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Abstracts of the joint annual meeting 2023

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SWISS SOCIETY OF CARDIOLOGY
SWISS SOCIETY FOR HEART AND THORACIC VASCULAR SURGERY
SWISS SOCIETY OF PNEUMOLOGY
SWISS SOCIETY FOR THORACIC SURGERY

ABSTRACTS OF THE JOINT ANNUAL MEETING 2023

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ABSTRACT SESSION: CORONARY ARTERY DISEASE / ACUTE CARDIOVASCULAR CARE – 1

O01

Artificial intelligence to improve ischemia prediction in Rubidium Positron Emission Tomography

Simon Frey[1], Philip Haaf[1], Federico Caobelli[2], Andrew Tsirkin[3], Caroline Oehri[3], Peter Ruff[3], Michael Zellweger[1]

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Introduction: Patients are referred to coronary artery disease (CAD) testing based on their pre-test probability (PTP). The available, easy-to-use risk prediction tools use three variables only and their diagnostic accuracy is limited. Artificial intelligence-based tools incorporate multiple variables and could improve PTP assessment due to the resulting combinatorial power. We aimed to compare the diagnostic accuracy of a novel, artificial intelligence-based tool with commonly used PTP tools to predict ischemia.

Method: Consecutive patients (n = 2417) referred for Rubidium-Position Emission Tomography (PET) were evaluated. PTP was calculated using the ESC 2013/2019 and ACC 2012/2021 guidelines, and a memetic pattern-based algorithm (MPA) model incorporating symptoms, vitals, ECG and laboratory findings. Five risk categories (very low to very high risk) were defined (<5%, 5-15%, 15-50%, 50-85%, >85%). Ischemia was defined as summed difference score (SDS) ≥2 on PET. Receiver operator characteristics were calculated and compared using the DeLong method.

Results: Known CAD, ischemia and scar (detected on PET) were present in 46.3%, 37.1% and 24.6%, respectively. The MPA model was most accurate to assess PTP of ischemia (AUC: 0.758, ESC 2013: 0.661, ESC 2019: 0.673, ACC 2012: 0.585, ACC 2021: 0.667, p <0.0001 each) as depicted in figure 1. The MPA's sensitivity and negative predictive value to rule-out ischemia were 99.1% and 96.4%, respectively. The model allocated patients more evenly across risk groups, reduced the proportion of patients in the 15-85% range by 29% (ACC 2012) to 51% (ESC 2013), and was the only risk tool to correctly estimate ischemia prevalence in the very low risk group (table 1).

Conclusion: The MPA model significantly improved PTP assessment of ischemia. It enables clinicians to safely exclude ischemia based on readily available variables without advanced testing. It could be used to improve risk stratification of patients and to significantly reduce unnecessary non-invasive functional tests.

Conflict of interest: Simon Frey, Philip Haaf, Federico Caobelli have no conflicts of interest to declare. Peter Ruff: part-owner and CEO of Exploris Health. Caroline Oehri: chief operating officer of Exploris Health. Andrew Tsirkin: head modeling and development of Exploris Health.

Figure 1:

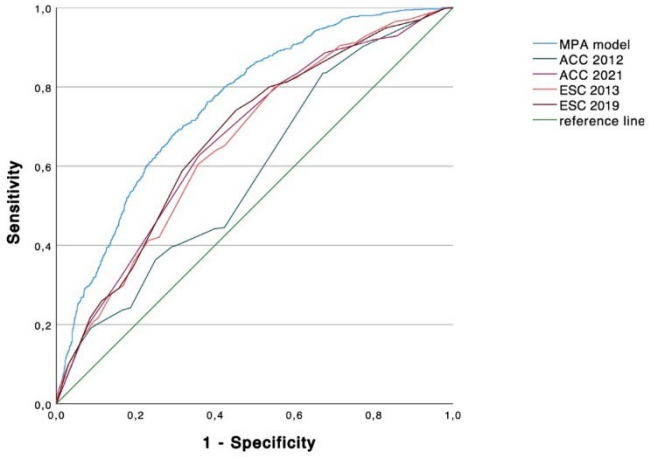

Table 1: Comparison of the MPA model with four common risk scores

Estimated risk	ACC 2012	ACC 2021	ESC 2013	ESC 2019	MPA model
Very low risk	5.7% (1.4%)	6.7% (1.2%)	n.a. (0.0%)	18.0% (6.2%)	4.0% (9.3%)
Low risk	21.6% (16.5%)	19.7% (17.3%)	11.9% (4.2%)	21.3% (28.3%)	7.7% (8.6%)
Medium risk	42.0% (40.8%)	38.1% (69.3%)	27.9% (50.9%)	43.9% (59.8%)	27.6% (32.0%)
High risk	34.5% (21.8%)	59.7% (12.2%)	47.7% (39.2%)	65.7% (5.7%)	36.7% (12.6%)
Very high risk	45.4% (19.4%)	n.a. (0.0%)	65.7% (5.7%)	n.a. (0.0%)	60.4% (37.4%)
Observed ischemia prevalence	< 5%	5-15%	15-50%	50-85%	> 85%

Table indicating the distribution of patients within their estimated/predicted risk group according to four common risk scores and the MPA model. The percentage at the top of the table cell indicates the observed prevalence of ischemia within each group and is color-coded. The percentage at the bottom of the cell in parentheses represent the percentage of patients in the corresponding group.

O02

The adrenomedullin system and risk of cardiogenic shock or death complicating acute coronary syndromes

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Introduction: Cardiogenic shock (CS) remains the leading cause of death following acute coronary syndromes (ACS). Immediate revascularization improves outcomes, but early identification of patients at high risk of CS and thus death remains challenging. The adrenomedullin (ADM) system acts to modulate vascular tone and endothelial barrier function, and monitoring its activity may improve risk stratification of ACS patients at high risk of CS and death.

Method: In 4'787 ACS patients, prospectively recruited at 4 Swiss university hospitals (ClinicalTrials.gov-Identifier: NCT01000701), the 3 major ADM system components were assessed in EDTA-plasma: ADM-glycine (its inactive substrate), peptidylglycine α-amidating monooxygenase (PAM; the ADM-amidating enzyme), and the biologically active ADM-amide. Patients were monitored for in-hospital development of CS, and followed at 30 days and 1 year with external event adjudication. Multivariable-adjusted regression models were fit to assess the association of each ADM system component with CS development and death.

Results: Baseline ADM-glycine, PAM, and ADM-amide strongly associated with in-hospital CS (odds ratio, 95% confidence interval [CI] per doubling in each, 2.04, 1.79-2.33, P <.0001; 1.91, 1.63-2.23, P <.0001; 1.72, 1.11-2.66, P = .016) which remained consistent when accounting for established risk factors (1.65, 1.35-2.00, P <.0001; 1.50, 1.26-1.77, P <.0001; and 1.87, 1.13-3.11, P = .015). Integration of ADM-glycine, PAM, and ADM-amide in a clinical risk prediction model revealed high predictive utility, leading to enhanced discrimination for CS prediction (AUC, 0.76 vs. 0.81, P <.0001). While both ADM-glycine and ADM-amide independently associated with mortality risk at 30-days (multivariable-adjusted hazard ratio per doubling, 95% CI, 1.93, 1.54-2.42, P <.00001; and 1.81, 1.34-2.44, P <.00001) and 1-year (1.41, 1.18-1.68, P <.00001; and 1.52, 1.24-1.87, P <.00001), PAM showed no association with these outcomes (P <.0005).

Conclusion: Monitoring key regulators of the adrenomedullin system holds promise for early identification of ACS patients at high risk of CS, with admission ADM-glycine and ADM-amide representing independent risk factors for 30-day and 1-year mortality post-ACS.

Conflict of interest: No

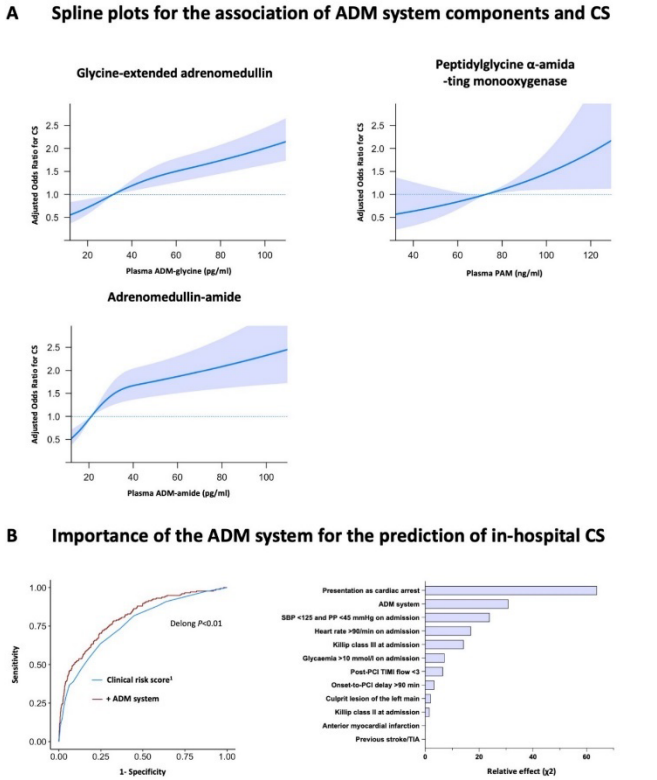

Figure 1. **The ADM system and cardiogenic shock.** Panel A shows restricted-cubic-spline plots for the association between each ADM system component and in-hospital cardiogenic shock. Colour bands signify 95% confidence intervals. The median level of each biomarker served as a reference and all models were adjusted for sex, age >70 years, Killip class III, SBP <125 and PP <45 mmHg, culprit lesion of the left main, and post-PCI TIMI flow <3. Panel B shows a receiver operating characteristic curve for the prediction of in hospital cardiogenic shock (left) and the ranking of the ADM system within the clinical risk prediction model by comparing the full vs. the reduced model (right). ADM denotes adrenomedullin and CS cardiogenic shock. [1]V. Auffret *et al.*, Eur.H.J. 2018.

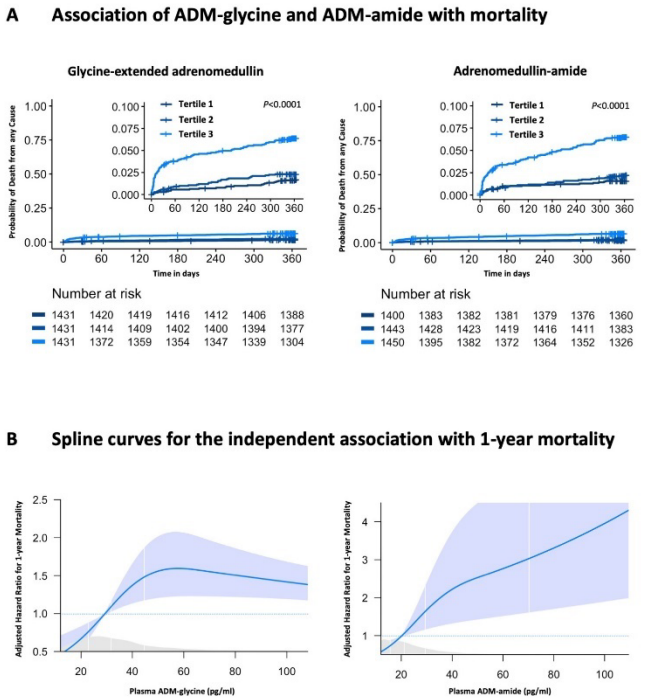

Figure 2. **Association of ADM-glycine and ADM-amide with mortality risk post-ACS.** Panel A shows Kaplan–Meier estimates of the cumulative probability of death from any cause among all patients stratified by tertiles of ADM-glycine (left; tertile 1: <25.7; tertile 2: 25.7-39.0; tertile 3: >39.0 pg/ml) or ADM-amide (right; tertile 1: <17.2; tertile 2: 17.2-25.8; tertile 3: >25.8 pg/ml). Panel A depicts 3-knot restricted cubic spline plots for the association of continuous ADM-glycine and ADM-amide levels, respectively, and risk of death 1 year. Blue colour bands signify 95% confidence intervals, whilst the density of the population along the spline variable is highlighted in grey. The median level of each biomarker served as a reference. Multivariable-adjusted regression models for the association of each biomarker with mortality were adjusted for sex, age, hs-CRP, hs-cTnT, NT-proBNP, type of ACS, dyslipidaemia, and history of congestive heart failure.

O03

Clinical effectiveness of statin therapy in older adults with acute coronary syndromes

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Introduction: The real-life implementation and effectiveness of statin therapy after acute coronary syndromes (ACS) are poorly described among older adults.

Method: Data from SPUM-ACS, a Swiss cohort of patients with ACS, was analyzed to assess statins use and LDL-C target achievement (<1.4mmol/L and ≥50% reduction) one and five years after an ACS according to age group (<75, ≥75 years). Adjusted hazard ratios (adjHR) controlled for confounders and the GRACE score were obtained for major cardiovascular events (MACE) according to statin intensity at discharge.

Results: 6994 participants completed a one-year and 3332 an additional five-year follow-up. 20% were older adults, of whom 37% were women. Older adults were less likely to receive statins at discharge (96% vs 98%, p <0.001), especially at high-intensity (64% vs 72%, p <0.001), compared to younger ones. They were less likely to receive statins at one-year (89% vs 93%, p <0.001, high-intensity 51% vs 62%, p <0.001) and five-year (75% vs 86%, p <0.001, high-intensity 38% vs 48%, p = 0.002) follow-ups, and more likely to discontinue statins during the first year (10% vs 7%, p <0.001) and five years (24% vs 14%, p <0.001). There was no significant difference in achieving the LDL-C target between both age groups at one-year (11% vs 13%, p = 0.529) and five-year (15% vs 16%, p = 0.907) follow-ups.

In older adults, moderate- compared to no-to-low-intensity statins at discharge were associated with a lower risk of MACE (one-year adjHR = 0.52 [0.30-0.91], five-year adjHR = 0.60 [0.36-1.00]). A similar pattern was observed comparing high- to no-to-low-intensity statins (one-year adjHR = 0.41 [0.24-0.70], five-year adjHR = 0.50 [0.31-0.83]). No difference was found between high- and moderate-intensity statins, nor any effect modification by age group (p_{int}>0.05).

Conclusion: High-intensity statins were less commonly used in older adults after ACS. However, statin therapy may be as effective in preventing MACE in older as in younger adults, suggesting both age groups should be managed similarly regarding lipid-lowering.

Conflict of interest: No

O04

Clinical implementation and prognostic value of PET-derived myocardial flow reserve: a single-center experience over 20 years

Dominik Sager[1], Chrysoula Garefa[1], Apostolos Tsinaridis[1], Aju Pazhenkottil[1], Andreas Giannopoulos[1], Philipp Kaufmann[1], Ronny Buechel[1], Dominik Benz[1]

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Introduction: Positron emission tomography (PET) myocardial perfusion imaging (MPI) is guiding the management of patients with suspected or known coronary artery disease (CAD) at our institution for almost 30 years. A major strength of PET-MPI is the ability to quantify myocardial blood flow (MBF) and calculate myocardial flow reserve (MFR). The aim of the present study is to investigate its integration into clinical routine and its prognostic value.

Method: An all-comers population of 1558 patients undergoing PET-MPI between 1995 and 2015 was assessed for demographics and baseline characteristics, PET findings, and mortality. Outcome was determined through patient records and/or death notices. Cox regression analysis was performed to assess the influence of MPI and MFR on risk stratification.

Results: The study cohort was predominantly male (79%) at median age of 64 years [IQR, 57-71], with known CAD (77%) including 47% with prior acute coronary syndrome. About half of the patients were symptomatic (44%) and/or had three or more cardiovascular risk factors (55%). Median ejection fraction was 55% [IQR, 37-63] and median eGFR 76mL/min [IQR, 55-92]. The prevalence of ischemia and scar were 39% and 64%, respectively. Within the study cohort, MBF was quantified in 1119 patients (72%), with the proportion increasing over time (1995-1999: 27 (28%), 2000-2009: 549 (61%), 2010-2015: 543 (98%), p <0.001). Median MFR was 1.9ml/min/g [IQR, 1.4-2.4]. Over a median follow-up of 5.4 years [IQR, 3.2-7.9], 297 patients died (28%). Annualized mortality was 4.6% and differed by MFR **(Figure 1)**. After multivariate adjustment, MFR was independently associated with mortality (hazard ratio per increase in MFR by 1: 0.62, 95% confidence interval, 0.48-0.80, p <0.001) and incrementally improved risk stratification **(Figure 2)**.

Conclusion: Quantification of MBF is well implemented into clinical routine, and the integration of MFR independently and incrementally improves risk stratification in patients with known or suspected CAD.

Conflict of interest: DF Sager was supported by the Swiss Academy of Medical Sciences and the G.&J. Bangerter-Rhyner Foundation through the "Young Talents in Clinical Research" program (YTCR grant 25/21).

Figure 1 – Outcome by myocardial flow reserve (MFR)

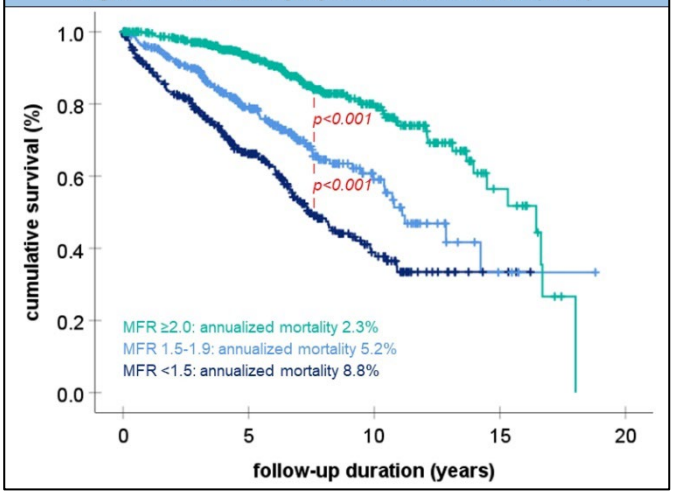
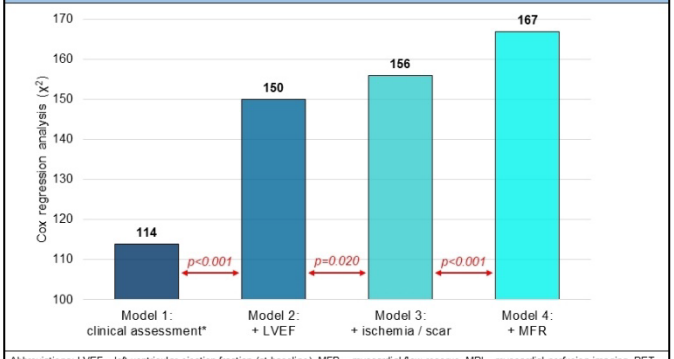


Figure 2 – Added value of PET MPI in risk stratification



Abbreviations: LVEF – left ventricular ejection fraction (at baseline), MFR – myocardial flow reserve, MPI – myocardial perfusion imaging, PET – positron emition tomography

* Parameters included in clinical assessment: age, sex, body mass index, symptoms, risk factors, history of coronary artery disease and history of acute coronary syndrome

O05

Association Between Quantitative Flow Ratio And Non-Target-Vessel Events Prior To Planned Staged Percutaneous Coronary Intervention In Patients With Acute Coronary Syndrome

Sarah Bär[1], Raminta Kavaliauskaite[1], Tatsuhiko Otsuka[1], Yasushi Ueki[1], Jonas Häner[1], Georgios Siontis[1], Jonas Lanz[1], Fabien Praz[1], Thomas Pilgrim[1], Stefan Stortecky[1], Sylvain Losdat[2], Stephan Windecker[1], Lorenz Räber[1]

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Introduction: The optimal timepoint of non-target-vessel (non-TV) percutaneous coronary intervention (PCI) among patients with acute coronary syndrome (ACS) remains a matter of debate. Quantitative Flow Ratio (QFR) is a novel, non-invasive, vasodilator-free method to assess the hemodynamic significance of coronary stenoses. We aimed to investigate the association between non-TV QFR and non-TV-related events occurring prior to planned staged PCI (sPCI), to derive first conceptual knowledge, whether QFR could be useful to determine the optimal timepoint of sPCI.

Method: Between 2009-2017, all ACS patients scheduled to undergo out-of-hospital sPCI within 6 months from index PCI at Bern University Hospital, Switzerland, were eligible for QFR measurement. The primary endpoint was non-TV myocardial infarction (MI) and urgent (unplanned) non-target-vessel PCI occurring before planned sPCI. QFR was measured using the index presentation angiogram in the non-TV planned for sPCI. The association between lowest QFR per patient and the occurrence of the primary endpoint was assessed with a multivariable Cox proportional hazards regression including a penalized spline term for QFR and the following variables: age, sex, diabetes mellitus, renal failure, and diameter stenosis (DS%) (per 5%).

Results: Out of 8657 ACS patients, 1432 were scheduled to undergo sPCI, and 1093 patients (1262 vessels) were analyzed by QFR. At baseline, mean QFR was 0.73 ± 0.17 and mean DS% 54.8 ± 11.2%. sPCI was planned with median 28 days after the index PCI. In multivariable analysis (1018 patients, 51 events), there was no independent association between QFR and the primary endpoint (HR 0.87, 95% CI 0.69-1.05, p = 0.125; QFR non-linear p = 0.648).

Conclusion: In this cohort study of ACS patients scheduled to undergo out-of-hospital sPCI within median 28 days, QFR did not emerge as a predictor of non-TV events prior to planned sPCI. Thus, this study does not support the concept, that QFR is helpful to determine the optimal timepoint of sPCI.

Conflict of interest: Research grants to the institution from Medis Medical Imaging Systems, Abbott, and Bangerter-Rhyner Stiftung, and personal research grant from the Swiss National Science Foundation, outside the submitted work.

Figure 1. Primary Endpoint

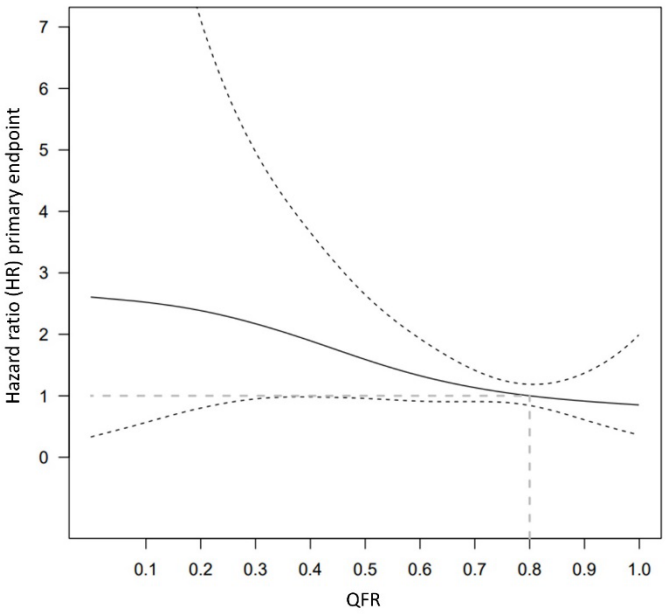

Table 1. Cox Proportional Hazards Regression Primary Endpoint

Multivariable Analysis	N Patients (N Events)	Primary Endpoint	
		HR (95% CI)	P value
Age (per 1 year increase)	1018 (51)	1.00 (0.98 - 1.03)	0.750
Female sex	1018 (51)	1.17 (0.52 – 1.83)	0.637
Diabetes mellitus	1018 (51)	0.80 (0.304- 1.56)	0.573
Renal failure	1018 (51)	1.15 (0.36 – 1.93)	0.728
DS% (per 5% increase)	1018 (51)	0.97 (0.83 - 1.12)	0.726
QFR (per 0.1 increase)	1018 (51)	0.87 (0.69-1.05)	0.125
QFR (non-linear)	1018 (51)	-	0.648

O06

Dynamic and fixed stenotic components of anomalous aortic origin of a right coronary artery with an interarterial course: A comparison of FFRdobutamine versus FFRadenosine

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Introduction: Anomalous aortic origin of a right coronary artery (AAORCA) with an interarterial course between the great arteries are a rare subtype of coronary artery anomalies. It is suggested that the combination of anatomical fixed stenotic components (slit-like ostium and proximal narrowing) and dynamic components (lateral compression of the intramural segment) influence possible ischemia in AAORCA. To what degree the fixed components (assessable using adenosine stress) and dynamic components (assessable under dobutamine stress) contribute to the hemodynamic relevance is unknown. We aimed to assess invasively measured FFRadenosine and ultra-sound measured ostial area (IVUS-OA) and compare it to FFRdobutamine and IVUS-OAdobutamine.

Method: Consecutive AAORCA patients with an interarterial course from the NARCO trial (Noninvasive anatomical assessment for ruling out hemodynamically relevant coronary artery anomalies – A comparison of coronary-CT to invasive coronary angiography) were included. IVUS-OA was measured in rest and FFR was measured invasively under adenosine (140µg/kg/min) stress and both further under dobutamine and volume challenge (40 µg/kg/min + saline: 1.5–3l + 1 mg atropine) and results were compared.

Results: Twenty-eight patients with complete FFR and IVUS-OA measurements were included. Mean age was 56 ± 13 years and 21 (75%) were male. Right dominance of the coronary system was present in 23 (75%). Concomitant coronary artery disease was detected in 6 (21%) patients, whereof 3 within the anomalous vessel. Median FFRadenosine was 0.89 (0.85-0.93) and median FFRdobutamine was significantly lower (i.e. 0.87, 0.81-0.89; p <0.001). IVUS-OA was significantly lower under dobutamine stress versus rest (i.e. 5.6 ± 2.0mm2 versus 7.0 ± 2.3mm2 ; p <0.001).

Conclusion: In this preliminary data of middle-aged patients with AAORCA and interarterial course, FFRdobutamine and IVUS-OAdobutamine were significantly lower compared to FFRadenosine and IVUS-OArest and confirms that beside fixed components, also dynamic components contribute to the hemodynamic relevance. More patient data is needed to depict quantitative anatomic high-risk feature extent and its association with ischemia.

Conflict of interest: DF Sager was supported by the Swiss Academy of Medical Sciences and the G.&J. Bangerter-Rhyner Foundation through the "Young Talents in Clinical Research" program (YTCR grant 25/21).

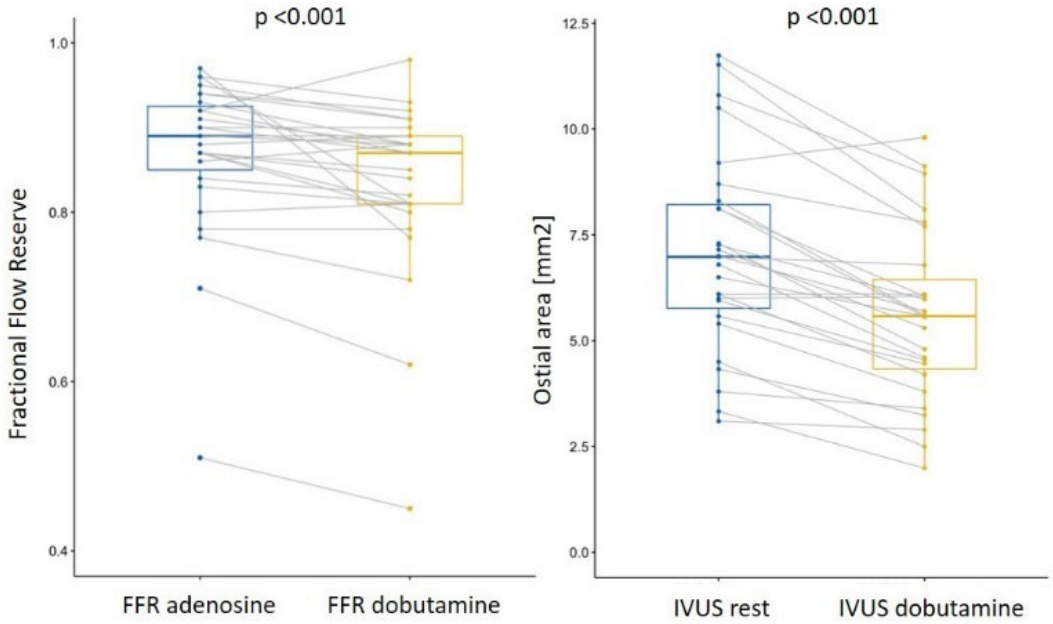

Figure 1: On the left the change of FFR adenosine to FFR dobutamine is depicted, showing a significant drop. In the same patients shown on the right, the ostial area measured from intravascular ultrasound (IVUS) shows a significant decrease under dobutamine stress compared to the ostial area under resting condition.

O07

Treatment of microvascular angina with the coronary sinus reducer: a first experience

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Introduction: The Coronary Sinus Reducer (CSR) is a percutaneously implanted device approved for the treatment of refractory angina (RA) in patients with obstructive coronary artery disease (CAD). No data is however available for non-obstructive disease. In this preliminary study, we evaluated the efficacy of CSR in a small cohort of patients with microvascular angina.

Method: Consecutive patients from the prospective COMPLEX registry that received a CSR for RA between June 2018 and November 2022 were screened. Inclusion criteria were the absence of obstructive CAD (<50% coronary stenoses, or a negative intracoronary fractional flow reserve test) and no prior history of revascularization. Endpoints were symptoms, evaluated with the Canadian Cardiovascular Society (CCS) and the New York Heart Association (NYHA) scores, procedural success rate, and MACE.

Results: We ultimately enrolled 8 patients; their baseline characteristics are depicted in table 1. Microvascular dysfunction was invasively confirmed in 5 (62.5%) patients; mean index of microvascular resistance (IMR) was 32.8 ± 15.7 and mean coronary flow reserve (CFR) 1.7 ± 0.7. In one patient, reduced global CFR (1.4) was evident on cardiac magnetic resonance examination. At baseline, mean CCS class was 2.9 ± 0.6, NYHA class 2 ± 0.9, and number of antianginal drugs were 2.6 ± 1.6. Procedural success was 100%; only one patient experienced a procedure-related complication (sternocleidomastoid muscle hematoma requiring no intervention). At a median follow-up of 647.5 days (IQR 132-732), mean CCS class was 1.5 ± 0.8, NYHA class 1.9 ± 0.9 and number of antianginal drugs 1.9 ± 1.1. All patients improved by ≥1 CCS class and 3 (37.5%) by ≥2 CCS classes. No MACE was observed.

Conclusion: To the best of our knowledge, we present the first report of CSR implantation for treatment of microvascular angina. Our results are particularly promising given the paucity of treatment options currently available for the condition, but larger studies are needed to confirm these findings.

Conflict of interest: The spouse of Dr Seiler is an employee of Boston Scientific and stock owner of Boston Scientific and Abbott.

Table 1. Baseline characteristics of the study population

Baseline characteristics	n = 8 n (%) – mean±SD
Female sex	6 (75%)
Age (years)	67.8±9.9
BMI (kg/m^2)	27.8±6.7
Previous ACS (MINOCA)	2 (25%)
ACS in the last 3 months before implantation	2 (25%)
Previous PCI/CABG	0 (0%)
History of HF	0 (0%)
Previous PM/CRT implantation	0 (0%)
Significant valvular disease	0 (0%)
CKD	1 (12.5%)
Hypertension	5 (62.5%)
Dyslipidemia	6 (75%)
Diabetes mellitus	1 (12.5%)
Previous or current smoke	2 (25%)
Positive family history of CAD	2 (25%)
LVEF (%)	60.1±6.4
TAPSE (mm)	24±3.5
CCS class	2.9±0.6
NYHA class	2±0.9
N. of antianginal drugs	2.6±1.6

Abbreviations: *BMI*, body mass index; *ACS*, acute coronary syndrome; *MINOCA*, myocardial infarct with non-obstructive coronary arteries; *PCI*, percutaneous coronary intervention; *CABG*, coronary artery bypass graft; *HF*, heart failure; *PM/CRT*, pacemaker/cardiac resynchronization therapy; *CKD*, chronic kidney disease; *CAD*, coronary artery disease; *LVEF*, left ventricular ejection fraction; *TAPSE*, tricuspid annular plane systolic excursion; *CCS*, Canadian Cardiovascular Society; *NYHA*, New York Heart Association.

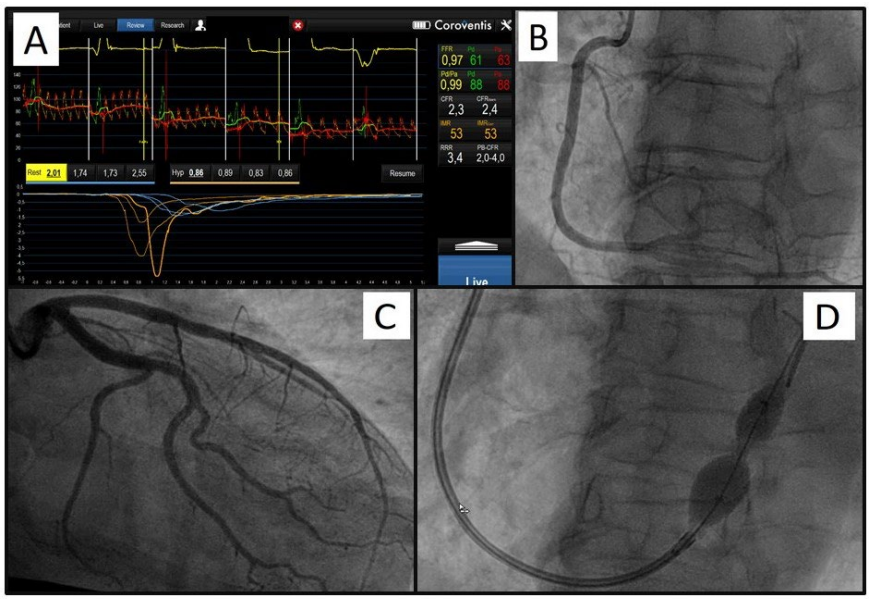

Figure 1. *Panel A*, an example of invasive assessment of microvascular dysfunction: in this case IMR is abnormally high (N.V. <25); *Panel B and C*, absence of epicardial coronary disease in the same patient; *Panel D*, successful CSR implantation.

ABSTRACT SESSION: VALVULAR HEART DISEASE – 1

O08

Transcatheter aortic valve implantation using the transcervical vascular access: a 6-year experience from a Swiss tertiary center

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Introduction: The transfemoral (TF) access is the gold-standard vascular pathway for transcatheter aortic valve implantation (TAVI). However, it is not suitable in 10-15% of patients and alternative accesses, such as the transcervical (TC) one, are needed. Previous studies have suggested the latter might yield outcomes comparable to the TF access. In our center, TC-TAVI is considered as the first-line alternative when TF-TAVI is contraindicated. We herein present our 6-year experience regarding the use of the TC access for TAVI.

Methods: We included all consecutive patients referred for TC-TAVI after Heart-team evaluation, between 01.01.2016 and 31.12.2022. Data regarding patients' clinical and echocardiographic characteristics, perioperative and 30-day outcomes were prospectively collected. Patients were separated into two temporal groups (Group 1: 01.2016-06.2019, Group 2: 07.2019-12.2022), in order to assess the changes over time, of their characteristics and outcomes.

Results: A total of 86 patients were included, with more belonging to Group 2 (N = 54, vs. N = 32 in Group 1). Compared with patients in Group 1, those in Group 2 were significantly younger (81.0 [IQR 77.5-87.5] vs. 90.0 [IQR 85.0-92.0] years, p <0.001), presented with a higher prevalence of hypertension (87.0% vs. 65.6%, p = 0.018) and chronic pulmonary disease (35.2% vs. 15.6%, p = 0.034). There was no significant difference regarding other comorbidities and surgical scores. 30-day all-cause mortality, risk of stroke or transient ischemic attack at 30 days were similar (respectively Group 2 vs. Group 1, 5.6% vs. 3.1%, p = 0.877, 1.9% vs. 0%, p = 0.434), as well as the risks of permanent pacemaker implantation, post-operative acute kidney injury, cardiac tamponade, life-threatening bleeding and major vascular complications.

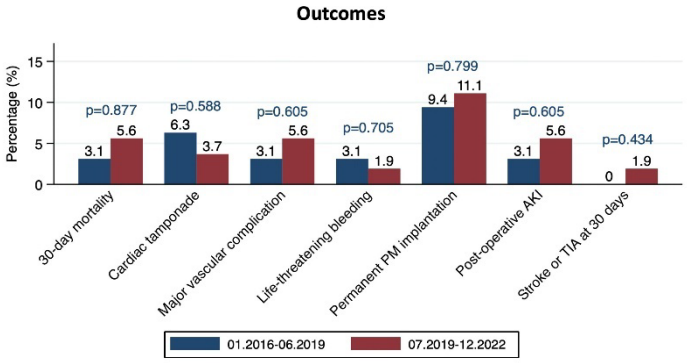
Conclusions: The use of the TC access increased over time. Rates of adverse events did not change, despite patients from mid-2019 on presenting with slightly more comorbidities. The risks of adverse events associated with TC-TAVI lie in the same range as TF-TAVI.

Conflict of interest: Olivier Muller reports grants from Abbott and Edwards. The other authors do not have any disclosure to report.

Table. Baseline clinical and echocardiographic characteristics of patients und transcervical TAVI, according to temporal groups.

	Overall (N=86)	01.2016-06.2019 (N=32)	07.2019-12.2022 (N=54)
Clinical characteristics			
Age, years, median (IQR)	85.0 (80.0-90.0)	90.0 (85.0-92.0)	81.0 (77.5-87.5)
Male	53 (61.6)	21 (65.6)	32 (59.3)
BMI, kg/m^2, mean±SD	25.5±4.6	25.0±4.5	25.8±4.7
Euroscore, median (IQR)	4.1 (2.8-6.3)	4.4 (2.9-6.4)	4.1 (2.8-6.3)
STS score, median (IQR)	4.6 (2.3-5.2)	3.8 (2.3-5.0)	3.3 (2.5-5.6)
Lower extremity artery disease	29 (33.7)	11 (34.4)	18 (33.3)
Chronic pulmonary disease	25 (29.1)	5 (15.6)	20 (37.0)
Diabetes mellitus	23 (26.7)	10 (31.2)	13 (24.1)
Dyslipidemia	59 (68.6)	23 (72.0)	36 (66.7)
Previous cardiac surgery	18 (20.9)	9 (28.1)	9 (16.7)
Previous percutaneous coronary intervention	28 (32.6)	9 (28.1)	19 (35.2)
Hypertension	68 (79.1)	21 (65.6)	47 (87.0)
Stroke or transient ischemic attack	14 (16.3)	7 (21.9)	7 (13.0)
Moderate to severe chronic kidney disease	45 (52.3)	14 (44.8)	31 (57.4)
Echocardiographic characteristics			
LVEF			
• > 50%	5 (5.8)	2 (6.3)	3 (5.6)
• 30-50%	14 (16.3)	5 (15.6)	9 (16.7)
• < 30%	67 (77.9)	25 (78.1)	42 (77.8)

Data are reported as n(%), means±SD or medians (IQR).



O09

Left ventricular early diastolic strain rate predicts mortality after transcatheter aortic valve implantation

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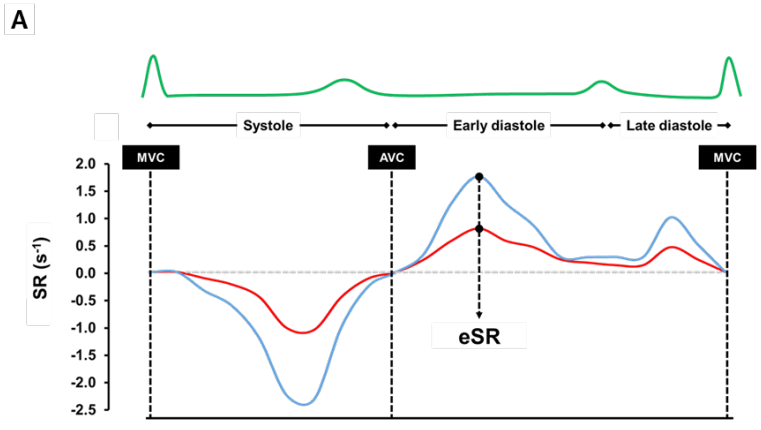
Introduction: Speckle-tracking echocardiography is an increasingly important tool for assessing degenerative aortic valve stenosis (AS). This study aims to analyse left ventricular early diastolic strain rate (eSR) in patients with severe AS undergoing transcatheter aortic valve implantation (TAVI) and explore its association with mortality during long-term follow-up.

Method: From our prospective AS cohort study, 100 patients with severe AS and a comprehensive echocardiographic examination prior to TAVI were identified, and eSR was determined using TomTec ImageArena v.4.6 (Figure A). All-cause five-year mortality was defined as the endpoint.

Results: Baseline characteristics were comparable between non-survivors (14%) and survivors (86%) except for a higher STS-Score among the former (non-survivors: 3.6 [2.7–7.4]%; survivors: 2.6 [1.8–3.7]%; P = 0.024). There was no significant difference between non-survivors and survivors with regard to LVEF (54 [50–58]% vs 58 [52–63]%; P = 0.069) and LVGLS (-14.8 [-15.8 to -12.7]% vs -15.4 [-15.8 to -14.7]%; P = 0.339). In contrast, eSR was significantly lower in non-survivors (0.72 [0.67–0.87]s^{-1}) than survivors (0.88 [0.73–1.22]s^{-1}); P = 0.013; Figure B). Patients with an eSR ≤ 0.72 s^{-1} (ROC AUC 71%; P = 0.008) exhibited a lower survival probability as revealed by Kaplan-Meier survival analysis (P = 0.001; Figure C). Inclusion of eSR improved the fitness ($\chi 2$) of a multivariable logistic regression model for LV systolic function (LVEF and LVGLS; Figure D). A similar effect was observed when eSR was included in a model for LV diastolic function (E/A and E/e'; Figure D). These improvements in $\chi 2$ were significant for both models (ANOVA P = 0.026, and P = 0.037, respectively).

Conclusion: eSR differentiated non-survivors from survivors and was associated with long-term mortality after TAVI. This association was independent of and improved outcome prediction by LV systolic or diastolic function parameters. These findings highlight the potential value of eSR for assessing long-term mortality after TAVI.

Conflict of interest: This project is supported by a grand of LUNG Zuerich.



O10

Left atrial pump strain predicts long-term mortality in patients undergoing transcatheter aortic valve implantation

Neria E. Winkler[1], Shehab Anwer[1], Philipp M. Rumpf[1], Glykeria Tsiourantani[1], Thierry G. Donati[1], Jonathan Michel[1], Albert M. Kasel[1], Felix C. Tanner[1]

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Introduction: Speckle-tracking echocardiography is an increasingly important tool for assessing aortic stenosis (AS). Left atrial reservoir (LARS) and pump strain (LAPS) were studied for their association with long-term mortality in AS patients undergoing transcatheter aortic valve implantation (TAVI).

Method: From our prospective AS cohort study, 198 patients with severe AS were identified who underwent TAVI and had a comprehensive preinterventional echocardiographic examination allowing full target analysis. Five-year all-cause mortality was defined as the endpoint.

Results: Left atrial volume index (LAVI) was increased (mean (SD): 46.9 ml/m2 (± 16.5)) and left atrial deformation impaired (LARS (21.7% (± 6.9); LAPS (-9.5% (± 4.5)), while left ventricular ejection fraction (LVEF) (56.7% (± 11.5)) was preserved in the study population. Over a follow-up time of five years, 49 patients (24.7%) died. LARS and LAPS were more impaired in non-survivors (20.0% (± 6.5) and -8.1% (± 4.0), respectively; Figure) than in survivors (22.3% (± 6.9); P = 0.042 and -9.9% (± 4.5), respectively; P = 0.014; Figure), while LAVI did not differ (P = 0.248). Univariable Cox regression models demonstrated that LAPS was associated with mortality (P = 0.014), while LARS was not (P = 0.066) (Table A). In bivariable and multivariable models, the association of LAPS with mortality was independent of LVEF and LAVI, and inclusion of LAPS improved the fitness (χ2) of these models (Table B). Furthermore, the improvement in χ2 was significant for all models (ANOVA P = 0.012, P = 0.013, and P = 0.015, respectively).

Conclusion: LAPS was associated with long-term mortality after TAVI, while LARS and LAVI were not. The association of LAPS was independent of LVEF and LAVI and showed potential incremental value for assessment of outcome association. Hence, LAPS may be useful for predicting long-term outcome after TAVI.

Figure:

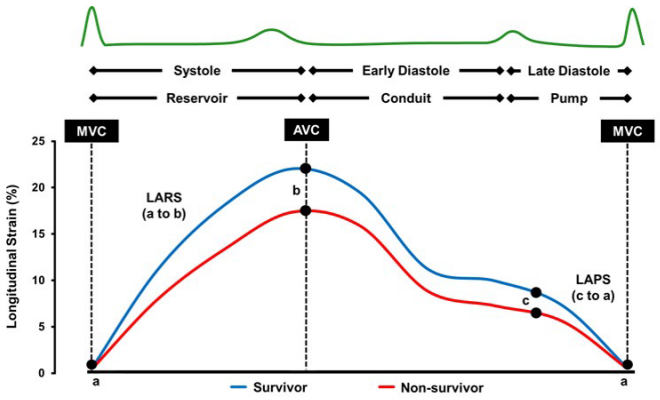

Table:

A

Variables	Cox Regression			Model Fitness	
	HR	95% CI	P	χ2	χ2 P
LVEF	1.00	0.97 – 1.02	0.830	0.05	0.829
LAVI	1.01	0.99 – 1.02	0.450	0.55	0.458
LARS	0.96	0.92 – 1.00	0.066	3.57	0.059
LAPS	1.09	1.02 – 1.17	0.014*	6.47	0.011*

B

Variables	Cox Regression			Model Fitness	
	HR	95% CI	P	χ2	χ2 P
LVEF	1.00	0.98 – 1.02	0.920	0.62	0.733
LAVI	1.01	0.99 – 1.02	0.440		
LVEF	1.00	0.98 – 1.02	0.960	6.29	0.043*
LAPS	1.09	1.02 – 1.17	0.016*		
LAVI	1.00	0.99 – 1.02	0.650	6.67	0.036*
LAPS	1.09	1.02 – 1.17	0.017*		
LVEF	1.00	0.98 – 1.02	1.000	6.51	0.089
LAVI	1.00	0.99 – 1.02	0.630		
LAPS	1.09	1.01 – 1.17	0.019*		

O11

Comparison of mitral valve regurgitation quantification using 4D flow versus standard cardiac magnetic resonance methods

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Introduction: Cardiac magnetic resonance imaging (CMR) allows quantification of mitral valve regurgitation (MVR). Intraventricular four-dimensional (4D) flow is a novel method for flow quantification; however, there is limited data available how it can be used in MVR. In this study, we aimed to compare 4D flow against established CMR MVR quantification methods in patients with severe MVR.

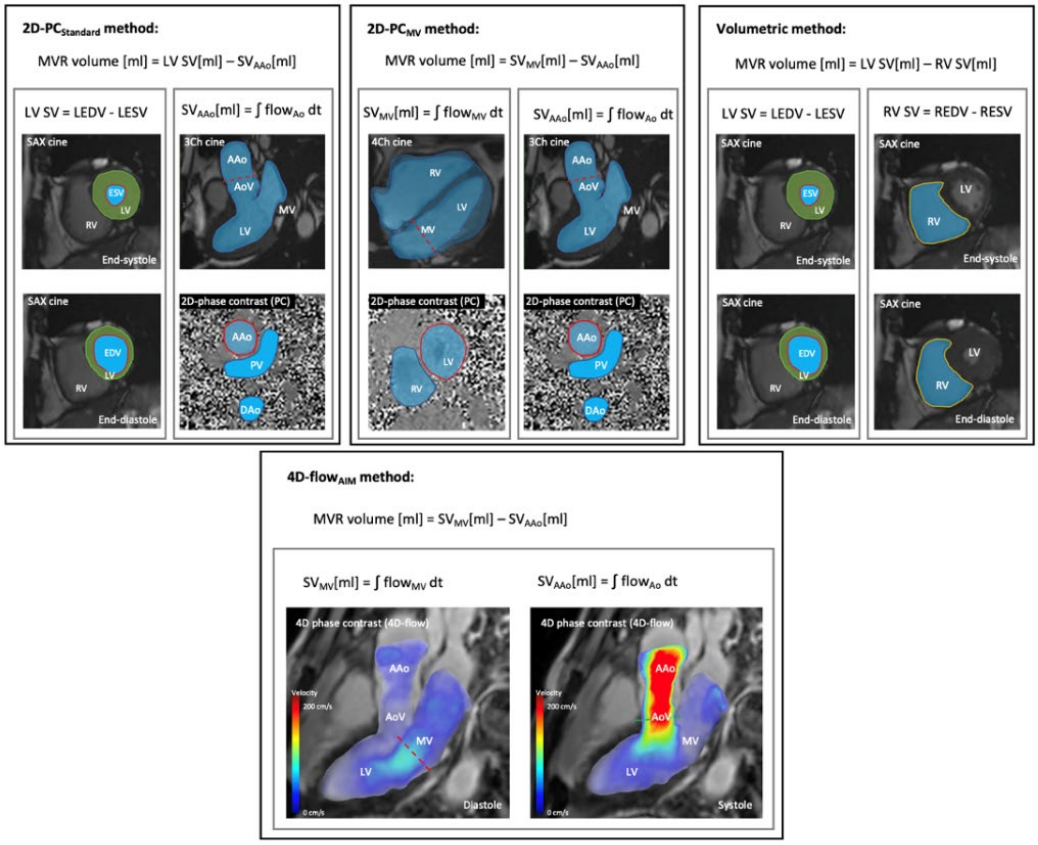
Method: Consecutive transcatheter edge-to-edge repair (TEER) candidates with severe MVR according to echocardiography, who underwent CMR including 4D flow and who were included in the PRE-MITRA study were analyzed. Patients underwent a CMR scan at a 1.5 T Siemens scanner (Magnetom Trio, Siemens Healthineers). MVR was quantified using the following 4 different methods: Regurgitant volume (RVol) was derived using 1) 4D-flow intraventricular annular inflow (4D-flow$_{AIM}$) method, (2) 2-dimensional phase-contrast standard method (2D-PC$_{standard}$), (3) 2D-PC mitral valve method (2D-PC$_{MV}$), and (4) the volumetric method (Figure 1). Quantification was compared among the different methods, using R software version 4.2.2 (R Foundation for Statistical Computing).

Results: A total of 7 patients (72 ± 16, 100% male) with severe MVR underwent CMR scanning. Mean left ventricular (LV) end diastolic volume was 243 ml (range 52-424 ml). Mean left ventricular ejection fraction was 30% (range 15-51%). Mean RVol were 34 ± 12 ml for 4D-flow$_{AIM,}$ 26 ± 21 ml for 2D-PC$_{standard}$, 26 ± 15 ml for 2D-PC$_{MV}$, and 34 ± 25 ml for the volumetric method. There was strong correlation between methods (r = 0.82-0.99, p <0.05) except for the 2D-PC$_{MV}$ method (Table 1).

Conclusion: 4D-flow$_{AIM}$ is an alternative method for quantifying MVR with strong correlation to standard CMR MVR methods except for direct 2D phase contrast method. Further data is needed in larger cohorts to evaluate the value of 4D-flow$_{AIM}$ for decision-making towards optimal therapy selection.

Conflict of interest: No

Figure 1. Illustration of MVR quantification methods.



2D-PC$_{standard}$, CMR flow gold standard (Left Ventricle Stroke Volume [LV SV] – Stroke Volume derived from Aortic Forward Flow [SV$_{AAo}$]); 2D-PC$_{MV,}$ directly quantifying flow through Mitral Valve (Stroke Volume derived from Mitral Valve Flow [SV$_{MV}$] – Stroke Volume derived from Aortic Forward Flow [SV$_{AAo}$]); Volumetric (Left Ventricle Stroke Volume [LV SV] – Right Ventricle Stroke Volume [RV SV]); 4D-flow$_{AIM}$ (Stroke Volume derived from Mitral Valve Flow [SV$_{MV}$] – Stroke Volume derived from Aortic Forward Flow [SV$_{AAo}$]); AoPC, Aortic Forward Flow ; EDV, Left Ventricle End Diastolic Volume; ESV, Left Ventricle End Systolic

Table 1. Measured parameter for the patients and the Pearson correlation coefficient table.

Patient Number	LVSV (ml)	RVSV (ml)	LV EF (%)	SV_{AAo} (ml)	SV_{mv} (ml)	2D-$PC_{standard}$ (ml)	2D-PC_{mv} (ml)	Volumetric (ml)	4D-$flow_{AIM}$ (ml)
1	41.72	74.87	15.48	33.15	122.41	8.57	7.97	33.15	34.01
2	99.62	18.76	33.34	29.59	133.99	70.03	30.13	80.86	45.40
3	58.84	81.68	33.66	41.61	38.67	17.23	25.79	22.84	12.58
4	90.48	41.57	29.39	58.74	136.38	31.74	17.56	48.91	49.04
5	73.11	53.08	30.90	45.60	140.19	27.51	15.38	20.03	25.30
6	87.66	61.24	20.66	77.19	35.87	10.47	53.30	26.42	32.26
7	78.16	81.99	51.34	61.72	97.60	16.44	35.76	3.83	39.51

CORRELATIONS	2D-PC_{MV} (ML)	VOLUMETRIC (ML)	4D-$FLOW_{AIM}$ (ML)
2D-$PC_{STANDARD}$ (ML)	−0.35	0.99***	0.82*
2D-PC_{MV} (ML)		−0.39	−0.30
VOLUMETRIC (ML)			0.83*

The level of significance is presented as follows: * = ($p<0.05$), ** = ($p<0.01$), *** = ($p<0.001$).

ABSTRACT SESSION: VALVULAR HEART DISEASE – 2

O12

Significant tricuspid regurgitation does not impact the 1-year outcome of patients undergoing transcatheter aortic valve replacement

Enrico Ferrari[1], Alberto Pozzoli[1], Elena Caporali[1], Catherine Klersy[2], Tiziano Torre[1], Tiziano Cassina[1], Stefanos Demertzis[1], Giovanni Pedrazzini[1]

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Introduction: The outcome of patients undergoing transcatheter aortic valve replacement (TAVR) can be affected by tricuspid regurgitation (TR). We investigated the clinical results of patients undergoing TAVR with or without high-degree TR.

Method: Patients undergoing TAVR were divided into two groups: none/mild TR and significant TR. Data were analysed and compared. Primary endpoints were mortality at 30-day and 1-year. Secondary endpoints were re-hospitalization and degree of postoperative and 1-year TR

Results: TAVR procedures were performed in 345 patients (September 2011-February 2020). Median STS score was 4.3% (IQR: 2.6-7.2), median LVEF was 59.0% (IQR: 45.0-62.0), median aortic area was 0.70cm^2 (IQR: 0.60-0.86), median gradient was 43.0mmHg(IQR: 36.0-53.0). Before TAVR, 297 patients (86.1%) had none/mild TR and 48 (13.9%) significant TR. Mean age was 82.4 ± 5.7 and 83.8 ± 6.2 years in none/mild TR and significant TR (p = 0.109); with 47.5% (none/mild TR) and 56.3% (significant TR) of female (p = 0.279). Patients showed differences in EuroSCORE-II (3.2% vs 5.6%; p <0.001), impaired right ventricular function (3.0% vs 20.8%; p <0.001) and pulmonary hypertension (9.1% vs 39.6%; p <0.001). Mean valve size was 27.7 ± 2.9mm. Hospital mortality was 2.0% and 4.2% in in low and high-grade TR (p = 0.308). Among discharged patients (n = 337), 7 patients died within 30-days (2.0% none/mild TR; 2.1% significant TR; logrank test p = 0.154) and 40 were re-hospitalized (11.1% none/mild TR; 14.6% moderate/severe TR; p = 0.470). After 1-year, 26 patients died, corresponding to a mortality of 7.9 deaths per 100-person year (95%CI 5.2-12.0) in none/mild TR group and 9.1 deaths per 100-person year (95%CI 3.4-24.3) in significant TR group (logrank test p = 0.815), with HR of 0.87, 95% CI 0.26-2.89. Re-hospitalization was 16.5% and 19.6% (p = 0.713). Echocardiographic and functional changes over time showed no significant interaction between TR and time.

Conclusion: In our experience, patients undergoing TAVR showed similar outcomes and re-hospitalization rate, regardless of the degree of concomitant tricuspid regurgitation

Conflict of interest: No

O13

Right anterior thoracotomy for aortic valve replacement: the only remaining surgical competitor of TAVI?

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Introduction: Right anterior small thoracotomy (RAST) has evolved to a standard procedure in specialized centres with excellent outcomes. Due to the small incision (5cm), it is very well accepted by patients and referring cardiologist. In 2013, we have established our structural heart-team centre with the aim to offer patient tailored medicine by discussing every valve case in a dedicated meeting (surgery versus interventional). The aim of our study was to analyse the outcomes of our single-centre heart-team-decision-based RAST cohort with regard to morbidity, mortality and midterm outcomes.

Method: Baseline characteristics, in-hospital and follow-up outcomes were collected from our medical database and by contacting the patients and referring cardiologists by phone.

Results: We identified a total of 316 consecutive RAST patients operated between August 1st 2013 and July 31st 2022. Mean age was 62.5 ± 6.1 years, Euroscore II 1 ± 0.05, 29% were women. Cross-clamp time was 72 ± 24 minutes, three patients were converted to sternotomy (0.9%). Thirty-day mortality was 0.3% (n = 1) and there were two strokes (0.62%). Mean follow up time was 2.5 years with up to 9 years. At 1 and 5 years, survival was 99.3% and 98.7% respectively. Three patients died during follow up of unreported causes. They were all older than 75 years. One patient (0.3%) needed a re-operation due to endocarditis six months after the first surgery.

Conclusion: Our study shows that in a specialized structural heart-team centre with patient tailored decision-making, RAST has an in-hospital mortality below 1%, low morbidity, need for reoperation and favourable mid-term survival. We believe that RAST is the only remaining surgical treatment option in the era of interventional procedures and that its excellent results should serve as benchmark for the implementation of new interventions, especially in younger and low-risk patient populations.

Conflict of interest: No

O14

Early and late mortality of patients with infective endocarditis depending on surgical indication and valve operation

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[1]Lausanne University Hospital, Department of Cardiology, Lausanne, Switzerland, [2]Lausanne University Hospital, Infectious Diseases Service, Lausanne, Switzerland, [3]Lausanne University Hospital, Department of Cardiac Surgery, Lausanne, Switzerland

Introduction: Valve operation is required in half of all infective endocarditis (IE) patients. The aim of this study was to determine predictors of early (30-day) or late (1-year) mortality in IE patients depending on the presence of surgical indication and the realization of valve operation.

Method: This was a prospective study of adult IE patients hospitalized at Lausanne University Hospital during an eight-year period (2014-21). Patients were divided in three groups: Group 1: patients without surgical indication; Group 2: patients with surgical indication and valve operation; Group 3: patients with surgical indication without valve operation. Definite or possible IE and indications for valve operation were specified in the European Society of Cardiology 2015 guidelines.

Results: In total, 520 patients diagnosed with definite or possible IE were included in our study (Group 1: 251, 48%; Group 2: 208, 40%; Group 3: 58; 11%). Early (30-day) and late (1-year) mortality were 13% and 29%, respectively. Multivariate analysis (Table) revealed that early mortality was associated with Charlson Comorbidity Index >4 (OR 1.96, 95% CI 1.13-3.39), acute heart failure (OR 2.83, CI 1.69-4.78), sepsis (OR 2.10, CI 1.21-3.62), presence of embolic events (OR 1.98, CI 1.12-3.48) and absence of surgical indication (OR 2.32, CI 1.10-4.86) or presence of surgical indication without valve operation (OR 7.57, CI 3.67-15.73) (both compared to presence of surgical indication with valve operation). Absence of surgical indication (OR 1.98, CI 1.23-3.21) and presence of surgical indication without valve operation (OR 4.31, CI 2.55-7.23) (both compared to presence of surgical indication with valve operation) were also independently associated with late mortality (Table). The figure shows the Kaplan Meier curve of mortality of the three Groups.

Conclusion: Valve operation was associated with better outcome (early or late) even as compared with patients without surgical indication.

Conflict of interest: No

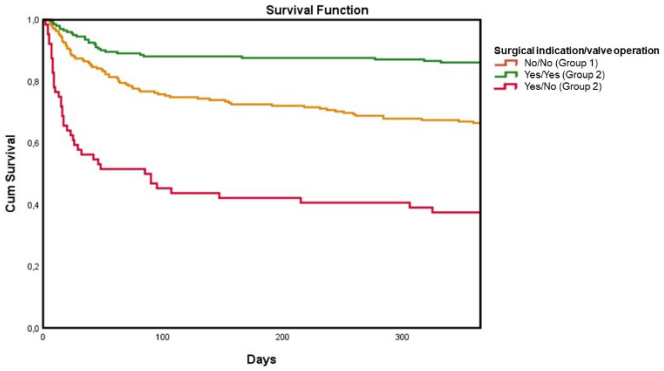

Table. Predictors of early (30-day) and late (1-year) mortality

	Early mortality		Late mortality	
	P	OR (95% CI)	*P*	OR (95% CI)
Age >60 years			0.029	1.86 (1.07-3.26)
Charlson Comorbidity Index >4	0.016	1.96 (1.13-3.39)	0.002	2.06 (1.31-3.25)
Immunosuppression			0.572	1.15 (0.70-1.90)
Obesity			0.316	1.21 (0.83-1.20)
Nosocomial infective endocarditis			0.001	1.92 (1.29-2.86)
Staphylococcus aureus	0.078	1.66 (0.95-2.92)	0.014	1.61 (1.10-2.36)
Acute heart failure	<0.001	2.83 (1.69-4.78)	0.018	1.58 (1.08-2.32)
Sepsis	0.008	2.10 (1.21-3.62)	0.008	1.72 (1.15-2.57)
Embolic event	0.018	1.98 (1.12-3.48)		
Haemorrhagic stroke			<0.001	3.01 (1.69-5.36)
Septic arthritis			0.005	2.92 (1.39-6.15)
Hospital-acquired pneumonia			0.010	1.75 (1.14-2.68)
Aortic valve infective endocarditis			0.273	0.82 (0.58-1.17)
Valve operation depending on surgical indication				
No surgical indication	0.026	2.32 (1.10-4.86)	0.005	1.98 (1.23-3.21)
Surgical indication without valve operation	<0.001	7.57 (3.67-15.73)	<0.001	4.31 (2.55-7.23)
Surgical indication with valve operation	reference	reference	reference	reference

O15

Ten-year experience with alternative access sites for transcatheter aortic valve replacement in patients with aortic stenosis and peripheral vascular disease

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Introduction: Transcatheter aortic valve replacement (TAVR) through alternative access routes is indicated in patients with severe aortic valve stenosis and peripheral artery disease. We analysed the outcome of patients undergoing transapical (TA), direct transaortic (TAO) and transcarotid (TC) TAVR procedures.

Method: Preoperative characteristics, procedural details and 30-day outcome of patients undergoing non-transfemoral TAVR procedures were prospectively collected and retrospectively analysed.

Results: From 2011 to 2022, 98 TA, 88 TAO and 11 TC-TAVR (total: 197 cases) were consecutively performed with balloon-expanding (n = 153; 77.7%) and self-expandable (n = 44; 22.3%) transcatheter valves. Mean age for each group was 80.1 ± 6.5 (TA), 81.9 ± 6.5 (TAO) and 85.7 ± 4.9 (TC) years. Female gender was more represented in the TAO-TAVR group (52% (TAO), 34% (TA), and 36% (TC)); TC-TAVR patients showed higher prevalence of previous vascular surgery (36% (TC), 21% (TA), and 8% (TAO)); and TA-TAVR underwent more previous cardiac surgery (47% (TA), 45.4% (TC), and 2.3% (TAO)). Mean left ventricular ejection fraction was 47.8 ± 13.5% (TA), 52.8 ± 12.5% (TAO), and 36.6 ± 13.9% (TC), while mean aortic gradients were 38.5 ± 14.7mmHg (TA), 40.3 ± 16.1mmHg (TAO), and 28.0 ± 18.8mmHg (TC), respectively. Mean EuroSCORE-II was 5.8% (TA), 5.5% (TAO), and 5.6% (TC) while mortality at 30-day was 8 patients for TA (8%), 5 patients for TAO (5.6%), and 1 patient for TC (9%). Permanent pacemaker implantation rate was 7% for TA, 9% for TAO, and 0% for TC group, respectively. Hospital stay was 10.6 ± 7 days for TA, 10.4 ± 11.6 days for TAO and 4.7 ± 0.9 days for TC TAVR.

Conclusion: Our 10-year experience with alternative access sites for TAVR in high-risk patients shows good results with low pacemaker rate and low 30-day mortality. A trend towards a shorter hospital stay with TC must be confirmed with larger cohorts

Conflict of interest: George Asimakopoulos is a proctor for the implantation of Perceval S

O16

Trifecta and Carpentier Edwards aortic bioprostheses: comparison of 6 years follow-up outcomes

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Introduction: To compare mid-term clinical outcomes and hemodynamic performance of the stented pericardial Trifecta bioprosthesis for surgical aortic valve replacement with those of a standard of care surgical aortic bioprosthesis.

Method: Data from consecutive patients implanted with the TF or the Carpentier Edwards Magna Ease valve were retrospectively analyzed. Primary analysis was performed on a propensity score matched cohort. Primary endpoints included the composite of death or reoperation, and structural valve deterioration. Comparison also included echocardiographic assessments at 1-week post-AVR and at the last documented follow-up.

