], HAS-BLED 1 [0-2], and EHRA scores 2 [2-3]) were enrolled, in which a total of 45 CA procedures for AA were performed (left atrial CA: n = 19 AF, n = 10 AT; right atrial CA: n = 16 CTI). Mean age at AA CA was 48.2±14.8 y.o. At baseline, 63% of pts were on oral anticoagulants (OAC) (n = 9 warfarin; n = 13 NOAC). Catheter ablation was successful and sinus rhythm obtained at the end of the procedure in all patients, with 2 (6%) AF patients requiring electrical cardioversion. Over a median follow-up of 36 [14-74] months, 12 (27%) pts experienced arrhythmia recurrence (left atrial group: n = 6 AF recurrences, n = 3 AT recurrences; CTI-FL group: n = 1 CTI-FL recurrence; n = 1 new AF with previous CTI-dependent flutter ablation), with a 1-year follow-up resulting comparable to what has been reported in the literature for the general population. [Figure 1 and 2]. 61% pts were on OAC at last follow-up.

Conclusion: Age at the time of CA for AA is about 10 years younger in patients with ARVC as compared to the general population.CA for AA in ARVC pts is safe and effective; surprisingly, long-term CA outcomes for AF and left AT result comparable to those reported in the general population, whereas recurrence rates of CTI-dependent flutter seem to be higher.

Disclosure: Authors declare no relevant disclosure to the present abstract

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Analysis of the pulmonary veins activity to identify their contribution to the mechanism of persistent atrial fibrillation

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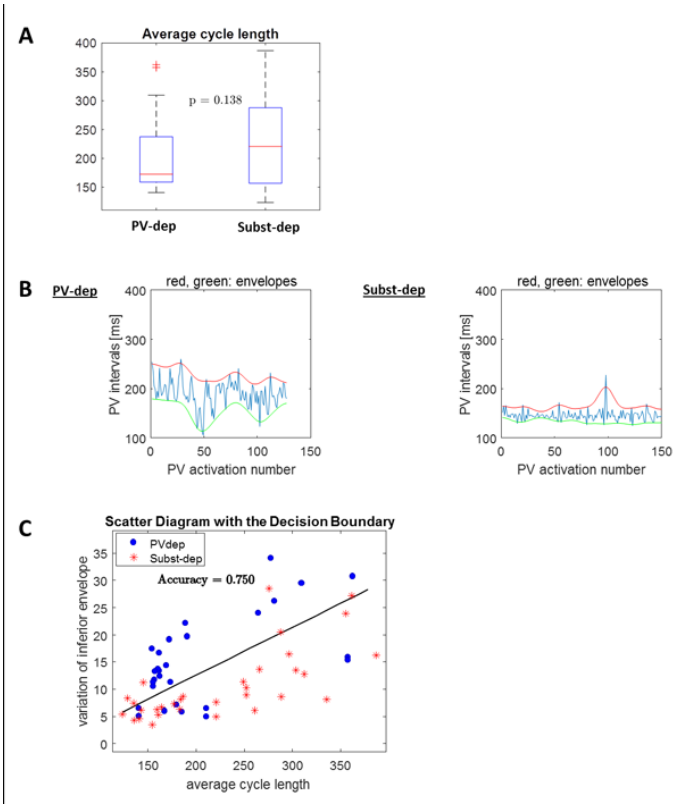
Introduction: Pulmonary vein isolation (PVI) is the cornerstone interventional treatment for AF. While this strategy is effective in pts with *paroxysmal* AF, the success rate of this approach is more limited in pts with *persistent* AF (PsAF). The challenge however still remains to discriminate pts in whom PV play a major role in AF maintenance from those who may require an extended ablation strategy to target substrate alterations. We hypothesized that the analysis of the electrical activity recorded within the PV may provide the key to discriminate passive PV from PV playing an active role.



[Figure 1]

Methods: Two-subgroups of consecutive pts who underwent first-time "stepwise" ablation for PsAF were considered: 1) pts with a mechanism of AF mainly related to PV, based on procedural AF termination during PVI (the "PV-dep" group) 2) pts with a suspected "substrate-based" mechanism based on both failure to terminate AF by ablation and failure to control arrhythmia on the long term (the "Subst-dep" group). Electri-

cal activity within PV was assessed using Lasso recordings before ablation. An automatic detection algorithm was developed to extract PV activations from intra-cardiac electrograms (EGM) in order to perform further analyses. EGM epochs of > 20-sec were used.

Results: Eleven pts in each subgroup were identified (mean age 60 ± 10 y). A nonsignificant trend towards faster average cycle length (CL) was observed in the PV-dep group (Figure 1A). The dynamics of PV activation intervals was assessed using the envelope of the PV intervals time series. Two representative examples are illustrated in Figure 1B. We found that the CL variations of the inferior envelope relative to the average CL of the time series allowed the discrimination of pts with a PV-dependent mechanism of AF (accuracy 0.75) (Figure 1C).

Conclusions: The assessment of the CL variations recorded within the PV before PsAF ablation may provide the key to discriminate pts who may be cured by PVI only.

Disclosure: Nothing to disclose

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Predictors of left atrial fibrosis in patients with atrial fibrillation referred for catheter ablation

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[1]Department of Cardiology, University Hospital Zurich, [2]Center for Integrative Human Physiology, University of Zurich, Zurich, Switzerland

Introduction: Left atrial (LA) fibrosis in patients with atrial fibrillation (AF) is associated with an increased risk of AF recurrence after catheter ablation. Therefore, we searched for clinical risk factors that confer an increased risk of LA fibrosis and may influence treatment strategy.

Methods: We prospectively included 100 AF-patients undergoing electroanatomical voltage mapping-guided catheter ablation. LA low-voltage areas were measured with the CARTO3-mapping system and corrected for LA volumes by computed tomography. Blood tests including NT-proBNP and echocardiographic parameters of left ventricular function were analyzed. The H2-FPEF and HFA-PEFF scores as indicators of heart failure with preserved ejection fraction were integrated in our prediction model.

Results: Patients were 62±11years old; 29% were female, 32% had persistent AF. LA fibrosis was present in 67%, with 41% having a fibrotic area of >5% (≥Utah-Stage1). Mean LVEF was 55.4%±11.2. Patients with LA fibrosis had higher NT-proBNP values (1022±1290*vs.*492±639ng/l,p = 0.014), larger LA volumes (BSA-corrected 63.6±20.3*vs.*44.3±13.9ml/m^2,p <0.001), higher H2-FPEF and HFA-PEFF scores (4.8±1.4*vs.*5.3±1.3,p = 0.037 and 3.5±1.5*vs.*4.5±1.3,p = 0.001, respectively). Females had higher NT-proBNP values (1231±1520*vs.*680±896ng/l,p = 0.008), and echocardiographic measures of diastolic dysfunction (E/e' 15.1±8*vs.*11±7.9,p = 0.05).

LA fibrosis was significantly associated with female gender, older age, persistent AF, increased LA volumes, hypertension, stroke, statin therapy, higher NT-proBNP values, E/e', CHA_2DS_2-VASc and HFA-PEFF scores. In multivariable analyses, only higher NT-proBNP values, larger LA volumes and higher HFA-PEFF score remained as independent predictors of LA fibrosis.

Conclusions: Higher NT-proBNP levels, larger LA volumes and higher HFA-PEFF scores predict LA fibrosis in AF-patients, suggesting increased left-sided filling pressures as an important driver of LA fibrosis.

Disclosure: Nothing to disclose

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Complications of lead extraction by mechanical dilator sheaths with and without upsizing

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Universitätsspital Zürich, Zürich, Switzerland

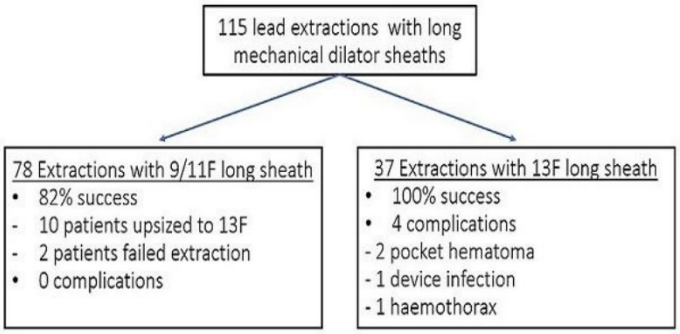
Introduction: Lead extraction of pacemaker and implantable cardioverter defibrillator leads is increasingly necessary due to rising numbers of patients with malfunctioning leads and device infections. The decision to sizing and upscaling of mechanical rotation-dilator sheaths varies by operator and personal preference. The rate of successful extraction and incidence of complications with primary use of larger sheaths in comparison to upscaling is mostly unknown.

Purpose: To compare incidence of complications and success rates between upscaling of sheath size versus primary use of a larger (13 French) mechanical rotation-dilator sheath.

Methods: We retrospectively analysed our cohort of device extractions since the beginning of standardized procedures in 2017 for sheath size, upscaling and incidence of complications.

Results: Over 34 months (January 2017 - October 2019), 115 patients (mean age 63 years) underwent device extraction by 2 experienced operators with 238 leads extracted (mean 2.1 lead per patient). 109 extractions (95%) were successful and 5 were partially successful with 1 remaining lead. One patient had to be rescheduled to open chest extraction due to device infection and failed previous transvenous extraction. In total, 32 (28%) had their leads extracted for device infection, while 84 (72%) were extracted due to lead malfunction. 37 patients (32%) were successfully extracted through primary use of a larger 13F mechanical dilator sheath with 4 complications occurring in 4 patients (11%) (2 pocket hematoma requiring transfusion or revision, 1 haemothorax requiring surgical intervention, 1 device infection). Of the remaining 78 patients, 66 (57%) were successfully extracted through mechanical dilator sheaths up to 11F. The remaining 12 extractions with smaller sheaths primarily failed (18%); 2/12 were deemed unsuccessful and 10/12 patients ultimately needed upscaling of sheaths up to 13 French without significant complications.

Conclusion: Modern lead extraction with mechanical rotation dilator sheaths is associated with a high success rate. Use of smaller sheaths failed in a significant amount of cases needing subsequent upscaling. Primary use of larger mechanical extraction sheaths was feasible with a low rate of extraction failure and a potential cost benefit, but was associated with an increased risk of non-fatal complications.



[Picture 1]

Disclosure: Nothing to disclose

HEART FAILURE / CARDIOMYOPATHY / MYOCARDIAL- AND PERICARDIAL DISEASES / SYSTEMIC DISEASES / MYOCARIDAL FUNCTION / HEART TRANSPLANTATION / VALVE DISEASES

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Sutureless aortic bioprosthesis: is it a true benefit for the patient?

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Introduction: Sutureless aortic valves are meant to provide clinical benefit in high surgical risk patients because are associated to shorter aortic cross clamp time. This study reviews our experience with sutureless aortic valve compared to standard valves in terms of clinical outcome and tries to assess if the benefit is due to better hemodynamic or quicker surgical procedure.

Methods: From July 2016 to July 2018, 30 patients have been enrolled for isolated on pump aortic valve replacement for aortic stenosis. Half received stented biological aortic valve (SAVR) and half received Perceval sutureless aortic valve (PAVR). Patients were homogeneous for demography and clinical indications. We collected among other parameters, aortic cross-clamp time, pre and post operative hemodynamic parameters using transthoracic echocardiography, hospital stay and 30days mortality.

Results: STS score was 2.2% (IQR, 1.3-4.9%) and 3.5% (IQR 2.6-4.3%) in group SAVR and PAVR respectively. Mean aortic cross clamp time was 55min in SAVR (range 47-68min) vs 30min in PAVR (range 25-43min) with P = <0.001. Mortality rate was 0% in both groups. The Effective Orifice Area of the prosthetic aortic valve was 1.3±0.3cm² vs 1.3±0.1cm² respectively in SAVR and PAVR (P = 0.88) calculated day 5 post intervention. Pacemaker implantation was necessary in 1 patient PAVR group. Trivial paravalvular leak was 13% in SAVR vs 20% in PAVR. Post operative intubation time was 92 min in PAVR (IQR 0-756min) vs 220min in SAVR (IQR 0-320min).

Conclusions: Perceval allows a shorter cross-clamp time to replacing the aortic valve and represents a real advantage for the surgeon making the surgical procedure easier and faster. However, this study has failed to show differences in clinical outcome according to the type of valve implanted. The true benefit for the patient remain unproven.

Disclosure: Nothing to disclose

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Meta-analysis of echocardiographic parameters predicting right ventricular failure after left ventricular assist device implant

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Introduction: Ten to 40% of patients who receive Left Ventricular Assist Device (LVAD) suffer of right ventricular failure (RVF). Patients with post-LVAD RVF tend to have poor outcomes when the right circulatory support is belated. There are several scores predicting the occurrence of RVF after LVAD implant (The Michigan Score and the CRITT Score), but their reliability is low. We have searched for non-invasive variables to be correlated to the function of the right ventricle focusing on echocardiographic parameters of the right ventricle.

Material and **Methods:** We selected 3 parameters: tricuspid annular plane systolic excursion (TAPSE), RV fractional area change (FAC) and the RV global strain (GLS). TAPSE indicates RV longitudinal systolic function and any value <17 mm is considered abnormal. RVFAC is a global parameter of RV systolic function and it can be calculated using the RV-focused apical 4-chamber view with a dedicate formula. GLS is well correlated to the function of the left ventricle and could possibly be a good predictive variable for RVF. We searched across the literature and pooled relevant studies in a meta-analysis using a dedicate algorithm. Finally, we have done statistical analysis (The DerSimonian-Laird Method or Random-Effect model) to conclude if each parameter is a reliable predictor of the RVF before LVAD implantation.

Results: We retain 13 studies for a total of 944 patients. 290 of these patients developed post-LVAD RVF (30.7%). Data are shown in Forrest plots. We have found a pooled standardized mean difference (SMD) of -0.6 mm for TAPSE with lower and upper tails going to -0.1 to 0.4 mm. Concerning RV FAC, summary SMD was equal to 2.70 and lower and upper extremities to 0.89 and 4.51. Finally, regarding the GLS, SMD was equal to 2.17 with incertitude of value between 0.094 and 4.24. Neither publications bias nor lack of homogeneity were observed.

Conclusions: TAPSE is not reliable in RVF prediction, particularly in severe RVF. RV FAC gives a sensible evaluation of the systolic function of RV with cut-off value of 35% associate to post LVAD dysfunction. GLS seems to be a strong predictor of RVF after LVAD but cut-off values displayed in literature do not apply to the specific pre-implantation population therefore further prospective studies are necessary to confirm them.

Disclosure: Nothing to disclose

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Hypertrophic cardiomyopathy and other forms of left ventricular hypertrophy - the P wave can make the difference

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Introduction: Structural disarray of hypertrophied myocytes and interstitial fibrosis characterize hypertrophic cardiomyopathy (HCM). These morphological changes also affect atrial myocytes and, together with hemodynamic alterations because of HCM, may lead to atrial cardiomyopathy.

The study investigates the incremental value of P-wave parameters to differentiate left ventricular hypertrophy (LVH) because of HCM from LVH in hypertensive heart disease (HHD) and athletes heart.

Methods: In a prospective study, we compared electrocardiographic (including signal-averaged ECG of the P wave) and echocardiographic data of patients with HCM, HHD and athletes heart. We developed a predictive model with a simple scoring system to identify HCM.

Table 1 Results of the investigated parameters after univariate and multivariate (*) analysis

	HCM	HHD	Athletes	P-value	HCM vs HHD*			HCM vs Athletes*		
						95%-CI	P-value		95%-CI	P-value
P-wave duration [ms]	152.7 ± 25.8	143.9 ± 16.5	133.5 ± 14.2	<0.001	-16.9	-24.6 to -9.1	<0.001	-16.3	-22.7 to -9.9	<0.001
P-wave integral [µVs]	850.4 ± 272.4	672.0 ± 235.4	773.1 ± 260.1	<0.001	-198.6	-320.8 to -76.3	0.002	-68.2	-169.7 to 33.2	0.187
QRS [ms]	110.3 ± 27.3	96.9 ± 20.3	95.1 ± 9.8	<0.001	-16.4	-24.7 to -8.1	<0.001	-13.8	-20.8 to -6.9	<0.001
QTc [ms]	447.9 ± 27.2	438.6 ± 24.5	414.0 ± 22.9	<0.001	-21.1	-32.7 to -9.5	<0.001	-30.8	-40.5 to -21.2	<0.001
LVMMI [g/m2]	153.6 ± 55.5	133.5 ± 30.3	98.6 ± 19.7	<0.001	-15.3	-29.7 to -0.9	0.038	-56.1	-67.7 to -44.6	<0.001
IVS [ms]	16.8 ± 4.2	11.8 ± 2.2	10.3 ± 1.5	<0.001	-5.2	-6.3 to -4.1	<0.001	-6.4	-7.3 to -5.6	<0.001
LAVI [ml/m2]	43.2 ± 13.9	30.5 ± 9.7	30.8 ± 9.5	<0.001	-14.6	-20.0 to -9.3	<0.001	-12.2	-16.6 to -7.9	<0.001

The table shows the study result after univariate and multivariate (*; adjusting for age and sex) analysis.

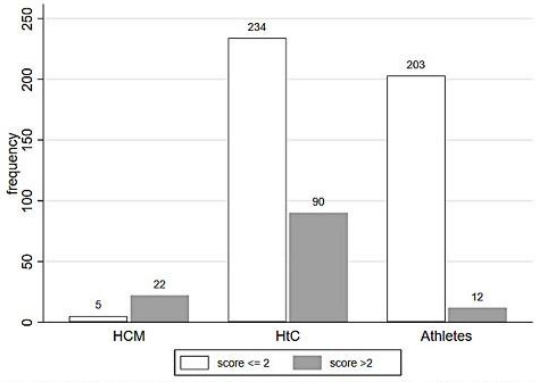

Figure 1 shows the allocation based on the score for the differentiation between HCM and the other forms of LVH.

Results: We compared data of 27 patients with HCM (70% males, 49.8±14.5 years), 324 patients with HHD (52% males, 74.8±5.5 years), and 215 subjects with athletes heart (72% males, 42.3±7.5). The table

shows the significant differences among the 3 groups. We included the following parameters into a predictive score to differentiate HCM from other forms of LVH: QRS width (>88ms = 1 point), P-wave integral (>688µVs = 1 point) and septum thickness (>12mm = 2 points). A score >2 (Youden index 0.626) correctly classified HCM in 81% of the cases with a sensitivity and specificity of 82% an 81%, respectively.

Conclusion: Differentiation of HCM from other forms of LVH is improved by including atrial parameters. A simple scoring system including septum thickness, QRS width and P wave integral allowed identification of patients with HCM with a sensitivity and specificity of >80%. This score needs to be validated prospectively.

Disclosure: Nothing to disclose

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Vessel fractional flow reserve in heart transplant recipients with and without graft vasculopathy

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Introduction: To assess the usefulness of vessel fractional flow reserve (vFFR) derived from coronary angiography to detect cardiac allograft vasculopathy (CAV) in heart transplant recipients.

Methods: This retrospective study was performed in patients who underwent heart transplant between January 1987 and December 2018. In heart transplant patients referred for annual check-up, undergoing surveillance coronary angiography, the extent of CAV was graded according to the criteria proposed by the International society of heart and lung transplantation (ISHLT). In those patients, three-dimensional coronary geometries were constructed from the latest coronary angiography and pressure losses were calculated using CASS vFFR. vFFR values were obtained for each major native coronary vessel. The most distal value was used for the analysis and vFFR values ≤ 0.80 were considered as significant disease.For the patient-level analysis, the lowest vFFR value of the 3 major epicardial vessels was selected.

Results: In 65 heart transplant patients with a mean age of 53.7 ± 10.1 years, 8.5 years [IQR 1.90, 15.2] years post heart transplantation, a total number of 173 vessels (59 LAD, 61 LCX, 53 RCA) were analysed. Most donors (76.9%) and recipients (67.7%) were male. Mean donor and recipient age were 35.7 and 53.7 years, respectively. The most frequent indication for heart transplant was ischemic cardiomyopathy. Mean vFFR was 0.84 ± 0.15, median 0.88 [IQR 0.79, 0.94]. A vFFR ≤ 0.80 was present in 24 patients (48 vessels). Heart transplant patientswith previous history of ischemic cardiomyopathy (ICMP) had lower vFFR as compared to those with non-ICMP (0.70 ± 0.22 vs. 0.79 ± 0.13, p = 0.06). When categorizing functional vessel characteristics by CAV classification a significant lower vFFR (p = 0.009) and a higher percent diameter stenosis (p <0.001) was observed in patientswith higher CAV grade. Use of vFFR reclassified 31.9% of patients compared to the anatomical ISHLT criteria. Despite a CAV score of 0, a pathological vFFR ≤ 0.80 was detected in 8 patients (34.8 %).

Conclusion: The impairment of coronary flow assessed by vFFR in a subgroup of patients without CAV according to standard ISHLT criteria, suggests the presence of a diffuse vasculopathy undetectable by conventional coronary angiography. Therefore, we speculate that vFFR may be a helpful tool in risk stratification post heart transplant.

Disclosure: Nothing to disclose

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A simple technique for artificial chordae loops in video assisted mitral valve repair. Is it reproducible in routine surgery? A single surgeon 12-year experience

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Background: Traditional resectional techniques and chordal transfer are somehow surpassed and difficult to apply in video-assisted mitral valve repair. Using artificial chords appears easier in this setting. We have developed a simple technique for preparing loops with goretex sutures in adequate length and using them in video-assisted mitral valve repair since 12 years. The purpose of this study was to review the effectiveness and reproducibility of neochordal repair as a routine approach in this setting and assess the stability of these loops over the time.

Methods: This is a retrospective review of all patients who underwent elective video-assisted mitral valve repair from February 2008 to September 2019. The primary endpoints were recurrent mitral regurgitation and reoperation.

Results: 743 consecutive patients were included during the study period, with a mean age of 56±24 years. Custom made neochordal loops were used in all patients, and in association with leaflet resection in 47 patients. Eight patients were not repairable and underwent valve replacement (repair rate 99%). 22 patients had a mild grade (2.95%) regurgitation, while the remainder had only trivial. Patients were fast-tracked, with 25% extubated in the operating room and the remainder within 6 hours except 35 patients extubated after 10 hours. There were 5 deaths within 30 days (0.7%). Follow-up ranged from 3-132 months, during which all of the patients but 12 (12/708 pts:1.7%) remained with none or trace of mitral regurgitation. Twenty patients required re-operation: we had 3 ring partial posterior desinsertion which have been re-repaired through video-assisted approach with very good result, two patients presented rupture of the neochordal attachment on the free edge of the cusp and get re-repaired and 5 patients required mitral valve replacement between 3-7 years after the first operation and 10 patients required re-operation for other cardiac causes.

Conclusions: Video-assisted mitral valve repair using neochords loops provided a high rate of repair, reproducible results in a routine cardiac surgery setting, and stable repair during follow-up. This has become our preferred technique for mitral valve surgery.

Disclosure: Proctor for Covidien

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Type A aortic dissection mainly occurs in small aneurysms: is it time to review the guidelines on surgical treatment of ascending aorta aneurysm?

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Introduction: Current guidelines recommend prophylactic replacement of the ascending aorta at an aneurysm diameter of >55mm to prevent acute type A aortic dissection (TAAD) (class I, level C), in non-Marfan patients. This recommendation is based on a single study of a heterogeneous cohort of only 54 patients published in 1997. Several publications have recently questioned the threshold of 55mm, suggesting that surgery should be performed in smaller aneurysms to prevent this devastating disease. We reviewed our experience to clarifying the role of aortic size in the development of TAAD.

Methods: Single centre, retrospective analysis including all patients admitted to our emergency department from 1st January 2014 to 31st October 2019 for TAAD and received at least the replacement of the ascending aorta. Patients with Marfan syndrome or others major collagene diseases were excluded from the study. The diameter of the dissected aorta was measured on pre operatory CTscan with contrast medium at the level of the pulmonary bifurcation. We estimated the aortic diameter at the time of dissection being 20% smaller than the measured dissected aorta.

Results: 117 patients underwent surgical replacement of the ascending aorta. 15 patients were excluded from the study: 8 were Marfan patients and in 7 the CT scan could not be found because done in other hospitals. Data on 102 patients were analysed: 67 were male (60%) and 35 female (40 %), mean age was 65+/-13 years old. 66 % were treated for hypertension. The mean height was 173 +/-23 cm, for a mean weight of 80+/-27 kg. Mean diameter of the dissected aorta after the 20% correction was 39.7mm (range 31.2mm-59.2mm). In men the mean diameter was 39.6 mm whilst in female was 39.9 mm (p = 0.1). 30 days mortality rate was 19.6% (20/102).

Discussion: Type A aortic dissection occurred at an aortic diameter of <40mm in 90% of our patients without Marfan syndrome. No significant difference in aortic diameters with respect to sex. The current aortic diameter threshold of 55mm excludes approximately 95% of patients with

an acute type A aortic dissection from prophylactic replacement of the ascending aorta, therefore the diameter of 55mm should not be considered the right indication for prophylactic surgery and deserves reappraisal.

Disclosure: Nothing to disclose

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Sex and gender differences in TAVI patients: from clinical presentation to procedural outcomes

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Background: The epidemiological impact of aortic stenosis has recently grown, and indications to valvular treatment have changed substantially with the implementation in clinical practice of TAVI procedures. Significant differences according to patients' sex are likely to be related to different biological features, but the undelrying mechanisms haven't been verified yet.

Aims and **Methods:** We collected from the SwissTAVI Registry the available data about 373 subjects who where consecutively treated in Cardiocentro Ticino with a TAVI procedure over the last 10 years. We compared two subgroups of female (n = 161, age 83.5±5.4 yrs) and male (n = 212, age 82.3±5.9 yrs) patients in terms of severity indices of the disease (residual valve area and transvalvular gradients). The same parameters were measured after the procedure with a quantitative estimation of eventual post-procedural paravalvular leaks.

Results: As previously reported, female patients showed significantly higher transvalvular mean gradients at baseline (48.02±16.0 vs. 42.9±14.8 mmHg; P = 0.004) on smaller resudual valve areas (0.66±0.18 vs. 0.77±0.19 cm^2; P <0.001). TAVI procedures were equally efficient in both sex, restoring similar valve areas and gradients, but paravalvular leaks were more frequent and significant in females (F vs. M no leak 44.5 vs. 55.3%, mild 47.7 vs. 42.7%, moderate 6.5 vs. 1.5%, severe 1.3 vs. 0.5%; overall P = 0.037).

Conclusions: Sex-related differences are only partially described and their substrate is not clear. Female patients are known to be more prone to bleedings and cerebrovascular accidents, but our data show that also paravalvular leaks could be more common and significant in comparison to males. A detailed analysis of the anatomy of the aortic outflow and of the valvular deterioration in aortic stenosis is required and is the aim of the second phase of this study. Understanding sex-related characteristics underlying these discrepancies can potentially improve TAVI technologies towards a further customization of prosthetic devices.

Disclosure: Nothing to disclose

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Midterm outcomes of minimally invasive combined mitral and tricuspid valve surgery

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Introduction: We use minimally invasive valve surgery through a right lateral thoracotomy (MIVS) as our standard approach. Our aim was to examine the outcomes of combined minimally invasive mitral and tricuspid valve surgery.

Methods: Baseline characteristics, in-hospital and follow-up information were collected between July 1st 2013 and October 31st 2019.

Results: We identified 270 consecutive MIVS patients out of which 25 were combined mitral/tricuspid cases (9.3%). Mean age was 72.3±7years, Euroscore II 3±1.6, CPB time 202±5minutes and aortic cross clamp time 133±2minutes. In 17 patients (68%) the mitral valve was repaired using a ring with resection or artificial chordae and 8 patients (32%) received a planned replacement (bioprosthesis). All tricuspid valves were repaired with an incomplete ring. There was no operative mortality, no stroke and no rethoracotomy. Successful mitral repair rate was 100%. In-hospital mortality was 4% (n = 1, cerebral hypoxia). Median in-hospital and ICU stay was 12(9-32) and 1(1-32) days respectively. Follow up was complete in 100% for a median of 535(32-2027) days. Three patients died during follow up (one due to cardiac arrest and two due to unknown causes). All repaired tricuspid and mitral valves (except for two mitral, 8%) were competent with less than grade 2 of regurgitation. Two patients with mitral valve repair had to be reoperated (8%): one due to failed Alfieri stich with heavily calcified annulus and one due to late endocarditis.

Conclusion: Our data suggest that combined minimally invasive mitral and tricuspid valve surgery in a standard setting is safe and durable with a high rate of successful mitral repair and with good mid-term competent valves, which could serve as benchmark for future interventional procedures.

Disclosure: Nothing to disclose

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Added clinical value of soluble ST2 in addition to NTproBNP in an all-comer population of a cardiac outpatient clinic

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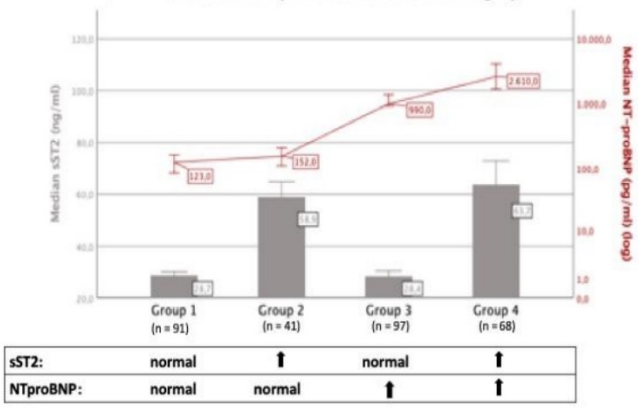
Objectives: The soluble form of suppression of tumorigenicity 2 (sST2), a recently introduced biomarker, is a strong and NTproBNP-independent predictor of outcome in heart failure patients. We sought to evaluate the clinical value of sST2 in addition to NT-proBNP in a heterogeneous cardiac outpatient population.

Methods: 297 all-comer patients visiting the outpatient clinic of Heart Clinic Zurich, Switzerland, from January to December 2018 were included. Patients were divided into four groups depending on their sST2 and NT-proBNP levels. Differences between groups and Spearman's correlations, linear and multiple regression analysis for sST2 were calculated.

Figure 1: Median sST2 and NT-proBNP levels in the four biomarker groups



[Median sST2 and NTproBNP levels in four different biomarker groups]

Results: The median patient age was 74 ± 19 years, 41.8% were women. Figure 1 reports sST2 and NTproBNP levels of four different groups, with respective clinical and laboratory findings in table 1. 13.8 % of patients had elevated sST2 levels in the presence of normal NTproBNP levels (group 2). Compared to group 1 (low-risk patients in good condition), group 2 showed significantly higher rates of coronary artery disease, peripheral vascular disease and renal dysfunction. When comparing group 3 to group 4 (both groups with elevated NTproBNP), the presence of sST2 was mainly associated with clinical signs of heart failure, higher EuroScore II and worse left ventricular ejection fraction (LVEF group 3: 58.0% vs group 4: 53.3%, p = 0.022). Despite similarely elevated sST2 levels in groups 2 and 4, patients in group 4 were significantly sicker (all clinical, laboratory and echo findings worse). Correlation of sST2 was weaker than of NTproBNP with most clinical variables. sST2 significantly correlated with EuroSCORE II (R = .280), kidney function (R-.259), CRP (0.248), left atrial volume (R = .199) and right ventricular function (R = .213; all p ≤ .001). Dependency for sST2 was found with kidney function, left atrial size and EuroScore II (all p <.008). In multiple regression analysis, left atrial volume was the strongest independent predictor of sST2 elevation (p = .002).

	group 1 (n = 91)	group 2 (n = 41)	*p-value, 1 vs 2*	group 3 (n = 97)	group 4 (n = 68)	*p-value, 3 vs 4*
	normal sST2 normal NTproBNP	elevated sST2 normal NTproBNP		normal sST2 eleva. NTproBNP	elevated sST2 elev. NTproBNP	
positive HJR, n (%) (n = 112)	0(0%)	0 (0%)	*n/a*	10 (27.8 %)	17 (51.5 %)	*0.044*
Leg edema, n (%) (n = 190)	4 (6.8%)	4 (15.4 %)	*0.211*	11 (18.6 %)	22 (47.8 %)	*0.001*
pulmonary rattling sounds, n (%) (n = 123)	0 (0%)	2 (10.5 %)	*0.037*	4 (12.1 %)	13 (41.9 %)	*0.007*
dyspnoe NYHA III or IV, n (%)	9 (10.5%)	8 (20%)	*0.145*	20 (21.1%)	21 (31.8%)	*0.123*
EuroSCORE II Mortality, median (+/- IQR)	1.0 (+/- 0.8)	1.9 (+/- 2.0)	*0.005*	1.8 (+/- 2.1)	3.1 (+/- 3.6)	*0.021*
Coronary artery disease, n (%)	20 (22 %)	17 (41.5 %)	*0.021*	35 (36.1 %)	34 (50 %)	*0.074*
Peripheral arterial disease, n (%)	3 (3.3 %)	7 (17.1 %)	*0.006*	10 (10.3 %)	4 (5.9 %)	*0.315*
GFR, CKD-EPI, ml/min, median (+/- IQR)	88.0 (+/- 20.2)	78.8 (+/- 30.5)	*0.018*	68.8 (+/- 31.5)	63.3 (+/- 42.8)	*0.053*

[clinical and laboratory characteristics of 4 different groups]

Conclusion: The added clinical value of sST2 in addition to NTproBNP was limited in this all-comer cardiology population. In patients with elevated NTproBNP, sST2 corroborated clinical sings of heart failure. Surprisingly, sST2 levels were elevated in a substantial number of a patients with normal NTproBNP, correlating with artherosclerosis and pointing to an additional pathway of sST2 elevation independent of heart failure and fibrosis.

Disclosure: CA and PB report speaker fees from RUWAG AG

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Maximal ascending aortic diameter as a criterion for surgery indication in ascending aortic aneurysms: should it be abandoned?

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Introduction: The maximal ascending aortic diameter is the main criterion for surgery indication in patients with ascending aortic aneurysm. However, recent data suggest that indexing the aortic diameter to body surface area (aortic size index - ASI) or height (aortic height index - AHI) may be superior for predicting complications rates. Aim of this study is to assess if the aortic diameter can still be used as a criterion for surgery indication in ascending aortic aneurysms.

Methods: We performed a retrospective analysis of the data of 216 patients with ascending aortic aneurysm (maximal ascending aortic diameter ≥45mm) undergoing replacement of the ascending aorta in the period 01/2013-01/2020. Excluded were patients with isolated aortic root aneurysms, thoracic aortic dissections and intramural hematomas. ASIs and AHIs were calculated and used to classify the patients as having a low, moderate, high, or severe average yearly risk of complications according to the published literature.

Results: The maximal ascending aortic diameter was 45-49mm in 75 (34.7%) patients, 50-54mm in 73 (33.8%) patients, 55-59mm in 44 (20.4%) patients, 60-64mm in 13 (6%) patients and ≥65mm in 11 (5.1%) patients. Based on the calculated ASIs, 3 (1.4%) of the patients had a low, 167 (77.3%) an intermediate, 43 (19.9%) a high and 3 (1.4%) a severe average yearly risk of complications at the time of surgery. Based on the calculated AHIs, 1 (0.5%) of the patients had a low, 154 (71.3%) an intermediate, 57 (26.4%) a high and 4 (1.9%) a severe average yearly risk of complications at the time of surgery.

Conclusion: Almost all patients had an at least intermediate average yearly risk of complications, based on their calculated indexes, thus retrospectively justifying the decision for surgery. The ascending aortic diameter seems sufficient for surgery indication, although using the more informative aortic indexes should be preferred.

Disclosure: Nothing to disclose

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Pre-procedural left ventricular stroke work determines prognosis in patients undergoing transcatheter aortic valve implantation

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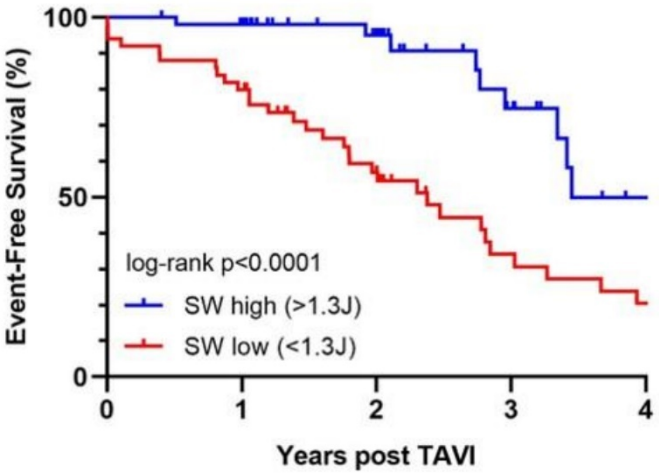
Background: Left-ventricular stroke work (SW) is the amount of energy the left ventricle generates with each heartbeat. Previous translational research has indicated that pre-procedural SW predicts improvement of symptoms after transcatheter aortic valve implantation (TAVI). However, it is unknown if SW also affects the prognosis after TAVI.

Methods: SW in Joules (J) was calculated using pre-procedural echocardiographic and noninvasive blood pressure measurements in patients with severe aortic stenosis undergoing TAVI. Valvuloarterial impedance (Zva) and resistive arterial load (indexed systemic vascular resistance, SVRI) were also calculated. The primary endpoint was a composite of all-cause mortality and hospitalization for heart failure.

Results: A total of 101 patients with a mean age of 82 years (53% female) were analyzed. Median follow-up was 67±37 months and the primary endpoint occurred in 47(46.5%) patients. Mean SW before TAVI was 1.57±0.51 J in patients without a primary endpoint, and 1.1±0.31J in patients with a primary endpoint (p <0.0001). ROC-curve shows good discriminatory ability of pre-TAVI SW: AUC 0.80 (95%CI 0.72-0.89) and indicates an optimal cut-off value of 1.30 J. Patients with a SW above this cut-off had very favorable outcomes (Figure), mainly driven by a lower incidence of hospitalization for heart failure. Patients with high pre-procedural SW had higher mean aortic valve gradients (50±14 vs. 36±15mmHg, p <0.0001), lower Zva (4.3±1.1 vs. 5.8±1.6 mmHg*mL^{-1}*m^{-2}, p <0.0001), and lower SVRI (2250±871 vs. 3304±1292 dynes*sec/cm^{-5}/m^{-2}, p <0.0001), compared to patients with low SW.



[Figure - Kaplan Meier Curves Comparing Patients with High- and Low-Stroke Work Before TAVI]

Conclusion: Despite the low number of patients in this study, there was a significant association of pre-procedural stroke work and outcomes in patients undergoing TAVI. These findings suggest that pre-procedural SW identifies patients with a healthier myocardium that is able to operate with a higher performance despite higher aortic valve gradients, lower Zva and lower SVRI.

Disclosure: Nothing to disclose

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Myocardial extracellular volume by CMR T1 mapping and arrhythmia burden in mitral valve prolapse with mitral annulus disjunction

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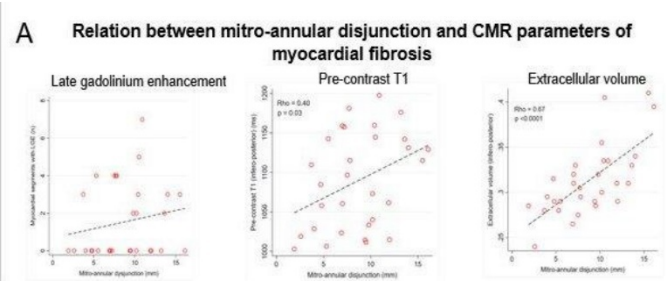
Background: In patients with mitral valve prolapse (MVP), mitral annular disjunction (MAD) has been associated with the presence of late gadolinium enhancement (LGE) and increased risk of sudden cardiac death. The relation between myocardial interstitial fibrosis, MAD and arrhythmia is currently unknown.

Methods: 30 patients (pts) with MVP and MAD (MVP-MAD) underwent Cardiovascular Magnetic Resonance imaging (CMR). The control group included 14 pts with mitral regurgitation and no MAD (MR-NoMAD) and 10 pts with normal CMR (NoMR-NoMAD). CMR included measurement of MAD distance, assessment of LGE, pre-contrast myocardial T1 relaxation time (T1) and extracellular volume (ECV) of the basal segments. Ventricular arrhythmia burden was evaluated by a 24h Holter in a subset of 17 pts of the MVP-MAD group.



[Fig.1]

Results: T1 was significantly higher in MVP-MAD compared to MR-NoMAD (1067±45ms vs 1029±37ms,p <0.05) and to NoMR-NoMAD (1032±26ms, p <0.05). ECV was significantly higher in MVP-MAD compared to MR-noMAD (30±3% vs 24±3 %, p <0.01) and to NoMR-NoMAD (24±2%, p <0.01) (Fig.1). MAD distance was associated with ECV (rho = 0.65, p = 0.0001) but not T1 (rho = 0.35, p = 0.06) or LGE extent (rho = 0.21, p = 0.25). MVP-MAD patients with ECV>31% had significantly higher PVC burden (6011 [1245-12171] vs 749 [17-2168] PVC/24h, p = 0.04) and a trend toward higher NSVT burden (5.5 [2-17] vs 0[0-1] NSVT/24h, p = 0.09). The presence of LGE did not identify patients with higher PVC or NSVT burden (3944 [1245-8145] vs 749 [17-7616] PVC/24h, p = 0.13 and 3 [0.5-12] vs 1 [0-7] NSVT/24h, p = 0.52). Four patients had unexplained out-of-hospital cardiac arrest (OHCA). Importantly, presence of LGE (sensitivity 100%, specificity 62%, ROC 0.81) and basal posterior ECV >33.5% (sensitivity 75%, specificity 85%, ROC 0.83) both identified MVP-MAD pts with previous OHCA.

Conclusion: In patients with MVP and MAD, ECV measurement by CMR identifies patients with a higher incidence of ventricular arrhythmias. The identification of a more specific marker may help refine the (unmet challenge of) sudden cardiac death risk stratification.

Disclosure: Nothing to disclose

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Importance of the relationship between mean pulmonary artery wedge pressure and left ventricular end-diastolic pressure in severe aortic stenosis

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Introduction: There is increasing evidence that the mean pulmonary artery wedge pressure (mPAWP) and the left ventricular end-diastolic pressure (LVEDP) are not interchangeable but may differ substantially, and that this may be clinically relevant. We assessed the difference between mPAWP and LVEDP ($delta_{mPAWP-LVEDP}$) in patients with aortic stenosis (AS), its clinical determinants, and its prognostic impact.

Methods: We studied 335 patients with severe AS (indexed aortic valve area 0.42±0.13 cm^2/m^2, left ventricular ejection fraction (LVEF) 57±12%) undergoing left and right heart catheterization prior to valve replacement. The clinical endpoint was all-cause mortality.

Results: Overall mPAWP was lower than LVEDP (16±8 mmHg vs 21±8 mmHg; p <0.001; mean $delta_{mPAWP-LVEDP}$ -5±7 mmHg). In 88 patients, mPAWP was higher than or equal to LVEDP ($delta_{mPAWP-LVEDP}\geq0$), whereas in 247 patients, mPAWP was lower than LVEDP ($delta_{mPAWP-LVEDP}$ <0). Patients with $delta_{mPAWP-LVEDP}\geq0$ had smaller indexed aortic valve area, lower LVEF, larger left atrial area, higher prevalence of moderate or severe mitral regurgitation, higher mean pulmonary artery pressure, mPAWP, and pulmonary vascular resistance, lower LVEDP and stroke volume index (Table), and higher prevalence of atrial fibrillation. After a median follow-up of 1484 (1064-1944) days, mortality was higher in patients with delta $delta_{mPAWP-LVEDP}\geq0$ vs. <0 (Figure; log rank p <0.001). Every increase in $delta_{mPAWP-LVEDP}$ by 1 mmHg was associated with a 10% higher risk of death (hazard ratio 1.10 (95% confidence interval 1.05-1.15); p <0.001). The mPAWP (hazard ratio 1.07 (95% confidence interval 1.03-1.11); p = 0.001) but not LVEDP was also a predictor of mortality. The area under the receiver operator characteristics curve for the prediction of death was numerically larger for $delta_{mPAWP-LVEDP}$ than for mPAWP (0.71 vs. 0.68).

	deltamPAWP-LVEDP≥0 (n = 88)	deltamPAWP-LVEDP<0 (n = 247)	P value
Indexed aortic valve area (cm2/m2)	0.39±0.10	0.43±0.14	<0.05
LVEF (%)	53±14	59±11	<0.05
Left atrial area (cm2)	28±11	24±5	<0.05
Moderate/severe mitral regurgitation (%)	25	6	<0.05
Mean pulmonary artery pressure (mmHg)	34±13	22±8	<0.05
mPAWP (mmHg)	22±9	14±6	<0.05
LVEDP (mmHg)	18±8	22±7	<0.05
Pulmonary vascular resistance (WU)	2.9±2.0	1.9±0.9	<0.05
Stroke volume index (ml/m2)	31±12	38±9	<0.05

[Table]

Conclusions: $Delta_{mPAWP-LVEDP}\geq0$ characterizes patients with more severe AS, more advanced cardiac dysfunction, a worse hemodynamic profile, and worse long-term prognosis after valve replacement. Thus, the relationship between mPAWP and LVEDP is clinically meaningful in severe AS.

Disclosure: Nothing to disclose

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Short-term changes of body composition and physical capacity following corticosteroid weaning after heart transplantation

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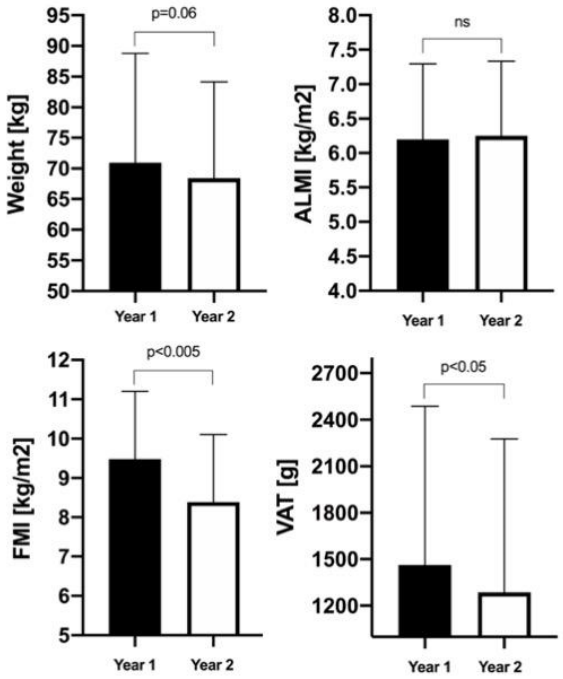
Introduction: Maximal exercise capacity remains limited to the 50-70% level of age-group predicted values in most heart transplant (Htx) recipients. Corticosteroid treatment, an indispensable part of the immunosuppression within the first year after Htx, is known to promote sarcopenia. This pilot study investigated body composition (BC) and maximal aerobic capacity (peak $V0_2$) at 1 and 2 years after Htx.

Method: BC was assessed by Dual-Energy X-Ray Absorptiometry for measurement of Fat Mass Index (FMI), Visceral Adipose Tissue (VAT), and Appendicular Lean Mass Index (ALMI), a surrogate for appendicular skeletal muscle mass. Peak VO2 was determined by standard cardiopulmonary exercise testing.

Results: Table 1 contains patient characteristics (n = 12). Overall, FMI was 9.48±1.72 at 1 year, corresponding to an excess of fat (FMI >9

kg/m2). An 11% reduction of FMI (p = 0.002) and VAT (p = 0.02) were observed at 2 years (figure 1, table 2), while ALMI increased marginally (6.13±1.07 to 6.24±1.08 kg/m2; p = 0.56) to remain in the sarcopenic range for males (ALMI <7.23 kg/m2). In the subgroup of females, ALMI also indicated sarcopenia (<5.67 kg/m2) without significant improvement at 2 years (5.20±0.56 to 5.25±0.52; p = 0.66), but FMI was in the normal range (5-9 kg/m2) and did not decrease significantly (8.72±1.50 to 8.08±1.23; p = 0.27). Of note, females were younger (43.6±12.7 vs 57.1±9.1 years; p = 0.04), with lower BMI at 1 year compared to males (22.2±2.3 vs 26.6±3.8 kg/m2; p = 0.04). Peak VO_2 were always reduced and did not improve significantly (14.7±3.4 to 16.0±5.1 ml/kg/min; p = 0.21), even in patients gaining ALMI (14.7±4.8 to 17.1±7.2; p = 0.27). In patients not increasing ALMI, pronounced loss of weight (-5.4±2.9 kg; p = 0.01) and ALMI (-0.20±0.09; p = 0,004) were observed, without significant change of peak $V0_2$ (14.7±0.6 to 15.6±3.5 ml/kg/min; p = 0.12).



Age at Htx [years]	52.0±12.4
Sex [% male]	58
Weight at Htx [kg]	67.0±13.3
BMI at Htx [kg/m2]	23.5±2.7
Hypertension [%]	0
Diabetes [%]	17
Dyslipidemia [%]	42
Donor age [years]	54.4±15.5
Donor sex [% male]	41
Ischemic time [min]	164±41

[Table 1]

	1 year post-Htx	2 years post-Htx	Difference (year 2 - year 1)	95% CI	p
Prednisone [mg/kg/day]	0.11±0.05	0.04±3.08	-0.075	NA	0.003
Weight [kg]	70.9±17.9	68.4±15.8	-2.54	-5.23 to 0.14	0.061
FMI [kg/m2]	9.48±1.72	8.39±1.71	-1.09	-1.71 to -0.47	0.002
VAT [g]	1462±1025	1287±988	-174.7	-321.6 to -27.7	0.024
ALMI [kg/m2]	6.13±1.07	6.24±1.08	0.04	-0.12 to 0.22	0.546
Peak VO2 [ml/kg/min]	14.7±3.4	16.5±5.6	1.7	-1.2 to 4.7	0.210
Peak VO2 [% of predicted]	53.7±11.4	56.2±15.2	2.4	-7.8 to 12.7	0.059
Heart rate [% of predicted]	68.4±9.1	72.6±12.3	4.2	-2.5 to 11.0	0.188
Anaerobic Threshold [% of predicted pVO2]	30±6.7	32.2±11.1	3.1	-4.2 to 10.5	0.388

[Table 2]

Conclusion: This pilot study shows persistence of sarcopenia in Htx recipients at 2 years after HTx despite of early weaning of corticosteroid treatment. The role of sarcopenia in these patients warrants further exploration.

Disclosure: Nothing to disclose

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To balloon or not to balloon in ECMO dependent low cardiac output - effects of intra-aortic balloon-pump on coronary blood flow

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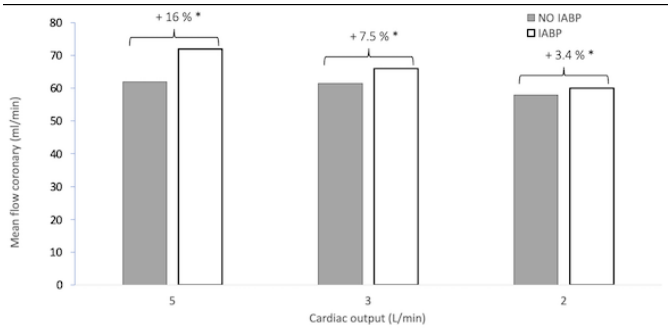
Introduction: Intra-Aortic Balloon Pump (IABP) is a cardiovascular mechanical support option to increase coronary flow and restore pulsatile flow conditions in patients undergoing extra corporeal membrane oxygenation (ECMO) for refractory low cardiac output syndrome. Recent review studies reported different clinical outcomes on those patients. Lack of scientific evidence prompted us to verify the coronary blood flow impact of the combined IABP and ECMO approach in a high fidelity in-vitro setup.

Methods: The in-vitro setup includes a silicon model of the main systemic circulation, connected to a pulsatile pump that replicates the left ventricular (LV) cardiac output (CO). The circuit is filled with glycerol/water to reproduce blood rheology. Progressive heart failure (HF) is simulated through decreasing pump output (CO) from 5->2L/min while keeping overall flow stable at 5l/min by compensating with increasing continuous ECMO flows from 0->3L/min. A pressure driven semi-automatic IABP is added to study changes in coronary flow during each flow scenario and at a heart rate (HR) of 60 and 100 b/min. A novel coronary artery model with synchronized varying resistance simulates the effect of LV contraction and the flow waveform is measured with transonic sensors.

Results: Coronary mean flow at baseline condition (CO 5L/min), for intermediate (CO 3L/min) and severe (CO 2L/min) LV failure level is presented in Fig.1 at an HR of 60/min. IABP increased coronary flow in these three conditions by 16%, 7.5% and 3.4% respectively. When increasing HR to 100/min, IABP increased coronary flow by 6%, 4.5% and 2.5% respectively.



*[Fig 1. Mean coronary flow for different cardiac outputs of 5, 3 and 2L/min for an heart rate of 60/min. * represents the change of coronary mean flow]*

Conclusions: ECMO support remains of key importance in acute cardiogenic shock patients. Clinically added IABP remains matter of debate. Our results show important insights to the contribution of IABP when combined with ECMO impacting favorably coronary flow, depending on the HR and degree of ECMO support in a high fidelity in-vitro model.

Disclosure: Nothing to disclose

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Mid-term results after aortic valve replacement using autologous pericardium

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Introduction: Long-term data from a single centre showed the safety and durability of aortic valve replacement/neocuspidization using autologous pericardium (OZAKI technique). Since validation data from other centres are missing, aim of this study was to analyse the mid-term follow-up data of our first patients that were operated with the OZAKI technique.

Methods: Between September 2015 and May 2017, 35 patients (24 males, median (IQR) age 72.0 (59.0, 76.0) years) suffering from aortic stenosis (AS;n = 10), aortic regurgitation (AR;n = 13) or a combination of both (AS/AR;n = 12), were assigned for an OZAKI procedure. Echocardiographic mid- term follow-up was performed using a standardized examination protocol.

Figure 1. Kaplan-Meier curve showing freedom from death.

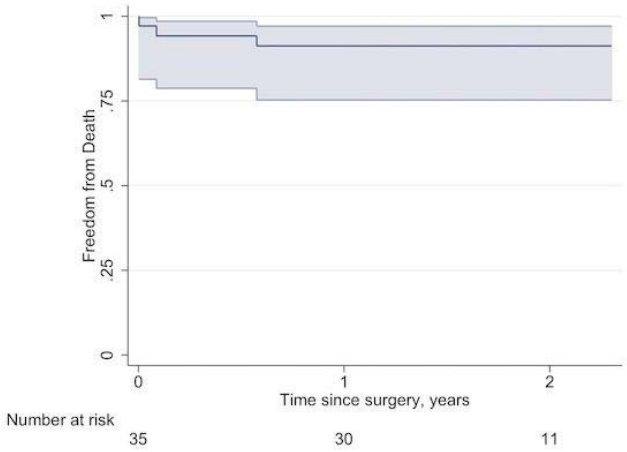
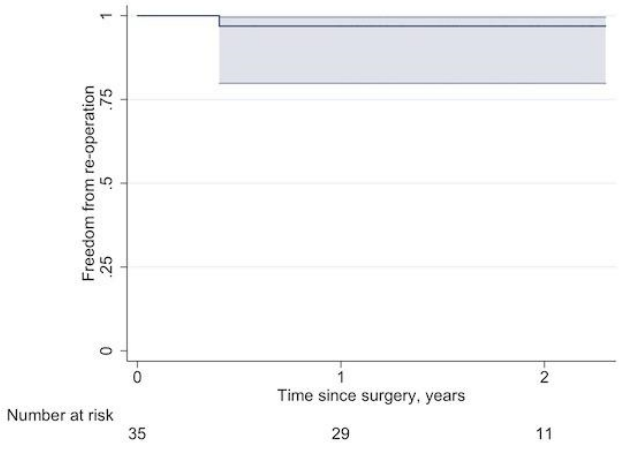


Figure 2. Kaplan-Meier curve showing freedom from reoperation.



Results: Clinical follow-up was completed in 97% of the patients. Median (IQR) follow-up time was 645 (430, 813) days. Mortality rate was 9% (n = 1: aspiration pneumonia; n = 1: unknown; n = 1: anaphylactic shock; Figure 1), and the reoperation rate was 3% (n = 1: endocarditis; Figure 2). No pacemaker implantation was necessary after isolated OZAKI procedures. Echocardiographic follow-up was performed in 83% of the patients (n = 29; median (IQR) time 664 (496, 815) days). Median (IQR) mean and peak gradients were 6 (5,9) mmHg and 12 (8.25, 17) mmHg. Moderate aortic regurgitation was seen in 2 patients (7%). No severe aortic regurgitation or moderate or severe aortic stenosis occurred within the follow-up period.

Conclusion: The OZAKI technique is reliable and reoperation due to structural valve deterioration nil within a mid-term follow-up period. The low rate of moderate aortic regurgitation will be surveilled very closely. Further studies are required to evaluate the significance of this procedure in aortic valve surgery.

Disclosure: Nothing to disclose

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Outcome of transapical and direct transaortic transcatheter aortic valve implantation in high-risk patients

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Objective: Transcatheter aortic valve implantation (TAVI) through alternative surgical access sites is indicated in high-risk patients with aortic valve stenosis and concomitant vascular disease or small vascular diameters. We analysed the clinical outcome of 126 consecutive patients who underwent transapical (TA) and direct transaortic (TAO) TAVI procedures.

Methods: From March 2012 to January 2020, 64 transapical (TA-group) and 62 transaortic (TAO-group) TAVI procedures were performed by an hospital Heart-Teams with balloon-expanding and self-expanding transcatheter valve prosthesis. Clinical data from the two groups were prospectively collected and retrospectively analysed.

Results: Mean age was 80.33±6.37 and 82.18±6.81 years, in the TA and TAO-group, respectively. Female gender was more represented in the TAO-group: 61% vs 33% (p <0.001) while TA-group showed higher prevalence of previous vascular surgery (17% vs 3%, p <0.001), coronary disease (75% vs 58%, p <0.001), previous cardiac surgery (47% vs 3%, p <0.001), previous CABG (39% vs 3%, p <0.001), kidney failure (42% vs 30%) and porcelain aorta (23% vs 3%; p <0.001). EuroSCORE-II was 9.3±9 (TA) and 6±8.8 (TAO). Mean LVEF was 48±15 (TA) and 53±13 (TAO). More patients in the TA group had pulmonary hypertension (45% vs 37%). In total, 95 (75%) Sapien, 28 (22.5%) CoreValve and 3 (2.5%) Accurate valves were implanted. Procedural time was shorter in TA-group (97±27 vs 119±46 minutes) while bailout valve-in-valve for malpositioning was performed in TA-group only (3 cases). 63% of patients were extubated in the hybrid room. Hospital mortality: 6 TA (9%) and 4 TAO (6%). Rethoracotomy for bleeding: 2 TA (3%) and 5 TAO (8%). Stroke was never detected. New pacemakers were 5 (8%) in TA-group and 7 (11%) in TAO-group. Mean hospital stay was 11±6 (TA) and 9±6 (TAO) days. Moderate to severe paravalvular leak was more prevalent in TA (5%) than TAO (3%) patients (p <0.001).

Conclusions: In our study, TA and TAO-TAVI presented different risk profiles and hospital mortality was correctly predicted by EuroSCORE. Transapical procedures were performed faster with a higher incidence of moderate paravalvular leak.

Disclosure: Nothing to disclose

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Prognostic value of health-related quality of life in patients with acute dyspnea

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Background: Previous studies have shown the prognostic value of health-related quality of life (HRQL) in stable chronic heart failure patients. However, it is unknown whether HRQL can predict all-cause mortality in patients presenting to the emergency department (ED) after acute onset of symptoms. In order to address this unmet need, the aim of this study was to assess the prognostic value of HRQL in patients

with acute dyspnea caused by acute heart failure (AHF) and other dyspnea aetiologies for 360-day mortality.

Methods: Basics in Acute Shortness of Breath EvaLuation (BASEL V) is a prospective, multicenter, diagnostic study enrolling adult patients presenting with acute dyspnea to the ED. For this analysis, only patients with a complete set of variables necessary for calculation of EQ-5D (range 0-10) and EQ VAS (range 0-100) at baseline were included. The endpoint was the prognostic value of EQ-5D and EQ VAS at 360 days of follow-up regarding all-cause death. Prognostic accuracy was calculated using c-statistics. In a cox regression analysis EQ-5D was treated as both, a continuous and categorical variable. Adjustments were made for clinically relevant covariates (age, sex, orthopnoea, edema, level of N-terminal pro-B-type natriuretic peptide (NT-proBNP) at presentation, history of coronary artery disease and chronic obstructive pulmonary disease, diuretics, β-blockers and ACE-inhibitors at discharge).

Results: Among 2605 patients enrolled, 1141 (43,8%) had a complete set of variables allowing the calculation of EQ-5D and EQ VAS. Of these patients 594 (52.1%) had an adjudicated final diagnosis of AHF. 211 (18.5%) patients died within 360 days of follow-up. Median EQ-5D was 3 (interquartile range (IQR) 1.5-5) and median EQ VAS was 50 (IQR 40-70). The prognostic accuracy for 360-day mortality was 0.65 (95% confidence interval ((CI) 0.61-0.69) and 0.58 (95 % CI 0.54-0.62) for EQ-5D and EQ VAS, respectively (p = 0.002). The prognostic accuracy of EQ-5D was comparable to that of NT-proBNP (c-statistics 0.69, p = 0.385). In an adjusted cox regression analysis the hazard ratio for patients with EQ-5D >4 was 2.2 (95% CI 1.7-2.9; p <0.001).

Conclusions: In patients presenting with acute dyspnea HRQL is a strong prognostic instrument. Independently of the aetiology of the dyspnea the prognostic value of the generic EQ-5D for 360-day mortality is comparable to NT-proBNP. Patients with an EQ-5D >4 are at significantly higher risk for mortality within 360 days.

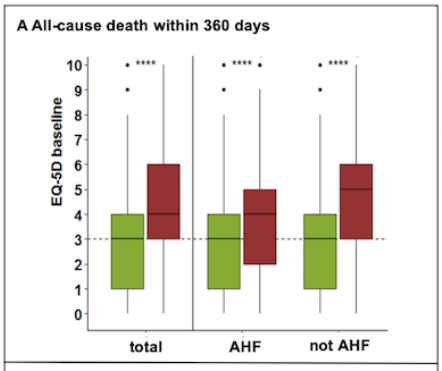

Figure 1A. Baseline EQ-5D of patients presenting with acute dyspnea to ED. Median EQ-5D of whole cohort is marked with vertical line. Boxplots compare patients who died and who lived after 360 days in total cohort and after dividing into two groups regarding their diagnosis.

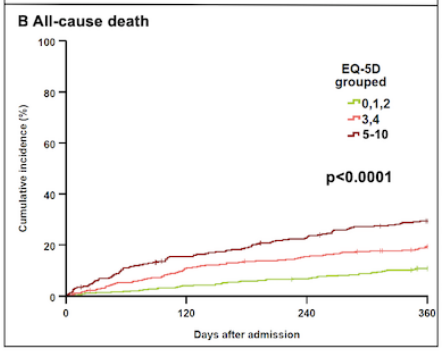

Figure 1B. Cumulative mortality rate over 360 days for EQ-5D grouped into tertials plotted by Kaplan-Meier curves. Patients grouped according their EQ-5D: low-risk group (0-2), moderate-risk group (3,4) and high-risk group (5-10). All-cause death as primary endpoint. P-value calculated with log rank test for overall comparison. All p-values for comparison were calculated with Kruskal-Wallis test, tested two-sided with p<0.05 considered as significant; ****: p<=0.0001; AHF = acute heart failure; ED = emergency department.

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Cytosorb in endocarditis patients undergoing valve surgery

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Background: The Cytosorb Adsorber (Cytosorbents Corporation, USA) is a hemadsorption device designed to eliminate inflammatory mediators during cardiopulmonary bypass (CPB) to decrease inflammatory response and improve outcome. The surgical trauma and the CPB are important triggers for postoperative inflammatory complication. Patient with infective endocarditis have a further increased risk for such complications. The aim of this study is to evaluate outcome of patients with infective endocarditis undergoing valve surgery with perioperative use of Cytosorb.

Methods: In this retrospective single-center database analysis we included all the patients (n = 249) that underwent valve surgery due to infective endocarditis (IE) from 2009 to 2019 at the Department of Cardiac Surgery, University Hospital of Basel. We used inversed probability of treatment weighting to create two comparable groups (Control n = 171 and Cytosorb n = 36). Primary endpoint was in-hospital mortality. Secondary endpoints were length of intensive care unit stay, length of hospital stay and postoperative complications.

Results: After successful propensity weighting, 207 patients (Control: n = 171; Cytosorb: n = 36) were included into the analysis. The primary outcome of In-hospital mortality was not significantly different between the two groups (Control vs. Cytosorb: 8.2 vs. 12.2 %; p = 0.471). Re-operations for bleeding (6 vs. 22 %; p = 0.013) and neurological complications (25.9 vs. 47.5%; p = 0.025) were significantly increased in the Cytosorb® group.

Conclusion: Cytosorb therapy showed no influence on in-hospital mortality, while risk for reoperation due to bleeding was even increased in the Cytosorb group. In summary, no benefits of Cytosorb therapy could be observed in endocarditis patients undergoing valve surgery. Additional analyses are needed to further evaluate the benefits or even potential risks of the Cytosorb Adsorber.

Disclosure: Nothing to disclose

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Myocardial work analysis in left ventricular non-compaction, and its association with cardiovascular outcomes

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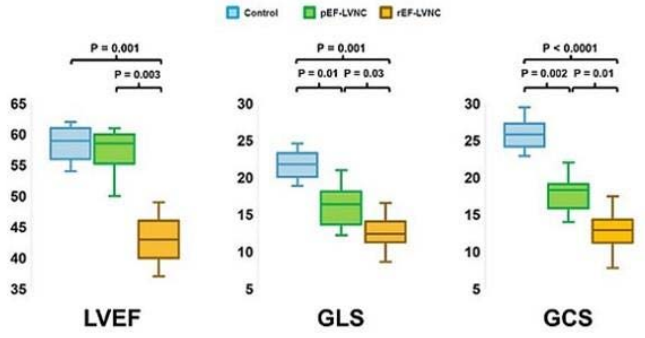
Introduction: Left ventricular (LV) non-compaction (LVNC) is a rare cardiomyopathy characterised by a two-layered LV myocardium with prominent trabeculae separated by deep recesses perfused from the LV cavity. Myocardial work analysis (MWA) is a novel echocardiographic method that calculates pressure-strain loops from longitudinal strain and bedside blood pressure measurement. Our study investigates the MWA features of LVNC patients and their association with outcomes.

Methods: We compared 40 LVNC with preserved LVEF (≥ 50%) (pEF-LVNC) and 40 LVNC patients with reduced LVEF (<50%) (rEF-LVNC) to 40 healthy matched controls. GE EchoPAC® (Version 203) was used for echocardiographic analysis. A combined endpoint was defined as heart failure progression, sustained ventricular tachycardia, thromboembolic accidents, and atrial fibrillation.

Figure 1-A:
Clinical characteristics and echocardiographic findings of the study groups

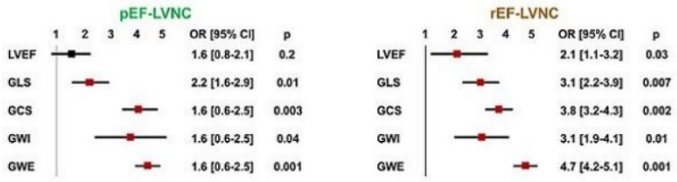
Parameter	Control (n=40)	pEF-LVNC (n=40)	rEF-LVNC (n=40)	Sig.
Clinical characteristics				
Age (years)	44 (25-53)	45 (22-55)	44 (24-56)	NS
Male Gender (n, %)	26 (65%)	26 (65%)	26 (65%)	NS
Heart rate (BPM)	65 (61-94)	66 (65-95)	75 (68-95)	NS
Sys. BP (mm.Hg) at time of echo-study	120 (115-130)	110 (105-128)	105 (95-122)	0.02
Dias. BP (mm.Hg) at time of echo-study	80 (75-84)	75 (70-82)	70 (68-82)	NS
NYHA III-IV	N/A	10 (25%)	20 (50%)	0.04
Echocardiographic characteristics				
LVEF (%)	59 [56-62]	58 [55-60]	43 [41-46]	0.0003
Diastolic dysfunction	0	16 (40%)	24 (60%)	NS
GLS (%)	22.3 [21.4-24.9]	16.3 [14.5-18.6]	12.4 [11.5-14.8]	0.003
GCS (%)	25.8 [24.8-27.4]	18.3 [15.4-19.6]	13.1 [11.8-14.9]	0.001

Figure 1-B: LVEF, GLS, and GCS in control, pEF-LVNC, and rEF-LVNC



Results: Clinical characteristics, conventional echocardiography, and strain analysis results are detailed in Figure 1 (A and B). Myocardial work index was significantly reduced in rEF-LVNC (1088 [138-1211 mm.Hg%]) and pEF-LVNC (1394 [1138-1501 mm.Hg%]) in comparison to control (1827 [1758-1981 mm.Hg%]), but there was no difference between the two LVNC groups. Global constructive work (GCW) was significantly lower in rEF-LVNC (1094 [947-1281 mm.Hg%]) than in pEF-LVNC (1730 [1368-1691 mm.Hg%]) (p = 0.001), while both LVNC groups were lower than control (2201 [1965-2406 mm.Hg%]) (pEF-LVNC p = 0.001, rEF-LVNC p <0.0001). Global wasted work (GWW) was significantly lower in rEF-LVNC (204 [181-231 mm.Hg%]) than in pEF-LVNC (154 [115-171 mm.Hg%], p <0.0001) and control (61 [45-98 mm.Hg%], p <0.0001). Global work efficiency (GWE) was significantly lower in rEF-LVNC (18.3 [15.4-19.6 %], p = 0.001 than in pEF-LVNC and control. In both pEF-LVNC and rEF-LVNC, impaired GWE and GCS were the parameters most significantly associated with increased risk of cardiovascular events as detailed in Figure 2.

Figure 2: Univariate analysis of echocardiographic parameters in association with the study's combined endpoint



Conclusion: MWA is a promising parameter for risk assessment of LVNC patients especially because it is less load-dependent and, unlike LVEF, incorporates left ventricular haemodynamics.

Disclosure: Nothing to disclose

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Direct Comparison of BNP and NT-proBNP for mortality prediction in patients with acute dyspnea

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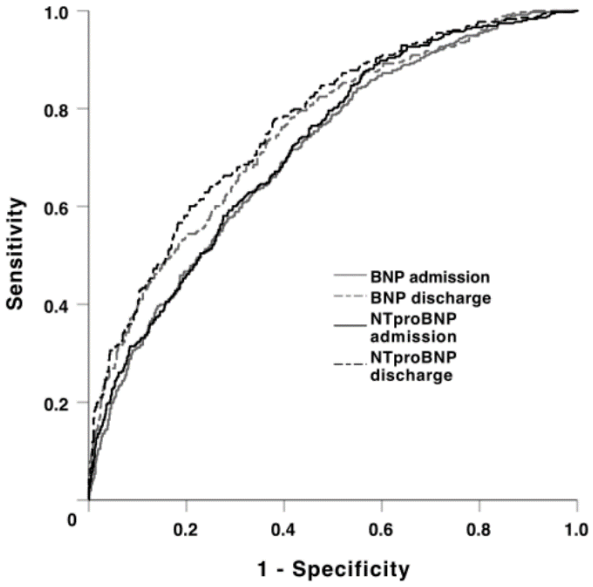
Introduction: It is unclear whether BNP or NT-proBNP, their admission or discharge measurement or percentage change during hospitalization are preferable for mortality prediction in patients with acute dyspnea. We therefore, directly compared BNP and NT-proBNP regarding their potential in mortality prediction in patients with acute dyspnea and in patients with dyspnea due to acute heart failure (AHF).



[Prognostic accuracy of natriuretic peptides for 720-day mortality prediction in acute dyspnea.]

Methods: In a prospective multicenter diagnostic study the presence of AHF was centrally adjudicated by two independent cardiologists among patients presenting with acute dyspnea. The levels of BNP and NT-proBNP were measured at presentation and discharge. Patients were stratified according to their natriuretic peptide response (responders vs. non-responders: natriuretic peptide decrease ≥25% vs. <25% before discharge). Prognostic accuracy for 720-day mortality was quantified using the area under the receiver-operating-characteristic curve (AUC). Cox proportional hazard models were constructed to identify significant predictors for 720-day mortality.

Results: Among 1156 patients presenting with acute dyspnea, 353 (30.5%) died within 720 days of follow-up. Prognostic accuracy for death at 720 days was significantly higher for discharge compared to admission measurements for BNP (AUC 0.750 vs. 0.711, p <0.001) and NT-proBNP (AUC 0.769 vs. 0.720, p <0.001). When directly comparing discharge measurements, NT-proBNP levels exhibited a significantly higher accuracy (p = 0.013). 632 (54.6%) and 600 (51.9%) patients were BNP and NT-proBNP non-responders, respectively. Among BNP and NT-proBNP non-responders 202 (32%) and 207 (34.5%) patients died within 720 days of follow-up. After adjusting for common covariates NTproBNP response was the strongest predictor for 720-day mortality in a Cox regression model (Hazard ratio for NT-proBNP non-responders: 2.096 (95%CI 1.550-2.835), p <0.001). Results were confirmed in a sensitivity analysis of 687 (59.4%) patients with adjudicated AHF.

Conclusion: Percentage change of NT-proBNP during hospitalization seems to be the strongest predictor for long-term mortality in patients with acute dyspnea in general and in those with dyspnea due to AHF in particular.

Disclosure: Nothing to disclose

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Lamin A/C cardiomyopathy: don´t miss it and grasp the nettle

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Introduction: Lamin A/C (LMNA) mutations have been associated with dilated cardiomyopathy (DCM) with variable arrhythmic expression. We investigated prevalence and phenotypic expression of LMNA mutations among patients (pts) with DCM with or without cardiac conduction disorders (CCD) as well as with isolated CCD and/or sinus node dysfunction (SND) referred to our center.

Methods: From January 2005 to December 2019, 14 pts with unexplained isolated DCM, 13 pts with DCM associated with CCD and 5 pts with unexplained isolated CCD and/or SND underwent genetic testing. Family screening was performed among mutation-carriers' (MCs) family members.

Results: Four (31%) LMNA pathogenic mutations were detected in 13 pts with DCM associated with CCD, while no mutation was identified in the pts' groups with pure DCM or isolated CCD/SND. Family screening allowed for diagnosing 3 additional LMNA-MCs. Genotype-phenotype correlation among the 7 LMNA-pts showed a mean age at diagnosis of 49 ±15 years and a mean left ventricle ejection fraction of 44 ±19%. All pts had CCD: 4 (57%) underwent first a pacemaker implantation due to high degree AV block (3 pts) and SND (1 pt) but a defibrillator (ICD) was finally implanted in all pts (100%). Two pts presented with episodes of non-sustained and sustained ventricular tachycardia respectively, while six pts (86%) developed atrial arrhythmias. One pt (14%) experienced aborted sudden death due to ventricular fibrillation, while two (29%) pts underwent heart transplantation. Table 1.

Conclusions: The association of DCM with CCD should strongly raise the suspicion for LMNA cardiomyopathy as confirmed by a 31% prevalence of LMNA mutations among our pts. Genotype-phenotype correlation in our population highlights the heavy clinical burden of LMNA-MCs leading to ICD implantation in all pts and to heart transplantation in 29% of cases. Due to the aggressive clinical course, early diagnosis and prompt therapeutic management are mandatory.

Patient n°	Sex	Left Ventricle Ejection Fraction (LVEF)	Cardiac Conduction Disorders	Supraventricular Arrhythmias	Ventricular Arrhythmias	Device	ICD indication	Heart transplantation	Mutation
1	M	61 -> 44	II° Mobitz I and III° atrioventricular block	Atrial fibrillation	Sustained ventricular tachycardia (SVT)	PM -> CRT-D	SVT, LVEF, male sex, non-missense mutation	No	c.76_80delATCAC
2	F	50	I° and paroxystic III° atrioventricular block + sinus node dysfunction	No	Non-sustained ventricular tachycardia (NSVT)	PM -> ICD	NSVT, non-missense mutation	Yes	c.568C>T
3	F	15	Multilevel atrioventricular block	Atrial flutter	No	PM -> ICD	LVEF	Yes	c.1129C>T
4	M	50	I° atrioventricular block	Atrial fibrillation	No	ICD	male sex, non-missense mutation	No	c.1129C>T
5	M	20	High degree atrioventricular block	Atrial fibrillation	Ventricular fibrillation (VF)	PM -> CRT-D	VF, LVEF	No	R377H
6	M	64	I° atrioventricular block, incomplete right bundle branch block and left anterior hemiblock	Atrial flutter	No	ICD	male sex, non-missense mutation	No	R377H
7	M	46	I° atrioventricular block -> III° atrioventricular block	Atrial fibrillation, atrial flutter	No	ICD -> CRT-D	male sex, non-missense mutation	No	R377H

[Patients' clinical characteristics]

Disclosure: Nothing to disclose

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Use of induction therapy in pediatric heart transplant recipients in Switzerland

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Background: Evaluation of induction therapy practice in a national pediatric heart transplant program.

Methods: Retrospective analysis of the Swiss Transplant Cohort Study (STCS). Ethical approval as well as approval by the STCS were granted.

Results: Between 05/2008 and 6/1/2018 347 heart transplantations were registered within the database. Out of these 32 transplants were done in 31 patients (11♂ , 20♀) <19ys of age in four centers. Twelve patients (38%) were bridge with a VAD to transplant. One patient received a re-transplant. There were no combined transplants with other organs.

Mean age at time of transplant was 7.6 years (±1.1). 11 patients were on a VAD prior to transplant. Primary diagnosis were: DCMP (22), CHD other than DCMP (4), other (5). All donors were brain dead donors. Mean Ischemic time was 123 minutes (±13.8). Compared to adults where 4.1% of patients received no induction therapy it was given at a median of 4 days (1-63) in all patients of the study group (9 patients received IL2 receptor antibodies, 23 anti-thymocyte globulin) as well as corticosteroids. Corticosteroids were stopped after a median of 261 days (range 1-1079). There were 7 donors EBV+ on EBV- recipients whereas 9 patients were constellation dCMV+, rCMV-. Median follow up time was 2.96 years ranging from 106 days to 8.1 years. There were no PTLD in the follow up. Six patient died within the observed time period. There were 24 rejection episodes > 1a in 32 patients.

Median time to first treated rejection was 233 days (±SD 727) without significant difference if treated with IL2 or ATG (p:0.5).

Conclusion: Induction therapy is widely accepted in Switzerland. Negative long term effects especially PTLD were not reported.

Disclosure: Nothing to disclose

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Effect of comprehensive vasodilation vs usual care on mortality and heart failure rehospitalization in women with acute heart failure

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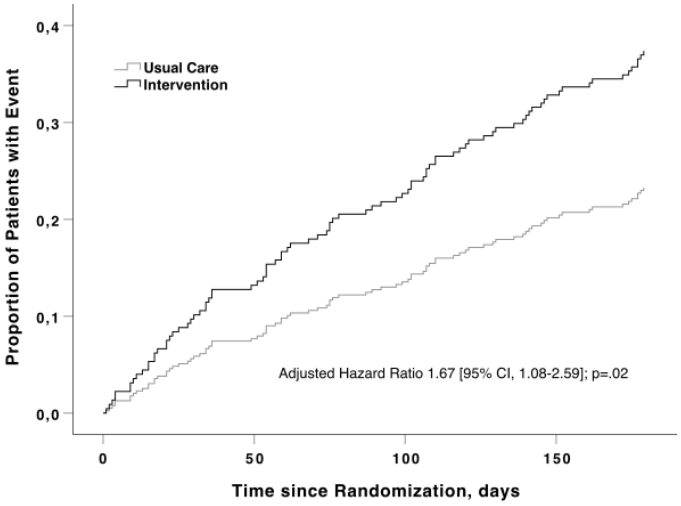
Introduction: Guidelines recommend evaluating the risk/benefit ratio of novel therapies individually in women and men, as the pathophysiology and the response to treatment may differ between women and men. Among patients with acute heart failure (AHF), a strategy of intensive vasodilation, compared with usual care, overall did provide comparable outcomes. We therefore, evaluated the effect of a strategy that emphasized early intensive and sustained vasodilation in women with AHF.

Methods: In a randomized, open-label blinded-end-point trial patients hospitalized for AHF were enrolled in 10 hospitals in Switzerland, Bulgaria, Germany, Brazil, and Spain. Inclusion criteria were AHF expressed by acute dyspnea and increased plasma concentrations of natriuretic peptides, systolic blood pressure ≥100mmHg, and a plan for treatment in a general ward. Patients were randomized 1:1 to a strategy of early intensive and sustained vasodilation throughout the hospitalization or usual care. The primary end point was a composite of all-cause mortality or rehospitalization for AHF at 180 days.

Results: Among 788 patients randomized, 781 completed the trial and were eligible for the primary end point analysis. Of these 288 (36.9%) were women. The primary end point, a composite of all-cause mortality or rehospitalization for AHF at 180 days, occurred in 53 female patients (37.9%) in the intervention group (including 28 deaths [20.0%]) and in 34 female patients (23.0%) in the usual care group (including 22 deaths [14.9%]) (absolute difference for the primary end point, 14.9%; adjusted hazard ratio, 1.67 [95%CI, 1.08-2.59]; P = .02). Clinically significant adverse events with early intensive and sustained vasodilation vs usual care included hypotension (8% vs 2%).



[Cox proportional hazard curves among women treated with intensive vasodilation vs. usual care.]

Conclusion: Among women with AHF, a strategy of early intensive and sustained vasodilation, compared with usual care, had a detrimental effect on a composite outcome of all-cause mortality and AHF rehospitalization at 180 days.

Disclosure: Nothing to disclose

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Effect of a strategy of comprehensive vasodilation vs usual care on health-related quality of life in patients with acute heart failure

M. Belkin[1], D. Wussler[1], I. Strebel[1], N. Kozhuharov[1], E. Michou[1], Z. Sabti[1], J. Walter[1], A. Goudev[2], D. Flores[1], M.T. Maeder[3], S. Shrestha[1], D. Menosi Gualandro[1], M. Tavares de Oliveira Junior[4], R. Kobza[5], H. Rickli[3], T. Breidthardt[1], T. Münzel[6], P. Erne[5], C. Mueller[1]

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Background: Early initiation of high-dose intravenous nitrates improved outcomes in acute heart failure (AHF) with severe pulmonary edema. However, in a recent randomized controlled trial aggressive preload and afterload decrement in patients with AHF did not significantly improve all-cause mortality or AHF reshospitalisation. Beyond these classical endpoints, patient reported outcomes including symptoms that lead to physical and social limitations are of major importance. It is unknown, whether early aggressive vasodilatation may improve health-related quality of life (HRQL).

Methods: Goal-directed AfterLoad Reduction in Acute Congestive Cardiac Decompensation Study (GALACTIC) was a prospective, multicenter, randomized, interventional controlled trial enrolling adult patients presenting with AHF. HRQL was assessed after admission by disease-specific Kansas City Cardiomyopathy Questionnaire (KCCQ) and generic EQ-5D. We focused on the development of KCCQ total symptom and overall score (KCCQ-tss; KCCQ-os) and of the 5 dichotomized dimensions of EQ-5D (no/any problems) over a period of 180 days. Changes were compared between the intervention and the standard care group using empirical bootstrap to estimate the variation of point estimates.

Results: Among 781 patients 171 (22%) and 269 (34%) had completed KCCQ and EQ-5D, respectively. In both analysed samples intensive vasodilatation and standard care groups were equally proportioned (53% and 52% of patients in intervention group) and had comparable baseline

characteristics including HRQL. Among adverse events, dizziness, headache and hypotension were more frequent in the intervention group. After 180 days KCCQ-tss and KCCQ-os had improved similarly in both groups (median change of KCCQ-os 24 (interquartile range (IQR) 7 - 47) vs 24 (IQR 8 - 45); p-value for comparison 0.749). The only dimension of EQ-5D which differed significantly was anxiety/depression. The standard care group had 1 (1%) patient less with anxiety/depression compared to baseline; in contrast, additional 16 (11%) patients in the intervention group had anxiety/depression after 180 days (p-value 0.045).

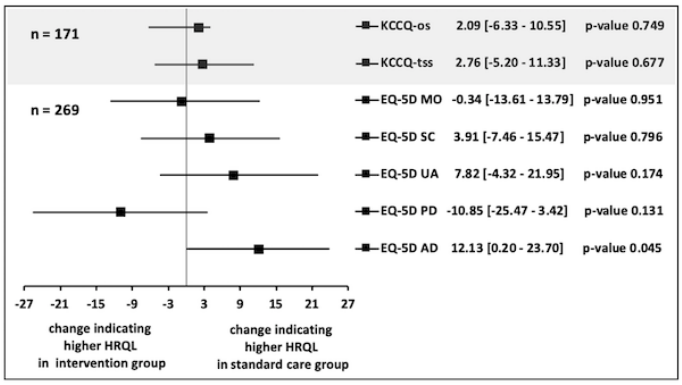

Figure 1. Differences in change of health-related quality of life status between standard care and intensive vasodilatation group after 180 days of follow up. 171 patients had a complete set of variables to calculate KCCQ-os and 269 patients completed the EQ-5D questionnaire. Changes after 180 days of follow up were compared between standard care and intensive vasodilatation group with bars intersecting vertical line representing no significant difference in change. Calculation of change with 95 % confidence interval was done using empirical bootstrap method. P-values were tested two-sided with p<0.05 considered as significant; AD = anxiety/depression; HRQL = health-related quality of life; KCCQ = Kansas City Cardiomyopathy Questionnaire; KCCQ-os = KCCQ overall score; KCCQ-tss = KCCQ total symptom score; MO = mobility; PD = pain/discomfort; SC = self-care; UA = usual activities.

Conclusions: Among patients with AHF, a strategy of early intensive and sustained vasodilation, compared with usual care, did not significantly improve HRQL measured by disease-specific and generic instruments at 180 days. Increased anxiety/depression after aggressive vasodilatation could be consequences of more frequent adverse events.

Disclosure: Dr Goudev reported receiving personal fees (speaking honoraria and advisory board membership) from Pfizer, Novartis, AstraZeneca, and Amgen. Dr Walter reported receiving grants from the Swiss Heart Foundation and the Swiss Academy of Medical Sciences. Dr Gualandro reported receiving personal fees from Servier. Dr Kobza reported receiving grants from Biosense Webster, Biotronik, Medtronic, Abbott, SIS Medical, and Boston Scientific. Dr Münzel reported being the principal investigator of the DZHK (German Center for Cardiovascular Research) Partner Site Rhine-Main. Dr Mueller reported receiving grants from the Swiss National Science Foundation, the Swiss Heart Foundation, the Foundation for Cardiovascular Research Basel, and the Stanley Johnson Foundation; grants, personal fees, and nonfinancial support from Roche Diagnostics, Singulex, and Brahms; personal fees from Novartis, Cardiorentis, and Boehringer Ingelheim; and grants and nonfinancial support from Abbott. No other disclosures were reported.

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ARVC specific autoantibodies identify cardiac sarcoidosis and correlate with inflammation activity

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Introduction: Cardiac sarcoidosis (CS) is an inflammatory granulomatous disease of unknown origin. CS and arrhythmogenic right ventricular cardiomyopathy (ARVC) are overlapping syndromes. With both, patients are at increased risk of ventricular arrhythmias and sudden cardiac death. However, the diagnosis of CS is challenging, especially in patients with no extracardiac involvement, but correct diagnosis has large therapeutic impact. Recently, a novel diagnostic autoantibody (anti-DSG2 Ab) was identified in ARVC. We sought to identify this antibody in CS patients and correlate its levels with inflammation activity using cardiac positron-emission-tomography (18-FDG-PET).