Results: Two propensity score matched groups of 170 patients each were identified from the overall population (n = 486). Incidence of postoperative mortality (2.9% vs. 7.1%, respectively, p = 0.08), and patient prosthesis mismatch (1.2% and 2.4%, p = 0.41) were similar. At mean follow-up of 5.84 (Trifecta) and 6.1 (Carpentier Edwards) years, the incidence of all-cause death/reoperation (15.3% vs. 15.9%, p = 0.88 for Trifecta and Carpentier Edwards, respectively) and structural valve disease (1.8% vs. 2.9%, p = 0.47) were similar. Overall, postoperative mean transvalvular pressure gradients were significantly lower in the Trifecta group than in the Carpentier Edwards group (7.7 ± 3.3 vs. 11.3 ± 3.6 mmHg, p <0.01). Mean transvalvular gradient remained significantly lower through the last follow-up for small-sized Trifecta valves (19/21 mm; 10.5 ± 4.2 vs. 13.8 ± 5.9 mmHg, p = 0.039) but not for larger valves (10.3 ± 4.8 vs. 9.4 ± 3.5 mmHg, p = 0.31).

Conclusion: The Trifecta valve is a valuable alternative for the Carpentier Edwards valve in terms of safety, hemodynamic performance and mid-term durability. Smaller-sized valves provide additional clinical benefits, given their persistent hemodynamic advantages through mid-term follow-up.

Conflict of interest: Research contract with Philips Healthcare.

ABSTRACT SESSION: RHYTHM DISORDERS – 1

O17

Pulsed-field ablation versus single catheter high-power short-duration radiofrequency ablation for atrial fibrillation: procedural characteristics, myocardial injury and midterm outcomes.

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Introduction

Pulsed-field ablation (PFA) has emerged as a novel treatment strategy for patients with atrial fibrillation (AF). A direct comparison to high-power short-duration (HPSD) radiofrequency (RF) ablation using a single catheter is lacking. The aim is to compare pulmonary vein isolation (PVI) using PFA versus single catheter HPSD-RF ablation regarding efficiency, safety, myocardial injury, and outcomes.

Method

119 patients underwent PVI and were included (age 65.6 ± 10 years, ejection fraction 0.55 ± 0.11, left atrial size 41 ± 6.6 mm, paroxysmal AF 55%). 56 patients (47%) underwent PFA using a multi-electrode pentaspline PFA catheter with a biphasic waveform, and 63 patients (53%) underwent single catheter HPSD-RF ablation without a multipolar mapping catheter.

Results

Using PFA, the median procedure time was significantly shorter compared to the single catheter HPSD-RF group with 58 (IQR 51-70) min versus 83 (IQR 71-99) min (p <0.001), while fluoroscopic time was significantly longer with 12 (IQR 10-16) min versus 2.2 (IQR 1.3-3.6) min (p <0.001). First-pass isolation was achieved in 91% of the PFA group and 88% in the HPSD-RF group. 3.3 catheters vs. 1.0 catheters were used in the PFA group versus the HPSD-RF group, p <0.01. One procedural complication was observed in the PFA group, and one complication in the HPSD-RF group (Tamponades). High sensitivity cardiac troponin levels were, on average, significantly higher in patients using the PFA system, 1520 (IQR 1010-1980) ng/l compared to 897 (IQR 725-1240) ng/l in the HPSD-RF group. During a median follow-up of 177 days (IQR 92-300), AF recurrence was observed in five patients (9%) from the PFA group and in 15 patients (24%) from the HPSD-RF group. (Figure 1)

Conclusion

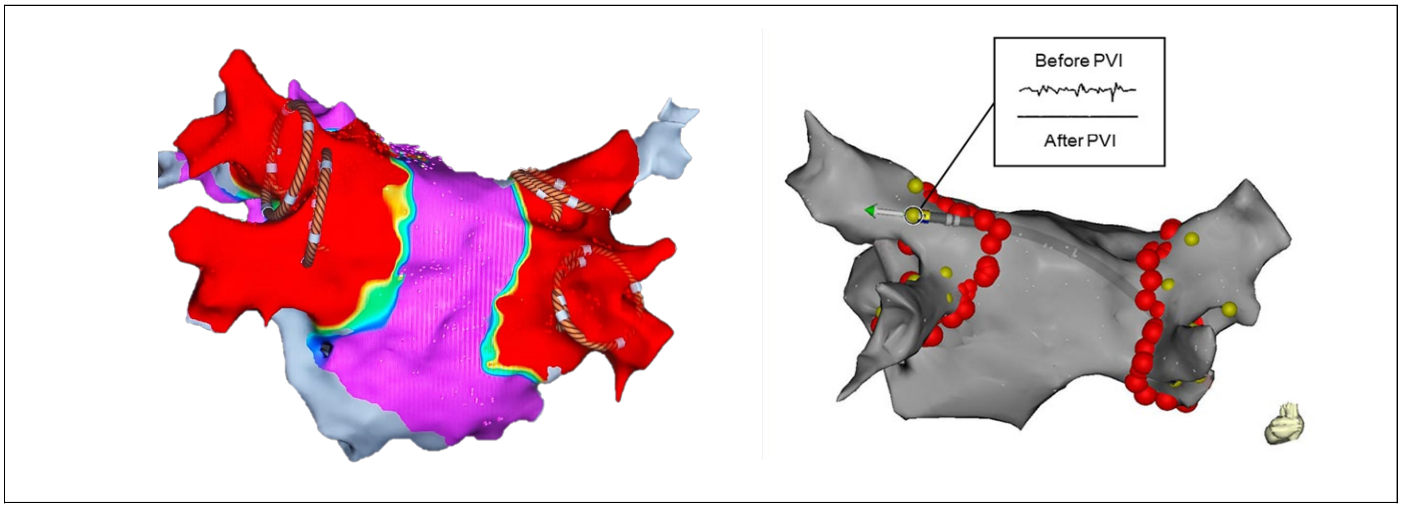
PFA showed shorter procedure times but longer fluoroscopy times, higher levels of hs-cTnT, and a possible improved AF-free survival.

Conflict of interest: No

	PFA, n=56	HPSD-RF, n=63
Procedure duration (min)	58 (IQR 51-70)	83 (IQR 71-99)
Fluoroscopy time (min)	12 (IQR 10-16)	2.2 (IQR 1.3-3.6)
First pass isolation, n(%)	91%	88%
Postoperative Troponin ng/l	1520 (IQR 1010-1980)	897 (IQR 725-1240)
AF recurrence, n(%)	5 (9%)	15 (24%)

Abbreviations: AF= atrial fibrillation, IQR = Interquartile Range, HPSD-RF= High-power short-duration radiofrequency, PFA= Pulsed-field ablation

Figure1 3D reconstruction of pulmonary vein for ablation planning: left for PFA, right for HPSD-RF



O18

Severe complications after pulmonary vein isolation for atrial fibrillation: a worldwide collaborative registry

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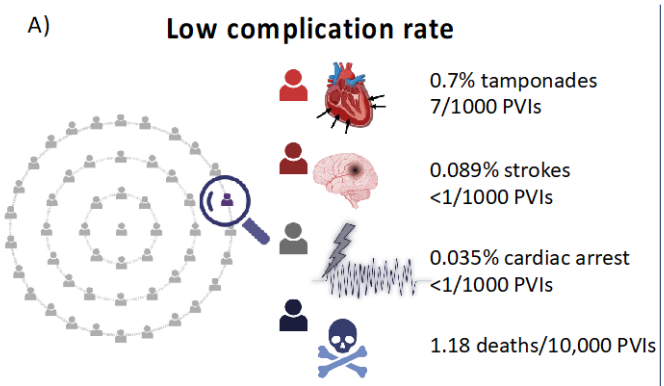
Introduction: Pulmonary vein isolation (PVI) is a commonly performed electrophysiological procedure. Severe complications are believed to be uncommon.

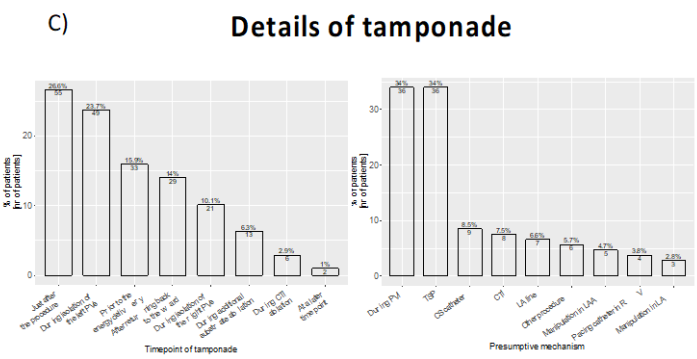
Method: to investigate the incidence, predictors, management details and outcome of severe complications (cardiac tamponade, stroke, cardiac arrest, death) after PVI, we contacted electrophysiologists from large centers, thereby gathering individual patient-data from 23 centers worldwide. Few datapoints were collected for the overall collective and exhaustive details recorded for patients experiencing a severe complication.

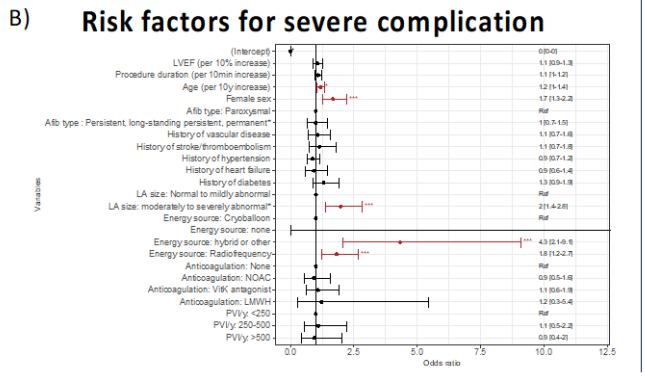
Results: From the 23 participating centers a total of 33,889 procedures could be collected (median age 63 y.o., 30% female, 27% cryoballoon ablations). The incidence of severe complications was low (tamponade 0.7% (7/1000 PVIs), stroke 0.089% (<1/1000 PVIs) or cardiac arrest (0.035%, <1/1000PVIs)), and death was extremely rare (1.18/10,000 PVIs), Figure panel A). Female sex (OR 1.7 95%-CI [1.3-2.2], p <0.001), a dilated left atrium (OR 1.9 95%-CI [1.4-2.8], p <0.001) and the use of radiofrequency (OR 1.8 95%-CI [1.3-2.7], p = 0.002) appeared as strong predictors for the composite endpoint of all severe complications (Figure panel B). Critical steps during the ablation were transseptal puncture and energy delivery and 14% of all tamponades led to procedure abortion (Figure panel C). Among the patients experiencing a tamponade, 13% required cardiac surgery and perforations were predominantly found in the left atrial appendage and in the PVs during surgery (Figure panel D). Patient outcomes despite a severe complication were good with 93% of patients discharged directly home after a median length of stay of 5 days (IQR 3-7).

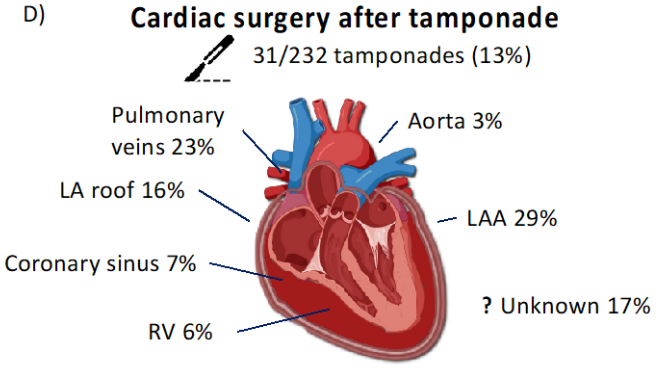
Conclusion: This very large worldwide collaborative study highlighted that tamponade, stroke, cardiac arrest or death are rare after PVI. Female sex and the use of radiofrequency catheters were associated with a higher risk of severe complications. A non-negligible percentage of patients required cardiac surgery after tamponade, where a perforation was most commonly found in the left atrial appendage and PVs.

Conflict of interest: No









O19

Pulsed-field- vs. Cryo- vs. Radiofrequency ablation: One-year recurrence rates after pulmonary vein isolation in patients with persistent atrial fibrillation

Thomas Kueffer[1], Antonio Madaffari[1], Aline Mühl[1], Jens Maurhofer[1], Anita Stefanova[1], Jens Seiler[1], Gregor Thalmann[1], Nikola Kozhuharov[1], Helge Servatius[1], Hildegard Tanner[1], Andreas Haeberlin[1], Samuel Baldinger[1], Fabian Noti[1], Laurent Roten[1], Tobias Reichlin[1]

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Introduction: A multipolar pulsed-field ablation (PFA) catheter has recently been introduced and showed favorable data in terms of safety and procedural efficiency of pulmonary vein isolation (PVI) for atrial fibrillation (AF). Long-term outcome data in comparison to other ablation modalities however is lacking.

Method: Consecutive patients with persAF undergoing a first PVI with PFA at our institution from May to December 2021 were included. For comparison, patients with persAF undergoing a first PVI with Cryo or RFA between May 2020 and March 2021 were included. After the PVI procedure, patients were followed with 7d-Holter ECGs at 3, 6, and 12 months. The primary endpoint was recurrence of any atrial arrhythmias following a blanking period of 90 days.

Results: A total of 177 patients were included (PFA: 65; Cryo: 63; RF: 49). Age, gender, CHA2DS2-VASc score, LVEF and LAVI did not differ among the groups (Table). Median procedure time was different among the groups (PFA: 109 [interquartile range 88-130] min, Cryo: 81 [62-96] min, RF: 177 [153-200] min, p <0.01). Fluoroscopy dose was different among groups: RF (1.9 [0.7-4.9] Gycm2), PFA (8.3 [4.3-19.0] Gycm2), and Cryo (9.5 [4.8-19.1] Gycm2, p <0.01). Median follow-up time in patients without recurrence was 13 [11-13] months for the PFA group, 13 [12-13] months for the Cryo group and 12 [11-13] months for RFA group. Recurrence of atrial arrhythmias in the KM-analysis after 12 months was not different in all three groups (PFA 44%, Cryo: 33%, RFA: 51%, Figure).

Conclusion: In patients with persAF, recurrence of atrial arrhythmias 12 months after PFA PVI only is high, regardless of ablation modality. Assessment of strategies including ablation of extra-PV targets in some patients with persAF is needed.

Conflict of interest: No

Table: Characteristics of the patients at baseline and procedure data

Variable	PFA	Cryo	RFA	p
N	65	63	49	
Age, years	70 [61, 74]	69 [56, 74]	69 [57, 75]	0.846
Age >65 yr - no. (%)	39 (62.9)	38 (60.3)	31 (63.3)	0.937
Sex = male	51 (78.5)	41 (65.1)	31 (63.3)	0.139
Body-mass index	30 [26, 33]	29 [27, 33]	29 [25, 32]	0.438
CHA2DS2-VASc score - no. (%)				0.833
0	8 (13.1)	5 (12.2)	3 (11.5)	
1	6 (9.8)	3 (7.3)	5 (19.2)	
2	13 (21.3)	12 (29.3)	4 (15.4)	
3	20 (32.8)	13 (31.7)	6 (23.1)	
4	9 (14.8)	4 (9.8)	4 (15.4)	
>4	5 (8.2)	4 (9.8)	4 (15.4)	
NYHA classification - no. (%)				0.305
1	22 (36.1)	16 (25.4)	15 (30.6)	
2	23 (37.7)	36 (57.1)	23 (46.9)	
3	15 (24.6)	11 (17.5)	9 (18.4)	
4	1 (1.6)	0 (0.0)	2 (4.1)	
Previous DCCV - no. (%)	38 (62.3)	39 (61.9)	38 (77.6)	0.152
Previous stroke - no. (%)	1 (1.6)	2 (3.2)	1 (2.0)	0.841
Previous TIA - no. (%)	2 (3.3)	2 (3.2)	2 (4.1)	0.962
Previous myocardial infarction - no. (%)	8 (13.1)	8 (12.7)	4 (8.2)	0.678
Coronary artery disease - no. (%)	13 (21.0)	11 (17.5)	8 (16.3)	0.799
Hypertension - no. (%)	43 (69.4)	39 (61.9)	26 (53.1)	0.214
Hyperlipidemia - no. (%)	28 (45.2)	19 (30.2)	22 (44.9)	0.155
Diabetes mellitus - no. (%)	11 (17.7)	9 (14.3)	9 (18.4)	0.814
Chronic obstructive pulmonary disease - no. (%)	7 (11.7)	3 (4.8)	3 (6.1)	0.317
Obstructive sleep apnea - no. (%)	14 (23.0)	13 (20.6)	5 (10.2)	0.199
Beta-blocker - no. (%)	47 (82.5)	53 (96.4)	37 (86.0)	0.061
Class I AAD - no. (%)	2 (5.1)	3 (7.7)	1 (3.3)	0.728
Class III AAD - no. (%)	37 (90.2)	33 (84.6)	26 (86.7)	0.747
Left atrial diameter - mm	46 [41, 50]	45 [40, 50]	42 [37, 48]	0.150
Left atrial volume index - mL/m²	41 [36, 52]	42 [35, 58]	44 [36, 52]	0.941
Left ventricular ejection fraction - %	55 [49, 60]	57 [46, 65]	55 [41, 60]	0.144
Procedural characteristics				
Procedure time	109 [88, 130]	81 [62, 96]	177 [153, 200]	<0.001
Use of 3D-mapping	65 (100.0)	0 (0.0)	49 (100.0)	<0.001
Fluoroscopy time - min	26 [19, 31]	18 [15, 24]	7 [3, 14]	<0.001
Fluoroscopy dose - Gycm²	8.3 [4.3, 19.0]	9.5 [4.8, 19.1]	1.9 [0.7, 4.9]	<0.001

Numbers are median [IQR] unless otherwise noted. IQR = interquartile range. DCCV = direct current cardioversion. AAD = antiarrhythmic drugs. TIA = transient ischemic attack.

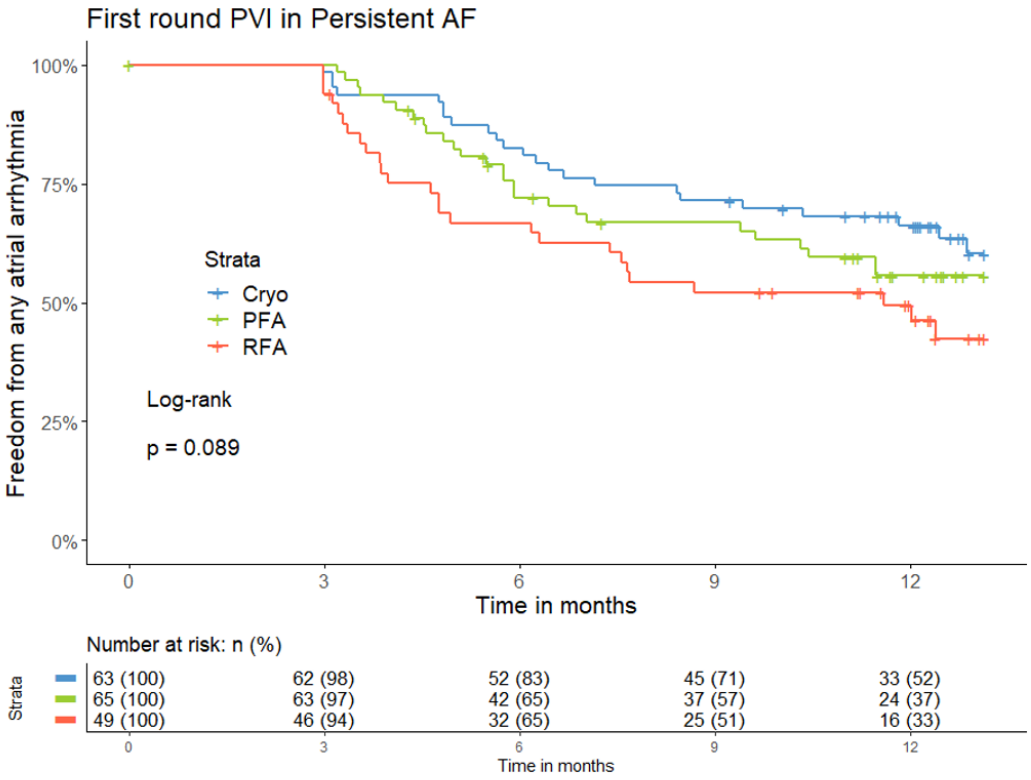

Figure: Freedom from any atrial arrhythmia after first pulmonary vein isolation using different technologies in persistent atrial fibrillation patients

O20

Pulmonary vein reconnection rates and lesion regression during repeat procedures in patients with recurrent arrhythmias after pulsed field ablation pulmonary vein isolation

Thomas Kueffer[1], Antonio Madaffari[1], Aline Mühl[1], Jens Seiler[1], Gregor Thalmann[1], Helge Servatius[1], Nikola Kozhuharov[1], Hildegard Tanner[1], Andreas Haeberlin[1], Fabian Noti[1], Samuel Baldinger[1], Laurent Roten[1], Tobias Reichlin[1]

[1]Department of Cardiology, Inselspital, Bern University Hospital, University of Bern, Bern, Switzerland, Bern, Switzerland

Introduction: A novel multipolar pulsed-field ablation (PFA) catheter has recently been introduced for pulmonary vein isolation (PVI). Pre-market data showed high rates for PVI-durability during mandatory remapping studies. Post-market data in patients with recurrent atrial arrhythmias are limited.

Method: Consecutive patients undergoing a redo procedure after an index PFA PVI between May 2021 and October 2022 were included. 3-D electro-anatomical maps (3D-EAM) on redo procedure were compared to the 3D-EAM acquired after ablation during the index procedure. PV-reconnection was assessed on a per-vein and per-patient level and the sites of reconnections were identified. Furthermore, lesions extent was compared.

Results: Of the included 265 patients, 26 (9.8%) underwent a redo ablation after recurrence of atrial tachyarrhythmia. After the index procedure, 100/102 veins (98%, two common ostia) were isolated (3D-EAM, two LIPV's could not be isolated).

On redo procedures, 3D-EAM identified 65/100 (65%) PVs with persistent isolation. In 7 (27%) patients, all PVs were isolated. Reconnection occurred most frequently in the right inferior PV (11, 42%) followed by the left superior PV (9, 36%), the right superior PV (8, 31%), the left inferior PV (6, 27%), and the left common ostium (1, 50%). The predominant reconnection sites were located anterior of the superior veins, and on the inferior aspect of the right inferior PV (Figure). On the posterior wall, the distance between the lesions of the left pulmonary veins and the right pulmonary veins increased by a median of 5 mm [0, 10] between the index and Redo procedure.

Conclusion: In patients with recurrent atrial arrhythmias after PFA PVI, PV reconnections were present in 73% of the patients and in 35% of the veins. The reconnections were most prevalent on the anterior aspects of the upper veins, as well as on the inferior aspect of the right inferior vein.

Conflict of interest: No

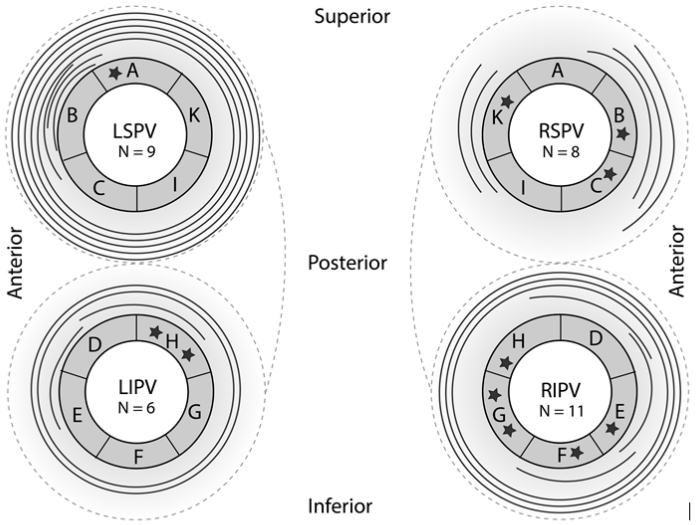

Figure: Reconnection patterns identified by high-density bipolar voltage mapping during repeat procedures after pulmonary vein isolation using pulsed-field ablation. Stars denote focal gaps. Full circles denote complete, un-localizable reconnection of the pulmonary vein, while segmental gaps are depicted with curved lines. LSPV = left superior pulmonary vein, LIPV = left inferior pulmonary vein, RIPV = right inferior pulmonary vein, RSPV = right superior pulmonary vein.

O21

Pulsed-field- vs. Cryo- vs. Radiofrequency ablation: One-year recurrence rates after pulmonary vein isolation in patients with paroxysmal atrial fibrillation

Thomas Kueffer[1], Antonio Madaffari[1], Aline Mühl[1], Jens Maurhofer[1], Anita Stefanova[1], Jens Seiler[1], Gregor Thalmann[1], Nikola Kozhuharov[1], Helge Servatius[1], Hildegard Tanner[1], Andreas Haeberlin[1], Samuel Baldinger[1], Fabian Noti[1], Tobias Reichlin[1]

[1]Department of Cardiology, Inselspital, Bern University Hospital, University of Bern, Bern, Switzerland, Bern, Switzerland

Introduction: A multipolar pulsed-field ablation (PFA) catheter has recently been introduced and showed favorable data in terms of safety and procedural efficiency of pulmonary vein isolation (PVI) for atrial fibrillation (AF). Long-term outcome data in comparison to other ablation modalities however is lacking.

Method: Consecutive patients with paroxAF undergoing a first PVI with PFA at our institution from May to December 2021 were included. For comparison, patients with paroxAF undergoing a first PVI with Cryo or RFA between May 2020 and March 2021 were included. After the PVI procedure, patients were followed with 7d-Holter ECGs at 3, 6, and 12 months. The primary endpoint was recurrence of any atrial arrhythmias following a blanking period of 90 days.

Results: A total of 202 patients were included (PFA: 32; Cryo: 82; RF: 88). Age, gender, CHA2DS2-VASc score, LVEF and LAVI did not differ among the groups (Table). Median procedure times were shortest with Cryo (76 [interquartile range 60-95] min) followed by PFA (94 [82-110] min) and RFA (157 [126-211] min, p <0.01). Fluoroscopy dose was lowest with RFA (1.4 [0.6-2.5] Gycm2) followed by PFA (4.8 [3.5-7.9] Gycm2) and Cryo (5.3 [2.8-10.2] Gycm2, p <0.01). Median follow-up time in patients without recurrence was 12 [10-12] months for the PFA group, 12 [12-13] months for the Cryo group and 13 [12-13] months for the RFA group. There was a trend towards fewer recurrences of atrial arrhythmias with PFA compared to Cryo and RFA (PFA 7%, Cryo: 25%, RFA: 20%, p = 0.13, Figure).

Conclusion: Recurrences of atrial arrhythmias 12 months after PFA PVI for paroxAF may be lower compared to Cryo and RFA. Larger prospective randomized studies are needed to confirm this initial experience.

Conflict of interest: No

Table: Characteristics of the patients at baseline and procedure data

Variable	PFA	Cryo	RFA	p
N	32	82	88	
Age, years	62 [58, 68]	68 [57, 72]	64 [56, 72]	0.288
Age >65 yr – no. (%)	13 (43.3)	43 (52.4)	37 (42.0)	0.371
Sex = male	26 (81.2)	60 (73.2)	62 (70.5)	0.497
Months since AF diagnosis	21 [8, 76]	14 [6, 40]	16 [4, 44]	0.263
Body-mass index	26 [23, 29]	26 [24, 29]	26 [24, 29]	0.867
CHA2DS2-VASc score – no. (%)				0.264
0	7 (23.3)	6 (11.1)	9 (18.4)	
1	4 (13.3)	15 (27.8)	14 (28.6)	
2	10 (33.3)	15 (27.8)	11 (22.4)	
3	6 (20.0)	5 (9.3)	10 (20.4)	
4	2 (6.7)	4 (7.4)	2 (4.1)	
>4	1 (3.3)	9 (16.7)	3 (6.1)	
NYHA classification – no. (%)				0.314
1	10 (33.3)	46 (56.1)	40 (45.5)	
2	18 (60.0)	33 (40.2)	40 (45.5)	
3	2 (6.7)	3 (3.7)	7 (8.0)	
4	0 (0.0)	0 (0.0)	1 (1.1)	
Previous DCCV – no. (%)	4 (13.3)	5 (6.1)	5 (5.7)	0.335
Previous stroke – no. (%)	1 (3.3)	3 (3.7)	3 (3.4)	0.995
Previous TIA – no. (%)	0 (0.0)	2 (2.4)	3 (3.4)	0.586
Previous myocardial infarction – no. (%)	1 (3.3)	9 (11.0)	4 (4.5)	0.180
Coronary artery disease – no. (%)	6 (20.0)	17 (20.7)	10 (11.4)	0.221
Hypertension – no. (%)	20 (66.7)	42 (51.2)	36 (40.9)	0.045
Hyperlipidemia – no. (%)	14 (46.7)	32 (39.0)	33 (37.5)	0.670
Diabetes mellitus– no. (%)	3 (10.0)	10 (12.2)	7 (8.0)	0.654
Chronic obstructive pulmonary disease – no. (%)	0 (0.0)	0 (0.0)	2 (2.3)	0.276
Obstructive sleep apnea – no. (%)	6 (20.0)	6 (7.3)	5 (5.7)	0.046
Beta-blocker – no. (%)	22 (81.5)	62 (91.2)	59 (89.4)	0.393
Class I AAD – no. (%)	7 (46.7)	7 (23.3)	8 (27.6)	0.258
Class III AAD – no. (%)	9 (60.0)	21 (70.0)	20 (69.0)	0.779
Left atrial diameter – mm	42 [38, 46]	40 [37, 43]	39 [35, 43]	0.053
Left atrial volume index – mL/m²	38 [34, 45]	37 [29, 43]	35 [30, 40]	0.107
Left ventricular ejection fraction - %	60 [56, 65]	60 [59, 65]	60 [55, 65]	0.499
Procedural characteristics				
Procedure time	94 [82, 110]	76 [60, 95]	157 [126, 211]	<0.001
Use of 3D-mapping	32 (100.0)	0 (0.0)	88 (100.0)	<0.001
Fluoroscopy time - min.	26 [22, 30]	16 [13, 23]	5 [3, 11]	<0.001
Fluoroscopy dose - Gycm²	4.8 [3.5, 7.9]	5.3 [2.8, 10.2]	1.4 [0.6, 2.5]	<0.001

Numbers are median [IQR] unless otherwise noted. IQR = interquartile range. DCCV = direct current cardioversion. AAD = antiarrhythmic drugs. TIA = transient ischemic attack.

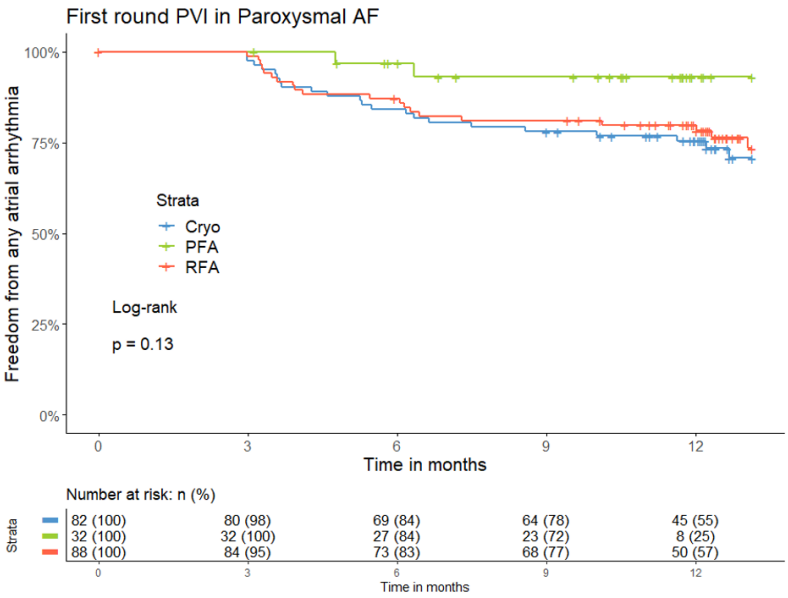

Figure: Freedom from any atrial arrhythmia after first pulmonary vein isolation using different technologies in paroxysmal atrial fibrillation patients

O22

Recurrences of ventricular tachycardia after stereotactic arrhythmia radioablation arise outside the treated volume: analysis of the Swiss Cohort

Claudia Herrera Siklody[1], Luis Schiappacasse[2], Raphael Jumeau[2], Tobias Reichlin[3], Ardan Saguner[4], Nicolaus Andratschke[5], Olgun Elicin[6], Frederic Schreiner[7], Boldizsar Kovacs[4], Michael Mayinger[5], Adrian Huber[3], Mathieu Le Bloa[1], Patrizio Pascale[1], Cheryl Teres[1], Esat Ozsahin[2], Jorge Solana Muñoz[1], Adrian Luca[1], Jean Bourhis[2], Etienne Pruvot[1]

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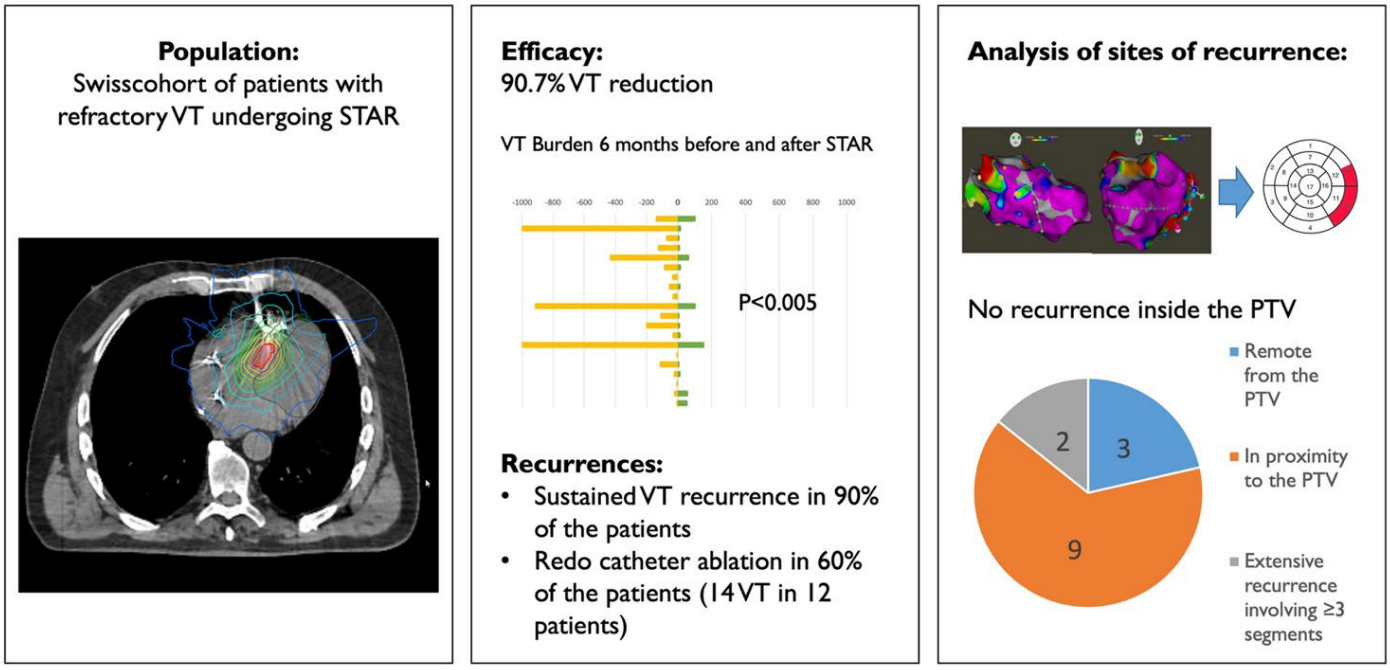
Introduction: Stereotactic arrhythmia radioablation (STAR) has been recently introduced for the management of ventricular tachycardia (VT) refractory to antiarrhythmic drugs and catheter ablation (CA). VT recurrences have been reported after STAR but the mechanisms remain largely unknown. We analyzed recurrences in the Swiss Cohort.

Method: From 09.2017 to 01.2020, 20 patients (68 ± 8y, LVEF 37 ± 15%) suffering from refractory VT were enrolled. The underlying cardiopathy was ischemic in 6, inflammatory in 4, neoplastic in 1 and idiopathic in 9 patients. Sixteen out of 20 patients had a history of at least 1 electrical storm. Before STAR, an invasive electro-anatomical mapping (Carto3) of the VT substrate was performed. A mean dose of 23 ± 2Gy was delivered to the planning target volume (PTV).

Results: The median ablation volume was 26 ml (range 14-115) and involved the interventricular septum (IVS) in 75% of patients. During the first 6 months after STAR, VT burden decreased by 92% (median value, from 108 to 10 VT/semester). After a median follow-up of 25 months, 12/20 (60%) developed a recurrence with 14 sustained VTs and underwent a redo CA. VT recurrence was located in proximity of the PTV in 9 cases, remote from the PTV in 3 cases and involved a larger substrate over ≥3 LV segments in 2 cases. No recurrences occurred inside the PTV. The estimated dose delivered at sites of VT recurrence was very heterogeneous (range 0.11- 28.37 Gy; <15 Gy in 12/14). Voltage measurements showed a significant decrease in both bipolar and unipolar signal amplitude.

Conclusion: STAR is a precious new tool available for the treatment of therapy-refractory VT, allowing for a significant reduction of VT burden. VT recurrences are common during follow-up, but no recurrences were observed inside the PTV. Local efficacy was supported by a significant decrease in both bipolar and unipolar signal amplitude.

Conflict of interest: No



ABSTRACT SESSION: HEART FAILURE – 1

O23

Diverging role of epicardial adipose tissue across the entire heart failure spectrum

Valentina Rossi[1], Delia Nebunu[1], Thomas Haider[1], Natallia Laptseva[1], Matthias Nägele[1], Frank Ruschitzka[1], Isabella Sudano[1], Andreas Flammer[1]

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Introduction. Epicardial adipose tissue (EAT) is associated with cardiometabolic effects. Although there is growing evidence that EAT might extert detrimental effects in patients with heart failure with preserved ejection fraction (HFpEF), the role of EAT in HF across the entire spectrum of ejection fraction is currently poorly understood. The aim of this study was to investigate the association between EAT thickness and endothelial function in patients with heart failure (HF) across the entire ejection fraction spectrum.

Method. 258 patients with HF were included in this single-center observational study. Epicardial adipose tissue (EAT) was measured with transthoracic echocardiography. Vascular function was assessed with flicker-light induced vasodilation of retinal arterioles (FIDart%), and flow-mediated dilatation (FMD%) as well as pulse-wave velocity (PWV) in conduit arteries.

Results. HF patients with reduced ejection fraction (HFrEF, n = 168, age 60.6 ± 11.2years) have less EAT compared to patients with preserved ejection fraction (HFpEF, n = 50, mean age 65.1 ± 11.9 years; 4.2 ± 2 mm vs. 5.3 ± 2 mm, respectively, p <0.001). Interestingly, microvascular function was inversely associated with EAT thickness in HFrEF (r = -0.213, p = 0.012, EAT median split ≥3.9 mm: 0.9 [0.3-2.2] vs. 1.6 [0.8-2.5], p = 0.018), whereas in HFpEF EAT was positively associated with FIDart% (r = 0.346, p = 0.039, EAT median split ≥5.5 mm: 3.5 [1.5-7.4] vs. 1.7 [1.2-3.7], p = 0.036). However, after correction for potentially confounding factors (age, BMI, hypertensions, diabetes), the association of microvascular dysfunction with EAT was only seen in HFrEF and not HFpEF (SCR: -0.184, p = 0.049). Similarly, more EAT was independently associated with impaired FMD% in HFrEF patients (SCR: -.178, p = 0.043) bit not in HFpEF. After a mean follow-up of 3.3 years, higher EAT values were predictive for cardiovascular death (n = 29,13%, ROC: AUC 62%, 95% CI 0.51-0.73, p = 0.033).

Conclusion. The amount of EAT is associated with impairment of systemic vascular function in HF patients, also affecting survival.

Conflict of interest: No

O24

Organ damage and not amyloid burden is a marker of risk in cardiac ATTR amyloidosis

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Introduction: The aims of this study were to investigate the relationship of ^{99m}Tc-pyrophosphate (PYP) uptake with cardiac structure and function, and to assess the prognostic value of markers of organ damage and amyloid burden in patients with suspected cardiac transthyretin (ATTR) amyloidosis.

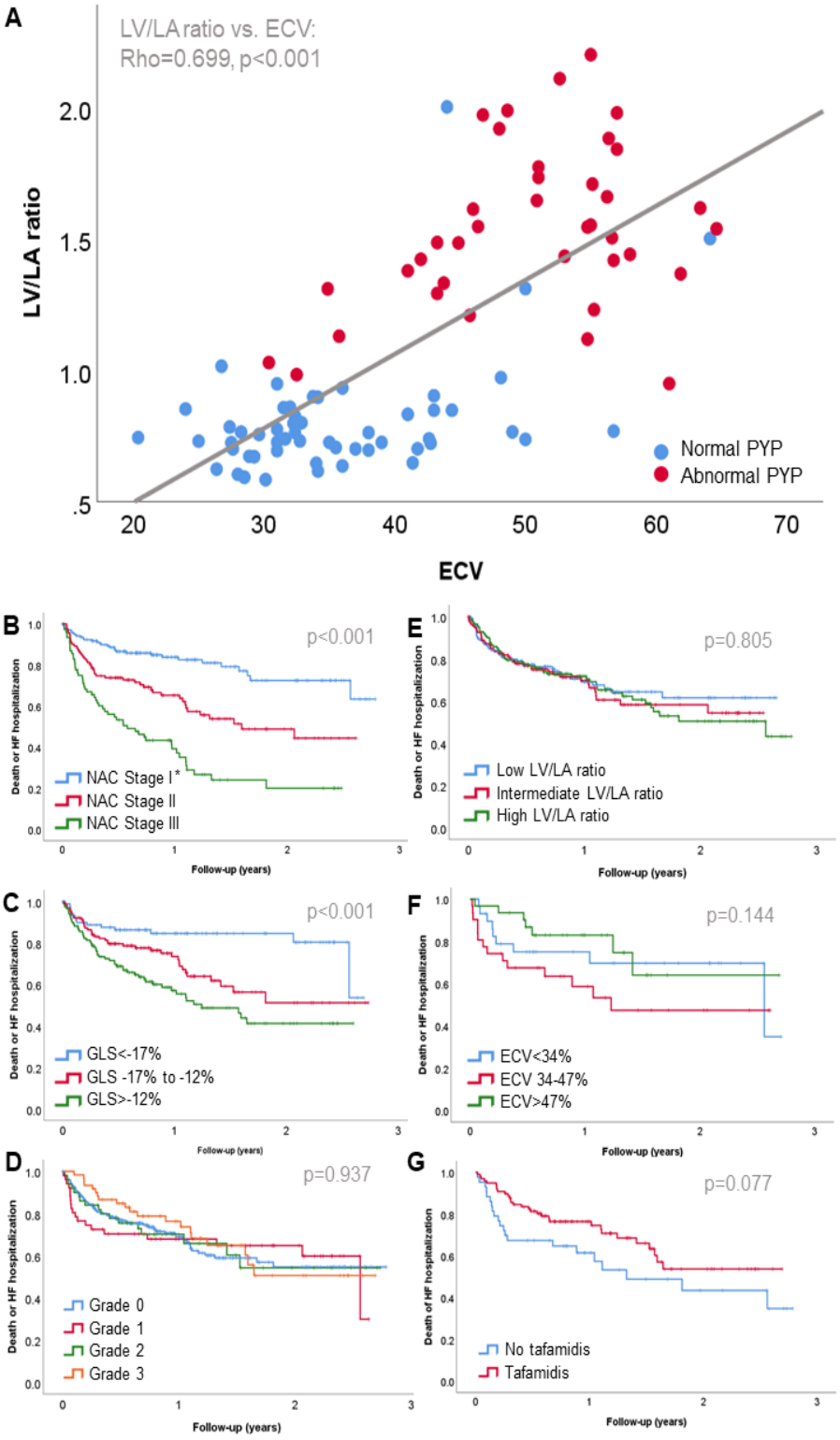
Method: The study cohort included 423 consecutive patients referred for PYP SPECT/CT. Images were assessed by visual grading, and PYP uptake was quantified by SPECT heart-to-contralateral lung (H/CL) ratio and by left ventricle-to-left atrium (LV/LA) ratio. Global longitudinal strain (GLS) from echocardiography, and extracellular volume (ECV) from CMR were quantified where available (82% and 25% patients, respectively). The endpoint was a composite of all-cause death or hospitalization for heart failure.

Results: The study population was representative of HFpEF with dyspnea (44%), lower leg edema (58%), median NT-proBNP of 1739 ng/L, atrial fibrillation (62%), median EF of 55% and 62% with at least grade II diastolic dysfunction. ECV correlated better with LV/LA ratio (Rho = 0.699, p <0.001; **Panel A**) than with H/CL ratio (Rho = 0.487, p <0.001). Among patients with ATTR amyloidosis (n = 118), LV/LA ratio correlated with LVMi (Rho = 0.316, p = 0.027) and GLS (Rho = 0.331, p <0.001).

Over a median follow-up of 0.9 years (IQR, 0.6-1.5), composite endpoint occurred in 135/423 patients (32%). National amyloidosis center (NAC) staging and staging by GLS predicted the composite endpoint in the entire cohort (**B and C**; p <0.001) and in the ATTR amyloidosis cohort (p <0.05). However, neither visual grading (**D**), LV/LA ratio (**E**) nor ECV (**F**) were associated with the composite endpoint (p >0.05). Of note, 86% of patients with ATTR amyloidosis received tafamidis, which improved event-free survival (**G**) and may have modified the relation between amyloid burden and outcomes.

Conclusion: PYP uptake is closely associated with ECV and correlates with morphological and functional alterations in ATTR amyloidosis. However, biomarkers of organ damage, and not amyloid burden, allow risk-stratification in the era of tafamidis treatment.

Conflict of interest: Research contract with Philips Healthcare. Payments from Philips Healthcare and Pfizer.



*Stage I was defined as NT-proBNP ≤3000 ng/L and eGFR ≥45 ml/min, Stage III was defined as NT-proBNP >3000 ng/L and eGFR <45 ml/min, and the remainder were Stage II.

O25

Clinical effect of renal dysfunction on diagnostic and prognostic accuracy of B-type Natriuretic Peptide and N-terminal Pro-B-type Natriuretic Peptide for acute heart failure

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Introduction: We aimed to directly compare the diagnostic and prognostic accuracy of B-type natriuretic peptide (BNP) and N-terminal pro-BNP (NT-proBNP) in patients presenting with acute dyspnea, including the effect of renal function.

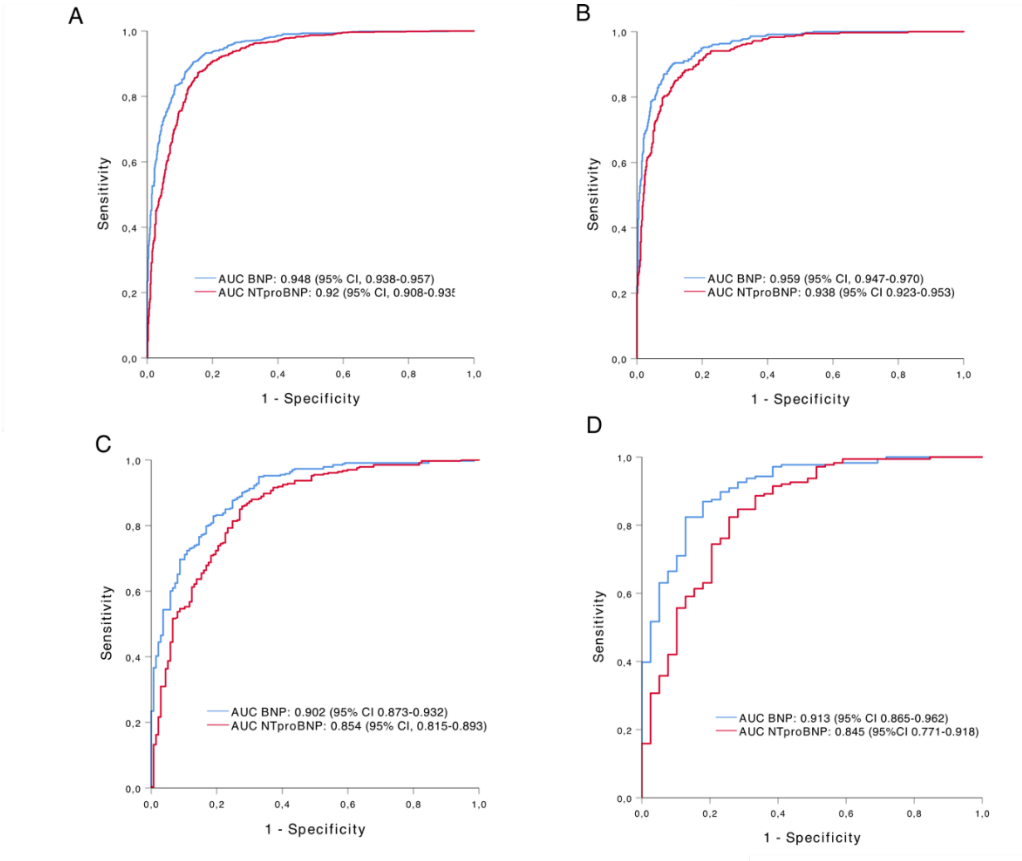
Method: This prospective diagnostic study enrolled unselected patients presenting with acute dyspnea to the emergency department. The final diagnosis was centrally adjudicated by two independent cardiologists using all information including imaging and follow-up. BNP and NT-proBNP plasma levels were determined at presentation. 360 days all-cause mortality was the primary prognostic end point.

Results: Among 1579 patients, acute heart failure (AHF) was the adjudicated final diagnosis in 865 patients (54.8%). Plasma concentrations of both BNP and NT-proBNP were significantly higher in AHF as compared to other causes of acute dyspnea (both p <0.001). Diagnostic accuracy as quantified by the area under the receiver-operating-characteristics curve (AUC) was 0.948 (95% CI 0.938-0.958) for BNP as compared to 0.921 (95% CI 0.908-0.935) for NT-proBNP, p <0.001. The diagnostic superiority of BNP was consistent among predefined subgroups according to renal function and increased with the extent of renal dysfunction. In contrast, prognostic accuracy for the prediction of death at 360 days was higher for NT-proBNP (AUC 0.731, 95% CI 0.702-0.760 versus 0.706, 95%CI 0.676-0.736 for BNP; p <0.001). The diagnostic superiority of NTproBNP was consistent among predefined subgroups according to renal function but decreased with the extent of renal dysfunction.

Conclusion: In patients with acute dyspnea, BNP and NT-proBNP at presentation both have very high diagnostic accuracy for AHF and moderate prognostic accuracy for death. There is a numerically small, but statistically and possibly also clinically significant diagnostic superiority of BNP and prognostic superiority of NT-proBNP.

Conflict of interest: Simon Frey, Philip Haaf, Federico Caobelli have no conflicts of interest to declare. Peter Ruff: part-owner and CEO of Exploris Health. Caroline Oehri: chief operating officer of Exploris Health. Andrew Tsirkin: head modeling and development of Exploris Health.

Figure 1. Diagnostic accuracy for AHF in all patients (A), patients with eGFR ≥ 60 ml/min/1,73 m² (B), patients with eGFR 30-59 ml/min/1,73 m² (C), patients with eGFR <30 ml/min/1,73 m².



O26

Value of exercise echocardiography to identifiy exercise induced pulmonary hypertension in everyday practice

Carmen Diaz-Leante[1 1], Anna Lam[1], Stefano Caselli[1], Helene Hammer[1], Keiko Yonekawa[1], Christine Attenhofer Jost[1]

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Introduction: Assessment of exercise induced pulmonary artery pressure can help to differentiate dyspnea on exertion. According to the literature, the 95th centile values for post-exercise PASP are 46mmHg <30 years; 50 mmHg for 31–50 years; 52mm Hg for 51–70 years; and 53mmHg for >70 years; There a little data on the most common reason for exercise induced pulmonary hypertension (PHT).

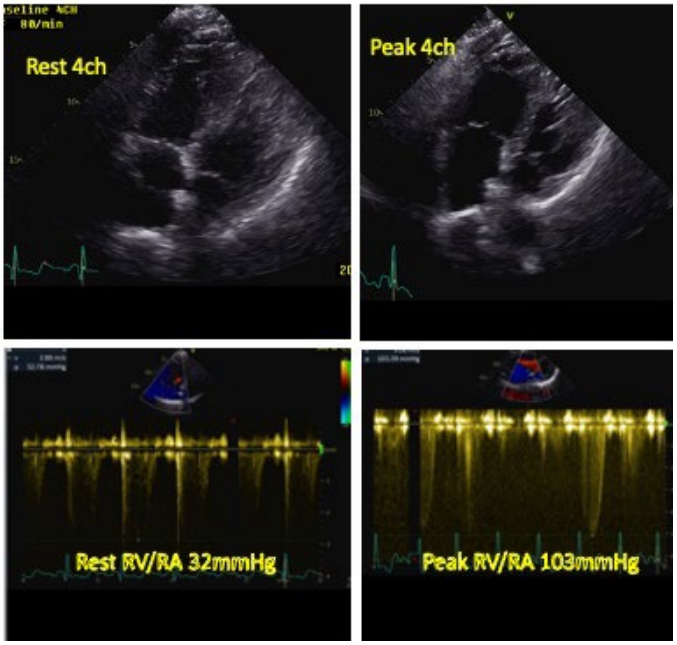
Method: Our echodata base was searched for patients who had assessment of PAP at rest and after treadmill exercise. Those who fulfilled the criteria for exercise induced PHT were analyzed: NYHA class, echocardiographic findings, cardiovascular risk factors, and the most likely underlying disease causing exercise induced PHT.

Results: There were 50 patients, 15 (30%) men, mean age 58 ± 11.7 years, 37 pts (74%) with hypertension, 15 pts (30%) with CAD, 4 pts (8%) with DM. Average NYHA class was II. They achieved 97 ± 27% PWC. Mean systolic PAP at rest was 36 ± 11.7 mmHg, at peak 61 ± 11.7 mmHg. Average increase in systolic PAP was 27 ± 11.7 mmHg.

The most likely etiologies for exercise induced PHT included diastolic dysfunction (19 pts, 38%), pulmonary embolism (8 pts, 16%), valvular heart disease (9 pts, 18%), lung disease (7 pts, 14%), connective tissue disease (3 pts, 6%), in 4 pts (8%) it was unknown. In many patients, assessment of pulmonary artery pressure after exercise, was the clue for the diagnosis of dyspnea (Figure 1, patient with NYHA III of unknown etiology, severe PHT after exercise with right ventricular dilatation, scintigraphy revealed multiple chronic pulmonary emboli).

Conclusion: Analysis of pulmonary artery pressure with exercise is extremely helpful to analyze the cause of dyspnea of unknown etiology. Exercise echocardiography is thus not only helpful in identifying coronary artery disease but should be routinely combined with assessment of pulmonary artery pressure.

Conflict of interest: No



O27

Self-Management of Anticoagulation in Patients with LVAD, is there also a cost benefit?

Debora Jenni[1], Fürholz Monika[1], Muster Christian[1], Capek Lukas[1], Bruno Jolie[1], Kopfstein Lucie[1 2], Schnegg Bruno[1]

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Introduction: It has been demonstrated that patients with LVAD can monitor and adjust their anticoagulation management and achieve more time in therapeutic range (TTR) compared to standard monitoring and care by physicians. We wanted to compare the TTR of self-management versus standard treatment and the cost of the two strategies in a European context.

Method: We offered to the patients to follow a training on anticoagulation to manage their anti-vitamin K treatment independently. We compared the TTR and the cost before and after. Test-strip costs 4.8CHF per unit, the lancet a few cents, and the POC machine (CoaguCheck) costs 810CHF. The combined cost of the blood test and the interpretation by a general physician (GP) is about 50CHF.

Results: Since November 2021, 11 patients have been included in the protocol. The patients have been included in the protocol for a cumulative of 3240 days. Two patients were transplanted, and none died. One patient had a haemorrhagic complication following colonoscopy.

Before inclusion in the protocol, the median TTR was 72% (IQR 63-78). During the protocol this increased to 91.1% (IQR 78-93). On average the INR control cost per day was 9.4CHF (IQR 6.6-13), before entering the protocol, compared with 2.4CHF (IQR 2.0-2.5) after. Before the protocol, INR monitoring occurred on average 5.9 times per month (IQR 4.2-8.2). During the protocol, patients measured their INR 12.4 times/per month (IQR 10.1-13.3). The cost of one day of INR in the target with the standard treatment is 13CHF. In comparison, during the first year on protocol, the price is 5.0CHF per day for an INR in range and 2.6 CHF in the following years.

Conclusion: Despite being associated with more INR control, Self-management of anticoagulation by LVAD- patients is less expensive and results in a higher TTR. The Self-management also promotes patients independence.

Conflict of interest: No

O28

Female sex improves survival in patients hospitalized for acute heart failure and cardiorenal syndrome.

Sara Schukraft[1], Tamila Abdurashidova[1], Henri Lu[1], Nisha Soborun[1], Peter Vollenweider[1], Marie Mean[1], Panagiotis Antiochos[1], Pierre Monney[1], Delaviz Golshayan[1], Martin Müller[2], Roger Hullin[1]

[1]Centre hospitalier universitaire vaudois (CHUV), Lausanne, Switzerland, [2]Bern University Hospital (Inselspital), Bern, Switzerland

Introduction: Sex affects the clinical phenotype and prognosis of heart failure (HF). Whether sex impacts differently on outcome in HF patients hospitalized for treatment of acute heart failure (AHF) with concomitant renal dysfunction is unknown. We assessed the association between sex and 1-year all-cause mortality in a cohort of European and Central Asian patients hospitalized for treatment of AHF and cardiorenal syndrome (CRS).

Method: This observational, multicenter study included a total of 1513 consecutive patients with AHF and CRS, defined by an estimated glomerular filtration (eGFR) rate <90 mL/min/1.73 m^2 at admission, in Switzerland and Kyrgyzstan. Demographic, clinical, and biological variables were extracted for each participant from electronic charts. The studied outcome was 1-year all-cause mortality. The association between sex and survival was investigated in a multivariable analysis using the Cox proportional-hazards model.

Results: Female represented 46% of the study population, were older (79 ± 11 vs 74 ± 12 years, p <0.001) and more often had preserved LVEF (53% vs 30%, p <0.001). At discharge, angiotensin-converting enzyme inhibitors and mineralocorticoid receptor antagonists were applied more often in males (44% vs 38%, p = 0.036; 39% vs 27%, p <0.001; respectively). Discharge prescription did not differ for betablockers (69% vs 65%, p = 0.05), angiotensin II receptor blockers (19% vs 21%, p = 0.37), or diuretics (87% vs 86%, p = 0.88).

Overall, 1-year mortality rate was 28%. Female sex was associated with better prognosis when compared to men (HR 0.67, 95% CI 0.55-0.83, p <0.001) after adjustment for age, left ventricular ejection fraction (LVEF), renal function, medication and cardiovascular risk factors associated with survival. Estimated survival functions according to sex are depicted in **Figure 1.** Female sex was a protective factor across all KDIGO stages (**Figure 2**)

Conclusion: These results provide further evidence that sex difference is of prognostic importance in HF and highlighting the urgent need for improved understanding of the underlying pathomechanism.

Conflict of interest: No

Figure 1.

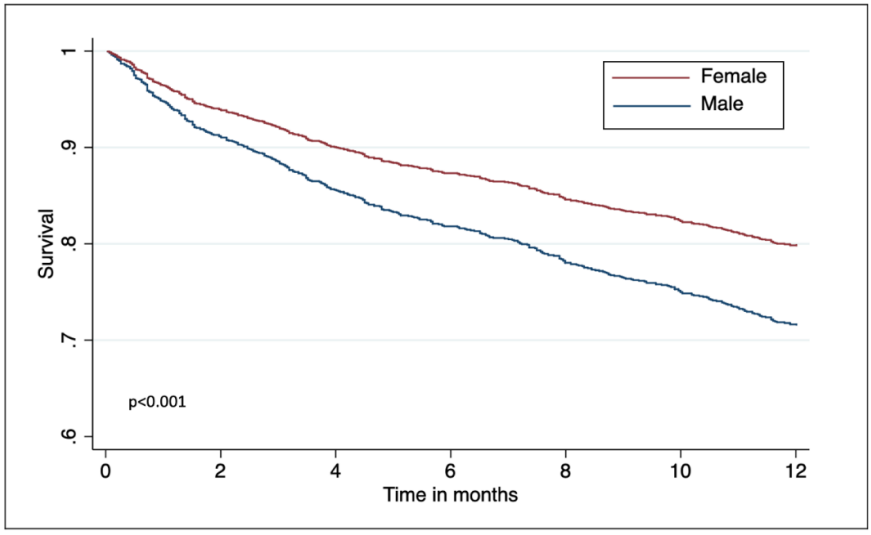
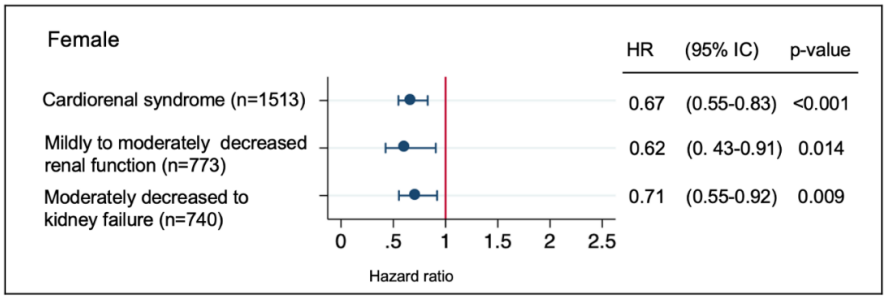


Figure 2.



ABSTRACT SESSION: HEART FAILURE – 2

O29

Disease-specific prevalence of red flags for rare diseases in patients presenting with a Hypertrophic Cardiomyopathy phenotype

Niccolo Maurizi[1], Emanuele Monda[2], Elena Biagini[3], Carlo Fumagalli[4], Franco Cecchi[4], Pierre Monney[1], Perry Elliott[5], Giuseppe Limongelli[6], Juan Pablo Kasky[7], Iacopo Olivotto[4]

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Introduction: For patients presenting with primary Left Ventricular Hypertrophy (LVH), the ESC recommends systematic search for diagnostic clues or 'red flags' (RF) that can identify particular treatable disorders and guide rational selection of diagnostic tests. To date, the prevalence and clinical significance of RF within the different clinical entities associated with HCM phenotypes is unknown.

Method: We studied 533 patients with definite diagnosis of sarcomeric HCM or one of its genocopies (52 ± 24 years, 305 males) referred to three tertiary centers with a HCM phenotype. Pre-specified RFs were categorized into five domains: family history; signs/symptoms; electrocardiography, echocardiographic and laboratory.

Results: Two-hundred-seventy-six (52%) were diagnosed with sarcomeric HCM, 110(21%) with TTR-amyloidosis, 90(17%) with Fabry-disease (FD), 9(2%) with mitochondrial disease, 6(1%) with Pompe disease, 6(1%) with PRKAG2 cardiomyopathy, 6(1%) with Noonan, 12(2%) with Friederich's Ataxia, 13(2%) with LEOPARD and 5(1%) with Danon disease. A total of 1800 RFs have been identified: 346(19%) related to family history, 269(15%) from physical examination, 280(16%) ECG-related, 810(45%) with echocardiography and 48(5%) with routine laboratory tests. Thirty-six percent of RFs could have been identified in a GP setting (clinical history, physical examination), 59% in the cardiologist's office (ECG, echocardiography), whereas 5% with the help of routine laboratory. X-linked inheritance (69/71 cases), ophthalmological, neurological signs/symptoms (68/79 patients) were specific for FD. Giant T-waves inversion was the most prevalent ECG alteration in 71 patients, but aspecific. Mitral valve disease (109/276,39%), SAM, anterior mitral leaflet elongation) and apical LVH (22/276,8%) were almost entirely observed in sarcomeric HCM. Concentric LVH and severe left posterior wall hypertrophy were extremely specific for non-sarcomeric HCM (214/218 cases).

Conclusion: Clinical RFs in patients with primary LVH are common and can be highly specific. An extensive diagnostic work-up can be conducted by the physician to identify potentially treatable primary LVH causes also at the cardiologist's office level.