Methods: Recombinant human desmoglein-2 (DSG2) proteins on western blots were exposed to sera as well as purified IgG of 14 patients with CS (all confirmed by histology) and 6 controls (1 ARVC patient (positive control) and 5 healthy subjects (negative control)). Clinical patient characteristics were correlated to detected antibody intensity levels.

Results: Anti-DSG2 Abs were identified in 43 % (6/14) and were detected faintly (below cut off level) in 21 % (3/14) of all CS patients. Antibody was also present in the ARVC patient (1/1). Antibody was absent in all (5/5) control subjects. Myocardial inflammation was present on 18-FDG PET imaging in all CS patients with positive anti-DSG Abs, corresponding to an average SUVmax (standardized uptake value) of 8.1 ± 4.2. In patients with faint or no antibody, the SUVmax values were significantly lower with 1.2 ± 2.1 and 3.2 ± 4.0, respectively (P = 0.044, one-way ANOVA). The Pearson correlation coefficient (R) was 0.6 (P = 0.037) for SUV vs. higher antibody levels assessed by pixel count of the western blot bands for purified IgG.

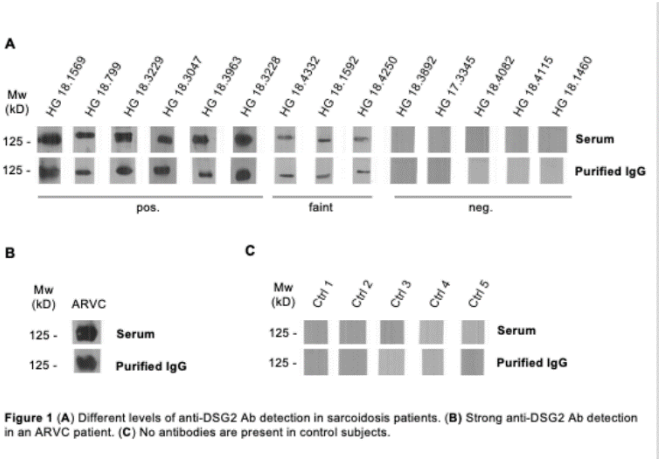

Figure 1 (A) Different levels of anti-DSG2 Ab detection in sarcoidosis patients. **(B)** Strong anti-DSG2 Ab detection in an ARVC patient. **(C)** No antibodies are present in control subjects.

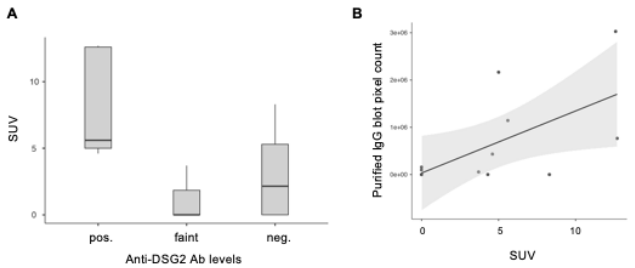

Figure 2 (A) Correlation of SUVmax values assessed by 18-FDG PET cardiac imaging to different levels of anti-DSG2 Ab detection (P=0.044, one-way ANOVA). **(B)** Pearson correlation coefficient (R) = 0.6 (P=0.037) for SUV vs. antibody levels assessed by pixel count of the western blot bands for purified IgG.

Conclusions: Anti-DSG2 Abs are not only a specific biomarker for ARVC, but are also found in CS, suggesting a similar pathophysiological mechanism in these overlapping syndromes, both involving cardiac inflammation and myocyte cell death. Antibody levels seem to correlate with disease activity on cardiac PET imaging. Larger cohorts are necessary to confirm these findings.

Disclosure: Nothing to disclose

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Prognostic value of disease-specific health-related quality of life in patients with acute heart failure

M. Belkin[1], D. Wussler[1], I. Strebel[1], N. Kozhuharov[1], E. Michou[1], Z. Sabti[1], J. Walter[1], A. Goudev[2], D. Flores[1], M.T. Maeder[3], S. Shrestha[1], D. Menosi Gualandro[1], M. Tavares de Oliveira Junior[4], R. Kobza[5], H. Rickli[3], T. Breidthardt[1], T. Münzel[6], P. Erne[5], C. Mueller[1]

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Background: Despite the striking progress made in the treatment of heart failure, rehospitalisation rate and mortality remain a major unpredictable problem. Previous studies have shown the prognostic value of

health-related quality of life (HRQL) in stable chronic heart failure patients. However, it is unknown, whether HRQL can predict all-cause mortality or rehospitalisation in acute heart failure (AHF). In order to address this unmet need, the aim of this study was to assess the prognostic value of HRQL in patients presenting after acute onset of symptoms.

Methods: Goal-directed AfterLoad Reduction in Acute Congestive Cardiac Decompensation Study (GALACTIC) was a prospective, multicenter (n = 10), randomized, interventional controlled trial enrolling adult patients presenting with AHF. HRQL was assessed after admission by Kansas City Cardiomyopathy Questionnaire (KCCQ). We focused on the prognostic value of KCCQ overall score (KCCQ-os) and explored its association with all-cause mortality, all-cause rehospitalisation and AHF rehospitalisation at 180 days of follow-up. Patients were grouped according to their KCCQ-os: high-risk (0 to 25), moderate- to high-risk (>25 to 50), low- to moderate-risk (>50 to 75) and low-risk group (>75-100). Cumulative incidences were displayed in Kaplan-Meier curves and groups were compared by log rank tests (figure 1). Adjustment was made using logistic regression models.

Results: Among 781 patients 367 (47%) had a complete set of variables to calculate KCCQ-os. Over 180 days out of 367 patients 45 (12%) died and 168 (46%) were hospitalised for any reason, 74 (20%) of which due to AHF. Median KCCQ-os was 41 (IQR 27-62), with 19% of patients attaining the high-risk group and 10% the low-risk group. Patients from the low-risk group had significantly less AHF rehospitalisation events compared to the other 3 quartiles (p-value for comparison between high- and low-risk group 0.023). After adjusting for common covariates the odds ratio (OR) of the low- and the high-risk group differed significantly (OR of low-risk group 0.172; 95% confidence interval 0.035-0.843; p = 0.030). In contrast, KCCQ-os did not allow to predict mortality or all-cause rehospitalisation.

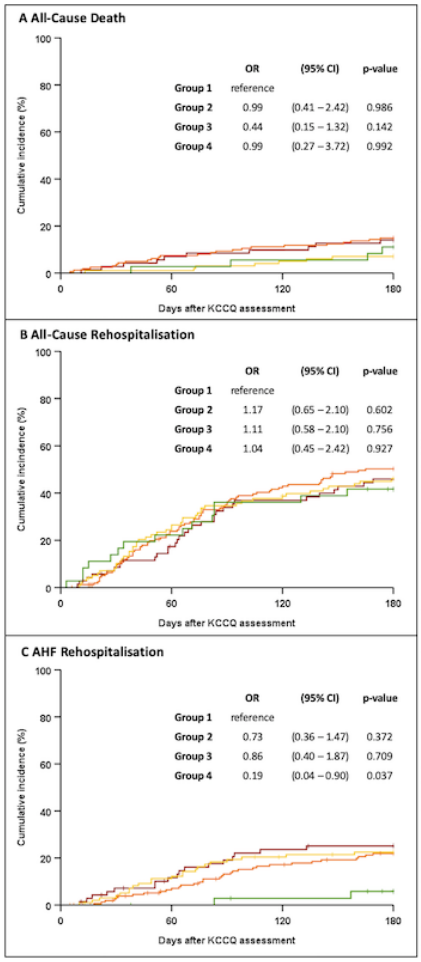

Figure 1. Kaplan–Meier Curves for All-Cause Death (A), Rehospitalisation for Any Cause (B), and AHF Rehospitalisation (C). Patients grouped into quartiles according their KCCQ-os: high-risk group 1 (<25), moderate- to high-risk group 2 (25 - <50), low- to moderate-risk group 3 (50 - <75) and low-risk group 4 (75-100). Odds ratios below 1 denote a lower incidence of events than in reference group 1. Adjustment was made using clinically relevant and validated covariates (age, history of coronary artery disease, rehospitalisation for heart failure in the last 12 months, edema and chest pain on entry, renal insufficiency (estimated glomerular filtration rate <60 mL/min/m^2), β-blockers and diuretics at discharge. KCCQ-os was treated as categorical variable with a significant pairwise log rank test between group 4 and the other groups (p-value = 0.016 comparing group 1 and group 4). P-values were tested two-sided with p<0.05 considered as significant.

[Figure 1 Cumulative incidence of all-cause death, all-cause rehospitalisation, AHF rehospitalisation]

Conclusions: Health status, measured by KCCQ among those patients with AHF, is strongly associated with rehospitalisation for heart failure, but not mortality or all-cause rehospitalisation. AHF patients with high KCCQ-os are unlikely to be readmitted for AHF in 180 days.

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Is the sutureless Perceval-S aortic valve safe for bicuspid aortic valve replacement?

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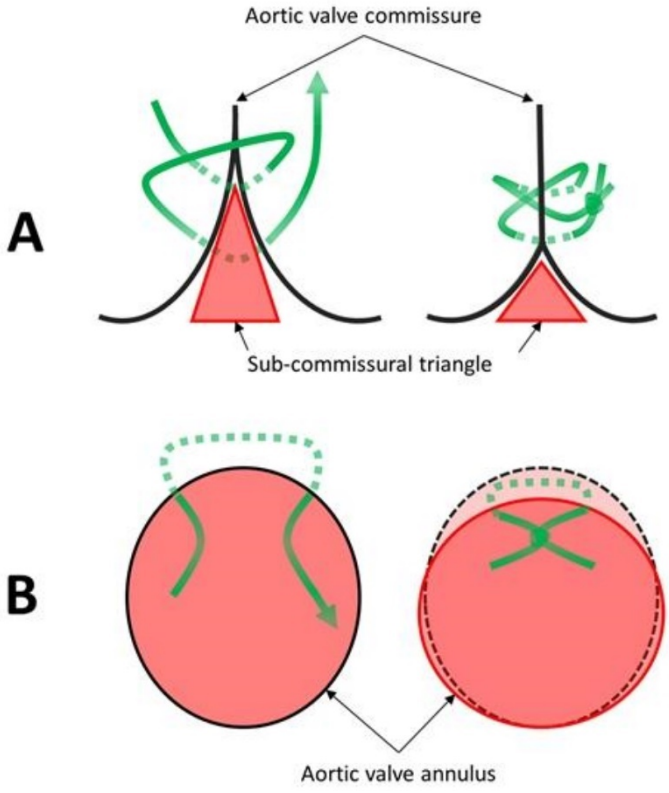
Introduction: Sutureless bioprostheses offer a reliable and accepted alternative in aortic valve replacement (AVR) for severe aortic stenosis. Initially reserved for AVR of calcified tricuspid valves, their use has gradually spread to situations considered marginal, like bicuspid aortic valve (BAV). Here we present the feasibility and short-term outcome of using the Perceval-S valve in BAV.

Method: All patients who underwent an AVR with a Perceval-S, from March 2015 to December 2019, were reviewed retrospectively. We included those with confirmed intraoperative BAV, regardless of whether another procedure was associated. According to the frequent ovoid shape of the aortic annulus, the surgeon could perform a sub-commissural annuloplasty (SCAP) to improve the valve anchoring (figure 1). The primary endpoint was success of the implantation defined by a good functioning of the valve, without greater than trivial paravalvular leak. Secondary endpoints were in-hospital mortality, stroke, pacemaker requirement and measurement of the valve gradients.



Results: One hundred and twenty-two patients received a Perceval S during the study period, of which 17 (35% women) had BAV, all of them Sievers type 1. Eleven patients (65%) required SCAP before implantation in order to ensure better anchoring of the Perceval-S. Only one (6%) implantation failed and required to change for a sutured valve. In-hospital mortality was zero. There was no stroke, only one AV-block (6%) required a pacemaker implantation. The peak and mean gradients decreased from 69 ± 28.14 mmHg and 44 ± 18.20 mmHg to 22 ± 9.18 mmHg and 12 ± 4.36 mmHg, respectively, and no paravalvular leak was detectable on the echocardiography before discharge.

Conclusions: Perceval-S implantation in BAV Sievers type 1 is safe and feasible, but a SCAP is often helpful to ensure its anchoring. Larger studies and longer follow-up remain necessary in order to validate this practice.

Disclosure: The cardiac surgery department is supported by Livanova for the SURE-AVR registry.

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Novel echocardiographic methods for outcome prediction in patients with arrhythmogenic right ventricular cardiomyopathy

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Introduction: Echocardiography plays an important role in the diagnosis of Arrhythmogenic Right Ventricular Cardiomyopathy (ARVC). It is not known whether tissue Doppler imaging (TDI) alone or in combination with other echocardiographic parameters is useful for predicting outcome in ARVC. In this study, we aimed at understanding the association of different functional echocardiographic parameters including TDI with outcome in ARVC.

Methods: We studied 63 ARVC patients, 54 patients (86%) with definite and 9 (14%) with borderline ARVC according to the 2010 Task Force Criteria. Clinical and echocardiographic parameters including TDI and speckle tracking derived deformation analysis were collected over a median follow-up time of 1935 days.

The composite endpoints examined are described as first combined endpoints including cardiovascular mortality and heart transplantation (7 patients, 11 %) and second combined endpoint including all sustained ventricular arrhythmias (21 patients, 33 %).

Results: Cardiovascular Mortality was significantly associated with changes in right-sided chamber morphology and function such as right ventricular (RV) end diastolic area (EDA) (β = 1.14, p = 0.002), right atrial (RA) diameters (β = 4.17, p = 0.001), and tricuspid annulus plan systolic excursion (TAPSE) (β = 1.43, p = 0.001). A decline in left ventricular (LV) ejection fraction was associated as well (β = 1.08, p = 0.004). Furthermore, cardiovascular mortality was significantly associated with systolic RV and LV TDI-derived parameters such as tricuspid S' (β = 1.48, p = 0.029), septal S' (β = 2.13, p = 0.037) and lateral S' (β = 1.58, p = 0.029). Endocardial RV global longitudinal strain (GLS) also displayed association (β = 1.58, p = 0.001) with events. Similarly, sustained ventricular arrhythmias were significantly associated with RV EDA (β = 1.05, p = 0.014), FAC (β = 1.05, p = 0.015), and TAPSE (β = 1.119, p = 0.011). Furthermore, ventricular arrhythmias were associated with RV and LV systolic TDI-derived parameters such as tricuspid S' (β = 1.275, p = 0.015) and septal S' (β = 1.362, p = 0.023). RV GLS (β = 1.204, p = 0.007) also was associated with events.

Conclusion: TDI derived parameters were significantly associated with mortality and ventricular arrhythmias in ARVC patients. Hence, TDI is useful for outcome prediction in echocardiographic evaluation of ARVC. This is particularly interesting because TDI measurements are relatively easy to obtain, in particular in patients with difficult echocardiographic windows.

Disclosure: Nothing to disclose

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One shot Del Nido versus Buckberg cardioplegia for minimally invasive aortic valve replacement

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Introduction: Del Nido cardioplegia (DLC) is frequently used for myocardial protection during adult cardiac surgery with acceptable safety and efficacy. The advantage of single-dose cardioplegia is appreciated especially in minimally invasive surgery. We introduced DLC 3 years ago with promising outcomes and retrospectively assessed its potential impact to operative times, postoperative myocardial injury and early outcomes.

Methods: A total of 123 consecutive isolated minimally-invasive aortic valve replacement were analyzed. From August 2003 to June 2015 the prevalent approach was right anterior minithoracotomy and Buckberg cardioplegia (BC) (n = 56). From July 2015 to December 2019 the prevalent approach was upper ministernotomy and DLC (n = 66). Intraoperative and postoperative data were retrospectively reviewed and compared using t-test and chi-squared test.

Results: The two groups were comparable except for gender (p = 0.01). No difference in age, ejection fraction and Euroscore. No death in neither group. Mean operation- and CPB-times were statistically longer in BC group (p = 0.001). In the DNC group there was a statistically significant less need for defibrillation after cross-clamp release (p <0.001). Patients in BC group received more blood transfusions during CPB (P <0.001). The maximum Creatine Kinase-MB (CK-MB) at 6 hours postop, incidence of atrial fibrillation and postoperative length of stay were similar.

Variables	Buckberg Group (n = 56)	Del Nido Group (n = 66)	p value
Operation time (min, mean±SD	229±45.5	200.8±44.3	0.001
CPB time (min, mean±SD)	121.9±36.8	89.5±29.7	<0.001
Cross-Clamp time (min, mean±SD)	73.2±17.3	69±21.1	0.2
Blood transfusions during CPB (n,%)	22 (39.3%)	6 (9.1%)	<0.001
Internal defibrillation (n, %)	37 (66.1%)	11 (16.7%)	<0.001
Maximum CK-MB (U/l, mean±SD	65.3±99.7	49.2±91.6	0.3
Post op atrial fibrillation (n, %)	21 (37.5%)	25 (37.9%)	1
Rethoracotomy (n, %)	8 (14.3%)	4 (6.1%)	0.1
30-days mortality (n, %)	0	0	/

[Opertive and postoperative variables]

Conclusion: One-shot DNC allows for a smooth and more comfortable minimally invasive surgery. It provides adequate myocardial protection, shows significantly more spontaneous return of regular heartbeat compared to BC, allows for less CBP time with consequently less blood transfusions.

Disclosure: Nothing to disclose

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Impact of genetic reclassification on ARVC diagnosis based on the 2010 task force criteria

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Introduction: Arrhythmogenic Right Ventricular Cardiomyopathy (ARVC) is an inherited condition, which is associated with potentially life-threatening ventricular arrhythmias in the young. Approximately 60% of

patients carry a possibly disease-causing genetic variant. The aim of this study was to investigate the impact of the 2015 American College of Medical Genetics (ACMG) Criteria on ARVC diagnosis based on the 2010 Modified Task Force Criteria (TFC).

Methods: The study included 79 patients from the Swiss ARVC Registry who harbored a genetic variant at initial screening deemed to be associated with the disease, and classified them as definite, borderline or possible ARVC. Every variant found was re-classified on Varsome Genetics, based on the 2015 ACMG Criteria. Clinical information was then assessed at last available follow-up of every patient and ARVC diagnosis was reclassified based on the newest genetic evidence available.

Results: In 42 out of 79 patients (53.2%), genetic variants were reclassified. Out of these, 33 variants (41.8%) were downgraded from pathogenic (P) / likely pathogenic (LP) to either variants of unknown significance (VUS) or benign (B) / likely benign (LB). Three patients (3.8%) were upgraded from LB / VUS / LP to P. Out of the 12 variants initially classified as VUS, 9 (75%) were reclassified as B or LB. Overall, 13 patients (16.5%) were downgraded from their initial diagnosis (11 from definite to borderline and 2 from borderline to possible).

Conclusion: A significant proportion of patients with an ARVC diagnosis based on the 2010 TFC were reclassified when the 2015 ACMG Criteria were taken into consideration. These findings may have clinical consequences, particularly for genetic cascade screening of family members of ARVC patients, and necessitate reassessment of genetic variants of index patients who were previously diagnosed with ARVC.

Disclosure: Nothing to disclose

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Our experience in sutureless aortic valve replacement Intuity™ vs Perceval™

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Introduction: Sutureless aortic valves are feasible to reduce cross clamping time and show good hemodynamic performance with elevated pacemaker rates. In literature some cases of thrombocytopenia are described after sutureless valve implantations. We investigated the Sorin™ Perceval Sutureless Valve and the Edwards™ Intuity Sutureless valve regarding postoperative outcome and the hemodynamic performance.

Methods: 79 patients underwent aortic valve replacement using a sutureless valve in a single center between 2015 - 2018. 37 patients received Sorin™ Perceval (Group A) and 42 Edwards™ Intuity (Group B). Combined surgery with myocardial revascularization was performed in 23 patients in Group A and 22 patients in Group B. We compared the groups regarding postoperative TEE, postoperative ECG, especially need for pacemaker implantation, postoperative platelet count and 30 day mortality.

Results: Only in Group B 2 patients had paravalvular leakage and 1 was reoperated within the same hospital stay. In Group A 9 patients suffered from postoperative atrial fibrillation, in Group B 16 patients. Upon discharge only 2 patients in Group A needed oral anticoagulation due to persistent atrial fibrillation, in Group B 9 patients which is statistically significant (G-square = 121.72, p <0.0001). Left bundle branch block (LBBB) was observed in 5 patients in Group A and 13 patients in Group B. 1 patient in Group A needed a definite pacemaker and 4 patients in Group B. Tachy-Brady Syndrome and LBBB were observed more frequently in Group B (Fisher-Freeman-Halton exact p = 0.0218) as well as ECG alterations in general (Fisher-Freeman-Halton exact p = 0.0244). Aortic valve mean gradient upon discharge was ±13,43 mmHg in Group A and ±14,5 mmHg in Group B. One patient died within 30 days in Group A due to multiorgan failure. This patient was older and multimorbid compared to the average. Regarding platelet count we saw statistically significant decrease (95% CI, p <0.0001) in both groups (110x10^9/L Group A, 170x10^9/L Group B). There were no major bleeding complications or reoperations due to hemorrhage.

Conclusion: Our data shows that sutureless aortic valve replacement is associated with new postoperative ECG alterations which are self-limiting in most cases. Compared to literature pacemaker implantation rate in Group B is higher. In Group A pacemaker rate was lower, than in literature described. Regarding platelet counts further investigations are necessary.

Disclosure: Nothing to disclose

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Incidence and prognostic impact of positive hs-cTnT in hospitalized patients with influenza infection: the Myo-Flu pilot study

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Background and aim: estimate of cardiac involvement associated with seasonal influenza pandemics is lacking. Our aim was to evaluate prevalence of positive high-sensitivity cardiac T troponin in consecutive patients (pts) with laboratory-confirmed influenza infection as a marker of flu-related cardiac involvement.

Materials and methods: Multicentre prospective observational pilot study with regional enrollment (Ticino Canton). All hospitalized pts with laboratory-confirmed influenza infection were evaluated with hs-cTnT after exclusion of concomitant causes for troponin rise during 2018-2019 seasonal pandemic. Primary end-point was the prevalence of pts with positive troponin (hs-cTnT >15 ng/L, TROP+) while in-hospital mortality was set as a secondary endpoint.

	All patients	Troponin positive	Troponin negative	p value
Number of patients	147	92	55	
Male sex, %	66 (45)	43 (46)	23 (42)	0.562
Age, years	75 (66-84)	80 (71-88)	70 (54-80)	**<0.001**
Risk factors				
Family History, %	6 (4)	3 (3)	3 (5)	0.515
Smoking, %	28 (14)	17 (18)	11 (20)	0.741
Dyslipidemia, %	59 (40)	43 (47)	16 (29)	**0.035**
Hypertension, %	93 (63)	65 (70)	27 (50)	**0.016**
Diabetes, %	32 (22)	22 (24)	10 (18)	0.415
BMI> 30, %	13 (9)	8 (9)	5 (9)	0.935
Comorbidities				
OSAS, %	8 (5)	7 (8)	1 (2)	0.134
COPD, %	29 (20)	21 (23)	8 (15)	0.222
CAD, %	20 (14)	13 (14)	7 (13)	0.810
LVEF<50%, %	2 (1)	2 (2)	0 (0)	0.271
PVD, %	22 (15)	13 (14)	9 (16)	0.713
Previous stroke/TIA,%	16 (11)	15 (16)	1 (2)	**0.006**
Laboratory findings				
Creatinine (umol/L)	86 (67-109)	93 (73-121)	79 (64-94)	**0.002**
Hemoglobin (g/L)	132 (120-142)	128 (118-142)	135 (124-145)	0.167
C reactive protein (mg/L)	35 (14-60)	40 (19-66)	25 (10-58)	**0.049**
hs cTnT (ng/L)	19 (9-40)	32 (20-53)	7 (5-10)	
In hospital outcomes				
Hospitalized following ER admission, n %	127 (86)	91 (98)	38 (70)	**0.001**
ICU admission, n %	18 (12)	15 (16)	3 (5)	0.052
Mechanical ventilation, n %	4 (3)	4 (4)	0 (0)	0.117
Mechanical hemodinamic support,	1 (0.7)	1 (1)	0 (0)	0.438
Length of hospital stay, days (IQR)	6 (3-9)	8 (6-10)	6 (3-8)	
In hospital mortality, n %	7 (4.8)	7 (8)	0 (0)	**0.036**

[Population - two groups characteristics and outcomes]

	Troponin <15	Troponin >15 ≤ 50	Troponin >50 ≤ 150	Troponin >150	p value
Number of patients	55	61	26	5	
Male sex, %	23 (42)	24 (39)	16 (61)	3 (60)	0.277
Age, years	70 (54-80)	81 (72-86)	81 (75-89)	76 (57-80)	**<0.001**
Risk factors					
Family History, %	3 (5)	3 (5)	1 (2)	1 (20)	0.281
Smoking, %	11 (20)	6 (10)	5 (19)	2 (40)	0.174
Dyslipidemia, %	16 (29)	26 (43)	14 (54)	3 (60)	0.122
Hypertension, %	27 (50)	40 (65)	22 (84)	3 (60)	**0.031**
Diabetes, %	10 (18)	8 (13)	12 (46)	2 (40)	**0.004**
BMI> 30, %	5 (9)	6 (10)	2 (8)	0 (0)	0.895
Comorbidities					
OSAS, %	1 (2)	4 (6)	3 (11)	0 (0)	0.294
COPD, %	8 (15)	6 (10)	2 (8)	0 (0)	0.895
CAD, %	7 (13)	7 (11)	6 (23)	0 (0)	0.385
LVEF<50%, %	0 (0)	1 (2)	0 (0)	1 (20)	**0.003**
PVD, %	9 (16)	7 (11)	4 (15)	2 (40)	0.371
Previous stroke/TIA,%	1 (2)	10 (16)	3 (11)	2 (40)	0.012
Laboratory findings					
Creatinine (umol/L)	79 (64-94)	82 (62-108)	115 (93-149)	112 (102-143)	**0.001**
Hemoglobin (g/L)	135 (124-145)	129 (120-141)	126 (113-142)	115 (112-134)	0.188
C reactive protein (mg/L)	25 (10-58)	37 (15-59)	49 (25-79)	37 (35-290)	**<0.001**
In hospital outcomes					
Hospitalized following ER admission, n %	38 (70)	58 (95)	26 (100)	5 (100)	**<0.001**
ICU admission, n %	3 (5)	4 (6)	7 (27)	4 (80)	**<0.001**
Mechanical ventilation, n %	0 (0)	1 (2)	1 (4)	2 (40)	**<0.001**
Mechanical hemodinamic support,	0 (0)	0 (0)	0 (0)	1 (20)	
Length of hospital stay, days (IQR)	6 (3-8)	8 (6-9)	9 (7-11)	4 (3-5)	**0.009**
In hospital mortality, n %	0 (0)	1 (2)	3 (11)	3 (60)	**<0.001**

[Population stratification based on troponin values - characteristics and outcomes]

Results: From December 2018 to March 2019, 147 pts with a median age of 75 (66-84) years were enrolled in the study at 4 different sites. At admission, 92 pts (63%) had TROP+ with median value of 34,5 ng/L (21-61). At baseline, TROP+ had a greater burden of hypertension, dyslipidemia and previous stroke/TIA, while comparable for other characteristics. Seven deaths occurred leading to an in-hospital mortality of 5%. All deaths occurred in TROP+ pts (8% vs 0%, p = 0.036). Eighteen (12%) patients required ICU hospitalization while in 3 (2,0%) diagnosis of myocarditis was effectively achieved, with 1 (0,6%) presenting acute heart failure requireing hemodynamic support. When stratified according

to degree of troponin rise, in-hospital mortality progressively increased (1/61 (2%) pts with troponin >15 and ≤50 ng/l, 3/26 (11%) pts with >50 and ≤50 and 3/5 (50%) pts with >150 ng/L, p <0.001).

Conclusion: Cardiac involvement during laboratory confirmed influenza infection is frequent with a 8% in-hospital mortalty in TROP+ pts, being frequently overlooked and potentially associated with an ominous prognostic role.

Disclosure: Nothing to disclose

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Perioperative outcomes of minimally invasive mitral valve surgery through right mini-thoracotomy: 7-year experience of a standardized technique

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Introduction: Minimally invasive mitral valve surgery (MIMVS) through right mini-thoracotomy is an established, standardized procedure at our institution. The aim of the current study was to evaluate our institutional early outcomes following MIMVS over the last 7 years.

Methods: We retrospectively analysed the preoperative variables, intraoperative data and postoperative results in a series of 275 consecutive patients who underwent MIMVS from January 2013 through December 2019 at our institution. All patients received a central aortic cannulation and a peripheral vein cannulation over the groin via Seldinger technique.

Results: Mean patients-age was 66 ± 13 years (29 % = female; Mean EuroSCORE II = 2.49 ± 3.12 %). Of the whole patient cohort 9 patients (3.3 %) had already underwent a cardiac operation. The majority of our patients were presented with a severe mitral valve regurgitation based on fibroelastic deficiency (221 patients, 80.4 %), 16 patients (5.8 %) required an operation because of active mitral valve endocarditis, whereas 35 patients (12.7 %) presented with a sever mitral valve stenosis. 234 patients (85.1 %) underwent a mitral valve reconstruction and 41 patients (14.9 %) a mitral valve replacement. Associated procedures were tricuspid valve annuloplasty (21 patients, 7.6 %) and MAZE procedure (56 patients, 20 %). Mean cardio-pulmonary bypass and aortic cross-clamp time were 99 ± 32 and 71 ± 24 minutes, respectively. Two patients (0.7 %) required conversion to median sternotomy and eight patients (2.9 %) underwent postoperative re-exploration for bleeding. The incidence of perioperative neurologic complications was 2.2 % (N = 6). Overall 30-day mortality was 1.5 % (4 patients). Echocardiographic follow-up at discharge revealed sufficient mitral valve function with none or trivial mitral valve regurgitation in 98.5% of the patients whereas the incidence of early mitral valve reintervention was 1.5 % (N = 4).

Conclusions: A standardized approach to minimally invasive mitral valve surgery through right mini-thoracotomy with direct aortic cannulation is a feasible, safe and reproducible technique associated with low perioperative mortality and morbidity.

Disclosure: Nothing to disclose

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Circumferential deformation in diagnosis and risk assessment of patients with left ventricular non-compaction

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Introduction: Echocardiography-based deformation analysis is used for studying left ventricular (LV) mechanics and have an emerging role in the diagnosis of cardiomyopathies. Left ventricular non-compaction (LVNC) is a rare cardiomyopathy characterised by a two-layered LV myocardium with prominent trabeculae separated by deep recesses perfused from the LV cavity. Left ventricular hypertrabeculation (LVHT) may be difficult to differentiate from LVNC. In this study, we aim to develop a diagnostic algorithm based on the circumferential deformation (CD) of LVNC, LVHT and controls; and find their associations with LVNC outcomes.

Methods: We compared 45 LVNC patients, 45 LVHT individuals, and 45 matched healthy controls. LVNC was diagnosed according to current echocardiographic criteria. LVHT was defined as presence of three or more trabeculae in the LV apex visualised in both parasternal short axis and apical views. Controls had a normal echocardiographic examination and no evidence of cardiovascular disease. Strain analysis was performed using TomTec Image-Arena (version 4.6).

Figure 1-A

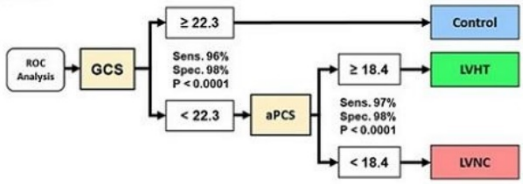


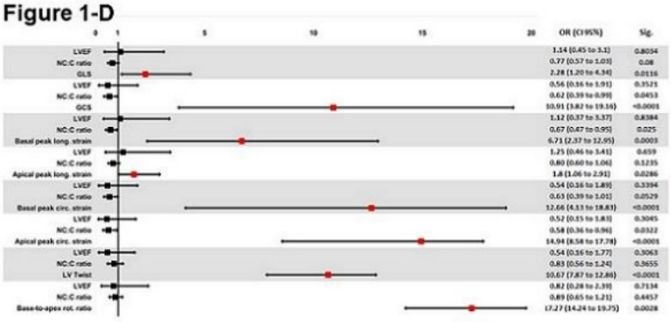
Figure 1-B

Diagnostic approach	Control (n=32)	LVHT (n=32)	LVNC (n=32)	Correctly identified (n=96)
ROC-based model	32	30	32	94 (98%)
ROC-based model AND conventional echocardiographic diagnostic criteria	32	31	32	95 (99%)

Figure 1-C

Events*	n
Cardiovascular death (Defined as: sudden cardiac death, mortality due to cardiovascular event, or heart transplant)	0
Progression of HF (Defined as: EF decline below 40%, progression to NYHA class III-IV, and/or hospitalisation for acute heart failure)	10
Arrhythmias (Defined as: Atrial fibrilliation, aborted arrest, appropriate ICD discharge, and/or sustained ventricular tachycardia)	11
Thromboembolic events (Defined as: transient ischaemic attacks, cerebro-vascular strokes, and/or peripheral arterial thrombo-embolism)	1

Figure 1-D



Results: Receiver observer characteristics curve (ROC) analyses revealed that GCS <22.3% differentiated LVNC from control or LVHT. In individuals with global circumferential strain (GCS) below 22.3%, an apical peak circumferential strain (PCS) cut-off value of 18.4% differentiated LVNC [<18.4%] and LVHT [≥18.4%] (fig. 1-A). An independent echocardiographer (Figure 1-B) performed blind validation of diagnosis on 32 subjects from each group. Combined endpoint of cardiovascular events in LVNC (CVE) is described in figure 1-C. Multi-variate regression analyses have shown that GCS was associated with 11-fold increased risk of CVE independent of LVEF and NC:C ratio, while global longitudinal strain (GLS) displayed only 2-fold increased risk. Regional basal and apical peak circumferential or longitudinal strain, left ventricular twist, basal-apical rotation ratio have shown significant associations (Fig. 1-D).

Conclusions: A diagnostic algorithm with GCS and aPCS (threshold value 18.4%) differentiates LVNC from LVHT and control with very high sensitivity and specificity independent of additional echocardiographic or clinical information. Circumferential strain derived parameters exhibit a very strong association with outcomes independent of LVEF and NC:C ratio. Absence of CVE in LVHT provides further evidence on the distinct nature of LVNC and LVHT.

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MitraClip for high risk patients with Barlow´s mitral valve disease

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Introduction: No data have been published to now about the outcomes of MitraClip in inoperable patients with Barlow´s Mitral Valve Disease. Despite the technical advantages of the new generation of MitraClips, the length and the thickness of the mitral leaflets and presence of flails with complete eversion and pseudo-cleft are challenging MitraClip procedure.

Methods: We retrospectively collected the cases of MR in Barlow's disease treated with MitraClip in our institution from 2012 to 2018. The case were included in the analysis in presence of the following characteristics: bileaflet billowing or prolapse [or both], excessive leaflet tissue, and annular dilatation with or without calcification.

Results: We included in this analysis 59 patients (mean age 78±8 years, STS mortality score 4± 2.9%). Echo data at baseline showed normal left ventricle ejection fraction and diastolic volume and increased left atrial volume index. Half of the included patients had a chordal rupture (n = 27, 47%) and in 14 patients (23%) calcification of annulus and/or leaflet was diagnosed. The mean procedural time was 92±41min with a technical success (M-VARC) of 100% and more than 80% of patients requiring more than 1 clip. At 30 days follow-up the device success and the procedural success were respectively 59% and 56%. The mean diastolic mitral valve gradient was 3.1±1.5mmHg. At 30 days follow-up, 91% of the patients were NYHA class II stable patients; no death and no hospitalization occurred. During a median follow-up time of 412 days (IQR: 209-992 days) death for any cause occurred in 23% of the patients (n = 14) and 16% of the patients (n = 10) died because of a cardiovascular cause; 10 patients were re-hospitalized for heart failure and 5% of the patients (n = 3) underwent an open-heart surgery at follow-up time. At univariate cox regression analysis the 1-Y composite end-point (death for any cause, HF re-hospitalization, MV surgery) was predicted by LV dimensions and 30 days procedural success.

Conclusions: To our knowledge, this is the first analysis of outcomes of Barlow´s disease treated with MitraClip. Despite a high incidence of MR recurrence, we observed a good clinical response in term of NYHA class and mortality rate. Left ventricle size and 30-day procedural success predict outcomes.

Disclosure: F. Maisano is a consultant for Abbott Vascular, Medtronic, Edwards Lifesciences, Perifect, Xeltis, Transseptal Solutions, Magenta and Cardiovalve, has received grant support from Abbott Vascular, Medtronic, Edwards Lifesciences, Biotronik, and Boston Scientific, has received royalties from Edwards Lifesciences and 4Tech, and is cofounder of Transseptal Solutions, 4Tech, and SwissVortex. M. Taramasso reports consultancy fees from Abbott Vascular, Edwards Lifesciences, 4Tech, Boston Scientific, CoreMedic, Occlufit, and SwissVortex, outside the submitted work. M.Gavazzoni and M.Zuber are consultant for Abbott

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Electrical storms in arrhythmogenic cardiomyopathy: incidence, triggers and prognosis

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Introduction: Implantable cardiac defibrillators (ICD) can prevent arrhythmic death in arrhythmogenic cardiomyopathy (ACM). Electrical storms (ES), defined as more than 3 episodes of ventricular arrhythmias requiring ICD therapy within 24 hours, carry significant morbidity and psychosocial/health-economic impact.

Purpose: To describe the incidence, potential triggers and prognosis of ES in ACM patients with ICDs during long-term follow up.

Methods: We retrospectively analysed patients suffering from ACM in our ICD registry using every available device interrogation for data collection.

Results: 10 ES occurred in 7 of 40 patients (17.5%, baseline data in Table 1) during a median follow up of 9.8±6.5 years. Median time to first ES was 3.9 years (95%CI 2.0-9.9). In 9 out of 10 ES, ICD shocks were delivered and the median amount of shocks per ES was 5 (95%CI 0-15.6). 6 out of 10 ES occurred during winter (Winter 60%, Summer 30%, Autumn 10%, Spring 0%) and all of them during daytime. We identified at least one potential reversible trigger in all ES (7 hypokalaemia, 4 infections, 3 decompensated heart failure, 2 hypoxemia, 2 physical activity), while multiple triggers were present in 5 ES. Mean potassium in hypokalaemia-triggered ES was 3.2 mmol/l. All but one patients were hospitalized, 1 died, 2 required urgent heart transplantation for refractory heart failure and in 5 patients arrhythmic therapy was escalated successfully. 2 out of 7 patients with ES suffered from serious complications during their hospital stay (stroke, mesenterial ischemia). All 3 patients who died or received a heart transplantation experienced an ES in the setting of worsening heart failure.

Mean age at ACM diagnosis	48.1
Male	86%
Definite ACM (diagnostic criteria 2010)	86%
Coronary heart disease	14%
Secondary prevention ICD implantation	86%
LVEF<50% (TTE)	43%
RV systolic function reduced (TTE)	43%
Betablocker	86%
Amiodarone	86%
ACE-Inhibitor/Aldosterone-Antagonist	57%

[Patients characteristics]

Conclusion: Electrical storms are frequent in patients with ACM carrying ICDs during long-term follow-up with an increased incidence during daytime and in winter. Potential reversible triggers for ES are often present but heterogenous. Prognosis of ES depends on the underlying condition, with worsening heart failure signalling a worse outcome. Physical activity, hypokalaemia, hypoxia and infections are potential targets to prevent ES in ACM patients.

Disclosure: Nothing to disclose

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Adverse events with HeartMate 3- our 4 years' experience

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Objective: The latest HeartMate3 LVAD has already shown promising results. Here, we evaluate adverse events of our single center cohort.

Methods: We retrospectively studied a patient cohort of 42 consecutive patients (39 men and 3 women, aged 56.7±11.8 years) supported using the HM3 LVAD at our institution. We excluded patients with other type of assist device. Mean duration of support was 14.0±10.6 months.

Results: Postoperative survival in our patient population was 88.4%± 5.5 % and 84.4%±6.6% at 1 and 2 years after implantation, respectively. Seven (17%) patients required postoperative RV support. Bleeding complications were noted in 16 (38%) among which twelve (29%) patients required surgical re-exploration. Non-surgical bleeding occurred in 11 (26%) of patients and involved naso-pharyngeal (n = 5, 12%), gastrointestinal (n = 6, 14%), broncho-pulmonary (n = 2, 5%), and muscular (n = 2, 5%) systems. Twenty-one (50%) patients undergone postoperative non LVAD-related infections. Nineteen (45%) patients had LVAD-specific infections. Seventeen (40%) patients developed driveline infection. Six (16%) patients experienced a central nervous complication. Five (14%) patients had a non-disabling ischemic stroke, while one patient had a post-traumatic subdural haemorrhage requiring surgery. Four (10%) patients died while on support (INTERMACS clinical profiles 1 or 2).

Conclusion: In our experience, we observed satisfying survival using HM3 LVAD. However, the adverse event burden, especially bleeding complications and driveline infections, remain significant.

Disclosure: Nothing to disclose

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Right atrium and right ventricle echocardiographic deformation features in arrhythmogenic right ventricular cardiomyopathy, and their association with cardiovascular outcomes

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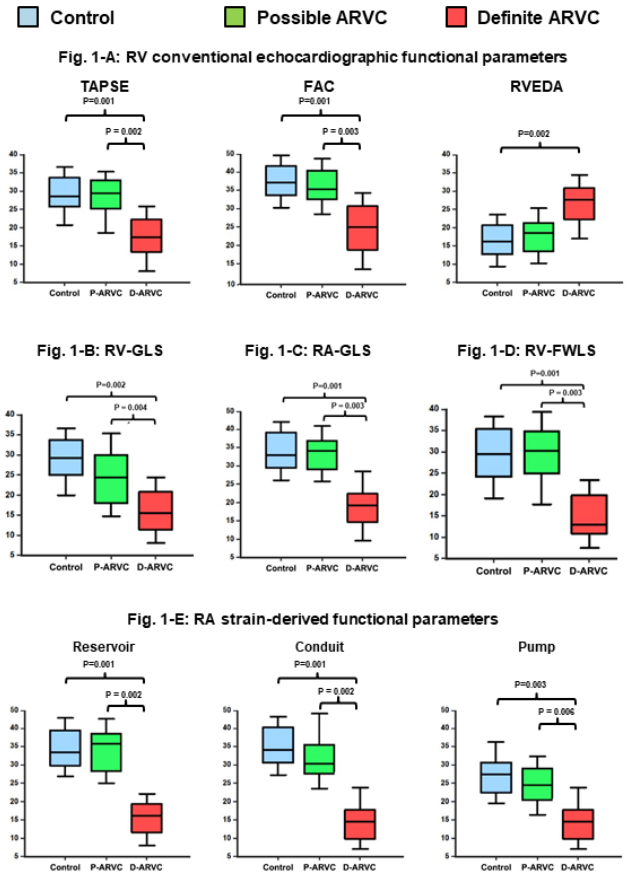
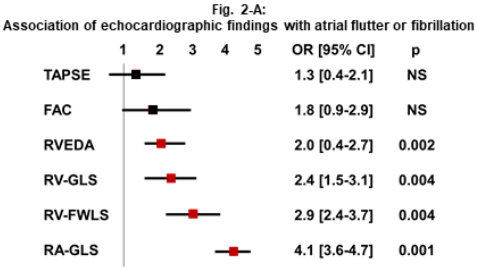
Introduction: Echocardiography plays an important role in the diagnosis of Arrhythmogenic Right Ventricular Cardiomyopathy (ARVC). Deformation analysis have been promising in diagnosis and risk assessment of cardiomyopathies. In this study, we aimed at understanding the association of right atrial (RA) and ventricular (RV) echocardiographic deformation parameters with outcome in patients with definite or possible ARVC.

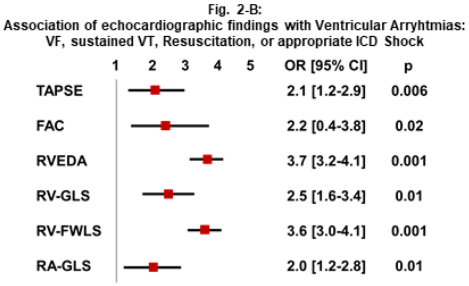


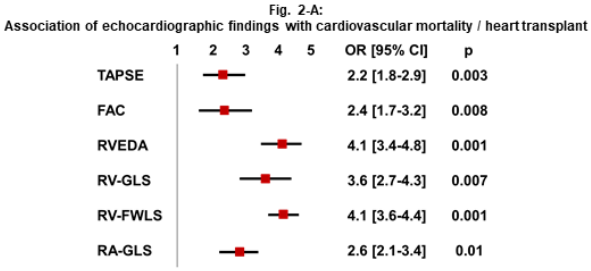
[Fig. 1: Echocardiographic findings in the study groups]

Methods: We analysed echocardiography studies of 55 patients with definite ARVC (D-ARVC) and 40 with possible ARVC (P-ARVC) who were diagnosed according to the 2010 Task Force Criteria, and compared them to 50 healthy matched control group. Strain analysis was performed using TomTec ImageArena (Version 4.6) targeting RA and RV. Over a median of 1655 days, we monitored outcomes of atrial/ventricular arrhythmias, and cardiovascular mortality/heart transplant.

Results: At baseline, there were no significant differences in clinical characteristics between the three groups. Results of conventional echocardiographic parameters are shown in Fig. 1-A. RV global longitudinal strain (RV-GLS) was significantly reduced in D-ARVC group (15.2 [11.7-20.8]%) in comparison to P-ARVC (24.5 [18.2-30.6]%, p = 0.004) or control (28.6 [17.2-33.4]%, p = 0.002) (Fig 1-B). Similarly, right atrial global longitudinal strain (RA-GLS) was significantly reduced in the D-ARVC (18.6 [15.1-22.5]%), in comparison to P-ARVC (34.5 [29.4-36.4]%, p = 0.003) or control (32.8 [29.7-39.2]%, p = 0.001) (Fig 1-C). In addition, the RV free wall longitudinal strain (RV-FWLS) and RA strain-based functional parameters (RA-SFP) have shown similar patterns between the 3 groups, as shown in Fig. 1-D and 1-E. As for association with outcomes: RA GLS, RA-SFP, and RV-FWLS were associated with increased risk of atrial flutter or fibrillation in D-ARVC and P-ARVC (Fig 2-A). Impaired RVEDA, and RV-FWLS were significantly associated with increased risk of ventricular tachycardias and fibrilliation, appropriate defibrillator shocks, and resuscitation (Fig 2-B). Similar associations were found with risk of cardiovascular mortality / heart transplant (Fig 2-A).







[Fig. 2: Association of echocardiographic parameters with cardiovascular outcomes in ARVC patients]

Conclusions: According to our results, RA strain findings provides an additional evidence that cardiac involvement is not exclusive to RV in patients with ARVC. Moreover, RA and RV strain-derived parameters can help with risk assessment of major cardiovascular events in ARVC, as well as distinguishing possible from definite ARVC patients.

Disclosure: Nothing to disclose

CORONARY HEART DISEASE / MYOCARDIAL INFARCTION / INTERVENTIONAL CARDIOLOGY / SURGICAL REVASCULARISATION

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Temporal trends in In-hospital complications of acute coronary syndromes: insights from the Nationwide AMIS Plus registry

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Introduction: *Acute coronary syndrome (ACS)-related morbidity and mortality remain substantial. Data on temporal trends in in-hospital complications of ACS patients are scarce. This study sought to investigate whether the incidence of in-hospital complications of ACS patients changed over time.*

Methods: Acute coronary syndrome patients prospectively enrolled in the National Registry of Acute Myocardial Infarction in Switzerland (AMIS Plus) between 2003 and 2018 and with available data on in-hospital complications were included in the analysis. Rates of in-hospital complications, including recurrent angina, recurrent myocardial infarction, cerebrovascular events, cardiogenic shock, bleeding, acute renal failure, sepsis/systemic inflammatory response syndrome (SIRS)/multiorgan dysfunction syndrome (MODS), AV block needing pacing and new-onset atrial fibrillation, were assessed for each 2-year period.

Results: Among 47'845 ACS patients, in-hospital complications significantly decreased from 22.0% in 2003/2004 to 18.9% in 2017/2018 (p for trend <0.001). An initial decline in rates of in-hospital complications to 15.7% in 2009/2010 (p for trend <0.001) was followed by a constant increase thereafter (p for trend = 0.002). While rates of recurrent angina, recurrent myocardial infarction, and cardiogenic shock decreased over time, rates of bleeding events, acute renal failure, sepsis/SIRS/MODS, and new-onset atrial fibrillation increased. Rates of in-hospital complications were higher in women, mainly due to a constantly increased risk of bleeding and AV block needing pacing.

Conclusion: In-hospital complications of ACS significantly decreased over the 16-year period, with overall rates being higher in women. These findings emphasize that advanced strategies targeting non-ischemic complications are warranted to further improve quality of care of ACS patients.

Disclosure: The AMIS Plus registry is funded by unrestricted grants from the Swiss Heart Foundation and from Abbott Medical AG, Amgen AG, AstraZeneca AG, Bayer AG, Biotronik (all Switzerland) AG, Boston Scientific AG, B. Braun Medical AG, Cordis-Cardinal Health GmbH, Daiichi Sankyo (Switzerland) AG, Medtronic (Switzerland) AG, Novartis Pharma Switzerland AG, Sanofi-Aventis (Switzerland) SA, Servier (Switzerland) SA, SIS Medical Distribution AG, Terumo Germany GmbH, Vascular Medical GmbH, Swiss Working Group for Interventional Cardiology. The sponsors did not play any role in the design, data collection, analysis, or interpretation of the registry.

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Radiation exposure in monoplane versus biplane percutaneous coronary interventions: the RAMBO trial

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Introduction: Interventional cardiologists are exposed to substantial occupational ionizing radiation. Data on radiation exposure to interventional cardiologists are scarce, and randomized comparisons between biplane and monoplane imaging lacking. This study sought to investigate differences in radiation exposure in biplane versus monoplane coronary angiography and percutaneous coronary intervention (PCI).

Methods: RAMBO (RAdiation exposure in Monoplane versus Biplane cOronary interventions) was a prospective, randomized, two-arm, single-centre, open-label trial, enrolling a total of 430 patients undergoing coronary angiography for suspected coronary artery disease. Patients were randomly assigned to biplane or monoplane imaging. The primary efficacy measure was the operator radiation dose at the level of the left arm as measured by a wearable electronic dosimeter.

Results: Median age of the patients was 69.0 [61-76] years (37.6% women). Percutaneous coronary intervention was performed in 85 (21.9%) patients. In the per-protocol population, the primary efficacy measure was significantly higher in the biplane as compared with the monoplane group (4 [1-13] µSv versus 2 [0-6.8] µSv, p <0.001). While fluoroscopy time did not differ among groups (p = 0.89), the amount of contrast medium was lower with biplane as compared with monoplane imaging (p <0.001). The dose area product was 11955 [7095-18246] mGy*cm^2 and 8349 [5851-14159] mGy*cm^2 in the biplane and the monoplane groups (p <0.001).

Conclusion: Biplane imaging for coronary angiography and PCI is related with an increased radiation exposure to the interventional cardiologist as compared with monoplane imaging. Monoplane imaging should be considered for advanced radioprotection in cardiac catheterization, with biplane imaging used for selected patients.

Disclosure: Nothing to disclose

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Functional assessment of myocardial ischemia by intracoronary electrocardiogram

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Introduction: In patients with chronic coronary syndrome (CCS), percutaneous coronary intervention (PCI) targets hemodynamically significant stenoses, i.e., those thought to cause ischemia. The hemodynamic severity of a coronary stenosis increases with its tightness and with the myocardial mass of viable myocardium downstream of the stenosis. The goal of this study was to test the accuracy of intracoronary ECG (icECG) during pharmacologic inotropic stress to determine coronary lesion severity in comparison to established physiologic indices (fractional flow reserve, FFR; instantaneous wave-free ratio, iFR) as well as to quantitatively determined percent diameter stenosis (%S) using biplane coronary angiography.

Method: This was a prospective, open-label study in patients with CCS. The primary study end point was the maximal change in icECG ST-segment shift during pharmacologic inotropic stress induced by dobutamine plus atropine obtained within 1 minute after the point of maximal heart rate (estimated by the formula 220 - age). IcECG was acquired by attaching an alligator clamp to the angioplasty guidewire positioned downstream of a stenosis. For the pressure-derived ratios, i.e. FFR and iFR, the coronary perfusion pressure downstream of a lesion as well as the aortic pressure were continuously recorded.

Results: One hundred patients were included in the study. Pearson-Correlation coefficient was significant between icECG and all three comparators (%S p <0.001, iFR p <0.001, FFR p <0.001). Using the FFR threshold of 0.80 defining coronary hemodynamic significance, ROC-analysis of the absolute icECG ST-segment shift showed an area under the curve (AUC) of 0.708±0.053 (p = 0.0001, n = 100, FFR <0.80 n = 41). AUC for iFR was 0.919±0.030 (p <0.0001), for percent diameter stenosis it was 0.867±0.036 (p <0.0001).

Conclusions: During pharmacologic inotropic stress, intracoronary ECG ST-segment shift provides specific evidence for regional myocardial ischemia irrespective of the etiology and thus, provides an additional (patho-)physiologic information for decision making in borderline coronary lesions.

Disclosure: Nothing to disclose

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Resolution of a stenotic 4-artery coronary configuration by the multi-artery fractional flow reserve method

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Introduction: The hyperemic fractional flow reserve (FFR) method is superior to traditional angiographic stenosis severity assessment, as demonstrated in the famous FAME study. However, current FFR-oriented methods (hyperemic FFR, resting P_d/P_a and wave-free iFR) do not take into account inter-arterial interactions that usually take place in multi-artery coronary configurations. The multi-artery FFR method does include the effect of these interactions in the resolution of stenotic multi-artery coronary configurations. In this work the capability of the novel multi-artery FFR method to resolve complex 4-artery coronary configurations is demonstrated.

Methods: In cases of independent single stenotic artery (stand-alone position) the FFR treatment-decision criteria (FFR cut-off value and FFR ´grey-range´) apply to its FFR value (denoted FFR^{true}). If however a stenotic artery is part of a multi-artery configuration, it is influenced by the other arteries and is no longer in an independent stand-alone position. Treatment decision criteria therefore do not apply to FFR^{true} in such cases, rather to its actual FFR (denoted FFR^{real}) that reflects its current condition. In search of optimal resolution of a stenotic configuration, outcomes of optional revascularizations are predicted and evaluated by the multi-artery FFR method.

Results: The multi-artery FFR method is applied to the stenotic unprotected LMCA-LCx-LAD-D_1 configuration in this work. In the numerical example the initial status of the configuration is:

$FFR^{true}(LMCA) = 0.83$ $FFR^{true}(LCx) = 0.80$ $FFR^{true}(LAD) = 0.78$ $FFR^{true}(D_1) = 0.86$

$FFR^{real}(LMCA) = 0.68$ $FFR^{real}(LCx) = 0.69$ $FFR^{real}(LAD) = 0.67$ $FFR^{real}(D_1) = 0.57$

After optimal resolution (by hyperemic FFR criteria), the final status of the configuration follows:

$FFR^{true}(LMCA) = 0.83$ $FFR^{true}(LCx) = 1.00$ $FFR^{true}(LAD) = 1.00$ $FFR^{true}(D_1) = 1.00$

$FFR^{real}(LMCA) = 0.83$ $FFR^{real}(LCx) = 0.83$ $FFR^{real}(LAD) = 0.83$ $FFR^{real}(D_1) = 0.83$

Conclusion: The multi-artery FFR method extends the current FFR-oriented single-artery methods to the multi-artery domain without altering their experimental techniques. From the numerical example in this work it is obvious that a percutaneous coronary intervention (PCI) practitioner can apply the formulas of the method to actual intracoronary pressure data in real time during the PCI procedure.

Disclosure: Nothing to disclose

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Hyperemic hemodynamic characteristics of serial coronary lesions assessed by Pressure Pullbacks Gradients (PPG) index

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Introduction: To describe the functional characteristics of angiography-defined serial coronary lesions using fractional flow reserve (FFR)-derived motorized pullback tracings, and to describe the Pullback Pressure Gradients (PPG) index - in these lesions.

Methods: Prospective, multicenter study with independent core laboratory analysis. Patients undergoing coronary angiography due to stable angina were enrolled. Serial lesions were defined angiographically as the presence of 2 or more narrowings with visual diameter stenosis >50% separated at least by 3 times the reference vessel diameter in the same coronary vessel. Continuous IV adenosine-FFR measurements were obtained using a motorized-pullback device at a speed of 1 mm/s. Pullback curves were assessed to determine the presence of focal step-ups (FFR >0.05 units over 20 mm). In addition, the PPGindex was computed for all vessels. PPGindex values close to 0 define functional diffuse disease whereas values close to 1 define focal disease.

Results: From a total of 159 vessels (117 patients), 25 vessels were adjudicated as presenting serial lesions (mean PPGindex 0.48 ± 0.17, range 0.26 - 0.87). Two focal pressure step-ups were observed in 40% of the cases (n = 10; mean PPGindex 0.59 ± 0.17), whereas 8% of the vessels presented a progressive pressure losses (n = 2; mean PPGindex 0.27 ± 0.01). In the remaining 52% of the cases, a single pressure step-up was recorded (n = 13; mean PPGindex 0.44 ± 0.12; ANOVA p-value = 0.01). The PPGindex independently predicted the presence of two focal pressure step ups.

Conclusion: Hyperemic FFR curves in tandem stenoses revealed high prevance of functional diffuse CAD. Two pressure step-ups occurred in less than half of the vessels. High PPG-Index identified vessels with two focal pressure drops. FFR tracings and the PPGindex provide a more objective CAD evaluation, which can lead to changes in the therapeutic approach.

Disclosure: Nothing to disclose

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BASILICA technique to prevent coronary obstruction during TAVI: a single center initial experience

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Introduction: Coronary artery obstruction (CO) is an uncommon but potentially life-threatening complication during transcatheter aortic valve implantation (TAVI). Since the first BASILICA (Bioprosthetic or native Aortic Scallop Intentional Laceration to prevent Coronary Artery obstruction) description, this technique has been used in selected patients with CO high-risk. The purpose of this study was to describe the initial experience employing BASILICA in five patients submitted to valve-in-valve from November 2018 to February 2020 in a high-volume TAVI center.

Methods: All patients presented degeneration of a bovine pericardium bioprostheses [4 Trifecta (19, 21, 23 and 25 mm); 1 Mitroflow (25mm)] resulting in severe aortic stenosis (n = 4) or severe aortic regurgitation (n = 1). Interventions were performed in a hybrid room, under general anesthesia, transesophageal echocardiogram guidance and retrograde transfemoral access, and a self-expanding device (23mm in 3 cases; 26mm in 2 cases) was chosen.

Results: Median age, EuroScore II, and STS score were 81years (Q_1-Q_3 77-83), 3% (Q_1-Q_3 2.8-11.2), and 2.6% (Q_1-Q_3 2.2-3.4), respectively. Median left and right coronary heights were 9.7mm (Q_1-Q_3 6.3-12.1) and 12.2mm (Q_1-Q_3 9.2-14), respectively, with a median valve-to-coronary distance of 2.6mm (Q_1-Q_3 1.6-4.2) on left and 4.4mm (Q_1-Q_3 1.7-10.3) on right side. Isolated left leaflet laceration was planned in three patients, and bileaflet laceration in two. Only one unsuccessful right leaflet laceration was reported, corresponding to the first patient. All other 6 leaflets lacerations were successfully performed, with no complications. Median procedural and fluoroscopy time were 133min (Q_1-Q_3 80-312), and 63min (Q_1-Q_3 32-146), respectively. No CO, in-hospital death, valve complication, cardiovascular event, or pacemaker implant were reported. All patients are being followed in routine outpatient visits, and no adverse events were registered.

Conclusion: The first five cases employing BASILICA reported here demonstrated that the method is safe, feasible, and effective in preventing CO, allowing a safe TAVI deployment. Operator experience is essential to enable an accurate and successful procedure.

Disclosure: Dr. Miura has been a consultant for Japan Lifeline. Dr. Taramasso has been a consultant for Abbott Vascular, Boston Scientific, CoreMedic, and 4Tech. Dr. Zuber is a consultant for Abbott and Edwards Lifesciences. Dr. Maisano has been a consultant for Abbott Vascular, Medtronic, Edwards Lifesciences, Perifect, Xeltis, Transseptal Solutions, and Cardiovalve; has received grant support from Abbott Vascular, Medtronic, Edwards Lifesciences, Biotronik, and Boston Scientific; and has received royalties from Edwards Lifesciences and 4Tech. All other authors have reported that they have no relationships relevant to the contents of this paper to disclose.

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External stenting for saphenous vein grafts in CABG: technical feasibility and safety

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Objectives: Progressive saphenous vein graft (SVG) disease is still the key limitation of the long-term clinical outcome of CABG. Randomized trials have shown that external stenting of vein grafts has the potential to reduce vein graft disease by mitigating intimal hyperplasia, reducing oscillatory shear stress and improving lumen uniformity up to 5 years after CABG. The objective of the study was to evaluate the technical success of external stent implantation and early safety.

Methods: 41 patients undergoing isolated CABG in a single center were included in this study retrospectively. All SVGs were harvested using endoscopic technique and 40 patients (97,5%)underwent off pump CABG. In all patients, BIMA-grafts were used for the left sided vessels together with additional venous grafts. At each patient at least one vein graft, which was placed to the right coronary territorywas supported with external stent (VEST, Vascular Graft Solutions, Tel Aviv, Israel), while additional grafts remained non stented. CT angiography was performed at discharge and patients underwent clinical follow up at 3 months for Major Adverse Cardiac and Cerebrovascular Events (MACCE).

Results: A total of 41 patients (mean age 63.65 ± 9.41 years, 88% males) were admitted to our center with multi-vessel disease for isolated CABG, between Sep 2016 and Sep 2018. External stent application was successful in 100% of the grafts. During surgery, transient time flow measurements and pulsatility index of the externally stented vein grafts were 37.24±19 and 1.9±0.9. Post-operative CT angiography has been completed for 35patients (85,3%). The total number of grafts evaluated with CT angiography was 107 of which 102 were patent (95,3%). There were 35 VEST supported and 10 not supported vein and 67 arterial grafts. Three of 35 VEST supported veins were closed due to failure of the distal anastomosis, without any doubt of participation or influence of the VEST. Those patients experienced PCI of the native right coronary artery before discharge. One patient had an urgent PCI of the native vessels soon after surgery because of the acute failure of both IMAs, while the supported vein remains open. All patients completed the 3 months clinical follow up. No MACCE was reported during the follow period.

Conclusion: VEST external stent of saphenous vein grafts is safe and easy to apply in off pump and multi arterial CABG. Short term clinical follow up demonstrated no device related adverse events.

Disclosure: Nothing to disclose

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Delay between symptom onset and hospital admission in patients with ST-elevation myocardial infarction: different trends in men and women

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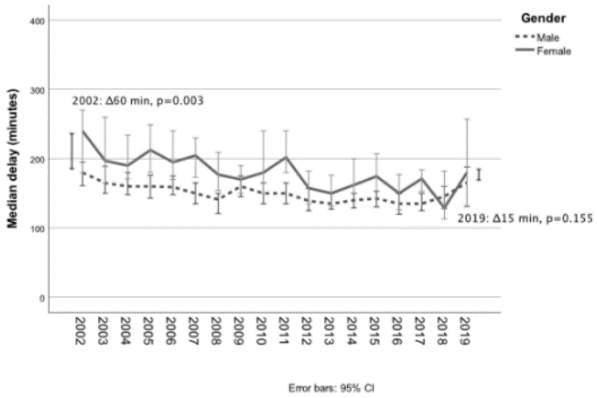
Introduction: The aim of this study was to analyse whether prehospital delay in ST-elevation myocardial infarction (STEMI) has changed in men and women since 2002.

Methods: We used data from the AMIS Plus registry of patients who were admitted for STEMI between 2002 and 2019. Patients who were transferred from another hospital or were resuscitated before admission were excluded. Patient delay was defined as the difference between symptom onset and hospital admission time. Trends in delay according to gender were depicted by medians per year with a 95% confidence interval. Differences between men and women were tested using the Mann-Whitney test. To analyse the adjusted effect of gender on delay, multivariable quantile regression was applied including the interaction between gender and admission year as well as the covariates age, diabetes, pain at presentation and myocardial infarction (MI) history.

Results: Among the 15,154 patients included (74.5% men), the overall median (IQR) delay between 2002 and 2019 was 150 (84;345) minutes for men and 180 (100;415) for women. Women were older (71.3y vs. 62.8y, p <0.001), had more often diabetes (20.0% vs. 16.9%, p <0.001), but less often MI history (11.2% vs. 14.9%, p <0.001) and less often pain at presentation (92.0% vs. 94.8%, p <0.001). The unadjusted median delay decreased over the admission years. The decreasing trend was stronger in women than men: the unadjusted difference in delay between men and women decreased from 60 min in 2002 (p = 0.003) to 15 min in 2019 (p = 0.155) (Fig 1). The multivariable model confirmed a significant interaction between gender and admission year (p = 0.042) indicating that the decrease in delay was stronger for women (-3.1 min per year) than for men (-1.4 min per year) even after adjustment. The adjusted difference between men and women decreased from 27.4 min in 2002 to -1.6 min for women in 2019. Additional independent predictors of longer delay were the covariates age (+1.6 min per additional year, p <0.001) and diabetes (+27.1 min, p <0.001). Conversely, pain at admission (-46.3 min, p <0.001) and MI history (-32.9 min, p <0.001) predicted a shorter delay.



[Fig.1. Trends of unadjusted median delay according to gender.]

Conclusions: The difference in delay between symptom onset and hospital admission in STEMI patients between men and women steadily diminished from 2002 to 2019. This might indicate that the public and health professionals' awareness of STEMI in women has ameliorated over time.

Disclosure: Nothing to disclose

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Eight-years trends and outcomes in TAVI performed in a high-volume center

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Introduction: Since the first transcatheter aortic valve implantation (TAVI) performed in 2002, remarkable changes in procedure features and patients' profiles have been reported, making it a widespread treatment for severe aortic stenosis in all risk-class patients. The purpose of this study was to evaluate TAVI contemporary trends and outcomes in the last eight years.

Methods: Data of adult patients submitted to TAVI from April 2012 to April 2019 in a single high-volume center were obtained from the Swiss TAVI registry, a prospective national multicenter database. Intervention indications were based on the institutional heart team evaluation. Patients were divided according to implant period in two groups: 1) TAVI performed from 2012 to 2016, and 2) from 2017 to 2019.

Results: Over a 9-year period, a total of 1485 TAVI procedures were performed, increasing from 95 in 2012 to 320 in 2018 (p <0.001). A remarkable modification in patients' profile and procedure characteristics can be seen in Table 1. Despite higher age and surgical risk, a significant decrease in 1-year mortality (6.8% vs. 3.2%; p <0.001) was observed in

the last three years. This difference was especially notable in the subgroup of high-risk patients (STS score ≥8), who presented a decrease in 30-days (5% vs. 3.3%; $p = 0.001$) and 1-year mortality (13.1% vs. 4.9%; $p < 0.001$). In multivariate analysis, age (OR 1.05, 95% CI 1.0–1.1), non-femoral access (OR 2.7, 95% CI 1.2–6.0), and STS score (OR 1.07, 95% CI 1.0–1.1) were independent predictors of in-hospital mortality, while male gender (OR 1.8, 95% CI 1.06–3.2), chronic obstructive pulmonary disease (COPD) (OR 2.1, 95% CI 1.1–3.9), and STS score (OR 1.07, 95% CI 1.01–1.14) were predictors of 1-year mortality.

Conclusion: Significant changes in patients' profile and procedure characteristics were observed in the last three years compared to the first five years of TAVI experience. Age and non-femoral access were associated with higher 30-day mortality, while male gender and COPD were predictors of 1-year mortality, as well as STS score. Even when performed in elderly and high-risk patients, TAVI was associated with low early and 1-year mortality. The Swiss TAVI registry offers the unique opportunity to monitor trends and outcomes in patient submitted to TAVI.

	2012-2016 (n = 819)	2017-2019 (n = 666)	p-value
Age - years (mean ± SD)	79±7	81± 7	0.005
Male gender - n (%)	442 (51%)	378 (56%)	0.05
EuroScore II (median Q1-Q3)	3 (Q1-Q3 1.7–5)	3.4 (Q1-Q3 2–6)	0.03
STS score (median Q1-Q3)	3.3 (Q1-Q3 2.1–5.1)	4 (Q1-Q3 2–6)	<0.001
Permanent pacemaker - n (%)	79 (9.6%)	34 (5%)	0.001
Aortic regurgitation ≥ II - n (%)	91 (11%)	97 (14%)	0.018
General anesthesia - n (%)	259 (31%)	42 (6%)	<0.001
Non-femoral access - n (%)	46 (5.6%)	18 (2.7%)	0.009

[Baseline and Procedure Characteristics]

Disclosure: Dr. Miura has been a consultant for Japan Lifeline. Dr. Taramasso has been a consultant for Abbott Vascular, Boston Scientific, CoreMedic, and 4Tech. Dr. Zuber is a consultant for Abbott and Edwards Lifesciences. Dr. Maisano has been a consultant for Abbott Vascular, Medtronic, Edwards Lifesciences, Perifect, Xeltis, Transseptal Solutions, and Cardiovalve; has received grant support from Abbott Vascular, Medtronic, Edwards Lifesciences, Biotronik, and Boston Scientific; and has received royalties from Edwards Lifesciences and 4Tech. All other authors have reported that they have no relationships relevant to the contents of this paper to disclose.

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Are there mortality risk predictors in myocardial infarction and cardiogenic shock treated by extracorporeal life support?

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Introduction: This retrospective study was designed to identify predictors of mortality, in patients with refractory cardiogenic shock (CS) associated with acute coronary syndrome (ACS) necessitating veno-arterial-extracorporeal membrane oxygenation (VA-ECMO).

Methods: We retrospectively analyzed 51 patients treated at our centre for ACS complicated by ECMO requiring CS. Logistic regression analysis was performed to identify the association of potential predictors of perioperative mortality.

Results: Between January 2005 and December 2019, ECMO support was instituted in 51 patients. Mean age was 61.8 ± 11 years, 41 patients (80.4%) were male. The onset of out-of-hospital ACS occurred in 19 (37%). The median time to ECMO implantation for the whole cohort was 60 minutes, and the ECMO perfusion time averaged 4410 ± 5291 minutes. PCI was performed in 47 patients (92.1%) and isolated CABG in 5 (9.8%). One patient underwent both. Hospital mortality was 60.8% (31 patients). Seventeen patients (33%) were successfully weaned from ECMO. Twenty-two patients (43%) died while on ECMO support. One patient was bridged to heart transplantation, a second one received a single-ventricle assist device.

Complications consisted in acute renal failure (54.9%), cerebral ischemia (23.5%) and pneumonia (54.9%). Eight (15.7%) developed limb ischemia requiring fasciotomy. Multivariable analysis identified the association of preimplantation lactate serum level ≥ 8 mmol/L and an ECMO implantation time interval ≥ 30 minutes from ACS onset, as predictors of 30-day mortality (p 0.02). No other factors resulted statistically significant for early and long-term mortality.

Conclusions: ECMO represents a valid option for hemodynamic support, allowing to perform emergency myocardial revascularization in ACS patients with refractory CS.

ECMO instituted within 30 minutes from ACS onset, associated with a serum lactate level below 8 mmol/L can reduce mortality of 65%.

Prompt ECMO implantation is an effective strategy in reducing the duration of end-organ ischemia and is the keystone in the management of this patient population.

Disclosure: Nothing to disclose

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Fowler score to identify patients at high-risk for surgical site infection after coronary surgery. A retrospective single centre study

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Introduction: Surgical Site Infections (SSI) after Coronary Artery Bypass Grafting (CABG) can compromise outcomes due to significant increase of morbidity, mortality and costs. Aim of this study was to explore if the Fowler Score (FS) among other variables would predict SSI in our setting.

Methods: From January 2016 to December 2018, 525 consecutive CABG procedures were performed. All MIDCAB (Minimally Invasive Direct Coronary Artery Bypass) procedures were excluded. The FS is a scoring system created to predict the risk of major infections after cardiac surgery. A FS higher than 13 points is considered an indicator for major infections. We reviewed the SSI at discharge time and the follow-up data of our patients registered by the Swiss National Center for Infection Prevention (Swissnoso). Logistic regression analysis was performed to detect predictive factors of SSI occurrence.

	Odds Ratio	p value	95% Conf.	Interval
Age	0.93	0.02	0.88	0.99
Gender	2.02	0.2	0.63	6.5
BMI	0.94	0.3	0.82	1.07
Urgency Grade	1.53	0.4	0.53	4.39
Diabetes with insulin	2.03	0.2	0.53	7.78
NYHA	0.66	0.2	0.3	1.42
CPB time	0.99	0.08	0.98	1
Fowler score > = 13	13.91	0.003	2.47	78.33
BIMA graft	0.92	0.9	0.26	3.23

[Table 1. SSI in all CABG procedures (n = 525)]

	Odds ratio	p value	95% Confidence	Interval
Age	0.93	0.02	0.87	0.98
Gender	2.43	0.1	0.66	8.86
BMI	0.96	0.5	0.83	1.1
Urgency Grade	1.47	0.5	0.45	4.74
Diabetes with insulin	2.27	0.2	0.57	8.95
NYHA	0.51	0.1	0.19	1.34
CPB time	0.99	0.3	0.97	1
Fowler score > = 13	10.83	1.01	1.61	72.72
BIMA graft	0.91	0.8	0.25	3.34

[Table 2. SSI in isolated CABG procedures (n = 411)]

Results: There were 42 patients (8%) identified by FS at high-risk for major infections. The total incidence of SSIs was 17 cases (3.2%): 14 patients (2.6 %) had superficial wound infections, 3 (0.6%) had deep

sternal wound infections (DSWI). Among all SSI cases, 5 patients (0.9%) were classified as high risk. Logistic regression analysis identified the Fowler score ≥ 13 and age as significant predictors of SSI (P <0.05 in both combined and isolated CABG procedures). Gender, Body Mass Index (BMI), urgent surgery, insulin-dependent diabetes, renal insufficiency, Cardiopulmonary Bypass (CPB) time and Bilateral Internal Mammary Artery (BIMA) use were not statistically significant predictors of SSI (tables 1-2).

Conclusion: In our experience, the Fowler score and age of patients predicted SSI. We acknowledge a selection bias in BIMA cases (preoperative selection).

Disclosure: Nothing to disclose

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Detection of future culprit lesions based on angiography-derived computational fractional flow reserve. The Future Culprit Study

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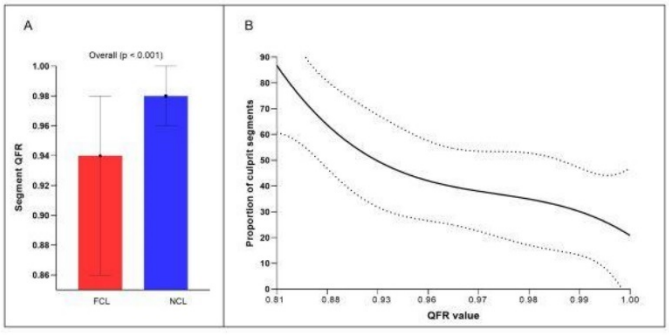
Introduction: Quantitative Flow Ratio (QFR) is a virtual calculation of FFR that allows hemodynamic assessment of coronary artery lesions using three-dimensional quantitative coronary angiography. This case-control study evaluates the performance of QFR to detect future culprit lesion (FCL) of myocardial infarction (MI).

Methods: We selected 81 patients admitted for PCI in the setting of MI (NSTEMI and STEMI) and in whom a previous angiogram had been performed within the previous 5 years. In each patient, we identified lesions on segments that progressed to acute occlusion (FCL), and analysable segments on main epicardial vessels that did not lead to MI, where "non-culprit lesions" (NCL) were detected using the QFR software.

Results: There were 81 FCL and 113 NCL in 81 patients. Median age was 62 years (IQR:55-75), 74% were male. Median time between the last angiography and the MI was 24 months (IQR:11-41). Overall, FCL were more severe (3D-diameter stenosis (DS) 38.6% (IQR:30.1-47.1) versus 29.8% (IQR:25.4-34.8), p <0.001), and had lower QFR values (0.94 (IQR:0.87-0.98) versus 0.98 (IQR:0.96-1.00), p <0.001). In lesions with delay <2 years between index angiography and MI, the difference in QFR was more pronounced compared to the group with longer delay (0.93 (IQR:0.86-0.96) versus 0.98 (IQR:0.96-1.00), p <0.001 for the short delay; 0.97 (IQR:0.87-0.99) versus 0.98 (IQR:0.96-1.00), p = 0.011 for the long delay, Figure 1). When dividing lesions in tertiles according to delay, a significant progression of lesions over time was observed in FCL (p = 0.034) but not in NCL (p = 0.832). In multivariate analysis including QFR, DS and lesion length, QFR was the only independent predictor of MI (OR = 1.11 (9%CI 1.02-1-23), p <0.013 for 0.01 decrease of QFR).



[Figure 1]

Conclusion: Coronary segments that will eventually give rise to a myocardial infarction (i.e. future culprit lesions) exhibited lower QFR compared to lesions that will not. QFR might help to identify future culprit lesions.

Disclosure: Nothing to disclose

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Temporal trends in treatment and outcomes of patients with acute coronary syndrome and concomitant moderate to severe renal failure

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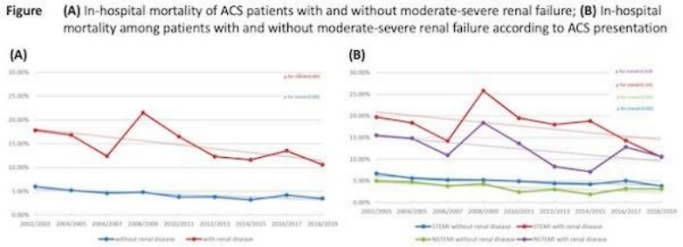
Introduction: Limited information about the management and outcomes of patients with acute coronary syndromes (ACS) and moderate to severe renal failure (RF) is available owing to underrepresentation of this population in most studies.

Methods: We compared the use of guideline-recommended therapies and in-hospital outcomes of totally 49´191 ACS patients with normal-mild renal failure (RF) (defined as eGFR >45ml/min/m2) versus moderate-severe RF (eGFR <45ml/min/m2) enrolled in the prospective Acute Myocardial Infarction in Switzerland (AMIS) cohort between 2002 and 2019 according to 2-year periods.

Results: Overall, 3´478 (7.1%) patients had moderate-severe RF. They were older (65.2+12.9 versus 77.2+10.6 years) and had significantly more comorbidities (including heart failure, cerebrovascular and peripheral vascular disease). Moderate-severe RF patients received less frequently guideline-recommended drugs, including P2Y12 inhibitors, ACEI/ARBs and statins (p <0.0001). Between the first and last 2-year periods, the number of patients with moderate-severe RF and number of performed percutaneous coronary interventions (PCI) increased in this cohort (p-for-trend = 0.001). At the same time, in-hospital mortality significantly decreased among ACS patients with and without RF (17.5% to 10.5% and 6.0% to 3.9%, respectively, p-for-trend = 0.001 for both, see *Figure*). Similar trends were observed for other complications, namely cardiogenic shock and reinfarction). However, major bleedings increased significantly over time in patients with and without RF (p-for-trend = 0.038 and <0.001, respectively).



[Figure - In-hospital mortality among ACS patients with and without moderate-severe renal failure]

Conclusion: Outcomes of ACS patients with moderate to severe RF improved over the last two decades. Even though the rate of PCI increased in ACS patients with moderate-severe RF, they were less likely to receive guideline-recommended therapies and still suffer a high in-hospitality mortality (>10%). With respect to the increasing burden of ACS patients with RF, our study implicates that more efforts should be undertaken to further improve outcomes of those patients.

Disclosure: MB received consulting and speaker fees from Amgen, Astra Zeneca and Bayer, and travel grants from Pfizer, Vifor and Bayer.

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Cerebral protection device as a routine during TAVI procedures

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Introduction: With transcatheter aortic valve implantation (TAVI) indications expanding to low-risk patients, the search for a safer procedure, with minimal adverse cerebrovascular events, has become a priority. In this setting, the potential role of cerebral protection devices (CPD) in reducing neurological complications has drawn considerable interest. The

purpose of this study was to report the experience using CPD as a routine practice during TAVI procedures in a high-volume center.

Methods: Data of consecutive adult patients submitted to TAVI from October 2018 to April 2019 were obtained from an institutional database. Interventions were indicated based on the institutional heart team evaluation.

Results: During the studied period, CPD was used in 98 patients. Mean age and STS score were 79±7.4 years and 3.5±2.5%, respectively, and 58% were male. The most frequent associated comorbidities were arterial hypertension (87%), dyslipidemia (67%), coronary artery disease (41%), atrial fibrillation (25%), and diabetes mellitus (20%). Previous stroke was reported in 9%, and New York Heart Association functional class ≥III in 43%. Peak and mean aortic gradients were 65.5±26 mmHg and 40.3±15 mmHg. In all patients, CPD was inserted through the right radial artery. In a mean follow-up of 350±44 days, no case of cerebrovascular event, death, myocardial infarction, or repeat unplanned valvular intervention were reported. Access site complication, bleeding, and acute kidney injury according to the VARC II criteria were diagnosed in 1 (1%), 4 (4%), and 8(8%) patients, respectively.

Conclusion: The results presented here demonstrate an initial experience employing CPD as routine during TAVI procedures. An excellent safety profile was observed, besides a remarkably low rate of adverse events. Long-term follow-up and higher sample studies are needed to support these first observations.

Disclosure: Dr. Miura has been a consultant for Japan Lifeline. Dr. Taramasso has been a consultant for Abbott Vascular, Boston Scientific, CoreMedic, and 4Tech. Dr. Zuber is a consultant for Abbott and Edwards Lifesciences. Dr. Maisano has been a consultant for Abbott Vascular, Medtronic, Edwards Lifesciences, Perifect, Xeltis, Transseptal Solutions, and Cardiovalve; has received grant support from Abbott Vascular, Medtronic, Edwards Lifesciences, Biotronik, and Boston Scientific; and has received royalties from Edwards Lifesciences and 4Tech. All other authors have reported that they have no relationships relevant to the contents of this paper to disclose.

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Outcome of thoracic endovascular aortic repair (TEVAR) after aortic dissection

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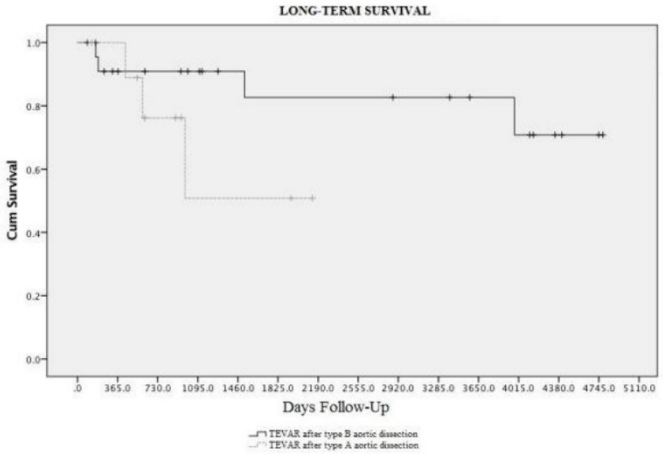
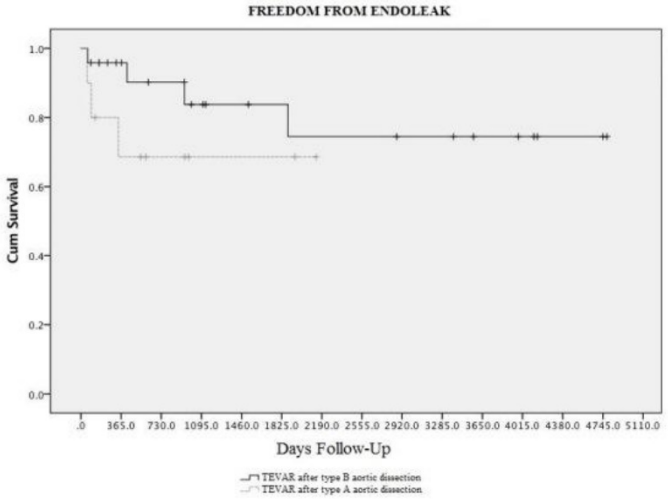
Introduction: Thoracic endovascular aortic repair (TEVAR) has become a recognized treatment for several thoracic aortic diseases. We evaluated the long-term outcomes of TEVAR after aortic dissection.

Method(s): Between June 2002 and December 2019, a total of 114 patients were treated with TEVAR. Patients were divided according previous Type A and B dissection. Demographics, preoperative characteristics and intra and postoperative outcomes were evaluated. Survival and freedom from endoleak were determined using Kaplan-Meier methods. Log-rank test were used to compare groups.



[Figure 1. Survival in patients treated with TEVAR after type A and B aortic dissection.]



[Figure 2. Freedom from endoleak in patients treated with TEVAR after type A and B aortic dissection.]

Results: Patients treated with TEVAR after aortic dissection were 36 (31%). A total of 25 (21%) underwent TEVAR for type B aortic dissection and 11 (9%) for type A aortic dissection. Common origin for the innominate and left common carotid arteries was identified in 4 (16%) patients with type B dissection and in 2 (14%) patients with type A dissection (p = 0.88). All patients in our populations present hypertension. No demographic difference between groups were observed in Table 1. Left ventricular ejection fraction was lower in patients in aortic type A dissection (p = 0.022). No in-hospital mortality was observed in both groups. The overall survival was 100%, 90% and 82% and 59% at 1,3 and 5 years for type B dissection and 85%, 50% and 50% respectively for type A dissection (log rank = 0.170) (Figure 1). During follow up, freedom from endoleak development presents no statistically significant difference comparing type A and B dissection (log rank = 0.29) (Figure 2).

Conclusion: TEVAR is a safe and effective procedure with excellent in-hospital results. However, overall long-term survival is reduced, particularly for patients with type A aortic dissection. Further study will be address the role of comorbidity, as reduced ejection fraction, in long-term survival.

	Type B n = 25	Type A n = 11	P value
Age, mean ± SD, y	68.9±10.9	66.2±8.7	0.503
Female, n (%)	7 (29%)	2 (20%)	0.692
Smoking, n (%)	10 (41%)	7 (70%)	0.259
Hypertension, n (%)	25 (100%)	10 (100%)	-
Diabetes, n (%)	2 (8%)	1 (10%)	0.704
Hypercholesterolemia, n (%)	15 (62%)	5 (50%)	0.423
Lung disease ≥ Moderate, n (%)	2 (8%)	3 (30%)	0.296
Creatinine, mean ± SD	97.2±28	92.7±26	0.670
LV EF, mean ± SD	58.3±9	48.3±9	0.022

[Table 1. Demographic characteristics in patients treated with TEVAR after type A and B aortic dissection.]

Disclosure: Nothing to disclose

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Quantifying coronary microvascular disease: assessing absolute microvascular resistance reserve (MRR) by continuous coronary thermodilution

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Background: Hyperemic absolute coronary blood flow (in mL/min) can be measured with intracoronary continuous thermodilution of saline at room temperature and at an infusion rate of 20 mL/min. This study aims at assessing whether continuous thermodilution can also measure resting flow and microvascular resistance.