Conflict of interest: No

O30

Long-Term Outcomes of Patients with Tachycardia-induced Cardiomyopathy

Serban Teodor[1], Jeanne du Fay de Lavallaz[1], Simon Weidlich[1], Otmar Pfister[1], Michael Kühne[1], Christian Sticherling[1], Patrick Badertscher[1]

[1]*Universitätsspital Basel, Cardiology, Basel, Switzerland*

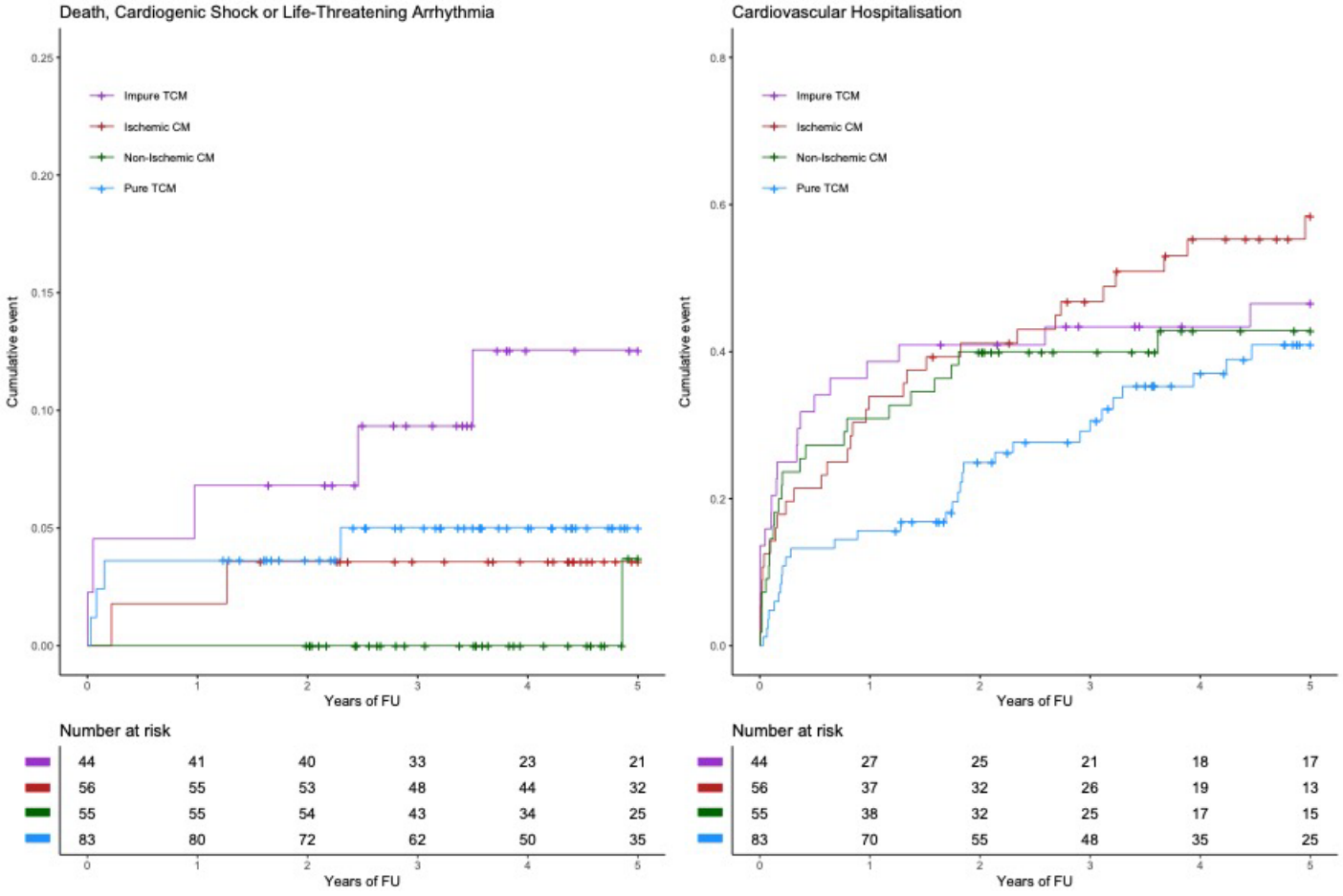
Introduction: Tachycardia-induced cardiomyopathy (TCM) is a reversible type of heart failure that occurs after sustained tachyarrhythmia. TCM can occur on its own (pure TCM) or superimposed on another type of CM (impure TCM). Survival data for such patients are lacking. We aimed to compare the 5-year survival rates of pure and impure TCM patients compared to other types of CM.

Method: We retrospectively identified patients with reduced ejection fraction (≤50%) and/or atrial fibrillation or flutter with a left ventricular ejection fraction (LVEF) that improved from baseline (≥ 15% in LVEF at follow-up (FU)) through retrospective chart review. Patients were then divided into four groups (pure TCM, impure TCM, ischemic CM and nonischemic CM). The primary outcome was defined as a composite of death, life-threatening arrhythmia or cardiogenic shock. Secondary outcome was cardiovascular re-admission during FU.

Results: 238 patients were included (mean age 68 ± 12 years, 31% women). Patients were classified as pure TCM in 35%, impure TCM in 18%, ischemic CM in 24% and non-ischemic CM in 23%. Median FU was 5 (IQR 4-6) years. 13 (5.5%) patients reached the composite outcome at FU. While patients with pure TCM showed similar survival rates as patients with ischemic or nonischemic CM (Figure), a significant difference in survival was observed between impure CM and ischemic and non-ischemic CM with respect to the composite outcome (11% vs 2.7%, p = 0.024). Patients with impure CM showed comparable rates of cardiovascular re-admission during FU compared to patients with ischemic and non-ischemic CM (45% vs. 49%, p = 0.91).

Conclusion: TCM patients have similar survival rates as patients with another type of CM. Patients with TCM on top of a non-ischemic or ischemic CM (impure TCM) demonstrated the lowest 5-year survival rates. Early detection and treatment of cardiac arrhythmias in patients with impure TCM seem to be warranted.

Conflict of interest: No



O31

Posttransplant Survival of Patients with Pretransplant Durable Continuous Flow Mechanical Circulatory Support in a Swiss Cohort of Heart Transplantation Recipients

Roger Hullin[1], Tamila Abdurashidova[1], Barbara Pitta-Gros[1], Sara Schukraft[1], Valentina Rancatti[2], Henry Lu[1], Carlo Marcucci[2], Zied Ltaief[3], Karl Lefol[4], Christoph Huber[5], Manuel Pascual[4], Piergiorgio Tozzi[6], Philippe Meyer[7], Matthias Kirsch[6]

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Introduction: Worldwide, almost half of all heart transplantation (HTx) candidates arrive at transplant operation with durable continuous-flow mechanical circulatory support (CF-MCS). Lengthening waitlist time entails prolongation of pretransplant CF-MCS duration resulting in higher risk of device-related complications with potential adverse impact on posttransplant outcome.

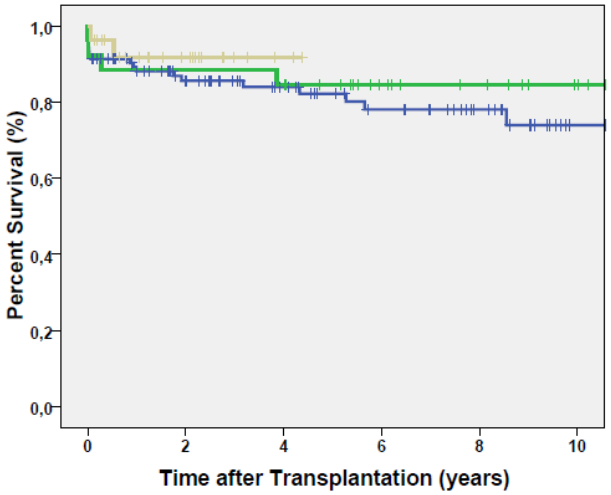
Method: This retrospective observational two-center study includes 158 HTx recipients with transplant surgery between 2008 and 2020. During this time period pre-and posttransplant protocols, and the national donor heart allocation strategy remained unchanged.

Results: The study participants had a median age of 53.7 years, 24% were females. 53 had pretransplant CF-MCS; at implantation the prevalence of ischemic cardiomyopathy was 51 vs 32% (p = 0.013), the median left ventricular ejection fraction was 21 vs. 23% (p = 0.047). The median annual proportion of transplanted CF-MCS patients was 34%. The first-year mean acute cellular rejection score (0.16 [0.20] vs. 0.14 [0.14]; p = 0.81) and posttransplant 3-years survival (85.7 vs. 90.3%, respectively; p = 0.515) were not different between HTx recipients without or with pretransplant CF-MCS. The median duration of CF-MCS time increased progressively from 2008 to 2020 (β = 34.4 ± 11.2, p = 0.003) and was 226 days with HeartMate (n = 13, years 2008-2011), 232 days with the HVAD (n = 13, years 2011-2015), and 329 days with the HeartMate 3 (n = 27, years 2015-2020). Posttransplant survival was not significantly different between HTx recipients with either pretransplant CF-MCS type (log-rank p = 0.681) and numerically best with the HeartMate 3 (Figure).

Conclusion: These data indicate that a strategy of pretransplant CF-MCS followed by orthotopic HTx is associated with excellent outcomes even with prolonged duration of CF-MCS.

Conflict of interest: No

Kaplan-Meier estimates of survival after HTx comparing direct HTx recipients (n = 105) with recipients with pretransplant HeartMate 2® or HVAD® (n = 26), or HeartMate 3® (n = 27)



Survival after HTx in Patients without prior CF-MCS support and those with axial (HeartMate 2®) or centrifugal MCS (HVAD®, HeartMate 3®)

O32

Seven years experience with the HeartMate3 left ventricular assist device for advanced heart failure

Anna Nowacka[1], Valentina Rancatti[2], Carlo Marcucci[3], Marco Rusca[4], Lucas Liaudet[5], Piergiorgio Tozzi[6], Julien Regamey[7], Patrick Yerly[8], Roger Hullin[7], Matthias Kirsch[1]

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Introduction: The aim of the study was to analyse clinical characteristics, survival and adverse events of patients with advanced heart failure supported using the Abbott HeartMate 3 left ventricular assist device (LVAD).

Method: We retrospectively reviewed 71 consecutive HeartMate 3 recipients assisted in our centre between 1 November 2015 and 31 October 2022.

Results: Our series comprised 63 males, aged 57,5 ± 12,9 years. Twenty-three (32%) patients had preimplant INTERMACS clinical profiles of 1 or 2. The mean duration support was 22.5 ± 17,8 months. During follow-up, 13 (18%) patients died while on support, 29 (41%) patients received a heart transplant and one patient completely recovered ventricular function and was weaned from device. Overall survival after LVAD implantation was 88,3 ± 3,9, 86,6 ± 4,2 and 73,0 ± 7,2 at 1,2 and 5 years, respectively. There were no case of pump thrombosis or technical malfunction. Eighteen (25%) patients required post-implant temporary right ventricular support. Adverse events included bleeding requiring surgery in 23 (32%) patients, gastrointestinal bleeding in 14(20%) patients, LVAD specific infections necessitating surgery in 19% of patients, non-disabling ischemic stroke in 8 (12%) patients and two patients (3%) presents posttraumatic intracranial bleeding

Conclusion: We have achieved satisfactory survival rates with the HeartMate 3 device for long-term mechanical circulatory support. The absence of technical failure, pump thrombosis or the need for pump replacement during our 7 years experience confirms its technical reliability and improved haemocompatibility, but bleeding complications and infections remain a concern.

Conflict of interest: No

O33

HeartMate3 ventricular assist device as a bridge to transplantation (BTT) and destination therapy (DT) – experience from a Swiss tertiary centre

Anna Nowacka[1], Julien Regamey[2], Patrick Yerly[2], Roger Hullin[2], Carlo Marcucci[3], Lucas Liaudet[4], Zied Ltaief[4], Piergiorgio Tozzi[1], Matthias Kirsch[1]

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Introduction: Up to now, Abbott's HeartMate3 (HM3) device has shown to improve the quality of life and survival of patients on ventricular support for end-stage heart failure. In our institution, we became more familiar with the use of this device in November 2015. At this stage, we report the latest results of our experience**.**

Method: We retrospectively studied the group of 71 patients with end-stage heart failure who received an HM3 device between November 2015 and November 2022. The objective of this study was to analyse the demographics, clinical characteristics, adverse events and survival of patients assisted by an HM3 device. Patients were splited into two groups regarding the goal of therapy BBT vs DT.

Results: The HM3 device was placed in 71 patients (47/16♂, BTT/DT). There were more patients in the BTT group N = 51 versus N = 20 in the DT group. In relation to patients in the BTT group, those in the BTT group were older (71.0 ± 4.5 vs 52.2 ± 11.1years), they had a higher incidence of chronic renal and liver disease. The median length of hospitalisation was longer in the DT group, 70 vs 29 days. Over the follow-up period, eight (40%) patients died in the DT group compared to five (10%) in the BTT group. Adverse events rates (DT/BTT) included bleeding requiring surgical intervention 45/28%, gastrointestinal bleeding 30/16%, VAD-specific infections with DL infection requiring surgery 20/12%. Survival on LVAD support respectively in the BTT vs DT group at 1, 2 and 3 years was 91,3+4.2% vs. 84.7 ± 8.1%, 87.3+5,6% vs. 84.7 ± 8.1% and 87.3+45.6% vs. 61.8 ± 12.9%

Conclusion: The use of the HM3 device is growing over time and continues to show positive clinical results not only as a BTT but also in patients with DT. Our experience shows an adequate overall survival results. The question of quality of life in this patient group remains open.

Conflict of interest: No

ABSTRACT SESSION: BASIC SCIENCE AND EPIDEMIOLOGY

O46

Endothelial expression of JCAD worsens outcome after acute ischemic stroke: a translational study

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Introduction: Despite the increasing availability of early reperfusion, acute ischemic stroke (AIS) is still burdened by high mortality and long-term disability. Junctional protein associated with Coronary Artery Disease (JCAD) was associated to multiple cardiovascular disorders, but its role in AIS has not been investigated so far.

The aim of the study is to investigate the role of endothelial JCAD in the pathogenesis of AIS and its potential as a therapeutic target.

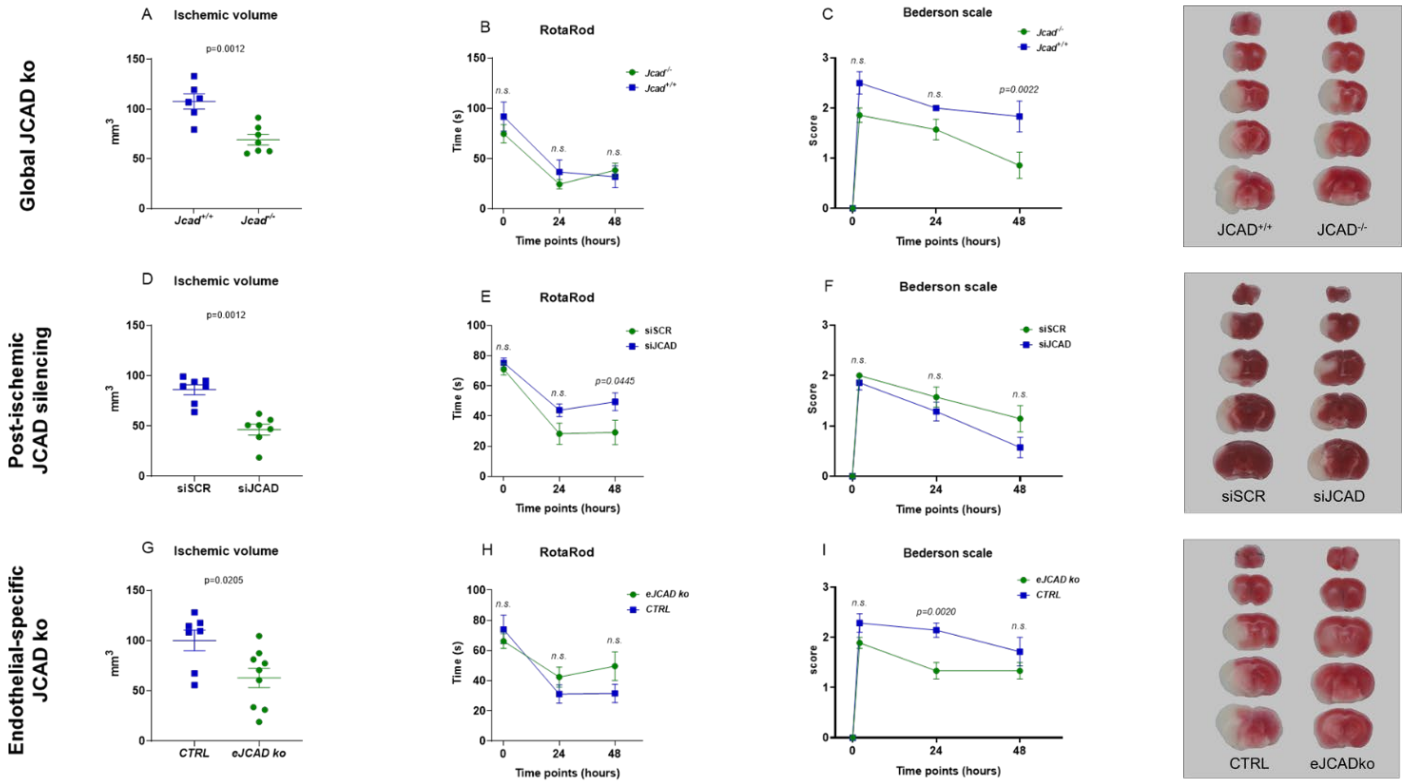
Method: Transient cerebral ischemia was induced in mice with either global or endothelial-specific JCAD genetic deletion. Neurological function was assessed 24 and 48 hours after reperfusion. Silencing of JCAD was achieved by administration of a JCAD small interfering RNA (siRNA). JCAD silencing was performed in human brain microvascular endothelial cells (HBMVECs), followed by hypoxia/reoxygenation (H/R) injury. Cell death and trans-endothelial electrical resistance (TEER) were measured. Lastly, JCAD plasma levels were determined in patients with AIS.

Results: Both global and endothelial-specific JCAD knockout mice, displayed reduced stroke size and a significantly improved neurological function. Of translational relevance, post-ischemic JCAD silencing also improved stroke outcome (Figure 1). JCAD-silenced HBMVECs showed a reduced cell death rate and a higher TEER after H/R injury, associated with increased phosphorylation of Akt. After treatment with the Akt/PI3K inhibitor Wortmannin, the non-silenced phenotype was restored in JCAD-silenced HBMVECs. Lastly, higher levels of JCAD in patients with AIS at the time of hospitalization were associated with a higher risk of death within 90 days after the event.

Conclusion: JCAD plays a deleterious role in ischemia/reperfusion cerebral damage in mice and associates with higher mortality in patients. In vitro results suggest that JCAD negatively impacts on endothelial integrity after H/R injury, inducing cellular death through the inhibition of the Akt/PI3K pathway. JCAD may represent a therapeutic target to improve the prognosis of patients with acute ischemic stroke.

Figure 1.

Conflict of interest: No



O47

Circulating GDF11 exacerbates myocardial injury in mice and associates with increased infarct size in humans

Simon Kraler[1], Daria Vdovenko[1], Carolina Balbi[1 2 3], Giovanni G. Camici[1], Luca Liberale[4 5], Tetiana Lapikova-Bryhinska[1], Nicole Bonetti[1 6], Candela Diaz Canestro[1], Fabienne Burger[7], Aline Roth[7], Federico Carbone[4 5], Giuseppe Vassalli[1 2 3], Francois Mach[7], Shalender Bhasin[8], Florian A. Wenzl[1], Olivier Muller[9], Lorenz Räber[10], Christian M. Matter[1 6], Fabrizio Montecucco[4 5], Thomas F. Lüscher[1 11], Alexander Akhmedov[1]

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Introduction: The heart rejuvenating effects of circulating growth differentiation factor 11 (Gdf11), a TGF-β superfamily member sharing 90% homology with myostatin (Mstn), remained controversial. We aimed to probe the role of Gdf11 in acute myocardial infarction (MI), a frequent cause of heart failure and premature death during ageing.

Method: 12-14-week-old and 22-24-month-old C57BL/6 mice injected daily with either recombinant GDF11 (rGDF11; 0.1 mg/kg BW over 30 days) or vehicle were subjected to 30 min of ischemia (I) followed by 24h of reperfusion (R). Infarct size was assessed morphologically.

Results: Myocardial *Gdf11* mRNA expression declined during the course of ageing and was particularly reduced following I/R injury, suggesting a therapeutic potential of GDF11 signalling in MI. Unexpectedly, boosting systemic Gdf11 by rGDF11 delivery prior to myocardial I/R augmented rather than reduced infarct size in mice irrespective of their age, predominantly involving pro-apoptotic pathways (***Figure 1***). By employing a targeted transcriptomics approach, we identified the cardiac progenitor cell (CPC) activity marker *Nkx2-5* to be blunted upon rGDF11-supplementation. Accordingly, human CPCs exposed to high rGDF11 *in vitro* showed similar reductions in *Nkx2-5* expression, coinciding with diminished anti-apoptotic effects conferred by resident CPCs on HL-1 cardiomyocytes. Finally, by harnessing a highly-specific LC–MS/MS-based assay, we show that circulating GDF11 levels incline with age in patients with MI. Notably, GDF11 levels were particularly elevated in those at high risk for adverse outcomes, with circulating GDF11 emerging as an independent predictor of myocardial infarct size, as estimated by standardized peak creatine kinase-MB levels (***Figure 2***).

Conclusion: Our data challenge the initially reported rejuvenating effects of GDF11 and suggest that high levels of circulating GDF11 exacerbates myocardial injury by impinging on cardioprotective effects of resident CPCs. Persistently high levels of circulating GDF11 may contribute to the age-dependent loss of endogenous cardioprotective mechanisms and thus poor outcomes post-MI.

Conflict of interest: No

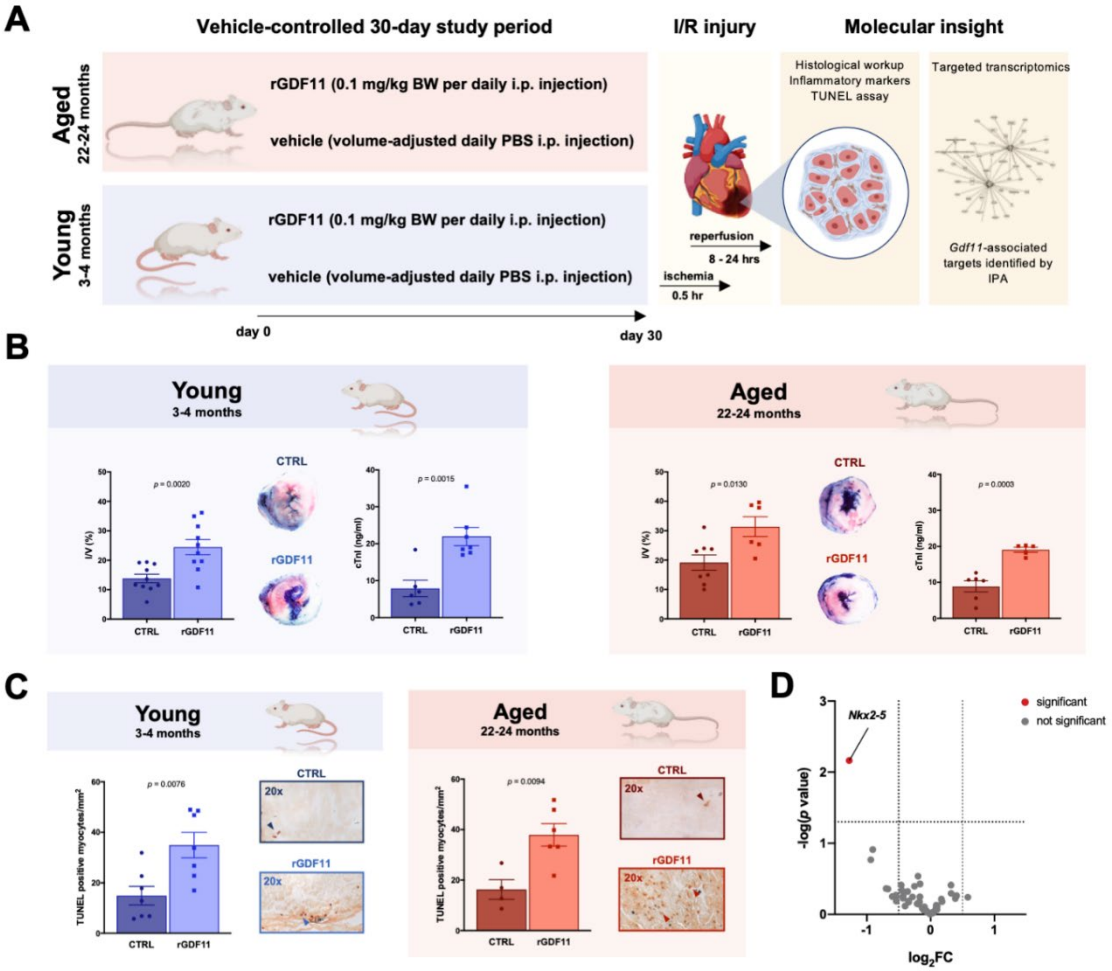

Figure 1. **Vehicle-controlled study design (A) and effects of systemic rGDF11 replenishment on infarct size (B), cardiomyocyte apoptosis (C) as well as GDF11-associated gene transcripts (D). A,** Schematic overview of the vehicle-controlled study design in which aged (top) and young (bottom) mice were randomly assigned to 0.1 mg/kg BW rGDF11 or control treatment over 30 days before I/R injury was induced. **B,** Myocardial infarct size and serum cTnI levels in mice receiving rGDF11 *vs.* CTRL treatment stratified by age; representative images of TTC-stained middle-heart sections are shown. **C,** TUNEL staining in freshly extracted hearts of rGDF11 *vs.* CTRL treated animals stratified by age. **D,** Volcano plot of IPA-identified genes in rGDF11 vs. CTRL treated mice. BW denotes body weight, cTnI cardiac troponin I, CTRL control, FC fold change, *Gdf11* growth differentiation factor 11, IPA ingenuity pathway analysis, I/V infarct-size per ventricular surface, rGDF11 recombinant GDF11, *Mstn* myostatin.

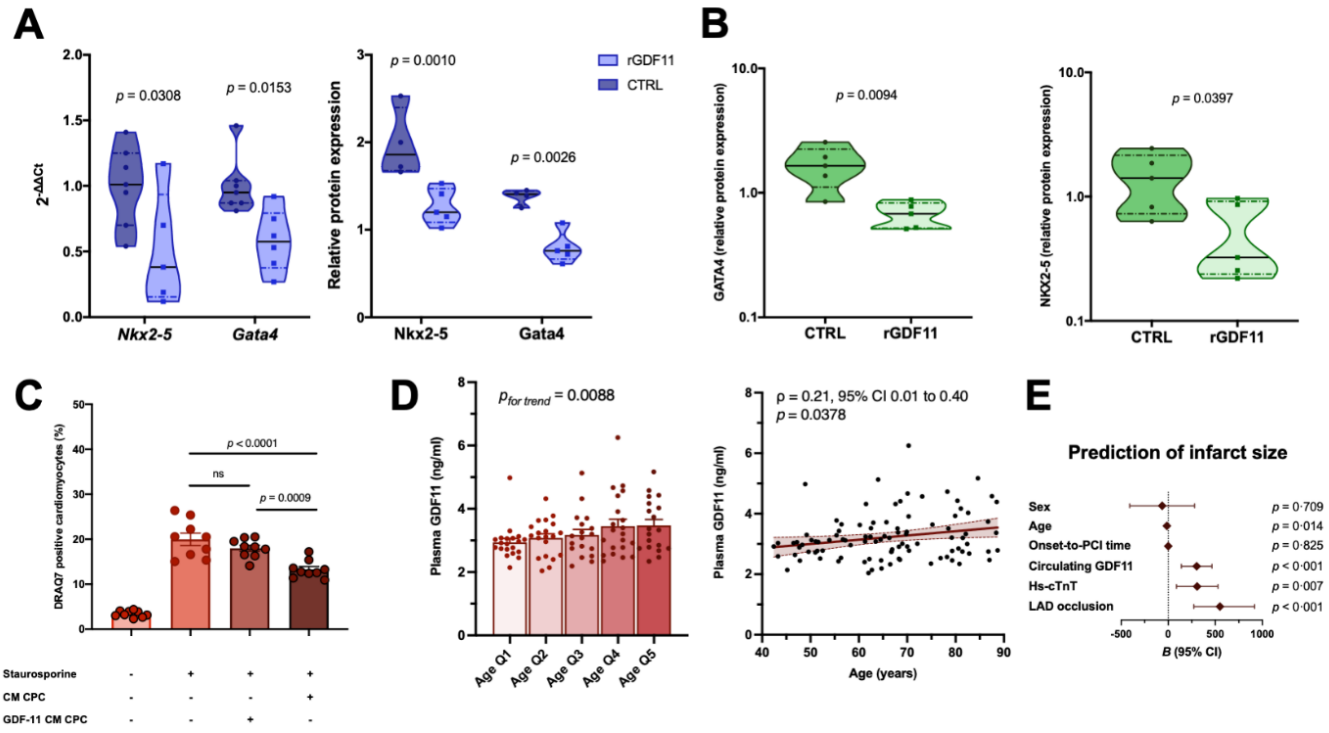

Figure 2. **Validation of targeted transcriptomics in murine hearts (A), NKX2-5 and GATA4 expression in human CPCs exposed to rGDF11 or CTRL treatment (B), their paracrine effects on cardiomyocyte viability (C), and the association of plasma GDF11 with age (D) and final infarct size in prospectively recruited patients with MI (E). A**, mRNA and protein expression of NKX2-5 and its cofactor GATA4 in murine hearts and, **B**, in human CPCs exposed to rGDF11 or CTRL conditions. **C**, Staurosporine-induced cell viability test performed on HL-1 cardiomyocytes treated with 50µg/ml protein of CM from human CPCs exposed to rGDF11 or CTRL conditions. **D,** LC/LC-MS-based quantification of plasma GDF11 in SPUM-ACS patients (ClinicalTrials.gov Identifier: NCT01000701) per age quintile (n = 20/quintile; left) and Spearman rank correlation between continuous GDF11 and age (right). Simple linear regression and 95% confidence bands of the best-fit line is plotted. **E,** Unstandardized coefficients (B) of each independent variable included in the final model ranked by their importance for the prediction of standardized peak CK-MB levels, a surrogate of infarct size. Line length corresponds with the 95% confidence interval. CTRL denotes control, ns not significant, and rGDF11 recombinant GDF11.

O48

A Chromatin Signature by the Methyltransferase SETD7 Orchestrates Angiogenic Response in Diabetic Limb Ischemia

Shafeeq Mohammed[1], Era Gorica[2], Mattia Albiero[3], Gergely Karsai[4], Paolo Madeddu[5], Spinetti Gaia[6], Gianpaolo Fadini[3], Sarah Costantino[1], Frank Ruschitzka[1], Francesco Paneni[1]

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Introduction: Peripheral artery disease (PAD) is highly prevalent in patients with diabetes (DM) & associates with a high rate of limb amputation and poor prognosis. Surgical and catheter-based revascularization have failed to improve outcome in DM patients with PAD. Hence, a need exists to develop new treatment strategies able to promote blood vessel growth in this setting. Mono-methylation of histone 3 at lysine 4 (H3K4me1) – a specific epigenetic signature induced by the histone methyltransferase SETD7 – favours an open chromatin thus enabling gene transcription.

Purpose: To investigate whether SETD7-dependent epigenetic changes modulate angiogenic response in diabetes.

Methods: Primary human aortic endothelial cells (HAECs) were exposed to normal glucose (NG, 5 mM) or high glucose (HG, 25 mM) concentrations for 48 hours. Mice with streptozotocin-induced diabetes were orally treated with (*R*)-PFI-2 or vehicle and underwent hindlimb ischemia by femoral artery ligation for 14 days. Blood flow recovery was analysed at 30 minutes, 7 and 14 days by laser Doppler imaging. Our experimental findings were also translated in gastrocnemius muscle samples from patients with and without diabetes.

Results: RNA-seq in HG-treated HAECs revealed a profound upregulation of the methyltransferase SETD7 and associated with increased H3K4me1 levels as well as with impaired endothelial cell migration and tube formation. Both SETD7 gene silencing and pharmacological inhibition by (R)PFI-2 rescued hyperglycemia-induced impairment of HAECs migration and tube formation. RNA-seq and ChIP assays showed that SETD7-dependent H3K4me1 regulates the transcription of the angiogenesis inhibitor semaphorin-3G (SEMA-3G). In diabetic mice with hindlimb ischemia, treatment with (*R*)-PFI-2 improved limb vascularization and perfusion as compared to vehicle. Finally, SETD7/SEMA3G axis was upregulated in muscle specimens from T2D patients as compared to controls.

Conclusion: Targeting SETD7 represents a novel epigenetic-based therapy to boost neovascularization in diabetic patients with PAD.

Conflict of interest: No

O49

Sirtuin-1 improves β-cell Function and Glucose Metabolism via deacetylation of TLR4 and Inhibition of Ceramide Synthesis

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Introduction: Obesity and type 2 diabetes (T2D) are major risk factors for cardiovascular diseases (CVD). Diet-induced obesity favours pro-apoptotic ceramide synthesis, reduces β-cell insulin secretion, promotes hyperglycemia leading to T2D. Pro-apoptotic ceramides predict CV outcomes and modulate insulin sensitivity and glucose tolerance. Sirtuin-1 is a NAD^+- dependent deacetylase that protects against pancreatic β-cell dysfunction; however, its circulating levels are decreased in obese T2D mice and may promote pro-apoptotic ceramides synthesis, and hyperglycemia. Herein, we assessed the therapeutic potential of restoring circulating SIRT1 levels to prevent the metabolic imbalance in obese T2D mice.

Method: Twelve-week-old diabetic (db/db) mice were treated with vehicle or recombinant murine SIRT1 (rmSIRT1) i.p. for 4 weeks with a dose of 5µg/mouse/day. Weekly body weight measurements were recorded and at the end of treatment period, glucose metabolism was assessed using GTT and ITT. Pancreatic islets were harvested to study ceramide content and β-cell health.

Results: Circulating Sirtuin-1 levels were reduced in obese T2D mice (db/db) compared to age-matched db/+ controls (3.0 ± 0.46 vs. 9.6 ± 1.04ng/mL; p = 0.0002). Restoration of Sirtuin-1 plasma levels with rmSirtuin-1 for 4-weeks (8.1 ± 0.69ng/mL; p = 0.0008) prevented body weight gain, restored β-cell function, and insulin sensitivity in db/db mice. Lipidomic analysis revealed that Sirtuin-1 restored insulin-secretory function of β-cells by reducing synthesis and accumulation of pro-apoptotic ceramides. Molecular mechanisms involved direct binding to and deacetylation of Toll-like receptor-4 by Sirtuin-1 in β-cells thereby decreasing the rate limiting enzymes of sphingolipid synthesis SPTLC1/2 via AKT/NF-κB. Finally, T2D patients with high baseline plasma levels of Sirtuin-1 prior to metabolic surgery display a restored β-cell function (HOMA2-β) and pronounced remission of T2D.

Conclusion: Acetylation of TLR4 promotes β-cell dysfunction via ceramide synthesis in T2D and this is blunted by SIRT1 systemic treatment. SIRT1 restoration may provide a novel therapeutic strategy against toxic ceramide synthesis and in turn CV complications of T2D.

Conflict of interest: No

O50

Direct diagnostic and prognostic comparison of carotid plaques (Total Plaque Area) with coronary calcifications (Agatston Score)

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Introduction: There are few studies comparing diagnostic and prognostic meaning of carotid plaques and coronary calcified plaques.

Method: Patients were assessed between 2002-2022 comparing carotid total plaque area (TPA) and coronary calcifications (CAC). Follow-up was obtained by recall of patients, questionnaires or external clinical records. Comparison was made for SCORE2, TPA, and CAC using ROC, logistic regression, and Cox proportional hazards (Cox).

Results: In 942 patients, average age 59 (range 22-89) years, TPA >21 mm^2 was found in 20%, of which none had coronary calcifications and CAC score >0 without carotid plaque was found in 14% of patients, and 15% had no plaques. 436 patients with a complete follow-up over 10 (range 1-20) years. Cox predictors of 50 events during follow-up (14 stents or CABG, 10 AMI, 5 strokes, 21 deaths of any cause) were TPA (p = 0.048), DMII (p = 0.002) and age (p = 001), but not CAC. Area under the curve (AUC) was 0,618 (95%CI: 0,571 to 0,664) for TPA and was 0,686 (95%CI: 0,640 to 0,729, p for difference NS). In 302 patients, complete follow-up 31 events occurred (9 Stents/CABG, 7 AMI, 2 Strokes and 13 deaths of any cause during a follow-up time of 11 (range 1-20 years). Significant predictors of events were DMII (p = 0.013), SCORE2 TPA risk category (p = 0.011) and SCORE2 CAC risk category (p = 0.013), but not sex, age, family history of ASCVD, medication, systolic blood pressure, cholesterol, HDL, LDL, and SCORE2 (p = 0.502). Using ROC analysis, SCORE2 risk category AUC was 0,589 (95%CI: 0,531 to 0,645), for SCORE2 TPA risk category was 0,647 (95%CI: 0,590 to 0,700) and for SCORE2 CAC risk category was 0,662 (95%CI: 0,605 to 0,715, for all p = NS).

Conclusion: TPA was non-inferior to CAC regarding presence of significant atherosclerosis and ASCVD outcome in practice-based patients.

Conflict of interest: No

O51

Sex Differences in Readmission Rate after Cardiac Surgery

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Introduction: The understanding of mechanisms underlying hospital readmissions is crucial to reduce this burden on patients. We aimed to analyse sex-specific differences and underlying factors in 30-day readmission rate after cardiac surgery.

Method: We conducted a single center study analyzing the incidence of readmission after cardiac surgery from January 2012 to September 2020. Causes for readmission, as well as sex-specific differences were assessed. Primary outcome was the rate of 30-day readmission compared between male and female. We calculated odds ratios (OR) with 95% confidence intervals (CI) for female sex with re-admission crude and adjusted for plausible confounding factors using logistic regression.

Results: 4868 patients (median [IQR] 68 [60 to 74] years, 24% (n = 1149) female) were included. Female patients were significantly older with lower body mass index and fewer cardiovascular risk factor compared to men. Baseline characteristic are provided in Table 1. 30-day readmission was comparable between both sexes (7.0% [n = 81] in female versus 8.7% [n = 322] in men; p = 0.084). Cardiac related readmissions and infections were the most common reasons for readmission in both groups. The overall odds ratio of female sex with readmission (0.80, 95% CI 0.62 to 1.03, p = 0.084) remained robust after adjustment for EuroSCORE (0.78, CI 0.61 to 1.01, p = 0.042). Patients undergoing mitral valve surgery had a higher risk for readmission (OR 1.28, CI 1.01 to 1.63), whereas patients participating in an inpatient rehabilitation had a reduced risk for readmission (OR .056, CI 0.41 to 0.77).

Conclusion: We found no difference in the rate of readmission after cardiac surgery between male and female. Interestingly, reasons for readmission were comparable between male and female patients. This is contradictory to previous published studies and needs further investigation. Moreover, we found that inpatient rehabilitation was associated with a reduced risk for readmission, whereas mitral valve surgery was associated with and increased risk warranting further investigations.

Conflict of interest: No

Table 1: Patient characteristics by gender

	Total (N = 4868)	Male (N = 3719)	Female (N = 1149)	p
Age	68 (60 to 74)	67 (59 to 74)	70 (63 to 76)	<0.001
BMI	26 (24 to 29)	27 (24 to 29)	25 (22 to 30)	<0.001
Diabetes Mellitus				0.023
No	3717 (76%)	2804 (75%)	913 (79%)	
Diet	169 (3.5%)	136 (3.7%)	33 (2.9%)	
On Oral antidiabetics	574 (12%)	463 (12%)	111 (10%)	
Insulin	408 (8.4%)	316 (8.5%)	92 (8.0%)	
Hypertension	3825 (79%)	2947 (79%)	878 (76%)	0.044
Hypercholesteremia	2996 (62%)	2373 (64%)	623 (54%)	<0.001
Current Smoker	1060 (22%)	845 (23%)	215 (19%)	0.004
Peripheral aretery disease	490 (10%)	377 (10%)	113 (10%)	0.82
Preoperative Stroke	473 (10%)	360 (10%)	113 (10%)	0.86
Renal disease	292 (6.0%)	241 (6.5%)	51 (4.4%)	0.010
Last pre-operative creatinine	83 (71 to 99)	85 (74 to 101)	72 (61 to 88)	<0.001
Creatinin Clearance	81 (61 to 104)	85 (66 to 107)	68 (51 to 88)	<0.001
Dialysis	56 (1.2%)	45 (1.2%)	11 (0.96%)	0.63
COPD	529 (11%)	400 (11%)	129 (11%)	0.66
Prior MI	1636 (34%)	1371 (37%)	265 (23%)	<0.001
3-Vessel CAD	2231 (46%)	1897 (51%)	334 (29%)	<0.001
Main Stem	666 (14%)	573 (15%)	93 (8.1%)	<0.001
NYHA				
n/a	506 (10%)	425 (11%)	81 (7.0%)	
I	1144 (24%)	957 (26%)	187 (16%)	
II	1702 (35%)	1312 (35%)	390 (34%)	
III	1266 (26%)	840 (23%)	426 (37%)	
IV	250 (5.1%)	185 (5.0%)	65 (5.7%)	
NYHA III or IV	1516 (31%)	1025 (28%)	491 (43%)	<0.001
AF preoperative	540 (11%)	394 (11%)	146 (13%)	0.05
Ejection fraction	57 (49 to 62)	56 (48 to 61)	60 (51 to 65)	<0.001
Euroscore2	2.0 (1.1 to 4.2)	1.8 (1.0 to 3.7)	2.8 (1.5 to 5.7)	<0.001

BMI Body Mass Index *COPD* Chronic Obstructive Pulmonary Disease *MI* Myocardial Infarction *CAD* Coronary artery disease *NYHA* New York Heart Association *AF* Atrial Fibrillation

Table 2: Reasons for 30-day readmission

	Total (N = 4868)	Male (N = 3719)	Female (N = 1149)	P
Outcome (30-day readmission)	403 (8.3%)	322 (8.7%)	81 (7.0%)	0.084
Cardiac related	121 (30%)	92 (29%)	29 (36%)	0.22
Volume overload	34 (8.4%)	27 (8.4%)	7 (8.6%)	
Arrhythmia	31 (7.7%)	22 (6.8%)	9 (11%)	
Angina or myocardial infarction	7 (1.7%)	7 (2.2%)	0 (0.00%)	
Adjustment of anticoagulation agents	2 (0.50%)	2 (0.62%)	0 (0.00%)	
Blood pressure management	2 (0.50%)	2 (0.62%)	0 (0.00%)	
Thromboembolism	6 (1.5%)	5 (1.6%)	1 (1.2%)	
Blood glucose or electrolyte management	2 (0.50%)	0 (0.00%)	2 (2.5%)	
Dressler syndrome	30 (7.4%)	23 (7.1%)	7 (8.6%)	
Cardiac related other	7 (1.7%)	4 (1.2%)	3 (3.7%)	
Infection	102 (25%)	75 (23%)	27 (33%)	0.09
Infection in operation site	63 (16%)	46 (14%)	17 (21%)	
Infection not in operation site	28 (6.9%)	21 (6.5%)	7 (8.6%)	
Fever without an identified source of infection	8 (2.0%)	5 (1.6%)	3 (3.7%)	
Infection other	3 (0.74%)	3 (0.93%)	0 (0.00%)	
Bleeding	63 (16%)	56 (17%)	7 (8.6%)	0.06
Gastrointestinal bleeding	8 (2.0%)	7 (2.2%)	1 (1.2%)	
Anemia	8 (2.0%)	7 (2.2%)	1 (1.2%)	
Bleeding complication in operation site	26 (6.5%)	22 (6.8%)	4 (4.9%)	
Bleeding complication not in operation site	21 (5.2%)	20 (6.2%)	1 (1.2%)	
Neurological	19 (4.7%)	16 (5.0%)	3 (3.7%)	0.78
Cerebrovasular accident	4 (0.99%)	4 (1.2%)	0 (0.00%)	
Fall/syncope/presyncope	7 (1.7%)	6 (1.9%)	1 (1.2%)	
Neurological other	8 (2.0%)	6 (1.9%)	2 (2.5%)	
Non infectious wound complications	26 (6.5%)	17 (5.3%)	9 (11%)	0.07
Gastrointestinal disease (no bleeding)	15 (3.7%)	13 (4.0%)	2 (2.5%)	0.75
Pain excluding angina	18 (4.5%)	17 (5.3%)	1 (1.2%)	0.14
Musculoskeletal disorders	13 (3.2%)	12 (3.7%)	1 (1.2%)	0.48
Urological disorders	6 (1.5%)	6 (1.9%)	0 (0.00%)	0.60
Other reasons	20 (5.0%)	18 (5.6%)	2 (2.5%)	0.39

O52

Achievement of guideline-recommended goals for LDL-C in patients with acute myocardial infarction admitted to Swiss hospitals between 2020 and 2022 and characterization of medication, risk factors and cardiovascular outcomes

Jan Loosli[1], Fabienne Foster-Witassek[1], Hans Rickli[2], Marco Roffi[3], Giovanni Pedrazzini[4], Franz Eberli[5], Kashan Ahmed[6], Dragana Radovanovic[1]

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Introduction: The 2019 ESC/EAS guidelines for managing dyslipidaemia recommend a rigorous reduction of low-density lipoprotein cholesterol (LDL-C). We investigated characteristics, recommended LDL-C targets, and existing lipid lowering therapies (LLT) of acute myocardial infarction (AMI) patients in Switzerland.

Method: In accordance with ESC guidelines, AMIS Plus registry patients enrolled between 2020 and 2022 were classified as «very high risk» in case of documented atherosclerotic cardiovascular disease (ASCVD; target LDL Cholesterol <1.4mmol/l) or as «other risk» if no previous ASCVD was mentioned (target LDL-Cholesterol <1.8mmol/l). Patient characteristics and LDL-C levels at admission were retrospectively analysed using Fisher's exact test, Pearson's Chi-squared test and the Wilcoxon rank-sum test.

Results: Among the 3808 patients, 757 (19.9%) were categorized as «very high risk» and 3051 (80.1%) as «other risk». Overall, «very high risk» patients were older (71.9y vs. 64.1y, p <0.001), suffered more often from comorbidities and were more likely to have major adverse cardiac and cerebrovascular events (5.9% vs. 3.4%, p = 0.001) or die in hospital (4.9% vs. 2.7%, p = 0.002). Pre-admission intake of LLT (69.3% vs. 15.4%, p <0.001) and specifically statins (68.6% vs. 15.0%, p <0.001), ezetimibe (10.6% vs. 1.4%, p <0.001), or a combination of the two (10.0% vs. 1.0%, p <0.001) was more frequent in «very high risk» patients as compared with the «other risk» group. The median LDL-C at admission was significantly higher for «other risk» than for «very high risk» patients (3.70mmol/L vs. 2.50mmol/L, p <0.001). In the «other risk» group, 98.3% of patients without and 84.0% of patients with pre-admission LLT failed to reach LDL-C targets. Of the «very high risk» group, 98.2% of patients without and 87.4% of patients with LLT prior to admission failed.

Conclusion: Pre-admission LLT reduced the percentage of patients failing LDL-C targets in both groups, however, the proportion of patients not achieving LDL-C goals remained high.

Conflict of interest: No

ABSTRACT SESSION: RHYTHM DISORDERS – 2

O53

Ventricular Pacing Burden in Patients with Left Bundle Branch Block after Transcatheter Aortic Valve Replacement Therapy

Serban Teodor[1], Sven Knecht[1], Jeanne du Fay de Lavallaz[1], Thomas Nestelberger[1], Christoph Kaiser[1], Gregor Leibundgut[1], Beat Schär[1], Philipp Krisai[1], Stefan Osswald[1], Christian Sticherling[1], Michael Kühne[1], Patrick Badertscher[1]

[1]*Universitätsspital Basel, Basel, Switzerland*

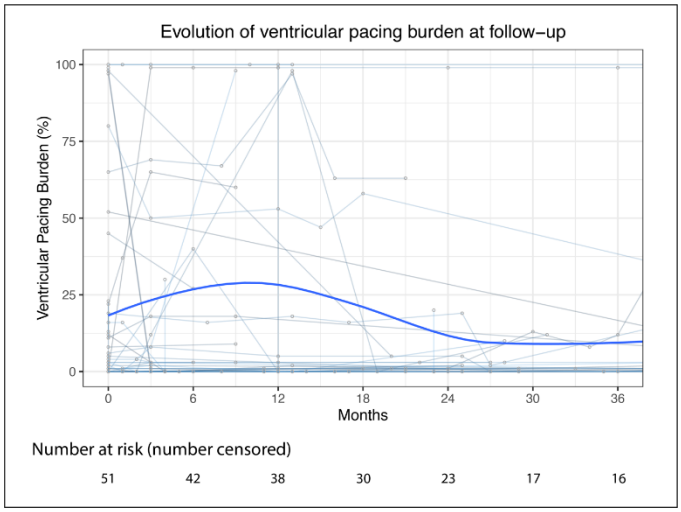
Introduction: Left bundle branch block (LBBB) remains the most frequent complication after transcatheter aortic valve replacement (TAVR). Current guidelines recommend "prophylactic" pacemaker (PM) implantation in patients with infrahisian conduction delay (IHCD) as detected by invasive electrophysiological (EP) testing. We aimed to assess the ventricular pacing (VP) burden in patients receiving PM therapy for LBBB after TAVR.

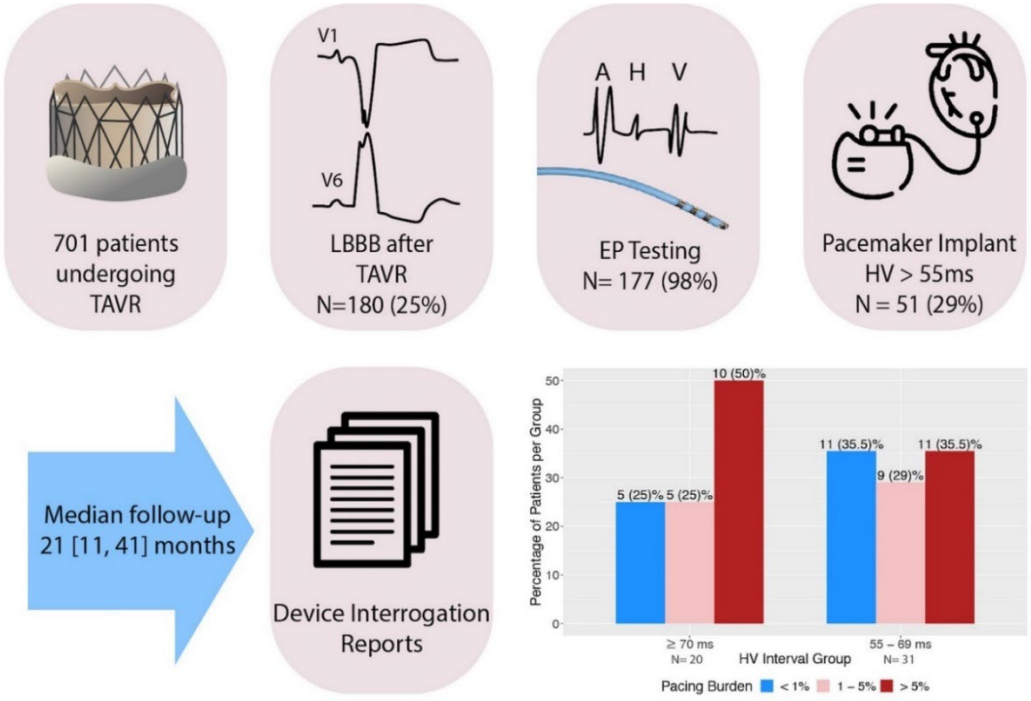
Method: All patients with LBBB after TAVR at the University Hospital of Basel underwent EP testing the day after TAVR. In patients with a prolonged HV interval (>55 ms), PM implantation was performed.

Results: 701 patients underwent TAVR of which 177 patients presented with LBBB the day following TAVR and underwent EP testing. 51 patients (mean age 84 ± 6.2 years, 45% women) received a PM due to prolonged HV intervals (61% HV 55-69 ms, 39% HV ≥70 ms). The median VP burden overall was 3%. The median VP burden was numerically higher in patients with an HV ≥70 ms (6.5 [IQR 0.8-52]) than in those with an HV of 55-69 ms (2 [IQR 0–17], p = 0.23). 31% of patients had a VP burden <1%, 27% 1-5% and 41% >5%. The median HV intervals in patients with VP burden <1%, 1-5% and >5% were 66 (IQR 62-70) ms, 66 (IQR 63–74) ms and 68 (IQR 60–72) ms respectively, p = 0.52. When only assessing patients with an HV interval of 55-69 ms, 36% demonstrated a VP burden of <1%, 29% of 1-5% and 35% of >5%. In patients with an HV Interval ≥70ms, 25% demonstrated a VP burden <1%, 25% of 1-5% and 50% of >5%, p = 0.64 (Figure).

Conclusion: In patients with LBBB after TAVR and IHCD defined by an HV interval >55 ms, VP burden is relevant in a non-negligible amount of patients during follow-up.

Conflict of interest: No





O54

Lead and device dysfunction in children and adolescents with epicardial pacemaker and implantable cardioverter defibrillator systems: The challenge of early recognition

Florian Winkler[1 2], Stefanie von Felten[3], Roland Weber[1 2], Matthias Gass[1 2], Florian Berger[1 2], Christian Balmer[1 2]

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Introduction: A major issue of cardiac device therapy in pediatric patients is the high incidence of lead dysfunctions and associated reinterventions. Early detection of dysfunctions is essential to protect patients from life-threatening complications.

Method: Retrospective single-center analysis of 283 children and young adults with pacemaker or implantable cardioverter defibrillator therapy between January 1998 and December 2018.

Results: Median age at implant was 6.1 years (SD ± 5.8 years) and median follow-up 6.4 years (IQR, 3.4 – 10.4 years) with a total of 1998.1 patient years of cardiac device therapy with epicardial systems. In total, 120 complications were lead-related and occurred in 82 patients (29.0%). They were detected by device interrogation (n = 89), symptoms (n = 13), intraoperative findings (n = 7), routine chest radiography (n = 5), routine ECG (n = 4) and physical examination (n = 2). Overall, 20 complications were considered as device-related and occurred in 13 patients (4.6%). They were detected by symptoms (n = 8), physical examination (n = 6), device interrogation (n = 3), recall (n = 2) and routine chest radiography (n = 1). The median time interval between occurrence and detection of a lead dysfunction was 1.3 months (IQR, 0.2 – 5.0 months). None of the potential risk factors showed a significant association with the occurrence of lead-related complications.

Conclusion: Early recognition of lead and generator dysfunction remains challenging in pediatric patients. Therefore, close patient monitoring is mandatory, even in asymptomatic patients with a good clinical course. Patients with insufficient escape rhythm and patients with ICDs need additional safety measures, e. g. backup leads and remote monitoring with daily data transmission. To further improve the safety of pediatric pacing systems, more durable epicardial electrodes are mandatory.

Conflict of interest: No

O55

Leadless pacemaker implantation via the internal jugular vein – A single-center experience

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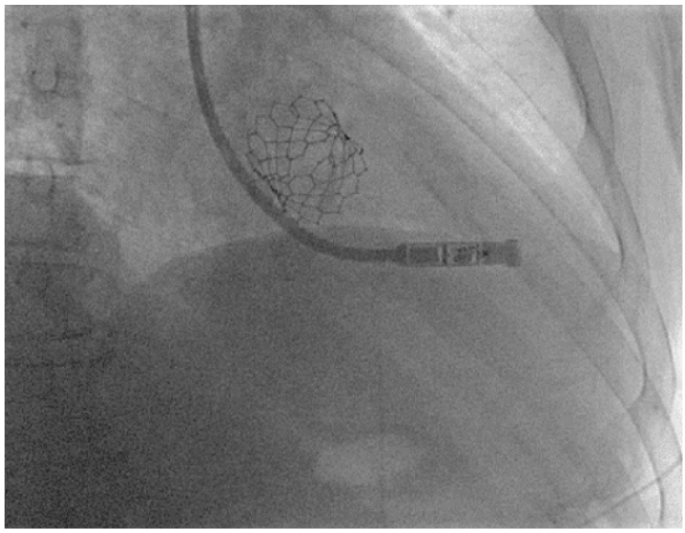
Introduction: Leadless pacemaker therapy was introduced to address lead- and pocket-related complications in conventional transvenous pacemaker therapy. These leadless devices are self-contained right ventricular single-chamber pacemakers implanted by using a femoral percutaneous approach. However, the femoral route is not always available or feasible. The aim of this analysis is to investigate the first experience of jugular pacemaker implantation in Switzerland.

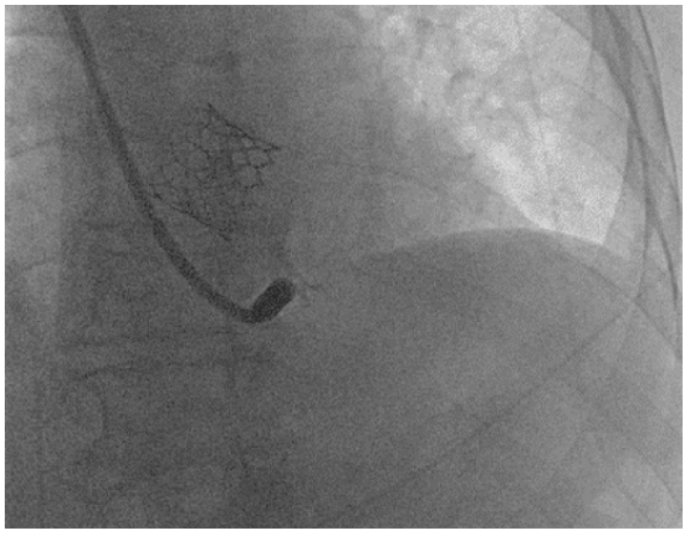
Method: The records of all patients who underwent leadless pacemaker implantation via the internal jugulary venous route at our center were analyzed prospectively.

Results: Ten patients underwent internal jugular vein leadless pacemaker implantation (mean age 83.3 ± 3.6 years, 6 males). All leadless pacemakers were implanted successfully. The jugular approach was well tolerated by the patients. Mean procedure time was 31.9 ± 6-4 min with a mean fluoroscopy time of 3.4 ± 2.4 min. The device was positioned at the inferior septum in 3 patients, and midseptal in 7 patients. The mean pacing threshold was 0.47 ± 1.4 V at 0.24 ms pulse width, sensed amplitude was 9.1 ± 3.8 mV. There were no complications. At follow-up, electrical parameters remained stable in all patients with a rising trend in the sensing and a decreasing trend in the impedance values.

Conclusion: The jugular approach seems to be a safe and efficient method for implantation of a leadless pacemaker.

Conflict of interest: Dr. Breitenstein has received consultant and / or speaker fees from Abbott, Bayer Healthcare, Biosense Webster, Biotronik, Boston Scientific, Bristol-Myers Squibb, Cook Medical, Daiichi Sankyo, Medtronic, Pfizer, and Spectranetics/Philips.





O56

Impact of Clinical Expertise and Choice of Wearable Device on Accuracy to detect Atrial Fibrillation via Single-lead ECGs

Simon Weidlich[1 2], Diego Mannhart[1 2], Serban Teodor[1 2], Philipp Krisai[1 2], Sven Knecht[1 2], Jeanne du Fay de Lavallaz[1 2], Beat Schär[1 2], Stefan Osswald[1 2], Michael Kühne[1 2], Christian Sticherling[1 2], Patrick Badertscher[1 2]

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Introduction: Manual interpretation of single-lead ECGs (SL-ECG) is often required to confirm a diagnosis of atrial fibrillation (AF). However, accuracy to detect AF via SL-ECGs may vary according to clinical expertise and choice of wearable device. Aim of this study is to compare the accuracy to detect AF via single-lead ECG from five different wearable devices between cardiologists, internal medicine residents, and medical students.

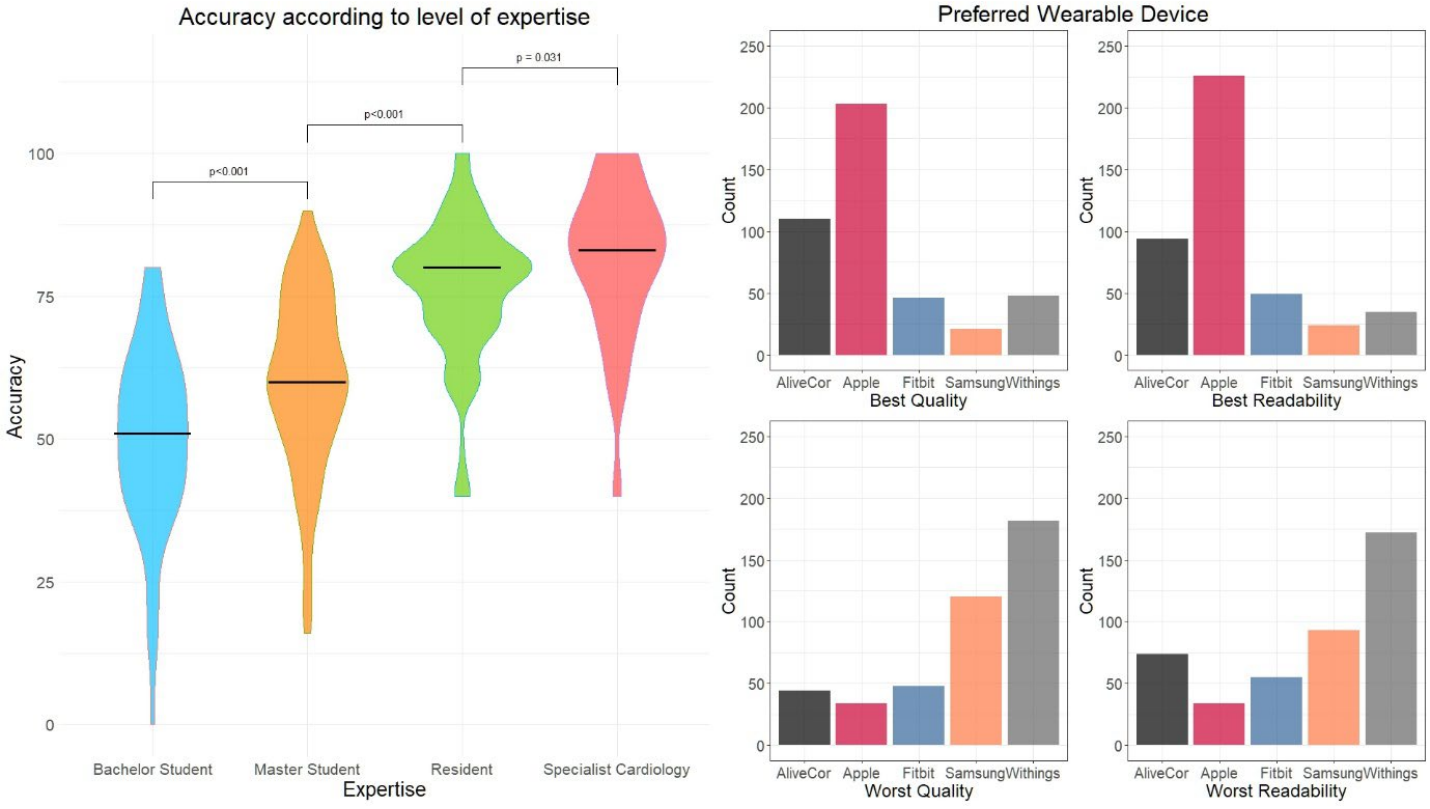
Method: In this prospective study (BaselWearableStudy, NCT04809922), invitations to an online survey were distributed via digital invitations among physicians from major Swiss hospitals and medical students from Swiss universities. Participants needed to classify 50 SL-ECGs (from 10 patients and five different devices) into three categories: sinus rhythm, AF, or inconclusive. This classification was compared to the diagnosis from an almost simultaneously recorded 12-lead ECG interpreted by two independent cardiac electrophysiologists. In addition, participants were asked to choose the best/worst quality/readability of each manufacturer's SL-ECG.

Results: Overall, 450 participants rated 10'865 SL-ECGs. Sensitivity and specificity for detection of AF via SL-ECG were 72% and 92% for cardiologists, 68% and 86% for residents, 54% and 65% for master medical students, and 44% and 58% for bachelor medical students, p <0.001, (Figure A). Participants who stated prior experience in interpreting SL-ECGs demonstrated a sensitivity and specificity of 63% and 81% compared to 54% and 67% for participants with no previous experience, p <0.001. 107 participants rated all 50 ECGs. Diagnostic accuracy of the first five interpreted SL-ECGs was 60% (IQR 40-80%), and diagnostic accuracy of the last five was 80% (IQR 60-90%), p <0.001. No difference in accuracy of AF detection was seen between the five wearable devices, p = 0.33.

Conclusion: AF detection via SL-ECG can be challenging. Accuracy to correctly identify AF depends on clinical expertise, while the choice of wearable device seems to have no impact.

Conflict of interest: No

Figure A Accuracy in single-lead ECG and preferred wearable device



O57

Bone Morphogenetic Protein 10 as a Predictor for Recurrent Atrial Fibrillation after Catheter Ablation

Elisa Hennings[1 2], Stefanie Aeschbacher[1 2], Michael Coslovsky[3], Rebecca Paladini[1 2], Pascal B Meyre[1 2], Florian Spies[1 2], Gian Voellmin[1 2], Livia Blum[1 2], Peter Kastner[4], André Ziegler[5], David Conen[6], Christine Zuern[1 2], Philipp Krisai[1 2], Patrick Badertscher[1 2], Christian Sticherling[1 2], Stefan Osswald[1 2], Sven Knecht[1 2], Michael Kühne[1 2]

[1]Cardiovascular Research Institute Basel, University Hospital Basel, University of Basel,, Basel, Switzerland, [2]Cardiology, University Hospital Basel, University of Basel, Basel, Switzerland, [3]Department of Clinical Research, University Hospital Basel, University of Basel, Basel, Switzerland, [4]Roche Diagnostics GmbH, Penzberg, Germany, [5]Roche Diagnostics International AG, Rotkreuz, Switzerland, [6]Population Health Research Institute, McMaster University, Hamilton, Canada

Introduction: Atrial remodeling, defined as a change in atrial structure, promotes atrial arrhythmias. Bone morphogenetic protein 10 (BMP10) is an atrial-specific biomarker released to blood during atrial development and structural changes. It is known to maintain the contractile state of vascular smooth muscle cells. We aimed to examine whether BMP10 is predictive for AF recurrence after catheter ablation (CA) in a large cohort of patients.

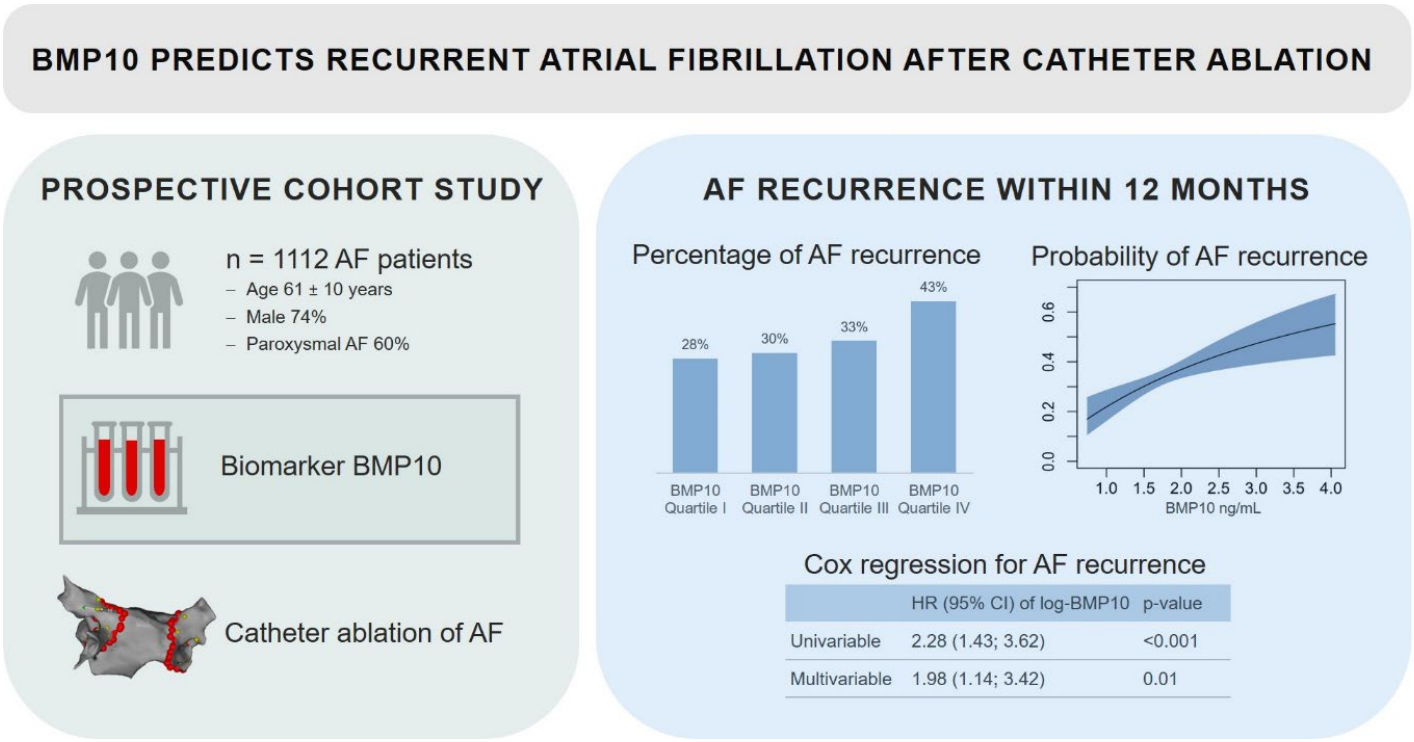
Method: We measured baseline BMP10 concentrations in AF patients who underwent a first elective CA in the prospective Swiss-AF-PVI cohort study. The primary outcome was AF recurrence lasting longer than 30 seconds during a follow-up of 12 months. We constructed multivariable cox proportional hazard models to determine the association of BMP10 and AF recurrence.

Results: A total of 1,112 patients with AF (age 61 ± 10 years, 74% male, 60% paroxysmal AF) was included in our analysis. During 12 months of follow-up, 374 patients (34%) experienced AF recurrence. The probability for AF recurrence increased with increasing BMP10 concentration. In the unadjusted cox proportional hazard model, a per-unit increase in log-transformed BMP10 was associated with a hazard ratio (HR) of 2.28 (95% CI 1.43, 3.62; p <0.001) for AF recurrence. After multivariable adjustment, the HR of BMP10 for AF recurrence was 1.98 (95% CI 1.14; 3.42, p = 0.01), and there was a linear trend across BMP10 quartiles (p = 0.02 for linear trend).

Conclusion: The novel atrial-specific biomarker BMP10 was strongly associated with AF recurrence in patients undergoing CA for AF.

Conflict of interest: No

Figure: Graphical Abstract



O58

Initial experience and early outcomes of posterior wall ablation using pulsed-field ablation

Thomas Kueffer[1], Antonio Madaffari[1], Aline Mühl[1], Jens Seiler[1], Gregor Thalmann[1], Helge Servatius[1], Hildegard Tanner[1], Andreas Haeberlin[1], Samuel Baldinger[1], Nikola Kozhuharov[1], Fabian Noti[1], Tobias Reichlin[1], Laurent Roten[1]

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Introduction: In patients with persistent AF, additional isolation of the posterior wall may improve ablation success. Pulsed field ablation (PFA) is a novel ablation technology that might be superior to conventional methods for posterior wall ablation due to its safety profile and might allow for posterior wall ablation (PWA) rather than posterior wall isolation (PWI) based on its efficiency.

Method: Consecutive patients with PWA during their first PFA procedure for AF between May 2021 and October 2022 at our institution were included. For PWA, single sets of two applications were delivered in an overlapping fashion and without catheter rotation between lesion sets to cover the entire posterior wall. PWA was verified using a 3D mapping. Patients were followed with seven-day Holter ECGs after 3, 6 and 12 months. The primary endpoint was recurrence of atrial arrhythmias after a blanking period of 90 days.

Results: PWA using PFA was performed in 163 patients (mean age 67 years, 71% male). In 55 patients (34%), PWA was added to PVI during the first AF ablation procedure and the remaining patients had undergone a median of two (IQR 1-3) AF ablation using different technologies. Of all patients, 45 (28%) had paroxysmal, 93 (57%) persistent AF, and 22 patients (15%) left atrial reentry tachycardia. All posterior walls could be isolated acutely. No cardiac tamponade, stroke, phrenic nerve injuries, atrio-esophageal fistula, or clinically manifest coronary spasm occurred.

112 patients were followed for a median of 6 (IQR 3-8) months. Recurrence of atrial arrhythmias in KM-Analysis was 22% after 6 months and 55% after 12 months. During repeat ablation, 6 of 7 (86%) patients showed persisting PWI.

Conclusion: Left atrial PWA using PFA can be performed safely and efficiently. Early data on the durability of PWA and on arrhythmia-free outcome are moderate and larger, prospective studies are needed.

Conflict of interest: The SPUM-ACS cohort was supported by the Swiss National Science Foundation (SNSF 33CM30-124112, Inflammation and acute coronary syndromes (ACS) – Novel strategies for prevention and clinical management, and SNSF 32473B_163271, Long-term benefit of the multi-center, multidimensional secondary prevention program in patients with acute coronary syndromes) and unrestricted grant from AstraZeneca, Switzerland, Eli Lilly USA, and Medtronic, Switzerland.

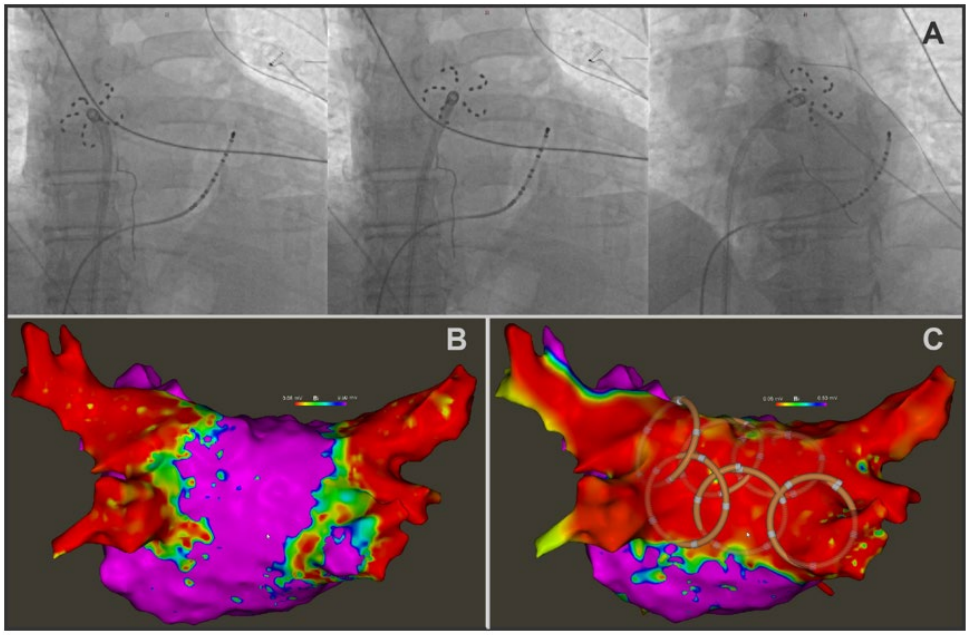

Figure: Posterior wall ablation using pulsed-field ablation during a Redo-Procedure after Cryo ablation. Example positions of the catheter in flower configuration in antero-posterior view (A). Pre-ablation map (B) and post-ablation map with a selection of overlapping catheter positions, tracked by the mapping system (C). In addition to the visualized PFA catheter positions, anchor lesions are performed with the wire extended into the pulmonary veins and posterior angulation of the sheath.

ABSTRACT SESSION: CORONARY ARTERY DISEASE / ACUTE CARDIOVASCULAR CARE – 2

O59

Clinical Efficacy of Permanent Internal Mammary Artery Occlusion in Chronic Coronary Artery Disease: a Double-Blind, Randomized, Sham-Controlled Trial

Marius Reto Bigler[1], Andrea Kieninger-Graefitsch[1], Christine Tschannen[1], Raphael Grossenbacher[1], Christian Seiler[1]

[1]Bern University Hospital, Cardiology, Bern, Switzerland

Introduction: Natural internal mammary artery (IMA) bypasses to the coronary circulation have been shown to act as extracardiac sources of myocardial blood supply, which has been found augmented by right IMA device occlusion. The goal of this randomized, sham-controlled trial was to test the efficacy of permanent right or left IMA device occlusion on symptoms of chronic coronary artery disease (CAD), on coronary artery occlusive blood supply, as well as on myocardial ischemia.

Method: This was a prospective superiority trial in 100 patients with chronic CAD randomly allocated (1:1) to IMA permanent vascular device occlusion (verum group) or to IMA sham intervention (placebo group). The primary study endpoint was the change in treadmill exercise time (DET in seconds, s) during 6 weeks of follow-up after trial intervention. Secondary study endpoints were the changes in simultaneously obtained collateral flow index (CFI), and angina pectoris during a 1-minute proximal balloon occlusion of the coronary artery of interest. CFI is the ratio between simultaneous mean coronary occlusive divided by mean aortic pressure both subtracted by central venous pressure.

Results: In the verum and placebo group, exercise time changed from 398 ± 176s to 421 ± 198s in the verum group ($p = 0.1745$), and from 426 ± 162s to 430 ± 166s in the placebo group ($p = 0.55$); DET was +23 ± 116s and +4 ± 120s, respectively ($p = 0.44$). CFI change during follow-up was +0.022 ± 0.061 in the verum and -0.039 ± 0.072 in the placebo group ($p < 0.0001$). Angina pectoris at follow-up during the coronary balloon occlusion for CFI measurement had decreased or disappeared in 20/48 patients of the verum group, and in 10/47 patients of the placebo group ($p = 0.0336$).

Conclusion: Permanent IMA device occlusion tends to augment treadmill exercise time in response to heightened coronary artery occlusive blood supply, the fact of which is reflected by mitigated signs of myocardial ischemia.

Keywords

Coronary circulation, collateral circulation, internal mammary artery, myocardial ischemia, angina pectoris

Conflict of interest: No

O60

Surgical treatment of acute type A aortic dissection: Outcomes of a standardized institutional protocol

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Introduction: Surgery is the recommended treatment for acute type A aortic dissection (AAAD). A standardized protocol has been introduced in our institution since 2016 which was operator-dependent before. The aim of this study is to determine how the standardized protocol has impacted AAAD management.

Method: Retrospective cohort study on patients diagnosed with AAAD and treated surgically between 2010 and 2021. Patients were divided into 2 groups: Group 1 consisted of the patients who underwent an operation before 2016 by "operator-dependent techniques" and group 2 were patients who underwent an operation from 2016 with a "standardized institutional protocol". Pre-, per-, and post-operative data were collected for each patient from our computer system and compared between each group.

Results: A total of 104 patients were included. Mean age was 66.5 ± 11.4 years and 55.8% were male. Demographics and preoperative data were similar in both groups. Arterial and venous cannulation site of both groups were different (p <0.001): femoral artery and vein cannulation for group 1 versus subclavian artery and central venous canulation for group 2. Alone ascending aorta replacement versus ascending aorta plus hemi-arch replacement were the preferred techniques in group 1 and 2, respectively (p <0.001). Hypothermic circulatory arrest and cerebral perfusion were largely performed in group 2 compared to group 1 (p <0.001). Total time of surgery, cardiopulmonary bypass and aortic cross-clamping times were longer in group 2 (p <0.05). Both groups had similar rates of postoperative complications, except for late reoperation and aortic dilatation rates which were less frequent in group 2 (p <0.05). [See Table 1 and Figure 1]

Conclusion: Converting AAAD operations from « surgeon-tailored » to « patient-tailored » approach is feasible. Since the introduction of the standardized protocol, there has been a significant decrease in aortic reoperation and aortic dilatation rates. Using standardized institutional protocols in small volume centers may help to get better results.

Conflict of interest: No

Table 1. Peri- and post-operative parameters

Parameter	Overall (N=104)	Group 1 (N = 58)	Group 2 (N=46)	P-value
Cannulation site				
Arterial				
Femoral	52.0% (53)	73.2% (41)	26.1% (12)	<.001
Central	12.7% (13)	8.9% (5)	17.4% (8)	.202
Subclavian or axillary	35.3% (36)	17.9% (10)	56.5% (26)	<.001
Venous				
Femoral	44.1% (45)	73.2% (41)	8.7% (4)	<.001
Central	63.7% (65)	41.1% (23)	91.3% (42)	<.001
Surgical procedure				
Ascending aorta replacement with arch preservation	41.3% (43)	69.0% (40)	6.5% (3)	<.001
Hemi arch replacement	48.1% (50)	24.1% (14)	78.3% (36)	<.001
Total arch replacement	8.7% (9)	3.4% (2)	15.2% (7)	.034
Distal anastomosis techniques				
Open	58.3% (60)	29.3% (17)	95.6% (43)	<.001
Under clamping	41.7% (43)	70.7% (41)	4.4% (2)	<.001
Operation by:				
1 surgeon	52.9% (55)	67.2% (39)	34.8% (16)	<.001
≥2 surgeons	47.1% (49)	32.8% (19)	65.2% (30)	<.001
Hypothermia	62.5% (65)	37.9% (22)	93.5% (43)	<.001
Degree of hypothermia, mean ± SD (°C) (N = 65)	26.0±4.0	24.7±4.3	26.1±2.3	.162
Cerebral perfusion (CP)				
None	48.1% (50)	79.3% (46)	8.7% (4)	<.001
Antegrade	50.0% (52)	17.2% (10)	91.3% (42)	<.001
Retrograde	1.9% (2)	3.4% (2)	0.0% (0)	.502
Duration of CP, mean ± SD (min)	43.9±27.8	43.3±15.3	44.0±29.4	.970
Unilateral CP	23.1% (24)	20.7% (12)	26.1% (12)	.516
Bilateral CP	28.8% (30)	0.0% (0)	65.2% (30)	<.001
Total length of surgery, mean ± SD (hours)	6.1 ±2.2	5.6 ±2.2	6.6 ±2.0	.019
Duration of CPB, mean ± SD (hours)	3.0 ±1.3	2.7 ±1.3	3.3 ±1.2	.028
Aortic cross clamping duration, mean ± SD (hours)	2.0 ± 0.9	1.8 ±0.9	2.2 ±0.8	.011
Late reoperation				
Total number of reoperation	14.4% (15)	24.1% (14)	2.2% (1)	.002
Aortic dilatation (Aneurysm, pseudoaneurysm)	11.5% (12)	19.0% (11)	2.2% (1)	.008
Recurrent aortic dissection	7.7% (8)	12.1% (7)	2.2% (1)	.074
Aortic valve insufficiency	3.8% (4)	6.9% (4)	0.0% (0)	.128
Follow-up, mean ± SD (years)	4.8 ± 4.1	6.6 ± 4.4	2.4 ± 2.1	<.001

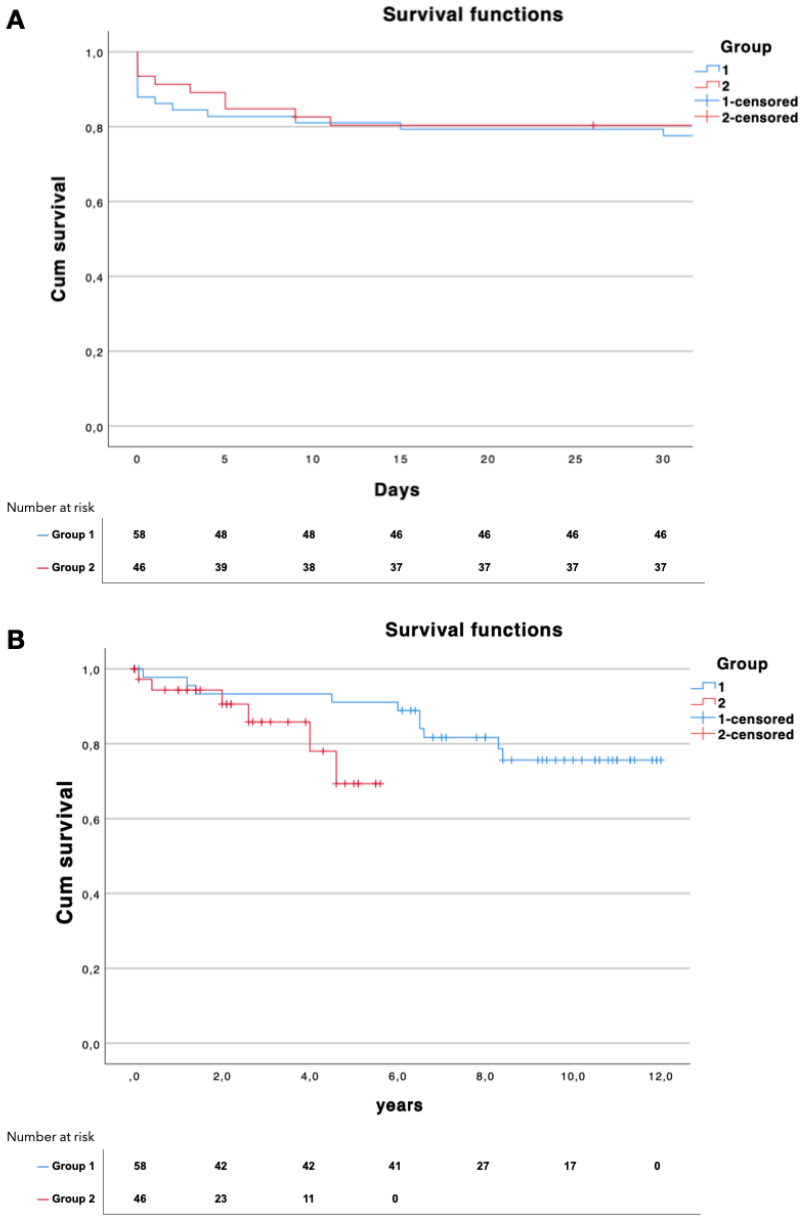

Fig. 1-A-B. Survival curves
A. 30-days mortality (in-hospital mortality)
B. Long term mortality

O61

Direct Comparison of the European Society of Cardiology 0/1h and 0/2h-High-Sensitivity Cardiac Troponin Algorithms for Early Diagnosis of Acute Myocardial Infarction in Patients with prior Coronary Artery Bypass Grafting

Luca Koechlin[1], Jasper Boeddinghaus[2], Pedro Lopez Ayala[2], Thomas Nestelberger[2], Karin Wildi[2], Oliver Reuthebuch[3], Friedrich Eckstein[3], Christian Müller[2]

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Introduction: Based on the lower efficacy of the European Society of Cardiology (ESC) 0/1h-high-sensitivity cardiac troponin (hs-cTn) algorithm in patients with a history of coronary artery bypass grafting (CABG), the early diagnosis of myocardial infarction (MI) is limited in this vulnerable patient cohort. We hypothesized, that a longer time to the 2nd blood draw within the 0/2h-hs-cTn algorithm would increase the efficacy.

Method: In a post-hoc analysis from an international multicenter diagnostic study including patients presenting to the ED with chest discomfort, final diagnoses were adjudicated according to the Fourth Universal Definition of MI according to all available medical records including a 3-month follow-up and study specific data including serial measurements of hs-cTn. Adjudication was performed by two independent cardiologists. We aimed to directly compare the performance of the ESC 0/1h and 0/2h-hs-cTnT/I algorithms in patients with prior CABG.

Results: In 356 patients (median [Interquartile range, IQR] age 73.0 [64.0, 80.0] years, 15% [n = 54] female, prevalence of Non ST-elevation myocardial infarction [NSTEMI]: 31% [n = 112]) available for the analysis of the ESC 0/1h and 0/2h-hs-cTnT algorithms, safety was very high for both algorithms (0/1h: Sensitivity: 100% [96.7-100], negative predictive value [NPV]: 100% [96.1-100]; 0/2h: Sensitivity: 99.1% [95.1-99.8], NPV: 99% [94.4-99.8]) and accuracy for rule-in of NSTEMI was very accurate (0/1h: Specificity: 97.1% [94.2-98.6], positive predictive value [PPV]: 91.8% [84-96]; 0/2h: Specificity: 98.4% [95.5-99.4], PPV: 94.9% [87.7-98]; Central Illustration). Efficacy was limited in both algorithms with about 50% of the patients remaining in the Observe-Zone meaning they could not be triaged to either rule-in/out of MI within 1 or 2 hours, respectively. Findings were confirmed using hs-cTnI Architect.

Conclusions: The 0/2h-hs-cTn algorithm does not help to increase the efficacy of the early triage and does therefore not improve the early diagnosis of patients with prior CABG.

Conflict of interest: Dr. Koechlin received a research grant from the Swiss Heart Foundation, the University of Basel, the Swiss Academy of Medical Sciences and the Gottfried and Julia Bangerter-Rhyner Foundation, the "Freiwillige Akademische Gesellschaft Basel" as well as speaker honoraria from Siemens, Roche and Abbott outside the submitted work.

Central illustration.

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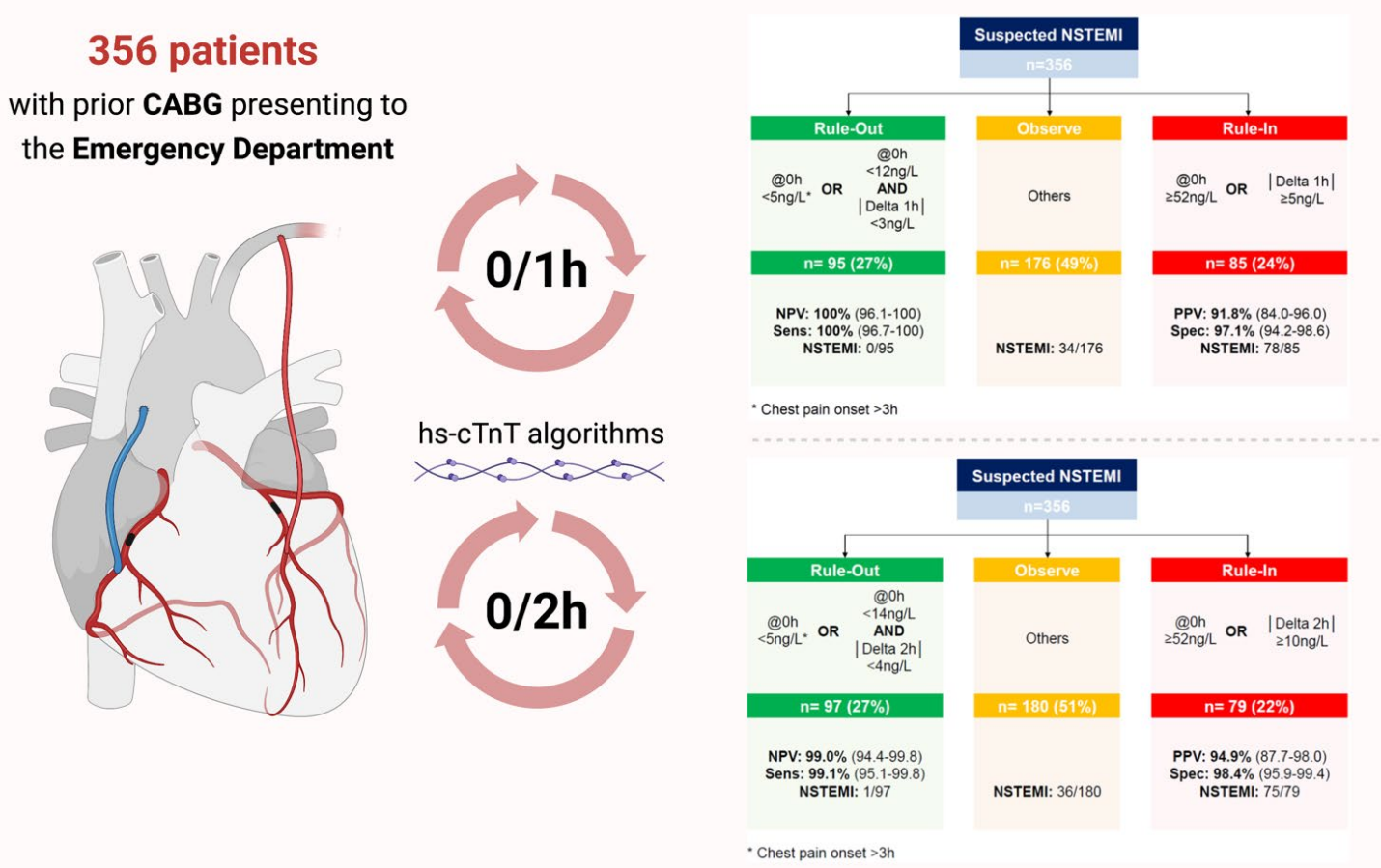

O62

Head-to-head comparison of two different angiography-derived FFR techniques in NSTEMI patients

Ioannis Skalidis[1], Ohm Wongo[1], David Meier[1], Bernard De Bruyne[2], Carlos Collet[2], Jeroen Sonck[2], Thabo Mahendiran[1], Eric Eeckhout[1], Olivier Muller[1], Stephane Fournier[1]

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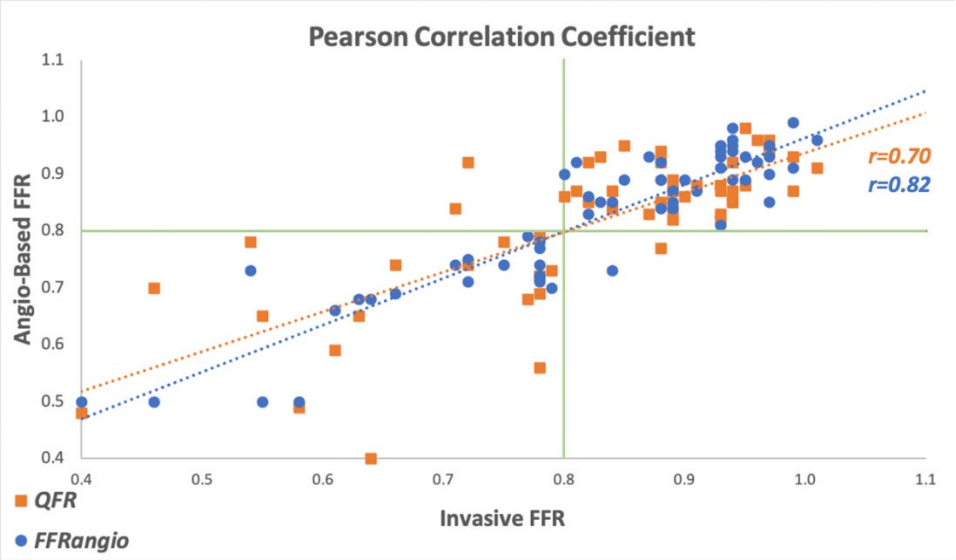
Introduction: Recently, non-invasive methods ("wire free") to functionally assess the hemodynamic severity of a coronary artery have emerged. FFRangio® (CathWorks®, Israel) and QFR (Medis Medical Imaging System bv, Netherlands) are angiography-based technologies that have been validated in patients with chronic and acute coronary syndrome compared to invasive FFR measurement. To date, no direct comparison between these two methods has been reported and they have never been prospectively evaluated in patients presenting exclusively with Non-ST Segment Elevation Myocardial Infarction (NSTEMI)

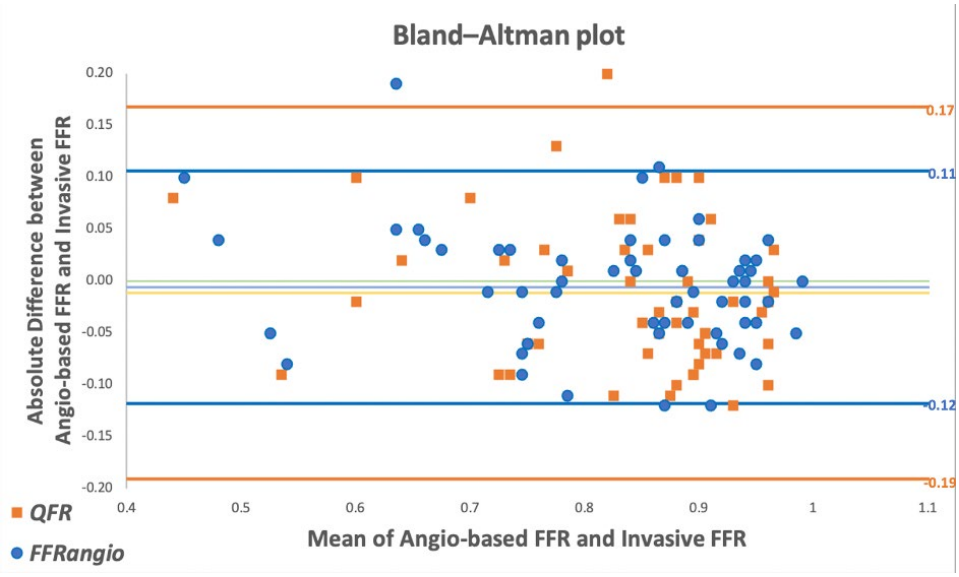
Method: Patients with NSTEMI were prospectively included in this multicenter, single-arm, double-blinded study comparing FFR calculated by FFR_{angio}® and QFR – to invasively-measured FFR ($FFR_{invasive}$). $FFR_{invasive}$ was measured in all angiographically intermediate lesions (30%-70% stenosis) and was then compared to FFR_{angio}® and QFR which were calculated at the same vessel position, by a blinded operator. The primary endpoints were the sensitivity and specificity of FFRangio® and QFR relative to the reference standard $FFR_{invasive}$ using a cutoff value of ≤0.80.

Results: Among 100 NSTEMI patients who were screened, 46 patients with 60 vessels in total underwent $FFR_{invasive}$ measurements and were included in the study. The mean value of $FFR_{invasive}$ was 0.83 ± 0.3 with 22 (36%) being ≤0.80. The mean FFR_{angio}® was 0.82 ± 0.1 with 22 (36%) being ≤0.80. FFRangio exhibited a sensitivity of 95.5%, a specificity of 97.4% and a diagnostic accuracy of 96.7%. The mean QFR was 0.86 ± 0.2 with 20 (33%) being ≤0.80 and it showed sensitivity of 86.4%, specificity of 97.4% and diagnostic accuracy of 93.3%.

Conclusion: To our knowledge, this study represents the first head-to-head comparison between these two non-invasive angiography-derived physiology assessment modalities. Both, FFRangio® and QFR demonstrated great diagnostic performance which is slightly better compared to previous validation studies. Although, based on this study, FFR_{angio}® seems to have better sensitivity, further larger validation studies are required.

Conflict of interest: No





O63

Long term outcomes after coronary angioplasty with a sirolimus-coated balloon

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Introduction: The Selution SLR™ (MedAlliance SA, Nyon, Switzerland) is a novel sirolimus-eluting drug coated balloon (SCB), which provides a controlled release of its limus-drug. We have recently demonstrated promising early outcomes with this SCB in a small patient population. So far, no long-term outcomes (>12 months) after coronary angioplasty using the Selution SLR™ have been reported. The aim of this study was to assess long-term outcomes after PCI involving this novel SCB in a large population, involving also complex coronary artery lesions.

Method: Consecutive patients, which were treated with the Selution SLR™ SCB were enrolled in the prospective SIROOP Registry (NCT04988685). Outcomes of interest included, target lesion failure (TLF), target lesion revascularization (TLR) and target vessel myocardial infarction (TV-MI). All angiograms and outcomes were independently adjudicated.

Results: Overall, 321 patients and 357 lesions underwent PCI with the Selution SLR™. The cohorts mean age was 67 ± 10.3, 102 (33%) had diabetes and 122 (38%) patients presented with an acute coronary syndrome. Most lesions were in the left anterior descending artery 178 (50%), The mean SYNTAX score was 21 ± 12. Mean DCB diameter was 2.7 ± 0.54 mm. Flow-limiting dissections after use of DCBs requiring bail-out stent implantation occurred in 8 (2.5%) procedures. We encountered no coronary artery perforations or acute vessel closures. After a mean follow-up time of 15 ± 5.4 months, TLF occurred in 20 (7.8%) patients, only 1 (0.4%) patient presented with TV-MI. The leading TLF cause appeared to be lesion recoil/ collapse. Further baseline/angiographic characteristics can be found in *Figure 1*. *Figure 2* depicts an illustrative case.

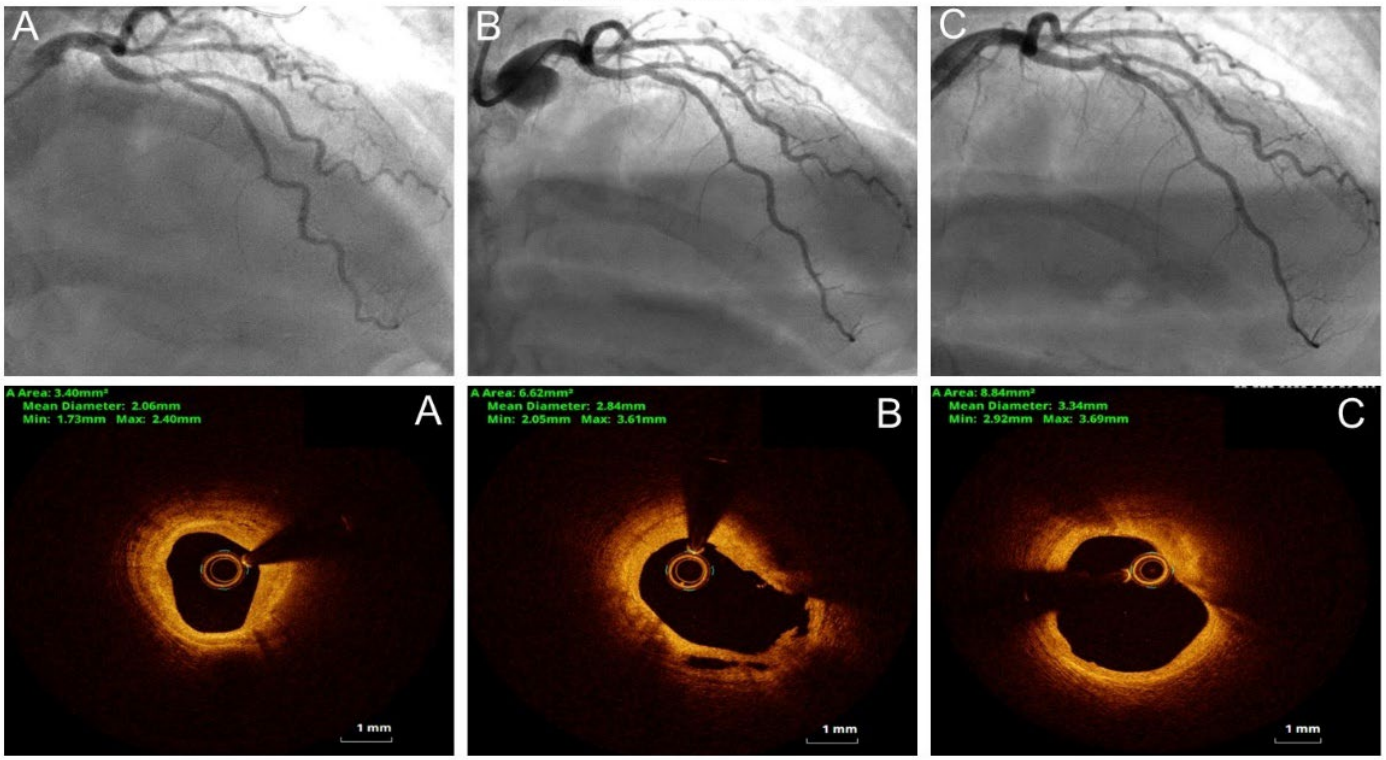
Conclusion: Treatment of coronary lesions, including complex and long lesions, with the novel Selution SLR™ drug-coated balloon seems associated with favourable long-term outcomes, including a low rate of TLF and very low risk for acute vessel closure. These findings warrant further investigation in a dedicated randomized trial.

Conflict of interest: FP was compensated for travel expenses by Abbott Vascular, Edwards Lifesciences, Polares Medical, and Medira. SW reports research and educational grants to the institution from Abbott, Amgen, Astra Zeneca, BMS, Bayer, Biotronik, Boston Scientific, Cardinal Health, CardioValve, CSL Behring, Daiichi Sankyo, Edwards Lifesciences, Guerbet, InfraRedx, Johnson & Johnson, Medicure, Medtronic, Novartis, Polares, OrPha Suisse, Pfizer, Regeneron, Sanofi-Aventis, Sinomed, Terumo, V-Wave. SW reports research, travel or educational grants to the institution from Abbott, Abiomed, Amgen, Astra Zeneca, Bayer, Biotronik, Boehringer Ingelheim, Boston Scientific, Bristol Myers Squibb, Cardinal Health, CardioValve, Corflow Therapeutics, CSL Behring, Daiichi Sankyo, Edwards Lifesciences, Guerbet, InfraRedx, Janssen-Cilag, Johnson & Johnson, Medicure, Medtronic, Merck Sharp & Dohm, Miracor Medical, Novartis, Novo Nordisk, Organon, OrPha Suisse, Pfizer, Polares, Regeneron, Sanofi-Aventis, Servier, Sinomed, Terumo, Vifor, V-Wave. SW serves as advisory board member and/or member of the steering/executive group of trials funded by Abbott, Abiomed, Amgen, Astra Zeneca, Bayer, Boston Scientific, Biotronik, Bristol Myers Squibb, Edwards Lifesciences, Janssen, MedAlliance, Medtronic, Novartis, Polares, Recardio, Sinomed, Terumo, V-Wave and Xeltis with payments to the institution but no personal payments. He is also member of the steering/executive committee group of several investigator-initiated trials that receive funding by industry without impact on his personal remuneration. TP has received research grants to the institution from Biotronik, Edwards Lifesciences and Boston Scientific; Speaker fees/consultancy fees from Medtronic, Boston Scientific, Edwards Lifesciences, Abbott, and HighLife SAS. DR reports travel expenses from Abbott, Edwards Lifesciences and Medtronic. OR is member of the advisory board of Medira. He reports travel expenses from Abbott, Medtronic and Edwards Lifesciences. The other authors have no conflict of interest to declare.

Figure 1: Baseline and angiographic characteristics

Baseline and angiographic characteristics	No. of patients/lesions (n=321/357)
Males (%)	267 (84)
Presentation (%):	
Chronic coronary syndrome	199 (62)
Acute coronary syndrome	122 (38)
In-stent restenosis (ISR)	51 (14)
Chronic total occlusions (CTOs)	65 (18)
Moderate to severe calcifications	210 (59)
Hybrid approach (DES+DCB)	145 (41)
DCB-only approach	212 (59)

Figure 2: Illustrative case depicting DCB-PCI of the proximal LAD with the Selution SLR™ before (A) after (B) PCI and at 6 months follow-up (C)



O64

Gender differences in outcome following concomitant coronary artery bypass and aortic valve replacement surgery

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Introduction: Combined coronary artery bypass grafting (CABG) and aortic valve replacement (AVR), and female gender are associated with increased perioperative mortality in clinical risk scores. This study investigated gender differences in short-term outcome stratified by age groups.

Method: All patients undergoing AVR and CABG between January 2001 and June 2021 at our institution were included. 1963 patients were grouped by decades into: 59 years and younger (n = 127), 60-69 (n = 471), 70-79 (n = 1070) and 80 years and older (n = 295). The primary end points of this study were 30- and 180-days mortality. Secondary end points were influence of preoperative risk factors and impact of gender on survival and postoperative major adverse events.

Results: Female patients showed higher 30- and 180-days mortality after combined CABG and AVR surgery (8.3% vs. 4.2%, p <.001; 15.8% vs. 9.4%, p <.001). Stratified by age groups 30- and 180-days mortality, remained significantly higher in septuagenarians (9.6% vs. 2.5%, p <.001; 16.3% vs. 7.7%, p <.001). Females were significantly older, had better preserved left ventricular function and higher incidence of diabetes mellitus compared to male patients in this subgroup (p <.001; p = .01; p <.001). Additionally, females received significantly less internal mammary artery (IMA) conduits (p <.001). Female gender (OR: 3.33, 95%-CI: [1.76-6.31]; 1.93, [1.22-3.06]), higher age (1.28, [1.13-1.45]; 1.16, [1.06-1.26]), diabetes mellitus (1.93, [1.03-3.60]; 1.70, [1.08-2.67]) and LVEF <30% (3.26, [1.48-7.17]; 2.23, [1.24-4.02]) were correlated with 30- and 180-days mortality, respectively. Upon multivariable testing, gender (1.77, [1.21-2.58]) and LVEF <30% (3.71, [2.39-5.76]) remained significant risk factors for major adverse postoperative events. Infrequent use of IMA grafts was associated with increased 30- and 180-days mortality as well as adverse events (0.47, [0.25-0.87]; 0.46, [0.29-0.72]; 0.61, [0.42-0.88]).

Conclusion: Gender disparities in baseline characteristics may delay operative intervention in female patients. The inherent risk profiles might be responsible for outcome differences in septuagenarians.

Conflict of interest: No

ABSTRACT SESSION: CLINICAL HEART CASES

O65

Ablation of frequent and symptomatic premature ventricular beats originating in the ascending aorta.

Vittorio Beltrani[1], Julia Hermes-Laufer[2], Lorenzo Grazioli Gauthier[1], Chan-Il Park[1]

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Introduction: A 53-year-old woman presented with palpitations, chest discomfort and dyspnea. Initial cardiological work-up revealed normal LV function without scar (TTE/CMR) but a high burden of monomorphic PVCs (29'250/day, 30%daily-beats). The ECG showed normal sinus rhythm with the origin of the PVCs compatible from the LVOT.

Method: Bisoprolol was introduced and titrated to 10 mg/day. Despite this, the patient remained symptomatic with a high burden of PVCs; consequently she was referred for PVC Ablation.

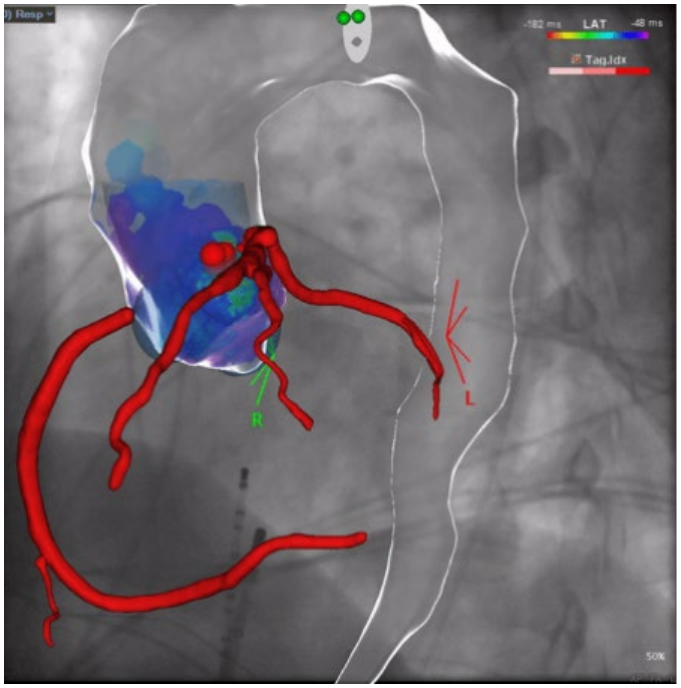
The RVOT and LVOT were reconstructed with intracardiac echocardiography and an activation map was performed in both outflow tracts and at the great cardiac vein with a high-density mapping catheter and a decapolar catheter.

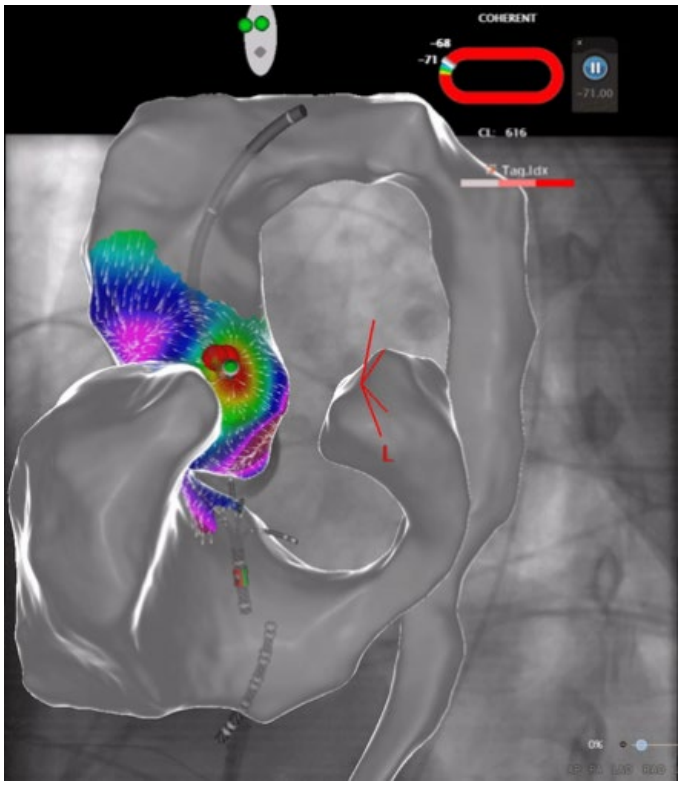
A fragmented potential was recorded preceding the onset of the PVC by 32 ms at the level of the ascending aorta, 26 mm above the sino-tubular junction of the left coronary cusp. Pace mapping at this level showed a very good correlation with the PVC (11/12, 98%). For safety purposes, we performed an aortography and coronography to locate the LM, which was located 4 mm from the earliest site. A single burst of radiofrequency (25W) was able to abolish the PVC. Unfortunately, the PVC recurred after 3 minutes requiring 2 more RF applications followed by complete disappearance of PVC (25-30W, Ablation index 400).

Results: After 8 months follow-up, the patient remained free of symptoms and Holter monitoring confirmed complete absence of PVCs.

Conclusion: This case illustrates a rare and exceptional PVC origin located far above the aortic valve. PVCs originating from the aortic sinuses of Valsalva account for ~21% of idiopathic PVCs. When performing PVC ablation in the outflow tract region, care should be taken to explore the usual locations below and above the coronary cusps as well as to map the ascending aorta.

Conflict of interest: No





O66

Thrombus entrapment by means of left atrial appendage closure facilitating the management of severe tachycardiomyopathy

Anita Stefanova[1], Livia Primiceri[1], Raouf Madhkour[1], Lorenz Räber[1], Tobias Reichlin[1], Jolie Bruno[1], Bruno Schnegg[1]

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Introduction: A 65-year-old male patient presented to the emergency department for symptomatic acute new-onset heart failure. We noted bibasilar crackles on auscultation and oedema of the lower limbs. The ECG showed a typical atrial flutter. In the TTE, ejection fraction of 15% without ventricular dilatation (LVDD 53 mm). The TEE showed a thrombus in the left atrial appendage (LAA) (Figure 1a).

Differential diagnosis: The differential diagnosis in any patient presenting with systolic dysfunction and supraventricular tachycardia includes the classic causes of heart failure (ischemic, hypertensive, valvular, idiopathic, infiltrative heart disease). When this initial diagnosis is accompanied by tachycardia, the etiology may be tachycardiomyopathy.

Tachycardiomyopathy is always a retrospective diagnosis (after correction of the arrhythmia). The suspicion for this diagnosis was high in our case, given all of the aspects above.

Method: We considered rhythm control with restoration of sinus rhythm to be of primary importance in managing this patient. Cardioversion, however, was contraindicated due to the thrombus. We decided to perform a thrombus-trapping procedure with the implantation of a Watchman in the LAA (Figure 1b and 1c). This technique is characterized by the positioning of the Watchman delivery sheet in the left upper pulmonary vein with the Watchman device partially expanded. Subsequently, the device is directed towards the ostium of the LAA and carefully delivered to the landing zone.

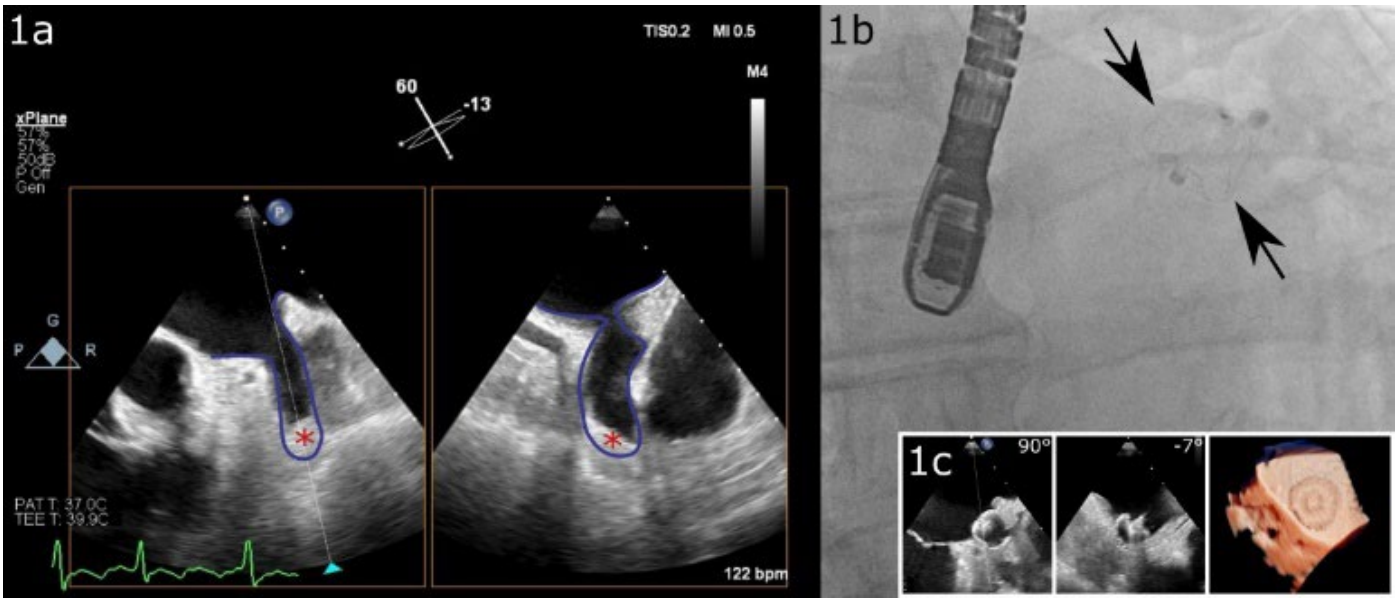
Results: On the same day, we successfully ablated the cavotricuspid isthmus with the termination of atrial flutter and restoration of sinus rhythm.

Six months after discharge, echocardiography revealed sustained recovery of the LVEF to 60%.

Conclusion: Thrombus entrapment using left atrial appendage closure in a patient with severe tachycardiomyopathy allowed rapid and safe restoration of sinus rhythm with subsequent complete restoration of ventricular systolic function at six months.

Conflict of interest: No

Figure 1a, b and c



O67

The HeartMate3 left ventricular assist device outflow graft sub-occlusion – a growing problem but with a simple solution

Anna Nowacka[1], Nadia Kilani[2], Vanessa Torres[1], Roger Hullin[2], Patrick Yerly[2], Carlo Marcucci[3], Lorenzo Rosner[3], Sébastien Deglise[4], Matthias Kirsch[1]

[1]CHUV, Cardiac surgery, Lausanne, Switzerland, [2]CHUV, Cardiology, Lausanne, Switzerland, [3]CHUV, Anesthesiology, Lausanne, Switzerland, [4]CHUV, Vascular surgery, Lausanne, Switzerland

Introduction: Since its introduction on the clinical use, the HeartMate3 (HM3) device has significantly improved the quality of life and survival of patients as bridge-to-transplantation or destination therapy. Nevertheless, the HM3 device is not immune to complications. In long-term support patients, narrowing of the outlet cannula has been reported due to the accumulation of biodebris in-or-outside the outflow cannula but within the bend relief structure. We report a sub-occlusion of the outlet cannula successfully treated with percutaneous stenting.

Method: A 69-year-old man on transplant list since 2019, assisted by HeartMate3 for end-stage ischemic cardiomyopathy since February 2020. He had an uncomplicated course and returned to an active lifestyle. Thirty-three months after device implantation, he experienced intermittent low-flow alarms, slightly decreased exercise intolerance and peripheral oedema.

The transthoracic echocardiography revealed normal left ventricular dimensions, one-to-one aortic valve openeing with a moderate insufficiency. Angio-CT showed a narrowed lumen of the outflow cannula due to extensive thrombus between the outflow graft and the bend relief. Invasive haemodynamic monitoring with a ramp test confirmed outflow obstruction (no left ventricular unloading despite increased pump speed).

Results: Given the high risks of re-operation, an endovascular approach was chosen using a right transcarotid access. A Tempo-Cobra-C2 catheter (Cordis) was placed retrograde into the outflow graft up to the metallic junction between pumphousing and the bend relief. With the LVAD speed reduced to 2000rpms and pump flow to 0,6L/min two EXCLUDER aortic endoprosthesis (16mmx9,5 cm and 18mmx 9,5cm)were deployed in the cannula. HM3 flow immediately improved from 1,8 L/min before and 4,6 L/min after procedure. The patient was immediately extubated after the procedure, without neurologic complications.

Conclusion: Due to the growing number of patients receiving HM3 therapy, irrespective of the therapy destination, outlet graft obstruction can be a significant survival risk. A percutaneous approach seems to provide a simple and safe option.

Conflict of interest: No

O68

Electrosurgery-induced ventricular fibrillation during ICD lead revision

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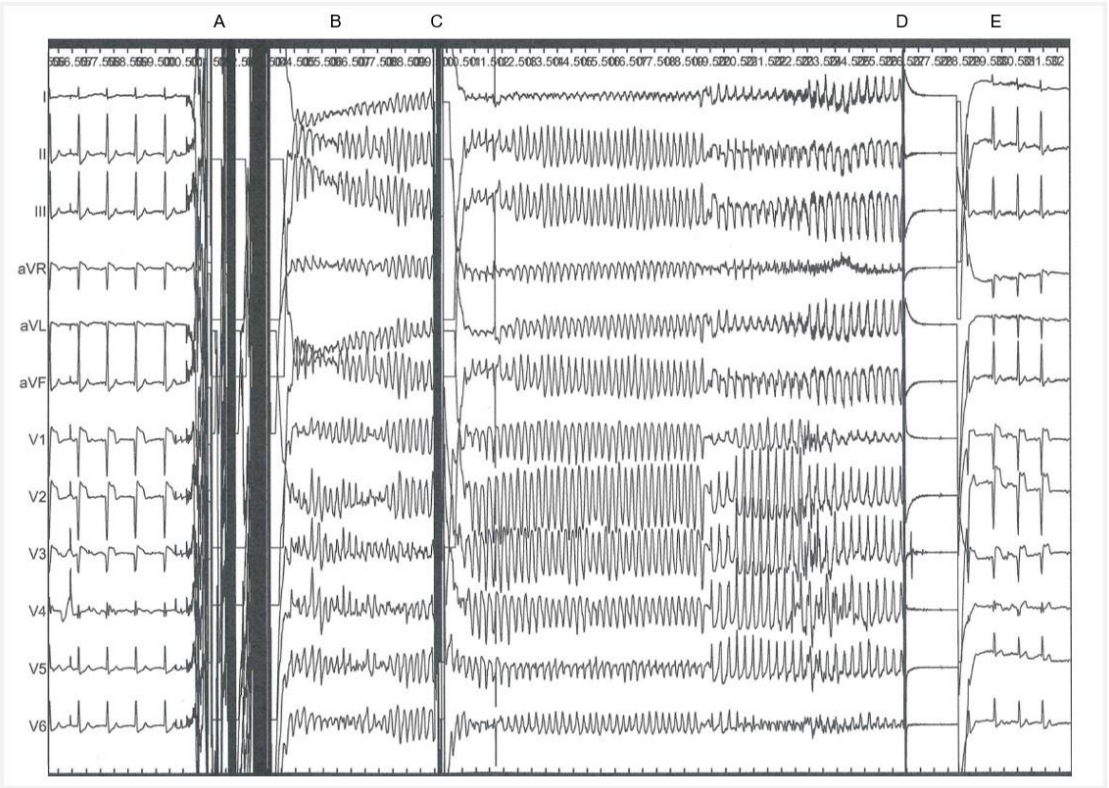
Introduction: Monopolar electrosurgery (ME) in patients with cardiac implantable electronic devices is generally recognized as safe if device parameters are set according to current recommendations. However, few cases with ME-induced ventricular fibrillation (VF) have been published over the last decades.

Case Report: A 71-year-old male patient with a VVI-ICD (single-coil, axillary vein access, implanted 2018) and recently diagnosed lead insulation defect was referred for lead revision intervention. The tachycardia detection function of the ICD was switched off prior to the procedure. The pocket was dissected using ME with the dispersive pad placed on the outside of the right thigh. ME (cut-mode) suddenly induced VF after a short pulse of <3 seconds. External defibrillation successfully converted VF into sinus rhythm (Figure 1). The remaining tissue was dissected using a cold scalpel. Inspection of the extrathoracic part of the lead revealed no obvious insulation defect. An additional ICD lead was implanted and the patient discharged on the same day. No recurrent episodes of VF were noted during short-term follow-up.

Conclusion: In ME, a high frequency alternating electric current at variable voltage is passed through tissue to generate heat and achieve hemostasis. This current may enter the lead at the level of an insulation defect and induce VF exiting at the myocardial lead interface. The incidence of ME induced ventricular tachyarrhythmia is overall low and can occur even in the absence of a lead insulation defect. Precautions could include the use of low power settings, bipolar electrosurgery, attentive patient monitoring and immediate access to an external defibrillator.

Conflict of interest: MD-PhD salary partly paid by SNF Grant

Figure 1. A and C: monopolar electrosurgery; B: ventricular fibrillation; D: defibrillation; E: sinus rhythm



O69

Non-infectious endocarditis with a large size vegetation in a patient with chronic Haemophilus influenzae pulmonary colonization: a case report

Samaksha Pant[1], Sebastien Colombier[1], Grégoire Girod[1], Nadège Lambert[1], Bojan Djokic[1], Alexandre Jean Pelouze[1], Dominique Delay[1]

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Non-infective thrombotic endocarditis (NITE) remains an important source of cardiac vegetation. Frequently seen in association with sepsis, autoimmune disease or malignancy, NITE have a significant risk of vegetation and subsequent embolization. This is particularly true in the case of concomitant Haemophilus species infection.

A 60-year-old smoker patient benefited from medical investigations for a progressive worsening NYHA III dyspnea. Recent medical history revealed treatment for chronic sinusitis by Clindamycin twice in the last 6 months.

Trans-Thoracic Echocardiography revealed a severe aortic stenosis with a bicuspid valve associated with a 18x13 mm vegetation. Inflammatory parameters and blood samples remained negative. A F^{18}-FDG PET/CT excluded neoplasia, autoimmune diseases or valvular infection. However, it suspected multiple bilateral lung emboli. QuantiFeron® test remained positive with negative sputum culture.

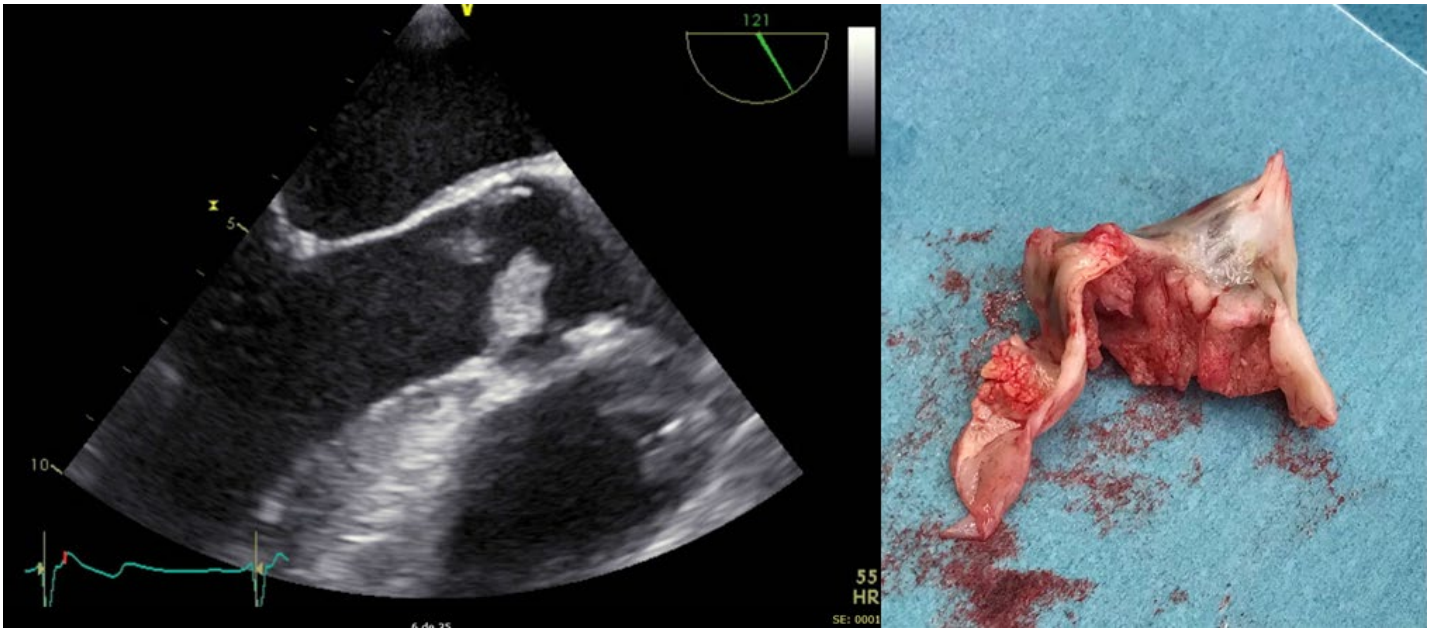
Facing a high risk of cardiac embolization with an indication for aortic valve replacement, valve surgery was planned in association with a concomitant broncho-alveolar lavage.

Intra-operative findings confirmed valvular lesions and a biological aortic valve was implanted with success. Post-operative course was uneventful.

Aortic valve cultures and eubacterial PCR were negative. However, broncho-alveolar samples remained positive to Haemophilus influenza. Histological valve analyses revealed a large organized fibrin mass with fibrosis and neovascularization. Diagnosis of NITE concomitant to a *Haemophilus influenza* chronic sinusitis infection was made. Treatment of *Haemophilus* pulmonary colonization was introduced and patient evolution was favorable at 6 post-operative months.

Literature described association of large aortic vegetation in 25% of *Haemophilus influenza* culture positive endocarditis. We described herein a rare case of a NITE with a large vegetation associated with a symptomatic *Haemophilus influenza* chronic respiratory tract colonization. In case of negative initial NITE investigations, we propose addition of broncho-alveolar cultures and *Haemophilus* respiratory tract colonization research.

Conflict of interest: No



ABSTRACT SESSION: CONGENITAL & PEDIATRIC CARDIOLOGY

O81

Strain analysis of right ventricular dyssynchrony and its association with long term outcomes in adults with repaired tetralogy of Fallot

Andrea Papa[1 2], Clément Nussbaumer[2], Fabienne Schwitz[2], Wustmann Kerstin[2 3], Matthias Greutmann[4], Markus Schwerzmann[2]

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Introduction: Adults with repaired tetralogy of Fallot (rTOF) are prone to cardiovascular complications. Much attention has been paid to the impact of residual pulmonary regurgitation on ventricular mechanics. Less is known about the consequences of right ventricular (RV) dyssynchrony on clinical outcomes. We aimed to investigate the impact of RV dyssynchrony measured by strain echocardiography on all-cause mortality, relevant arrhythmias and hospital admission for decompensated heart failure.

Methods: Using the multicenter Swiss Adult Congenital HEart disease Registry (SACHER) we have analysed TTE, cMRI and a cardiopulmonary exercise data. 2D speckle-tracking strain analysis of the right and left ventricle was performed with dedicaded software (Tomtec, Germany). RV dyssychrony index was measured as the standard deviation of time to peak shortening (TTP) in six RV segments. Interventricular shortening delay (IVSD) was defined as the maximal delay of TTP between ventricular segments (Fig. 1).

Results: A total of 284 patients were included. During mean follow-up of 48 ± 21 months we observed 4 cases of all-cause mortality, 18 clinically relevant arrhythmias and 11 hospitalisations for heart failure. RV dyssynchrony index and IVSD were significantly higher in the outcome group (49.4 ± 3 vs 40.9 ± 18, p-value 0.05, 130 ± 65ms vs. 103 ± 50ms, p-value 0.03, respectively). However, by multivariate Cox-regression, dyssynchrony parameter failed to show a statistically significant correlation with outcomes compared to age, ventilatory efficacy on exercise testing and the amount of the RV-RA systolic gradient (age, HR 1.64, p = 0.005; VE/VCO2, HR 1.11, p = 0.025; RV-RA gradient, HR 1.41 per 10 mmHg, p = 0.046) (Fig. 2).

Conclusion: In repaired TOF, RV dyssychrony index and IVSD correlate with clinical outcome during 4 years of follow up. However age, ventilatory efficacy and RV systolic pressure are stronger predictors of outcome than echocardiographic surrogates of RV dyssychrony.