Methods: In 87 coronary arteries (58 patients) with angiographic non-significant stenoses absolute flow was assessed by continuous thermodilution of saline at infusion rates of 10 mL/min and 20 mL/min. Simultaneously, average peak velocity (APV) was measured (26 vessels). Microvascular resistance (R_{μ}), defined as the distal coronary pressure divided by the absolute flow, was calculated both at rest ($R_{\mu\text{-}rest}$) and during hyperemia ($R_{\mu\text{-}hyper}$). Microvascular Resistance Reserve (MRR) is calculated as the ratio of $R_{\mu\text{-}rest}$ and $R_{\mu\text{-}hyper}$.

Results: No significant difference was found between P_d/P_a at baseline and during saline infusion at 10 mL/min (0.95±0.05 vs 0.94±0.05, p = 0.53) as well as in APV (22.2±8.4 vs 23.2±8.4 cm/s, p = 0.63), thus indicating presence of resting coronary blood flow during the infusion of 10 mL/min of saline. In contrast, an infusion rate of 20 mL/min induced significant decrease in P_d/P_a (0.85±0.09 vs 0.95±0.05, p <0.001) and a significant increase in APV (22.2±8.4 cm/s to 57.8±25.5 cm/s, p <0.001). The coronary flow reserve (CFR) calculated by thermodilution and by Doppler flow velocity correlated closely (2.7±0.8 vs 2.7±1.1, r = 0.87, 95% CI 0.72 - 0.94, p <0,001). Similarly, mean doppler- and thermodilution-derived MRR had a high level of agreement (3.32±1.5 vs 3.23±1.2, r = 0.91, 95% CI 0.81 - 0.96, p <0.001).

Conclusion: Absolute coronary blood flow can be measured by continuous thermodilution both at rest and during hyperemia. This allows for accurate, reproducible, and operator-independent direct volumetric calculation of CFR and MRR. The latter is a quantitative metric specific for microvascular function and independent from myocardial mass.

Disclosure: Nothing to disclose

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Applicability of ISCHEMIA to the daily practice of a Swiss University Hospital

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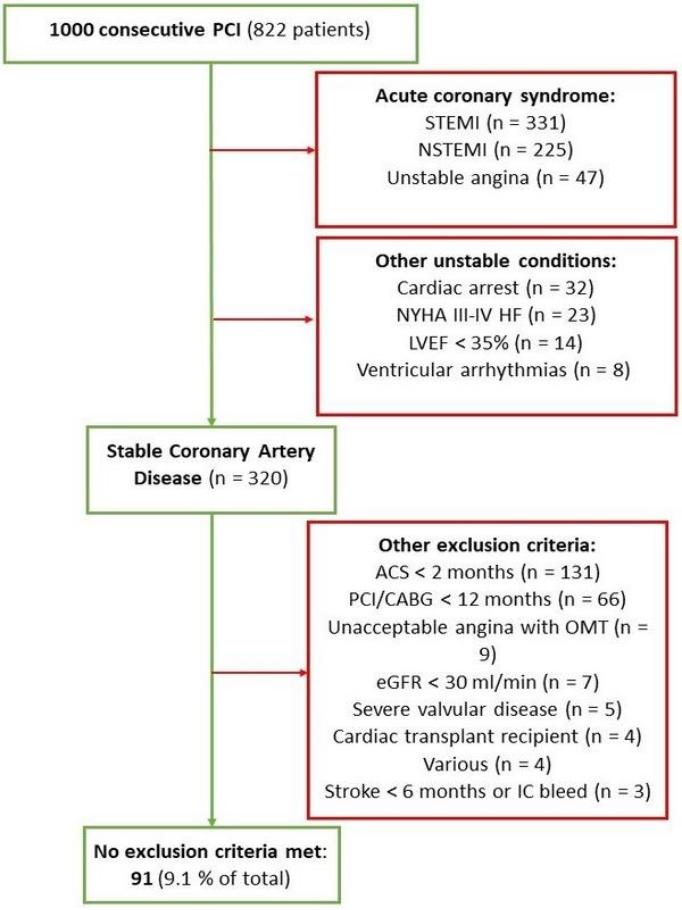
Introduction: The ISCHEMIA trial found that an invasive strategy was not associated with a reduction in major adverse cardiovascular events when compared with optimal medical treatment (OMT) alone among patients with moderate/severe ischemia. However, given the extensive exclusion criteria of the study, we sought to investigate if these results would actually change our daily practice.

Methods: We performed a retrospective analysis of the last 1'000 consecutive PCIs undertaken in our university hospital in Switzerland. We applied the ISCHEMIA exclusion criteria to this population in order to estimate the proportion of patients that would have been excluded from the trial.



[Figure 1: Flow chart of exclusion criteria among the 1000 PCI]

Results: Between October 2018 and November 2019, 1'000 PCIs were performed in a population with a mean age of 65.5 (IQR 51.0-76.0) years, of which 76.8% were men. Among these procedures, 603 (60.3%) were performed for an acute coronary syndrome (ACS) and 197 (19.7%) in the context of either an ACS within 2 months (n = 131), or a PCI/CABG within 12 months (n = 66) (Figure 1). A further 84 (8.4%) procedures were performed in patients with other high-risk features (ventricular arrhythmias, cardiac arrest, NYHA III-IV, eGFR <30 ml/min or LVEF <35%). Finally, 25 (2.5%) were performed in patients with unacceptable angina whilst on OMT, a cardiac transplant, a recent stroke, or another exclusion criterion. This left only 91 patients (9.1%) without any ISCHEMIA exclusion criteria. When considering only patients with SCAD (n = 320), 229 (71.6%) would have been excluded due to the presence of at least one exclusion criterion.

Conclusion: In this retrospective analysis of 1'000 consecutive PCIs, the vast majority were performed in patients with at least one ISCHEMIA exclusion criterion. These results suggest that the impact of ISCHEMIA on the real-world practice of a medium-sized PCI center like ours is likely to be limited.

Disclosure: Nothing to disclose

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Correlation and agreement of invasive versus non-invasive cardiac output measurements using thoracic electrical bioimpedance

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Introduction: Right and left heart catheterization using the thermodilution (TD) and the Fick methods are the reference techniques for cardiac output measurement. Non-invasive CO estimation relies mostly on echocardiography. Continuous thoracic electrical bioimpedance (TEB) has recently emerged as an interesting option correlating volumetric expansion of the ascending aorta to the change of thoracic bioimpedance after aortic valve opening.

Methods: Eighty-three patients undergoing right and left heart catheterization for aortic stenosis (n = 50), pulmonary hypertension (n = 14) or other valvulopathy (n = 19) assessment at the University Hospitals of Geneva by the same operators (SN and MC) from April 2019 to January 2020 were included in the analysis. Patients had standard CO measurement by TD and indirect Fick methods with concomitant TEB analysis using the ICON cardiac monitor. TEB was measured both at the time of the TD and the Fick calculation.

Results: Mean age was 74.2±16.5 years-old with a BMI of 26.1±5.5kg/m^2. CO was 4.9±1.2, 4.8±1.2, 5.2±1.3 and 5.4±1.5L/min as measured respectively by TD, Fick, TEB during TD and during Fick. There was no significant difference between the mean of CO as measured by TD vs Fick (p = 0.35) and TEB vs TD (p = 0.16), whereas the mean of CO differed significantly between TEB and indirect Fick (p = 0.02). Overall, TEB showed a good and moderate correlation with TD (r = 0.70, p <0.001) and indirect Fick (r = 0.63, p <0.001), respectively. There was no systematic bias for CO measurements using TEB vs TD or indirect Fick according to the Bland-Altman scatter plot. When considering only aortic stenosis, correlation between TEB and TD or indirect Fick was poor (respectively r = 0.42, p = 0.004 and r = 0.38, p = 0.01) but differed widely between patients with low BMI <25 (respectively r = 0.79, p <0.001 and r = 0.76, p <0.001) and high BMI≥25 (respectively r = 0.34, p = 0.04 and r = 0.29, p = 0.08).

Conclusions: TEB showed good correlation and agreement with invasive CO measurement methods. Overweight seems to interfere significantly with TEB measurements.

Disclosure: Nothing to disclose

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External validation of the No Objective Testing rules

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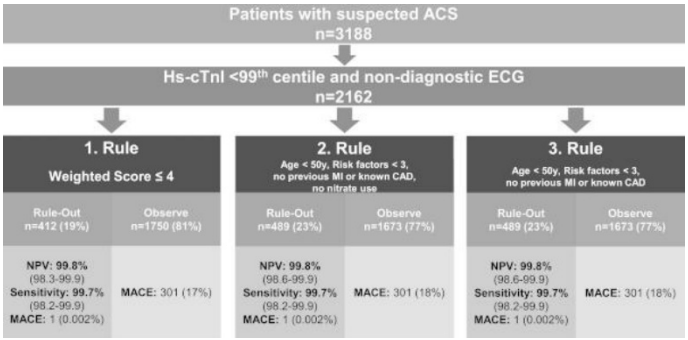
Introduction: Although suspected acute coronary syndrome (ACS) is one of the leading causes for emergency admissions, the majority of patients is finally diagnosed with conditions other than ACS. A recent study questioned the general need of objective testing in a subgroup of low-risk patients with normal cardiac troponin I (cTnI) concentrations and a non-diagnostic electrocardiogram. We aimed to externally validate the No Objective Testing (NOT) rules that identify patients who may not require objective testing for coronary artery disease (CAD).

Methods: We enrolled patients presenting to the emergency department with symptoms suggestive of ACS within a large ongoing prospective international multicentre cohort. We applied the NOT rules using high-sensitivity cTnI. In brief, the first rule is a weighted score derived from independent predictors of ACS, the second and third were simplified and only include age, history of myocardial infarction (MI) or CAD, cardiac risk factors and nitrate use. Primary objective was the safety and efficacy of the rules for rule-out of MACE (defined as MI, unstable angina pectoris, urgent or emergency revascularisation or cardiovascular death) at 30-days of follow-up.

Results: Among 3188 enrolled patients, 2162 (68%) were eligible for analysis of the NOT rules. MACE at 30-days occurred in 302 (14%) patients. Of the three NOT rules, the second and third rule provided highest safety and efficacy for rule-out of MACE. Both identified 492 (23%) patients at low-risk, with a sensitivity of 99.7% (95%-CI 98.2%-99.9%), and a negative predictive value of 99.8% (95%-CI 98.6%-99.9%). One MACE was missed within 30-days.



[Performance of NOT rules]

Conclusions: The NOT rules should not be used for patients with an ACS or clear non-cardiac diagnosis. However, for patients with an unclear diagnosis the NOT rules prove to be a safe tool that identifies nearly one-fourth of patients at low risk for MACE who may not need objective testing.

Disclosure: The study was supported by research grants from the Swiss National Science Foundation, the Swiss Heart Foundation, the KTI, the European Union, the Stiftung für kardiovaskuläre Forschung Basel, the University of Basel, the University Hospital Basel, Abbott, Beckman Coulter, Biomerieux, Brahms, 8sense, Roche, Ortho Clinical Diagnostics, Siemens, and Singulex.

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Stent apposition in proximal optimisation technique: diagnostic accuracy with progression of contrast mediUm to evaluate coronary opaciFication and Flow (POT Puff)

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Introduction: Percutaneous coronary intervention(PCI) involving bifurcations is accounted for about one third of cases. PCI of coronary bifurcations are largely finalized with a proximal optimization technique(POT) which consist of inflating a shorter and larger balloon adapted to the mother branch size. We sought that contrast progression during the POT could be a sign of stent apposition in the mother branch. To validate this simple angiographic sign called POT Puff as a stent apposition marker in the mother branch, we performed an observational study comparing POT Puff sign with optical coherence tomography(OCT) as gold standard of stent apposition.

Methods and results: In two centers, we performed contrast injection during the POT in stable patients who underwent PCI of any bifurcation lesion excluding left main, followed by an OCT. We named POT puff sign positive if contrast medium progressed through the inflated balloon and negative if it was completely stopped. The number of struts in the mother branch was counted and sorted as malapposition above 200µm to the intimal surface. We included 50 consecutive coronary bifurcations in 49 patients with POT Puff sign and OCT without complications. The prevalence of malapposition in the mother branch confirmed by OCT was 26%(14 cases). The POT puff sign was positive in 24%(12 cases). Sensitivity, specificity, positive predictive value and negative predictive value were respectively 69.23%(44.14-94.32, 95% confidence of interval), 91.89%(83.10-100), 75%(50.5-99.5) and 89.47%(79.72-99.23). The area under the ROC curve was 0.806(0.645-0.966).

Conclusions: Our study suggests that prevalence of stent malapposition in the mother branch is frequent and that POT Puff sign is effective to detect stent malapposition as compared with OCT. POT puff sign is simple, accurate and cost free. It should be used in every PCI of non-left-main bifurcation finalized with a POT to assess mother branch stent apposition.

Disclosure: Nothing to disclose

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Cardiac imaging to estimate the prevelance of type 1 myocardial infarction among patients with PMI following non-cardiac surgery

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Introduction: Patients with perioperative myocardial injury/infarction (PMI) after non-cardiac surgery have a high mortality, but there is still no consensus about PMI-management. The aim of this study is to describe the diagnostic approach to estimate the prevalence of type 1 myocardial infarction (MI) among patients with PMI following non-cardiac surgery.

Methods: Consecutive patients at increased cardiovascular risk undergoing non-cardiac surgery were enrolled into a prospective multicenter study. PMI was defined as an increase of more than the 99th percentile of the troponin assay above baseline. In case of a PMI further diagnostic and therapeutic steps were taken under the discretion of the attending cardiologist. PMI aetiology was centrally adjudicated by two independent experts on all information available. PMI were classified into extracardiac (eg. severe sepsis, stroke, pulmonary embolism, cardiac trauma) or cardiac (eg. tachyarrhythmia, heart failure, treated-as type 1 MI, possible type 2 MI). New regional wall motion abnormalities (WMA) in transthoracic echocardiography (TTE), scars and/or ischemia in myocardial-perfusion-scintigraphy/positron-emission-tomography (MPS/PET) and evidence of plaque rupture or thrombus in angiography were considered as signs for a type 1.

Results: From October 2014 to December 2017 we identified 344 patients (43%, mean age 77 years, 42% female) with cardiac PMI receiving cardiac consultation after exclusion. In 24 (29%) patients WMA was found in TTE. In 10 (45%) patients ischemia and in 9 (41%) scarring was found in MPS/PET. In the total of 37 lesions, 9 (24%) Ambrose type II lesions (eccentric lesion associated with disrupted plaques), 3 (8%) thrombus and 11 (30%) ulcerations were found in angiography. 44 (13%) patients had at least one sign for a type 1 MI in the undertaken cardiac imaging.

Conclusion: Cardiac imaging in selected PMI patients yield a high probability for detection of ischemia and angiographic abnormalities indicating a perioperative acute coronary event.

Disclosure: Grant from the Swiss Academy of Medical Sciences and the Bangerter Foundation (YTCR 09/19).

RISK FACTORS / ARTERIOSCLEROSIS / HYPERTENSION / LIPIDS / EPIDEMIOLOGY / CARDIAC REHABILITATION

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Carotid atherosclerotic burden significantly improves risk prediction derived from PROCAM and SCORE in middle aged subjects

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Introduction: There are few data about the predictive value of atherosclerosis imaging beyond traditional risk calculators in younger subjects.

Methods: We compared PROCAM, SCORE and FRAM with carotid ultrasound (total plaque area, TPA) and arterial age (AA), which was calculated in German and Swiss subjects without known cardiovascular diseases. Follow-up was obtained by phone or mail.

Results: In 2842 subjects (age 50±8, 38% women) 137 (4.8%) cardiovascular events occurred (ASCVD: 41 myocardial infarctions, 16 strokes or TIA, 17 CABG, 28 PTCA, 35 coronary artery disease defined by invasive angiography) during a mean follow-up time of 5.4 (1-12) years. PROCAM risk was 5±6%, SCORE risk 1.3±1.6% and FRAM 10±6%. Both for the primary outcome (AMI, STROKE/TIA, CABG) and the secondary outcome (adding CAD and PTCA) hazards increased significantly for TPA tertiles and AA groups between 1.1 (0.5-2.5) and 58.6 (8.1-425.3) after adjustment for risk factors (age, smoke, sex, systolic BP, lipids, BMI, medication in Model 1) and after adjustment for results from PROCAM, SCORE and FRAM (Model 2). Model performance was statistically improved regarding model fit and calibration in all models using TPA and AA. Net reclassification improvement (NRI) for PROCAM and SCORE using TPA tertiles or AA age groups increased significantly between 24% to 50%.

Conclusion: TPA and AA added clinically relevant additional prognostic information to conventional risk testing, supporting the assessment of ASCVD risk with carotid ultrasound in younger subjects.

Disclosure: Nothing to disclose

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Cardioprotective effects of strength training vs. accelerometric activity at the population level

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Introduction: Interventions suggest that resistance training has cardioprotective associations distinct from total activity, but recommendations either ignore activity type or focus on aerobic activity. We establish whether independent cardioprotective effects of resistance training persist at the population level.

Methods: 6947 American adults (51% male) self-reported resistance training and simultaneously tracked total activity with an accelerometer. 5-level activity categories were treated as predictor of heart-disease risks (hypertension, dyslipidemia, overweight and diabetes) corrected for year, age, sex, ethnicity, and smoking; activity categories were collapsed if there was no clear trend across them. Mutually corrected models were run only if both activity types predicted a given outcome.

Results: Average total activity was 20 minutes per day (SD 24). 29% of subjects resistance trained, averaging once per week (range 0-6.)

In corrected models, risk was lower for each increasing category of total activity for overweight (OR for the most active category vs. the least, 0.490) and diabetes (OR 0.234), with both p <0.001; but not hypertension or dyslipidemia (both p >0.05.) There were no trends across resistance-training categories above 'none,' but all categories of resistance trainers were at less risk than non-trainers for hypertension (ORs between 0.55 and 0.85) overweight (ORs between 0.55 and 0.74) and diabetes (0.51-0.80) (all p <0.01.) Because of this lack of trend, resistance training was collapsed to 'any' vs. 'none' in further models.

After mutual correction, both activity types remained significant predictors of overweight (ORs 0.66 for any resistance training, 0.53 for highest level of total activity) and diabetes (0.70 and 0.25) with all p-values <0.01.

Conclusions: Both activity types appeared cardioprotective, with comparable effect sizes that were almost independent. These findings support a cardioprotective use for routine resistance training in general practice.

Disclosure: Nothing to disclose

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Achievement of low-density lipoprotein cholesterol targets in light of the 2019 ESC dyslipidaemia guidelines: Real world data from cardiovascular rehabilitation

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Introduction: In 2019 the European Society of Cardiology (ESC) lowered the target values for low-density lipoprotein cholesterol (LDL-C) from <1.8 mmol/L to <1.4 mmol/L for secondary prevention of cardiovascular disease (CVD). Knowing that a large proportion of patients already fail to reach the 2016 guideline LDL-C goals, the latest update represents an ambitious challenge for LDL-management in daily clinical practice. To date, the percentage of patients already achieving this new LDL-C target in real world secondary prevention programs remains unknown.

Methods: To evaluate patient characteristics and LDL-C target achievement rates according the 2016 and 2019 ESC dyslipidaemia guidelines, we conducted a retrospective analysis of prospectively collected data in patients with Coronary Artery Disease (CAD), who completed the local ambulatory cardiovascular rehabilitation program (CR) in 2018.

Results: In 176 eligible patients, median age was 61 years (IQR 54-70) and sex was predominantly male (n = 155; 88.1%). Acute coronary syndrome (ACS) was the leading diagnosis triggering CR (136 patients; 77.3%). Lipid lowering medication included statins (96.0%), high potent statins (90.9%), Ezetimibe (13.1%), PCSK9-inhibitors (1.1%) and Fibrates (0.6%). At the end of CR, the primary endpoint (LDL-C target <1.4 mmol/L) was reached by 79 patients (44.9%) and the secondary endpoint (LDL-C target <1.8 mmol/L) was reached by 134 patients (76.1%). Patients with LDL-C above the 2016 guideline recommendation (>1.8mmol/L) were more often female (p = 0.014), had less statin (p = 0.013) but more ezetimibe therapy (p = 0.014). If statins were used, they were less potent overall (p = 0.033) without significant differences in-between groups (p = 0.022).

Conclusion: Almost half of patients participating in a comprehensive CR in 2018 achieve the 2019 recommended LDL-C goal of <1.4 mmol/L primarily by using high potent statins. Avoiding chronic undertreatment in women and increasing the use of combination therapies is crucial to further enhance the number of patients reaching the latest LDL-C target goals.

Disclosure: Prof. Pfister reported receiving speaker honoraria from Novartis, Vifor Pharma, AstraZeneca, and MSD.

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Short- and long-term effects of high intensity interval training vs. moderate intensity continues exercise on left ventricular remodeling in patients early after ST-elevation myocardial infarction - the HIIT EARLY randomized controlled trial

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Introduction: The effect of high intensity interval training (HIIT) on left ventricular (LV) remodeling in patients with acute ST-elevation myocardial infarction (STEMI) is poorly understood. We aimed to compare short- and long-term effects of HIIT vs. moderate-intensity continuous exercise (MICE) on LV remodeling in patients with a recent acute STEMI.

Methods: Patients with an acute STEMI (<4 weeks) were recruited. After a 3-week run-in period with up-titration of medical therapy and

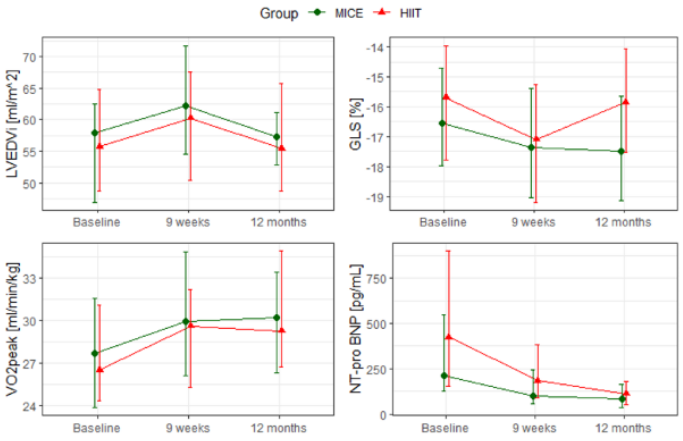
three weekly MICE, baseline assessment included echocardiography, cardiopulmonary exercise test, and blood testing. Patients were randomised to either HIIT or isocaloric MICE for 9 weeks (MICE: three weekly; HIIT: two HIIT and one MICE). Exercise training was tailored based on the ventilatory thresholds (VT), and appropriately up-titrated. Patients were re-assessed after 9-weeks and after 12 months. Mixed models were performed for LV end-diastolic volume relative to body surface area (LVEDVi), LV global longitudinal strain (LVGLS) and peak oxygen consumption (VO2) with group * time interaction effects.

Results: 73 male patients were included (Table 1). There was no group*time interaction for LVEDVi. LVEDVi increased overall by 5.04 ml/m^2 (95% CI 2.19 to 7.88 ml/m^2) from baseline to 9 weeks and by 0.44 ml/m^2, (-2.57 to 3.45 ml/m^2) from baseline to one year (Figure 1a). LVGLS improved in both groups from baseline to 9 weeks by -0.84% (-1.4 to -0.28%). However, there was a trend for group*time interaction (p = 0.052) with a worsening in LVGLS in the HIIT group by 1.30% (-0.01 to 2.61) compared to the MICE group at one year (Figure 1b). No further group*time interactions were found. Peak VO2 increased overall by 2.53 ml/kg/min (1.68-3.38 ml/kg/min) from baseline to 9 weeks and by 2.73 ml/kg/min (1.59-3.87 ml/kg/min) from baseline to 1 year (Figure 1c). HsTnT decreased by -0.54 pg/ml (-0.72 to -0.36 pg/ml) within 9 weeks and by -0.81 pg/ml (-1.01 to -0.61 pg/ml) within 1 year. NTpro-BNP decreased by -0.78 pg/ml (-0.97 to -0.59 pg/ml) and by -1.19 pg/ml (-1.44 to -0.95 pg/ml), respectively (Figure 1d).

Conclusion: In patients early after acute STEMI, HIIT was not different to isocaloric MICE with regard to short- and long-term effects on LVEDVi, biomarkers of myocardial damage and cardiorespiratory fitness. The trend towards a worsening in LVGLS at 12 months in the HIIT group suggests that HIIT may induce an unfavorable LV remodeling in the phase of myocardial healing.

	HIIT group	MICE group
Male sex (n)	37 (100%)	36 (100%)
Age (years)	56.5 (±11.2)	55.5 (±10.1)
Body mass index (kg/m2)	26.5 (±3.3)	27.7 (±2.9)
Blood pressure (mm Hg)	123.7 (±17.3) 72 (±9.4)	127.1 (±19.6) 76 (±10.9)
Anterior wall MI (n)	19 (51.4%)	17 (47.2%)
Ejection fraction (%)	56.7 (±8.6)	58.9 (±8.5)
ACE inhibitors/AT2 blockers	34 (91.9%)	35 (97.2%)
Beta blockers	36 (97.3%)	35 (97.2%)
Lipid lowering drugs	37 (100%)	36 (100%)

[Table 1 Baseline characteristics]



[Figure 1]

Disclosure: Nothing to disclose

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Cardioprotective associations of self-reported and objectively measured physical activity in a healthy population

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Introduction: Physical activity benefits health, but population-scale research is hampered by heterogeneity in assessment. Subjective assessments of activity (e.g. self-reports) are biased by recall and social desirability, while objective measures (e.g. accelerometry) are logistically complex and have their own biases. Choice of a measure is thus driven by issues of both clinical relevance and logistics. To inform this choice I compare both total levels, and cardioprotective associations, of total physical activity assessed both objectively and subjectively in the same population.

Methods: 7695 American adults (51% male) self-reported activity on a standardized questionnaire and wore an activity-tracking accelerometer for one week. Each activity measure was categorized into 5 levels for analysis, and we calculated associations with heart-disease risks (hypertension, dyslipidemia, overweight, and diabetes) first uncorrected and then corrected for confounders (age, ethnicity, gender and smoking.) If more than one activity measure predicted a given outcome, mutually corrected models were run.

Results: Subjectively and objectively measured total activity averaged 24.5 (SD 54) and 19.3 (SD 20) minutes per day. Both measures were (sometimes nonsignificantly) lower in females, tobacco smokers, older adults, and black Americans. After correction for confounding, both activity measures were significantly (p for trend <0.05) negatively associated with diabetes and overweight, but not dyslipidemia: subjective, but not objective, activity also predicted hypertension. For each significant association, risk of the outcome steadily decreased for all activity categories past the second-lowest. Compared to the lowest category of subjective activity, odds of hypertension for those in the highest category were 0.72 (p <0.05). Odds ratios (OR) for diabetes and overweight were 0.84 (p = 0.07) and 0.69 (p <0.05.) For objective activity, the odds ratios for diabetes and overweight were 0.23 and 0.49 (both p <0.001). After mutual correction, estimated effects of objective activity did not change much (new ORs 0.23 and 0.52, both p <0.05) but effects of subjective activity lost significance; and its estimated effect on diabetes was no longer consistently protective.

Conclusions: If objective activity measures are not available, subjective reports adequately capture levels of physical activity as well as the direction, though not size, of many of its effects.

Disclosure: Nothing to disclose

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Ideal cardiovascular health in suburban Switzerland - Results from the first phase of the Swiss Longitudinal Cohort Study (SWICOS)

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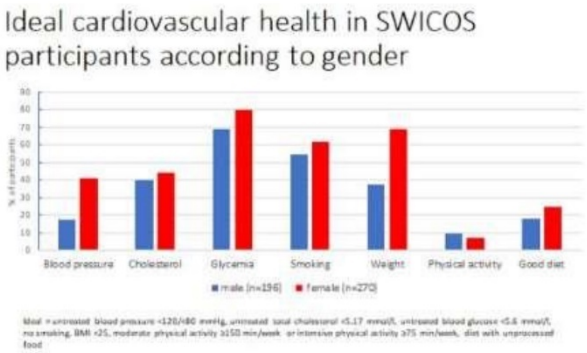
Introduction: Ideal Cardiovascular Health (ICH) is a concept defining cardiovascular health of individuals using seven health metrics. We assessed cardiovascular health among participants of the Swiss Longitudinal Cohort Study (SWICOS) using the ICH concept.

Method: This analysis of the SWICOS study included 466 participants without previous cardiovascular disease. The seven health metrics were blood pressure (BP), total cholesterol, blood glucose, smoking, body mass index (BMI), physical activity, and diet. Each of the seven metrics was divided into three categories (ideal, intermediate, and poor) using pre-defined cut-offs according to the ICH concept.

Results: Ideal BP was found in 145 (31.1%), ideal cholesterol in 192 (42.3%), ideal glucose in 341 (75.4%), non-smoking in 273 (58.6%), ideal BMI in 259 (55.6%), ideal physical activity in 37 (8.0%), and an ideal diet in 96 (22.9%) of the 466 participants (Figure 1). For BP, glucose, and BMI, significantly more female than male participants were in the ideal

category, whereas for physical activity more male than female participants showed ideal behavior. In a logistic regression model, increasing age was significantly associated with less ideal BP, cholesterol, glucose, and BMI.



[Figure 1]

Conclusion: This analysis from the SWICOS cohort suggests that cardiovascular health status may be improved in the Swiss population, and supports the need for a national strategy for the prevention of cardiovascular diseases.

Disclosure: Nothing to disclose

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Factors associated with white-coat hypertension in the population-based Swiss Longitudinal Cohort Study (SWICOS)

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Introduction: Several previous studies investigated white-coat hypertension and factors associated with it. To the best of the authors' knowledge, no previous population-based study comprehensively assessed factors associated with white-coat hypertension in Switzerland.

Method: The population-based Swiss Longitudinal Cohort Study (SWICOS) assessed cardiovascular risk profiles in a Swiss community (Cama/Lostallo GR). Of 496 participants, 61 participants with elevated office blood pressure (BP) (≥140/90 mmHg) underwent 24-hour ambulatory BP monitoring (ABPM). White-coat hypertension was defined as mean BP <130/80 mmHg during ABPM.

Results: Of the 61 participants, who underwent ABPM, 20 (32.8%) had white-coat hypertension. Body mass index (BMI) was significantly lower in white-coat hypertension (25.8 vs. 28.9 kg/m2, p = 0.010), and depression was significantly more prevalent (35.0% vs. 9.8%, p = 0.030). There were, albeit statistically non-significant, trends towards more female participants among white-coat hypertensives (55.0% vs. 34.1%, p = 0.17), and more persons who were married (75.0% vs. 56.0%, p = 0.17). There were no differences with regard to age, education, prevalence of cardiovascular risk factors, or the use of antihypertensive drugs.

Conclusion: The prevalence of white-coat hypertension in the general population is high with approximately one in three persons having white-coat hypertension. In particular, lean female persons with depression should undergo 24-hour ABPM to rule out white-coat hypertension.

Disclosure: Nothing to disclose

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Cuffless systolic and diastolic blood pressure estimation at the wrist via an optical device: comparison to intra-arterial measurements

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Introduction: The diagnosis and management of hypertension usually requires the estimation of blood pressure (BP) by means of an inflatable cuff placed around the upper arm. This procedure generates discomfort and limits patient compliance. Cuffless devices capture BP readings without performing any arterial occlusion. We believe that comfortable and cuffless BP monitoring devices can significantly aid in the fight against hypertension, provided that these devices provide reliable BP readings.

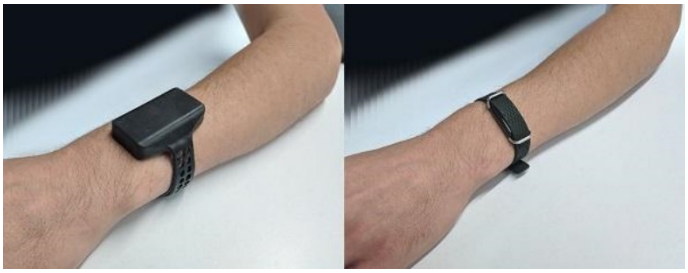
Purpose: The purpose of this study (NCT03837769) was to compare the systolic (S) and diastolic (D) blood pressure (BP) estimations from a new optical device at the wrist (figure) against invasive measurements performed on patients scheduled for radial arterial catheterization in the intensive care unit (ICU). The first results from this study were recently published and demonstrated good agreement for SBP and for DBP for the overall study population. Here we report expanded statistical analyses for different population subgroups such as gender, age, body mass index (BMI) and skin color.

Methods: The study protocol consisted of the simultaneous recording of reflective photo-plethysmographic signals (PPG) from the cuffless optical device and BP values recorded by a contralateral radial arterial catheter. The PPG signals were automatically processed to generate estimates of SBP and DBP. Agreement of paired BP estimations was further calculated in terms of standard deviation (SD) of differences. The mean of differences were systematically zero because BP estimations from the optical device were calibrated for each patient.

Results: The table shows that, for the overall population, both SBP and DBP differences SDs were smaller than 8 mmHg (as already published). Furthermore, when analyzing the performance across different population groups, both genders, all BMIs and all skin colors also resulted in SDs smaller than 8 mmHg. Only patients whose age was above 65 years were associated with a higher SD.

	Population	N	SD of measured BP differences SBP (mmHg)	SD of measured BP differences DBP (mmHg)
	All	16	7.1	2.9
Gender	Male	10	6.4	2.8
Gender	Female	6	8.0	3.1
Age (years)	<65	7	4.0	2.3
Age (years)	> 65	9	* 9.3	3.4
BMI (Kg/m2)	<26	10	7.9	2.9
BMI (Kg/m2)	> 26	6	5.7	2.8
Skin color (Fitzpatrick)	2	13	7.7	3.0
Skin color (Fitzpatrick)	3	3	4.5	2.6

[Standard deviation (SD) of the measured BP differences across different subgroups. (*) Only subgroup with a SD larger than 8mmHg]



[Investigational device (left). Further integration into a wearable medical device (right)]

Conclusions: SBP and DBP values obtained by radial artery catheterization and those obtained from optical estimations at the wrist were compared. While for the overall population and most subgroups the new optical technique appears to be capable of replacing more traditional methods of BP estimation, the SBP differences found for the subgroup of patients above 65 years old were larger. Additional studies are needed to confirm and expand these very encouraging results.

Disclosure: Nothing to disclose

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Impact of self-reported alcohol consumption on in-hospital outcomes after acute coronary syndrome: an insight from the AMIS Plus registry

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Introduction: The association between alcohol consumption and the occurrence of coronary heart disease is well described in literature. Data regarding the impact of regular alcohol consumption on in-hospital outcomes in the setting of acute coronary syndrome (ACS) are lacking. We aimed to evaluate the impact of self-reported alcohol consumption on in-hospital outcomes in patients with ACS.

Methods: Data derived from patients enrolled between 2007 and 2019 in the Acute Myocardial Infarction in Switzerland (AMIS) Plus registry were retrospectively analyzed. The primary endpoint was all-cause in-hospital mortality, while secondary endpoints were set as incidence of major adverse cardiac and cerebrovascular events (MACCEs). Outcomes comparisons according to quantity of daily alcohol intake were also performed.

Results: Records concerning alcohol consumption were available in 25707 patients; 5298 of them (21%) fulfilled the criteria of regular alcohol consumption. Daily alcohol intake was reported in 4059 (77%), of these patients (regular drinkers) with 2640 light drinkers (≤2 drinks/day) and 1419 heavy drinkers (>2 drinks/day). Regular drinkers were predominantly male, younger, smokers, more comorbid and with a worse clinical presentation as compared to abstainers/occasional drinkers.

In-hospital mortality and MACCEs of heavy drinkers were significantly higher compared to light drinkers (5.4% vs. 3.3% and 7.0% vs. 4.4%, both p = 0.001). When tested together with GRACE risk score parameters, heavy alcohol consumption was independently associated to in-hospital mortality (p = 0.004).

Conclusions: Heavy alcohol consumption is an additional independent predictor of in-hospital mortality in patients presenting with ACS.

Disclosure: Nothing to disclose

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Use of evolocumab in patients at high cardiovascular risk: the Swiss multicenter prospective observational ECARA study

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Introduction: Maintenance of low LDL-C-levels and adherence to lipid lowering therapy (LLT) is essential to prevent recurrent CV events. However, in Switzerland, more than 60% of patients with acute coronary syndrome do not achieve guideline recommended LDL-C goals at one year. Practicable solutions to increase long-term adherence to LLT are thus needed.

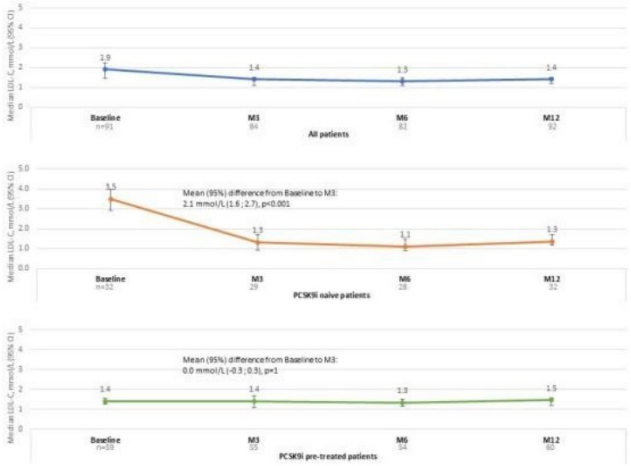
Methods: ECARA† enrolled adults ≥18 years with confirmed atherosclerotic cardiovascular disease (ASCVD) or at high risk of a CV event, and elevated LDL-C levels despite maximally tolerated statins. Patients must have initiated evolocumab 140mg every two weeks or 420mg monthly prior to enrollment; planned follow-up was 12 months. The web-based mHealthAlert system was used to support patient management and drug adherence. Primary outcome was cholesterol levels at initiation and after 3, 6 and 12 months of evolocumab therapy

Results: All 100 enrolled patients completed 12 months follow-up. Baseline characteristics are shown in the Table. 81% had a history of CV events and 55% had ≥2 previous CV events; 3% had familial hypercholesterolemia. At enrollment, 71% had a history of statin-related muscle symptoms, 44% were receiving statins, 65% had received prior PCSK9i therapy and 35% were PCSK9i-naive; median LDL-C was 1.9 mmol/L. In PCSK9i-naïve patients, median LDL-C at enrolment was 3.5 mmol/L and fell by a mean of 2.1 mmol/L within 3 months of evolocumab initiation; this reduction was maintained over time. In patients with prior PCSK9i therapy, LDL-C remained stable during evolocumab treatment (Figure).

Baseline characteristics	Patients	n (%) or Median (Q1, Q3)
Gender, male	*n=100*	72 (72)
Age, years	*n=100*	61.00 (53.00, 67.25)
Type of symptomatic ASCVD [a]	*n=100*	
Coronary artery disease		84 (84)
Cerebrovascular disease		19 (19)
Peripheral artery disease		20 (20)
Lipid levels, mmol/L		
Total cholesterol	*n=96*	3.92 (3.18, 5.68)
LDL-C	*n=91*	1.90 (1.29, 3.37)
HDL-C	*n=99*	1.30 (1.04, 1.54)
Triglycerides	*n=93*	1.53 (1.04, 2.11)
Lipid lowering medication [a]	*n=100*	
Statins [b]		44 (44)
Ezetimibe		30 (30)
PCSK9i [c]		65 (65)
History of statin-related muscle symptoms	*n=99*	70 (71)

[a] Patients could have more than one ASCVD or lipid lowering agent; [b] Statin dose could be zero in patients with severe statin intolerance; [c] n=6 patients had received prior alirocumab therapy and switched to evolocumab prior to enrolment into ECARA.
†ECARA: Explore Clinical Utility of Evolocumab in Combination with an e-Health System: Swiss Prospective Observational Study in Patients with clinical Atherosclerotic Cardiovascular Disease (ASCVD)

[Table 1. Baseline characteristics]



[Figure 1. LDL-C over time]

Conclusion: In Switzerland, evolocumab was used in high-/very high-risk patients with significant comorbidities and severe CV disease, of whom fewer than half were receiving statin therapy. Low LDL-C levels were maintained in all patients receiving evolocumab, including those with prior PCSK9i exposure, suggesting adequate adherence. Among PCSK9i-naïve patients, LDL-C levels were halved within 3 months of evolocumab initiation.

Disclosure: This study was funded by Amgen Switzerland AG. David Carballo has received congress attendance support. Isabella Sudano has received consulting fees, travel grants and honoraria from Amgen,

Daiichi Sankyo, Menarini, MSD, Recordati, Servier und Sanofi. Nina Reichert is an employee of Amgen and holds Amgen stock. David Nanchen participates as an investigator for clinical studies on lipid-lowering drugs sponsored by Amgen, Pfizer, Daiichi Sankyo, and Novartis, and has received no personal remuneration in cash or in kind from those pharmaceutical industries. Matthias Wilhelm has nothing to disclose.

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Incremental Value of C-reactive protein to the MEESSI acute heart failure risk score

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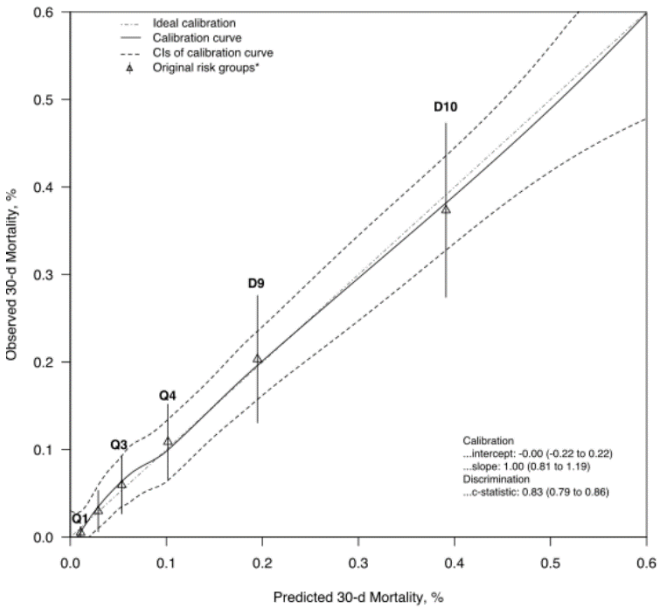
Introduction: The MEESSI acute heart failure (AHF) risk score has high accuracy in the prediction of 30-day mortality in patients presenting with AHF and may be considered the current gold standard for this indication. However, the impact of C-reactive protein (CRP) on the model´s goodness of fit is unknown.

Methods: In a prospective multicenter diagnostic study the presence of AHF was centrally adjudicated by two independent cardiologists among patients presenting with acute dyspnea to the ED. The MEESSI-AHF risk score was calculated using a recalibrated model containing 12 independent risk factors. The incremental value of CRP was examined by the use of a logistic regression analysis with an entry criterion of p <0.01. Goodness of fit tests were performed to measure the model´s discrimination and calibration.



[Calibration curve of the MEESSI-AHF risk score updated by CRP.]

Results: Among 1572 patients with adjudicated AHF, 1208 patients had complete data allowing calculation of the MEESSI score updated by CRP. Compared to the original MEESSI model (c-statistic, 0.79 (95% CI, 0.75-0.83)) the addition of CRP (c-statistic, 0.83 (95% CI, 0.79-0.86)) significantly improved the model´s discrimination (p = 0.01). When assessing the cumulative mortality, the gradient in 30-day mortality over six predefined risk groups was increased by addition of CRP. 30-day mortality rates in the lowest and highest risk groups of the original model were 0.4% and 31.0% compared to 0.5% and 37.8% in the updated model. Both models showed good overall calibration (Hosmer-Lemeshow p = 0.22 (original model), p = 0.84 (model updated by CRP)). Findings were confirmed in a sensitivity analysis that used multiple imputation for missing values in the overall cohort of 1572 patients.

Conclusion: CRP has a significant incremental value to the MEESSI score as indicated by the improved goodness of fit compared to the original model.

Disclosure: Nothing to disclose

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Predictors for one-year outcomes after cardiac rehabilitation in elderly patients: the EU-CaRE multicenter cohort study

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Background: Cardiac rehabilitation (CR) has been found to improve exercise capacity in patients with coronary artery disease (CAD) and valvular heart disease (VHD). However, elderly patients have largely been underrepresented in reported studies.