Conflict of interest: No

Fig. 1

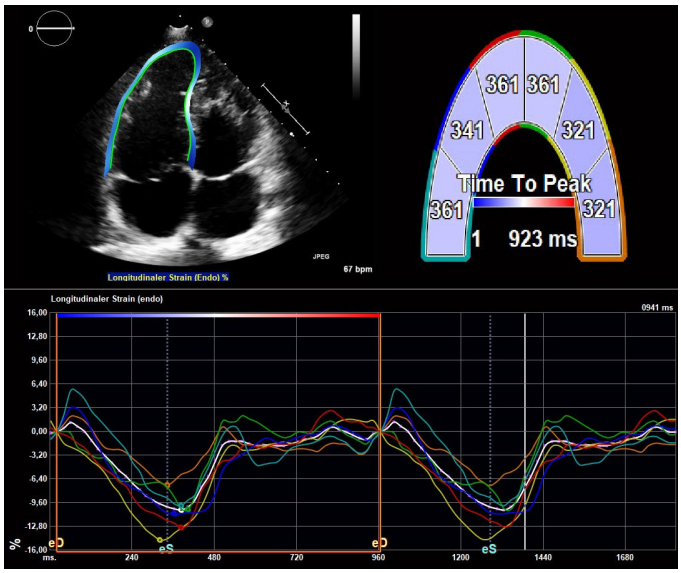
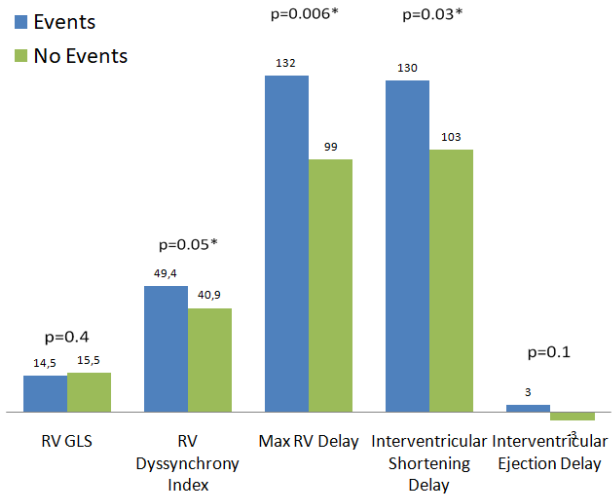


Fig. 2



Outcomes		Total cohort N = 285	
Time to follow-up	*Months*		48±21
Time to Event	*Months*		30±21
All events	*N (%)*		33(11.6)
All-cause mortality	*N (%)*		4(1.4)
Clinically relevant arrhythmia	*N (%)*		18(6.3)
Heart failure	*N (%)*		11(3.9)
Multivariate Cox- Regression analysis	**HR**	**95% CI**	**p-value**
Age	1.64	1.14-2.15	0.005*
RV Dyssynchrony Index	1.02	0.99-1.03	0.11
Max RV Delay	1.01	0.99-1.01	0.6
VE/VCO_2	1.11	0.97-0.99	0.025*
RV RA Gradient	1.41	1.00-1.12	0.046*

O82

Comparison of free-running whole-heart 5D and 4D flow imaging to standard 2D phase contrast in patients with right-sided congenital heart disease

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Introduction: Standard 2D phase contrast (2DPC) cardiac magnetic resonance sequences for flow quantification are limited by the need for precise prescription of image planes and long scan time. Recently introduced accelerated free-breathing 3D whole heart sequences promise an easier image acquisition allowing retrospective flow measurements in virtually all vessels. This study therefore compares 2DPC to an accelerated 4D flow sequence with prospective respiratory navigation and a free-running radial fully self-gated respiratory and cardiac motion-resolved 5D flow sequence (5D flow).

Method: In patients with right-sided congenital heart disease and no shunt, 2DPC, 4D flow and 5D flow sequences were acquired on a 1.5T scanner. Flow measured in the ascending, descending aorta (AA, DA), main, right and left pulmonary artery (MPA, RPA, LPA) and superior vena cava (SVC) as well as the internal consistency for systemic and pulmonary output determination were compared between all three sequences.

Results: Twenty patients (age 31 ± 11y, 7 women, tetralogy of Fallot N = 7, Ross operation N = 10; pulmonary regurgitation, atrial switch, Ebstein's disease each N = 1) were included.

Compared to 2DPC, both 4D and 5D flow moderately underestimated absolute flow which was significantly lower for the RPA for 4D flow compared to 5D flow (Table 1).

The mean difference (bias) of MPA flow between 2DPC and 4D flow correlated significantly to the MPA peak velocity (r^2 = 0.3, p = 0.03) with a similar trend for the comparison of 2DPC vs. 5D flow (r2 = 0.142, p = 0.141, Figure).

The internal consistency for systemic and pulmonary output determination was similar for 2DPC and 5D flow with a slightly lower agreement for 4D flow (Table 2).

Conclusion: 4D and 5D flow provide results comparable to 2DPC, although showing a trend towards lower values. The internal consistency was similar between 2DPC and 5D flow. Right-sided pathologies appear to have an impact on the difference observed between sequences as shown for the MPA.

Conflict of interest: No

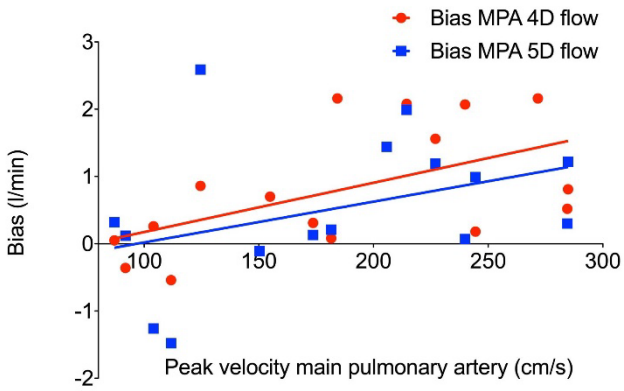

Table 1 Comparison of bias 2DPC vs. 4Dflow to 2DPC vs. 5D flow

Flow	2DPC vs. 4D flow	2DPC vs. 5D flow	p
AA	0.3 (-2.4, 2.9)	0.2 (1.5, 1.8)	0.055
DA	0.5 (-0.5; 1.5)	0.7 (-0.7; 2.0)	0.449
MPA	0.8 (-1.0; 2.6)	0.5 (-1.6; 2.7)	0.679
RPA	0.7 (-0.06; 1.5)	0.4 (-0.6; 1.4)	<0.001
LPA	0.6 (-1.9, 3.0)	0.1 (-3.2; 3.5)	0.058
SVC	0.2 (-0.1; 0.7)	0.3 (-0.1; 0.6)	0.959

Data shown are bias (l/min) and 95 % lower, upper limits of agreement.

p-Values refer to the comparison of the bias of the 2DPC vs. 4D flow and the 2DPC vs. 5D flow for each respective vessel.

Abbreviations: AA = ascending aorta, DA = descending aorta, MPA = main pulmonary artery, RPA = right pulmonary artery, LPA = left pulmonary artery, SVC = superior vena cava; 2DPC = 2D phase contrast.

Table 2 Comparison of internal consistency for determination of systemic and pulmonary output between sequences

Flow	2DPC	4D flow	5D flow	p
MPA vs. AA	-0.2 (-2.2; 1.7)	-0.5 (-3.1;1.9)	-0.5 (-2.3, 1.3)	0.080
DA+SVC vs. AA	-0.04 (-0.9; 0.8)	-0.5 (-3.2; 2.1)	-1.0 (-3.0; 1.1) [1]	0.015
RPA+LPA vs. MPA	0.3 (-1.5; 2.0) [2]	-0.4 (-1.8; 0.9)	0.3 (-1.9; 2.59)	0.015
RPA+LPA vs. AA	0.8 (0.4; 1.3) [3]	-0.9 (-3.7; 1.7)	-0.4 (-3.4; 2.7)	0.005
RPA+LPA vs. DA+SVC	0.03 (-2.5; 2.5)	-0.4 (-1.6; 0.7)[4]	0.8 (-2.0; 3.6)	0.006

Data shown are bias (l/min) and 95 % lower, upper limits of agreement.

p-Values refer to one-way analyses of variance (ANOVA) with Bonferroni post-hoc analyses for comparison of bias between the three sequences.

[1] p < 0.06 5D flow vs 2DPC and 4D flow, [2] p = 0.004 2DPC vs. 4D flow, [3] p=0.003 2DPC vs. 4D flow, [4] p < 0.050 4D flow vs. 2DPC and 5D flow

Abbreviations: see Table 1

O83

Accuracy of pulmonary venous flow determination by 2D phase contrast cardiac magnetic resonance

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Introduction: Determination of pulmonary venous flow by cardiac magnetic resonance (CMR) is frequently necessary in patients with complex congenital heart disease (CHD). Although new advanced sequences like 4D flow are increasingly available, standard 2D phase contrast (2DPC) is most frequently used for flow quantification.

This study therefore aims to investigate the accuracy of pulmonary venous flow quantification by 2DPC.

Method: Patients with CHD underwent a CMR on a 1.5 T scanner. 2DPC flow sequences (typical temporal resolution 35-50ms, inplane spatial resolution 1.3-1.8 mm2, VENC 80-100) were acquired in the ascending aorta (AA), main, right and left pulmonary arteries (MPA, RPA, LPA), left and right pulmonary veins (LPV, RPV). Pulmonary venous flow was compared to pulmonary arterial flow in all patients and to aortic flow in patients without shunt, using Bland-Altman analyses and Pearson's correlation.

Results: Twenty CHD patients were included (age 27 ± 3, range 7; 53 years, 7 women, tetralogy of Fallot N = 7, Ross operation N = 1; Fontan N = 4, transposition of great arteries N = 2, atrial septal defect N = 2, Turner syndrome 1, Ebstein N = 1, valvulopathies N = 2).

Table 1 shows absolute flow values. Table 2 shows a good agreement of total pulmonary venous (PV) to AA flow (group without shunt) and the sum of flow of both branch pulmonary arteries. However, agreement between PV with MPA flow as well as LPV and RPV with their respective branch pulmonary artery flow was reduced.

Conclusion: PV flow determined by 2DPC shows a good agreement with flow in the AA and the sum of LPA and RPA. Flow turbulences due to the pathologies of the right ventricular outflow tract probably contribute to the reduced agreement between PV and MPA flow. However, the reduced agreement of the flow in left/right pulmonary veins with their respective branch pulmonary arteries underlines the need for advanced techniques to more accurately determine the pulmonary venous flow.

Conflict of interest: No

Table 1 Results of flow measurements

	Flow
AA, l/min	4.7 ± 1.3
MPA, l/min	4.6 ± 1.6
RPA , l/min	2.6 ± 1.0
LPA , l/min	1.9 ± 1.0
LPV, l/min	2.1 ± 1.0
RPV, l/min	2.4 ± 0.9
Total PV, l/min	4.6 ± 1.3

Data shown are mean ± standard deviation, l/min

Abbreviations: AA = ascending aorta, LPV = left pulmonary venous return, MPA = main pulmonary artery, total PV = total pulmonary venous return, RPA = right pulmonary artery, RPV = right pulmonary venous return

Table 2 Bland-Altman analyses and correlations for comparison of pulmonary venous flow to pulmonary arterial and ascending aorta flow

Flow	All patients N = 20		Patients without, N = 15	
	Bias	R, p-value		R, p-value
Total PV vs. AA	-	-	0.9 ± 0.1 (0.7; 1.2)	0.890; <0.001
Total PV vs. MPA	0.13 ± 1.3 (-2.3; 2.6)	0.418; 0.137	0.3 ± 1.0 (-1.8; 2.3)	0.572; 0.041
Total PV vs. RPA+LPA	-0.08 ± 1.2 (-2.4; 2.2)	0.632; 0.006	-0.09 ± 0.7 (-1.5; 1.3)	0.910; <0.001
LPV vs. LPA	0.2 ± 0.8 (-1.4; 1.9)	0.426; 0.100	0.1 ± 0.9 (-1.7; 1.9)	0.417; 0.157
RPV vs. RPA	-0.3 ± 1.1 (-2.6; 1.9)	0.250; 0.333	0.3 ± 0.8 (-1.9; 1.3)	0.568; 0.034

Data shown are bias ± standard deviation, (95% upper and lower limits of agreement), l/min, as well as the Pearson's correlation coefficient.

Abbreviations: AA = ascending aorta, LPV = left pulmonary return, MPA = main pulmonary artery, total PV = total pulmonary venous return, RPA = right pulmonary artery, RPV = right pulmonary venous return

O84

Determinants of NT-proBNP Levels in Patients with a Systemic Right Ventricle: a new cut-off level for risk stratification?

Fabian Tran[1], Francisco Javier Ruperti-Repilado[1 2], Philip Haaf[2], Pedro Lopez Ayala[1], Matthias Greutmann[3], Markus Schwerzmann[4], Tobias Rutz[5], Judith Bouchardy[5 6], Harald Gabriel[7], Dominik Stambach[8], Juerg Schwitter[5 9 10], Kerstin Wustmann[5], Michael Freese[1], Christian Müller[1 2], Daniel Tobler[2]

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Introduction: The role of N-terminal natriuretic peptide (NT-proBNP) in the risk prediction of patients with a systemic left ventricle is indisputable. However, its value in patients with a systemic right ventricle (sRV) is not well defined.

Method: Ninety-eight patients with NT-proBNP values at baseline from the randomized clinical trial SERVE were included. The correlation between baseline NT-proBNP values and parameters of bi-ventricular volumes and function quantified by cardiac magnetic resonance was assessed by means of adjusted linear regression models. The prognostic value of NT-proBNP and other established prognostic markers were assessed by means of adjusted cox proportional hazards model, survival analysis and c-statistic. The primary outcome was defined as the occurrence of either clinically relevant arrhythmia, heart failure or death.

Results: Median age [interquartile range, IQR] at baseline was 39 years [32,48] and 32% were female. Median NT-proBNP was 238 [137,429] ng/L. Coefficients of determination for the relationship between NT-proBNP levels and right ventricular end-systolic and end-diastolic volume index, and ejection fraction (RVEF) were +0.481, p <0.001; +0.427, p <0.001; and -0.561, p <0.001, respectively. The sex and age adjusted hazard ratio [95% confidence interval, CI] for NT-proBNP values above the 75th percentile (429ng/L) showed an exponential increase (Figure) and there was a significant difference in survival comparing the group above our cut-off value and the group below it (Table). After adjusting for age and sex, the prognostic value of NT-proBNP was comparable to the prognostic value of RVEF and predicted VO2 max (C-statistic: 0.71, 0.72 and 0.71, respectively).

Conclusion: NT-proBNP levels correlated significantly with right ventricular parameters assessed by means of CMR. Measurement of NT-proBNP is a reliable and convenient tool for the prediction of adverse outcomes in patients with a sRV and using the cut-off value of 429ng/L could assist in the risk stratification for this population.

Conflict of interest: This study received financial funding from Astra Zeneca, GSK, Novartis, Sanofi AG, Mundipharma, Teva-Pharma, OM Pharma, Lungenliga Schweiz, Lungenliga beider Basel, Lungenliga St. Gallen/Appenzell, Lugenliga Graubünden, Lungenliga Bern, Lunge Zürich

Table 1. Study population split by the NT-proBNP quartiles

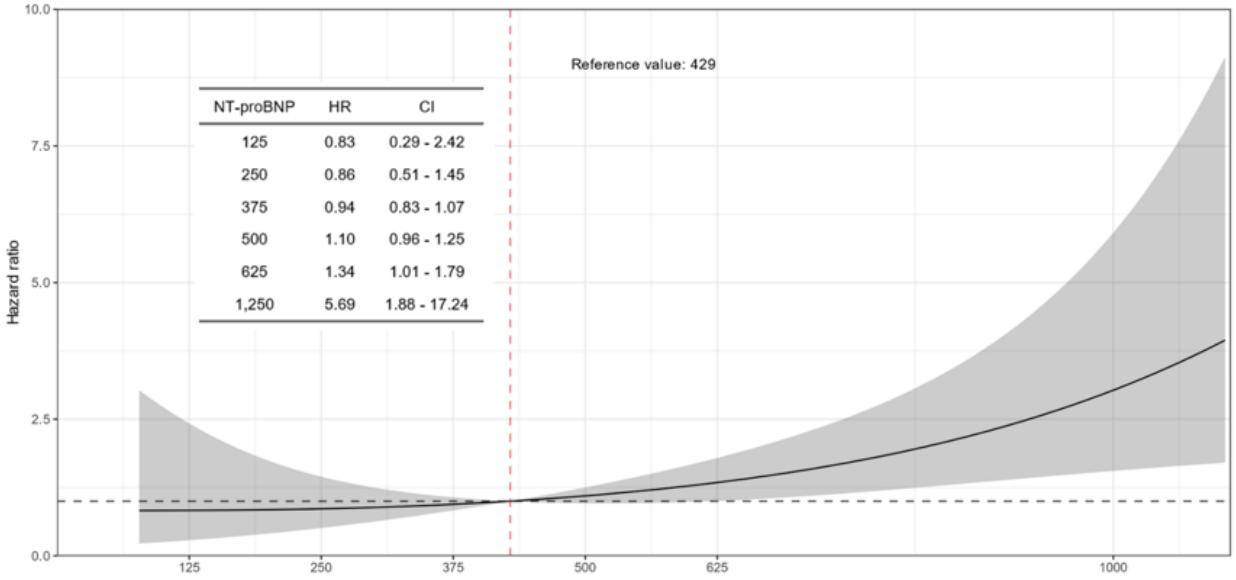
Variable IQR	Overall	1. quartile [56 - 136]	2. quartile [137 – 237.5]	3. quartile [237.6 - 429]	4. quartile [430 - 5778]	p-value
n	98	25	24	25	24	
Age (years)	**39.0 [32.0, 47.8]**	**32.0 [30.0, 40.0]**	**36.0 [31.0, 38.2]**	**41.0 [37.0, 49.0]**	**51.5 [40.5, 54.2]**	**<0.001**
Complications	**20 (20.4)**	**3 (12.0)**	**3 (12.5)**	**3 (12.0)**	**11 (45.8)**	**0.012**
CMR						
Indexed RV ESV (ml)	**63.9 [51.7, 82.9]**	**60.2 [49.4, 68.9]**	**61.9 [49.5, 69.1]**	**70.1 [53.1, 89.5]**	**84.5 [55.8, 108.6]**	**0.012**
Indexed RV EDV (ml)	**121.4 [103.6, 140.1]**	**110.7 [98.4, 122.8]**	**117.9 [101.0, 128.2]**	**128.8 [105.6, 157.5]**	**128.2 [113.6, 161.3]**	**0.022**
Indexed RV SV (ml)	**53.9 [47.7, 62.1]**	**52.8 [46.9, 56.0]**	**52.9 [48.5, 58.3]**	**63.2 [51.8, 69.6]**	**50.8 [43.6, 61.7]**	**0.016**
RV EF (%)	**45.6 [39.5, 50.5]**	**46.1 [43.1, 50.6]**	**47.5 [44.9, 50.6]**	**46.0 [41.4, 52.8]**	**35.3 [30.3, 46.9]**	**0.001**
CPET						
Peak VO2 (ml/min/kg)	**25.3 [19.1, 29.2]**	**29.1 [21.6, 31.3]**	**27.0 [22.9, 29.8]**	**25.1 [19.0, 28.9]**	**18.3 [14.3, 22.8]**	**<0.001**
Peak VO2 predicted (%)	**76.0 [67.0, 86.0]**	**81.0 [74.0, 92.0]**	**77.0 [69.8, 86.5]**	**82.0 [67.8, 92.5]**	**67.0 [56.0, 77.0]**	**0.006**

Data are median [interquartile range] or number (percentage). BMI= body mass index (in kg/m^2), ccTGA= congenitally corrected transposition of the great artery; CMR= cardiac magnetic resonance; d-TGA= dextro transposition of the great arteries; hs= high sensitive, ECG= electrocardiogram; LV EDV= left ventricular end-diastolic volume; LV EF= left ventricular ejection fraction; NYHA= New York Heart Association; RV EDV= right ventricular end-diastolic volume; RV EF= right ventricular ejection fraction; VO2= oxygen uptake

* Missing data = 15

Figure 1. Association between NT-proBNP levels and the risk of 36-months complications

We used the reference value of 429ng/L and calculated age and sex adjusted hazard ratios (95% CI) comparing our reference value to the standard cut-off value of 125ng/L and 2-, 3-, 4-, 5- and 10-times of this cut-off value.



CI= confidence interval; NT-proBNP = N-terminal pro Brain natriuretic Peptide; HR hazard ratio

O85

Prognostic Value and Determinants of High Sensitive Cardiac Troponin in Patients with a Systemic Right Ventricle: Insights from the SERVE-Trial

Javier Ruperti[1], Fabian Tran[2], Philip Haaf[1], Pedro Lopez Ayala[1], Matthias Greutmann[3], Markus Schwerzmann[4], Tobias Rutz[5], Judith Bouchardy[5], Harald Gabriel[6], Dominik Stambach[7], Jürg Schwitter[5], Wustmann Kerstin[8], Michael Freese[1], Christian Müller[1], Daniel Tobler[1]

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Introduction: The prognostic value of high-sensitivity cardiac Troponin T (hs-cTnT) in patients with a systemic left ventricle is well established. However, the determinants and prognostic value of hs-cTnT among patients with a systemic right ventricle (sRV) are largely unknown.

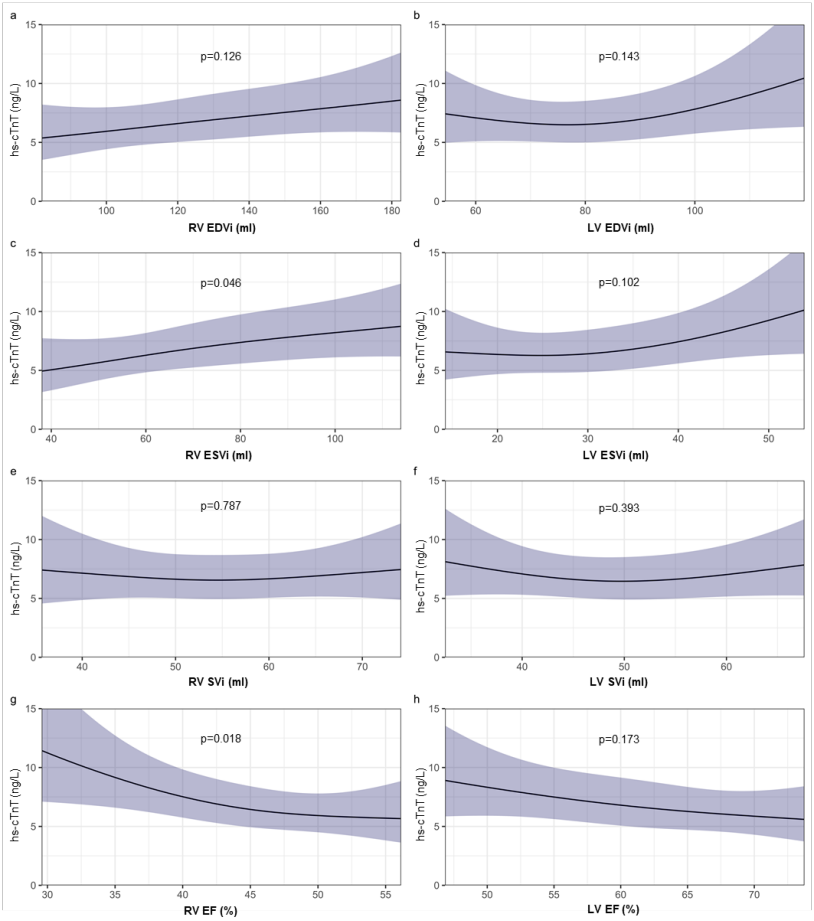
Methods: Ninety-eight patients with available hs-cTnT concentrations at baseline from the randomized-controlled SERVE-trial were included. The correlation between baseline hs-cTnT concentrations and bi-ventricular volumes and function quantified by cardiac magnetic resonance (CMR) was assessed by adjusted linear regression models. The prognostic value of hs-cTnT and other established prognostic markers were assessed by adjusted cox proportional hazards models, survival analysis and concordance statistics (c-statistics). The primary outcome was the composite of clinically relevant arrhythmia, hospitalization for heart failure or all-cause death.

Results: Median age [interquartile range, IQR] was 39 [32, 48] years and 32% were female. Median hs-cTnT concentration was 7 [IQR, 4-11] ng/L. Coefficients of determination for the relationship between hs-cTnT concentrations and right ventricular end-systolic volume index, (RVESVi) and ejection fraction (RVEF) were +0.368, p = 0.046; and -0.381, p = 0.018, respectively. The sex and aged adjusted hazard ratio [95%, confidence interval, CI] of hs-cTnT at 2- and 4-times the reference level (5 ng/l) for the primary outcome were 2.89 [1.14-7.29] and 4.42 [1.21-16.15], respectively (Figure 1). The prognostic performance quantified by the C-statistics [95%, CI] for age and sex adjusted models based on hs-cTnT, RVEF, and peak VO2 predicted (%) were comparable: 0.71 [0.61-0.82], 0.72 [0.59-0.84], and 0.71 [0.59-0.83], respectively (Figure 2).

Conclusion: Hs-cTnT concentration was significantly correlated with RVEF and RVESVi in patients with a sRV. The prognostic accuracy of this biomarker was comparable to that of the current gold standards (RVEF and peak VO2 predicted).

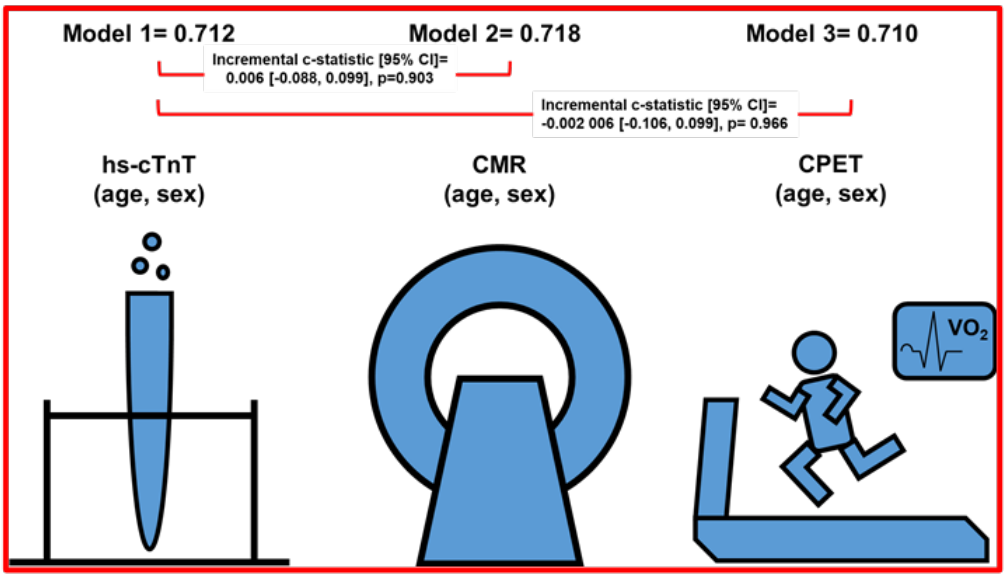
Conflict of interest: No

Figure 1. Multivariable linear regression models for the correlation of hs-cTnT concentrations with CMR derived bi-ventricular volumes and function



Multivariable linear regression models (age, sex and creatinine adjusted) were fitted for each baseline CMR variable
Hs-cTnT= high sensitivity cardiac troponin T; LV EDVi= left ventricular end-diastolic volume index; LV EF= left ventricular ejection fraction; LV ESVi= left ventricular end-systolic volume index; LV SVi= left ventricular stroke volume index; RV EDVi= right ventricular end-diastolic volume index; RV EF= right ventricular ejection fraction; RV ESVi= right ventricular end-systolic volume index; RV SVi= right ventricular stroke volume index

Figure 2. Prognostic performance of the hs-cTnT-based model compared to the RV EF-based and to the peak O2 predicted-based models



C-Statistics for the different predicting models and p-values for the comparison of the additive predictive value of Model 2 and 3 vs. Model 1.

CMR= cardiac magnetic resonance; CPET= cardiopulmonary exercise test; Hs-cTnT= high sensitivity cardiac troponin T

O86

Outflow tract rotation for complex transposition of great arteries, review of a single centre series.

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Introduction: When transposition of the great arteries (TGA) is associated with ventricular septal defect (VSD) and pulmonary valve stenosis (PS), Rastelli or Bex-Nikaidoh (posterior aortic translocation) procedures are usually performed. Right and left ventricular outflow tract obstruction are common complication after these surgeries. A modification of a novel surgical technique, initially described by Yamagishi, currently known as outflow tract rotation (OTR), has been used at our center in selected cases. OTR allows for conservation of both semilunar native valves, replaced in their physiological position by a half-turn rotation of the truncal block. The aim of this study was to analyse our general experience with this surgical technique and the mid-term results regarding growth of the arterial trunci and function of sumilunar valve when preserved.

Method: We reviewed all patients that underwent OTR in our center, performed by the same surgeon. Pre-operative patient selection was performed in multidisciplinary cardiology team after echocardiography, and CT. Included: TGA/VSD/PS, TGA with inlet VSD. Intra-operative anatomy was carefully inspected to confirm the adequacy of OTR. 23 Patients with TGA VSD PS underwent OTR between 2016 and 2022. Patient age ranged from 4 days to 11.5 years with a median of 2.2. Pulmonary valves could be preserved in 11 cases whereas 2 patients underwent monocusp pulmonary valve plasty and 2 Contegra implantation.

Results: Two patients with inlet VSD required pacemaker implantation. Short- and medium-term outcome were excellent, with no mortality, and no need for reoperation after a mean follow up of 18,7 months.

Conclusion: OTR is physiological surgical option in TGA/PS/VSD, when PV is unsuitable for arterial switch but acceptable in the pulmonary position. It allows for a free and straight LVOT, wall growth potential of pulmonary annulus, without the need for conduit replacement. It seems to be a safe and reproducible technique with excellent short and medium term outcomes.

Conflict of interest: No

HOT TOPICS IN HEART FAILURE

O87

Echocardiography Myocardial Stiffness for the Diagnosis and Tissue Characterization of Cardiac Amyloidosis

Dominik C. Benz[1], Sadeghi Ali[2], Rafter Pat[2], Clerc Olivier[1], Canseco Neri Jocelyn[1], Ho Carolyn Y[1], Cuddy Sarah AM[1], Falk Rodney H[1], Dorbala Sharmila[1]

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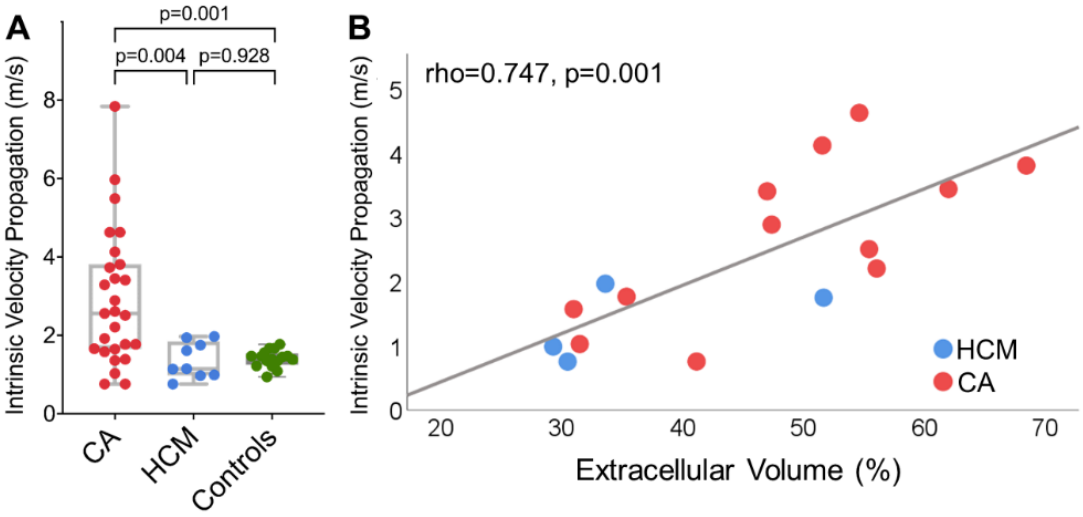
Introduction: Intrinsic cardiac elastography in echocardiography estimates myocardial stiffness by measuring the propagation of the myocardial stretch generated by atrial contraction. The aims of the present study were (A) to assess its value in differentiating cardiac amyloidosis (CA) from hypertrophic cardiomyopathy (HCM) and healthy volunteers (controls), and B) to correlate it with an established marker of cardiac amyloid burden and fibrosis.

Method: This prospective study evaluated myocardial stiffness in 52 participants with CA (n = 27), HCM (n = 9) and controls (n = 16) by ultra-high-frame rate (above 250 frames/sec) ultrasound imaging using diverging beam mode. The slope of the isovelocity wave front was measured as the intrinsic velocity propagation of myocardial stretch (iVP, in m/s). Additionally, participants with CA or HCM underwent comprehensive transthoracic echocardiography including quantification of global longitudinal strain (GLS) by speckle-tracking imaging. The relative apical sparing (RELAPS) ratio was calculated as the average GLS of apical / midventricular and basal segments. Extracellular volume (ECV) by native and post-contrast T1 mapping from cardiac magnetic resonance (CMR) was quantified in 16 participants.

Results: iVP was significantly higher in CA (i.e., 2.6 m/s [1.7-3.8]) than in HCM (1.2 m/s [1.0-1.8], p = 0.011) and controls (1.4 m/s [1.3-1.5], p = 0.002) but did not differ between HCM and controls (p = 1.000; **Panel A**). The diagnostic accuracy of iVP to identify CA was 82% and similar to the RELAPS ratio (i.e., 84%). iVP >2.0 m/s has a sensitivity, specificity, positive predictive value and negative predictive value of 59%, 100%, 100%, and 69% to diagnose CA among the 52 participants. There was a strong correlation of iVP with ECV (rho = 0.747, p = 0.001; **Panel B**). In contrast, iVP correlated moderately with GLS (rho = 0.514, p = 0.001), RELAPS ratio (rho = 0.433, p = 0.008), E/e' (rho = 0.413, p = 0.014) and NT-proBNP (rho = 0.476, p = 0.006).

Conclusion: Echocardiographic myocardial stiffness is highly specific to diagnose cardiac amyloidosis and provides unique insights into myocardial tissue composition.

Conflict of interest: No



REVIVE THE DEBATE: IMPAIRED LV FUNCTION (HFREF)

O88

Repeated inappropriate S-ICD discharges in a river caused by interferences with the Swiss railway

Andreas Haeberlin[1], Thomas Küffer[1], Tobias Reichlin[1], Fabian Noti[1]

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Case description: A 43-year old male had received a subcutaneous ICD (Emblem MRI S-ICD, Boston Scientific, US) due to idiopathic ventricular fibrillation in April 2022. In July 2022, he suffered from two S-ICD shocks while swimming in the Aare river.

Device interrogation showed two episodes of high-amplitude noise with a frequency of ~17Hz that had led to inappropriate shocks (Figure 1, panel 1). The unusual frequency raised suspicion of an electromagnetic interference (EMI) caused by the Swiss railway network using a power line alternating current of 16.7Hz. Indeed, the patient was swimming underneath a railway bridge when experiencing the discharges. To investigate the suspected root cause, our device team performed a field study (Figure 2). An S-ICD embedded in a frame (mimicking the thorax), was submerged and extensive measurements were performed in the river. S-ICD oversensing could be reproduced in proximity to the bridge whenever trains were passing by (Figure 1, panel 2). Noise signal amplitudes reached >10mV.

Discussion: EMI was caused by current travelling from the railway via the water through the patient's body. The sensing electrode configuration of the S-ICD constitutes an antenna, which is sensitive for picking up EMI. The patient was advised to refrain from swimming, particularly at this site.

Conclusion: Swimming with an S-ICD in proximity to electrical sources may result in inappropriate shocks.

Conflict of interest: No

Figure 1

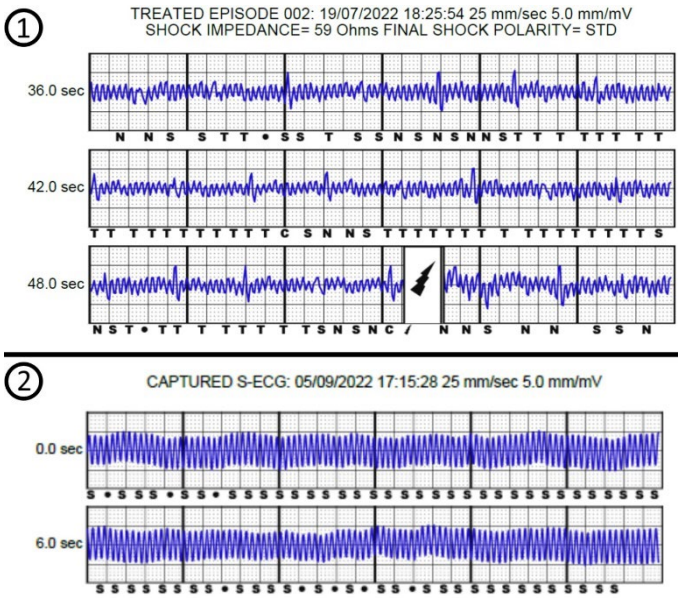

Figure 2

GUIDELINES INTO PRACTICE: 2022 ESC GUIDELINES ON NON-CARDIAC SURGERY: CARDIOVASCULAR ASSESSMENT AND MANAGEMENT

O89

Impact of beta blockers on perioperative complications in patients undergoing major noncardiac surgery

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Introduction: The optimal perioperative use of beta blockers (BB) remains uncertain. Therefore, we aimed to evaluate the impact of preoperative BB therapy on (1) the incidence of cardiac perioperative myocardial injury/infarction (PMI) and (2) major adverse cardiac events (MACE) within 365 days in patients after major noncardiac surgery.

Method: We prospectively included consecutive high-risk patients undergoing major noncardiac surgery at the University Hospital Basel and the Cantonal Hospital Aarau. The primary endpoint was PMI due to cardiac causes (type 1 myocardial infarction (MI), tachyarrhythmia, acute heart failure, or type 2 MI) within 3 days after surgery. The secondary endpoint was the occurrence of MACE, defined as a composite of acute myocardial infarction, acute heart failure, life-threatening arrhythmia, and cardiovascular death, within 365 days. We used inverse probability of treatment weighting to account for differences between BB and non-BB users and then performed a univariable logistic regression with cardiac PMI and a univariable Cox proportional hazard model with MACE.

Results: Between October 2014 and February 2018, we included 7751 high-risk patients undergoing major inpatient noncardiac surgery. The median age was 74 years and 45% were female. 2856 of 7751 patients (36.8%) received preoperative BB therapy. 812 patients (10.5%) had a cardiac PMI within 3 days after surgery, resulting in a weighted odds ratio of 0.99 (95% Confidence interval [CI] 0.89-1.10). The composite secondary endpoint MACE within 365 days occurred in 9% of all patients. After multivariable adjustment, there was no difference between patients receiving BB and those that did not, with a weighted hazard ratio of 1.07 (95% CI 0.86-1.33).

Conclusion: In our patient cohort, we could not see any difference in cardiac PMI and MACE after one year between patients receiving BB therapy and those who did not, suggesting that continuing BB perioperatively is safe but not associated with any benefit.

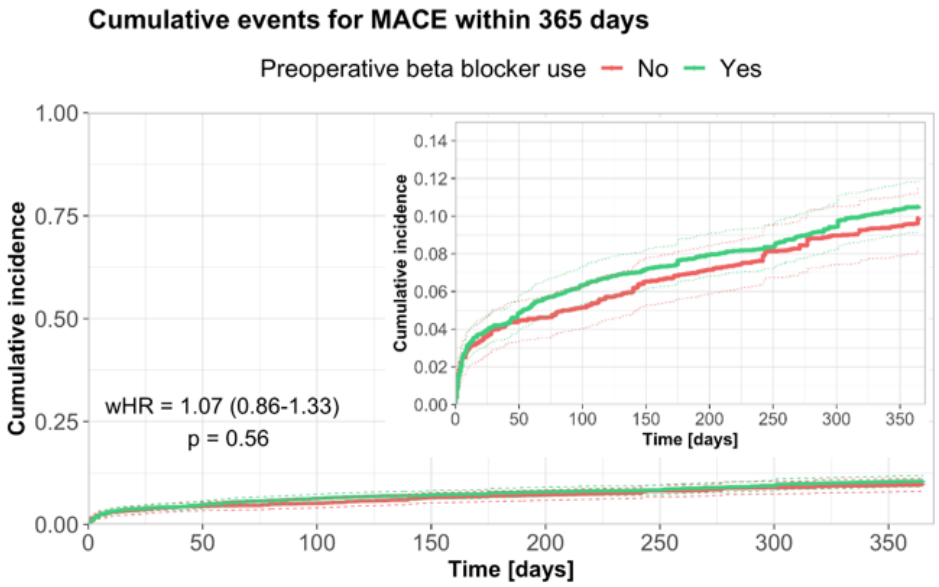

Figure 1: IPTW-weighted cumulative incidence curve of MACE within 365 days between patients with (green) and without (red) beta blocker therapy.

A CASE FOR TWO – HEART TEAM APPROACH IN SEVERE AORTIC STENOSIS

O90

Prognostic significance of carotid artery stenosis in patients undergoing transcatheter aortic valve implantation: a systematic review and meta-analysis.

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Introduction: Stroke is a known complication of both transcatheter aortic valve implantation (TAVI) and carotid artery stenosis (CAS). Whether CAS is a predictor of worse prognosis after TAVI is unclear. We performed a meta-analysis to assess the impact of CAS on the incidence of neurovascular complications and mortality after TAVI.

Method: We searched PubMed/MEDLINE and EMBASE databases from inception to January 2023. CAS was defined by ≥50% stenosis of at least one carotid artery. All studies comparing CAS versus non-CAS TAVI populations were included. Patients' baseline characteristics and 30-day clinical outcomes were extracted. Endpoints included the 30-day incidence of neurovascular complications (stroke or transient ischemic attack) and 30-day all-cause mortality.

Results: We identified six studies, totaling 6'763 patients in the CAS group and 23'861 patients in the non-CAS group. CAS patients were more often men and polymorbid, with significantly higher prevalence of hypertension, diabetes, dyslipidemia, coronary artery disease, previous myocardial infarction and coronary artery bypass graft, atrial fibrillation, peripheral artery disease, previous stroke or transient ischemic attack and chronic kidney disease. The gold-standard transfemoral vascular access for TAVI was more often used in patients without CAS (Table). Regarding outcomes, there was no significant difference in the rates of 30-day neurovascular complications between CAS and non-CAS groups (relative risk [RR]: 1.23, 95%confidence interval [CI]: 0.63, 2.40, p = 0.54) (Figure, panel A). However, CAS was associated with a higher risk of 30-day all-cause mortality (RR: 1.28, 95%CI: 1.12, 1.47, p <.0001) (Figure, panel B).

Conclusion: Patients with CAS presented with a significantly higher comorbidity burden. CAS was not associated with an increased risk of 30-day neurovascular complications. 30-day mortality was higher in the CAS group but that may be a surrogate of the heavy comorbidity burden of CAS patients.

Conflict of interest: No

Table. Baseline characteristics.

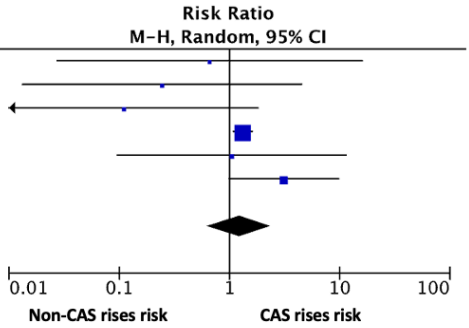
Characteristics	Numbers of studies (references)	CAS		non-CAS		p value	X2 (1. N = 30006)
		n	%	n	%		
Male gender	5 (23–27)	3718	55.4	12092	50.9	< 0.001	42.70
Hypertension	5 (15,23–25,27)	6198	92.4	21040	88.6	< 0.001	80.39
Diabetes	5 (24–26)	2755	41.1	8655	36.4	< 0.001	47.85
Dyslipidemia	4 (24–26)	243	81.8	677	66.8	< 0.001	24.87
Myocardial infarction	2 (23,26,27)	2073	31.9	5310	23.1	< 0.001	205.17
Coronary artery disease	4 (24–26)	232	78.1	578	57	< 0.001	43.37
Coronary artery by-pass graft	3 (24–26)	89	36.9	145	23.3	< 0.005	16.3
Atrial flutter or fibrillation	4 (23–26)	2597	39.0	9642	41.3	0.001	10.73
Peripheral artery disease	4 (23–25,27)	3196	48.8	5779	24.6	< 0.001	1349.12
Previous stroke/Transient ischemic stroke	5 (23–27)	1137	17.0	2631	11.1	< 0.001	166.39
Chronic obstructive pulmonary disease	3 (24,25,27)	45	22.5	109	18.0	0.17	1.92
Chronic kidney disease	3 (24,25,27)	87	43.5	331	41.4	< 0.05	9.24
Transfemoral access	3 (23–25)	4225	64.5	18095	78.2	< 0.001	515.06

Figure. A: 30-day risk of stroke. B: risk of 30-day mortality.

A

Study or Subgroup	CAS group Events	Total	Non-CAS group Events	Total	Weight	Risk Ratio M-H, Random, 95% CI	Year
Steinvill et al. 2014	0	57	1	114	4.1%	0.66 [0.03, 15.97]	2014
Ben-Shoshan et al. 2016	0	97	4	215	4.9%	0.24 [0.01, 4.50]	2016
Huded et al. 2016	0	51	18	212	5.2%	0.11 [0.01, 1.81]	2016
Kochar et al. 2018	136	6410	366	22733	57.1%	1.32 [1.08, 1.60]	2018
Klinkhammer et al. 2018	1	93	2	195	6.9%	1.05 [0.10, 11.42]	2018
Oestreicher et al. 2022	4	56	9	392	21.8%	3.11 [0.99, 9.77]	2022
Total (95% CI)		**6764**		**23861**	**100.0%**	**1.23 [0.63, 2.40]**	
Total events	141		400				

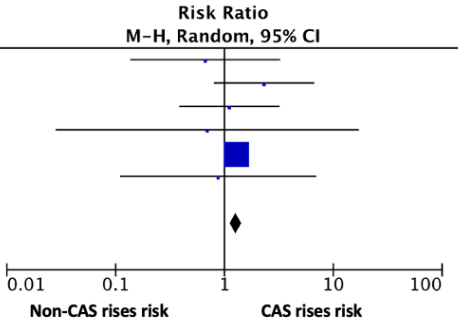
Heterogeneity: $Tau^2 = 0.19$; $Chi^2 = 6.85$, df = 5 (P = 0.23); $I^2 = 27\%$
Test for overall effect: Z = 0.61 (P = 0.54)



B

Study or Subgroup	CAS group Events	Total	Non-CAS group Events	Total	Weight	Risk Ratio M-H, Random, 95% CI	Year
Steinvill et al. 2014	2	57	6	114	0.7%	0.67 [0.14, 3.20]	2014
Huded et al. 2016	5	51	9	212	1.6%	2.31 [0.81, 6.60]	2016
Ben-Shoshan et al. 2016	5	97	10	215	1.6%	1.11 [0.39, 3.16]	2016
Klinkhammer et al. 2018	0	93	1	195	0.2%	0.70 [0.03, 16.90]	2018
Kochar et al. 2018	268	6410	740	22733	95.4%	1.28 [1.12, 1.47]	2018
Oestreicher et al. 2022	1	56	8	392	0.4%	0.88 [0.11, 6.86]	2022
Total (95% CI)		**6764**		**23861**	**100.0%**	**1.28 [1.12, 1.47]**	
Total events	281		774				

Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 2.23$, df = 5 (P = 0.82); $I^2 = 0\%$
Test for overall effect: Z = 3.66 (P = 0.0003)



CARDIOVASCULAR PREVENTION

O91

Educational status and quality of care, healthcare resources utilization and clinical outcomes in a large Swiss prospective cohort of patients with acute coronary syndromes

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Introduction: Individuals with low education levels may be at higher risk of poor health. This study aimed to examine the association between educational levels and process/clinical outcomes after acute coronary syndromes (ACS).

Method: We analyzed a Swiss cohort of 6014 patients hospitalized for ACS. Baseline educational level (EL) was categorized into (1) lower than apprenticeship/vocational school (EL1, N = 1012), (2) apprenticeship/vocational school (EL2, N = 3216), (3) high school (EL3, N = 790), and (4) university (EL4, N = 996). Odds ratios (OR) and 95% confidence intervals (CI) were obtained using logistic regression and adjusted for age, sex cardiovascular risk factors and previous myocardial infarctions (MI).

Results: Participants with the lower education were older, more likely to be female, smokers, and having more comorbidities (hypertension, diabetes, obesity, previous M, p <0.001). At discharge prescriptions of aspirin, statins, beta-blockers and ACE-inhibitors were similar across educational groups, ranging from 73.3% to 76.7% for ACE-inhibitors and from 98.8% to 99.6%% for aspirin. Similar patterns were found at one year, ranging from 53.5% to 58% for ACE inhibitors and from 95.7% to 96.1% for aspirin. The achievement of prevention targets was lower among adults with EL1 compared to adults with EL4 for LDL-C <1.8 mmol, OR 0.76, 95%CI 0.59-0.99; for systolic blood pressure <140mmHg, OR 0.76, 95%CI 0.6-0.98; for weight reduction of ≥5% in overweight or obese patients, OR 0.70, 95%CI 0.53-0.93). Compared to adults with EL4, adults with EL1 had lower attendance to cardiac rehabilitation (85.3% vs. 91.2%, OR 0.67, 95%CI 0.49-0.91), medical follow-up (FU) (87.1% vs. 91.5%, OR 0.69, 95% CI 0.5-0.95), and FU with a cardiologist (81.2% vs. 88%, OR 0.66, 95% CI 0.5-0.87).

Conclusion: Although use of cardiovascular preventive treatments was similar across categories, the achievement of cardiovascular prevention targets and access to care one year after ACS were worse with lower educational levels.

Conflict of interest: No

GUIDELINE INTO PRACTICE VENTRICULAR ARRHYTHMIAS AND THE PREVENTION OF SCD

O92

Brain lesions and cognitive decline in patients with atrial fibrillation

Katalin Bhend[1 2], Rebecca Paladini[1 2], Stefanie Aeschbacher[1 2], Elisa Hennings[1 2], Michael Coslovsky[1 2 3], Nicolas Rodondi[4 5], Jürg Beer[6 7], Angelo Auricchio[8 9], Giorgio Moschovitis[8 9], Nino Schorrer[1 2], Patricia Chocano[8 9], Elia Rigamonti[8 9], Tim Sinnecker[10], David Conen[11], Michael Kühne[1 2], Leo Bonati[12], Stefan Osswald[1 2]

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Introduction: In addition to clinical stroke, atrial fibrillation (AF) is associated with a high burden of various vascular brain lesions, the majority of which are silent. However, the impact of these lesions on cognitive performance remains unclear. Our aim was to assess the association between vascular brain lesions and cognitive decline in clinically asymptomatic AF patients.

Method: In a prospective multicentre cohort trial, we included 1536 AF patients (90% on oral anticoagulation therapy). Patients underwent brain magnetic resonance imaging (bMRI) for the detection of any brain lesions at baseline (ischemic lesions and microbleeds) and yearly cognitive assessment using different standardized tests. Cognitive decline was defined as a >1 standard deviation of the age-education standardized baseline population, compared with individual baseline levels. Multivariable adjusted Cox regression analyses were performed to assess the relationship of baseline brain lesions presence with cognitive decline during follow-up.

Results: At time of inclusion, 1030 (67%) of 1536 patients (mean age 72 years, 73% male) had ≥1 vascular brain lesions on baseline MRI. Based on the Montreal Cognitive Assessment score (MoCA), cognitive decline developed in 159 (10%) patients during a mean follow-up of 4.8 years. The incidence rate (per 100 person-years) for cognitive decline (MoCA) was 3.64 and 1.82 in patients with and without brain lesions. After multivariable adjustment, the hazard ratio (95% CI) of brain lesions with cognitive decline (MoCA) was 1.29 (0.85-1.96). The association of brain lesions with cognitive decline was 1.57 (1.02-2.40) for Digit-Symbol-Substitution-Test (DSST), 1.28 (1.01-1.63) for Semantic-Fluency-Test (SFT), and 0.91 (0.69-1.21) for Trail-Making-Test Part A (TMT-A).

Conclusion: In our AF cohort, two thirds of patients had brain lesions on baseline MRI, and these lesions were predictive of worse cognitive outcomes in the mid-term on some of the tests used. The full effects on cognitive outcome will be obtained during even longer follow-up.

Conflict of interest: No

POSTER WALK: RHYTHM DISORDERS

P051

Reducing the Burden of Inconclusive Smart-Device Single-lead ECG tracings via a Novel Artificial Intelligence Algorithm

Simon Weidlich[1 2], Diego Mannhart[1 2], Kennedy Alan[3], Serban Teodor[1 2], Sven Knecht[1 2], Michael Kühne[1 2], Christian Sticherling[1 2], Patrick Badertscher[1 2]

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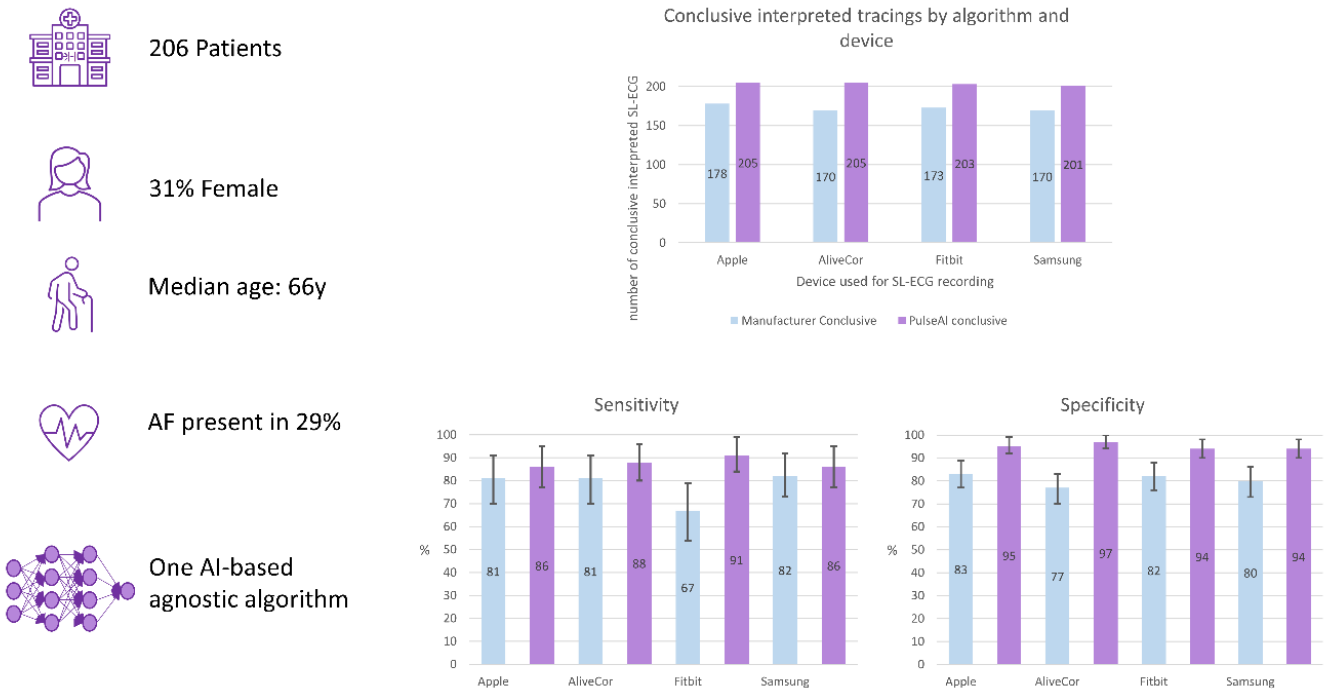
Introduction: Multiple smart-devices capable of automatically detecting atrial fibrillation (AF) based on single-lead electrocardiograms (SL-ECG) are presently available. The rate of inconclusive tracings by the manufacturers' algorithms is currently too high to be clinically useful. Reliable artificial intelligence (AI) algorithms may be valuable for managing the large amount of data created by smart-devices.

Method: This is a prospective, observational study enrolling patients presenting to a cardiology service at a tertiary referral center. We assessed the clinical value of applying a smart-device agnostic AI-based algorithm for detecting AF from four different commercially available smart-devices (Apple Watch, AliveCor KardiaMobile, Fitbit Sense, and Samsung Galaxy Watch3). Patients underwent a nearly simultaneous 12-lead ECG and four smart-device SL-ECGs. Single-lead ECGs were exported as PDF files and converted into Scalable Vector Graphics (SVG) images for signal extraction. The novel AI-algorithm (PulseAI, Belfast, United Kingdom) was compared with each manufacturer's algorithm.

Results: We enrolled 206 patients (31% female, median age 66 years). AF was present in 59 patients (29%). Sensitivity and specificity for the detection of AF by the novel AI-algorithm vs. manufacturer algorithm were: 86% vs. 81% (p = 0.45) and 95% vs. 83% (p <0.001) for the Apple Watch 6, 88% vs. 81% (p = 0.34) and 97% vs. 77% (p <0.001) for the AliveCor KardiaMobile, 91% vs. 61% (p <0.01) and 94% vs. 82% (p <0.001) for the Fitbit Sense, 86% vs. 82% (p = 0.63), and 94% vs. 80% (p <0.001) for the Samsung Galaxy Watch 3, respectively (Figure 1). The proportion of SL-ECGs with an inconclusive diagnosis (n = 10, 1.2%) was significantly lower for all smart-devices using the AI-based algorithm compared to manufacturer's algorithm (14%, 17%, 16%, and 17%, for the Apple Watch, AliveCor KardiaMobile, Fitbit Sense and Samsung Galaxy Watch 3, respectively).

Conclusion: A novel agnostic AI-algorithm improved sensitivity and specificity of AF detection and significantly reduced the rate of inconclusive tracings.

Conflict of interest: No



P052

Stylet-driven vs. non-stylet-driven lead implantation for left bundle branch area pacing

Andreas Haeberlin[1], Jens Seiler[1], Nikola Kozhuharov[1], Samuel Baldinger[1], Helge Servatius[1], Antonio Madaffari[1], Gregor Thalmann[1], Thomas Küffer[1], Aline Mühl[1], Hildegard Tanner[1], Laurent Roten[1], Tobias Reichlin[1], Fabian Noti[1]

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Introduction: Left bundle branch area pacing (LBBAP) is a novel pacing strategy, which overcomes limitations of right ventricular pacing. Conventional stylet-driven and non-stylet-driven leads have been used as a conduction system pacing lead. Procedural outcome data comparing both lead types are, however, scarce. The purpose of this work was to compare procedural outcomes during CSP device implantation with respect to the use of stylet-driven vs. non-stylet-driven leads.

Method: We prospectively assessed 170 consecutive LBBAP lead implantation attempts at our center from 09/2021 to 11/2022. All implanters had previous experience with His-bundle pacing lead implantation using the non-stylet-driven lead and 91% of all systems were implanted by two high-volume device implanters. Successful conduction system pacing was established according to standard criteria (LBBAP: R-wave peak time in V6, V1-V6-interpeak interval, programmed stimulation or visibility of a left bundle potential) and pacing thresholds (<2V/0.5ms). The used leads in this analysis were the non-stylet-driven 3830 SelectSure lead (Medtronic, US) and the stylet-driven Solia (Biotronik, Germany), Ingevity+ (Boston Scientific, US) and Tendril STS (Abbott, US) lead. Patient selection and implantation strategy was at the operator's discretion.

Results: Clinical baseline characteristics, echocardiography/ECG data and indications did not differ between patients, who received a stylet-driven or non-stylet-driven lead (table showing percentages and median values/interquartile ranges). Patients underwent implantation of a non-stylet driven 3830 SelectSure lead in 20% of cases and a stylet-driven lead in 80% of cases (Solia 76%, Ingevity+ 3%, Tendril STS 1%). Electrical outcome data did not differ between lead types. However, procedural success rate was significantly higher using stylet-driven leads (p = 0.025) and a trend towards shorter overall intervention duration was observed as well (p = 0.1).

Conclusion: Stylet-driven leads offer higher LBBAP lead implantation success rates while shortening implant duration.

Conflict of interest: No

Patient and procedural characteristics	Stylet-driven CSP lead n=136	Non-stylet-driven CSP lead n=34	p-value
Patient characteristics and comorbidities			
- Age [years]	78 (67-82)	75 (66-79)	0.125
- Female sex	35 (26%)	10 (29%)	0.828
- Body height [m]	1.72 (1.64-1.80)	1.69 (1.65-1.75)	**0.070**
- Body weight [kg]	80 (68-91)	81 (68-85)	0.959
- Coronary artery disease	48 (35%)	7 (21%)	0.151
- Arterial hypertension	89 (65%)	20 (59%)	0.603
- Diabetes	44 (32%)	8 (24%)	0.429
- Dyslipidemia	61 (45%)	12 (35%)	0.416
Echocardiography and ECG data			
- LVEF [%]	50 (35-60)	60 (40-64)	0.325
- LVEDD [mm]	55 (45-64)	50 (44-60)	0.382
- TAPSE [mm]	20 (17-24)	21 (15-26)	0.607
- Diameter of tricuspid annulus [mm]	39 (34-42)	41 (34-42)	0.468
- Interventricular septum [mm]	11 (10-13)	11 (9-12)	0.858
- Baseline QRS duration [ms]	133 (100-160)	126 (94-148)	0.718
Pacemaker indication			
- SSS	15 (11%)	2 (6%)	0.529
- Paroxysmal or persistent AV block	44 (32%)	17 (50%)	0.086
- Implantation prior AV node ablation	13 (10%)	4 (12%)	0.750
- In lieu of CRT	60 (45%)	11 (32%)	0.247
- Other indications	4 (2%)	0 (0%)	0.585
Procedure duration and fluoroscopy time			
- Overall procedure duration [min]	95 (70-125)	127 (86-167)	**0.100**
- Fluoroscopy duration [min]	10 (6-15)	12 (6-20)	0.403
Characteristics of CSP lead implantation			
- Acute procedural success	129 (95%)	28 (82%)	**0.025**
- CSP capture threshold @0.5ms [V]	0.66 (0.50-0.88)	0.62 (0.50-1.00)	0.971
- Sensed R-wave [mV]	9.4 (6.3-12.2)	7.8 (6.2-10.6)	0.365
- Unipolar lead impedance [Ω]	530 (480-567)	553 (487-608)	0.318
- Bipolar lead impedance [Ω]	722 (660-780)	736 (664-758)	0.870
- Paced QRS duration [ms]	120 (112-127)	128 (110-131)	0.210

P053

Left atrial appendage closure in patients refusing oral anticoagulation

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Introduction: Percutaneous left atrial appendage closure (LAAC) is a valid alternative to oral anticoagulation (OAC) in patients with non-valvular atrial fibrillation (AF) and high bleeding risk. However, the benefit of this procedure in AF patients refusing OAC is still unknown.

Method: All percutaneous LAAC attempted at the University Hospital of Bern after January 2009 were prospectively included in the LAAC-Bern Registry (clinicaltrials.gov-NCT04628078). Of them, AF patients who underwent LAAC because they refused OAC were included in the current analysis. Baseline characteristics, procedural and clinical follow-up data were prospectively collected. The study endpoints were stroke and major bleedings (BARC 3-5) at one year after LAAC, and were adjudicated by a clinical events committee composed by two cardiologists and one neurologist. The observed one-year rates of stroke and bleeding were compared with those predicted by CHA2DS2-VASc and HAS-BLED scores.

Results: Of the 1071 AF patients enrolled in the LAAC-Bern Registry, 94 were included in the current analysis. The mean CHA2DS2-VASc and HAS-BLED scores were 3.4 ± 1.7 and 2.1 ± 1.1, respectively. Procedural success was achieved in 98.0% of cases. At one year, no strokes and two major bleedings (2.4%, both periprocedural) were observed. The rate of observed stroke was numerically lower as compared to that predicted by CHA2DS2-VASc Score (0% vs. 2.1%). The rate of observed major bleeding, including those periprocedural, was similar to that estimated by HAS-BLED Score (2.4% vs. 2.3%).

Conclusion: In a single-center cohort of AF patients submitted to LAAC because of OAC refusal, LAAC showed to be a feasible and safe strategy for preventing stroke. Further and larger studies are needed to better understand the benefit of this procedure in this population.

Conflict of interest: No

P054

External Validation of a Novel Score for Predicting Responders to PVI for Atrial Fibrillation

Serban Teodor[1], Jeanne du Fay de Lavallaz[1], Ivo Strebel[1], Philipp Krisai[1], Gian Voellmin[1], Sven Knecht[1], Stefan Osswald[1], Christian Sticherling[1], Michael Kühne[1], Patrick Badertscher[1]

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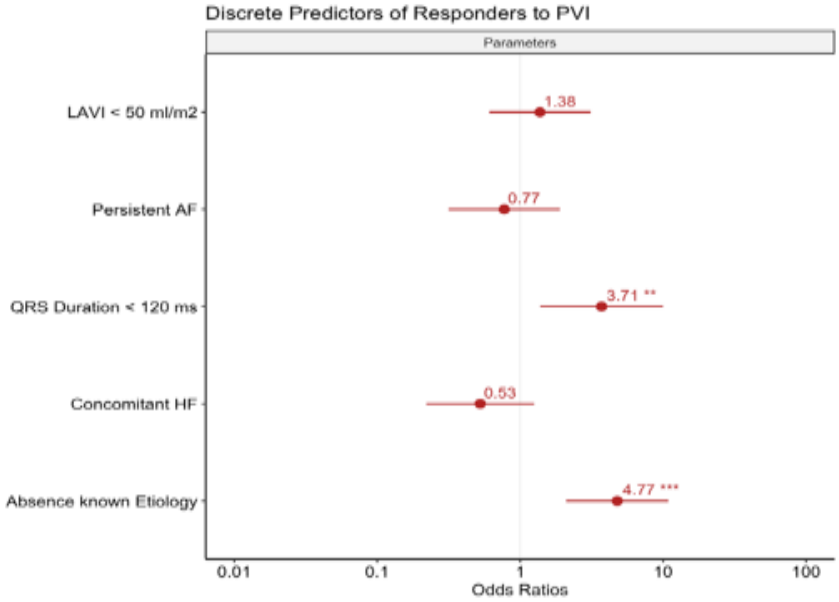
Introduction: Patients with heart failure and atrial fibrillation (AF), are likely to benefit from rhythm control by catheter ablation (CA). The Antwerp score was recently proposed as a new prediction model to potentially identify patients with recovered left ventricular ejection fraction (LVEF) after CA for AF. We aimed to externally validate the Antwerp score in a large cohort of patients undergoing CA for AF.

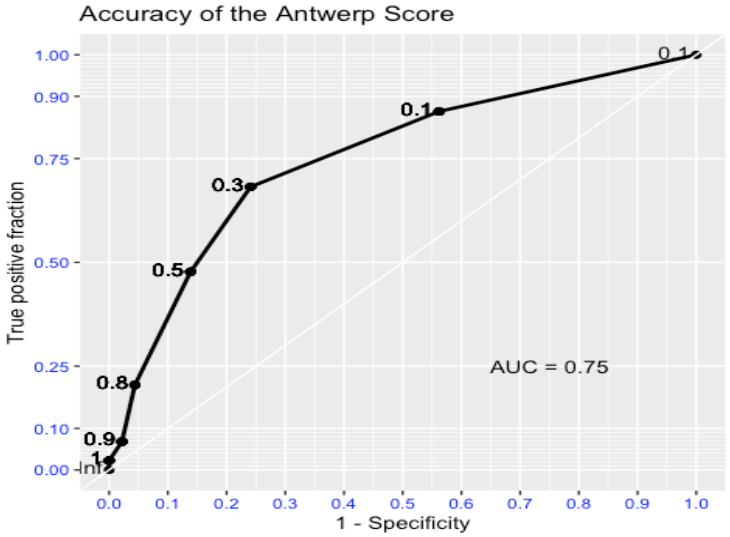
Method: We evaluated patients with reduced LVEF (<50%) who were scheduled to undergo CA for AF at University Hospital Basel. All patients were enrolled in the SWISS-AF PVI prospective observational registry. Patients were classified as responders and non-responders based on the improvement of LVEF after CA of AF.

Results: 181 patients were included in the final analysis for the external validation of the Antwerp score. 25% of patients were in paroxysmal and 75% of patients were in persistent AF. The mean LVEF at baseline was 40% (± 7.9). At 12 [IQR 6-12] months follow-up after the index procedure, 137 patients (76%) were responders, and 44 patients (24%) were non-responders. The median time to LVEF recovery in responders was 8 [IQR 3-27] months. The Antwerp score had an area under the curve (AUC) of 0.75 (95% CI 0.64-0.84) – Figure. Between responders and non-responders, differences in atrial volumes and type of AF were not significant (p = 0.05, p = 1), while QRS width and absence of known AF aetiology were highly significant (p <0.001 – Figure). 19% of responders had a prior clinical diagnosis of arrhythmia-induced cardiomyopathy.

Conclusion: The Antwerp score has a moderate ability to identify patients with recovered LVEF after CA for AF in an external population, showing modest rule-in and rule-out capabilities. QRS width and absence of known AF aetiology were confirmed as predictors of LVEF recovery.

Conflict of interest: No





P055

Assessment of the Atrial Fibrillation Burden in Holter ECG Recordings using Artificial Intelligence

Elisa Hennings[1 2], Michael Coslovsky[3], Rebecca E Paladini[1 2], Stefanie Aeschbacher[1 2], Sven Knecht[1 2], Vincent Schlageter[2], Philipp Krisai[1 2], Patrick Badertscher[1 2], Christian Sticherling[1 2], Stefan Osswald[1 2], Michael Kühne[1 2], Christine S. Zuern[1 2]

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Introduction: Emerging evidence indicates that a high atrial fibrillation (AF) burden is associated with adverse outcome. However, AF burden is not routinely measured in clinical practice. An artificial intelligence (AI)-based tool could facilitate the assessment of AF burden. We aimed to compare the assessment of AF burden performed manually by physicians with that measured by an AI-based tool.

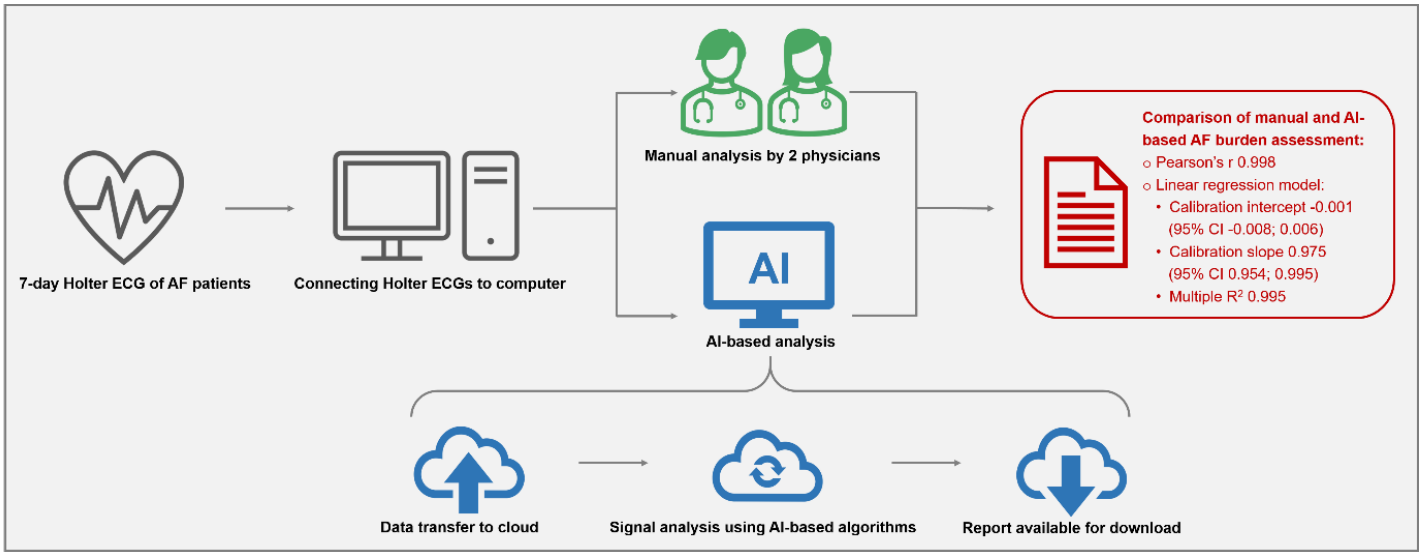
Method: We analysed 7-day Holter ECG recordings of AF patients included in the prospective, multicentre Swiss-AF Burden cohort study. AF burden was defined as percentage of time in AF, and was assessed manually by physicians and by an AI-based tool. We evaluated the agreement between both techniques by means of Pearson's correlation coefficient, linear regression model, and Bland-Altman plot.

Results: We assessed the AF burden in 100 Holter ECG recordings of 82 patients. We identified 53 Holter ECGs with 0% or 100% AF burden, where we found a 100% correlation. For the remaining 47 Holter ECGs with an AF burden between 0.01% and 81,53%, Pearson's correlation coefficient was 0.998. The calibration intercept was -0.001 (95% CI -0.008; 0.006), and the calibration slope was 0.975 (95% CI 0.954; 0.995; multiple R^2 0.995, residual standard error 0.017). Bland-Altman analysis resulted in a bias of -0.006 (95% limits of agreement -0.042 to 0.030). Physicians could save up to 2.5 hours per Holter ECG if the AI-based tool carried out the assessment, especially if multiple AF episodes were present.

Conclusion: The assessment of AF burden with an AI-based tool provided very similar results compared to manual assessment. An AI-based tool may therefore offer an accurate and efficient alternative for a time-saving assessment of AF burden.

Figure: Graphical Abstract

Conflict of interest: No



P056

Role of periprocedural ECG and electrophysiological findings to predict high degree atrioventricular block after transcatheter aortic valve replacement

Mattia Pagnoni[1], David Meier[1], Adrian Luca[1], Stephane Fournier[1], Farhang Aminfar[1], Pascale Gentil[1], Christelle Haddad[1 2], Niccolo Maurizi[1], Giulia Domenichini[1], Mathieu Le Bloa[1], Claudia Herrera Siklody[1], Cheryl Teres[1], Stephane Cook[3 4], Goy Jean Jacques[3 4], Mario Togni[3 4], Christan Roguelov[1], Girod Gregoire[1], Vladimir Rubimbura[1], Marion Dupre[1], Eric Eeckhout[1], Etienne Pruvot[1], Olivier Muller[1], Patrizio Pascale[1]

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Introduction: The identification of patients at risk of high-grade atrioventricular block (HAVB) is one of the major unmet challenges in transcatheter aortic valve replacement (TAVR). The aim of this study is to determine whether pre- and immediate post-TAVR ECG and HV interval findings are predictive of HAVB and pacemaker (PM) need over 1-year follow-up.

Method: ECG and standardized HV interval measurements were performed pre- and post-valve deployment with the quadripolar catheter used for rapid pacing in consecutive patients without prior PM implantation undergoing TAVR between August 2019 and October 2021. The primary outcome was either documented HAVB >24h post-TAVR or ventricular pacing >1% in patients undergoing prophylactic PM implantation because of abnormal electrophysiological (EP) testing within the days following TAVR.

Results: The primary outcome occurred in 8 of the 97 patients included (8.3%), with 7 HAVB (5 during hospitalisation), and 1 prophylactic PM implantation (EP testing with HV≥70ms) and ventricular pacing need during follow-up. Univariate predictors of the primary outcome were the pre- and post-TAVR PR interval, the post-TAVR HV interval and Delta-HV interval (difference between post- and pre-TAVR HV intervals) (Table 1). A Delta-HV≥18ms predicted HAVB with sensitivity = 50% and specificity = 90% (AUC = 0.708, PPV 31%), and an HV≥60ms post-TAVR predicted HAVB with sensitivity = 63% and specificity = 79% (AUC = 0.681, PPV 21%) (Figure 1). None of the patients with a post-TAVR PR≤180ms experienced the primary outcome.

Conclusion: The yield of the periprocedural EP assessment alone is limited in ruling out the risk of HAVB since about half of the patients at risk fail to be identified. Abnormal post-valve deployment HV or Delta-HV interval help identify a subgroup at particularly high risk developing up to one third of HAVB at follow-up. A PR interval≤180 ms identifies a subgroup of patients at very low risk, independently of QRS interval and morphology.

Conflict of interest: AA has received consulting and speaker fees from SIS Medical. MB has received consulting and speaker fees from Abbott Vascular, Abiomed, Amgen, Astra Zeneca, Bayer, Daichii, Mundipharma and SIS Medical. FC has received consulting and speaker fees from Abbott Vascular, Abiomed and SIS Medical.

Table 1 - Binary logistic regression

	Univariate	
	OR [95% CI]	P value
Pre-Implantation		
PR	**1.023 [1.002 – 1.045]**	**0.034**
AH	1.019 [0.998 – 1.042]	0.082
HV	1.015 [0.914 – 1.127]	0.782
QRS	1.018 [0.992 – 1.044]	0.181
Axis	0.994 [0.977 – 1.012]	0.517
Post-Implantation		
PR	**1.007 [1 – 1.035]**	**0.045**
AH	1.016 [0.995 – 1.038]	0.144
HV	**1.03 [1.004 – 1.057]**	**0.026**
QRS	1.011 [0.984 – 1.038]	0.421
Axis	0.997 [0.981 – 1.014	0.754
Delta (post – pre implantation)		
PR	1.002 [0.981 – 1.022]	0.883
AH	0.988 [0.950 – 1.028]	0.559
HV	**1.033 [1.005 – 1.061]**	**0.019**
QRS	0.995 [0.967 – 1.023]	0.712
Axis	1.003 [0.982 – 1.025]	0.754

Fig. 1A

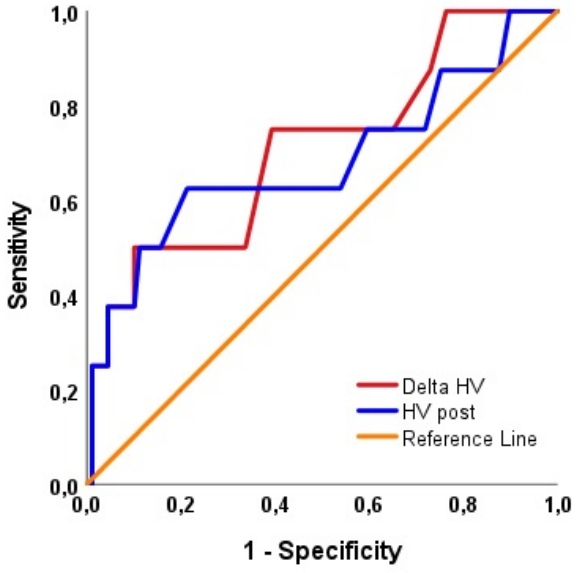
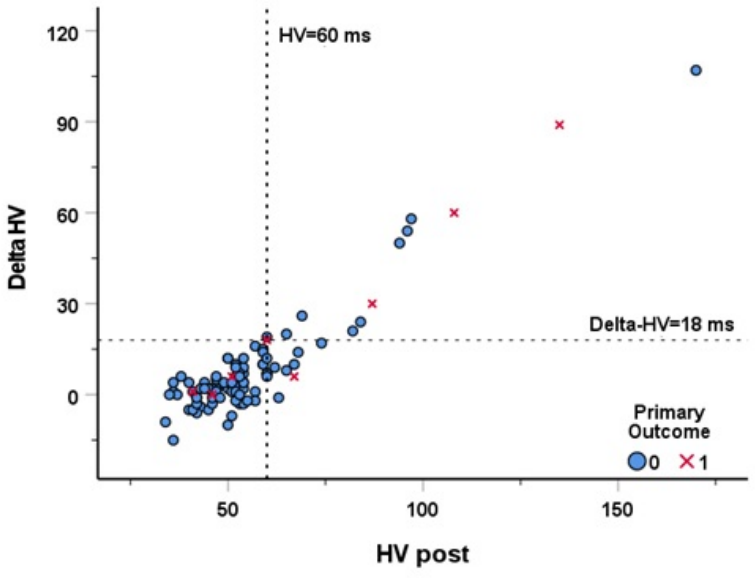


Fig. 1B



P057

Causes for recurrence after personalized radiofrequency catheter ablation for paroxysmal atrial fibrillation and pulmonary vein reconnection site characteristics

Cheryl Teres[1], Jose Alderete[2], David Soto-Iglesias[2], Diego Penela[2], Antonio Berruezo[2]

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Introduction: Personalized pulmonary vein isolation (PVI) for paroxysmal atrial fibrillation (PAF), tailoring the ablation index (AI) to the left atrial wall thickness (LAWT), has proven to be a highly efficient method with excellent arrhythmia free survival rates. We analyzed the PV reconnection sites and causes responsible for PV reconnections during REDO procedures after personalized PAF ablation.

Method: Consecutive patients referred for a REDO procedure after a personalized PAF ablation, were analyzed. LAWT maps obtained from multidetector computerized tomography (MDCT) were imported into CARTO navigation system. LAWT of the PV reconnection (PVR) sites was analyzed.

Results: 251 patients underwent personalized PVI (April 2019 – July 2021), 45 (17,9%) had arrhythmia recurrence after a follow-up of 1,4 ± 0,8 years. Of them, 28 underwent a REDO procedure. 26 patients (93%) had PVR [17 (60%) bilateral, 5 (18%) right PVs and 4 (14%) left PVs]. There were 76 PVR points (40 in right PVs and 36 in left PVs). Mean LAWT in right and left PVR sites was 2 ± 0,8 mm and 3,1 ± 1,2 mm, respectively. Most frequently PVR segments were anterosuperior (AS) and anterior carina (AC) for RPVs and AS, AC and anteroinferior for LPVs. Only 2 PVR (3%) occurred in areas with LAWT ≤ 1 mm. A plausible cause for PVR was found in 20 points (26%): i) gaps in the PVI line (inter-VISITAG™ ≥ 6 mm) in 5, lower ablation index than pre-specified in the personalized ablation protocol in 15, and absence of right carina ablation line in 5 cases.

Conclusion: Most of the patients with AF recurrence after a personalized AF ablation had PVR. Reconnection points were more frequently present in thicker segments of both PVs. GAPS in the ablation line, suboptimal ablation lesions and catheter instability are associated with PVR.

Conflict of interest: Dr Berruezo is a stockholder of Galgo Medical. Dr Soto is employed by Biosense Webster.

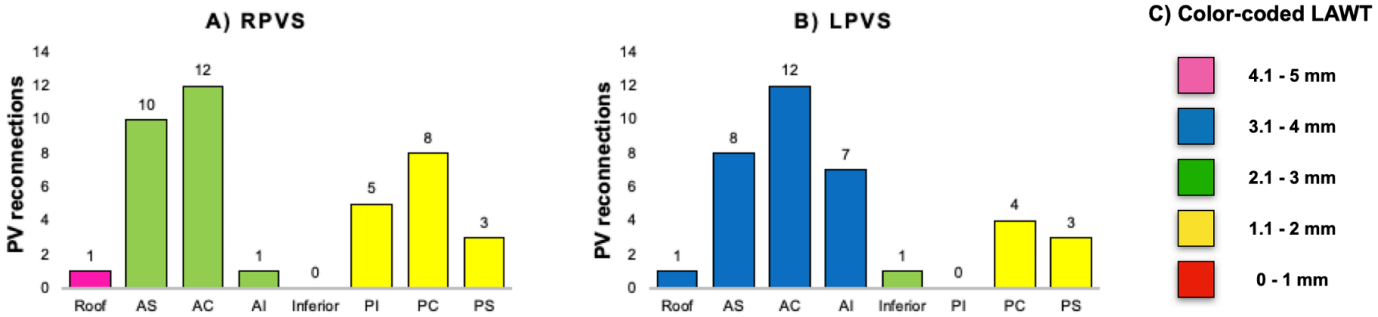

Figure 1. Reconnection sites in both right (A) and left (B) PVs. The bars colors represent the mean LAWT of each LA segment at the time of the index procedure. Most of the PVs reconnections occurred in thicker LA segments. C) Color-coded LAWT used during personalized PVI. PVs: pulmonary veins; LAWT: left atrial wall thickness; LA Left atrium; PVI: pulmonary vein isolation; AS: anterosuperior; AC anterior carina; AI: anteroinferior; PI: posteroinferior; PC: posterior carina; PS: posterosuperior.

P058

Coffee consumption and adverse outcome events in patients with atrial fibrillation

Vasco Iten[1], Elena Herber[1], Michael Coslovsky[1], Elisa Hennings[1], Rebecca Paladini[1], Tobias Reichlin[2], Nicolas Rodondi[2], Andreas Müller[3], Annina Stauber[3], Juerg Beer[4], Roman Brenner[5], Giulio Conte[6], Elena Caporali[6], Richard Kobza[7], Marcello DI Valentino[8], Patricia Chocano[9], Freschteh Moradi[1], Tim Sinnecker[1], Leo Bonati[1], Michael Kühne[1], Stefan Osswald[1], David Conen[10], Stefanie Aeschbacher[1], Christine Zuern[1]

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Introduction: Moderate coffee consumption has been associated with a lower risk of major adverse cardiovascular events (MACE) in the general population. However, there are some concerns that coffee consumption might be harmful for patients with atrial fibrillation (AF). The aim of this study was to investigate the association between coffee consumption and MACE in AF patients.

Method: Data of AF patients from two large prospective, multicenter cohort studies (yearly based follow-up data from Swiss-AF and Beat-AF) were used for this analysis. Coffee consumption was assessed and categorized into two main groups "not-daily" and "daily" consumers and subcategories (<1, 1, 2-3 and ≥4cups/day). The primary endpoint was defined as a composite of stroke or systemic embolism, myocardial infarction, hospitalization for acute heart failure and cardiovascular death (MACE). We performed time-updated multivariable adjusted Cox regression analyses to investigate the association of coffee consumption with MACE and other adverse outcome events.

Results: Among 3,835 patients (mean age 71.4 years, 28.0% females), 3,095 (80.7%) reported daily coffee consumption. The incidence rate for MACE was 5.09 in daily and 7.49 per 100py in not-daily consumers. After comprehensive multivariable adjustment, daily coffee consumption was associated with a 23% relative risk reduction for MACE compared to not-daily consumption (hazard ratio (HR) (95% confidence interval (CI)) 0.77 (0.67-0.89), p <0.001; cumulative incidence curve in Figure 1). Compared to patients with not-daily coffee consumption, patients with moderate coffee consumption (2-3 cups/day) had the lowest hazard for MACE (HR (95%CI) 0.73 (0.62; 0.85), p <0.001). The associations between coffee consumption and all adverse outcome events are presented in Figure 2.

Conclusion: In a population of AF patients, daily coffee consumption was associated with a lower risk of MACE. These findings seem to be similar to those in the general population.

Conflict of interest: No

Figure 1

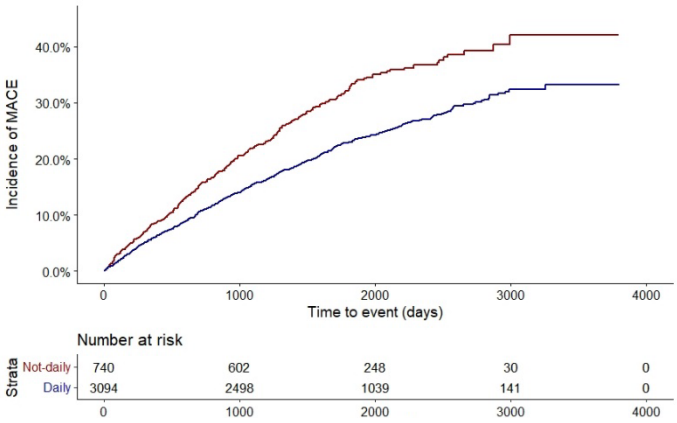
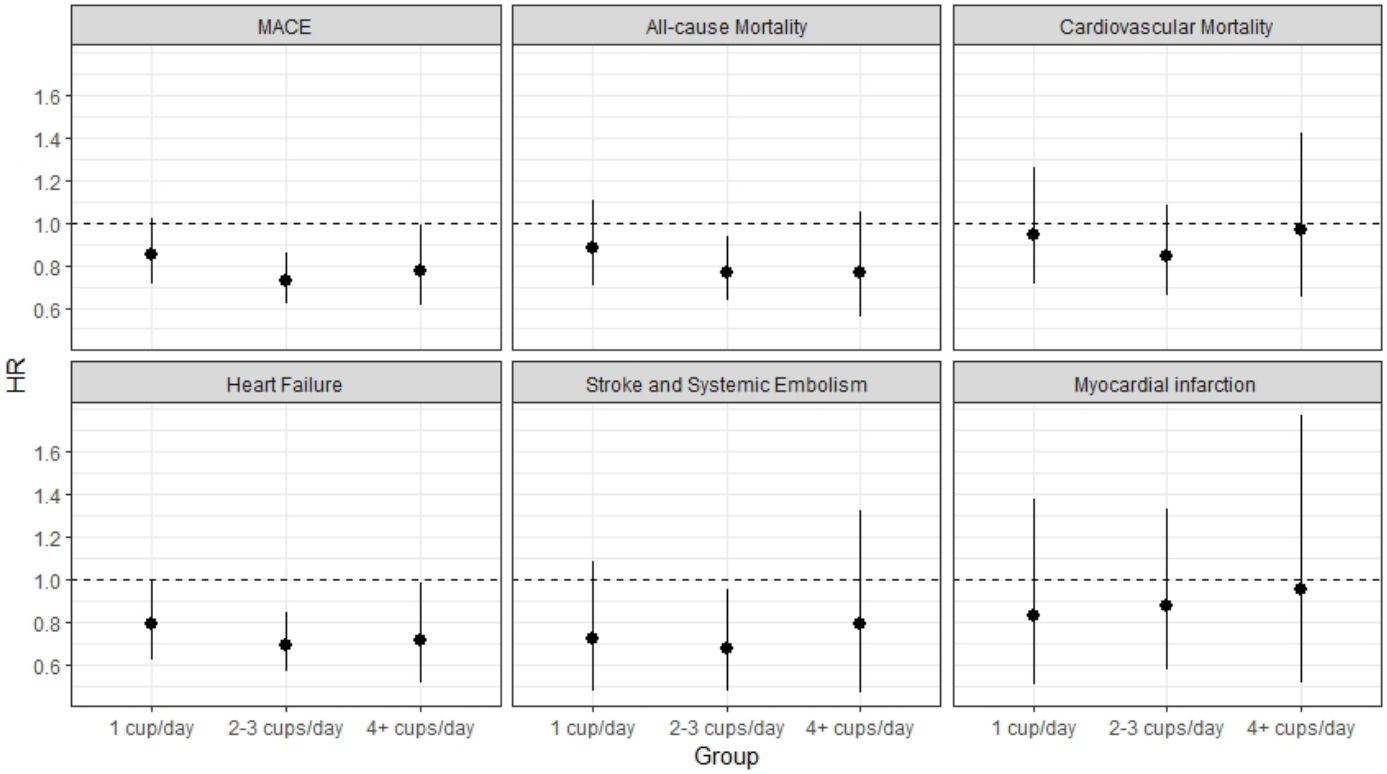


Figure 2



P059

Predictors of pericardial effusion after left atrial appendage closure: a single-center cohort study

Roberto Galea[1], Tommaso Bini[1], Fabrice Gil Temperli[1], Fabian Wieser[1], Mohammad Kassar[1], Papadis Athanasios[1], Georgios Siontis[1], Laurent Roten[1], Raouf Madhkour[1], David Julian Seiffge[1], Sven Ledwoch[1], Stephan Windecker[1], Lorenz Räber[1]

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Introduction: Left atrial appendage closure (LAAC) has been established in clinical practice as a valid strategy for preventing stroke in patients with atrial fibrillation and high-bleeding risk. One of the most common LAAC procedural complications is pericardial effusion. Several studies have been performed with the aim of detecting potential predictors of procedural pericardial effusion. However, vast majority have relevant limitations.

Method: Consecutives percutaneous LAAC procedures performed at University Bern Hospital between January2009 and April2022 were prospectively collected (clinicaltrial.gov-NCT04628078) and patients were followed for one year. The primary endpoint was the procedural pericardial effusion, defined as any pericardial effusion occurred within 7 days after intervention with more than 10 mm of pericardial separation in diastole as centrally evaluated by expert echocardiographist. This study aimed at describing the mid-term outcomes of procedural pericardial effusion and assessing the patient and procedural predictors including device used, imaging guidance/planning, first operators and his/her expertise, year of procedure, antithrombotic therapy regimen. A clinical event committee consisting of two cardiologists and one neurologist adjudicated all clinical events.

Results: Among 1023 LAAC procedures, procedural pericardial effusion was adjudicated in 31 (3.0%) patients. Patients with procedural pericardial effusion had higher overall mortality at one year (19.4% vs. 9.8%; Hazard Ratio [HR]: 2.16; 95% Confidence Interval [CI]: 0.94-4.93; p = 0.068); especially those implanting Amplatzer devices (20.0% vs. 9.1%; HR: 2.42; CI: 1.05-5.59; p = 0.039). After adjusting for confounders, lower age (HR: 0.07; CI: 0.01-0.13; p = 0.035) and male gender (HR: 0.32; CI: 0.01-0.20; p = 0.017) remained independently associated to a lower rate of procedural pericardial effusion.

Conclusion: In a large single-center cohort of consecutive LAA closures, procedural pericardial effusion occurred after Amplatzer device implantation was associated to higher overall mortality at one year. After adjusting for confounders, lower age and male gender remained independently associated to a lower rate of procedural pericardial effusion.

Conflict of interest: No

P060

Beat-to-beat variation of P-wave morphology immediately after ablation of persistent atrial fibrillation correlates with long-term clinical outcome

Adrian Luca[1], Eloise Coudray[1], Jean-Marc Vesin[2], Mathieu Le Bloa[1], Cheryl Teres[1], Claudia Herrera[1], Laurent Roten[3], Michael Kühne[4], Florian Spies[4], Sven Knecht[4], Christian Sticherling[4], Patrizio Pascale[1], Etienne Pruvot[1]

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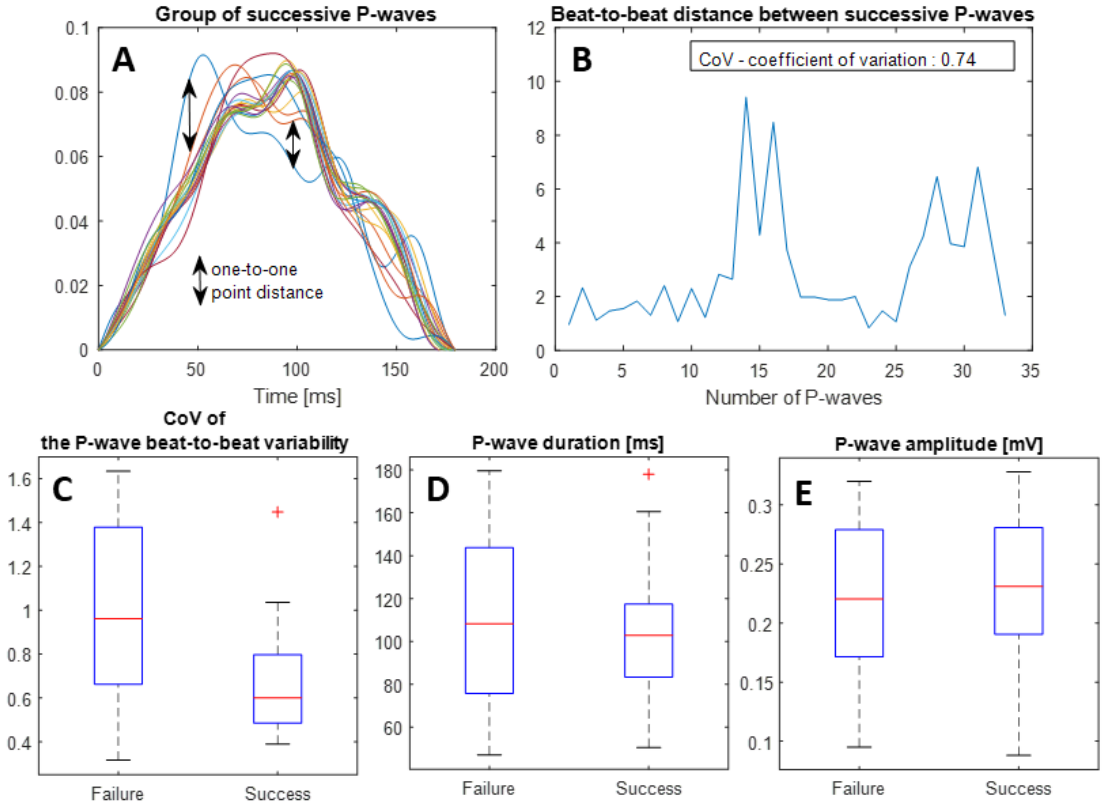
Introduction: P-wave morphology on surface ECG reflects the atrial electrical remodelling, and is regarded as a predictor of ablation outcome for atrial fibrillation (AF). We sought to investigate whether morphological characteristics of P-waves immediately after a wide circumferential isolation of pulmonary veins (WPVI) in persistent AF (peAF) correlate with long-term maintenance of sinus rhythm (SR).

Method: 33 patients (63 ± 10 y, sustained AF 11 ± 7 months) underwent a de-novo WPVI. A second WPVI was performed in patients with recurrent AF in order to provide complete PV disconnection. We defined "success" as patients who remained in SR after one or two procedures, and “failure” otherwise. The average duration and amplitude of the P-waves, and the coefficient of variation (CoV = standard deviation/mean) of the beat-to-beat similarity between ≥30 successive P-waves per patient were computed on ECG lead II during SR after cardioversion. Panel A shows a group of successive P-waves synchronized with regard to their centers of gravity. The similarity between the shapes of two successive synchronized P-waves was assessed using the dynamic time warping distance. Panel B shows the time-evolution of beat-to-beat distance between the P-waves displayed in Panel A.

Results: Over a mean follow-up of 31 ± 9 months, 21 patients remained free from AF off antiarrhythmics (success group), while 12 patients had AF recurrence after 2 WPVIs (failure group). The clinical characteristics (e.g. age, body mass index, left atrial volume or duration in sustained AF) were similar between groups (p >0.05). The success group displayed significantly lower beat-to-beat variability of P-wave morphology than that of the failure group (p <0.05, Panel C). No significant difference was found in P-wave duration and amplitude between the two groups (p >0.05, Panel D and E).

Conclusion: Low P-wave beat-to-beat morphological variability immediately after WPVI for persistent AF is associated with long-term maintenance of sinus rhythm.

Conflict of interest: No



P061

Integration of electroanatomical maps in the planning phase of stereotactic arrhythmia radioablation for refractory ventricular tachycardia

Jorge Solana Muñoz[1], Adrian Luca[1], Claudia Herrera Siklody[1], Martijn Van der Ree[1 2], Mathieu Le Bloa[1], Cheryl Teres[1], Alessandra Pia Porretta[1], Giulia Domenichini[1], Patrizio Pascale[1], Luis Shiappacasse[1], Etienne Pruvot[1]

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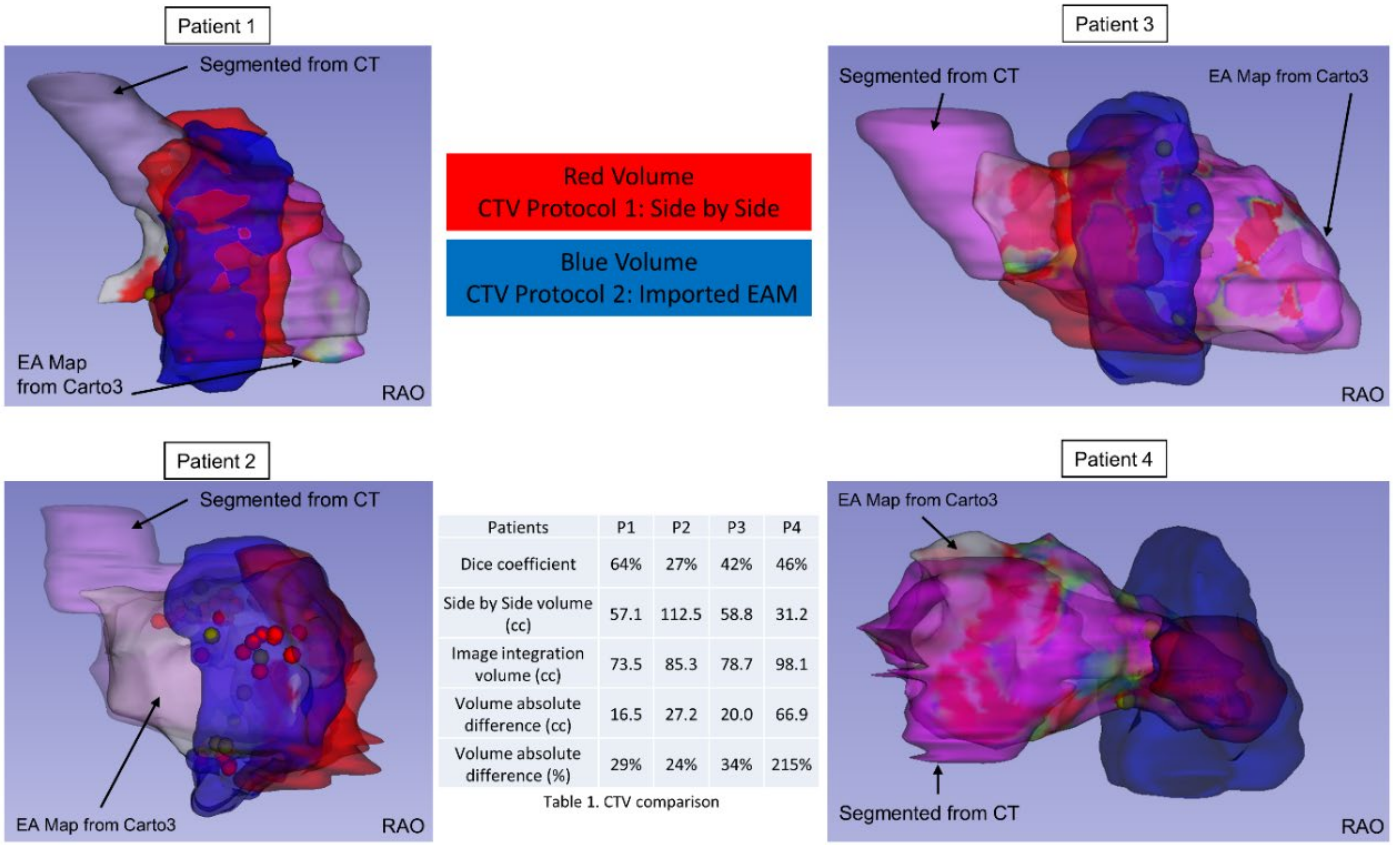
Introduction: Despite the efficacy of stereotactic arrhythmia radioablation (STAR) for refractory ventricular tachycardia (VT), the planning phase still suffers from limitations due to the incompatibility of data formats between the current 3D electroanatomical maps (EAM) and STAR planning softwares (CyberKnife). Herein, we developed a new protocol to integrate all 3D diagnostic data into the STAR planning workflow using the open source software Slicer3D.

Method: Two protocols were compared in a retrospective analysis. Protocol 1 comprised the manual delineation of the clinical target volume (CTV) on planning 4D-CAT SCAN drawn side-by-side using EAM (Carto3, Biosense Webster). Protocol 2 comprised semiautomatic delineation of CTV on planning 4D-CAT SCAN using imported EAM annotated with landmarks for VT target delimitation. The volume overlap (Dice coefficient) and the absolute difference between the CTVs were used to compare the two protocols.

Results: We applied both protocols to four patients (65.5 ± 8.5 yo) with refractory VT treated with STAR. Figure 1 shows substantial mismatch of CTV between both protocols. The median volume overlap (Dice coefficient) of the CTV was 44%, while the median volume absolute difference was 31%. Table 1 reports detailed results.

Conclusion: Our study reveals a high variability of CTV delineation for STAR using two different protocols. The intraprocedural assignment of anatomical landmarks for VT target delimitation on EAM appears promising for accurate CTV delineation. Further research is needed to evaluate the correlation between STAR outcomes and differences in CTV delineation using different protocols.

Conflict of interest: No



Patients	P1	P2	P3	P4
Dice coefficient	64%	27%	42%	46%
Side by Side volume (cc)	57.1	112.5	58.8	31.2
Image integration volume (cc)	73.5	85.3	78.7	98.1
Volume absolute difference (cc)	16.5	27.2	20.0	66.9
Volume absolute difference (%)	29%	24%	34%	215%

Table 1. CTV comparison

Figure 1 shows the EAM integrated on 4D-CAT SCAN and the CTVs obtained with both protocols.

P062

Getting it started – insights into initial experience with pulsed field ablation for atrial fibrillation

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Introduction: Pulsed field ablation (PFA) has recently been introduced as a promising novel treatment option for patients with symptomatic atrial fibrillation (AF). Using a nonthermal ablative mechanism to create microscopic pores into the myocardial cell membrane through a train of microsecond duration high amplitude electrical pulses, it could be shown to be highly tissue selective. Success with PFA however depends upon the proximity of the electrode to the target tissue. We want to share our initial experience with PFA for pulmonary vein isolation (PVI).

Method: We analyzed 39 patients, who were treated for symptomatic atrial fibrillation using the FARAWAVE PFA catheter (Farapulse, Menlo Park, CA, USA). Our peri-procedural findings are described. To gain an impression of the subjective sense of well-being all patients received follow-up calls.

Results: Between July 2022 and December 2022 39 patients (62 ± 8 years, 77% male, 56% paroxysmal AF) underwent an AF ablation using PFA. The median CHA2DS2-VASc score was 1.4 ± 1.2. In 38 (97%) patients PVI only was performed, while in 1 (3%) patient we additionally performed ablation of the posterior wall. The mean procedural time was 65 ± 18 min. with a mean fluoroscopy time of 16 ± 6 min. Using the recommended settings (2 + 2 basket & 2 + 2 flower configuration applications per vein) we could observe a first pass isolation rate of only 67% with the necessity of additional applications mostly at the anterior parts of both superior pulmonary veins. During the follow-up interviews 65% of our patients stated a subjective freedom from atrial fibrillation with no correlation between the first pass rate and the subjective outcome (p 0.725).

Conclusion: Our experience suggests that the initial use of PFA for pulmonary vein isolation contains a learning curve during which the expected outcome data differs significantly from the literature.

Conflict of interest: T.P.A., M.C., D.P., J.A., P.V., J.S. and J.S. are employees of Aktiia SA. C.P. serves as a consultant for Aktiia SA. All other authors report no potential conflicts of interest.

P063

Acute procedural outcomes of left bundle branch area pacing compared to His-bundle pacing

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Introduction: Conduction system pacing (CSP), encompassing left bundle branch area pacing (LBBAP) and His-bundle pacing (HBP), are pacing strategies, which overcome limitations of conventional pacing. Feasibility and early safety of both strategies have been established previously. While HBP is mentioned as an alternative strategy in the latest pacing guidelines, implantation recommendations regarding LBBAP are scarce. Notably, HBP was described to be associated with a higher failure rate compared to LBBAP, making it more contestable. The purpose of this work was to compare procedural outcomes after HBP and LBBAP lead implantation.

Method: We prospectively assessed 303 consecutive CSP lead implantation attempts at our center from 08/2018 to 11/2022. 81% of all implantations were performed by two high-volume device implanters. Successful CSP was established according to standard criteria (HBP: QRS morphology, R-wave peak time in V6, programmed stimulation, visibility of a His potential; LBBAP: R-wave peak time in V6, V1-V6-interpeak interval, programmed stimulation or visibility of a left bundle potential) and pacing thresholds (HBP: <4.0V/1.0ms; LBBAP: <2V/0.5ms). Patient selection and the implantation strategy was at the operator's discretion.

Results: Patients with a HBP attempt were younger and had a narrower QRS complex but did not differ with respect to ventricular function and dimension (table showing percentages and median values/interquartile ranges). LBBAP systems were more often implanted in lieu of CRT, whereas HBP systems were more commonly used in case of AV block without heart failure (table). Success rate, overall procedure duration and fluoroscopy time were better during LBBAP implantations (all p <0.001). Sensing values and capture thresholds (@ 1ms for HBP and 0.5ms for LBBAP) were superior in LBBAP systems, while achieved paced QRS duration was slightly shorter in HBP systems (table, figure 1).

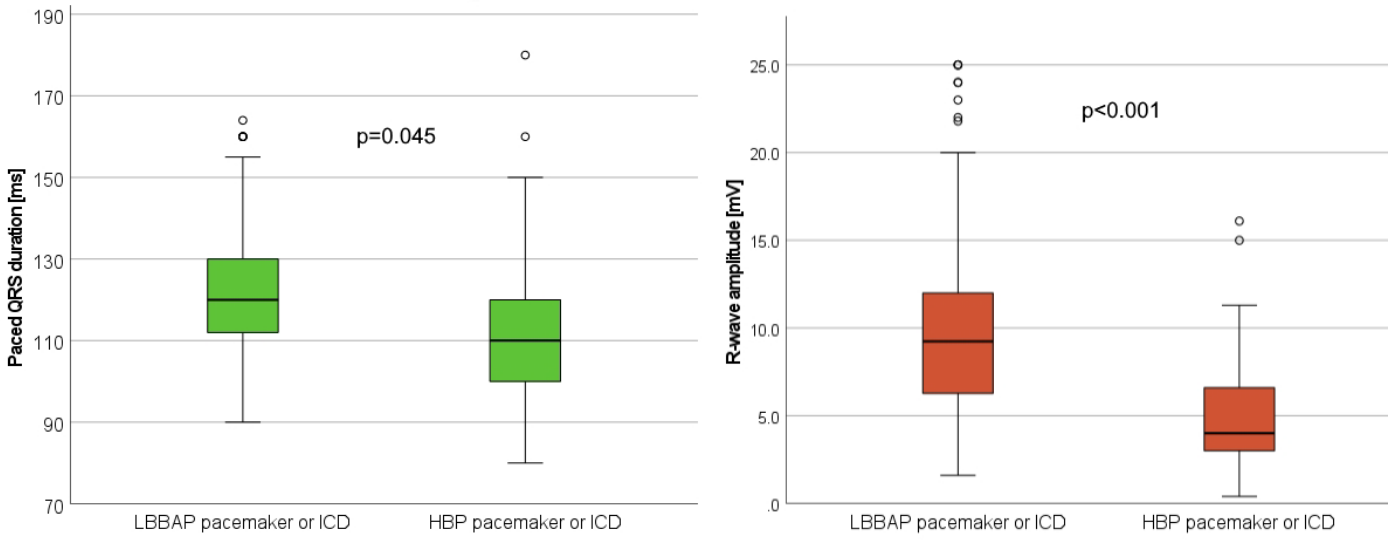
Conclusion: Success rates and acute procedural outcomes favor implantation of LBBAP compared to HBP systems.

Conflict of interest: No

Table 1

Patient and procedural characteristics	HBP n=133	LBBAP N=170	p-value
Patient characteristics and comorbidities			
- Age [years]	73 (64-80)	77 (63-80)	**<0.001**
- Female sex	48 (36%)	45 (26%)	0.094
- Body height [m]	1.73 (1.65-1.77)	1.70 (1.65-1.78)	0.204
- Body weight [kg]	80 (71-93)	80.0 (67.5-90.0)	0.726
- Coronary artery disease	44 (33%)	55 (33%)	0.991
- Arterial hypertension	86 (65%)	109 (66%)	1
- Diabetes	25 (19%)	52 (32%)	**0.027**
- Dyslipidemia	55 (41%)	73 (46%)	0.873
- Previous cardiac surgery	39 (29%)	49 (29%)	1
Echocardiography and ECG data			
- LVEF [%]	58 (45-62)	53 (35-60)	0.420
- LVEDD [mm]	50 (45-55)	54 (45-63)	0.054
- TAPSE [mm]	21 (17-24)	21 (17-25)	0.869
- Diameter of tricuspid annulus [mm]	39 (33-42)	39 (34-42)	0.256
- Baseline QRS duration [ms]	107 (95-175)	130 (100-160)	**<0.001**
- Left bundle branch block	27 (20%)	40 (24%)	0.203
- Right bundle branch block	24 (18%)	29 (17%)	0.943
Pacemaker indication			
- SSS	16 (12%)	17 (10%)	0.706
- Paroxysmal or persistent AV block	68 (51%)	61 (36%)	**0.011**
- Implantation prior AV node ablation	16 (12%)	17 (10%)	0.706
- In lieu of CRT	28 (22%)	71 (42%)	**<0.001**
- Other indications	5 (4%)	4 (2%)	0.513
Procedure duration and fluoroscopy time			
- Overall procedure duration [min]	142 (120-181)	98 (74-130)	**<0.001**
- Fluoroscopy duration [min]	17 (12-28)	10 (6-16)	**<0.001**
Characteristics of CSP lead implantation			
- Acute procedural success	87 (92%)	157 (65%)	**<0.001**
- Use of stylet-driven lead	13 (10%)	135 (81%)	**<0.001**
- CSP capture threshold @0.5ms [V]	0.9 (0.6-1.25)	0.63 (0.5-0.88)	0.438
- Final unipolar lead impedance [Ω]	416 (389-490)	531 (482-573)	**<0.001**

Figure 1



P064

The impact of clinical audits in patient radiation exposure: a preliminary study

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Introduction: Aim of clinical radiation audits is to ensure an ideal use of ionizing radiation. The first radiation audit in the USZ cardiology department took place in September 2019 and the main recommendation regarding patient exposure was to establish local diagnostic reference levels (LDRLs). The objective of this study was to establish LDRLs before and after the audit and examine if patient exposure was affected by the audit.

Method: Data from 500 electrophysiology procedures performed 6 months before and after the audit were retrospectively collected. The procedures included electrophysiologic study (EPS), catheter ablation (subdivided into right-sided and left-sided procedures with and without electroanatomical mapping (EAM), atrial fibrillation ablation with and without EAM, pacemaker/ICD implantation (single-chamber/dual-chamber) and CRT implantation. Patient exposure was evaluated in terms of dose-area product (DAP), fluoroscopy time (T) and cumulative dose at the reference point. The data were collected from a dose management system, cross-checked for accuracy with the patient information system and analyzed with a statistics software.

Results: LDRLs were established for all procedures and compared with national ones, where applicable. Results revealed that LDRLs were lower as compared to the national DRLS (Table 1). DAP and T remained similar prior to and after the audit for EPS, CRT implantation, catheter ablation with EAM, and significantly decreased for right-sided catheter ablation. T significantly decreased for atrial fibrillation ablation with and without EAM (p-value <0.0001), whereas DAP remained similar. For pacemaker/ICD implantation, the DAP was significantly decreased (p-value = 0.01), while T remained the same.

Conclusion: Purpose of clinical audits is to optimize patient safety. Our clinical audit significantly reduced radiation exposure of patients in pacemaker/ICD implantations and ablation procedures without EAM, whereas no differences were observed in other types of procedures. Regarding DRLs, local values were below national ones, which may indicate that national DRLs should be updated regularly.

Conflict of interest: No

Table 1: Local diagnostic reference levels after the audit

	DAP (Gy.cm²)	Cumulative Dose (mGy)	Fluoroscopy time (min)
CRT implantation	7.5	100	14
EPS	0.3	2	2
EPS - Swiss DRL	*20*	*300*	*10*
Catheter ablation, left-sided with EAM	5.3	45	13
Catheter ablation, left-sided without EAM	0.4	2	1
Catheter ablation, right-sided with EAM	0.6	3	2
Catheter ablation, right-sided without EAM	0.2	2	1
Catheter ablation without EAM - Swiss DRL	*150*	*2250*	*25*
Catheter ablation with EAM - Swiss DRL	*30*	*623*	*9*
Atrial fibrillation ablation with EAM	5.1	40	3
Atrial fibrillation ablation without EAM	20.0	150	15
Pacemaker/ICD implantation	3.5	2.4	4.1
Pacemaker/ICD implantation - Swiss DRL	*30*	*450*	*7*

P065

3D imaging assistance impact on atrial fibrillation cryoballoon ablation efficiency, a method validation study

Jorge Solana Muñoz[1], Cheryl Teres[1], Adrian Luca[1], Claudia Herrera Siklody[1], Hélène Leupi[1], Giulia Domenichini[1], Patrizio Pascale[1], Etienne Pruvot[1], Mathieu Le Bloa[1]

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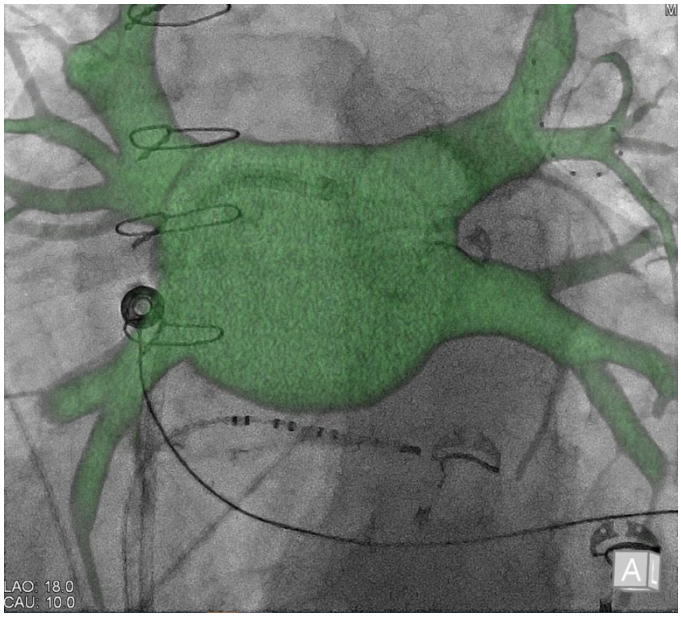
Introduction: Pulmonary vein (PV) isolation is a cornerstone therapy for symptomatic atrial fibrillation (AF). Current 3D-navigation technologies used with radiofrequency ablation allow drastic reduction of X-ray exposure and better anatomical characterization improving acute and long-term procedural results. We sought to investigate the incremental value of 3D imaging fusion during cryoballoon ablation (CA).

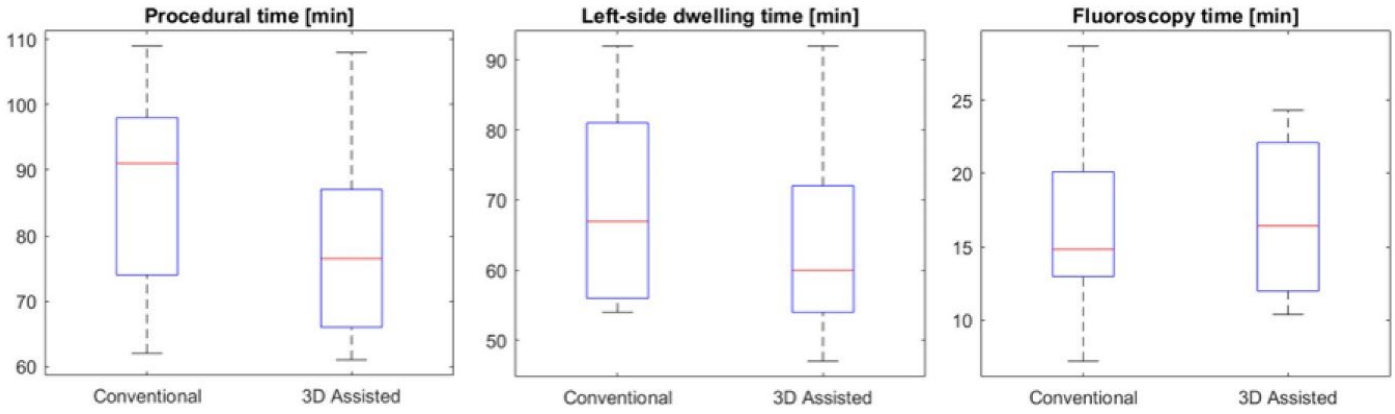
Method: Using semi-automatic segmentation (Alphenix, Canon Medical) obtained from pre-procedural cardiac computed tomography, 3D segmentations of the left atrium, including PV, and spine were fused on the real-time fluoroscopy acquisitions in three standard positions (AP, LAO, RAO), acquired at the beginning of the procedure. We compared procedural characteristics of CA performed with 3D fusion imaging to conventional fluoroscopy guided procedures.

Results: Twenty patients with paroxysmal AF were included in the study: 10 in the control group (conventional fluoroscopy based CA), and 10 in the 3D assisted group. Mean age was 59 ± 15 SD years for the conventional group and 61.3 ± 15.1 SD years for the 3D group with an 80% male population, in both groups. Acute PVI was achieved in all 20 patients. A decrease of both procedure time 86.8 ± 16.1 SD in the control group Vs. 78.4 ± 15.32 SD in the 3D group, and left sided dwelling time 69.7 14.31 SD in the control group Vs. 63.9 ± 13.96 SD in the 3D group, although this trend did not reach statistical significance. Fluoroscopy time and overall ablation time remained similar.

Conclusion: 3D imaging integration is feasible and allows for an exact PV anatomy depiction on fluoroscopy. The assistance workflow might help increase AF cryoablation efficiency and safety (lower left sided dwelling time). Further research is needed to evaluate the incremental value of 3D imaging to assist fluoroscopy-based CA. This could also impact long-term results since 3D Imaging assistance could reduce the likeability of missing intermediate PVs during AF ablation procedures.

Conflict of interest: No





P066

Sex-specific Differences in Infranodal Conduction Properties in Patients Undergoing Transcatheter Aortic Valve Replacement

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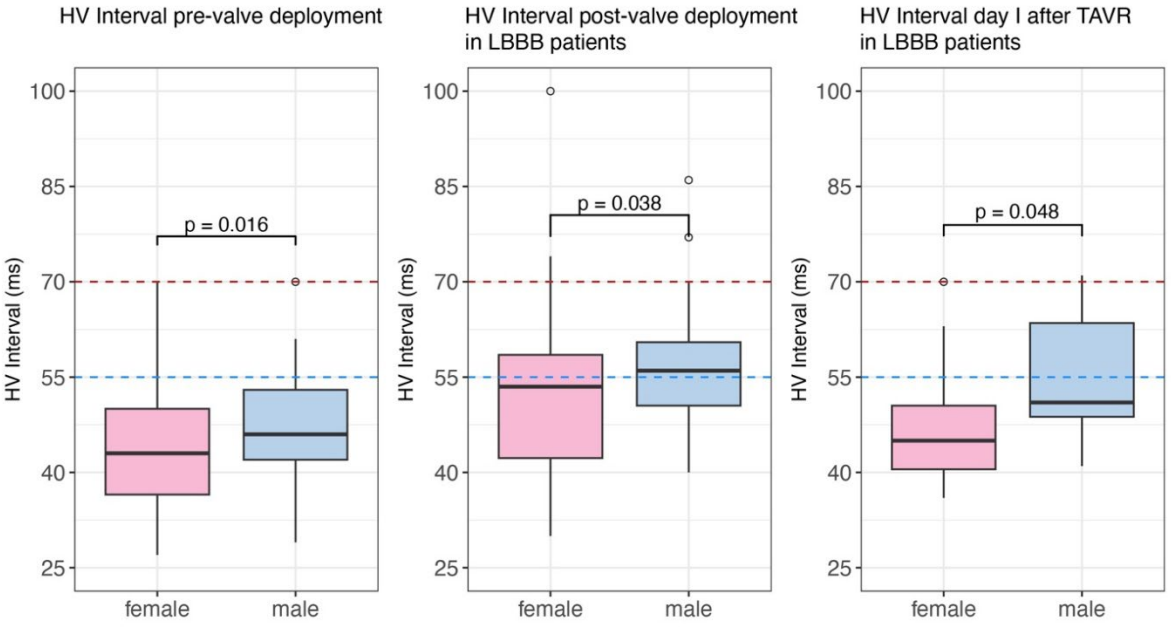
Introduction: Electrophysiological (EP) testing has been proposed for risk stratification of patients with left bundle branch block (LBBB) after transcatheter aortic valve replacement (TAVR). A uniform cut-off of 70ms for the His-ventricular interval has been proposed to trigger pacemaker implantation. However, sex-specific periprocedural data regarding infranodal conduction properties are lacking. We aimed to compare the HV interval in men and women undergoing TAVR.

Method: We analyzed consecutive patients undergoing TAVR at the University Hospital of Basel. EP testing was performed in all patients pre-and post-valve deployment and in the case of LBBB additionally for a third time the following day.

Results: 127 patients were included (81 ± 7 years, 46% female). Median HV interval pre-valve deployment was 43 [IQR 37-50] ms vs 46 [IQR 42-53] ms in women and men, respectively (p = 0.016). Nine patients underwent peri-procedural pacemaker (PM) implantation for a third-degree atrioventricular block. The median HV interval post-valve deployment was 54 [IQR 42-59] ms in women and 56 [IQR 51-61] ms in men (p = 0.038). The median HV interval the day following TAVR in patients with LBBB was 45 [IQR 41-49] ms in women and 50 [IQR 48-62]ms in men (p = 0.048). An HV interval ≥ 55 ms and ≥70 ms was present the day following TAVR in seven patients (24%, two women) and three patients (10%, one woman). (Figure)

Conclusion: Women have shorter HV intervals pre-and post-valve-deployment as well as the day following TAVR compared to men. Further studies evaluating sex-specific cut-offs for the HV interval are warranted.

Conflict of interest: No



P067

Pre operative factors associated with permanent pacemaker implantation after suturless bioprostetic aortic valve replacement.

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Introduction: Sutureless aortic valve replacement provides an acceptable alternative for high-risk patients undergoing surgical treatment for severe aortic stenosis in which reduced surgical times are desirable. Atrioventricular conduction alteration and subsequent permanent pacemaker implantation (PPI) remains one of the main complication after suturless aortic valve replacement.

Aim: To evaluate pre-operative predictors of PPI after sutureless aortic valve replacement.

Method: Analysis of a prospective series of patients who underwent surgical aortic valve replacement using the LivaNova Perceval S sutureless bioprosthesis in our institution between 2016 and 2019. We compared pre-operative clinical, echocardiographic and electrographic data in patients who required PPI during index hospitalization with those of patients who didn't.

Results: We included 103 patients (mean age 73.8 years; 65% males). Fourteen (13.6%) of these patients needed PPI during index hospitalization. Patients who needed a PPI had significantly longer ICU and hospital length of stay (2.5 vs 1 days and 15.5 vs 12 respectively, p <0.01). Significant pre-operative risk factors associated with PPI (Table) included: prolonged pre-operative PR interval, previous cardiac surgery, higher BMI. A pre-operative PR interval longer than 200ms was the strongest predictor of PPI with an odds ratio of 5.15 [1.29; 23.0] p value = 0.02). In contrast, pre-operative QRS duration was not associated with PPI.

Conclusion: A prolonged pre-operative PR interval is associated with PPI after sutureless aortic valve replacement in our series.

Conflict of interest: No

	Total N=103	No Pacemaker N=89	Pacemaker N=14	OR	p (overall)
Age	74.0 [69.8;77.9]	73.8 [69.6;77.6]	76.3 [71.0;81.9]	1.06 [0.97;1.15]	NS
Sex=male	67 (65.0%)	58 (65.2%)	9 (64.3%)	0.95 [0.30;3.42]	NS
ICU stay	1.00 [1.00;2.00]	1.00 [1.00;2.00]	2.50 [2.00;7.25]	1.87 [0.82;4.29]	0.004
Hospital stay	13.0 [9.00;16.0]	12.0 [9.00;15.0]	15.5 [13.0;23.0]	1.22 [1.09;1.36]	0.003
PR pre op	179 [160;202]	175 [160;200]	208 [179;238]	1.03 [1.01;1.05]	0.01
PR > 200ms pre op	24 (26.1%)	18 (22.0%)	6 (60.0%)	5.15 [1.29;23.0]	0.02
BMI	27.5 [24.4;30.8]	27.1 [24.4;30.4]	30.2 [27.1;34.6]	1.09 [0.99;1.19]	0.05
QRS pre op	92.0 [84.0;102]	92.0 [84.0;103]	94.0 [90.0;101]	1.01 [0.98;1.03]	NS
Pre-op LVEF	60.0 [55.0;67.0]	60.0 [55.0;67.0]	61.0 [59.2;65.0]	1.03 [0.97;1.09]	NS
Aortic surface	0.80 [0.60;0.90]	0.80 [0.60;0.90]	0.81 [0.69;0.96]	2.54 [0.30;21.8]	NS
Valve post dilatation pressure "high" (4 ATM)	78 (75.7%)	68 (76.4%)	10 (71.4%)	0.76 [0.22;3.11]	NS
Combined surgery	46 (44.7%)	38 (42.7%)	8 (57.1%)	1.77 [0.56;5.92]	NS

POSTER WALK: HEART FAILURE

P068

Characteristics, management, and outcomes of patients hospitalized for acute heart failure in Central Asia and Western Europe

Tamila Abdurashidova[1], Martin Müller[2], Sara Schukraft[1], Nisha Soborun[1], Barbara Pitta Gros[1], Henri Lu[1], Zalina Chazymova[3], Kanzaada Dzhorupbekova[4], Medet Beishenkulov[3], Aiperi Toktosunova[3], Kanybek Kaliev[3], Georgios Tzimas[1], Antoine Garnier[5], Matthias Kirsch[6], Peter Vollenweider[5], Nynke Halbesma[7], Pierre Monney[1], Roger Hullin[1]

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Introduction: Outcomes of hospitalization for acute heart failure (AHF) treatment differ between regions of the world and ethnicity may explain this observation. Kyrgyzstan and Switzerland both endorsed the ESC guidelines for heart failure (HF) treatment providing the same medical care of HF.

Method: This retrospective observational study compares characteristics, change of HF drug treatment, and 1-year all-cause mortality (ACM) or HF-hospitalization of consecutive AHF patients hospitalized in tertiary centers of each country.

Results: Of 1075 patients, 538 were from Bishkek (Kyrgyzstan) and 537 from Lausanne (Switzerland). Central Asian patients were younger (64.0 vs. 83.0 years, p <0.001), ischemic or rheumatic cardiomyopathy were more prevalent (77.1 vs. 47.1%; 8.7 vs 0%; p <0.001, respectively). Chronic obstructive pulmonary disease was more frequent in Central Asians (32.2. vs. 23.3; p <0.001), while smoking, dyslipidemia, hypertension, and atrial flutter/fibrillation were more prevalent in Western Europeans (p <0.036). Left ventricular ejection fraction (LVEF) was higher in the Western European cohort (47 vs. 36%; p <0.001); Swiss AHF patients had less often LVEF <50% (51 vs. 81.2%; p <0.001) with more frequent aortic stenosis (16.6 vs 3.7; p <0.001) while other valvular pathologies were more prevalent in Central Asians (p <0.001). At discharge, more Swiss patients were on angiotensin-converting enzyme inhibitors (ACEi) (p = 0.005), angiotensin II receptor blockers (ARB) (p <0.001), while less on mineralocorticoid receptor antagonists (MRA) (p = 0.001), betablockers (p = 0.001), or loop diuretics (p <0.001) adjusted by age, sex, and LVEF (Figure 1). Unadjusted 1-year ACM or HF-related hospitalization was higher in Swiss AHF patients (Figure 2) but this outcome was not different when adjusted for age.