Aims: To identify predictors for 1-year outcomes after CR programs offered across seven European countries for elderly CAD and VHD patients.

Methods: CAD patients with or without revascularization and patients after valve intervention > 65 yrs who participated in comprehensive CR were included in the study. Peak oxygen uptake (VO2), BMI, resting systolic blood pressure (BPsys), and low-density lipoprotein-cholesterol (LDL-C) were assessed before start of CR, at termination of CR and 12 months after start of CR and predictors for changes were identified by multivariate regression models.

Results: Analyses were based on 1241 patients. The strongest predictor for improvement in peak VO2 was open chest surgery with a three-fold greater increase in surgery patients compared to patients with percutaneous or no interventions. Therefore, predictors for surgery and non-surgery patients were identified separately. In the 468 patients after surgery, age, female sex, diabetes mellitus and lag time from index event to start of CR were negative predictors for improvement in peak VO2. In the 773 patients without open chest surgery, age and previous acute coronary syndrome were negative predictors. Neither number of attended training sessions nor duration of CR were associated with change in peak VO2. Non-surgery patients were more likely to achieve targets in risk factors control (BPsys, LDL-C and body mass index) compared to surgery patients. LDL-C targets were better achieved by DM patients and CAD patients with statin therapy.

Conclusions: Factors other than CR characteristics (number of attended training sessions or duration of CR), namely time between index event and start of CR in open chest surgery and disease severity in non-surgery patients were the most important predictors for long-term improvement of exercise capacity after CR programmes. The greater improvement in surgery patients was highly related to the time between index event and start of CR, which probably reflected the contribution of spontaneous recovery.

Disclosure: Nothing to disclose

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Cardiac rehabilitation in underrepresented groups: uptake and clinical outcomes from a tertiary referral center in Switzerland

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Introduction: Cardiac rehabilitation (CR) uptake remains consistently low across countries and time, especially for women, elderly patients, and migrants. In addition, factors associated with low uptake may be also associated with less clinical benefit from CR.

Objective: To evaluate the association of migration status, age and sex, with CR uptake and clinical outcomes of a hospital committed to treatment equity.

Methods: Longitudinal cohort study. We retrospectively included all consecutive records of patients who underwent PCI after acute or chronic coronary syndromes at the Bern University Hospital from 2006-

2017. We analysed CR uptake, and its clinical benefit in terms of gain in peak exercise capacity in metabolic equivalents (MET) and changes in cardiometabolic profile, including body mass index (BMI), blood pressure (BP), LDL-cholesterol and glycated hemoglobin (HbA1c) in patients with diabetes mellitus. To assess the associations of age, sex, and migratory status with CR uptake, a logistic adjusted regression model was performed. The effects on clinical benefits were evaluated by adjusted linear regression models.

Results: We included 2785 records. Overall CR uptake was 33.7% (43.2% among migrants, 25% among women). Of the 517 patients who enrolled in CR, 52% had an acute coronary syndrome. CR uptake significantly declined with increasing age (-47% per decade, p <0.0001) and was smaller in single/divorced/widowed patients than patients living with partner (-34%, p = 0.001). After adjustment for age, there was no difference in CR uptake between sexes or patients with native/foreign origin. We observed statistically significant changes after CR in exercise capacity (+0.8 MET or 13%, p = <0.0001), improvement in LDL-cholesterol (median -0.3 mmol/L or -13%, p <0.0001) and glycated hemoglobin in diabetic patients (median -0.4 mmol/mol or 5%, p = 0.0002). BMI and systolic BP did not change. The change in MET was independently associated with the number of attended sessions per week in patients younger than 65 yrs (0.4 MET per weekly session, p <0.0001). Increasing age was associated with a decrease in improvement of exercise capacity (-0.2 MET per decade, P <0.0001). Neither age, sex, migration status nor number of attended training sessions had an effect on changes in the evaluated parameters.

Conclusion: In a Swiss urban setting, older age was the only barrier to participate in CR and reduced the clinical benefit of CR.

Disclosure: Nothing to disclose

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Training intensity and associated improvements in exercise capacity in elderly patients undergoing European cardiac rehabilitation - The EU-CaRE study

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Introduction: Guidelines for exercise intensity prescription in Cardiac Rehabilitation (CR) are inconsistent and have recently been controversially discussed. We aimed 1) to compare training intensities between European CR centres and 2) to assess associations between training intensity and improvement in peak oxygen consumption (VO_2) in elderly CR patients.

Methods: Peak VO_2, heart rate (HR) and workload (Watt) at the first and second ventilatory thresholds were measured at start of CR. Training HR was measured during three sessions spread over the CR. Multivariate models were used to compare training characteristics between centres and to assess the effect of training intensity on change in peak VO_2.

Results: Training intensity was measured in 1011 out of 1633 EU-CaRE patients in 7 of 8 centers and the first and secondary ventilatory threshold was identified in 1166 and 817 patients respectively. The first and second ventilatory threshold was found at 44% (SD 16%) and 78% (SD 9%) of peak Watt and 78% (SD 9%) and 89% (SD 5%) of HR peak, respectively. Training intensity and session duration varied significantly between centres but change in peak VO_2 over CR did not. Training above the first individual threshold (β 0.62, 95% confidence interval [0.25 - 1.02]) and increased training volume per hour (β 0.06, 95%CI [0.01 - 0.12]) was associated with a higher change in peak VO_2 in the multivariate mixed model.

Conclusions: While training intensity and volume varied greatly amongst current European CR programs, changes in peak VO_2 were similar and the effect of training characteristics on these changes were small.

Disclosure: Nothing to disclose

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Cascade genetic testing of familial hypercholesterolemia in Switzerland: design of the CATCH randomized controlled trial

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Introduction: Familial hypercholesterolemia (FH) is a frequent genetic disorder (1/200) associated with an increased risk of early-onset myocardial infarctions. To improve detection and treatment of patient with FH, cascade genetic testing into families is recommended. However, the implementation of a genetic cascade screening program for FH has never been tested in Switzerland.

Methods: We designed an ethical genetic cascade screening program for FH to be tested in Switzerland. Index cases with a monogenic mutation in one of the three genes causing FH will be included. A randomization procedure will allocate index cases and their family member into the intervention arm or the usual care arm. The primary outcome will be the difference in the yield of detection of familial hypercholesterolemia (FH) between arms. Secondary endpoints include the transmission rate of phenotype and genotype into families.

Results: The intervention will consist in three cycles of screening performed by a network of several cardiovascular and lipid clinics in Switzerland. The contact of relatives will be initiated by the index case and supported by a centralized service. The index case will be provided with a prepared email to be addressed to his first-degree relatives. The email will contain a request to provide contact information by using a link to a secured webpage. After agreement, the relatives will then be directly contacted by the nearest specialized clinic. We will include 28 families per arm to show a statistically significant difference of 20% in the consent rate between the control and interventional arm.

Conclusions: Based on previous studies, the Swiss legal environment, and the use of mobile information technology, we have designed a cascade screening program ethically acceptable. The contact procedure will respect autonomy and privacy of relatives. A Swiss network of lipid and cardiovascular clinic supported by an innovative web-based datacenter will be created.

Disclosure: DN, AG and JB are supported by the Swiss Heart Foundation to conduct the CATCH study

CARDIAC IMAGING

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Myocardial flow reserve from positron emission tomography adds prognostic value and modifies treatment response in patients with ischemic heart failure

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Introduction: Although myocardial flow reserve (MFR) is a strong predictor of cardiac risk in patients without heart failure, it is unknown whether MFR improves risk stratification and modifies treatment response in patients with ischemic heart failure. This study sought to investigate the prognostic and clinical value of MFR in this patient population.

Methods: The study included 254 patients referred for stress/rest myocardial perfusion imaging and viability testing using positron emission tomography (PET). Major adverse cardiac events (MACE) consisted of death, resuscitated sudden cardiac death (SCD), heart transplantation, acute coronary syndrome, hospitalization for heart failure, and late revascularization.

Results: MACE occurred in 170 patients (67%) during median follow-up of 3.3 years. Beyond age, symptom severity, diabetes mellitus, previous myocardial infarction/revascularization, three-vessel disease, renal insufficiency, ejection fraction as well as presence and burden of ischemia, scar and hibernating myocardium, respectively, MFR was strongly associated with MACE (adjusted hazard ratio (HR) per increase in MFR by 1, 0.63 [95% confidence interval (CI), 0.45-0.91]). Compared to patients with a high MFR (≥1.7), annualized MACE rate was increased in patients with an intermediate MFR (1.2-1.6; 22% vs. 14%, p = 0.033) and in patients with a low MFR (<1.2; 33% vs. 14%, p <0.001). Incorporation of MFR into a risk assessment model incrementally improved prediction of MACE (likelihood ratio $\chi^2(16) = 49.33$ vs. $\chi^2(15) = 36.95$, p <0.001). After adjusting for the clinical and imaging covariates, there was a significant interaction between MFR and treatment strategy (p = 0.004), indicating that, in patients with an MFR below 1.2, early coronary artery bypass graft surgery is associated with lower annualized MACE rates compared to percutaneous coronary intervention (8% vs. 40%, p = 0.035) or medical therapy alone (8% vs. 32%, p = 0.021).

Conclusions: PET-derived MFR improves risk stratification and modifies treatment response in patients with ischemic heart failure.

Disclosure: Nothing to disclose

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The role of multivariate scores to determine priority for echocardiography in patients with bloodstream infections?

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Introduction: Infective endocarditis (IE) is a life-threatening condition. Prompt diagnosis is essential for optimal patient management. Predictive scores have been developed (VIRSTA, HANDOC, DENOVA) to identify patients at low risk of IE for whom echocardiography appears less justified. The aim of the present study was to evaluate the use of these scores in clinical practice.

Methods: This prospective observational study included all patients with suspected IE hospitalized at Lausanne University Hospital during a 24-month period (January 2018 to December 2019). IE (proven and probable) was defined by modified Duke Criteria. The multivariate scores (VIRSTA, HANDOC, DENOVA) were evaluated.

Results: Among 515 patients with suspected IE; 148 patients had bacteremia due to *Staphylococcus aureus* from which 47 (32%) were diagnosed with IE. When VIRSTA score was evaluated, a score ≤2 was associated with a negative predictive value (NPV) of 88.2% and a sensitivity of 91.5%, with an accuracy of 0.776 (95% CI 0.692-0.861). IE was diagnosed in 42.6% (20/47) patients with *Enterococcus faecalis* bacteremia and a DENOVA score of ≤2 had a NPV of 63% and a sensitivity of 63%, with an accuracy of 0.837 (95% CI 0.723-0.951). Regarding HANDOC score, among 48 patients with non-beta-haemolytic streptococcal bacteremia, 32 (66.7%) were diagnosed with IE. A score ≤2 was associated with a NPV of 66.7% and a sensitivity of 75%, with an accuracy of 0.828 (95% CI 0.738-0.918). Misclassification of IE endocarditis cases (proven or probable) to 'low risk' occurred in four cases for VIRSTA score, three for DENOVA and eight for HANDOC.

Conclusions: Although studies suggest the potential utility of these scores to avoid urgent echocardiography in patients at low risk, in our study the sensibility of these scores was not adequate to confirm this hypothesis. Hence, echocardiography should always be considered, even in the 'low risk' group.

Disclosure: Nothing to disclose

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Myocardial fibrosis assessed by extracellular volume quantification is a determinant of symptoms in aortic valve regurgitation with preserved ejection fraction

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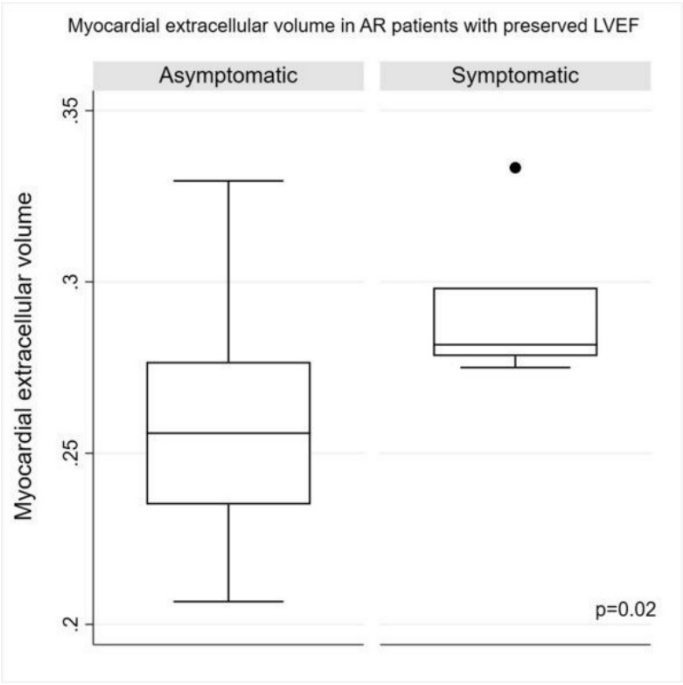
Introduction: Current guidelines on aortic regurgitation (AR) recommend valve replacement in case of symptoms occurrence, systolic left ventricular (LV) dysfunction, and/or LV dilatation. Although the prognostic significance of several clinical and imaging parameters has been demonstrated, the determinants of symptoms in patients with AR and preserved LV ejection fraction (LVEF) are still unknown. The extracellular volume (ECV), calculated using the novel T1 mapping cardiac magnetic resonance (CMR) technique, allows the quantification of myocardial interstitial fibrosis with high spatial resolution. We hypothesized that interstitial fibrosis assessed by ECV quantification may be a determinant of symptoms in AR.



[Myocardial extracellular volume in aortic regurgitation patients with preserved LVEF]

Methods: We retrospectively enrolled 34 consecutive patients with chronic, isolated, mild to severe AR who underwent a CMR at our institution. Exclusion criteria were the presence of any other heart condition that may induce myocardial fibrosis, ≥ mild associated valve disease, AR secondary to endocarditis, genetic, inflammatory or congenital disease except bicuspid aortic valve. T1 mapping of the basal segments was performed before and after contrast administration measuring native and post-contrast T1 relaxation time and ECV.

Results: Mean age was 56±19 years, 26 patients (77%) were males, and symptoms were reported in 10 patients (29%). Mean LVEF was 57±9% and ≥50% in 27 patients (79%). Aortic valve regurgitation fraction (RF) was 25±13%, ECV 0.27±0.04%, indexed LV end-diastolic volume (LVEDVi) 99±33 ml/m^2 and end-systolic volume (LVESVi) 46±20 ml/m^2. LVEDVi (r = 0.35,p = 0.04), LVEF (r = -0.59,p = 0.0002) and ECV (r = 0.40,p = 0.02) were correlated with symptoms, whereas age (r = 0.28,p = 0.11), gender (r = -0.25,p = 0.15) and RF (r = 0.27,p = 0.11) were not. In the subgroup of patients with preserved LVEF (≥50%), after adjustment for LVEDVi and RF, only ECV remained independently associated with symptoms (p = 0.049).

Conclusion: myocardial fibrosis quantified by ECV calculation is a determinant of symptoms in AR with preserved LVEF. Further studies are warranted to determine the prognostic value of ECV that may justify earlier intervention.

Disclosure: Nothing to disclose

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Vector flow mapping analysis of left ventricular energetic performance in patients undergoing transcatheter aortic valve implantation (TAVI) for severe aortic stenosis (AS)

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Background: Vector flow mapping (VFM) is a novel flow visualization echocardiographic technology that uses both color-Doppler and speckle tracking images. The calculated velocity vectors are integrated according to a weight function. Energy loss reference values have been proposed for children and adults; no evidence still now exist about vorticity and energy parameters in patients with aortic stenosis undergoing TAVI.

Aim: the objective of this prospective study is to collect the pattern of VFM and Left ventricular Energy loss index (LV-ELI) of patients with severe AS candidate to TAVI.

Method: Transthoracic echocardiography (TTE) was performed using Prosound F75 Premier (Hitachi, Tokyo, Japan) with a 2.5 MHz sector probe. We included in this preliminary analysis the complete VFM of 5 normal subjects and 7 patients before and after TAVI procedure (total of 19 complete dataset).

Results: Regarding the qualitative evaluation of vorticity visual indexes, in patients with severe AS the diastolic small posterior vortex and the dimensions of the systolic vortex tented to be less pronounced than in normal subjects. Quantitation of LV-ELI in pre and post TAVI patients revealed prominent LV-ELI in diastolic phase rather than systolic (pre-TAVI systolic ELI/diastolic ELI: 10.9±6.1 m-w/m and 20,8±16,0 m-W/m). ELI systolic was not correlated with LVEF and LV dimensions, but significantly with the transaortic- pressure gradient (Gp), both peak-Gp and mean-Gp: r2: 0.798 and p 0.005 for peak-Gp, 0,727 and p 0,008 for mean Gp. No correlation with any dimensional and Doppler parameters was found for diastolic ELI. After TAVI we observed an increased LV-ELI for both systolic and diastolic phase (from 10 ± 6 to 20 ± 16 mW/m, p value ns for systolic phase; from 10 ± 8 to 33,7 ± 17,6 m-W/m, p value 0.01 for diastolic phase). A negative significant correlation was found between reduction of gradients post-TAVI and increase of ELI (p value 0.02 for correlation between the variation of these 2 parameters).

Conclusions: The reduction of transvalvular systolic gradient after TAVI is related to an increase in Left ventricle energy loss index (LV-ELI) and changes in Vorticity parameters. Echocardiographic follow up will reveal if this hemodynamic positive effect of increase in ELI can lead to positive remodelling of LV after TAVI through less endocardial stress and myocardial oxygen consumption.

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CONGENITAL / PAEDIATRIC CARDIOLOGY

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2D cine vs. 3D free-breathing self-navigated whole heart for aortic root measurements in congenital heart disease

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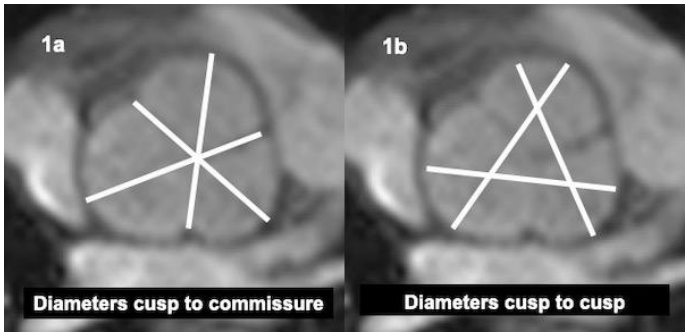
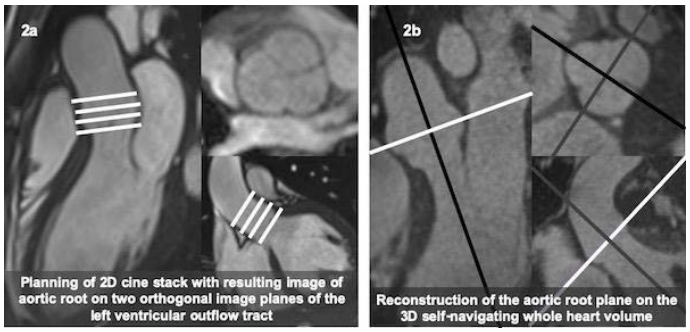
Introduction: Cardiac magnetic resonance (CMR) is the method of choice for determination of aortic root diameters in congenital heart disease (CHD). Usually a 2D cine stack is acquired perpendicular to the vessel axis to determine the maximum diameter. However, this method requires several breath-holds and a precise planning of image planes which can be difficult in complex anatomy and for patients with dyspnea. An alternative is the use of a free-breathing high-resolution 3D self-navigating whole heart sequence (3D-SN) which allows retrospective reconstruction of the aortic root. This study aimed to compare these two techniques for determination of aortic root diameters.



[Diameters of aortic root]



[Image planes of aortic root]

	2D cine	3D self-navigated whole heart	p
Cusp-commissure minimum, mm	33.5 ± 6.8	34.5 ± 5.0	0.003
Cusp-commissure mid, mm	34.8 ± 6.1	35.9 ± 6.0	0.001
Cusp-commissure maximum, mm	36.2 ± 7.0	37.2 ± 6.4	0.006
Cusp-cusp minimum, mm	35.8 ± 7.0	36.4 ± 8.3	0.419
Cusp-cusp mid, mm	37.2 ± 7.2	37.8 ± 8.6	0.454
Cusp-cusp maximum, mm	38.2 ± 6.7	39.7 ± 6.4	<0.001

[Comparision of aortic root diameters]

Methods: CMR exams were performed on a 1.5T scanner. Aortic root diameters in diastole (cusp to commissure, figure 1a; cusp to cusp, figure 1b) were measured on a stack of 2D cines prescribed on two orthogonal left ventricular outflow tract images (figure 2a) and compared to a reconstructed aortic root plane on a 3D-SN (figure 2b). Spatial resolution of 2D cine and 3D-SN was 1.5*1.5*4.5mm and 1.1^3 mm, respectively.

Results: 64 patients (age 32±15years, female 28%) with a variety of CHD were included. Measured aortic root diameters were larger on 3D-SN than on 2D cines (table). Intra- and interobserver variabilities were excellent for both techniques as shown for the largest diameters, with no differences between the 2D cine and 3D-SN techniques (bias (%) ± standard deviation (95% limits of agreement)): Intraobserver 2D cine -1.04±3.2 (-7.3; 5.2) vs. 3D-SN -1.7±3.3 (-8.2; 4.8), p = 0.3; interobserver cine 1.4±6 (-10.3; 13.2) vs. 3D-SN 5.5±2.3 (0.5; 10), p = 0.1.

Conclusions: Although 3D-SN provides slightly larger aortic root diameters than diameters measured on 2D cines, it is a valuable alternative to determine aortic root diameters.

Disclosure: Nothing to disclose

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Heart rate reserve but not right ventricular systolic function nor ntprobnp level predicts exercise capacity in patients after senning correction of TGA

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Introduction: Patients after Senning correction of TGA survive well into adulthood. Their quality of life is determined largely by exercise tolerance.Our aim was to compile a study of a set of routinely tested parameters easily accessible in daily clinical practice and examine their relation to maximal oxygen uptake.

Methods: 86 consecutive patients after Senning correction of TGA in childhood were subjected to clinical and echocardiographic examination, blood tests, MRI and exercise test. VO2max., NYHA , nt-proBNP, right ventricular ejection fraction and heart rate reserve during exercise were tested. Analysis of relations among studied variables was performed using non-parametric statistical methods. P-values less than 5% were considered as statistically significant

Results: Average age of patients was 23+-3,5 years, average NYHA class 1,3± 0,4. Echocardiographic and MRI right ventricular function respectively was normal in 60 (69,7%) and 50 (58,1%) patients, mildly decreased in 23 (26,7%) and 30 (34,8%) and moderately decreased in 3 and 6 (7,1%) patients. Average RVEF by MRI was 51,9 ± 7,9%. Average ntproBNP was 124,3 +-23,59 ng/l. Average VO2 max. was 31,7 ml/kg/min ± 6,5 ml/kg/min. Average heart rate reserve was 106 ± 24/min. There was no statistically significant relationship of NYHA , nt-proBNP and RVEF to VO2 max. HRR was the only parameter predicting VO2 max.

Discussion and conclusion: Long term results of follow up of patients after Senning correction of TGA are good. The most striking fact emerging from our study is that exercise capacity of our patients compared to literature is substantially, by 32%, higher than in other cohorts . Our patients reached 77,3% of norm for healthy subjects. Number of nt-proBNP values exceeding threshod for cardiac insufficiency in our study was extremely low. More than a half of patients show that their systemic right ventricle systolic function is in normal range and it is severely impaired only in minority of patients. RVEF does not correlate with VO2 max.. The reason is possibly considerably more complex etiopathogenesis of decreased exercise capacity in patients after atrial switch with intricate haemodynamics including limited flow through atrial baffles. Ability to increase heart rate during exercise is the only significant predictor of VO2x max in our study. This could possibly mean that it is not just the stroke volume but the overall heart output which influences the exercise capacity.

Disclosure: Nothing to disclose

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Management of an aortic dissection in a 9-year old boy with Loeys-Dietz syndrome

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Introduction: Loeys-Dietz syndrome (LDS) is an autosomal-dominant connective tissue disorder characterized by aortic aneurysm, generalized arterial tortuosity, hypertelorism and split uvula or palate. The vascular lesions tend to be aggressive with a high incidence of aortic adverse events even at younger age, especially in LDS type 2. Early and extensive surgical strategy is occasionally needed to prolong the patient's life expectancy.

Case: A 9-year old boy (26kg, 130cm) with known diagnosis of LDS 2 (TGFBR 2-mutation) and dilated aortic root (31mm, Z +4.4) on Losartan medication presented with acute back- and abdominal pain. The diagnosis of Stanford type B dissection was made by computed tomographic angiography (CTA) starting from A. subclavia sinistra with a distal reentry at the level of Truncus coeliacus. Lacking any end organ malperfusion an aggressive blood pressure lowering therapy was initiated. Frequent follow-up CTA revealed rapid dilatation of the abdominal aorta from 27x26 to 38x35mm within 8 days. Emergency surgical treatment was decided starting with a valve sparing aortic root replacement and additional arch replacement (frozen elephant-trunc technique); a thoracic-abdominal aortic replacement (Dacron 20mm) followed two days later (Figure 1). The patient was discharged after 6 weeks of hospitalisation with Irbesartan, Atenolol and antiplatelet therapy. Unfortunately, 3 months later the boy presented with asymptomatic progressive aneurysm of both subclavian arteries and right-sided dissection (right subclavian artery: 12mm to 23mm; left subclavian artery: 14mm to 22mm). The right side was successfully adressed with resection and an interponat from Truncus brachiocephalicus to right subclavian artery; the left side is planned within the next weeks.

Conclusions: LDS 2 can present with severe vascular findings and dramatic deterioration even in younger age. In the presented case an early and aggressive surgical approach with replacement of the entire aorta has been successful. However, the underlying disease is not healed and may cause further vascular events and challenge future management.

Disclosure: Nothing to disclose

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Advanced imaging and new cardiac biomarkers in long-term follow-up after childhood cancer

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Objectives: Pathological findings of ejection fraction (EF), shortening fraction (FS) and standard heart failure biomarkers (troponin T and NTproBNP) during follow-up after childhood cancer have been associated to irreversible cardiac damage, therefore more sensitive parameters for the detection of subclinical functional cardiac changes are needed. Aim of our investigation was to evaluate strain imaging values by echocardiography and new biomarkers for heart failure with preserved ejection fraction (HFpEF) in children, adolescents and young adults in follow-up after childhood cancer.

Methods: Prospective study in 50 childhood cancer survivors [median 16.2 years (IQR 14-18.5)], at median follow-up of 13 years (IQR 10-15). In addition to standard echo and laboratory parameters for heart failure, strain measurements and the following new biomarkers were obtained and compared to 50 healthy controls: myocardial inflammation (IL-6), extracellular matrix remodeling (CITP: C-terminal telopeptide of type-I collagen; PIIINP: intact N-terminal propeptide of type III procollagen) and other heart failure biomarkers (galectin 3, sST2: solutable ST2, GDF 15: growth differentiation factor 15).

Results: No significant differences in EF, FS, troponin T and NT proBNP, IL-6 and sST2 were found between study and control group. Instead, advanced imaging parameters showed significant differences between both groups [global longitudinal strain (-15.9% vs -20.4%, p <0.0001), global circumferential strain (-14.3 vs -20.3%, p <0.0001)], detecting 66% (GLS) and 76% (GCS) pathological values in contrast to 20% (EF) and 16% (FS) for standard parameters. Markers for disturbances of extracellular matrix remodeling (CITP, PIIINP, each p <0.0001), galectin 3 (p 0.01) and GDF 15 (p <0.0001) were significantly different between the groups.

Conclusion: Standard echo and laboratory parameters used during cardiac evaluation in follow-up after childhood cancer seem to be less sensitive in detecting early remodeling processes in contrast to strain imaging and newer cardiac biomarkers used in HFpEF. Especially the detection of myocardial remodeling processes due to disturbed collagen turnover at an early stage might give the opportunity to begin heart failure treatment earlier with the potential to delay its negative influence on cardiac function.

Disclosure: Nothing to disclose

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Vertical right axillary mini-thoracotomy for a variety of congenital heart defects in paediatric patients

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Background: Vertical-right-axillary-mini-thoracotomy (VRAMT) represents a less invasive and cosmetically attractive alternative to the standard approach for the correction of congenital heart defects the median sternotomy. Here we present our experience with VRAMT and its expansion to the correction of more complex heart defects in pediatric patients. Furthermore, this is the first study analyzing percutaneous femoral venous cannulation and extra-corporal-circulation (ECC) performance in relation to body-surface-area in children.

Methods: Retrospective analysis of patients up to 16 years of age who underwent corrective cardiac surgery by VRAMT starting from January 2012 until October 2018 were included. The surgical technique for the axillary mini-thoracotomy involved a 3-5 cm vertical incision parallel to the anterior axillary fold, central arterial and bi-caval cannulation for institution of mild hypothermic ECC. The study was approved by the ethics committee (Approval Nr. 2016-01484) of the canton of Bern, Switzerland.

Results: In total 110 patients were included in this study with the following cardiac diagnoses: ASD secundum (35), VSD (44), CAVSD (12), PAVSD (7), PAPVC (9), DCRV (1), and Cor triatriatum (2). The mean age of patients at surgery was 3.56 (±3.73) years, mean body weight was 13.18 (±9.09) kg. Mean ECC time was at 70.52 (±28.74) minutes, mean cross-clamping time was 42.52 (±15.73) minutes. Fast-track postop management with on-table extubation was achieved in 34.5% of cases (n = 38). For patients with percutaneous femoral venous cannulation (n = 39, 35.5%), thrombosis at the cannulation site was recorded in 5 (13.5%) cases. In patients with a BSA <0.3m^2 venous thrombosis at the cannulation site was most common when the percutaneous venous cannula was used >10 Fr. Calculated ECC flow at normothermia was achieved when percutaneous cannula size was equal to or smaller than SVC cannula size. Oversizing of the percutaneous femoral cannula lead to decreased ECC flow performance. There was no early or late mortality. There was no need for any conversion from VRAMT to MS in any case.

Conclusion: VRAMT can be considered as an alternative, less invasive and cosmetically attractive access for the repair of frequent congenital heart defects. For selected patient groups, it can also be expanded to more complex heart defects. Percutaneous femoral venous cannulation provides sufficient ECC-performance and can be safely applied even in infants.

Disclosure: Nothing to disclose

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Long-term outcome of adult patients with total anomalous pulmonary venous connection: data from the SACHER registry and a French center

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Introduction: Total anomalous pulmonary venous connection is a rare cyanotic congenital heart disease, where all pulmonary veins aberrantly connect to a systemic vein or the right atrium. The only curative treatment is surgery allowing the patients to reach adulthood. This study describes the long-term outcome of these individuals focusing on arrhythmias.

Methods: Clinical, surgical, imaging and invasive data were retrospectively reviewed from 7 centers participating in the Swiss Adult Congenital Heart disease Registry (SACHER) and one French center.

Table 1. Patients characteristics

	Patients with total anomalous pulmonary venous connection (N=57)
Female, N (%)	28 (49)
Type of TAVPC, N= 43	
- Supra-cardiac	26 (45)
- Cardiac	6 (10)
- Infra-cardiac	11 (19)
- Unknown	14 (25)
Pulmonary venous obstruction pre-op	14 (24)
Pre-op complications	
- Pulmonary hypertension	10 (17.5)
- Valvulopathy	6 (10)
- Arrhythmia	0
Age at correction, months (range)	1 (1 day- 14 years)
Time since surgery, years	22 ± 8
Age at latest follow-up, years	22 ± 8
Symptomatic	12 (21)
- NYHA class II	4
- Palpitations	6
- Chest pain	5
Treatment	4 (7)
- Betablocker	3
- Calcium channel blocker	1

Data are mean ± standard deviation or n (%)

Table 2. Latest paramedical exams

	Patients with total anomalous pulmonary venous connection (N=57)
Echocardiography, N (%)	54 (94)
LVEF %	62 ± 6
RV dilated	5 (8.8)
RV visual dysfunction	3 (5.3)
Shunt	5 (9)
S wave, cm/s	9 ± 2
TAPSE, mm	15 ± 2
Pulmonary artery pressure	26 ± 8
Exercise testing, N (%)	17 (30)
VO2max (ml/kg/min) (9)	35 ± 9
VE/VCO2 slope (7)	26 ± 3
VO2max, % (9)	92 ± 16
BPM, % predicted (13)	94 ± 11
MET, % predicted (12)	104 ± 21

Results: A total of 57 patients were identified and analyzed 22 ± 8 years after surgery, (see table 1 for characteristics). At last follow-up, 21% of patients presented cardiac symptoms, mainly palpitations. No patient had pulmonary hypertension (PH) or a relevant valvulopathy. Echocardiography revealed in five patients a dilated right ventricle and in 3 patients a diminished RV systolic function (table 2). Exercise capacity was normal

in most patients (table 2). Cardiac magnetic resonance imaging found in 2 (4%) had a residual shunt with an mean Qp:Qs of 1.25, due to a single anomalously connected pulmonary vein. Holter recordings revealed arrhythmias in 23% of patient. Ten (17.5%) had atrial fibrillation, flutter or tachycardia. Three (5%) patients presented ventricular arrhythmias: two patients showed non-sustained ventricular tachycardia and one patient complex ventricular extrasystoles. Four patients (7%) were on antiarrhythmic medication for supraventricular arrhythmias (table 1). Three patients (5%) underwent an electrophysiological study with a mean time since surgery of 20 years. Three (5%) patients underwent pacemaker implantation within 3 weeks to 36 months after surgical correction, which were removed in 2 patients after 7 years. Age and the presence of a valvulopathy at follow-up predicted tachyarrhythmia (7))ular lesions at follow-up. %Eart not differ ventricular (CMR) an RV enlargement leading to pulmonary vascular resistance on binomial logistic regression analysis (p <0.03).

Conclusions: In adult survivors after TAPVC repair, supraventricular but also ventricular arrhythmias are frequently observed which appears to be related to age and valvular lesions at follow-up. This study underlies the importance of long-term follow-up as some of the patients currently without arrhythmia will probably develop rhythm disorders in the future.

Disclosure: Nothing to disclose

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Long-term outcome of adult patients with partial anomalous pulmonary venous connection treated surgically and conservatively: Data from the SACHER registry and a French center

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Introduction: Partial anomalous pulmonary venous connection (PAPVC) is a rare congenital heart disease, which is characterized by one or some but not all pulmonary veins anomalously connected to the right atrium or a systemic vein. PAPVC is either an isolated shunt lesion or associated with an atrial septal defect (ASD). The only curative treatment is surgery, however the indication for surgery can be challenging. This study compares the outcome of patients treated surgically with those clinically monitored.

Method: Clinical, surgical, imaging and invasive data were retrospectively reviewed from 7 centers from the Swiss Adult Congenital HEart Registry (SACHER) and a French center.

Results: A total of 168 patients with partial anomalous pulmonary venous connection were identified. The majority (77%) of patients underwent surgery and the remaining (23%) were treated conservatively with clinical monitoring. The operated group (OG) had a significantly higher proportion of associated ASD (N = 106, 82%) and a higher prevalence of anomalous pulmonary veins leading to a mean Qp:Qs at 2.5 ± 1.2 before surgery (table). Latest follow-up was 12 years after surgery. Mean age was 40 ± 17 years. Patients in the non-operated group (NOG) were significantly more dyspneic than the OG. However, the need for medical treatment did not differ between groups: 58% of the NOG and 48% in the OG (p = 0.203). Right ventricular (RV) ejection fraction did not differ between groups despite a significantly larger RV end-diastolic volume and a higher Qp:Qs on cardiac magnetic resonance (CMR) in the NOG (table). On echocardiography, the NOG showed a significantly better right ventricular longitudinal function and a higher systolic pulmonary artery pressure than the OG (table). The prevalence of significant valvulopathies did not differ between groups (table). Both groups had normal exercise capacity and with no differences between groups (table).

Eighteen (14%) OG patients required a re-intervention either for residual shunt and/or stenosis of the pulmonary veins, superior and inferior vena cava.

Table. Characteristics and latest paramedical exams

	PAPVC operated N= 129	PAPVC non-operated N= 39	*p*-value
Female, N (%)	71 (55)	23 (59)	0.441
Number of anomalous veins	1.67 ± 0.58	1.46 ± 0.55	0.049
ASD associated	103 (80)	11 (28)	0.000
Secundum ASD	16 (12)	2 (51)	0.244
Sinus venosus ASD	83 (64)	9 (23)	0.000
Age at diagnosis	27 ± 21	41 ± 20	0.001
Qp:Qs before surgery	2.5 ± 1.2		
Right ventricular size ml/m2 before surgery, N=20	152 ± 59		
Age at correction	27 ± 20		
Age at latest follow-up	39 ± 17	42 ± 19	0.473
Weight, Kg	67 ± 16	70 ± 14	0.461
Body surface area	1.46 ± 0.6	1.74 ± 0.2	0.011
Symptomatic	44 (34)	16 (41)	0.254
- NYHA class II	17 (13)	13 (33)	0.002
- Palpitations	22 (17)	4 (10)	0.544
- Chest pain	8 (6)	4 (10)	0.316
Cardiac MRI, N (%)	26 (20)	29 (74)	
Left ventricular size ml/m2	71 ± 17	77 ±17	0.202
Right ventricular size ml/m2	93 ± 17	134 ± 53	0.001
Qp: Qs	1.2 ± 0.3	1.6 ± 0.6	0.002
LVEF	62 ± 6	59 ± 9	0.157
RVEF	55 ± 9	50 ± 14	0.152
Obstructed/stenosis of the pulmonary venous return	6 (5)	0	0.181
Obstructed VCS	5 (4)	0	0.351
Echocardiography, N (%)	126 (98)	38 (97)	
LVEF %	63 ± 6	60 ± 5	0.040
RV dilated, N (%)	46 (36)	27 (69)	0.000
Shunt	12 (9)	35 (90)	0.000
S wave, cm/s	9.5 ± 2	12 ± 3	0.000
TAPSE, mm	16.8 ± 4.6	23.7 ± 5.5	0.000
Systolic pulmonary artery pressure (PAPs), mmHg	26.6 ± 8.8	33.8 ± 17.9	0.060
Valvulopathy, N(%)	20 (16)	7 (18)	0.572
Exercise testing, N (%)	67 (52)	22 (56)	
VO2max (ml/kg/min)	24 ± 10	27 ± 9	0.417
VE/VCO2 slope	27 ± 9	28 ± 5	0.736
VO2max, %	74 ± 22	83 ± 28	0.241
BPM, % predicted	91 ± 13	89 ± 12	0.701
MET, % predicted	97 ± 33	91 ± 25	0.508

Conclusion: PAPVC patients after surgical correction, show a favorable outcome in terms of imaging parameters and exercise capacity, however, a significant number presents with symptoms. PAPVC patients treated conservatively with small left to right shunting, have similar outcome justifying a conservative approach.

Disclosure: Nothing to disclose

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Prevalence of arrhythmias on the long term of adult patients with partial anomalous pulmonary venous connection treated surgically and conservatively: data from the SACHER registry and a French center

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Introduction: Partial anomalous pulmonary venous connection (PAPVC) is a rare congenital heart disease, characterized by one or some but not all pulmonary veins anomalously connected to the right atrium or a systemic vein. PAPVC is either an isolated shunt lesion or associated with an atrial septal defect (ASD). The only curative treatment is surgery. This

study compares the arrhythmic outcome of patients treated surgically with those clinically monitored.

Method: Clinical, surgical, imaging and invasive data of PAPVC patients were retrospectively reviewed from 7 centers from the Swiss Adult Congenital HEart disease Registry (SACHER) and one French center.

Results: A total of 168 patients with PAPVC were identified. Most (77%) patients underwent surgery, while the remaining (23%) ones were treated conservatively with clinical monitoring. The operated group (OG) had a significantly higher number of associated ASD (N = 106, 82%) and a higher number of anomalous pulmonary veins leading to a mean Qp:Qs at 2.5 ± 1.2 before surgery (table 1). Moreover, the majority of patients in the OG had cardiac symptoms (N = 78, 60%) and were diagnosed at a significantly younger age (table 1). Age did not differ at latest follow-up. Right ventricular (RV) size was larger in the OG. Holter recordings revealed a higher prevalence of arrhythmia in the OG (p = 0.031), mainly of supraventricular tachyarrhythmias (table 2). The occurrence of ventricular non-sustained tachycardia and of bradyarrhythmia did not statistically differ between groups. Patients in the OG required more often medical treatment for arrhythmias: 12 (9%) needed electrophysiological study in the OG and none in the NOG (p = 0.057). The amount of patients requiring a pacemaker implantation in the OG (11%) was significantly higher than that of NOG (0%) (p = 0.039).

Table 1. Characteristics

	PAPVC operated N= 129	PAPVC non-operated N= 39	*p*-value
Female, N (%)	71 (55)	23 (59)	0.441
Number of anomalous veins	1.67 ± 0.58	1.46 ± 0.55	0.049
ASD associated	103 (80)	11 (28)	0.000
Secundum ASD	16 (12)	2 (51)	0.244
Sinus venosus ASD	83 (64)	9 (23)	0.000
Age at diagnosis	27 ± 21	41 ± 20	0.001
Qp:Qs before surgery	2.5 ± 1.2		
Right ventricular size ml/m2 before surgery, N=20	152 ± 59		
Age at correction	27 ± 20		
Age at latest follow-up	39 ± 17	42 ± 19	0.473
Cardiac MRI, N (%) on latest follow-up	26 (20)	29 (74)	
Left ventricular end-diastolic volume index, ml/m2	71 ± 17	77 ±17	0.202
Right ventricular end-diastolic volume index, ml/m2	93 ± 17	134 ± 53	0.001
Qp: Qs	1.2 ± 0.3	1.6 ± 0.6	0.002
Left ventricular ejection fraction, %	62 ± 6	59 ± 9	0.157
Right ventricular ejection fraction, %	55 ± 9	50 ± 14	0.152

Table 2. Arrhythmias

	PAPVC operated N= 129	PAPVC non-operated N=39	*p*-value
Rhythm disorder	50 (39)	7 (18)	0.031
Tachyarrhythmia	48 (37)	6 (15)	0.025
Supraventricular arrhythmia	34 (26)	4 (10)	0.063
- Atrial fibrillation	14 (11)	2 (5)	0.322
- Atrial flutter	9 (7)	0	0.099
- Ectopic beats	8 (6)	1 (3)	0.407
- Junctional rhythm	3 (2)	0	0.349
- Supraventricular tachycardia	17 (13)	2 (5)	0.190
Ventricular tachyarrhythmia	6 (5)	1 (3)	0.641
- Ventricular non-sustained tachycardia	4 (3)	1 (3)	0.901
Bradyarrhythmia	14 (11)	1 (3)	0.146

Conclusion: Patients after PAPVC repair present with a significant higher burden of arrhythmia than conservatively treated patients, either due to a larger shunt pre-operatively and/or as a late complication of the corrective surgery itself.

Disclosure: Nothing to disclose

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Bioprosthetic valve endocarditis again and again - surviving a worst case scenario with 3 endocarditis episodes with 3 different bacteria within 11 years

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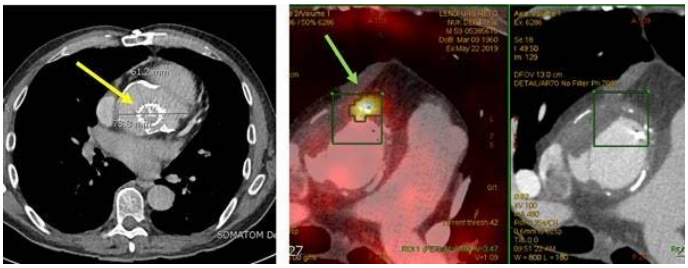
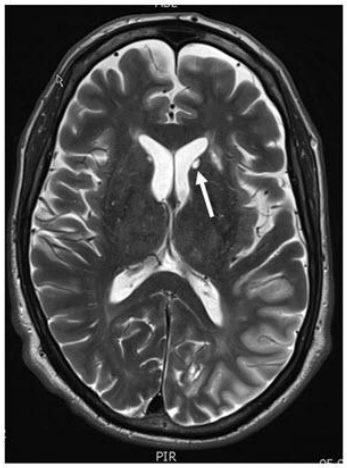
Introduction: Bicuspid aortic valve (BAV) disease is common. Many patients develop aortic regurgitation or stenosis and have to undergo aortic valve replacement, rarely endocarditis or aortic dissection can occur. Mortality of bioprosthetic or mechanical valve endocarditis is still high, recurrent endocarditis can often be fatal.