Conclusion: Characteristics of AHF patients admitted to tertiary centers in Switzerland or Kyrgyzstan vary largely, and these differences can explain heterogeneous application of HF-drugs. Nonetheless, Kaplan-Meier estimates adjusted for age did not show different 1-year ACM or HF-related hospitalization suggesting that medical treatment based on the ESC guidelines outperforms regional differences.

Conflict of interest: No

Figure 1 Drug treatment adjusted on age, sex and left ventricular ejection fraction

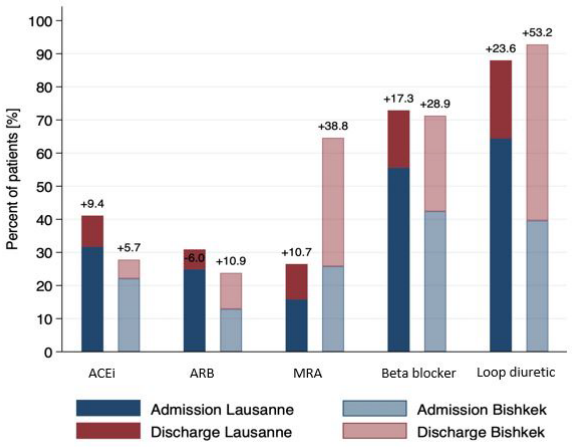
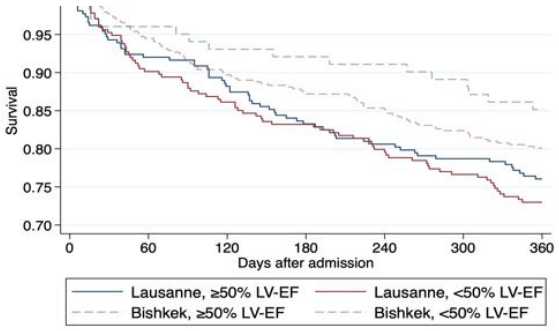


Figure 2 Kaplan Meier estimates for one-year all-cause mortality or heart failure related rehospitalization



Number at risk

Lausanne, ≥50% LV-EF	263	242	232	219	212	207	200
Lausanne, <50% LV-EF	274	247	236	228	219	210	200
Bishkek, ≥50% LV-EF	101	97	94	93	92	90	86
Bishkek, <50% LV-EF	437	413	392	381	373	360	350

P069

Echocardiographic Pattern of Left Ventricular Function Recovery in Tachycardia-induced Cardiomyopathy Patients

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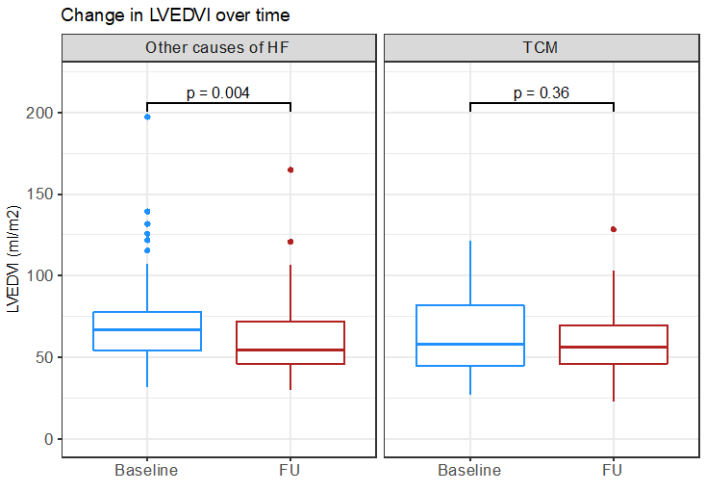
Introduction: Tachycardia-induced cardiomyopathy (TCM) represents a partially reversible type of heart failure (HF) that is often underdiagnosed. Cardiac chamber remodeling in TCM remains incompletely understood. We aimed to explore differences in the dimensions of the left ventricle (LV) and functional recovery in patients with TCM compared to patients with other forms of CM.

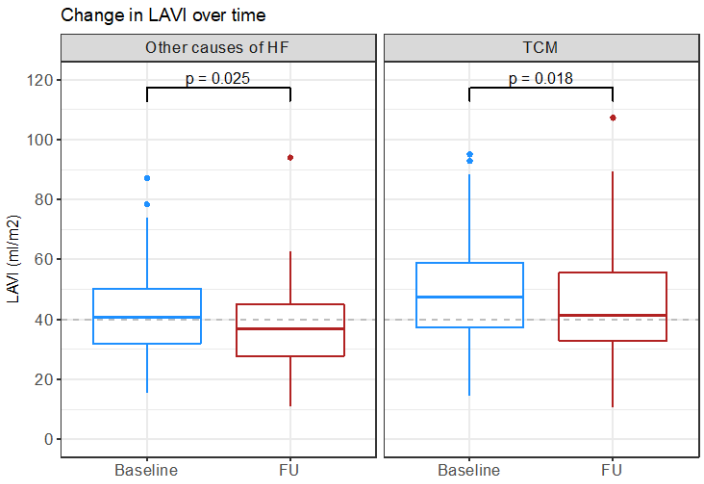
Method: We identified patients with reduced left ventricular ejection fraction- LVEF (≤50%) and/or atrial fibrillation or flutter with an LVEF that improved from baseline (≥15% in LVEF at follow-up (FU)). Patients were then adjudicated into two groups: A) TCM patients; B) patients with other forms of CM (controls).

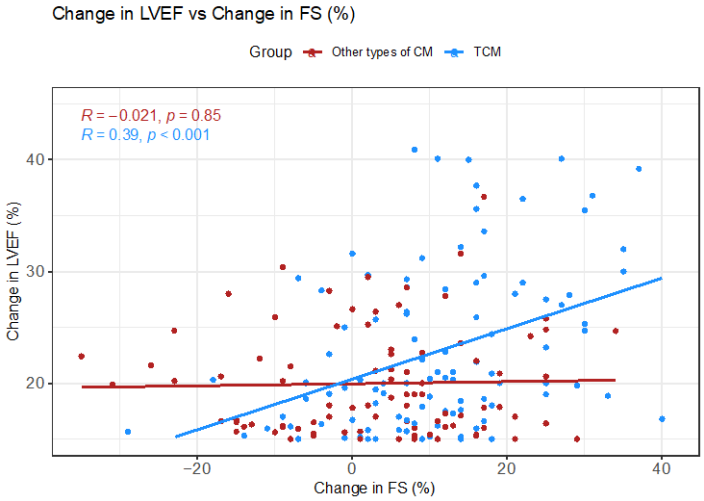
Results: 238 patients were included (31% female, 70 years median age), 127 patients had TCM, and 111 had other forms of CM. Patients with TCM did not significantly improve indexed LV volume (LVEDVI) after treatment (60 [45-84] ml/m^2 versus 56 [45-70] ml/m^2, p = ns, Figure) compared to controls (67 [54-81] ml/m^2 versus 52 [42-69] ml/m^2, p <0.001). Patients with TCM patients had significantly worse fractional shortening (FS) at baseline than controls (15.5 [12-23] vs 20 [13-30], p = 0.01) and higher indexed left atrial volume (LAVI) at baseline than controls (48 [37-58] vs 41 [33-51], p = 0.01) that remained dilated at FU (FU LAVI 41 [33-52] ml/m^2). Good predictors of TCM were: normal LVEDVI (LVEDVI <58 ml/m^2 (M) and <52 ml/m^2 (F)) (OR 5.2; 95% CI 2.2-13.3, p <0.001), FS <30% (OR 3.5; 95% CI 1.4-9.2, p = 0.009), LAVI >40 ml/m^2 (OR 3.4; 95% CI 1.6-7.3, p = 0.001) and normal LV wall thickness (OR 3.2; 95% CI 1.4-7.8, p = 0.008). 54% of patients with TCM demonstrated diastolic dysfunction at FU without differences from controls (54% vs 43%, p = ns).

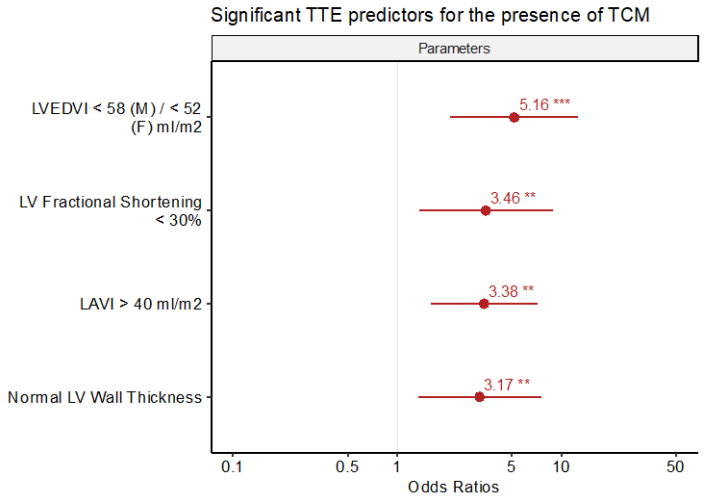
Conclusion: TCM patients have a specific pattern of functional recovery with persistent remodeling of the left atria and left ventricle. Several echocardiographic parameters might help identify TCM before treatment.

Conflict of interest: No









P070

Safety of levosimendan infusion before LVAD implantation: a retrospective study

Rita Godinho[1], Anna Nowacka[1], Stefania Aur[1], Julien Regamey[1], Zied Ltaief[2], Marco Rusca[2], Roger Hullin[1], Lucas Liaudet[2], Matthias Kirsch[1], Patrick Yerly[1]

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Introduction: With its long-lasting inotropic effect, preoperative levosimendan may prevent right ventricular failure (RVF) after left ventricular assist device (LVAD) implantation. However, levosimendan is also a vasodilator that may increase the risk of post-cardiopulmonary bypass (CPB) vasodilatory shock (VS). The goal of this study was to assess levosimendan's effect on post-CPB VS risk after HeartMate 3 implantation (2015-2020) in CHUV.

Method: Of the 55 patients implanted (49♂; 57.4±11.6 years-old; LVEF 22.2±6%; INTERMACS class 1-2/3/4-5 32.7%/18.3%/49%), 20 received levosimendan (0.089±0.052 µg/kg/min, started 4.55±1.93 days preoperatively for 24 hours), 10 at high-dose (≥0.1 µg/kg/min; 0.127±0.0048 µg/kg/min). Post-CPB VS had to occur within 6 hours of CPB weaning and was defined as the need for noradrenaline (NA) ≥0.2 µg/kg/min or any vasopressin (ADH) dose for ≥12 hours to achieve mean blood pressure (MBP) ≥65 mmHg with right atrial pressure (RAP) 6-15 mmHg, cardiac index (CI) ≥2.2 L/min/m^2 and systemic vascular resistance (SVR) <800/1000 dyn.s/cm^5 before/during NA.

Results: Post-CPB VS occurred in 10 patients (18.2%) (NA 0.53±0.26 µg/kg/min; ADH 0.7±0.92 Ui/h; MBP 67.7±7.3 mmHg; RAP 12.3±4.1 mmHg; CI 2.65±0.45 L/min/m^2; SVR 794±38 dyn.s/cm^5) 12 hours after CPB, 2/ 0 in the levosimendan-all/ levosimendan-high-dose groups.

Neither levosimendan nor levosimendan high-dose did predict post-CPB VS risk (OR 0.59/ 0.37, 95% CI = 0.18-2.38/ 0.02-1.48, P = 0.48/ 0.14). We found no other VS risk predictor but a borderline association with nadir MBP during CPB (OR 0.93, 95%CI = 0.83-1.02, P = 0.147), nadir hematocrit during CPB (OR 0.92, 95%CI = 0.79-1.03, P = 0.146), and red cells units (RCU) transfused (OR 4.63, 95%CI = 1.1-19.5, P = 0.054). These factors were equally distributed in levosimendan and levosimendan-naïve patients, but levosimendan-high-dose subjects received more RCU (3.6±2.4 vs 1.1±1.6; P = 0.045). After adjustment for RCU, levosimendan-high-dose did not predict increased VS risk (OR 0.29, 95% CI = 0.01-2.07, P = 0.29).

Conclusion: Our study shows that preoperative levosimendan does not increase VS risk after LVAD surgery, including at ≥0.1 µg/kg/min.

Conflict of interest: No

P071

CA 125 in the Diagnosis and Risk Stratification of Acute Heart Failure

Desiree Wussler[1], Maria Belkin[1], Antoni Bayés-Genís[2], Ivo Strebel[1], Nikola Kozhuharov[3], Danielle Gualandro[1], Samyut Shrestha[1], Tobias Breidthardt[4], Christian Mueller[1]

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Introduction: Recent evidence confirms the elevation of CA 125 in non-tumor processes such as acute heart failure (AHF). However, the utility of this novel biomarker for diagnosis, prognosis, and therapy guidance in AHF remains unclear.

Method: We quantified CA 125 in a blinded fashion among patients presenting with acute dyspnea to the ED in a multicenter diagnostic study. Final diagnosis of AHF including AHF-phenotype was centrally adjudicated by two independent cardiologists. To further characterize CA 125´s potential in AHF correlations with established biochemical and imaging markers were assessed. Diagnostic accuracy for AHF was quantified by the area under the receiver operating characteristic curve (AUC). All-cause mortality within 360 days was the prognostic endpoint.

Results: Among 470 patients eligible for this analysis, 268 (57.0%) had adjudicated AHF. CA 125 concentrations at presentation were significantly higher among AHF patients vs. patients with other final diagnoses (45.8 U/ml [interquartile range (IQR), 18.5-110.3] vs. 16.2 U/ml [IQR, 9.6-31.6], p <.0001). Patients with worsening heart failure had significant higher CA 125 levels compared to other heart failure phenotypes (p = .018). There was a significant positive correlation of CA 125 and high-sensitivity cardiac troponin T and NTproBNP and a significant negative correlation of CA 125 and left ventricular ejection fraction (correlation coefficients 0.204, 0.220, -0.331, respectively; all ps<.0001). CA 125´s AUC for AHF was significantly lower compared to NTproBNP´s in the overall population (0.72, 95% confidence interval (CI) 0.67-0.76 vs. 0.93, 95% CI 0.90-0.95, p <.0001, Figure 1). Among 268 AHF patients, 84 (31.3%) died within 360 days of follow-up. CA 125 plasma concentrations above the median indicated increased risk of all-cause mortality (hazard ratio 2.06, 95% CI 1.31-3.24; p = .002, Figure 2).

Conclusion: CA 125 may aid physicians in the risk stratification and rapid triage of patients with suspected AHF.

Conflict of interest: No

Figure 1.

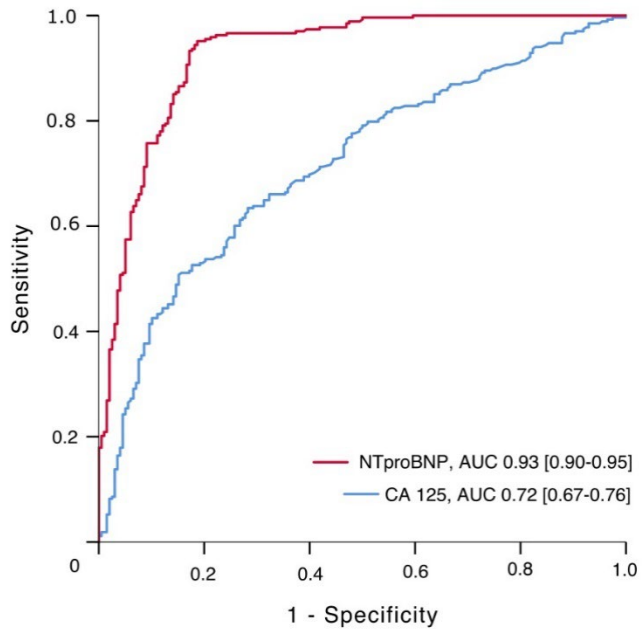
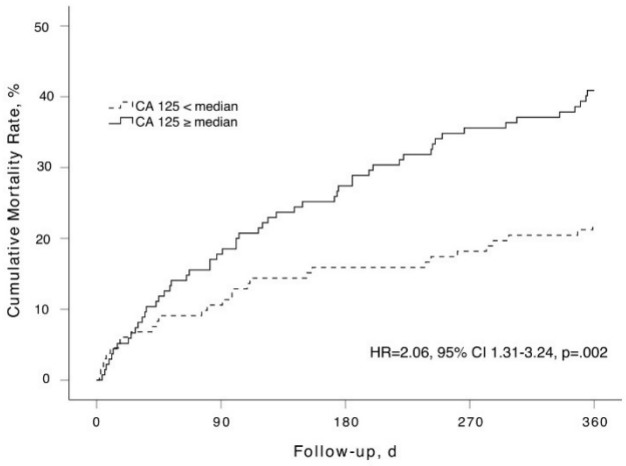


Figure 2.



P072

Left ventricular early diastolic strain rate and cardiovascular outcome in patients with left ventricular non-compaction phenotype

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Introduction: Speckle-tracking echocardiography is an increasingly important tool for assessing left ventricular non-compaction phenotype (LVNC). This study aims to analyse left ventricular early diastolic strain rate (eSR) in LVNC and explore its association with mortality during long-term follow-up.

Method: Fifty-nine patients meeting prespecified criteria were included from our prospective LVNC cohort. eSR was determined using TomTec ImageArena (Figure A). A combined endpoint (cardiovascular events) was defined including atrial flutter/fibrillation, sustained ventricular arrhythmias, aborted cardiac arrest, and cardiovascular mortality.

Results: Baseline characteristics were comparable between patients reaching the endpoint (16 [27%]) and those without (43 [73%]) except for a higher prevalence of ischemic heart disease in the former (event group: 13%; no-event group: 2%; P = 0.019). In the event group, there was a non-significant tendency for a lower LVEF (38 [26–56]% vs 51 [43–56]%; P = 0.091) and LVGLS (-12.3 [-16.3 to -9.7]% vs -15.2 [-17.7 to -12.8]%; P = 0.111). In contrast, eSR was significantly lower in the event group (0.45 [0.30–0.65]s-1 vs 0.70 [0.39–0.93]s-1; P = 0.018; Figure B). Patients with an eSR ≤ 0.70 s-1 (ROC AUC 70%; P = 0.005) exhibited a lower event-free probability in Kaplan-Meier survival analysis (P = 0.001; Figure C). Inclusion of eSR improved the fitness ($\chi 2$) of a multivariable logistic regression model for clinical characteristics (age, gender, and NC:C ratio; Figure D), while LVEF and LVGLS did not (Table). This improvement in $\chi 2$ by eSR was significant (ANOVA P = 0.033), while that by LVEF or LVGLS was not (P = 0.302 and 0.152, respectively).

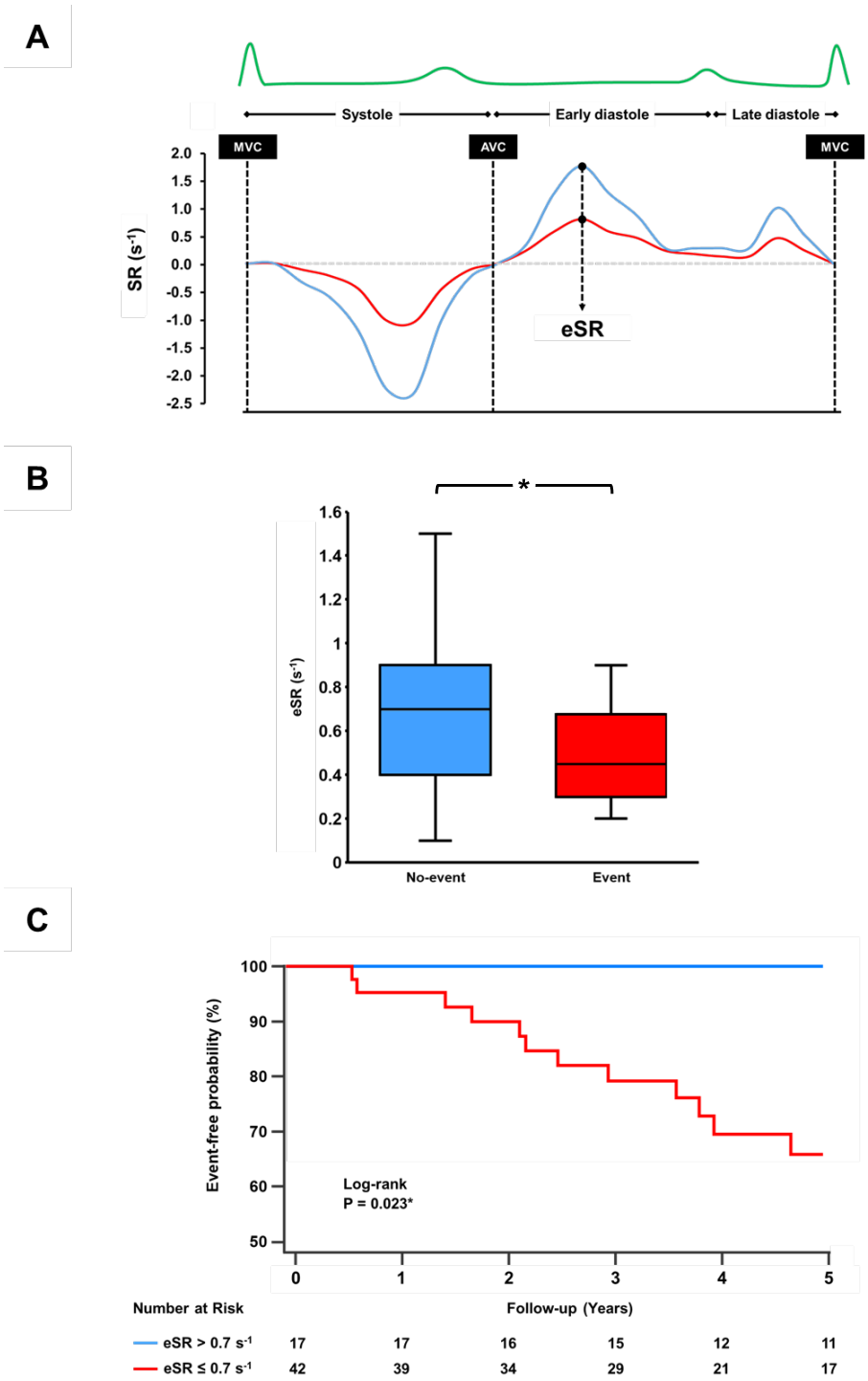
Conclusion: eSR was lower in LVNC patients with events, differentiated those with events from those without, and was associated with a higher risk of events during long-term follow-up. Outcome association of eSR was independent of age, gender, and NC:C ratio and improved their event prediction. eSR has potential value for functional characterization and outcome prediction in LVNC.

Conflict of interest: No

Table

Variables	Logistic Regression			Model Fitness	
	OR	95% CI	P	χ^2	χ^2 P
Clinical model	0.94	0.25 – 3.49	0.511	5.1	0.164
+ LVEF	0.97	0.92 – 1.02	0.088	5.7	0.221
+ LVGLS	1.14	1.06 – 1.35	0.049*	7.5	0.113
+ eSR	0.73	0.53 – 0.90	0.036*	9.9	0.042*

Figure



P073

Obstructive sleep apnea or obstructive hypertrophic cardiomyopathy – which is the hen and which the egg?

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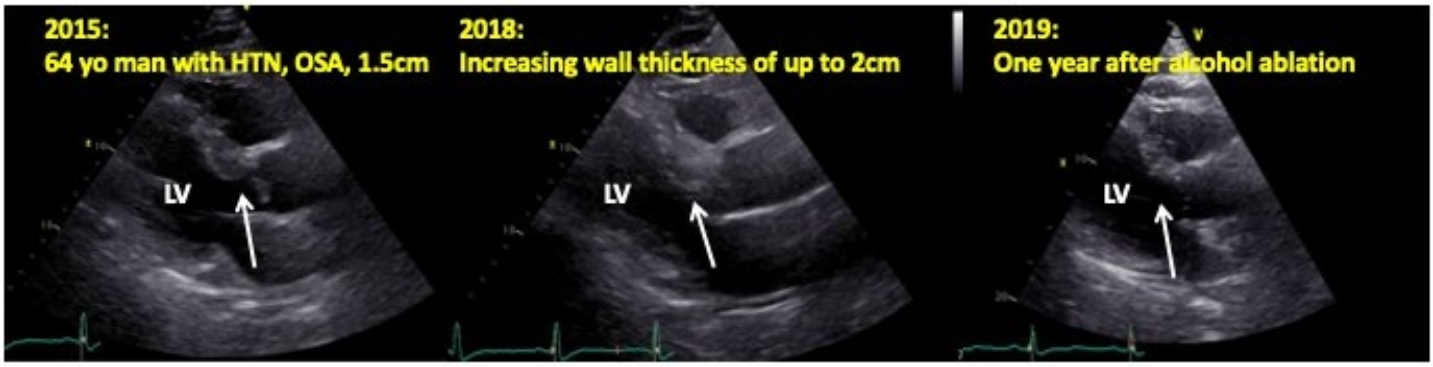
Introduction: Obstructive sleep apnea (OSA) is very common in the population, around 10% of women and 30% of men suffer from OSA. OSA has been described to be a cause of left ventricular hypertrophy, especially with hypertrophy of the basal septum causing obstruction mimicking obstructive hypertrophic cardioympathy (HOCM). The prevalence of isolated hypertrophy of the basal septum in OSA is not widely known.

Method: We analyzed our echocardiographic database searching all patients with definite or likely OSA analyzing the clinical reports, the cardiovascular risk factors and the echocardiography findings.

Results: There were 156 patients, 121 men (78%), 24% with probably/very likely OSA, 75% OSA proven with a sleep study. Hypertension (76%), coronary artery disease (31%) and paroxysmal or permanent atrial fibrillation were frequent. 48% had hypertrophy of the septum, totally 43 of 156 (36%) had typical asymmetric septal hypertrophy as seen in HOCM. A gradient in the left ventricular outflow tract and/or exensive hypertrophy of the basal septum needing alcohol ablation or myectomy (see Figure of an initially 64 year old man before and after alcohol ablation) was not rare. Overall, wall thickness of the septum was 1.2 ± 0.2; posterior wall 0.9 ± 0.2cm.

Conclusion: In any patient with asymmetric septal hypertrophy resembling HOCM OSA should be sought and excluded as a potentially reversible cause of not genetically determined left ventricular hypertrophy.

Conflict of interest: No



P074

The role of intraoperative hemoadsorption in cardiopulmonary unstable patientsundergoing left ventricular assist device implantation

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Introduction: Left ventricular assist device implantation (LVAD) in preoperative ventilated or vasopressor supported patients is associated with increased morbidity and mortality due to postoperative vasoplegia. Preoperative hemodynamic or respiratory stabilization is not always feasible. The aim of this study was to evaluate the role of intraoperative hemoadsorption on the incidence of postoperative vasoplegia and short-term mortality in such patients.

Method: Eligible candidates for this retrospective analysis were patients on invasive mechanical ventilation or vasopressor support (norepinephrine ≥0.05 µg/kg/min) undergoing LVAD implantation between December 2010 and December 2022. Patients were assigned to either the hemoadsorption or control group, according to application of intraoperative hemoadsorption. The primary endpoints were incidence of vasoplegia and 30-day mortality. Vasoplegia was defined as the need for norepinephrine 0.2µg/kg/min for at least 12 hours and absence of clinically relevant bleeding starting within the first 72 hours postoperatively.

Results: 75 hemodynamic or respiratory unstable patients underwent LVAD implantation. 40 patients received intraoperative hemoadsorption and 35 patients were operated on without intraoperative hemoadsorption. Baseline demographics and clinical status were comparable between both groups. The incidence of vasoplegia was 35% versus 57% (p = 0.055) in the hemoadsorption group and control group, respectively. Mortality at thirty days was 23% versus 40% (p = 0.101) in the hemoadsorption and control group, respectively.

Conclusion: Intraoperative hemoadsorption in cardiopulmonary unstable patients undergoing LVAD implantation seems to reduce the risk of postoperative vasoplegia and short-term mortality. These findings should be confirmed in larger cohorts.

Conflict of interest: No

P075

Preoperative levosimendan to reduce risk of right ventricular failure after LVAD surgery

Rita Godinho[1], Anna Nowacka[1], Stefania Aur[1], Julien Regamey[1], Zied Ltaief[2], Marco Rusca[2], Roger Hullin[1], Lucas Liaudet[2], Matthias Kirsch[1], Patrick Yerly[1]

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Introduction: Right ventricular failure (RVF) is frequent after left ventricular assist device (LVAD) implantation and influences outcome. Because of decreased septal contribution to RV contractility after surgery, RV emptying is more dependent on free wall shortening and may thus benefit from preoperative administration of levosimendan, a long-lasting inodilatator. The goal of this retrospective study was to assess levosimendan's effect on RVF risk in patients implanted with a HeartMate3 (2015-2020) in our institution.

Method: Levosimendan prescription was left to the discretion of the attending cardiologist, being started ≤7 days before surgery at ≥0.05µg/kg/min for 24 hours. The levosimendan-high-dose group included patients who received ≥0.1µg/kg/min. RVF was defined as right atrial pressure ≥16mmHg with bilirubin or creatinine ≥2mg/dL or as RVAD need.

Results: Fifty-five patients were included (49♂; 57.4±11.6 years-old; LVEF 22.2±6%; INTERMACS class (IMC) 1-2/3/4-5 32.7%/18.3%/49%). Levosimendan (0.089±0.052 µg/kg/min) was given to 20 patients [10 receiving high dose (0.127±0.0048 µg/kg/min)] and RVF occurred in 14 patients (25.4%), 6/4 in the levosimendan-all/ levosimendan-high-dose groups.

Three factors were more prevalent in the levosimendan-all/ levosimendan-high-dose groups (IMC 2.85±1.03 / 2.2±0.63; preoperative vasopressors 47.4%/ 80%; pulmonary artery pulsatility index (PAPi) 1.9±0.7/ 1.7±0.3) than in naïve patients (IMC 3.54±1.09, P = 0.012/ <0.01; vasopressors 16.7%, P = 0.025/ <0.001; PAPi 2.7±1.2, P = 0.031/ <0.001) and they were also associated with RVF risk (OR for IMC: 0.35, 95%CI = 0.16-0.67, P = 0.0035; OR for vasopressors: 10.5, 95%CI = 2.74-46.28, P = 0.001; OR for PAPi: 0.64, 95%CI = 0.31-0.96, P = 0.045).

Neither Levosimendan nor levosimendan-high-dose did predict RVF in univariate analysis (OR: 1.42/ 2.25; 95%CI = 0.66-2.99/ 0.47-10.56; P = 0.35/ 0.29). After adjustment for IMC, vasopressors and PAPi, only levosimendan-high-dose was associated with lower risk of RVF (OR: 0.41, 95%CI = 0.011-0.73, P = 0.039). After stepwise backward regression, levosimendan-high-dose remained in the best-fit-model (OR for RVF: 0.74, 95%CI = 0.34-0.97, P = 0.048) with IMC.

Conclusion: Preoperative levosimendan at ≥0.1µg/kg/min may prevent RVF after LVAD surgery.

Conflict of interest: No

P076

A novel nursing intervention to complement usual Heart Failure follow-up in Switzerland: Positive impact on Quality of life

Petra Schäfer-Keller[1 2], Denis Graf[2], Gabrielle Santos[1], Kris Denhaerynck[3], Josepha Girard[1], Marie-Elise Verga[1], Grégoire Menoud[1], Kelly Tschann[1], Marcia Leventhal[4], David Richards[5], Anna Strömberg[6]

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Introduction: The European Society of Cardiology (ESC) guidelines for the diagnosis and treatment of acute and chronic heart failure (HF) recommend a multidisciplinary team for the follow-up of persons with HF, including HF nurses. In Switzerland, HF nurses are part of clinical teams, but there is a lack of studies regarding their contributions to improved outcomes. We recently reported the successful testing for feasibility and outcome responsiveness of a novel complex nursing intervention, using a pilot randomized controlled trial with 60 persons with HF (age mean = 75.7 years, +/-8.9; 30% female; 63.3% in NYHA III-IV) with a 3-months follow-up period. Here, we report on its impact on HF-specific health status.

Method: We followed the UK Medical Research Council's framework for complex interventions in health. We created the intervention (Figure 1) based on relevant HF literature, 2016 ESC guidelines and the results of a needs assessment conducted in Western Switzerland. The intervention uses an algorithm structure to integrate HF-specific health status (assessed via the Kansas-City Cardiomyopathy Questionnaire – KCCQ-12; Figure 2), self-care capabilities, symptom experience and clinical characteristics relevant to self-care for individualized support. Physical activity and symptom self-management were self-care support priorities.

Results: At 3-months follow-up, the intervention had been delivered to 28 participants via home visits, clinic visits or both, for 18, seven or three participants, respectively. Effect sizes for KCCQ-12 scores were largest for physical limitation (Cohen's d = 0.36) and quality of life (Cohen's d = 0.32). The number-needed-to-treat was 16 for improving health status at 3-months follow-up. Across all KCCQ-12 scores, less participants worsened by five points or more between baseline and follow-up, as compared to participants not exposed to the intervention.

Conclusion: The novel evidence-informed nursing intervention is promising as regards the prevention of worsening HF, which is central to patients and clinicians alike. An efficacy trial is now needed.

Conflict of interest: No

Figure 1

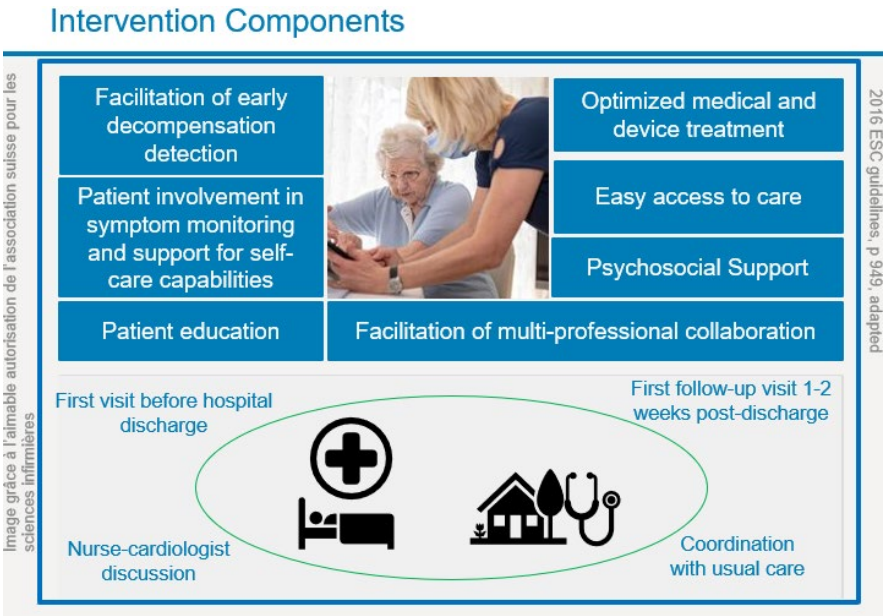
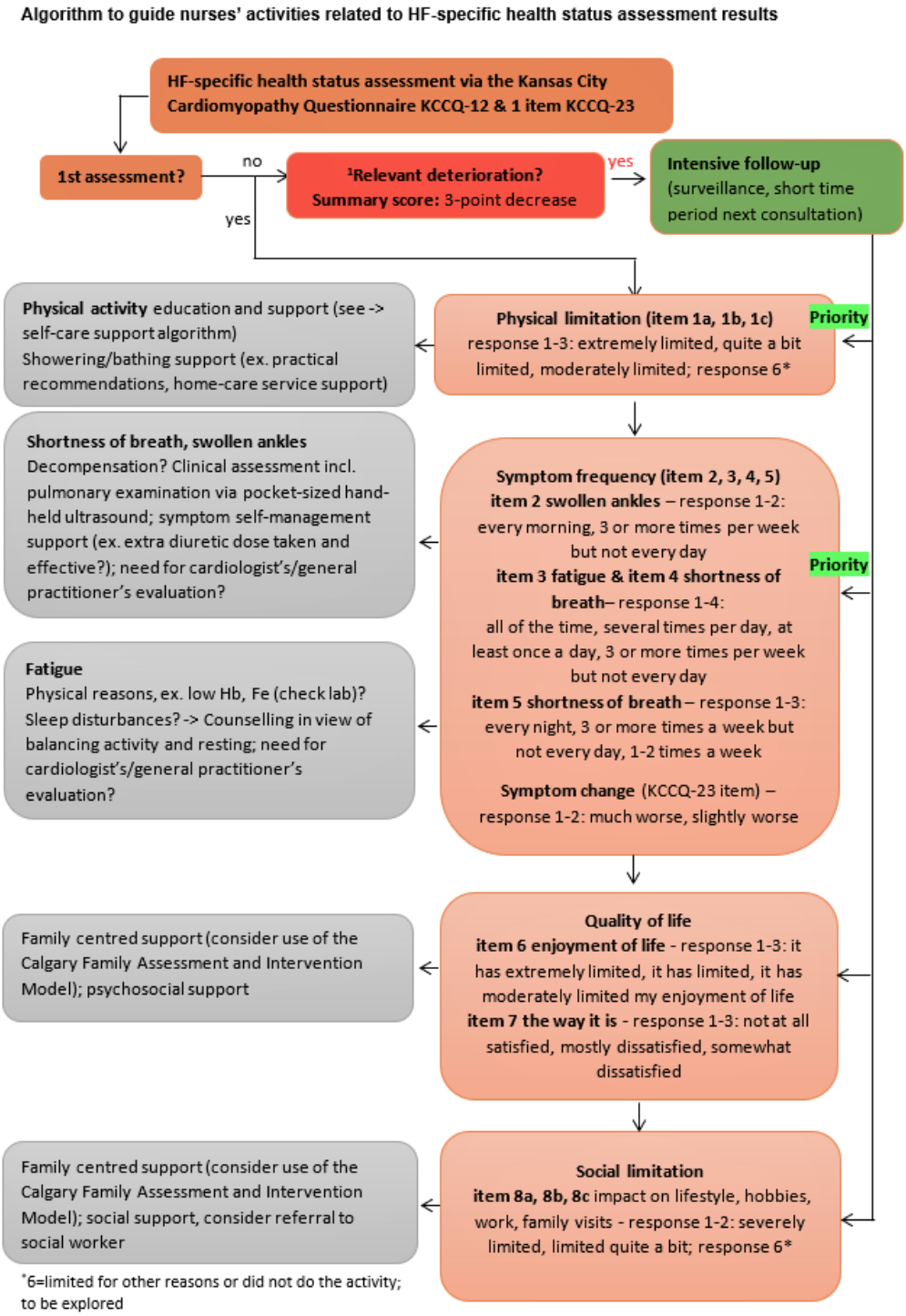


Figure 2



POSTER WALK: VALVULAR HEART DISEASE & CAD

P077

FULL-ROOT AORTIC VALVE REPLACEMENT BY MEDTRONIC FREESTYLE XENOGRAFTS: CLINICAL OUTCOMES, VALVULAR HEMODYNAMICS, AND INCIDENCE OF STRUCTURAL ABNORMALITIES ON CARDIAC COMPUTED TOMOGRAPHY

Emilien Ruchonnet[1], Ziyad Gunga[1], Mario Verdugo-Marchese[1], David Rotzinger[2], Matthias Kirsch[1]

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Introduction: The Medtronic Freestyle stentless porcine aortic root provides favourable hemodynamics and durability, including in high-risk cases patients.

Method: Between September 1, 2015, and August 31, 2022, 165 adult patients underwent aortic root replacement with coronary arteries reimplantation using the modified Bentall technique with a Medtronic Freestyle Root in our centre. Clinical and echocardiographic data were collected retrospectively. Using contrast-enhanced electrocardiogram-gated cardiac computed tomography, we are in the process of evaluating the incidence of structural abnormalities of the Medtronic Freestyle Root.

Results: Mean age was 67.5 ± 10.4 years. Mean EuroSCORE II was 6.3% [IQR 5.3%]. Surgery was urgent/emergent in 24.8%. Seventy-five additional procedures were performed in 64 patients (38.7%). Duration of cardiopulmonary bypass and aortic cross-clamp time were 110.6 ± 39.5 and 85.4 ± 24.7 minutes, respectively. Postoperative mean and maximal transvalvular gradients were 6.4 ± 3.1 and 12.3 ± 6 mmHg, respectively.

Twenty-nine early (30-day period) reinterventions were necessary in 24/165 patients (14.5%): pacemaker implantation (55.2%), surgical bleeding requiring resternotomy (34.5%), and lymphocele curing on canulation site (10.3%). Early mortality (≤ 30 days or index hospitalisation) was 2.4%, and late mortality was 5.4%. So far, four patients presented with 5 ruptures of prosthesis aortic wall (three in the noncoronary sinus and two in the right coronary sinus) on follow-up CT-scan, demanding reintervention in four cases.

Conclusion: The Medtronic Freestyle stentless porcine aortic root provides commendable hemodynamics, durability and effective orifice area. However, structural valve deterioration does occur, as in other bioprostheses. In this aspect, clinical and imaging follow-up is required to systematically access for incidence of Freestyle bioprostheses abnormalities and related clinical significance on adverse clinical outcomes, as cases of spontaneous rupture of the Freestyle xenograft, most frequently in the noncoronary sinus, are reported to a progressively increasing extent, including in our centre.

P078

Permanent pacemaker implantation after sutureless aortic valve replacement

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Introduction: Atrioventricular (AV) conduction alterations remains one of the main complications after surgical aortic valve replacement eventually requiring permanent pacemaker implantation (PPI). Sutureless aortic valve replacement remains an interesting alternative in high-risk patients, aiming to reduce aortic cross clamp times and cardiopulmonary bypass times duration. The timing of PPI and characteristics of the conduction alterations are seldom described after sutureless aortic valve replacement

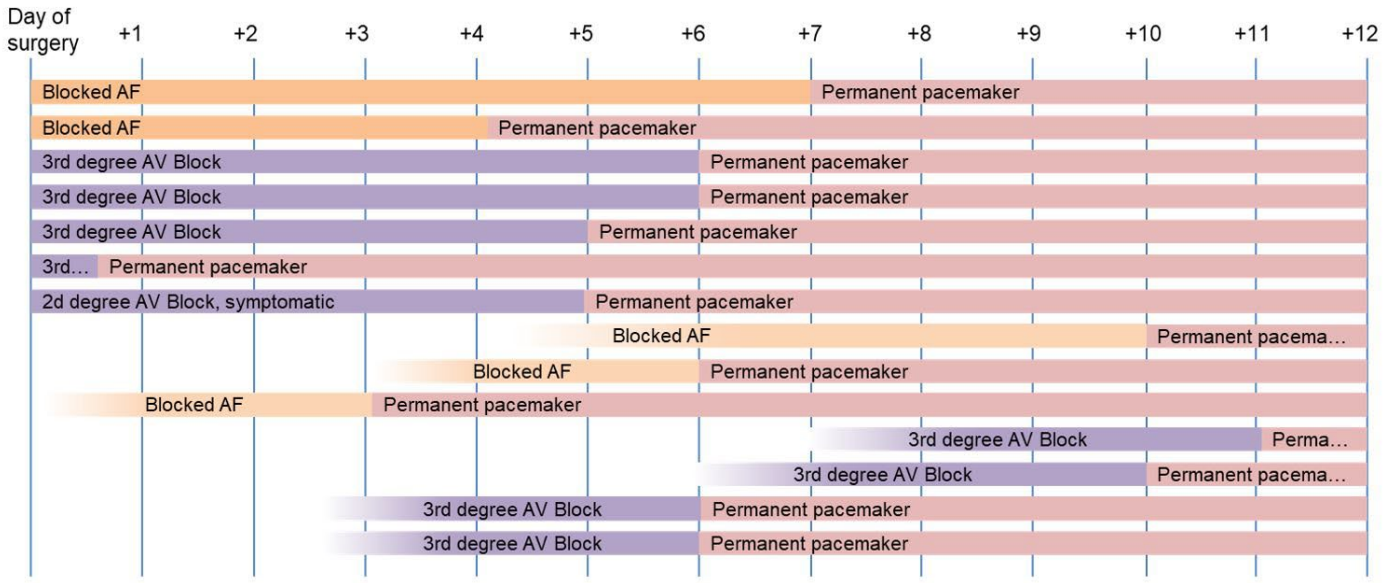
Aim: To characterize AV conduction alterations and clinical characteristics in patients needing PPI after sutureless aortic valve replacement.

Method: Analysis of a prospective observational series of 103 patients undergoing scheduled surgical aortic valve replacement using the sutureless LivaNova Perceval S bioprosthesis in our institution between 2016 and 2019. The charts of patients requiring PPI during index hospitalization were reviewed with special focus on type of conduction defect leading to PPI, time of onset of the conduction defect (immediate post-operative vs progressive), delay to PPI and PM type.

Results: We included 14 (13.6%) patients who required PPI in the index hospitalization. In 7 patients (50%), the AV conduction alteration was evident immediately after surgery. The mean delay of PPM was 6 days (Q1-Q3: 5-6.75) after valve surgery, with a tendency to higher delay in patients with progressive onset of AV bloc (7.4 vs 4.7 days, p – value 0.08). The AV conduction alteration leading to PM implantation was complete AV bloc in 8 (57.1%), slow or completely blocked atrial fibrillation in 5 (35.7%), and symptomatic second degree AV bloc in 1 (7.14%), patients. The implanted pacemaker types were: intravenous double chamber in 11 (78.6%); intravenous single chamber in 2 (14.3%), leadless single chamber in 1 (7.14%), patients.

Conclusion: In our series of sutureless aortic valve replacement, the conduction abnormality leading to PPI was evident in the immediate post-operative period in only half of the patients.

Conflict of interest: No



P079

Thrombocytopenia after sutureless aortic valve replacement: Clinical relevance and comparison with standard stented bioprosthesis

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Introduction: Thrombocytopenia after sutureless aortic valve replacement (sAVR) has been previously described with variable outcome and lack of robust analysis of factors affecting it. We aimed to describe the postoperative trend in thrombocyte variability of sAVR as compared with conventional aortic valve replacement (cAVR) and to assess predictors and impact on associated outcomes.

Method: From 2014-2021, 100 consecutive patients with first-time sAVR were compared retrospectively to 219 cAVR patients. The primary outcome was the platelet count (PLC) on day 0-6. Secondary outcomes were the use of transfusions, hospital stay, and intrahospital mortality.

Platelet measurements were modelled in a hierarchical structure, nested into individual patient clusters and postoperative day as a progressive time factor variable. By shaping the dataset longitudinally, g*eneralized estimating equations* were used to analyse the data using *Fixed-effect* models: for the effect of the post-operative day on PLC, and *Random-effect* models estimating time-variant (platelets) and time in-variant variables (valve type, age, LVEF, pre-op PLC).

Results: sAVR patients were older (72 ± 1 vs 68 ± 1 years,p <0.01) with higher NYHA status (3 (2-3) vs 2 (1-2),p <0.001). The cross-clamp time was shorter (58 ± 3 vs 69 ± 1 mins,p <0.001) and minimally invasive approach was carried out more often (p <0.001).

Mean PLC in the sAVR group was lower on day 4 (97.9 ± 44) and day 6 (110.6 ± 61) compared to the cAVR group (157.2 ± 60 and 181.7 ± 79 respectively). The effect of sAVR was a consistently strong predictor of reduced PLC (Coef 7.102, 95%CI 6.162-8.043, p <0.001).

Age (p <0.001) and longer CPB (p = 0.048) were predictors for lower PLC. This effect persisted in the cAVR group, but did not exist in the sAVR group, when analysed separately. The use of sAVR did not result in additional transfusions, bleeding or longer hospital stay(p >0.05).

Conclusion: Considering the older patient profile, thrombocytopenia after sAVR does not impact the clinical outcome in terms of product transfusion, short-term complications or hospital stay.

Conflict of interest: Research grants to the institution from Medis Medical Imaging Systems, Abbott, Bangerter-Rhyner Stiftung, personal research grant Swiss National Science Foundation, outside the submitted work.

Results 1: Patient characteristics

	Perimount (%) (n=219)	Perceval (%) (n=100)	P value
Age	68.2 ± 0.6	72.4 ± 0.7	<0.001
Male	137 (62.6)	54 (54)	0.379
BMI	28.8 ± 0.4	29.3 ± 0.5	0.500
NYHA	2 (1 – 2)	3 (2 – 3)	<0.001
Diabetes Oral	31 (14.1)	14 (14)	0.442
Diabetes Insulin	6 (2.7)	6 (6)	
Smoking	105 (47.9)	52 (52)	0.554
Hypertension	148 (67.6)	65 (65)	0.651
COPD	29 (13.2)	8 (8)	0.176
History of stroke	18 (8.2)	8 (8)	0.957
PVD	13 (5.9)	4 (4)	0.476
EF >50%	184 (84)	88 (88)	0.379
EF 30-49%	30 (13.7)	9 (9)	
EF <29%	5 (2.3)	3 (3)	
CKD	7 (3.2)	4 (4)	0.725
Valve haemodynamics			0.151
Stenosis	148 (67.6)	79 (79)	
Regurgitation	46 (21)	3 (3)	
Mixed	25 (11.4)	18 (18)	

	Perimount (%) (n=219)	Perceval (%) (n=100)	P value
CPB time	92.9 ± 1.8	86.8 ± 3.3	0.038
X clamp time	68.9 ± 1.3	57.9 ± 2.6	<0.001
Valve size			0.186
S/21	42 (19.2)	19 (19)	
M/23	87 (39.7)	31 (31)	
L/25	66 (30.1)	33 (33)	
XL/27	24 (10.9)	17 (17)	
Operative urgency			0.697
Elective	175 (79.9)	78 (78)	
Urgent	42 (19.)	21 (21)	
Emergency	2 (0.9)	1 (1)	
Approach			<0.001
Sternotomy	193 (88.1)	51 (51)	
Mini sternotomy	23 (10.5)	40 (40)	
Right anterior thoracotomy	3 (1.4)	9 (9)	

Perceval patients:
- were older & more symptomatic
- had lower cross clamp time & received more often a minimal invasive approach

Results 2: Platelet drop, predictors, & clinical outcome

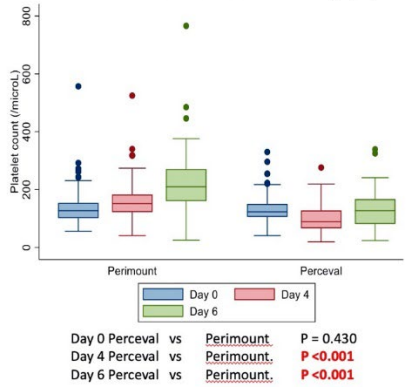

Table 1 Between group parametric and non-parametric tests of short-term outcome. *NB: * 1 product = one unit of platelets, FFP or RBC*

	Perceval (%) n=100	Perimount (%) n=219	p
Return to theatres	5(5)	9 (4.1)	0.714
Products*	0 (0-1)	0 (0-1)	n.s.
In-hospital mortality	0 (0)	1 (0.5)	n.s.
Postop Stay (days) (IQR)	8 (6-10)	8 (6-10)	n.s.

Table 2 Results of GEE model (random-effects) assessing the effect of multiple variables on platelet count across 6 post-operative days

	Coef	Std err	95% CI	P
Day	7.102	0.480	6.162 – 8.043	<0.001
Male gender	5.307	6.561	-7.552 – 18.165	0.419
Age	-1.025	0.318	-1.649 - -0.401	0.001
Valve size	0.157	1.726	-3.225 – 3.539	0.928
CPB time	-0.186	0.094	-0.371 - -0.001	0.048
Valve choice	-32.64	5.993	-44.384 - -20.890	<0.001

P080

Full-root aortic valve replacement by Medtronic freestyle xenografts for infective endocarditis: review of the literature, clinical outcomes and valvular hemodynamics

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Introduction: Choice of biological graft for surgical management of infective endocarditis is debated.

Method: Between March 1, 2015, and June 30, 2022, 28 adult patients underwent aortic root replacement with coronary arteries reimplantation using the modified Bentall technique with a Medtronic Freestyle Root in our centre for infective endocarditis. Clinical and echocardiographic data were collected retrospectively.

Results: Mean age was 62.8 ± 12.5 years. Prosthetic valve endocarditis represented 71.4% of cases, and 27/28 patients were still under antibiotic treatment at the time of surgery. Mean EuroSCORE II was 17.3 ± 11.3%. Three patients were in critical preoperative states (two on inotropic support and one on mechanical ventilation).

Mean durations of CPB and aortic cross-clamp were 192.7 ± 88.9 and 147.2 ± 56.9 minutes, respectively. Principal identified pathogens were *Methicillin-sensitive Staphylococcus aureus* (25.0%), *Streptococcus spp.* (17.9%), *Staphylococcus epidermidis* (10.7%) and *lugdunensis* (7.1%), and *Enterococcus fæcalis* (7.1%). Fourteen additional procedures were performed in 12 patients (42.8%). Annular abscess was present in 71.4% of cases and required annulus patch repair in 12/20 (60%).

Early reoperation rate was 17.9%, mostly for surgical bleeding. Early mortality was 7.1%. Postoperative mean and maximal transvalvular gradients were 7.8 ± 3.9 and 13.9 ± 6.5 mmHg, respectively.

Our review of literature found 102 results. Of these, 31 were considered relevant to the topic by manual sorting. We further excluded 9 case reports, 3 case series of fewer than five patients, and 7 retrospective controlled studies and one randomized controlled trial that failed to present outcomes pertinent to our study. Results from the 11 remaining studies aligned with ours.

Conclusion: Our results and those from current literature confirm that the Medtronic Freestyle prosthesis is a valid alternative to homografts for the treatment of infective endocarditis, particularly in cases necessitating LVOT reconstruction after extensive debridement of annular abscesses.

Conflict of interest: No

P081

del Nido versus Buckberg cardioplegia in minimally invasive aortic valve surgery

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Introduction: The quality of a myocardial protection of a single dose del Nido cardioplegia versus multiple dose blood-based modified Buckberg on operative times, myocardial injury, and outcomes in patients undergoing minimally invasive aortic valve replacement is basically unreported.

Method: Preoperative and postoperative data as well as technical details from isolated minimally-invasive aortic valve replacements, performed using single-dose or multiple-dose cardioplegia were prospectively collected and retrospectively analysed. A total of 110 patients undergoing minimally invasive valve replacements at our institution composed two groups: 55 patients in the Buckberg group (BuCa) and 55 in the del Nido group (DeNiCa).

Results: The two matched groups were comparable in terms of preoperative variables. Mean surgical and cardiopulmonary bypass times were longer in the BuCa group (p <0.001), with perioperative higher lactate levels (p = 0.01). In the DeNiCa group, there was a statistically significant less need for cardiac defibrillation after aortic cross-clamp release (p <0.001). Furthermore, the BuCa group received intraoperatively more blood transfusions (p = 0.001) and more insulin administration for higher glucose levels (p <0.001). Need for post-operative inotropic and vasoactive support, Creatine Kinase-MB levels after 6 and 12 hours, onset of post-operative atrial fibrillation and length of stay were similar. No deaths occurred in neither groups.

Conclusion: Single dose del Nido cardioplegia in the setting of minimally invasive aortic surgery seems to offer better myocardial protection, compared to multiple dose modified Buckberg's solution. The analyses demonstrated a more physiological recovery of regular heartbeat after cross-clamp release, with less stress confirmed by lower perioperative need of defibrillation, lactate- and glucose peak values, as well as less blood transfusions.

Conflict of interest: AA has received consulting and speaker fees from SIS Medical.MB has received consulting and speaker fees from Abbott Vascular, Abiomed, Amgen, Astra Zeneca, Bayer, Daichii, Mundipharma and SIS Medical. FC has received consulting and speaker fees from Abbott Vascular, Abiomed and SIS Medical.

P082

Transapical transcatheter mitral valve implantation with the Tendyne valve: The Swiss experience

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Introduction: Aim of this study was to report outcomes of all patients undergoing transcatheter mitral valve implantation with the Tendyne™ Mitral Valve System (Tendyne) in Switzerland.

Method: We retrospectively analysed preoperative echocardiographic and computed-tomographic data, procedural findings as well as 30-day and 1-year follow-up echocardiographic and clinical data of patients who underwent transcatheter mitral valve implantation with Tendyne in Switzerland.

Results: A total of 24 patients (age 74.8 ± 7.8 years, 67% male) underwent transapical transcatheter mitral valve implantation with Tendyne between June 2020 and October 2022. Technical success rate was 96%. In five patients concomitant interventions in the form of transcatheter aortic valve implantation (1), minimally invasive direct coronary artery bypass (1) and transcatheter edge to edge repair (3) were performed prior to or after the index procedure. There was one device embolization and two patients required valve retrieval. In-hospital outcomes included one stroke and three major bleeding events. None of the patients died within 30-days. Two patients were re-hospitalized for decompensated heart failure. At 1-year follow-up, there were three non-cardiovascular related deaths.

Conclusion: Transcatheter Mitral Valve implantation with Tendyne is feasible to treat polymorbid patients suffering from complex mitral valve disease, as well as patients with previous mitral interventions. Perioperative risk was acceptable and procedural success high.

Keywords: mitral valve, mitral valve disease, transcatheter mitral valve replacement

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P083

Combining minimally invasive direct coronary artery bypass grafting with transapical aortic valve implantation – the next level heart team approach

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Introduction: We present the first cohort of a combined approach for surgical revascularisation (Minimally Invasive Direct Coronary Artery Bypass Grafting (MIDCAB)) and Transapical interventional aortic valve implantation (TAVI) via left-sided minithoracotomy in cases of hostile femoral or coronary axis in Switzerland.

Method: Between May 2014 and November 2022, eleven patients (45% males, median (IQR) age at presentation 82 (80.5 to 85.5) years with severe aortic stenosis and coronary artery disease underwent concomitant TAVI and MIDCAB in a hybrid theatre. Mean STS Score was (%) 9.45 (7.4 to 12.3) while Euroscore II (%) was 10.4 (7.8 to 16.1). Further baseline characteristics are depicted in Table 1. In 5 patients (45%) the Heart Team considered the femoral access inappropriate for transfemoral TAVI due to severe calcifications or kinking of the femoral vessels or the aorta. In 9 patients (82%) a complex lesion of the left anterior descending coronary artery (LAD) drove the decision to surgical revascularisation (MIDCAB).

Results: MIDCAB with concomitant TAVI was successfully performed in all eleven patients. Median flow over the coronary artery bypass was 29ml/min (22.5 to 42.5) with a pulsatility index (PI) of 2.45 (2.2 to 3.1). Complementary PCI of circumflex artery was scheduled in 1 patient (9%). Mild paravalvular leak occurred in 1 patient (9%). There were no neurological events nor acute kidney injury. In-Hospital mortality was 9% (n = 1) and was due to TAVI-induced coronary obstruction. Pacemaker implantation was required in 1 patient (9%), due to third degree atrioventricular block. Detailed perioperative data are depicted in Table 2.

Conclusion: Simultaneous surgical revascularisation and interventional valve implantation in the setting of a hostile femoral and coronary axis appears to be safe and beneficial. We consider this technique as the next level heart team approach adding a combined therapeutic approach to the mere jointly decision making.

Conflict of interest: No

Table 1

Baseline Characteristics	
Male sex	5 (45%)
Age (years)	82 (80.5 to 85.5)
BMI (kg/m^2)	25 (23.1 to 32.5)
Syntax Score (%)	21.5 (13 to 31.5)
STS Score (%)	9.45 (7.4 to 12.3)
Euroscore II (%)	10.4 (7.8 to 16.1)
Previous PCI n (%)	4 (36%)
Last preoperative creatinine (mmol/l)	95 (81.5 to 92.5)
Echocardiography	
LVEF (%)	44 (40.5 to 45)
EOA (cm^2)	0.6 (0.4 to 0.8)
Mean AV Gradient (mmHg)	37.5 (30 to 46.75)
Peak AV Gradient (mmHg)	60 (61 to 75.5)
Annulus size (mm)	22 (22 to 23.5)
LVEDD (mm)	45 (43 to 48)
LVESD (mm)	34 (31 to 38)

Number presented as median (m) with interquartile range (IQR) or number (n) with %

BMI Body Mass Index, *STS* Society of Thoracic Surgeons, *PCI* Percutaneous Coronary Intervention, *LVEF* Left Ventricular Ejection Fraction, *EOA* Effective Orifice Area, *AV* Aortic Valve, *LVEDD* Left Ventricular End Diastolic Diameter, *LVESD* Left Ventricular End Systolic Diameter

Table 2

Operative data	
Operative time (min)	231 (225 to 248)
Bypass flow (ml/min)	29 (22.5 to 42.5)
Pulsatility index	2.5 (2.2 to 3.1)
Mean size of newly implanted valve (mm)	26 (24 to 27.5)
Mean postoperative pressure gradient (mmHg)	10 (6 to 11)
Postoperative Outcome	
Perioperative Stroke n (%)	0 (0%)
Perioperative myocardial infarction n (%)	0 (0%)
Postoperative Delirium n (%)	3 (27%)
Major bleeding (VARC-2) n (%)	0 (0%)
Minor bleeding (VARC-2) n (%)	2 (18%)
Rethoracotomy n (%)	0 (0%)
Acute kidney injury n (%)	0 (0%)
Need for new pacemaker n (%)	1 (9%)
Postoperative atrial fibrillation n (%)	3 (27%)
Length of ICU stay (days)	2 (1 to 4.5)
Length of hospital stay (days)	9 (7 to 15)
In-Hospital mortality n (%)	1 (9%)

Number presented as median (m) with interquartile range (IQR) or number (n) with %

VARC-2 Valve Academic Research Consortium 2, *ICU* Intensive Care Unit

P084

First Report of the International Safe and Timely Antithrombotic Removal (STAR) Registry

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Introduction: Extracorporeal polymer bead hemoadsorption has emerged as a novel strategy to reduce perioperative bleeding by active antithrombotic drug removal. The international Safe and Timely Antithrombotic Removal (STAR) registry (up to 10 countries is collecting high fidelity data on real-world clinical use and outcomes in this application (500 planned patients; ClinicalTrials.gov identifier: NCT05077124).

Method: Retrospective and prospective data were collected on outcomes of interest including bleeding complications according to the Bleeding Academic Research Consortium (BARC) definition, blood product transfusions, 24-hour chest-tube-drainage (CTD), and hospital length of stay in cardiac surgery patients on either dual antiplatelet therapy (Group 1) or direct oral anticoagulants (DOAC; Group 2).

Results: Seven institutions from Germany and UK have enrolled 88 cardiac surgical patients. Group 1 comprised of 63 patients (mean age 63 ± 10 years, 84% male) mainly undergoing isolated CABG (n = 49) at a mean time of 24.8 hours after last dose and with mean hemoadsorption duration of 99 ± 33 min. Group 2 comprised of 25 patients (mean age 69 ± 9 years, 68% male) mainly undergoing combined or complex cardiac surgery (n = 17) at a mean time of 28.2 hours since last dose and with a mean hemoadsorption duration of 137 ± 40 min. In each group 3 BARC-4 bleeding events occurred. Mean 24-hour CTD volume was 537 ± 223mL in group 1 and 638 ± 214mL in group 2. Intraoperative integration of the device was simple and safe at all sites without any device-related adverse events reported.

Conclusion: This is the first report of the ongoing STAR registry demonstrating that the intraoperative use of hemoadsorption was safe and appeared to mitigate the high rates of postoperative bleeding complications usually observed in patients on antithrombotic drugs undergoing cardiac surgery.

Conflict of interest: No

P085

Coronary artery bypass grafting of donor vessels of chronic total occlusion does not affect graft-patency rate

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Introduction: There is a data paucity regarding the interaction of coronary artery bypass grafts in cases of simultaneous grafting of chronic total occlusions (CTO) and their collateral blood supplying donor vessels. This study aims to assess the impact of grafting donor coronaries on the patency rate of grafts on CTO.

Method: We performed a retrospective analysis of the data of patients who underwent coronary artery bypass grafting (CABG) with an internal thoracic artery (ITA) on CTO of the left anterior descending (LAD) artery. All patients were operated on in our institution between 09/2018 and 08/2022 and underwent computed tomography coronary angiography (CTCA) postoperatively during the index hospitalization as part of the routine diagnostic work-up after CABG. We excluded patients with acute/subacute total occlusion of the LAD, intraoperative thromboendarterectomy of the LAD, sequential grafting of the ITA, and those without postoperative CTCA.

Results: 76 patients met the inclusion criteria. Mean age was 62.8 ± 10 years, and 19(25%) patients underwent a single bypass through a left mini-thoracotomy. 36(47.4%) patients had poor-to-medium (Rentrop 1-2) and 40(52.6%) well developed coronary collateralization (Rentrop 3). Intraoperative transit-time flow measurement of the ITA-LAD graft showed a median graft flow of 35(25-49)ml/min with a median pulsatility index of 1.7(1.3-2.3). Main donor vessels of the CTO were collaterals from the LAD in 23(30.3%), branches of the left coronary artery in 14(18.4%), and branches of the right coronary artery in 39(51.3%) patients. 29(38.2%) patients underwent a bypass on their main donor vessel. There was no significant difference regarding in-hospital postoperative ITA-graft patency rate between patients with and without bypass on donor vessel [28(96.6%) vs. 45(95.7%), p >0.999; for patients with vs. without bypass on donor vessel respectively].

Conclusion: Our data suggest that CABG of donor vessels does not influence the patency rate of bypass grafts on CTO in the early postoperative phase.

Conflict of interest: No

POSTER WALK: CORONARY ARTERY DISEASE / ACUTE CARDIOVASCULAR CARE – 1

P086

Diagnostic and Prognostic Value of H-ficolin and Mannose-Binding Lectin for Functionally Relevant Coronary Artery Disease

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Introduction: Reliable diagnosis of functionally relevant coronary artery disease (fCAD) currently requires advanced cardiac imaging. The complement system involved in atherosclerotic plaque formation from the beginning. We tested whether H-ficolin and mannose-binding lectin (MBL), central elements of the lectin complement pathway of activation, have any diagnostic and/or prognostic value for fCAD in patients with suspected fCAD

Method: We included 1571 consecutive patients (32.3% women) undergoing diagnostic work-up for fCAD. The presence of fCAD was centrally adjudicated using myocardial perfusion imaging single-photon emission tomography and coronary angiography. H-ficolin and MBL were measured in a blinded fashion. Major adverse cardiac events comprising cardiovascular death (CVD) and nonfatal myocardial infarction (MI) were assessed during a 5-year follow-up.