Patient history: A male born with BAV underwent aortic valve replacement (AVR) at age of 48 years for severe aortic stenosis. Three weeks postoperatively severe staphylococcal aortic valve endocarditis with aortoventricular disconnection, abscess formation close to the ostium of the left main coronary artery, skeptical detachment of the anterior mitral valve leaflet, dissection right coronary artery and aneurysm of the ascending aorta was diagnosed. Repeat AVR was performed with a composite graft replacement of the aortic root (Shelhigh prosthesis), reimplantation of both coronary arteries, one coronary artery bypass as well as a modified cabrol shunt. Nine years later (age 57 years), the patient developed another prosthetic endocarditis of the aortic graft and the Shelhigh prosthesis (Cardiobacterium hominis) with torrential aortic regurgitation and cardiogenic shock. Rescue percutaneous aortic valve replacement was performed with 29 mm Core valve prosthesis and percutaneous closure of the repeat aortoventricular shunt with an Amplatzer ASD 10 mm occluder. Three days later, inhospital resuscitation for asystole had to be performed while being treated with amiodarone for paroxysmal atrial fibrillation. There remained a large pseudoaneurysm of the aortic root (Figure 1). Age 59 years, repeat endocarditis proven with PET CT (Figure 2) and positive blood cultures (S. bovis) developed with cerebral embolic infarctions (Figure 3). Repeat antibiotic treatment was started in April 2019. Until end of January 2020, the patient remains stable with continuous antibiotic treatment with Co Amoxycillin 3 gr daily. His main complaint presently is aminoglycoside induced dizziness.



[Figure 1: Pseudoaneurysm of the aortic root (CT-scan) and positive PET-CT-Scan]



[Figure 2: Head CT scan with cerebral embolic infarction]

Conclusion: Endocarditis of bioprosthetic valves remains a potentially fatal, severe complication, which can be survived in the current era thanks to modern cardiologic options.

Disclosure: Nothing to disclose

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Medium to long-term outcome of patient implanted with a telemetric adjustable pulmonary artery banding device (FloWatch-PAB) in Switzerland

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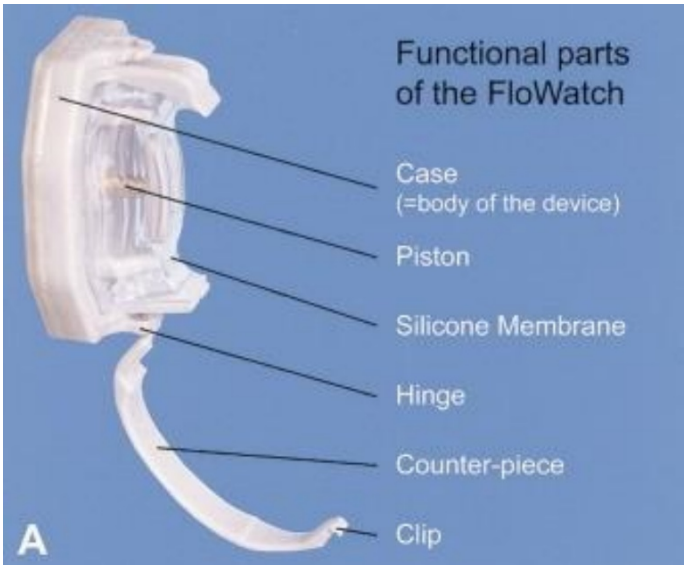
Introduction: Pulmonary artery banding (PAB) is used to treat cardiopathies with excessive pulmonary blood that cannot undergo complete repair and to retrain the left ventricle in late presenting transposition of the great arteries (TGA). Traditionally a polytetrahydofluorane band is used but optimal tightening is difficult leading to multiple surgeries. A battery free, wireless telemetric PAB (FloWatch-PAB) allowing for noninvasive multiple adjustments by either tightening or opening the FloWatch-PAB was developed to overcome these complications. (fig 1) Our objective was to evaluate medium to long-term outcome of all children having benefitted from this technology in Switzerland

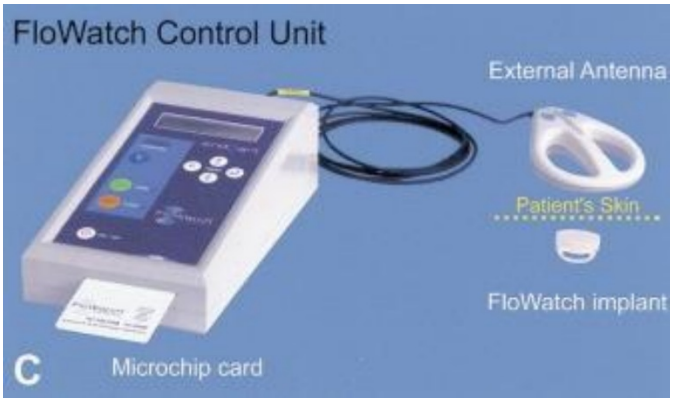
Method(s): Retrospective chart study of all patients implanted with a FloWatch-PAB in Switzerland from 2002 to 2016.

Results: FloWatch-PAB was implanted in 69 pts at the University Hospitals of Lausanne, Zurich and Geneva. Diagnosis were shunt lesions (n = 45), univentricular hearts (n = 6), late transpositions (n = 24). Median age at implantation was 30 days [IQR7, 113d], median weight at implantation was 3.7 kg [IQR3.2, 5.3 kg]. The median time before explantation was 161 days [IQR97.5, 306 d!] Average FloWatch adjustments was 4 +/-2 per patient. At explantation 58 pts (84%) did not require pulmonary artery reconstruction. 58 pts are alive at current date 10 of whom had late pulmonary artery stenosis needing angioplasties 10 pts died, all secondary to their severe congenital heart disease and not all at time of explantation. There was no direct FloWAtch-PAB related death.

Conclusion: FloWatch-PAB is a unique device, which has the main advantage to allow for multiple band adjustments avoiding multiple surgeries in children with complex heart defects not amenable to immediate complete repair. Long-term complications and outcome in children having benefitted from FloWatch-PAB are mostly related to the severity of underlying heart disease.



[FloWatch-PAB]



[FloWatch-PAB control unit]

Disclosure: Nothing to disclose

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Percutaneous lymphatic embolization to causally address two major manifestations of a failing Fontan circulation

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Introduction: Plastic bronchitis (PB) and protein loosing enteropathy (PLE) are rare but devastating complications of the Fontan physiology. PB occurs in about 4% of Fontan patients and is characterized by mucin-containing bronchial casts. It results from a combination of altered hemodynamics, bronchial mucosal inflammation, increased permeability and lymphatic vessel abnormalities. PLE occurs in about 10-20% of Fontan patients and is characterized by edema, hypoalbuminemia and increased ∝1-antitrypsin levels. The mortality is high: up to 50% and 20% in PB and PLE patients, respectively and medical therapy is limited. Therefore, novel interventional modalities such as lymphangiogram and lymphatic embolization are crucial novel strategy in this group of patients.

Methods and results: Between August 2019-February 2020, lymphatic embolization was performed in two PB patients and one PLE patient. All patients were male (range: age 5-18 years old, weight 13-52 kg, height 91-163 cm). PB appeared 2- 4 years and PLE 4 years after total cavopulmonary anastomosis. Before the embolization, patients underwent cardiac catheterization for hemodynamic evaluation and exclusion of major right-to-left shunts. PB patients underwent bronchoscopy with cast removal. Lymphatic embolization was performed under general anesthesia. Intranodal lymphangiogram was followed by image-guided (fluoroscopy and CT) to delineate the thoracic ductus morphology. Once the source of leak targeted, the embolization (Lipiodol and Histoacryl) place decided, in these two patients at the distal part of the thoracic duct. For the PLE patient, a liver lymphatic ducts embolization was performed under US guidance, after obtaining a lymphangiogram with the same method. The procedure was technically successful and resulted in symptomatic improvement in all patients. There were no procedure-related complications. A PB patient needed post-procedure bronchoscopy and intensive respiratory physiotherapy for casts' removal.

Conclusion: Percutaneous lymphatic embolization is a novel, safe and promising technique for the treatment of PB and PLE complicating a Fontan circulation

Disclosure: Nothing to disclose

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Pediatric orthotopic heart transplantation: single center Swiss 10 year experience

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Introduction: Pediatric orthotopic heart transplantation is the last alternative in terminal heart failure. It has been practiced since 1967 and 500 children worldwide benefit from it each year. We review our results over the past 10 years.

Methods: All consecutive pediatric heart transplants at our institution were included from 2009 to 2019.

Results: 13 patients were included during the study period. The study sample consisted of 6 boys (46%) and 7 girls (54%), with a median age of 13 years (min. 3 months; max. 18 years), median weight 32.8kg (min. 6.6; max. 75). The diagnosis requiring transplantation was dilated cardiomyopathy (46%, N = 6), congenital heart diseases (36%, N = 5), arrhythmogenic ventricle dysplasia (N = 1, 8%) and anthracycline heart diseases (N = 1, 8%). All were first transplants. 7 patients required pretransplant ECMO (54%), and 6 required ventricular assist device placement. The mean wait list time was 310±281 days. Mean graft ischemic time was 190±44 min. There was no operative or early mortality. The mean intensive care stay was 22±14.5 days with a mean of 5.8±6.4 days of invasive ventilation (median: 2 days). There were no early deaths. 1 patient required reoperation for stenosis of the SVC anastomosis, and 2 patients required post-bypass ECMO support which was successfully weaned. During a median follow-up of 15.5 months (min. 0 after discharge, max. 9.4 years), there was 1 late death for recurrent pulmonary infections and multistage caval stenoses.

Conclusion: Pediatric orthotopic heart transplantation can be done with excellent early and mid-term results, by a team with significant transplant and congenital cardiac surgery.

Disclosure: Nothing to disclose

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Contegra valve harvested from the contegra conduit: an option to replace the pulmonary valve with a low gradient profile valve

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Introduction: Congenital heart disease often requires reconstruction of the right ventricular outflow tract (RVOT). Homograft implantation was the method of choice for RVOT reconstruction, but the availability was limited. Contegra grafts (processed bovine jugular vein conduits) are now widely used for reconstructive surgery of the right ventricular outflow tract in patients with congenital heart disease (CHD). Contegra conduits calcify with times, mostly in small diameters. Harvesting the valve from the conduit might offer the possibility preserve part of the native outflow tract and to reduce turbulences.

Method: A 4 year-old boy, known for 2 attempts of Blalock-Taussig modified shunts was referred for a complete correction of a Tetralogy of Fallot (TOF). Both attempt failed and even lead to a severe infection with partial destruction of the right pulmonary artery. There were stenosis on both pulmonary arteries and multiple major aorto-pulmonary collaterals. A first attempt of correction was a failure, with elevated right ventricular pressure. The pulmonary valve was deemed unusable and was resected. The Ventricular septal defect was reopened and a trans annular patch implanted. On the 2nd attempt, the valve of a 14mm conduit was harvested and was then implanted at the base of the Main pulmonary artery (MPA). The opening in the infundibulum and the MPA was then closed with a patch.

Results: Postoperative echocardiography revealed a maximal pulomary valve gradient of 13 mmHg on the RVOT without any leak. Intensive care unit and hospital stays were 4 and 9 days respectively.

Conclusion: In complicated TOF repair, avoiding a pulmonary insufficiency is better. If the native valve is unusable, a Contegra valve, harvested from the conduit, is a good option. It preserves the MPA and provide a pulmonary valve without stent with a low gradient profile.

Disclosure: Nothing to disclose

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Ductal systemic perfusion for aortic arch enlargement

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Introduction: Aortic coarctation comprises 6-8% of Congenital Heart Disease. Hypoplastic arch may be seen in 33-40%. Severe aortic arch anomalies require surgery in the neonatal period. Hypoplastic proximal arch usually needs cardiopulmonary bypass and inner curvature patch augmentation

Method: A 5 days neonate of 3.67 kg, after an uncomplicated pregnancy presented a lower body malperfusion. Echocardiography revealed a coarcation with arch hypoplasia (proximal arch 4.2mm). Treatment with prostaglandin was initiated and he was adressed for surgery. After an extra pleural approach to the aorta through a left posterior thoracotomy in 4th intercostal space. The ductus arteriosus was patent during surgery and provided perfusion to the descending aorta while the aortic arch was enlarged with a patch in the outer curvature between the left common carotid artery and the left subclavian artery. Then the coarctation resection and end to end anastomosis

Results: Extubation was performed after 24 hours. Postoperative course was uncomplicated. Intensive care unit and hospital stays were 4 and 7 days respectively. There was no residual gradient.

Conclusion: Using the ductus arteriosus for systemic perfusion while enlarging the aortic arch avoids neonatal cardiopulmonary bypass. Outer curvature aortic arch enlargement makes easier the coarctation repair and only an end-to-end repair is necessary. It may reduce the rate of residual obstruction. Long term results has to be investigated

Disclosure: Nothing to disclose

CASE REPORT CARDIOLOGY / CARDIAC SURGERY

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Acute chest pain in the era of digital watches

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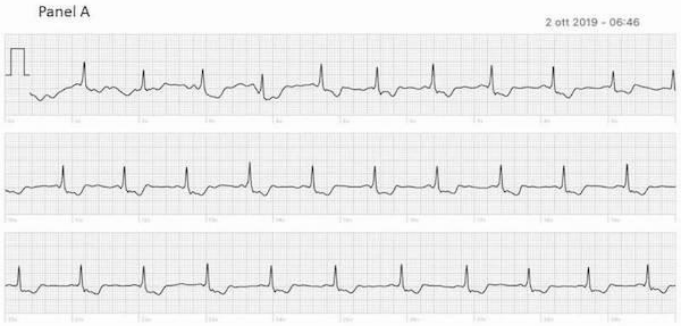
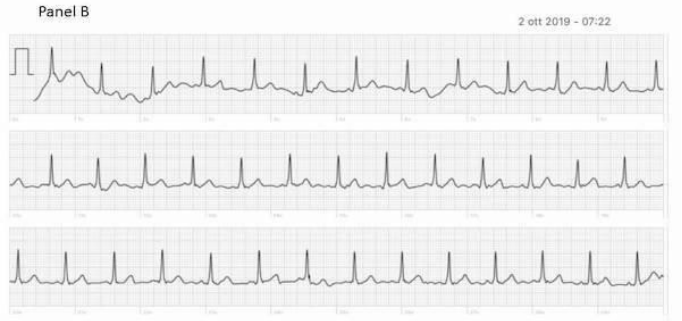
A 38-year-old male smoker with serum LDL-cholesterol of 6.4 mmol/L and family history of coronary artery disease (father with acute myocardial infarction at the age of 45 years) developed acute chest pain irradiating to the jaw and both arms at 6:46 a.m.. He immediately recorded a single-lead ECG (corresponding to ECG lead I) with his digital watch (Apple Watch® with photoplethysmography sensor), which showed sinus rhythm with significant ST-segment depression (Panel A). The patient took a nitro-glycerine pill and the pain resolved completely after a few minutes. A second single-lead ECG registered with his digital watch at 7:22 a.m. showed complete resolution of ST-segment depression (Panel B).





Both ECGs were sent by e-mail to his cardiologist, who organized immediate admission at the emergency department. 12-lead ECG was normal, whereas high-sensitive Troponin-T was slightly elevated with a value of 16 ng/L (cut-off <14 ng/L). Coronary angiogram documented a 50% stenosis of the right coronary artery and cardiac magnetic resonance imaging did not reveal any late gadolinium enhancement or signs of ischemia. The chest pain and the alterations on the single-lead ECG were most probably induced by vasospasm of the right coronary artery. Therefore, aspirin, high dose statins and a calcium channel blocker were initiated. Furthermore, the patient stopped smoking. During a follow up of three months, there were no further episodes of chest pain. Our case shows the potential role of digital watches in detecting transient acute transmural myocardial ischemia - in our case most probably due to coronary spasm.

Disclosure: Nothing to disclose

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Spontaneous non-ischemic rupture of the papillary muscle

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Introduction: Papillary muscle rupture (PMR) is a rare and often life threatening complication which is subsequent to a myocardial infarction or an active endocarditis. Spontaneous papillary muscle rupture is due to a non ischemic origin and of unknown etiology.

Case report: A 77-year-old woman with no medical history of known coronary artery disease presented to the emergency department with acute chest pain. A 12-lead electrocardiogram showed no sign of ischemia. Laboratory investigation demonstrated a hemoglobin of 135 g/L, platelets count was normal, white blood cell count of 12 G/l.The troponine level was twice the normal value and the D-dimere was normal. In addition, cultures of urine, blood, and sputum were negative. She quickly showed hemodynamic instability spurring on intubation and admission in the Intensive Care Unit. A transthoracic echocardiogram identified an anterior papillary muscle rupture with severe mitral regurgitation due to a flail anterior mitral valve leaflet. There was no sign of left ventricular dyskinesia. Transesophageal echocardiography confirmed the diagnosis of PMR. A cardiac catheterization was performed, demonstrating angiographically normal coronary arteries and severe mitral regurgitation. The patient was rapidly taken to the operating room and underwent a mitral valve replacement .Pathology excluded a hypereosinophilic syndrome of the PMR. Infectious investigations came negative and all cultures were sterile.

Discussion: Papillary muscle rupture is a life-threatening emergency that is highly associated with acute myocardial ischemia. PMR is responsible for approximately 5 % of death after myocardial. Spontaneous non-ischemic papillary muscle rupture is a much rarer cause and could be due to myocarditis, Ehler-Danlos syndrome, an infectious cause, Takotsubo cardiomyopathy, or mitral ring calcification, hypereosinophilic syndrome, and of traumatic origin. Once the necessary investigations are not conclusive of any mentioned etiologies, idiopathic spontaneous PMR should be considered. Pathology of the head stump is fundamental to annihilate an ischemic origin or a hypereosinophilic syndrome.

In our case, myocardial ischemia was discarded with a normal angiogram and the known mentioned non ischemic etiologies were all excluded. Hence, we concluded on an idiopathic rupture of the anterolateral PM. One possible explanation of the spontaneous rupture might be an excess of mechanical strain on the papillary muscle.

Disclosure: Nothing to disclose

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Traumatic right coronary artery dissection during cardiopulmonary resuscitation with mechanical chest compression device

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Introduction: Mechanical chest compression (MCC) devices facilitate continuous delivery of cardiopulmonary resuscitation (CPR). Despite promising hemodynamic data, clinical outcomes are inconclusive and complications are described.

Method: A 61-year-old good healthy frail male (55kg/160cm), underwent a cardiac arrest in a pharmacy. Trained personnel initiated CPR immediately. At rescue team arrival, initial rhythm was ventricular fibrillation. External defibrillation permitted return to spontaneous circulation after 32 minutes of low flow. At admission, patient was hemodynamically instable with a profound metabolic acidosis (pH 6.9, lactate 11 mmol/l). An anterior STEMI was suspected according to electrocardiogram and echocardiography (antero-septo-apical hypokinesia). Despite vasopres-

sive therapy, patient developed a refractory cardiac arrest. CPR was initiated, a MCC device (Lucas®) was used. A femoral Extra-Corporeal Life Support (ECLS) was implanted permitting restoration of an adequate perfusion and a sinusal rhythm, after 30 minutes of mechanical compressions.

Results: Coronarography confirmed an acute proximal left anterior descending artery occlusion, which was stented with success (XienceSierra active stent, Biotronik®). Right coronary artery injection revealed a heterogeneous coronary dissection associated with a diffuse intraluminal thrombosis. Right coronary artery perfusion was restored after 5 stents implantation (Orsiro, Biotronik®). Post-operative course was noticed at day-1 by development of a voluminous blood pericardial effusion needing surgical drainage, without recurrence. ECLS was weaned with success after 4 days. Post-operative Left Ventricular Ejection Fraction was 40% and patient leaved hospital 14 days later.

Conclusion: Iatrogenic traumatic injuries due to CPR is a well-known complication. Chest wall and neighbouring organs are the main sites of traumatisms. It is particularly true in case of frail patients benefiting of MCC or device malposition. Traumatic coronary artery dissections are rare. A unique case of manual chest compression-related dissection was described. Based on its thoracic anatomic anterior position, we hypothesize that the right coronary artery is more exposed to traumatic injuries, especially in case of calcified vessels.

Disclosure: Nothing to disclose

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Swan-Ganz catheter entrapment in the tricuspid valve: diagnosis and guided therapy by per-operative trans-esophageal echocardiography

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Introduction: Since its introduction in the 1970s, the pulmonary artery catheter is still used as one preferred hemodynamic monitoring device for the anaesthetic management of cardiac surgery patients.

Method: A 56-year-old man was prepared for elective complete off-pump coronary artery bypass graft (CABG) surgery. Pre-operative echocardiography was normal. According to the hospital recommendations for continuous hemodynamic monitoring during off-pump CABG surgery, a Swan-Ganz Catheter (SGC) was introduced. Per operative trans-oesophageal echocardiography (TOE) assessment revealed a new moderate tricuspid valve (TV) regurgitation due to SGC entrapment.

Results: The SGC formed a knot around the tricuspid subvalvular apparatus, leading to an anterior and septal leaflet restriction with intact papillary muscles. After a futile attempt to withdraw the SGC under echo control, the surgical strategy was changed to allow direct access to the TV via an Extra Corporeal Circulation. Remarkable at this point was that the SGC could not easily withdrawn even by the direct access, i. e. that it could not be untangled, because the knot had pulled extremely tight. The catheter had to be cut in several pieces before it could be removed successfully. Post-operative course was uneventful and 1-week echocardiography control confirmed an intact TV without any residual regurgitation.

Conclusion: American Guidelines for myocardial revascularization (ACCF/AHA 2011) recommend SGC monitoring during off-pump CABG, due to heart mobilization, which may lead to hemodynamic changes and reduced cardiac output. TOE may be a less invasive alternative, but visualization may be challenging while the heart is rotated. SGC entrapment around the TV is a rare but serious complication. The present case illustrated the inherent risk of damage to the subvalvular apparatus. Diagnosis and treatment can be challenging. Systematic SGC mobilization and echocardiography control prior to sternal closure can be helpful to recognize this complication.

Disclosure: Nothing to disclose

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A family with a novel variant in the *SLC4A3* gene leading to short QT phenotype - the importance of whole-exome-sequencing and cascade screening

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Introduction: Short QT syndrome (SQTS) is a rare genetic disease causing sudden arrhythmogenic death. Recently the gene *SLC4A3* has been implicated in SQTS. A mutation in the encoded bicarbonate transporter can lead to increased intracellular pH and shortened action potential. We present a family with a short QT phenotype in whom a novel genetic variant was detected by whole exome sequencing (WES) and cascade screening (CS).

Methods: We performed a thorough work-up of the index patient including echocardiography, stress testing, flecainide challenge and genetic testing. CS of all 1° and two 2° relatives was performed.

Results: The ECG of the index patient showed a QTc of 340ms and characteristics compatible with a SQTS. Clinical work-up was unremarkable. Genetic search with next generation sequencing focusing on channelopathy-associated genes detected a rare known heterozygous missense variant in the *KCNH2* gene (Arg328Cys, frequency 0.057%), which was predicted to be pathogenic according to various prediction algorithms (Polyphen, SIFT, Mutation Taster, DANN score: 0.9994). ECG and CS in all asymptomatic first-degree family members ruled out this variant as the causative mutation. Reanalysis of WES data was performed and revealed a novel heterozygous missense variant p.(Arg370Cys) in the *SLC4A3* gene. CS of the p.(Arg370Cys) mutation suggested that this was the causative mutation in this family.

Conclusion: Predictive bioinformatic algorithms to assess the pathogenicity of missense variants are of limited relevance, but genetic analysis of additional unaffected and affected family members may be instrumental to identify pathogenic DNA sequence variations.

Disclosure: Nothing to disclose

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Two cases of true aneurysm of freestyle bioprosthesis 5 and 8 years after implantation

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Background: Freestyle bioprosthesis(Medtronic) was proved to be hemodynamically superior and to have the best long-term results used for aortic root replacement. We report 2 cases of true aneurysmatic dilatation of Freestyle bioprosthesis.

Methods: Freestyle bioprosthesis had been used in our institution since 2006 exclusively as full root replacement. Two patients A (male, 51) and B (female, 58), were previously operated in 2011 and 2015. The patient A was re-operated after failure of mechanical prosthesis, which was implanted in 1996 because of bicuspid aortic valve stenosis. The re-operation took place in December 2019, 8 years after initial operation because of true aneurysmatic dilatation of 5,4cm of the Freestyle prosthesis, revealed on the CT-scan. The patient B became initially Freestyle-prosthesis because of bicuspid aortic stenosis and dilatation of sinus portion. The re-operation took place in January 2020, 5 years after initial operation, because of aneurysmatic dilatation of Freestyle up to 5.1cm and severe regurgitation. Due to progression of CAD the patient B became concomitantly CABG as well.

Results: The prosthesis of patient A was dilated and had competent cusps. The one of patient B was also dilated, more asymmetrically in left coronary sinus. Additionally, there was also a detachment of commissures, which caused cusps prolapse and subsequent severe valve insufficiency. Histological examinations of both prostheses have shown similar findings with abnormal proportion between IgG4 and IgG, which was over 50%, which normally can be found in IgG4 associated vasculitis. Furthermore, there were found small-spot necrosis with surrounding

granulomatous reaction and the inflammatory infiltrate, which can be found in Takayashu arteritis. The postoperative course was uneventful.

Conclusion: Late dilatation of Composite Graft is a clinically important finding. Active or inactive inflammation could be related to valve or graft detachment, however, long term follow up is mandatory to determine the durability of Freestyle stentless valve.

Disclosure: Nothing to disclose

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First two MRI guided stereotactic body radiation therapy of recurrent sustained ventricular tachycardia

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Introduction: Stereotactic body radiation therapy (SBRT) is emerging as a bail-out treatment in patients suffering from therapy resistant ventricular tachyarrhythmias (VT). We report the worldwide first cases of magnetic resonance image guided SBRT (MR-SBRT) in recurrent sustained VT due to dilated cardiomyopathy (DCM).

Methods: The patients were male, 71- (patient A) and 74-year-old (patients B) suffering from recurrent VT and electrical storms (ES) with ICD shocks, despite guideline-directed medical therapy. Patient A had two endocardial radiofrequency catheter ablation (RFA) and one epicardial surgical RFA and patient B had one endocardial RFA prior. An interdisciplinary decision was made to perform MR-SBRT in palliative intent to minimize repetitive ICD shocks.

Results: Areas of VT-substrate were identified to build a volumetric target using the performed EP studies as well as cardiac MRI and CT. A single fraction of 25Gy at isodose 80% was delivered to a planned target volume of 115.1ml and 73ml in the anterior/anteroseptal basal regions in patients A and B, respectively on a dedicated MR linac using real-time MRI tracking. Patient A developed a prolonged ES interpreted as acute radiation-induced inflammation, which ceased after administration of high-dose dexamethasone. Patient B had no immediate adverse effects from the treatment. Left-ventricular ejection fraction remained stable in both patients at 25%. Both patients had significant improvement of their quality of life. Patient A died 222 days after MR-SBRT due to recurrent ES.

Conclusion: In these first two cases, we demonstrate feasibility, safety and short-term efficacy of MR-SBRT.

Disclosure: Steffel J: Consultant and / or speaker fees from Abbott, Amgen, Astra-Zeneca, Bayer, Biosense Webster, Biotronik, Boehringer-Ingelheim, Boston Scientific, Bristol-Myers Squibb, Daiichi Sankyo, Medscape, Medtronic, Merck/MSD, Novartis, Pfizer, Sanofi-Aventis, and WebMD. He reports ownership of CorXL. Dr. Steffel has received grant support through his institution from Abbott, Bayer Healthcare, Biosense Webster, Biotronik, Boston Scientific, Daiichi Sankyo, and Medtronic. Andratschke N: Advisory or speaker's duty for AstraZeneca, Advisory duty for ViewRay and Debiopharm, Speaker's duty and research support from Brainlab.

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Coronary steal: a greedy neighbour!

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A 71-year-old patient, known for coronary artery disease, treated by a quadruple coronary artery bypass graft (CABG) in 2002 (left internal mammary artery (LIMA) diverted sequentially to the left anterior descending (LAD) coronary artery and to the first diagonal artery and two saphenous veins grafts, one to the first marginal artery and one to the intermediate artery). In 2011, he underwent percutaneous coronary intervention (PCI), with coronary angioplasty and multiple stenting in the right coronary artery (RCA).

He was hospitalized in March 2019 for unstable angina. Cardiac PET-CT showed moderate to severe ischemia (18% of the left ventricle (LV)) in the territory of the distal LAD, moderate ischemia (12% of the LV) in the territory of the proximal LAD (upstream of the anastomosis) and discrete ischemia (12% of LV) in the left circumflex artery (LCX) territory, without any necrosis. The PET-CT also demonstrated a coronary flow reserve below 1.0 in the territory of the LAD, which was related to a coronary steal. A coronary angiogram revealed a subtotal ostium stenosis of the saphenous bypass graft to the intermediate artery, treated by angioplasty with stenting, a complete permeability of de LIMA to the LAD and also a branch arising from a very proximal segment of the LIMA, which was not occluded during the surgery and supplying the whole lateral chest wall. 2 months later, due to severe chronic kidney disease, we performed a percutaneous occlusion of the side branch, via a left radial artery access, with one vascular plug (Reverse Medical MVP® Micro Vascular plug 18mm) and two coils (Terumo AZUR® Hydrocoil Pushable 18). A cardiac PET-CT was performed 3 months later, which showed a normalization of the coronary flow reserve, and a significant improvement of the ischemia in the LAD territory. Finally, the patient had a coronary angiogram a few months later, which demonstrated excellent results, with a complete occlusion of the side branch of the LIMA. Coronary steal due to an unligated side branch of the LIMA is known to be rare but as illustrated by this clinical case, it can be encountered during clinical practice. It should be known as a possible cause of ischemia after CABG, particularly when there is clear evidence of reversible ischemia on perfusion imaging. When LIMA side branch coronary steal is suspected, the management generally involves an interventional approach through use of coil embolization and vascular plugs, with very good results.

Disclosure: Nothing to disclose

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Continuous-flow left ventricular assist device induced Henoch-Schönlein purpura: does it harm heart transplant?

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Background: Immunoglobuline A vasculitis known also as Henoch-Schönlein purpura (HSP) is a systemic inflammatory vasculitis associate with the deposition of immune complexes of immunoglobulin A in small vessel wall and it is suggested that unknown antigens stimulate IgA production activating pathways leading to vasculitis. Circulatory support based on continuous-flow ventricular assist devices (LVAD) is a standard therapy for end-stage heart failure and it is associate to systemic inflammatory response syndrome. We report the first case of HSP probably due to CF LVAD induced lymphocyte B activation.

Case Summary: A 70 -year-old man in end-stage heart failure of CMD aetiology and no history of systemic inflammatory / immunologic disorders, received LVAD as destination therapy. Pump was exchanged 2 weeks later due to right heart failure and post-operatory outcome was critical and complicated by renal and respiratory dysfunctions. One month after the surgical procedure, patient presented palpable purpura on extremities and buttocks, microscopic haematuria and mild proteinuria which would highlight renal parenchyma involvement. Skin biopsy revealed leukocytoclastic vasculitis of small superficial vessels and immunofluorescence revealed IgA and complement C3 deposit in the vessel wall. The cytokine profile showed increased cytokines and inflammatory chemokines expression. haemorrhagic Skin involvement disappear with purely symptomatic local corticosteroid treatment.

Discussion: CF- LVAD seems to trigger Th1/Th2 imbalance and over activity of Th2 cells leading to increased production of immunoglobulins and subsequent deposition of immune complexes in small vessels. Increased levels of Th2 cytokines patient's profile allow us to postulate that the immune complex deposition of IgA results from the predominance of circulating Th2 type cytokines linked to the antigenic activity in LVAD recipient. We could speculate that CF- LVAD immune activation could have 2 relevant clinical consequences: 1) the induced vasculitis could compromise patient's respiratory and renal functions worsening his conditions before heart transplant (HxT) and harming his life expectancy; 2) after HxT, it could strengthen the immune process underlying rejection affecting graft functions and durability.

Conclusion: CF LVAD induced antigenic activity deserves extensive investigations because it could worst patient's clinical conditions and eventually affect the use of LVAD as bridge-to-transplant treatment

Disclosure: Nothing to disclose

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Right diaphragmatic palsy as a cause of QRS alternans

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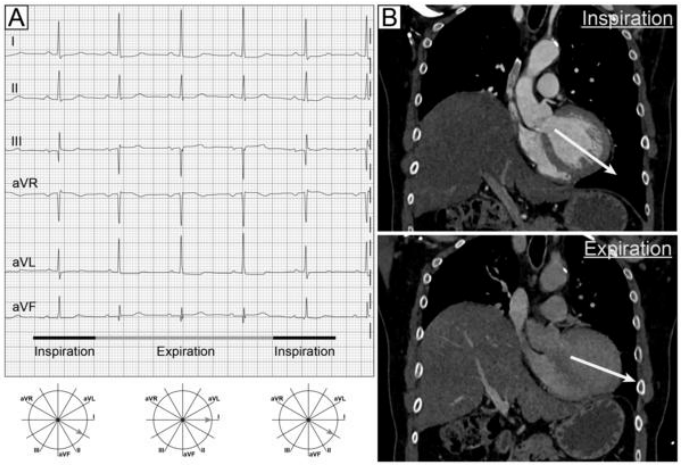
Introduction: QRS alternans, defined as an alternating QRS axis or amplitude in any or all leads on an electrocardiogram (ECG), can result from several cardiac or thoracic conditions. We report on a unique case of QRS alternans caused by right diaphragmatic palsy.

Methods: A 67-year-old man was assessed for progressive exertional dyspnea. On physical examination, dullness on percussion and decreased vesicular breath sounds at the right pulmonary base were observed. A 12-lead ECG depicted normal sinus rhythm with the QRS frontal axis alternating from 0° on expiration to 30° on inspiration (panel A). Transthoracic echocardiography was unremarkable. A chest radiograph revealed marked elevation of the right hemidiaphragm. Spirometry revealed a restrictive ventilatory defect and a reduced maximal inspiratory pressure (55% of predicted). Computed tomography acquisitions on inspiration and expiration with concomitant ECG recording demonstrated the direct relation between the anatomical (center of mitral orifice to apex) and electrical axes of the heart in the frontal plane (Panel B). After neurological assessment, right diaphragmatic palsy was confirmed and attributed to degenerative compressive cervical radiculopathy. The patient followed a pulmonary rehabilitation program, with significant functional improvement.

Results: QRS alternans can result from cardiac motion or conduction abnormalities, sometimes called "pseudo-electrical alternans". Abnormal cardiac motion with electrical alternans is classically described in the setting of large pericardial effusion, but has also been reported in pneumothorax, gastric volvulus and left diaphragmatic rupture. QRS alternans may also result from aberrant electrical conduction, generally as a result of supraventricular tachycardia, ventricular tachycardia, atrioventricular reentrant tachycardia or ventricular preexcitation.



[Right diaphragmatic palsy as a cause of QRS alternans]

Conclusion: In the present case, right diaphragmatic palsy was associated with an increased range of motion of the left hemidiaphragm, resulting in clockwise or rightward rotation of the heart axis in the frontal plane during inspiration, thereby confirming right diaphragmatic palsy as the cause of QRS alternans.

Disclosure: Nothing to disclose

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Cerebral claudication as belated complication of Stanford type A aortic dissection

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Objective: Perioperative cerebral injuries are serious complications for patients operated on for Stanford type A aortic dissection, especially when the supra aortic trunks are involved. Mid and long-term improvement usually occurs. We present herein a challenging case of cerebral claudication.

Methods: A 72-year-old woman with acute Stanford type A, De Bakey type 1, aortic dissection and a spontaneously thrombosed false lumen was operated at our institution. She underwent ascending aorta and hemi-arch replacement with aortic valve resuspension. The operation was technically uneventful. On the third post-operative day (POD) she presented weakness of the left upper limb which was blood pressure dependent (symptoms improved as the blood pressure increased). CT-Scan showed severe stenosis of the brachiocephalic trunk and right common carotid artery true lumens due to static compression by the false lumens. Doppler examination confirmed a functional near occlusion of the right common carotid artery with blood flow substitute through anterior and posterior cerebral communicant arteries. The patient underwent ligation of the right common carotid artery and prosthetic bypass with and 8mm Silver Graft (BBraun Medical) between the aortic tube and the right carotid bifurcation with a terminal anastomosis.

Results: Subsequently, the patient recovered completely without neurologic sequelae. She was discharged to a recovery clinic on POD 20 and remains asymptomatic with normal duplex findings at 3 months follow up.

Conclusion: Sustained cerebral malperfusion following aortic dissection type A repair may lead to severe neurological complication. Prompt diagnosis and aggressive surgical treatment even in the early post-operative period might be recommended.

Disclosure: Nothing to disclose

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"Cord-like" mobile left atrial mass related to a caseous calcification of the mitral annulus

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Case report: A 68-year old woman with dyspnea NYHA II and atypical chest pain was referred for echocardiographic evaluation. She has a known history of curative treated breast cancer and was currently treated for a dental infection without systemic symptoms. Transthoracic (TTE) and transesophageal echocardiography (TEE) revealed a normal left ventricular ejection fraction and a severe mitral regurgitation due to a prolapse of the posterior leaflet. In addition the posterior mitral annulus appeared locally heavily calcified and a cord-like, mobile, relatively echodense structure was found in the left atrium originating from the posterior mitral annulus (fig. 1a-d). Lab results including negative blood cultures showed no signs of possible endocarditis. A cardiac computed tomography (CT) scan showed an inhomogeneous calcification of the posterior mitral annulus with a caseous necrotic part in the P1-Segment, which raised the suspicion of a complicated caseous calcification of the mitral annulus (CCMA) (fig. 2). We especially thought of a calcified amorphous tumor (CAT) related to the CCMA. An anticoagulation with Enoxaparin to prevent thromboembolic events was started and a control-TTE was performed three weeks later. At that time the cord-like mass could not be detected any more. Clinically there were no suspicious symptoms of cerebral or peripheral embolization. To rule out cerebral embolization an MRI was performed, showing a non-specific cortical barrier disturbance without clear embolic lesions otherwise. Due to unchanged severe symptomatic mitral regurgitation the patient was referred for mitral valve reconstruction. Intraoperatively the CCTA with a partially ruptured fibrin cap was confirmed. Mitral valve prolapse was reconstructed and anuloplasty performed with a good result. This case shows a possible cardiac amorphous tumor with related CCTA. CAT are benign tumors consisting of fibrin, calcium deposits and an amorphous accumulation of degenerating blood elements and are very often related to CCTA and renal dysfunction. It is suggested, that the degenerative caseous material of CCTA can lead to a rupture of the fibrin cap of these lesions and then develop a CTA. These can lead to embolic events and case reports suggest, that anticoagulation may be beneficial, despite CAT usually has to be treated surgically.

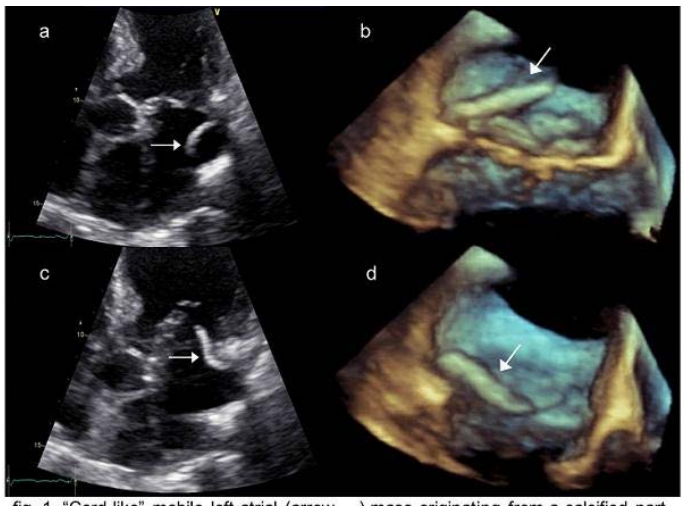

fig. 1. "Cord-like" mobile left atrial (arrow →) mass originating from a calcified part of the posterior mitral annulus in an transthoracic and transesophageal 3D-echocardiography during systole (a+b) and late diastole (c+d).

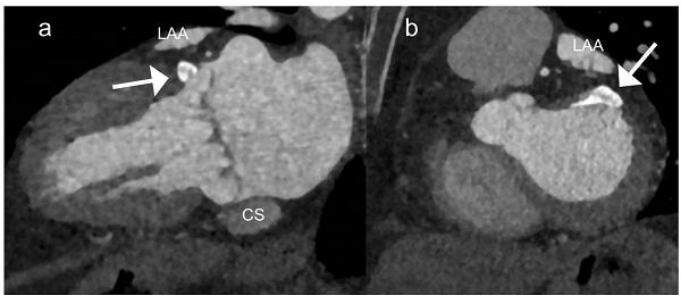

fig 2. a+b Cardiac computed tomography scan showing a caseous necrotic part in the calcified posterior mitral annulus, P1-Segment (arrow →). LAA left atrial appendage CS coronary sinus

Disclosure: Nothing to disclose

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Mitral valve endocarditis due to an emerging uropathogen Actinotignum schaalii

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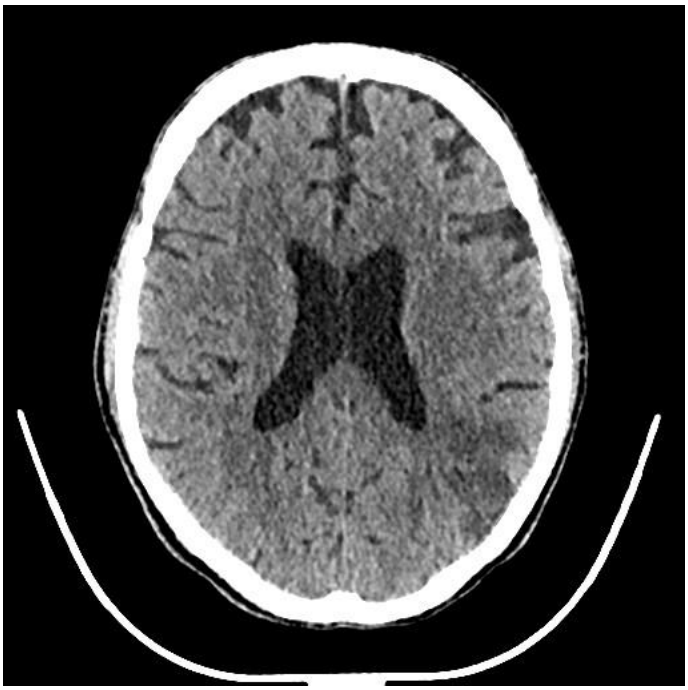
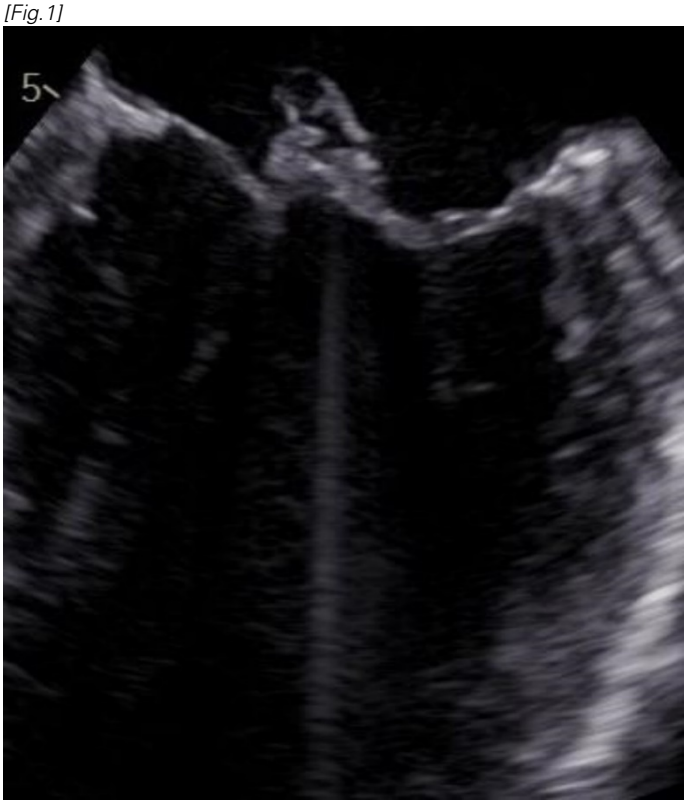
Introduction: A. schaalii is a facultative anaerobic Gram-positive rod which is part of the urinary microbiota of healthy patients and sometimes an overlooked cause of UTIs because of its fastidious growth on usual media. There are only two cases of endocarditis reported as caused by A. schaalii. We present a 66 year-old male, with no previous medical history, who developed A. schaalii mitral valve endocarditis

Case: At the end of December, 2019 the patient was treated in an outpatient setting with Augmentin due to the possibility having bronchitis. Starting January 10th he reported developing low back pain, night sweats, body aches and occasional chills and papular rasch on his left knee. By January 24, 2020 he developed symptoms related to fever including confusion and trouble speaking/finding words. He was referred to a regional hospital, through his family doctor, with a differential diagnosis of Endocarditis. His physical exam was remarkable for a 66 year-old male who appeared weak but awake and alert. His exam revealed that he had a loud systolic murmur, flanks tenderness on palpation and mucocutaneous lesions consistent with Osler nodes. The Echocardiography (Fig.2) showed a severe mitral valve regurgitation with a small vegetation. A computer tomography of his head (Fig.1) reveled a large temporal ischemic Infarct. The patient was started on Augmentin and Gentamycin after obtaining blood cultures. He was then transferred to the state hospital for mitral valve surgery. Four days after blood cultures showed positive for A. schaalii sensitive to Penicillin. Because of the high risk of cerebral bleeding the surgery was delayed for 2 weeks.

Conclusion: Infections caused by A. schaalii are rare. Early detection of UTIs caused by this fastidious growing bacteria should be performed to avoid *devastating* complications.



[Fig.1]



[Fig. 2]

Disclosure: Nothing to disclose

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Cardiac tamponade in a 22 y old woman - horrible holiday memories

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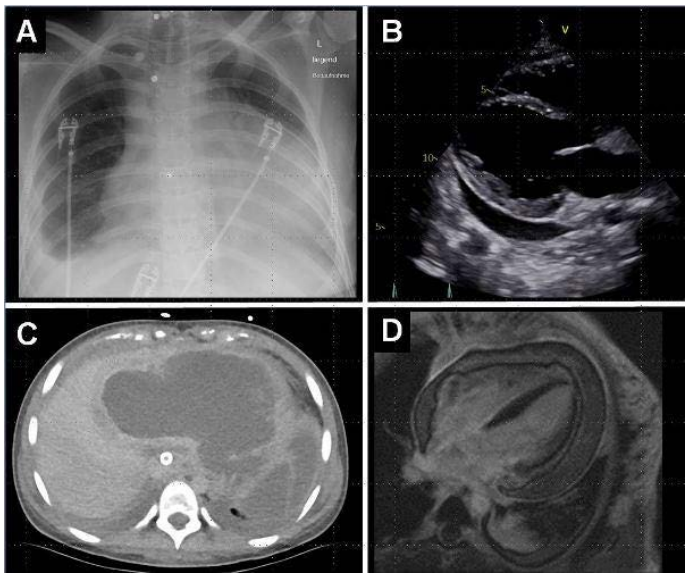
Case report: A 22-year-old female presented herself in a regional hospital with dyspnea, weight loss and fatigue after a syncope. She was tachypneic and tachycardic. A chest-X-ray showed bilateral pleural effusions and cardiomegaly (Figure 1-A). FAST (focused assessment with sonography for trauma) demonstrated pericardial effusion and ascites. While transferred to a stretcher she became asystole. Emergency pericardiocentesis under resuscitation yielded 100 mL brownish fluid. ROSC occurred after 7 min of CPR and was followed by a transport under massive adrenergic support to our tertiary hospital. In our emergency room, left ventricular ejection fraction (EF) was severely reduced (20%; Figure1-B). No cardiac tamponade was present. Mechanical circulatory support (va-ECMO) was installed due to refractory cardiogenic shock. Computed tomography revealed pericardial and bilateral pleural effusions, as well as ascites and extended lesions in the left liver lobe (Figure1-C). Because of a history of a 10 month trip to India, we suspected amebiasis with liver abscess. Broad anti-infective therapy was initiated. The clinical course was driven initially by severe left and right heart failure. Pericardial effusion was dynamic: repeated echo's demonstrated a spectrum from minimal to relevant fluid collections. An explanation was given during puncture of the liver abscess: ultrasound contrast injected into the liver abscess filled up the pericardial space, unmasking the fistula between liver abscess and pericardium. A myocardial involvement was ruled out by MRI (Figure 1-D).



[Figure 1: Chest x-ray (A), Pericardial effusion (B), abdominal CT (C) and cardiac MRI (D)]

Blood cultures and cultures of the abscess remained sterile. Microscopic examination of the abscess fluid showed the Trophozoites and confirmed the diagnosis. Later the serologic proof of entameba histolytica was obtained.

With specific anti-infective therapy, percutaneous drainages of the liver abscess, the ascites, the pericardial and the pleural effusions the patient rapidly improved. The ECMO could be removed on day four. A transfer from the ICU to the ward was possible on day 14 and to rehabilitation on day 21. The heart function measured by EF and two dimensional strain returned to normal.

Disclosure: Nothing to disclose

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Endovascular management of an acute post-traumatic rupture of the right pulmonary artery

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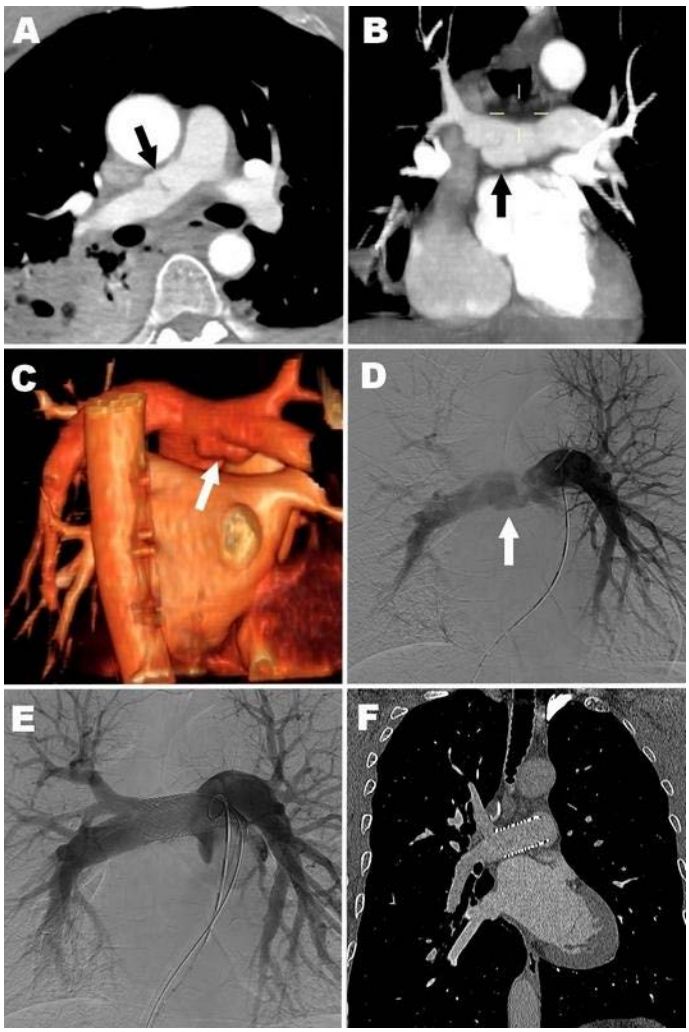
Introduction: Pulmonary artery (PA) rupture is extremely rare and most of the time patients die before arriving to the hospital. Covered stent proved their capability to address iatrogenic PA injury or pseudoaneurysm, but usually PA rupture after blunt chest trauma required emergent surgical approach. We present here a case of a post-traumatic PA rupture, which was successfully treated by endovascular approach.

Case report: A 50-year-old man was admitted after a ski fall with a height of several hundred meters. At the admission, he was hemodynamically unstable and hypothermic at 29°C. Full body scan revealed multiple fractures, a pneumothorax, pulmonary contusions and a pseudoaneurysm located in the middle of the right PA (Figure 1A,B,C), highly suggestive of PA rupture . After right PA angiography, PA rupture was confirmed (Figure 1D). A 48x22mm balloon expandable covered stent was implanted, which achieved the total exclusion of the pseudoaneurysm without complication (Figure 1E). The patient was extubated at day-5 and underwent several orthopedic operations before being discharged with acetylsalicylic acid therapy for 1 year.



[Figure 1]

In the present case, the dilemma was to operate the patient with a high risk of massive hemorrhage related to heparin requirement for cardiopulmonary bypass, or to challenge endovascular approach with the risk of worsening the PA tear, occluding the first bronchial artery or narrowing the pulmonary trunk. By using a very short and large covered stent, which is usually employed in the aorta, we successfully sealed the PA hemorrhage and the CT angiography confirmed the good result at 1 year

(figure 1F). To our knowledge, this is the first case of a pulmonary artery rupture secondary to a blunt chest trauma that was treated with a covered stent in an acute basis.

Conclusion: Endovascular approach is feasible to treat acute post-traumatic rupture of the pulmonary artery.

Disclosure: Nothing to disclose

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Towards batteryless endocardial pacing - a miniaturized endocardial electromagnetic energy source for leadless pacemakers

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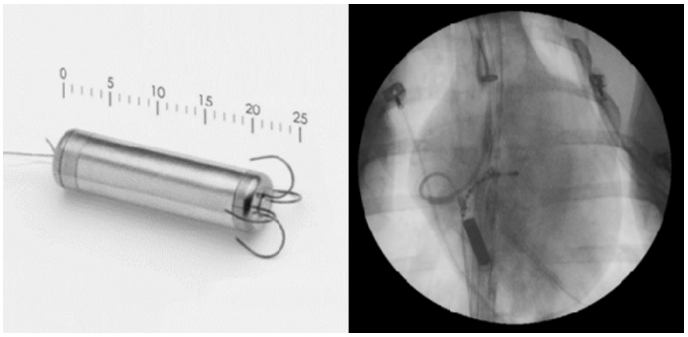
Introduction: Today, > 10% of pacemaker (PM) patients experience early complications after implantation, mostly related to the PM lead. To avoid leads, leadless PMs have been introduced (MICRA©/Medtronic) consuming about 4 microwatts under standard conditions. These devices are battery-powered and cannot be explanted after the battery's capacity is exhausted. The aim of our study was to investigate the feasibility of powering an endocardial pacemaker by converting a minimal amount of the heart's kinetic energy into electric energy, to overcome the need of replacing the PM once the battery becomes exhausted.

Methods: We developed an energy harvester prototype using a mass imbalance that drives an electromagnetic generator while moving. This principle is derived from Swiss wristwatches and was optimized for endocardial use by numerical simulations and bench tests. The prototype is suitable for catheter-based implantation and has the same size as a leadless pacemaker (Figure 1). We implanted the device at the apicoseptal side of the interventricular septum of a porcine heart (Figure 2). The device's harvested power was measured during sinus rhythm, atrial and right ventricular pacing.



[Figure 1: The Prototype in its final form. Figure 2: X-ray imaging of the implantation.]

Results: Implantation, anchoring and explantation at the target location was feasible without problems. During intrinsic sinus rhythm (at 89 beats per minute, bpm), the measured harvested power was 1.13 µW. During atrial pacing (120-160 bpm), median electric power was 2.43 µW (interquartile range 0.8-4.1 µW). During ventricular pacing (120-160 bpm), median harvested power was 3.26 µW (interquartile range 0.25-4.4 µW).

Conclusion: The prototype harvested a significant amount of power required to supply endocardial leadless pacemaker circuits. Ongoing research aims at further optimization of the device and integration into a fully functional lead- and batteryless pacemaker

Disclosure: Nothing to disclose

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Complex open lead extraction with simultaneous reimplantation, PFO closure and SVC reconstruction

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Introduction: Lead removal is recommended in patients with life threatening arrhythmias secondary to retained leads according to ESC/EHRA guidelines. In case of circumstances like total venous occlusion and persistent foramen ovale preventing transvenous lead extraction and reimplantation, alternative approach should be implemented. This report describes a 39-year-old patient who underwent open lead extraction with simultaneous ICD reimplantation, PFO closure and venous reconstruction.

Case: A 39-year-old patient was admitted urgently to our institution with history of atrio-ventricular block and pacemaker implantation, consecutive system upgrade to 2-chamber-ICD for HCM, however with incomplete lead extraction. He presented several inadequate shocks, recurrent syncope and the high voltage lead fracture was diagnosed. He was scheduled for transvenous lead extraction and reimplantation. The perioperative echocardiography revealed a persistent foramen ovale so that the procedure was interrupted to avoid the risk of paradoxical embolization. Furthermore, the phlebography showed occlusion of both subclavian veins. We performed then open lead extraction with reimplantation of epicardial atrial electrode, transatrial high voltage lead, PFO closure and reconstruction of SVC. The clinical and radiological success was achieved without major complications.

Disclosure: Nothing to disclose

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Acute ischemic right heart failure in ascending aortic dissection treated successfully by temporary extracorporeal right ventricle assistance

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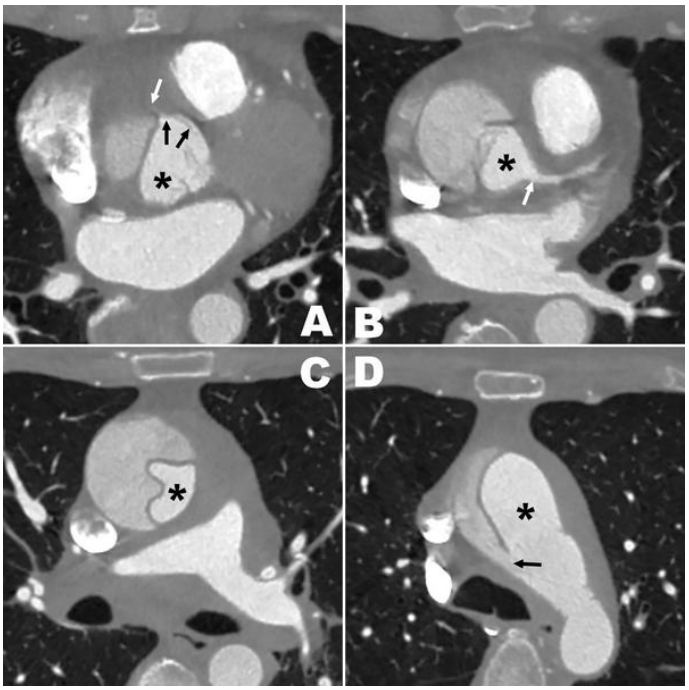
Introduction: Acute Stanford type A dissections (ATAAD) involving the coronary arteries result in higher risk of death. We present a case of myocardial infarction caused by right coronary artery (RCA) avulsion during an ATAAD, which was successfully treated by a Bentall procedure with a coronary bypass graft (CABG) and a temporary extracorporeal right ventricle assistance (eR-VAD).

Case report: A 55-year-old woman was admitted for an ATAAD that extended from the aortic root to the hemi-arch (Figure 1). Initial ECG showed nonspecific ST depression and pre-operative trans-esophageal echocardiography revealed a right ventricular (RV) dysfunction.



[Figure 1]

Inspection of the aortic root revealed a complete occlusion of the RCA due to the dissection (figure 1A). Cardioplegia could initially only injected into left main trunk while a saphenous vein was harvested to bypass the RCA. Once the distal anastomosis was finished cardioplegia was immediately injected into the graft. A Bentall procedure in combination with a

hemi-arch replacement was performed. Weaning from cardiopulmonary bypass (CPB) was impossible due to persistent severe RV dysfunction, thus we established an eR-VAD circuit with a centrifugal pump between the right atrium (by cannulating the right femoral vein) and the pulmonary trunk (by suturing an 8mm Dacron graft on it, which was tunneled via the retrosternal space to the skin). Doing this, the sternum could be closed after CPB weaning with transitory eR-VAD support. After partial RV recovery, the eR-VAD could be weaned percutaneously bedside 5 days later with hospital discharge 2 weeks after admission.

Conclusion: In case of RV infarction during ATAAD, the eR-VAD provides temporary support that enables recovery while avoiding systematic anticoagulation (due to the omission of the oxygenator in contrast to the usual ECMO support). This is of particular interest during the early postoperative period, which is generally associated with an increased bleeding risk.

Disclosure: Nothing to disclose

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Atrial fibrillation and AVNRT at the same time - is this possible? A rare case of AVNRT with upper common pathway block

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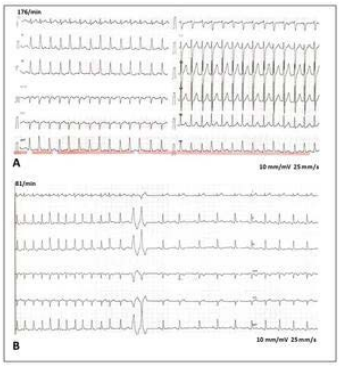
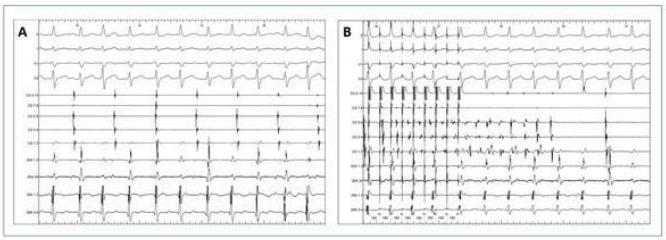
We present the case of a 34-year-old man who was referred to our hospital for an electrophysiologic study (EPS) and catheter ablation due to recurrent symptomatic palpitations. The 12-lead surface ECG had previously confirmed a narrow complex tachycardia with stable QRS morphology at a heart rate of around 180 bpm (tachycardia cycle length, TCL 333ms) with slightly varying cycle lengths as the cause of the patient's symptoms (Figure 1A). This tachycardia had the same QRS morphology as during sinus rhythm and was terminated by the administration of 18mg adenosine IV (Figure 1B). Further work-up by echo excluded structural heart disease, lab values were unremarkable. EPS showed normal baseline intracardiac intervals (AH 112ms, HV 42ms, AVBCL baseline 360ms). Dual AV nodal physiology was present (AH jump). VA was dissociated during ventricular stimulation. Atrial burst stimulation induced a narrow complex tachycardia with TCL of around 380ms with slightly varying cycle lengths similar to the clinically documented tachycardia. During tachycardia, VA dissociation was noted (Figure 2A).



[figure 1]



[figure 2]

A short sequence of atrial fibrillation was induced by atrial burst stimulation and did not influence the ongoing narrow complex tachycardia (dual tachycardia, 2B), which could be terminated by atrial pacing. During tachycardia, His was leading V, which excluded ventricular tachycardia. TCL during right bundle branch block aberration did not change, left bundle branch block morphology during tachycardia was never observed. This made AVRT with VA dissociation using a nodofascicular/-ventricular fiber as the antegrade limb or a nodoventricular fiber as the retrograde limb of the tachycardia circuit as well as bundle branch reentrant VT unlikely. Based on our observations, the most likely diagnosis was AVNRT with upper common pathway block. Therefore, we performed ablation of the slow pathway in loco typico with up to 35 Watts and up to 50°C. Junctional beats were noted during radiofrequency ablation. After ablation and a waiting period of 20 min., AH jump was abolished and no more tachycardia was inducible indicating successful ablation. Therefore, we concluded that the correct diagnosis was AVNRT with upper common pathway block. However, we cannot exclude the possibility of the presence of a nodofascicular fiber as the retrograde limb of the tachycardia circuit or an innocent bystander pathway, of which the treatment of choice is also ablation of the slow pathway in most cases.

Disclosure: Nothing to disclose

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Mitral valve clipping with MitraClip as therapeutic option in patients with symptomatic hypertrophic obstructive cardiomyopathy despite maximal pharmacological therapy

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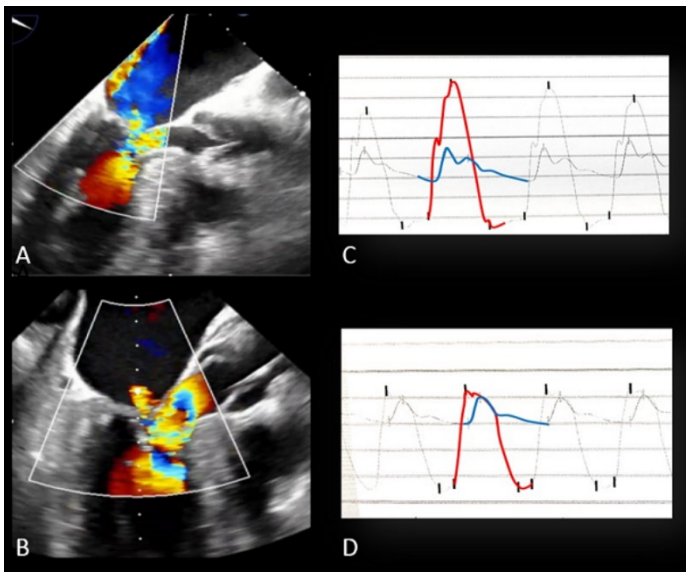
Introduction: Hereditary hypertrophic obstructive cardiomyopathy (HOCM) affect 0.2-0.5% of adults. Left ventricular outflow tract (LVOT) obstruction is caused by LVOT area reduction by ventricular hypertrophy and systolic anterior movement (SAM) of the elongated anterior mitral valve apparatus. Anatomic mitral valve abnormalities and SAM may lead to a severe mitral valve regurgitation (MR). Typical symptoms are angina, syncope, exertional dyspnea, arrhythmias and sudden cardiac death.



[figure 1]

Case description: We report the case of a 62-year-old male patient, known for HOCM, symptomatic for exertional dyspnea NYHA III despite maximal pharmacological therapy with beta-blocker and calcium-channel-blocker. Transthoracic echocardiography (TTE) showed asymmetric LV hypertrophy and elongated mitral valve leaflets with SAM, causing LVOT obstruction (gradient at rest 95 mmHg), severe MR (4+) and concomitant raised pulmonary systolic pressure of 60 mmHg. After heart team discussion, we proposed percutaneous mitral valve clipping using MitraClip, to address SAM, LVOT obstruction and MR. After placement of one MitraClip NTR, MR was reduced to grade 1 (figure1, A/B) and invasive measured LVOT gradient dropped from 68 mmHg to 5 mmHg

(figure 1, C/D). TTE control after 3 days confirmed marked reduction of MR and LVOT gradient (non-invasive gradient at rest 16 mmHg/ with Valsalva 36 mmHg). Patient's functional class improved to NYHA II. He was discharged on the day 3 with low dose beta-blocker.

Conclusion: In patients with symptomatic HOCM despite maximal pharmacological therapy, surgical septal myectomy or alcohol septal ablation (ASA) are indicated in experienced centers. Nevertheless, due to anatomic anomalies of the mitral valve, SAM may persist and request mitral valve repair or replacement. Mitral Valve clipping by means of MitraClip might represent a new and valid alternative to address simultaneously outflow tract obstruction and MR.

Disclosure: Nothing to disclose

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Assessment of familial arrhythmogenic right ventricular cardiomyopathy - the impact of different genetic screening strategies

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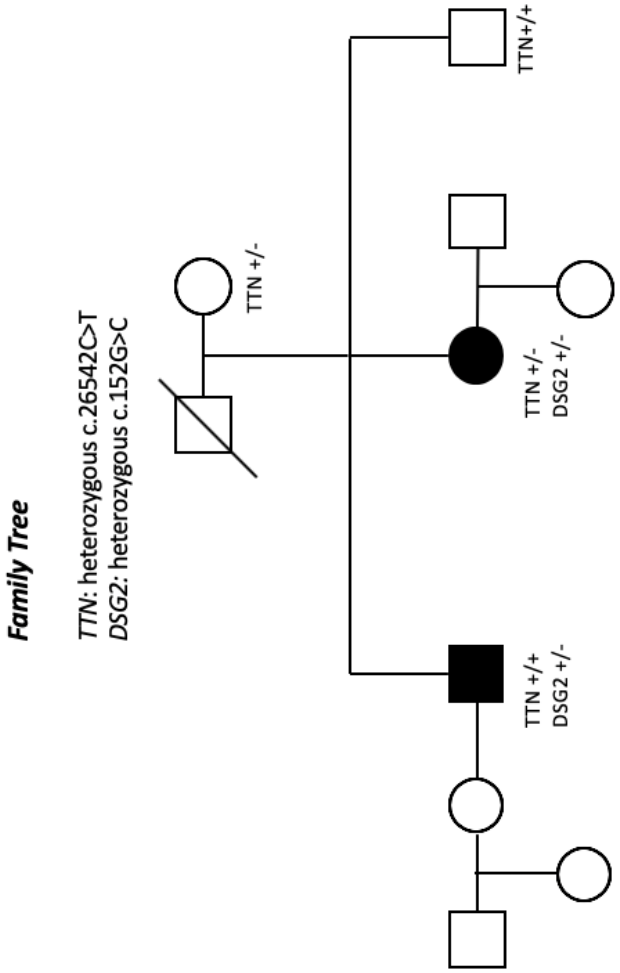
Introduction: Arrhythmogenic Right Ventricular Cardiomyopathy (ARVC) is an inherited condition, with approximately 60% of patients carrying a possibly disease-causing genetic variant. Desmosomal genes account for about 50% of those variants. We report a family with ARVC where the disease-causing genetic variant of a known desmosomal gene was missed because of the initial genetic testing method.



[Family tree]

Methods: A 54-year-old man diagnosed with ARVC by the presence of 3 major 2010 Task Force Criteria, underwent genetic cascade screening for the heterozygous genetic variant detected previously in an affected sister by Whole Exome Sequencing (WES) with focus on 380 pre-selected cardiac-disease genes (*TTN*: c.26542C>T, initially classified as likely pathogenic (LP)). He was shown to be a non-carrier, moreover, based on the American College of Medical Genetics (ACMG) this variant is currently classified as benign.

Results: Upon re-screening with a dedicated cardiomyopathy panel including 176 cardiomyopathy/channelopathy genes by Next Generation Sequencing (NGS) (Illumina), a heterozygous missense variant in *DSG2:* c.152G>C was found. The still accessible DNA from the sister was re-analyzed and the same *DSG2* variant was found, which current literature classifies as LP. The NGS data re-analysis revealed that the region of the mutation had low coverage (10x), therefore the *DSG2* variant was not detected at initial screening.

Conclusion: The absence of an established pathogenic genetic variant questions the utility of WES (20000 genes) as the initial diagnostic step for ARVC. While WES represents a good tool in searching for novel genes in Trio Analysis, it has a low coverage (mean 10x) of known genes. We therefore propose using smaller panels, such as the dedicated cardiomyopathy panel (mean coverage 100-300x) as an initial genetic screening method.

Disclosure: Nothing to disclose

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Sutureless valve in bio root prothesis: a surgical approach in endocarditis

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Introduction: 76- year old male patient with biological porcine aortic root replacement, ascending aortic-and hemiarch replacement with dacron graft. Patient suffered from fever with shivering and weight loss one year after initial operation. Blood cultures were positive for Enterococcus faecalis. Transthoracic echo showed mild transvalvular aortic insufficiency and leaflets with >1.5cm vegetation on the leaflets floating into LVOT. No abscess was detected. EF was slight reduced with 50%.

Methods: Dual antibiotic therapy was established with gentamicine and amoxicillin upon admission. Seven days later biological aortic valve replacement using a sutureless valve was performed in slight hypothermia (34°C) without any complications. Bypass time 43min, cross-clamp time 31min. Ventilation time was 8h, ICU stay 24h.

Results: Postoperative ECG showed sinus rhythm. Transthoracic echo showed aortic valve prothesis mean/ max gradient of 9/ 14mmHg and no paravalvular leak. Patient was discharged to rehabilitation one week after surgery. In Follow up until now no clinical signs of endocarditis and sufficient function of aortic valve prosthesis.

Conclusion: Our case shows that the procedure is feasible in endocarditis patients without annular aortic abscess. The postoperative course was similar to elective aortic valve replacement. Risk for atrioventricular-block is protected due to valve-in-valve implantation.

Disclosure: Nothing to disclose

313

Amyloid infiltration in a donor heart

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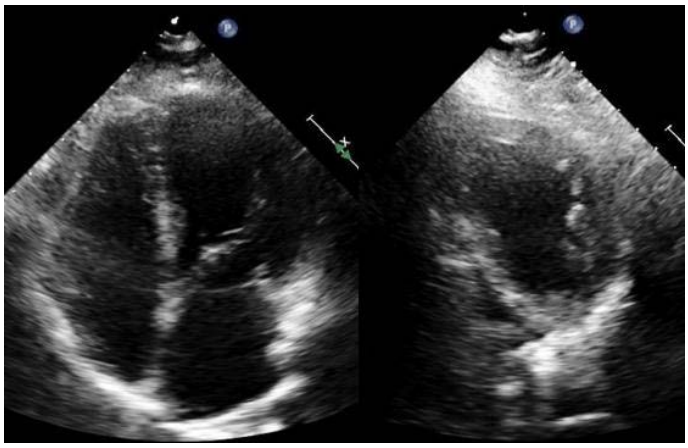
Introduction: Heart transplantation (HTx) remains the gold standard in patients with advanced heart failure even in patients aged >65 years old when the load of comorbity is low.

Case description: A 69 years-old patient with long-standing ischemic cardiomyopathy due to a large anterior myocardial infarction more than 20 years ago presented with a severely reduced ejection fraction complicated by severe ventricular tachycardia. Because of worsening of heart failure, a permanent left ventricular assist device was implanted in 3/2018, as a "bridge-to-transplant" strategy. HTx was performed in February 2019 with a 69 year old donor heart with normal biventricular function, normal left ventricular wall thickness and absent valvulopathy. However, grade I diastolic dysfunction and mild biatrial enlargement

were noticeable (figure 1). The electrocardiogram (ECG) and coronary angiogram were normal. Postoperative course after orthotopic HTx was complicated by primary graft failure with cardiac unresponsiveness to atrioventricular pacing why veno-arterial extracorporeal support was provided until post-operative day (POD) 10. During this period intracardiac conduction recovered but on POD 24 sudden cardiac arrest with complete atrioventricular block occurred. A right retro-auricular clot with local tamponade was treated by surgical extraction. External pacing wires were deployed, but without myocardial capture at maximal voltage pacing. Patient died despite of cardiopulmonary resuscitation. Autopsy revealed biventricular hypertrophy without macrospopic fibrosis while at the microscopic level multiple foci of positive Congo red coloration fibrosis indicated the presence of cardiac amyloidosis (Figure 2). Immunostaining for AL amyloidosis and transthyretin amyloidosis was negative, suggesting amyloidosis associated with chronic inflammation.

Conclusion: This rare case of amyloidosis in a donor heart illustrates that advanced echocardiographic measures should be systematically applied when potential cardiac donor are older. In fact, cardiac amyloidosis has been observed with a 15% prevalence in this age group when people present with heart failure and preserved ejection fraction.



[Figure 1]

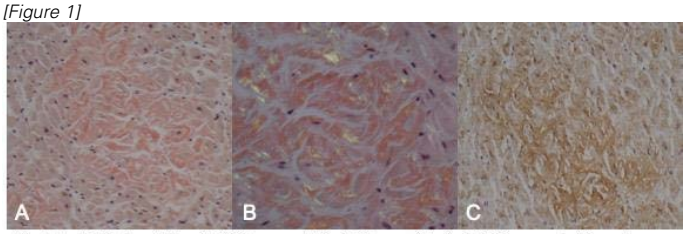


Fig. 1 Amyloid in heart allograft. (A) Congo red stain (200x magnification); (B) Congo red stain under polarized light source showing apple-green color birefringence of amyloid (400x magnification); (C) Substance P immunostain (200x magnification).

[Figure 2]

Disclosure: Nothing to disclose

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Very long-term follow-up after double mitro-aortic valve replacement

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Introduction: Five decades ago, when facing cardiac valve replacement the only available materiel were primitive valve prostheses with mitigated hemodynamic performances, requiring strong anticoagulation. However long-term durability of those substitutes could be excellent.

Methods: A 65 year-old man was admitted at our institution with signs right heart failure and cardiac cirrhosis.

Forty-five years earlier, at the age of 20, he had undergone double mitral and aortic valve replacement for rheumatic disease. The implanted prostheses were Starr-Edwards valves no 3 and 9 respectively.

Cine-valve examination showed good unrestricted motion of both silastic balls. Echocardiographic findings included an aortic mean gradient of 23mm Hg, an elevated trans-mitral mean gradient of 13mmHg together with moderate mitral regurgitation and severe tricuspid regurgitation. The patient benefited of a re-operation with replacement of the Starr prostheses by Edwards biological valves and tricuspid valve annuloplasty.

Results: Postoperative course was uneventful, the patient was discharged on postoperative day 17 to a recovery clinic. Three months echocardiographic follow-up confirmed a good result with normal mitral and aortic gradients and the absence of tricuspid regurgitation. The patient remains symptoms free one year after the operation.

Conclusion: For best long term results after cardiac valve replacement, prosthesis durability should be tailored to the patient's age and life expectancy. In this setting, modern mechanical valves certainly still have a role to play.

Disclosure: Nothing to disclose

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Early and late asystole after implantable loop recorder implantation: misdiagnoses and unexpected diagnostic opportunities

G. Domenichini[1], C. Haddad[2], P. Carroz[2], D. Graf[2], J. Li[2], C. Herrera Syklódy[2], A.P. Porretta[2], J. Schlaepfer[2], E. Pruvot[2], P. Pascale[2]

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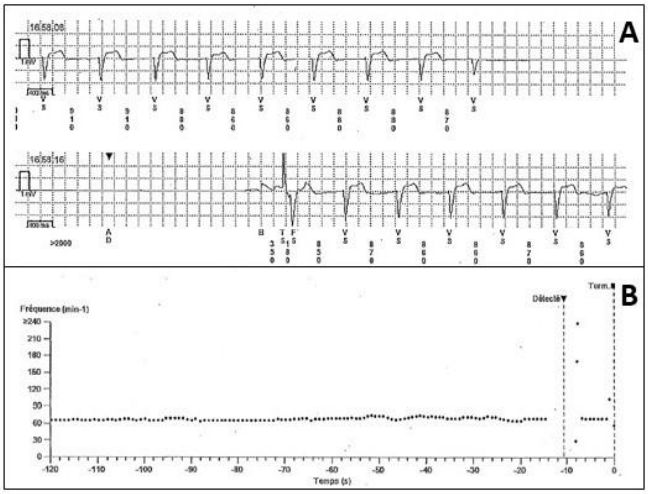
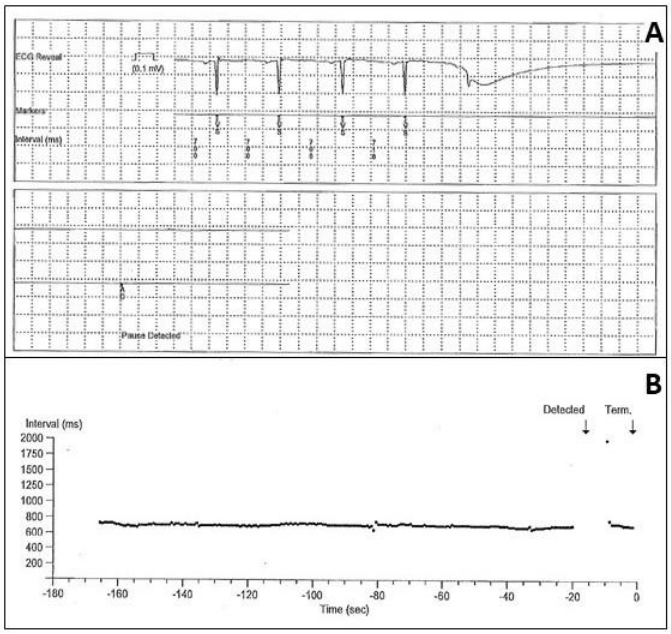
Introduction: Implantable loop recorders (ILR) allow arrhythmia detection and ECG-symptoms correlation in case of inconclusive diagnostic investigations. However, correct data interpretation is crucial to avoid misdiagnosis.

Methods: We present two cases of a 84 and a 79-year-old patient (case 1 and 2, respectively) implanted with a Medtronic Reveal LINQ in a context of unexplained syncope of suspected arrhythmic origin.



[Figure 1]

Results: Case 1. A CareLink alert was received a few days after implant because of 3 episodes of pauses up to 7 seconds recorded 6 hours after implant. The patient had no symptoms apparently. The corresponding ECG recording documented the complete disappearance of ECG signals (Figure 1A). An artifact was deemed most likely based on the absence of RR interval variations before and after the suspected asystole as would normally occur (Figure 1B). These findings were interpreted as the consequence of a loss of contact between tissue and device because of either haematoma, the anesthetic agent, or air entrapped in the pocket in the early phases after implant. No recurrence was observed thereafter. – Case 2. At 6 weeks post implant, Reveal interrogation documented 57 episodes of pauses lasting up to 10 minutes which occurred almost every day, mainly during night time. The available ECG recordings showed prolonged phases of apparent asystole (Figure 2A). Again, the absence of RR interval variations before and after such episodes was indicative of an artifact (Figure 2B). Motion artifacts during phases of sleep apnea were suspected as mechanism for signal disturbances. A polysomnography confirmed obstructive sleep apnea syndrome and no recurrence of pauses occurred after positive airway pressure therapy.



[Figure 2]

Conclusions: The occurrence of both early and late asystole during ILR monitoring should be carefully interpreted in order to avoid misdiagnoses as well as missed diagnostic opportunities.

Disclosure: Nothing to disclose

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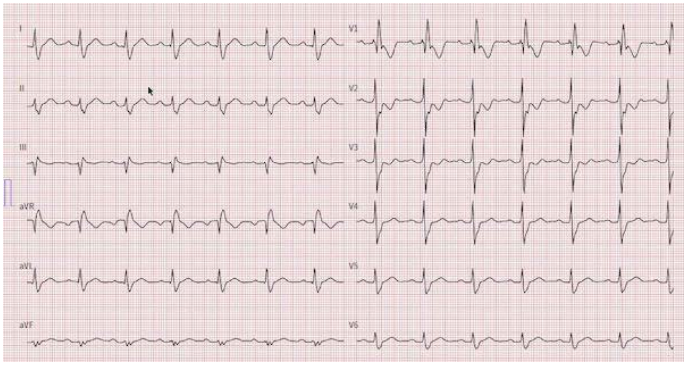
A reversible third degree atrioventricular block in a young patient

C. Haddad[1], P. Pascale[1], C. Herrera[1], D. Graf[1], P. Carroz[1], A. Porretta[1], J. Schlaepfer[2], G. Domenichini[1], E. Pruvot[1]

[1]Cardiology, [2]Lausanne University Hospital (CHUV), Lausanne, Switzerland

Introduction: Cardiac sarcoidosis is an underdiagnosed cause of permanent 3rd degree atrioventricular (AV) block in patients <60 yo, but definitive diagnosis remains challenging for isolated form.

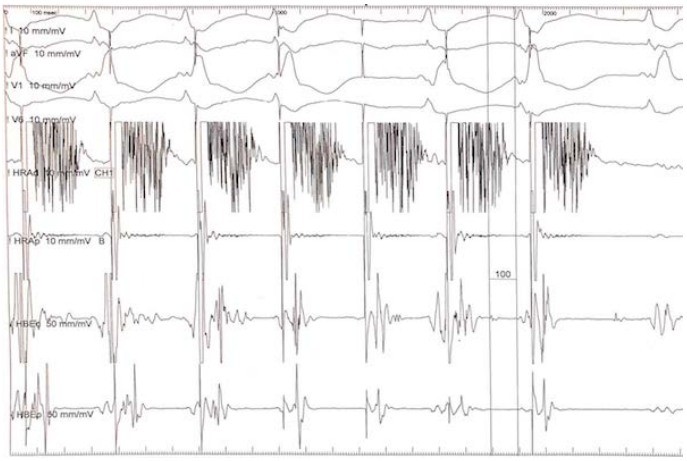
Methods: We report the case of a 58 yo man without medical history who experienced a symptomatic transient 3rd degree AV block. The standard exams were unremarkable: echocardiography, coronary angiography and biology. However, the ECG (Figure 1) after resumption of AV conduction showed a 1st degree AV block, complete right bundle block and left anterior hemiblock. A dual chamber pacemaker was implanted and additional exams were scheduled.



[Figure 1. Basic electrocardiogram (25 mm/s, 10 mm/mV) showing the trifascicular block]

Results: The cardiac magnetic resonance imaging only described non-specific fibrosis. The immunologic and viral biological investigations were negative. The 18FDG-PET-CT, however, revealed an active left ventricular uptake suggestive of diffuse inflammation. Histopathology of myocardial biopsies remained non contributive. The electrophysiological study, performed 4 months after the episode, pointed out an abnormal infra-hisian conduction after delivery of atrial premature beats (Figure 2). The conduction disorder was attributed to the septal inflammation as highlighted by the PET-CT. The patient met the criteria for a chronic myocarditis, likely sarcoidosis, and immunosuppressive therapy was started thereafter.

Conclusion: Our case highlights the importance to perform additional investigations in young patients with unexplained high-grade AV block in order to exclude cardiac sarcoidosis, event after resumption of AV conduction. The follow-up will tell us whether immunosuppressive treatment may correct the intraventricular conduction defects.



[Figure 2. Intracardiac recordings during atrial incremental pacing showing the infra-hisian block]

Disclosure: Nothing to disclose

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Spontaneous recanalization of coronary thrombus in a patient with polycythemia vera

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Spontaneous recanalized coronary thrombi (SRCT) are old thrombus formations characterized by multiple communicating channels. We report the case of a 72-year-old female patient who presented with a SRCT in the context of polycythemia vera. Optical coherence tomography (OCT) is the diagnostic method of choice.

Case report: A 72-year old woman with a history of polycythemia vera (PV) was admitted for assessment of severe aortic stenosis. The patient was under Hydroxyurea treatment since 15 years with adequate control of red cells and platelets. Cardiovascular risk factors included arterial hypertension, dyslipidemia and smoking. Diagnostic coronary angiogram revealed a hazy lesion in the mid left anterior descending artery with TIMI flow 3 in the distal artery. The rest of the coronary arteries was free of significant disease. Optical coherence tomography (OCT) was performed depicting the classic appearance of chronic intracoronary thrombosis with multiple intra-luminal channels of high signal intensity described as "swiss cheese"-like appearance. In contrast to previous reports describing fibrous plaques as underlying cause for rupture, there was no evidence of coronary artery atherosclerosis on OCT. Ventriculogram revealed normal left ventricular systolic function. The lesion was successfully stented with a 3×24 mm drug eluting stent. Four weeks after PCI the patient underwent successful transcatheter aortic valve implantation and dual antiplatelet therapy with Aspirin and Prasugrel 10 mg was prescribed for 6 months. After exclusion of other thromboembolic sources and absence of coronary atherosclerosis, a spontaneous recanalized coronary thrombus (SRCT) in the context of PV was suspected in this patient. PV is a myeloproliferative neoplasm characterized by abnormal proliferation of hematopoietic stem cells. Coronary events are not uncommon during the course of PV. In cases with unclear angiographic findings, optical coherence tomography (OCT) can help to determine and treat adequately the underlying pathology.

Disclosure: Nothing to disclose

INDEX OF FIRST AUTHORS

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