Results: fCAD was detected in 462 patients (29.4%). H-ficolin and MBL did not have sufficient diagnostic ability to distinguish patients with and without fCAD; H-ficolin AUC was 0.61 (95% CI 0.54–0.68, p = 0.033), and MBL AUC was 0.56 (95% CI 0.48–0.65, p = 0.102). H-ficolin concentrations were higher in men versus women (18.09 (15.9-21.81) and 17.6 (14.71-20.71), p = 0.04); no gender difference was found for MBL. MI occurred in 107 patients (6.8%), and 100 (6.4%) patients died due to CVD. In Kaplan-Meier analysis, high H-ficolin concentration (>90th percentile) demonstrated the ability to predict MI in the whole group (p = 0.018, Log-rank test) and in the subgroup without fCAD (p = 0.001, Log-rank test). This was confirmed in patients treated with aspirin but not in those without aspirin treatment. In Cox analysis, only H-ficolin, not MBL, demonstrated modest but significant predictive value after adjusting on risk factors and including the interaction between h-ficolin and fCAD (HR = 1.060, 95% CI 1.020-1.101, p = 0.03).

Conclusion: Only extremely high concentrations of H-ficolin are associated with an increased risk of myocardial infarction. H-ficolin and MBL do not have any diagnostic ability to distinguish patients with and without fCAD.

Conflict of interest: No

P087

Effect of the PCSK9 Inhibitor Alirocumab on Quantitative Flow Ratio and Diameter Stenosis of Non-Infarct Related Arteries from Patients with Acute Myodcardial Infarction: a Substudy From the PACMAN-AMI Randomized Trial

Sarah Bär[1], Raminta Kavaliauskaite[2], Jonas Häner[3], Georgios Siontis[3], Stefan Stortecky[2], Christoph Kaiser[4], Juan F. Iglesias[5], Stephan Windecker[3], Konstantinos Koskinas[2], David Spirk[6], Sylvain Losdat[7], Lorenz Räber[3]

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Introduction: Treating hypercholesterolemia with proprotein convertase subtilisin/kexin type 9 (PCSK9) inhibitors on top of statins leads to plaque regression and stabilization. Whether PCSK9 inhibitors induce changes in coronary hemodynamics and angiographic diameter stenosis (DS%) is unknown to date. Quantitative Flow Ratio (QFR) is a novel method to assess coronary hemodynamics. We aimed to investigate the effects of the PCSK9 inhibitor alirocumab on QFR and DS% of non-infarct related arteries (non-IRA) among acute myocardial infarction (AMI) patients.

Method: This was a pre-specified substudy of the PACMAN trial, a randomized, double-blind, placebo-controlled trial comparing alirocumab vs. placebo on top of high-intensity rosuvastatin among AMI patients. QFR and DS% were assessed at baseline and 1-year follow-up in any non-IRA with ≥2.0mm diameter and >25% 3D-Quantitative Coronary Angiography (3D-QCA) DS%. The pre-specified primary endpoint was the number of patients with mean QFR increase from baseline to follow-up, and the secondary endpoint the change in 3D-QCA DS%.

Results: Of 300 enrolled patients, 265 had serial follow-up, of which 193 underwent serial QFR analysis in 282 non-IRA. Baseline QFR across groups was 0.96 [IQR 0.91-0.99] (p = 0.593) and DS% 36.79 ± 8.18% (p = 0.742). At 1-year, QFR increased in 50 (53%) patients with alirocumab vs. 40 (40.4%) with placebo (Δ12.8%; OR = 1.7, 95%CI 0.9-3.0; p = 0.076). When excluding non-IRA with QFR >0.95, QFR increased in 37 (64.9%) patients with alirocumab vs. 22 (40.4%) with placebo (Δ20.9%; OR = 2.4, 95%CI 1.1-5.2; p = 0.031). DS% decreased by -1.03 ± 7.28% with alirocumab and increased by +1.70 ± 8.27% with placebo (Δ-2.54%, 95%CI -4.51 to-0.57; p = 0.012).

Conclusion: Treatment of AMI patients with alirocumab for 1 year resulted in a significant regression in angiographic DS% independent of baseline disease severity. While no overall improvement of coronary hemodynamics was observed with alirocumab, potential benefits were found in alirocumab treated patients with baseline QFR ≤0.95.

Conflict of interest: Research grants to the institution from Medis Medical Imaging Systems, Abbott, Bangerter-Rhyner Stiftung, personal research grant Swiss National Science Foundation, outside the submitted work.

Figure 2. Secondary Endpoint

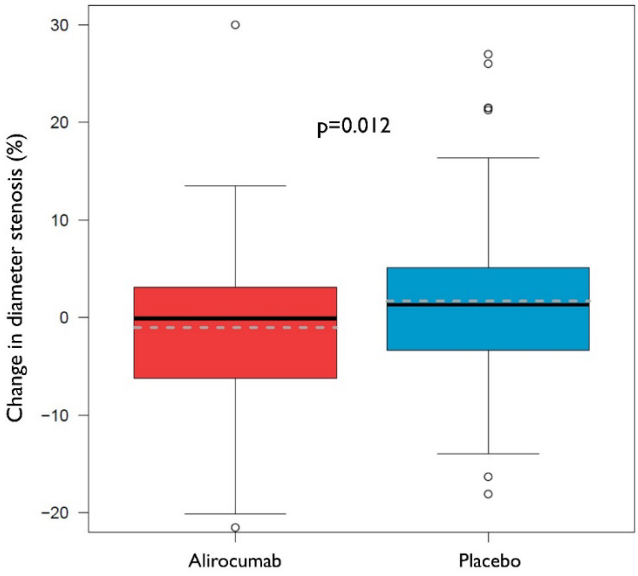
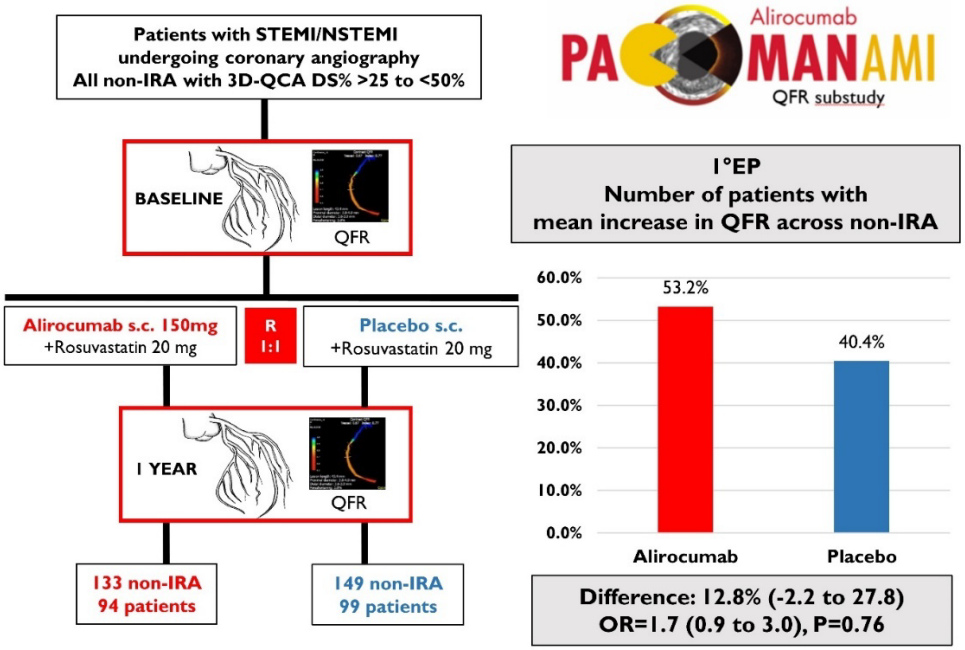


Figure 1. Flowchart and Primary Endpoint



P088

Circulating dipeptidyl peptidase 3 predicts hemodynamic impairment and premature death in acute coronary syndromes

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Introduction: Dipeptidyl peptidase 3 (DPP3) is a protease involved in the degradation of angiotensin II which disturbs systolic ventricular function and peripheral blood pressure regulation. Circulating DPP3 (cDPP3) was recently shown to portend poor outcomes in acute heart failure and may improve risk stratification in patients with acute coronary syndromes (ACS).

Method: Circulating DPP3 was studied in 4311 patients with ACS in the prospective multicentre SPUM-ACS study (ClinicalTrials.gov: NCT01000701). DPP3 levels were centrally measured in EDTA plasma by blinded study personnel using a sandwich-type luminometric immunoassay assay. Multivariable-adjusted regression models were fit to predict hemodynamic impairment and all-cause death.

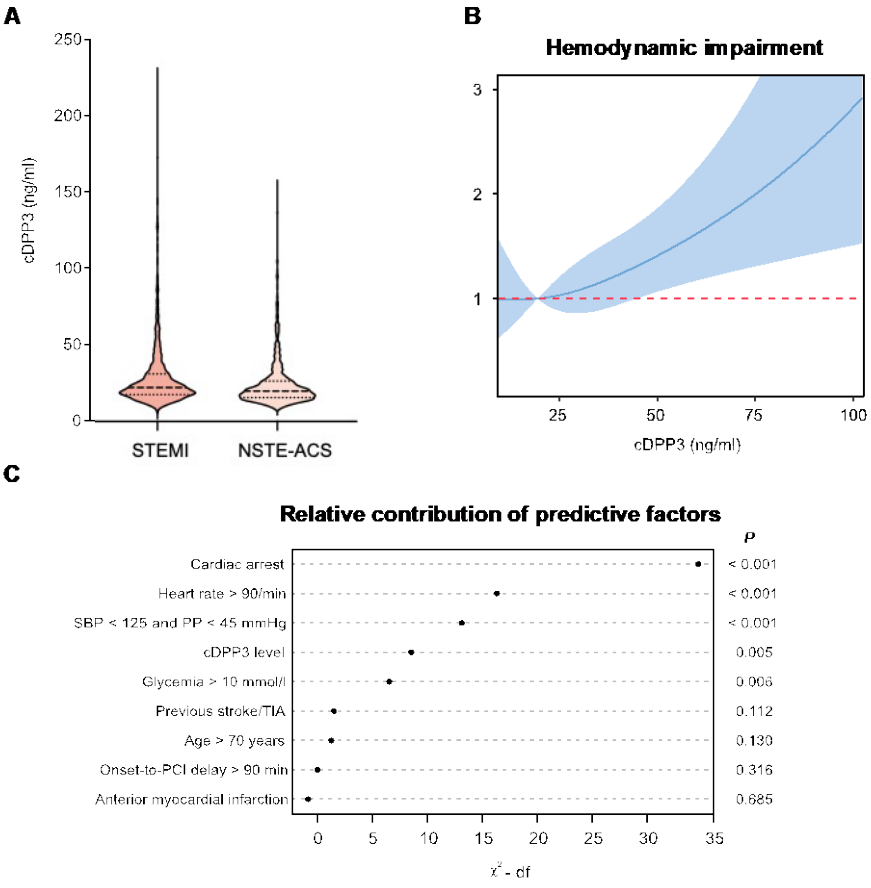

Figure 1 **Circulating Dipeptidyl Peptidase 3 (cDPP3) in Acute Coronary Syndromes (ACS). (A)** Violin plot showing elevated cDPP3 levels in patients presenting with ACS. Patients with ST-segement elvation myocardial infarction (STEMI) displayed pronouced increase in cDPP3 as compared to patients with non-ST-segment elevation ACS (NSTE-ACS). **(B)** Multivariable adjusted restricted cubic spline plot (3 knots) showing increasing risk of hemodynamic impairment (ie, requirement for vasopressor use, LVAD, or IABP) during hospitalization linked to increasing cDPP3 levels. Colour bands signify 95% confidence intervals (CI). Median cDPP3 levels served as a reference. The model was adjusted for risk factors for the development of cardiogenic shock shown in panel C. **(C)** Relative contribution of established predictors of cardiogenic shock obtained at hospital admission. SBP denotes systolic blood pressure, PP pulse pressure, TIA transient ischemic attack, PCI percutanous coronary intervention, df degrees of freedom.

Results: At baseline, median cDPP3 levels were 19.0 ng/ml (interquartile range [IQR] 15.0-26.0) with higher levels observed in patients with ST-segment elevation myocardial infarction than in patients with non-ST-segment elevation ACS (20.1 [15.9-28.2] vs. 18.0 [14.1-23.9], respectively, *P* <0.001). High cDPP3 was linked to longer hospitalization and higher risk to require medical or mechanical circulatory support (per log2 increase: odds ratio [OR] 1.91, 95% confidence interval [CI] 1.62-2.24, *P* <0.001; adjusted OR 1.34 95% CI 1.06-1.71, *P* = 0.017). In line, high cDPP was strongly associated with increased mortality at 30 days (per log2 increase: hazard ratio [HR] 1.96, 95% CI 1.48-2.59, *P* <0.001) and at 1 year (HR 1.51, 95% CI 1.24-1.83, *P* <0.001). When accounting for established risk factors including high-sensitivity troponin T, N-terminal pro-B-type natriuretic peptide, and high-sensitivity C-reactive protein, cDPP3 remained an independent predictor of premature death with doubling in cDPP3 levels translating into a 84% and 55% increase in 30-day and 1-year mortality risk, respectively (adjusted HR 1.84, 95% CI 1.36-2.49, *P* <0.001, adjusted HR 1.55, 95% CI 1.25-1.92, *P* <0.001, respectively).

Conclusion: We identified cDPP3 as a novel marker of cardiogenic shock and increased mortality in patients with ACS. Circulating DPP3 provides prognostic information beyond established risk factors and improves early risk assessment.

Conflict of interest: No

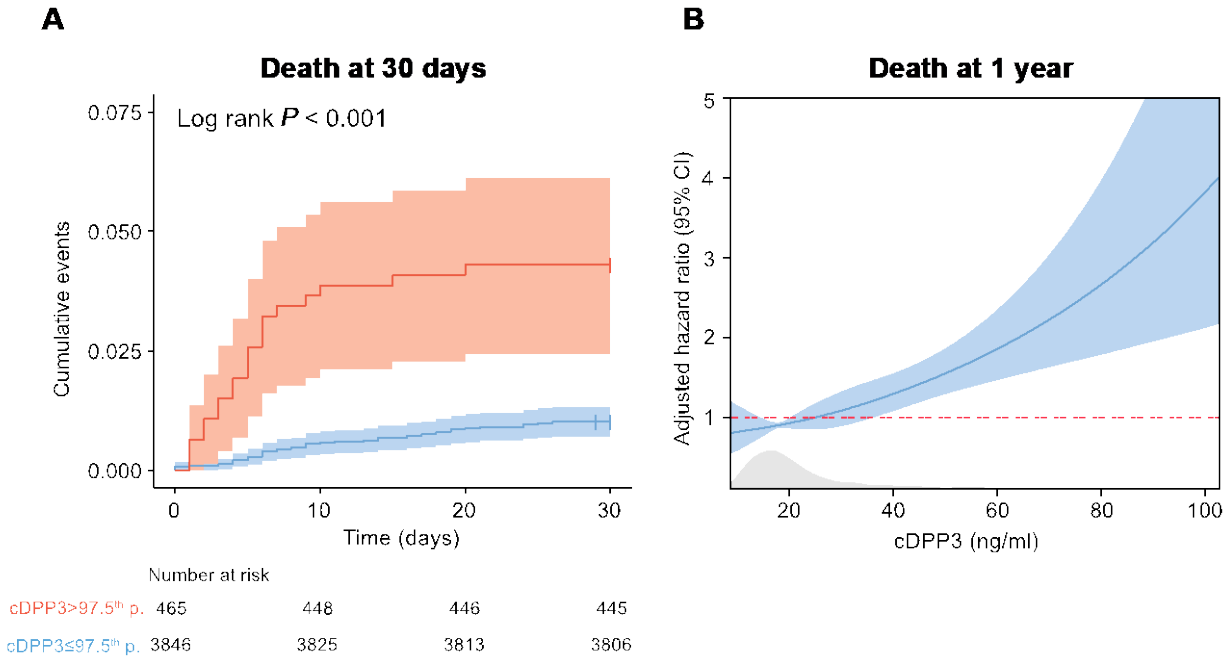

Figure 2. **Circulating Dipeptidyl Peptidase 3 independently predicts premature death in ACS. (A)** Cumulative deaths of patients presenting with ACS stratified by cDPP3 level. The upper limit of normal cDPP3 levels (97.5th percentile) in healthy adult individuals (ie, 40 ng/ml, unpublished data) served as thresold. **(B)** Multivariable adjusted restricted cubic spline plot (3 knots) showing increasing risk of death of any cause at 1 year linked to increasing cDPP3 levels. Colour bands signify 95% confidence intervals (CI). Median cDPP3 levels served as a reference. The population density across cDPP3 levels is indicated in grey. The model was adjusted for sex, age, heart rate, systolic blood pressure, history of diabetes, and levels of creatinine, high sensitivity troponin T, high sensitivity C-reactive protein, and N-terminal pro-B-type natriuretic peptide creatinine.

P089

Intracoronary ECG ST-segment shift remission time during reactive coronary hyperemia (τ-icECG): a new approach to assess hemodynamic coronary stenosis severity

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Introduction: Coronary pressure-derived fractional flow reserve(FFR) measurements are recommended for hemodynamic coronary stenosis assessment. Given temporary paralysis of the coronary microcirculation during hyperemia, pressure is, in theory, directly related to coronary flow. Pressure drop during hyperemia across a coronary stenosis, thus, provides an estimate of its restrictive effect on flow. FFR during reactive hyperemia induced by a proximal, 1-minute coronary artery balloon occlusion has been shown non-inferior to FFR as obtained by adenosine-induced hyperemia. Intracoronary ECG (icECG) is more sensitive in detecting myocardial ischemia than the surface ECG, and can be easily obtained. The present study evaluated a novel diagnostic approach based on icECG ST-segment shift remission time for hemodynamic stenosis severity assessment.

Method: This was a retrospective observational trial in patients with chronic coronary syndrome, who underwent hemodynamic measurements during a brief coronary occlusion with simultaneous icECG recording during coronary angiography. The icECG recording was used for a beat-to-beat analysis of the ST-segment elevation performed by a previously developed fully autonomous algorithm. The time after release of the 1-minute ostial coronary balloon occlusion when the ST elevation reached 50% of the pre-occlusion (baseline) isoelectric line, i.e., icECG remission half time (τ-icECG;τ = tau), was obtained by the algorithm *(Figure1)*. τ-icECG was evaluated using the simultaneously obtained FFR at a threshold of 0.80 as reference parameter.

Results: 139 icECGs from 119 patients were analysed, 23 had to be excluded in advance, due to incomplete icECG recording or algorithm failure. A ROC-analysis of τ at a threshold of >8s found it significantly accurate for detecting a hemodynamically relevant coronary stenosis at FFR≤0.80 (area under the ROC-curve 0.618, 95% CI 0.507-0.735, sensitivity 60%, specificity 67%, p = 0.037) *(Figure2)*.

Conclusion: T-icECG, a measure of icECG ST-elevation remission time to isoelectricity as obtained during reactive hyperemia FFR accurately detects hemodynamically relevant coronary artery stenoses at a threshold of ≥8seconds.

Conflict of interest: No

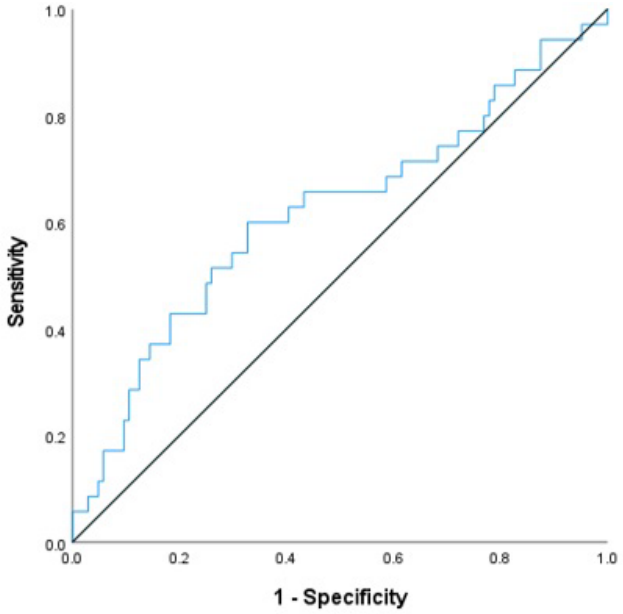

Figure 2. ROC analysis of τau values in the prediction of stenosis severity/significance determined by a FFR value ≤ 0.8. The dots represent the empirical value of true/false fractions for τau of 0–100s. (positive 35, negative 104, positive ≤ 0.8, AUC 0.618, std error 0.059 , p=0.037, 95% CI 0.502-0.734, cut-off 0.08)

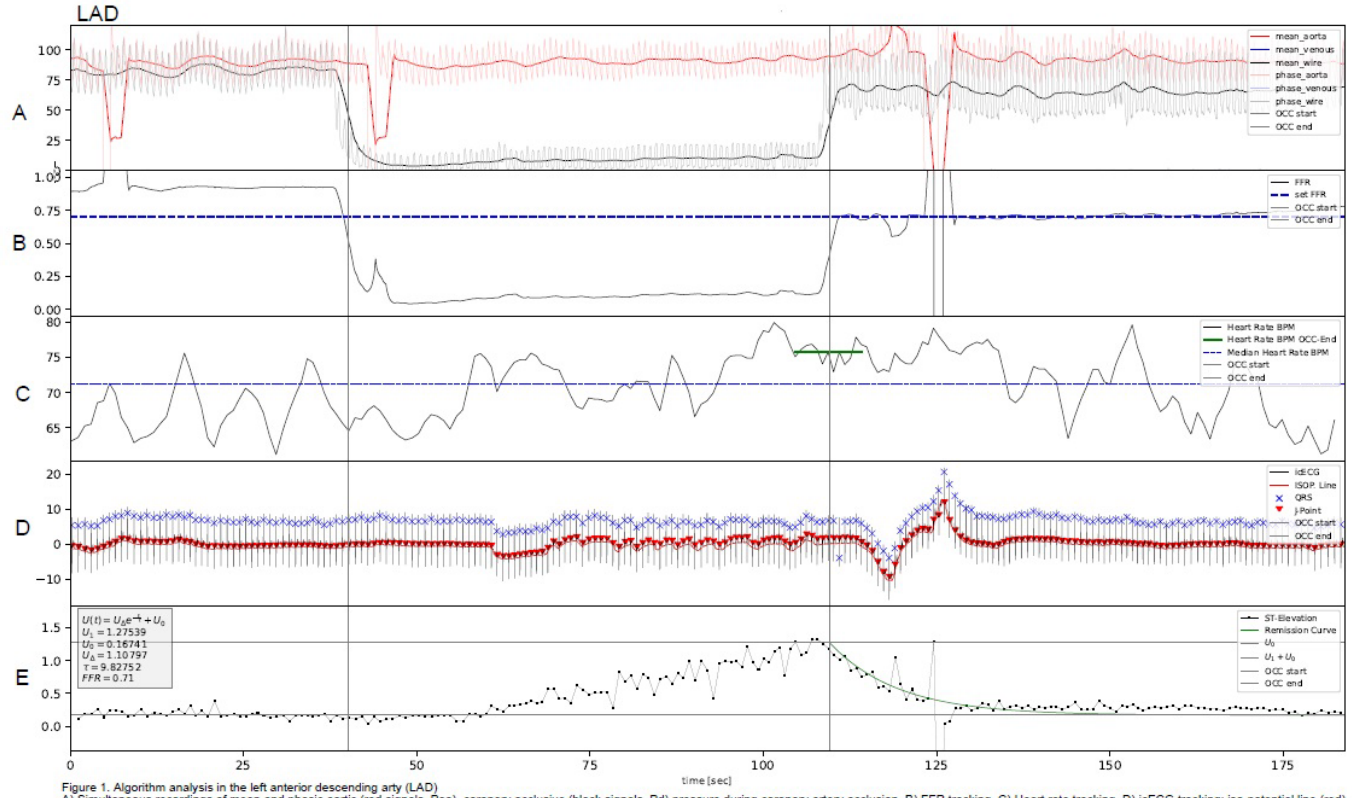

Figure 1. Algorithm analysis in the left anterior descending arty (LAD)
A) Simultaneous recordings of mean and phasic aortic (red signals, Pao), coronary occlusive (black signals, Pd) pressure during coronary artery occlusion. B) FFR tracking. C) Heart rate tracking. D) icECG tracking: iso-potential line (red), QRS (blue marks) and j-point (red marks). Shortly after balloon occlusion, icECG shows electrical alterations with flipped T-waves and ST-segment elevation. E) ST-elevation tracking, remission curve and τ determination.

P090

Performance of biomarker ratios in differentiating takotsubo syndrome from acute coronary syndrome – validation in a large multicenter cohort

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Introduction: Clinical differentiation between takotsubo syndrome (TTS) and acute coronary syndrome (ACS) prior to coronary angiography can be extremely challenging. Small scale studies have suggested that specific biomarker ratios distinguish TTS from ACS with high accuracy. The aim of the present study was to validate these previously proposed biomarker ratios in a large cohort of TTS and ACS patients.

Method: In the present study, a total of 1,007 TTS patients and 1,658 ACS patients were included. The levels of troponin (Tn), creatine kinase (CK), Brain natriuretic peptide (BNP)/NT-proBNP as well as the ratios of BNP/Tn, BNP/CK, Tn/CK and a previously proposed diagnostic score* were compared between subgroups of TTS and ACS patients on admission and at peak. For standardization among participating sites, biomarker levels were expressed as the upper limit of normal. All biomarker ratios with a reported area under the curve (AUC) above 0.8 were tested for their accuracy.

Results: For each comparison, patients were matched as reported in the respective study. The matching characteristics of these subgroups were age and sex with the study population of both Pirlet et al. and Budnik et al. consisting entirely of female patients. The ACS population of Doyen et al. exclusively consisted of patients with anterior ACS. Biomarker ratios and diagnostic scores are displayed in Table 1 with the number of TTS patients and AUC in the respective study cohort (N TTS 1, AUC 1) and in our cohort (N TTS 2, AUC 2).

Conclusion: Previously proposed biomarker ratios for the differentiation of TTS from ACS performed only moderately in a larger cohort, further underlining the importance of identifying novel diagnostic biomarkers.

Conflict of interest: No

Table 1. Diagnostic Biomarker Ratios

Publication	Cohort	Proposed biomarker ratio	N TTS 1	N TTS 2	AUC 1	AUC 2
Dagrenat et al.	TTS vs STEMI	BNP/Tn at peak	314	1007	0.96	0.716
		Diagnostic Score*	314	1007	0.93	0.815
Doyen et al.	TTS vs anterior STEMI	BNP/Tn at peak	62	205	0.98	0.732
	TTS vs anterior NSTEMI	BNP/Tn at peak	62	205	0.81	0.652
Budnik et al.	Female TTS vs female STEMI	BNP/Tn on admission	66	187	0.88	0.747
		BNP/CK on admission	66	187	0.85	0.725
Fröhlich et al.	TTS vs STEMI	BNP/Tn at peak	39	316	0.98	0.741
		BNP/CK at peak	39	316	0.97	0.786
	TTS vs NSTEMI	BNP/Tn at peak	39	316	0.98	0.734
		BNP/CK at peak	39	316	0.96	0.787
Pirlet et al.	Female TTS vs female ACS	Tn/CK on admission	35	297	0.8	0.516

Table 1: Biomarker ratios and diagnostic score reported in previous publications in comparison to ratios found in our cohort. N: Number of patients, AUC: area under the curve, TTS: Takotsubo, STEMI: ST-elevation myocardial infarction, NSTEMI: non-ST-elevation myocardial infarction, BNP: Brain Natriuretic Peptide, Tn: Troponin, CK: Creatine Kinase.

*$\frac{\text{Exp}(-0.031+0.013\text{xage}+0.0003\text{x}(\text{BNP/Tn})-0.077\text{xLVEF}+2.71+1(\text{gender}=1)-2.77\text{x}1(\text{psy}+=1))}{1+\text{exp}(-0.031+0.013\text{xage}+0.0003(\text{BNP/Tn})-0.077\text{xLVEF}+2.71\text{x}1(\text{gender}=1)-2.77\text{x}1(\text{psy}+=1)}$

P091

Influence of intracoronary hemodynamic forces on atherosclerotic plaque phenotypes

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Introduction: Coronary hemodynamics impact coronary plaque evolution and destabilization.The present study investigates the association of coronary atherosclerotic phenotype with endothelial shear stress and pressure profiles

Methods: The Precise PCI Plan (P3) Study is a prospective, international registry of patients with chronic coronary syndromes and flow-impairing lesions (fractional flow reserve [FFR] ≤ 0.80). Motorized FFR pullback pressure gradient (PPG), optical coherence tomography (OCT) plaque characterization, angiography-based translesional time-averaged wall shear stress (TAWSS) and topological shear variation index (TSVI) were obtained. Uni- and multivariate models investigated the association between PPG, plaque composition and WSS quantities.

Results: One hundred five vessels (FFR = 0.70 [Interquartile range (IQR) 0.56-0.77]) had combined PPG and WSS analyses. TSVI was correlated with PPG (r = 0.47, [95% Confidence Interval (95%CI) 0.30-0.65], p <0.001). Vessels with a focal CAD (PPG above the median value of 0.667) had significantly higher TAWSS (14.8 [IQR 8.6-24.3] *vs.* 7.03 [4.8-11.7] Pa, p <0.001) and TSVI (163.9 [117.6-249.2] *vs.* 76.8 [23.1-140.9] m^{-1}, p <0.001). In the 51 vessels with baseline OCT, TAWSS was associated with macrophage infiltration (Exp(β) = 1.15 [95%CI 1.02-1.30], p = 0.018), TSVI with plaque rupture (1.01 [1.00-1.02], p = 0.024), PPG with the extension of the lipid component (7.78 [6.19-9.77], p = 0.003), with the presence of thin-cap fibroatheroma (2.85 [1.11-7.83], p = 0.024) and plaque rupture (4.94 [1.82 to 13.47], p = 0.002).

Conclusions: Pressure gradients discriminating focal and diffuse disease are associated with WSS profiles. Both pressure gradients and WSS profiles are associated with atherosclerotic plaque phenotypes. Focal disease (as identified by high PPG) and high TSVI are associated with vulnerable plaque features.

Conflict of interest: No

P092

Non-infarcted myocardium inflammation predicts outcomes after myocardial infarction

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Background: ST segment elevated myocardial infarction (STEMI) is associated with a systemic inflammatory response. The role of inflammation at the tissue level is poorly characterized.

Objectives: to characterize inflammation of the non-infarcted myocardium in relation with infarct size and other inflammatory markers and its prognostic role after STEMI.

Methods: 171 consecutive patients with STEMI who underwent CMR after primary angioplasty were analysed in terms of standard infarct characteristics. Inflammation of the non-infarcted area, liver, spleen and chest wall was assessed based on T2 mapping. The primary endpoint was major adverse cardiac events (MACE), defined as deaths, myocardial infarction (MI), unplanned non-infarct-related artery revascularization or re-hospitalization for heart failure at follow-up.

Results: High (above the median value of 45 ms) T2 values in the non-infarcted area were associated with larger infarct size, microvascular obstruction and left-ventricular dysfunction and did not significantly correlate with C-reactive protein, white blood cells, or T2 values of the anterior chest wall, liver and spleen.

At median follow-up of 1.5 months, patients with high (>45 ms) T2 values in the non-infarcted area incurred greater MACE risk (21.5% vs 7.7% for T2 values <45 ms, p <0.001). At multivariable analysis, high non-infarcted myocardium T2 values was an independent predictor of MACE (HR 2.126, 95%CI 1.023 – 4.417, p = 0.043) and myocardial re-infarction (HR 10.928, 95%CI 1.441 – 83.686, p = 0.021) (Fig.1 and Fig.2).

Conclusions: High non-infarcted myocardium T2 values after STEMI are independently associated with worse outcomes, mainly owing to higher MI risk.

Conflict of interest: No

Figure 2: Violin plot showing the distribution of remote T2 values according to outcomes

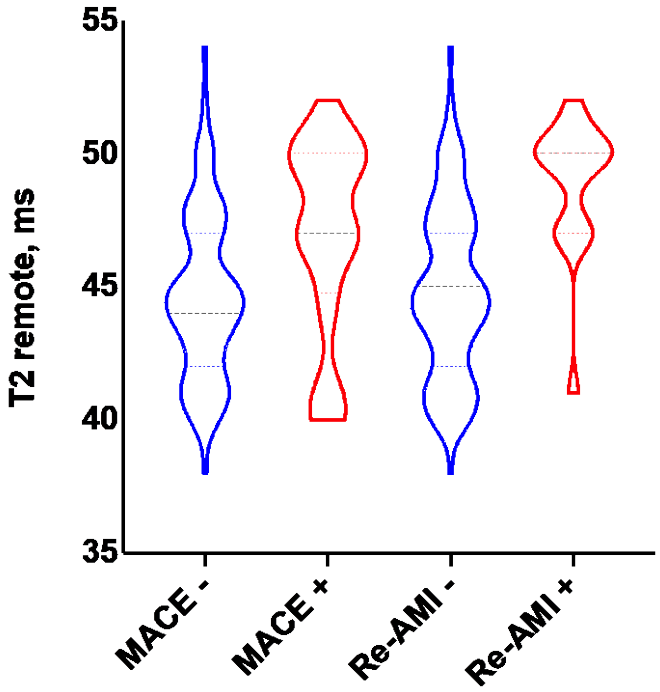
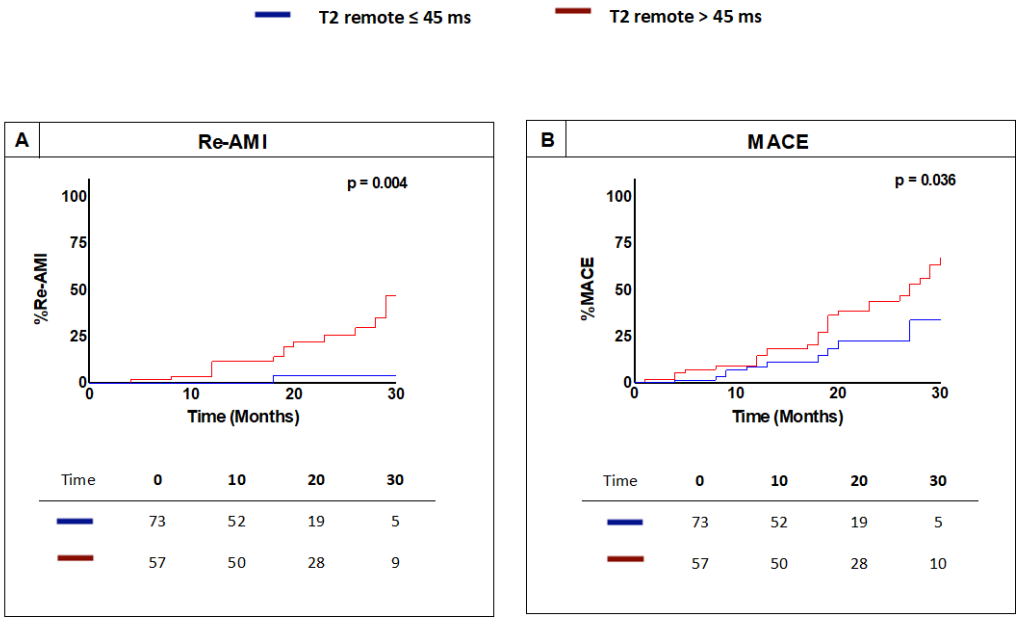


Figure 1: Kaplan Meier Curves for re-infarction (Re-AMI) and MACE in patients with non-infarcted T2-values >45ms and Non infarcted T2 values <45 ms.



P093

Differential effects of fentanyl and morphine weighted-dose on ticagrelor-induced platelet inhibition in ST-segment elevation myocardial infarction: a subgroup analysis from the PERSEUS randomized trial

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Introduction: Fentanyl does not improve ticagrelor-induced platelet inhibition at 2 hours compared with morphine in patients with ST-segment elevation myocardial infarction (STEMI) undergoing primary percutaneous coronary intervention (PCI). The differential effects of fentanyl and morphine dose on ticagrelor pharmacokinetic and pharmacodynamic response in STEMI patients remain undetermined.

Method: PERSEUS (NCT02531165) was a prospective, single-center, open-label, randomized controlled trial that compared fentanyl vs. morphine on ticagrelor pharmacokinetics and pharmacodynamics among symptomatic STEMI patients. In this post-hoc analysis, patients were further categorized for weight-adjusted fentanyl and morphine doses (above vs. below the median). Spearman correlation rank coefficients (ρ) were used to determine the relationship between weight-adjusted opioid doses and platelet reactivity assessed by P2Y12 reaction units (PRU) at 2 hours after ticagrelor loading dose (LD).

Results: Between December 18, 2015 and June 22, 2017, 38 patients were included. Baseline clinical and procedural characteristics were similar between treatment groups. At 2 hours, there was a significant correlation between unadjusted (ρ = 0.503; p = 0.033) and weight-adjusted (ρ = 0.699; p = 0.001) fentanyl doses and PRU at 2 hours, whereas no significant relationship was found with unadjusted (ρ = 0.141; p = 0.056) and weight-adjusted (ρ = 0.086; p = 0.73) doses of morphine. Unadjusted and weight-adjusted fentanyl, but not morphine, doses were significantly correlated with greater ticagrelor (ρ = -0.692; p = 0.001, and ρ = -0.655; p = 0.003, respectively) and its active metabolite AR-C124910XX2 (ρ = -0.530; p = 0.024, and ρ = -0.530; p = 0.024, respectively) concentrations at 2 hours after ticagrelor LD. In a linear regression analysis, weight-adjusted (p = 0.044), but not unadjusted (p = 0.10), fentanyl dose was independently associated with lower PRU at 2 hours after ticagrelor LD.

Conclusion: Among symptomatic STEMI patients undergoing primary PCI, we found a significant relationship between weight-adjusted fentanyl, but not morphine, doses and increased ticagrelor-induced platelet inhibition at 2 hours after LD administration.

Conflict of interest: AA has received consulting and speaker fees from SIS Medical. MB has received consulting and speaker fees from Abbott Vascular, Abiomed, Amgen, Astra Zeneca, Bayer, Daichii, Mundipharma and SIS Medical. FC has received consulting and speaker fees from Abbott Vascular, Abiomed and SIS Medical.

P094

Robotic-Assisted Percutaneous Coronary Intervention: First Experience in Switzerland

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Introduction: Percutaneous coronary intervention (PCI), the most frequently performed myocardial revascularization procedure, requires fluoroscopy, exposing the operator to ionizing radiation. Robotic-assisted PCI (RA-PCI) is a novel technology that allows the interventional cardiologist to operate coronary devices remotely from a radiation-shed cockpit. We report safety, feasibility and 12-months clinical outcomes of the first 21 patients undergoing RA-PCI in Switzerland.

Method: All patients undergoing RA-PCI using the CorPath GRX Vascular Robotic System between 06/2021 and 12/2021 at Inselspital, Bern were included in this retrospective registry study. Baseline, procedural and 12-months clinical follow-up data were prospectively assessed as part of the cardiobase Bern PCI registry (NCT02241291). The two co-primary endpoints were clinical success (defined as <30% residual diameter stenosis and absence of in-hospital major adverse cardiovascular events [MACE: composite of death, periprocedural myocardial infarction, target-vessel revascularization, and stroke]) and robotic success (defined as completion of RA-PCI without or with partial manual assistance with clinical success).

Results: Twenty-five lesions in 21 patients were treated with RA-PCI (age 62.4 +/- 9.1 years, 24% female). Clinical success was achieved in 100%, and robotic success in 81% (17/21 procedures, including 4 procedures requiring partial manual assistance). Manual conversion (e.g. manual completion of the procedure) occurred in 19% (4 procedures). Causes for manual assistance or conversion were poor guiding-catheter back-up or platform limitations (4), adverse events (2x transient slow-flow that was solved manually), safety decision (1x vagal reaction not related to robotic approach), and software error (1). No in-hospital MACE occurred. During 12 months of follow-up one patient suffered a non-target-vessel myocardial infarction requiring repeat PCI.

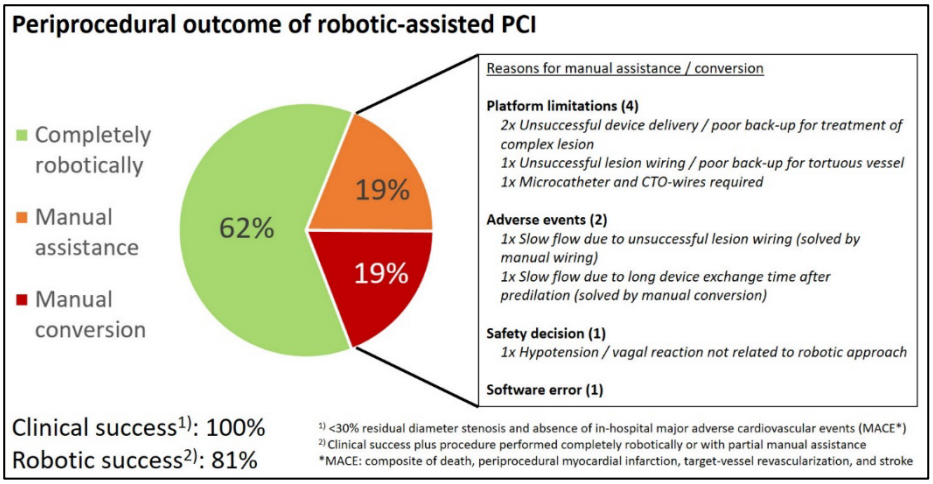
Conclusion: RA-PCI can safely be performed without clinically relevant robot-associated complications in the early phase of robotic program implementation with more than 80% of procedures conducted completely robotically or with partial manual assistance.

Conflict of interest: No

Table 1

Baseline and procedural characteristics (21 patients)	
Age (years)	62.4 ± 9.1
Female sex	24%
Staged percutaneous coronary intervention	100%
Radial access	95%
Robotic lesions per intervention	1.19 ± .040
Intervention time (min)	50.2 ± 19.6
Robotic time (min)	40.1 ± 18.3
Fluoroscopy time (min)	14.3 ± 7.2
Contrast (ml)	194 ± 63
Radiation (dose area product, cGycm^2)	5638 ± 3084
Lesion characteristics (25 lesions)	
Vessel treated	22
▪ LAD / LCX / RCA	52% / 24% / 24%
Lesion treated	25
▪ Type A/B1	28%
▪ Type B2/C	72%
Bifurcations	
▪ With side-branch fenestration	16%
▪ With side-branch stenting	8%
Percent diameter stenosis (%)	76 ± 11
Lesion length (mm)	24.5 ± 11.5
Reference vessel diameter (mm)	2.95 ± 0.53
Number of stents per lesion	1.42 ±0.65
Total stent length (mm)	33.3 ± 15.0
Mean stent diameter (mm)	2.7 ± 0.3
Wires used	
▪ Standard	100%
▪ Hydrophilic/CTO with robot	0%
▪ Hydrophilic/CTO after manual conversion	5%
Periprocedural outcome	
Clinical success	**100%**
Robotic success	**81%**
▪ *Completely robotically*	*62%*
▪ *Partial manual assistance*	*19%*
Manual conversion	19%
In-hospital events	
Death	0%
Periprocedural myocardial infarction	0%
Repeat revascularization	0%
Stroke	0%
Long-term clinical outcome (12 months)	
Death	0%
Myocardial infarction	5%
▪ *Target-lesion myocardial infarction*	*0%*
▪ *Non-target-lesion myocardial infarction*	*5%*
Repeat revascularization	5%
▪ *Target-lesion revascularization*	*0%*
▪ *Non-target-lesion revascularization*	*5%*
Stroke	0%

Figure 1



P095

Twenty-Five-Year Trends in a Swiss Cohort of Patients with Spontaneous Coronary Artery Dissection

Michael Würdinger[1], Victor Schweiger[1], Thomas Gilhofer[1], Victoria Cammann[1], Annnika Badorff[1], Iva Koleva[1], David Niederseer[1], Alessandro Candreva[1], Maciej Cieslik[1], Jonathan Michel[1], Alexander Gotschy[1], Julia Stehli[1], Barbara Staehli[1], Jelena-Rima Templin[1], Christian Templin[1]

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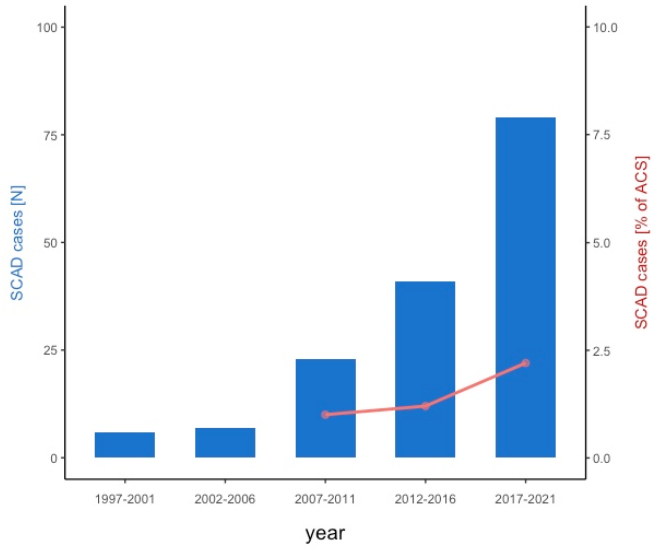
Introduction: Spontaneous coronary artery dissection (SCAD) is an underestimated cause of acute coronary syndrome (ACS). Knowledge about the disease is still limited and, therefore, clinical management is not yet standardized. We analyzed trends in incidence, clinical presentation, diagnosis, management, and outcomes of SCAD over 25 years.

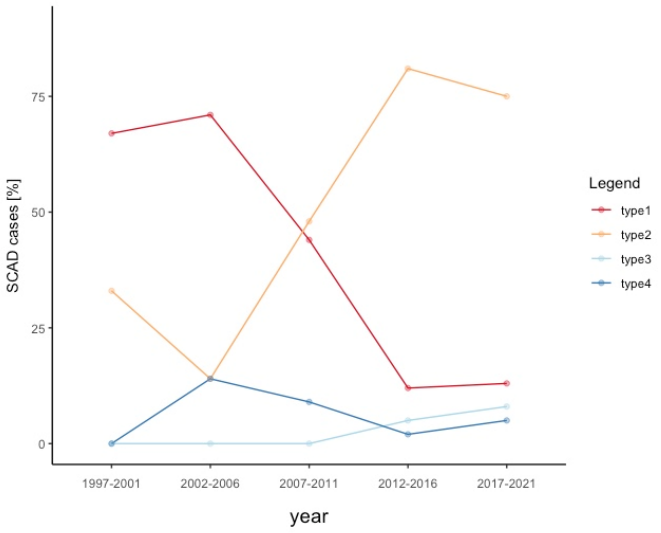
Method: Patients with a diagnosis of SCAD between 1997 and 2021 at a tertiary referral hospital in Switzerland were included. Incidences were analyzed as a total number and proportion of ACS cases. Data on presentation, angiographic findings, management, and outcomes were collected from medical records. Major adverse cardiac events (MACE) were defined as the composite of all-cause death, cardiac arrest, SCAD recurrence or progression, any other myocardial infarction, and stroke.

Results: One hundred fifty-six SCAD cases were included in this study. The incidence of SCAD increased significantly as a total number ($p < 0{\cdot}001$) as well as in relation to the ACS figures ($p < 0{\cdot}001$; figure 1). This rise was caused by an increase of SCAD type 2 ($p < 0{\cdot}001$) and lesions in side branches ($p = 0{\cdot}014$), whereas the proportions of lesions in the left main coronary artery and proximal segments were falling (p-values $0{\cdot}029$ and $<0{\cdot}001$, respectively; figure 2). There was an increase in conservative therapy ($p < 0{\cdot}001$), while the rate of MACE remained stable, but high (35%) over the whole study period. Moreover, there was a reduced proportion of patients with need for intensive care treatment ($p = 0{\cdot}017$).

Conclusion: The incidence of SCAD increased distinctly over the last 25 years. Consequentially, SCAD represents an important cause of ACS. The rise was based on higher numbers of more subtle lesions. There was a growing proportion of conservative management and a lower need for intensive care treatment.

Conflict of interest: No





P097

Percutaneous large-bore aspiration embolectomy with veno-arterial extracorporal membrane oxygenation support or standby in patients with high-risk pulmonary embolism and contraindications to thrombolysis

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Introduction: Large-bore catheter aspiration embolectomy reduces thrombus burden and right ventricle strain, and improves hemodynamics after pulmonary embolism (PE). Sparse data is available for patients with high-risk PE and contraindications to thrombolysis or thrombolysis failure, particulary if veno-arterial extracorporal membrane oxygenation (VA-ECMO) is required.

Method: All patients with acute high-risk PE and contraindications to thrombolysis undergoing FlowTriever® percutaneuous embolectomy and VA-ECMO circulatory support (or standby) at the University Hospital Zurich between April 2021 and August 2022 were retrospectively analyzed. The primary outcome was the combination of recurrent PE, heart failure hospitalization, and all-cause death at 30 days.

Results: The analysis included 15 patients: mean age was 63.1 years and 14 (93%) were men. Overall, 4 (27%) patients presented with cardiac arrest, 8 (53%) with ongoing obstructive shock, and 3 (20%) with persistent arterial hypotension. VA-ECMO was implanted prior to aspiration embolectomy in 8 (53%) patients. Three of 7 patients without initial VA-ECMO support experienced periprocedural cardiac arrest, of whom 2 received ECMO support before completion of embolectomy. VA-ECMO weaning was successful in all patients after a mean of 5.4 days. There was one periprocedural death in a patient who did not receive VA-ECMO support following a periprocedural cardiac arrest. The primary outcome at 30 days occurred in 5 (33.3%; 95%CI 13.0-61.3%) patients.

Conclusion: In patients with high-risk PE and contraindications to thrombolysis, percutaneous large-bore aspiration embolectomy in combination with VA-ECMO support (or standby) appears to be effective to reverse right heart failure and prevent PE-related death.

Conflict of interest: Speaker fee Inari Medical

P098

Treatment of refractory angina with the coronary sinus reducer

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Introduction: The Coronary Sinus Reducer (CSR) is a relatively recent addition to the therapeutic armory available for refractory angina (RA). One randomized trial and several observational studies have showed CSR efficacy in obstructive coronary artery disease (CAD), but very scarce if no data exists on patients with complete revascularization or even non-obstructive, purely microvascular dysfunction. We present our experience with CSR at a Swiss tertiary center.

Method: We enrolled consecutive patients from the prospective COMPLEX registry that received a CSR between June 2018 and November 2022. Endpoints were anginal symptoms, evaluated with the Canadian Cardiovascular Society (CCS) score, procedural success rate and complications, and MACE as a composite of all-cause mortality, cardiovascular death, acute coronary syndromes (ACS) and heart failure hospitalizations.

Results: We included 56 patients; their baseline characteristics are described in *Table 1*. Mean CCS class was 2.7 ± 0.6, mean number of antianginal drugs was 2.2 ± 1.2. Noteworthy, we offered CSR as a compassionate treatment also to patients that met exclusion criteria of most previously published studies (see *Table 1* for details): recent ACS or revascularization, previously implanted cardiac resynchronization therapy (CRT) device, predominantly right coronary artery (RCA) disease.

Procedural success rate was 98%; 1 patient required a second, ultimately successful, procedure. No major periprocedural complication resulting in bailout surgery, death or myocardial infarction occurred.

Clinical follow-up (median 258 days, IQR 104-405) was available for 54 (96%) patients. After CSR implantation, mean CCS class was 1.6 ± 1.1 and median number of antianginal drugs 2 ± 1. Overall, 70.2% of patients improved by ≥1 CCS class and 36.2% by ≥2 CCS classes. Moreover, 77.8% of patients with non-obstructive or completely revascularized disease also improved by ≥1 CCS class. Mortality and MACE were 7% and 15%.

Conclusion: In our cohort, CSR implantation was safe and resulted in an improvement of anginal symptoms, in line with previous studies.

Conflict of interest: No

Table 1. Baseline characteristics of the study population

Baseline characteristics	N = 56 n (%) – mean±SD
Male sex	38 (67.9)
Age (years)	70.5±9.5
BMI (kg/m^2)	29.9±5.2
Number of conventional CV risk factors	2.9±1
Diabetes mellitus	22 (39.3)
Previous ACS	30 (53.6)
ACS in the last 3 months	15 (26.8)
Three-vessel disease	39 (69.6)
Predominantly RCA disease	5 (8.9)
Previous PCI	44 (78.6)
Previous CABG	32 (57.1)
Revascularization in the last 6 months	12 (21.4)
Presence of at least one CTO lesion	22 (39.3)
Complete revascularization achieved	12 (21.4)
Non-obstructive disease	8 (14.3)
History of HF	14 (25)
Previous CRT implantation	2 (3.6)
At least moderate valvular disease	7 (12.5)
CCS class	2.7±0.6
NYHA class	2.2±0.7
N. of antianginal drugs	2.2±1.2

Abbreviations: *BMI*, body mass index; *CV*, cardiovascular; *ACS*, acute coronary syndrome; *RCA*, right coronary artery; *PCI*, percutaneous coronary intervention; *CABG*, coronary artery bypass graft; *CTO*, chronic total occlusion; *HF*, heart failure; *CRT*, cardiac resynchronization therapy; *CCS*, Canadian Cardiovascular Society; *NYHA*, New York Heart Association

P099

Treatment of in-stent-restenosis with everolimus-eluting bioresorbable scaffolds – The 5-year results of the randomized ABSORB-ISR trial

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Introduction: The best management of in-stent restenosis (ISR) is debated. Yet, ISR lesions are often treated with drug eluting stents, which leads to an "onion-skin phenomenon" and is associated with a considerable risk for recurrent ISR. Trials have shown the efficacy of paclitaxel-eluting drug coated balloons (PE-DCB) in ISR treatment. Observational studies reported promising outcomes after ISR treatment with the bioresorbable scaffold (BRS) Absorb® (Abbott Vascular, USA). The aim of this trial was to assess the efficacy of the Absorb® BRS compared to a PE-DCB in ISR treatment.

Method: The ABSORB-ISR trial (NCT02474485) was a randomized-controlled trial comparing OCT-guided PCI with the Absorb® BRS to the SeQuent® Please DCB (B. Braun Melsungen AG, Germany) in an all-comer population with clinically relevant ISR. The primary endpoint was late lumen loss (LLL) at 9 months. Clinical follow-up (FU) was obtained up to 5 years.

Results: Totally, 53 patients and lesions were enrolled between March 2015 and July 2017 (27 (51%) in the BRS group and 26 (49%) in the DCB group). At 9 months, the mean LLL did not significantly differ between patients treated with the BRS versus DCB (median 0.41 (interquartile range (IQR) 0.15; 1.23) mm versus 0.27 (IQR 0.13; 0.66) mm, p = 0.86). The target vessel revascularization (TVR) rates were 9 (33.3%) versus 9 (34.6%) with the BRS versus PE-DCB (p = 0.72). No stent (ST) or scaffold (ScT) thrombosis occurred. *For further baseline characteristics see Table 1. Figure 1 depicts two illustrative cases.*

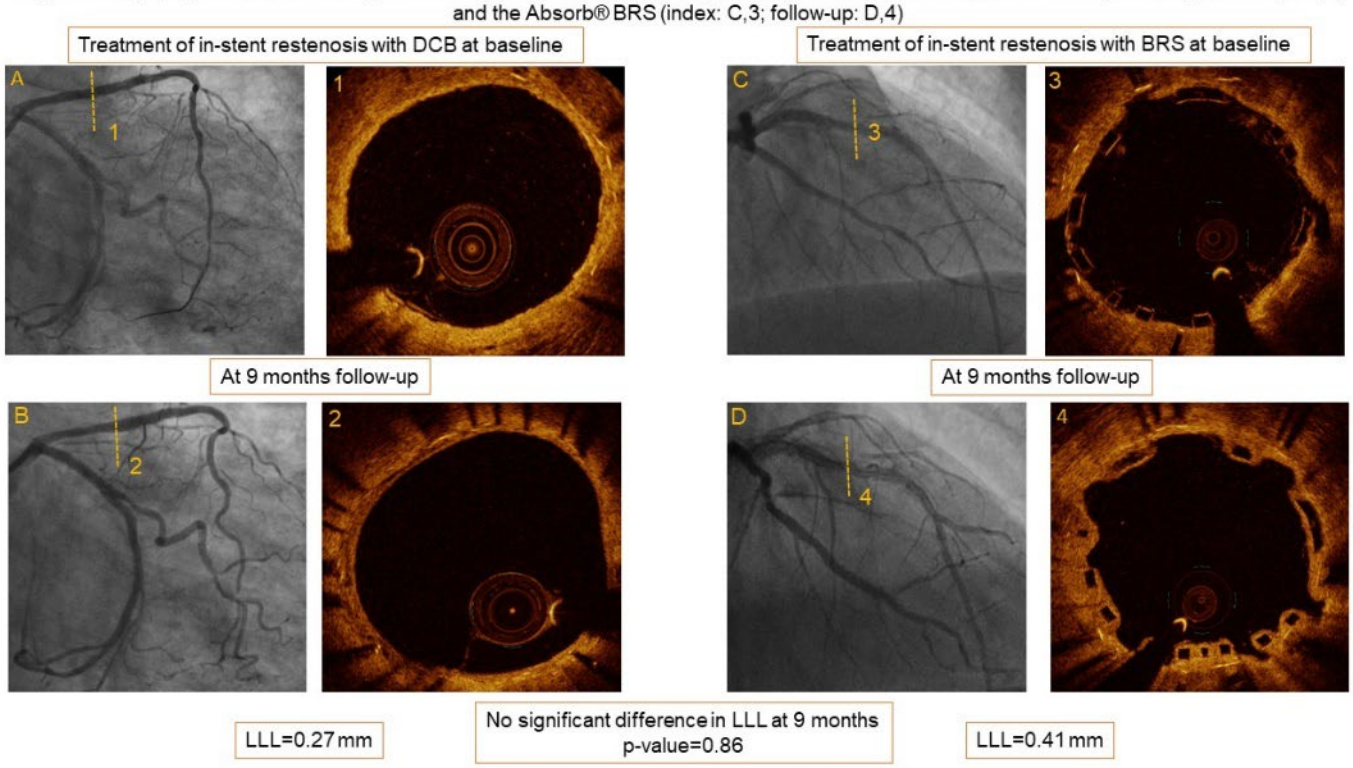
Conclusion: Our randomized trial showed no significant difference in angiographic, optical coherence tomography (OCT) and clinical endpoints after treatment of ISR using the Absorb® BRS compared to the SeQuent® Please PE-DCB during very long-term FU (up to 5 years). Noteworthy, the rates of TVR were high in both groups (>30%). However, we found no ScT or ST following OCT-guided PCI in both groups.

Conflict of interest: AA has received consulting and speaker fees from SIS Medical. MB has received consulting and speaker fees from Abbott Vascular, Abiomed, Amgen, Astra Zeneca, Bayer, Daichii, Mundipharma and SIS Medical. FC has received consulting and speaker fees from Abbott Vascular, Abiomed and SIS Medical.

Table 1: Baseline characteristics

Variable	Measure/Level	BRS group	DCB group	Total	p
Age at screening, years	n	27	26	53	0.6554
	Mean(±SD)	66.11 (±7.40)	67.35 (±11.98)	66.72 (±9.84)	
Sex	n	27	26	53	0.4203
	Female	2 (7.41%)	4 (15.38%)	6 (11.32%)	
	Male	25 (92.59%)	22 (84.62%)	47 (88.68%)	
Clinical presentation	n	27	26	53	
Chronic coronary syndrome		14 (51.85%)	16 (61.54%)	30 (56.60%)	0.0522
Acute coronary syndrome	n	13 (48.15%)	10 (38.46%)	23 (43.40%)	0.4769
Cardiovascular risk factors	n	27	26	53	
Diabetes mellitus		9 (33.33%)	7 (26.92%)	16 (30.19%)	0.6113
Cigarette smoking	Current	5 (18.52%)	2 (7.69%)	7 (13.21%)	0.3393
	Prior	13 (48.15%)	11 (42.31%)	24 (45.28%)	
Hypertension		19 (70.37%)	15 (57.69%)	34 (64.15%)	0.3360
Hyperlipidemia		21 (77.78%)	22 (84.62%)	43 (81.13%)	0.7277
Previous cerebrovascular event (stroke/TIA)		2 (7.41%)	2 (7.69%)	4 (7.55%)	1.0000
Family history of CAD		9 (33.33%)	13 (50.00%)	22 (41.51%)	0.2183
Previous MI		17 (62.96%)	12 (46.15%)	29 (54.72%)	0.2191
Previous PCI		27 (100.0%)	26 (100.0%)	53 (100.00%)	-
Previous CABG		1 (3.70%)	1 (3.85%)	2 (3.77%)	1.0000

Figure 1: angiographic and OCT findings at baseline and at follow-up in two patients treated with the SeQuent® Please (index: A,1; follow-up: B,2) and the Absorb® BRS (index: C,3; follow-up: D,4)



P100

The effects of the Coronary Sinus Reducer on biventricular systolic and diastolic function: an echocardiographic study

Giacomo Maria Cioffi[1 2], Eleonora Gnan[1 3], Matthias Bossard[1 4], Mehdi Madanchi[1 4], Irena Majcen[1], Yuan Zhi[1], Varis Gjergjizi[1], Thomas Seiler[1], Adrian Attinger-Toller[1], Florim Cuculi[1 4]

[1]Herzzentrum – Luzerner Kantonsspital, Luzern, Switzerland, [2]McMaster University, Hamilton, Canada, [3]University of Milan, Milano, Italy, [4]University of Lucerne, Luzern, Switzerland

Introduction: The Coronary Sinus Reducer (CSR) is an hourglass-shaped device approved for treatment of refractory angina (RA). Its percutaneous implantation causes a retrograde increase in venous pressure which is thought to improve perfusion to the ischemic myocardium. Few data exists on the effect of CSR on biventricular systolic and especially diastolic function. We evaluated changes in echocardiographic parameters in a cohort of patients with RA treated with CSR.

Method: Consecutive patients from the prospective COMPLEX Registry that underwent successful CSR implantation between June 2018 and November 2022 were enrolled. They were followed-up for angina and dyspnea, and for the occurrence of MACE as a composite of all-cause mortality, cardiovascular death, acute coronary syndrome and heart failure (HF) hospitalizations. Moreover, we performed an echocardiographic examination at baseline and follow-up.

Results: Of 56 patients, 18 (32.1%) were females (70.5 ± 9.5 years). Mean CCS and NYHA class at baseline were 2.7 ± 0.6 and 2.2 ± 0.7. Other baseline characteristics can be found in *Table 1*.

Clinical follow-up (median 258 days, IQR 104-405) was available for 54 (96%) patients: mean CCS and NYHA class were 1.6 ± 1.1 and 1.8 ± 0.8 respectively. MACE occurred in 15%, with 5.6% experiencing a re-hospitalization for HF.

Echocardiographic data was available both at baseline and follow-up in 41 (73%) patients; relevant parameters can be found in *Table 2*. At median follow-up of 243 days [IQR 103-394], we did not observe any significant difference in left ventricular ejection fraction (LVEF) or tricuspid annular plane excursion (TAPSE). Moreover, no significant difference between baseline and follow-up was observed for any of the diastolic parameters examined.

Conclusion: A possible negative impact of the device on myocardial diastolic function, related to an increase in interstitial edema, has been hypothesized in the past. To the best of our knowledge, this is the largest cohort in which no such worsening has been observed.

Conflict of interest: No

Table 1. Baseline characteristics of the study population.

Baseline characteristics	N = 56 n (%) – mean±SD
Female sex	18 (32.1)
Age (years)	70.5±9.5
BMI (kg/m^2)	29.9±5.2
Number of conventional CV risk factors	2.9±1
Diabetes mellitus	22 (39.3)
Previous ACS	30 (53.6)
Previous PCI	44 (78.6)
Previous CABG	32 (57.1)
Three-vessel disease	39 (69.6)
Predominantly RCA disease	5 (8.9)
Presence of at least one CTO lesion	22 (39.3)
Non-obstructive disease	8 (14.3)
History of HF	14 (25)
HFrEF	7 (12.5)
HFmrEF	2 (3.6)
HFpEF	5 (8.9)
Previous PM implantation	3 (5.4)
Previous CRT implantation	2 (3.6)
At least moderate valvular disease	7 (12.5)
CCS class	2.7±0.6
NYHA class	2.2±0.7
N. of antianginal drugs	2.2±1.2

Abbreviations: *BMI*, body mass index; *CV*, cardiovascular; *ACS*, acute coronary syndrome; *PCI*, percutaneous coronary intervention; *CABG*, coronary artery bypass graft; *RCA*, right coronary artery; *CTO*, chronic total occlusion; *HF*, heart failure; *PM*, pacemaker; *CRT*, cardiac resynchronization therapy; *CCS*, Canadian Cardiovascular Society; *NYHA*, New York Heart Association

Table 2. Echocardiographic parameters at baseline and follow-up.

Echocardiographic parameters N = 41	Baseline (mean±SD)	Follow-up (mean±SD)	P value
LV EDV (mL)	105±46	108±47	0.78
LVEF (%)	56±9	54±10	0.47
LAVi (ml/m^2)	33.5±14	36.5±17	0.45
TAPSE (mm)	19.3±4	19.5±5	0.88
Peak E-wave velocity (cm/s)	71.9±18	71.6±21	0.94
Peak A-wave velocity (cm/s)	79.8±15	78±23	0.7
E/A ratio	0.9±0.3	1.1±0.9	0.24
Lateral e' velocity (cm/s)	8.1±2.5	8.1±2.5	1
Average E/e' ratio	10.7±3.9	11.1±5.2	0.72

Abbreviations: *LV EDV*, left ventricular end-diastolic volume; *LVEF*, left ventricular ejection fraction; *LAVi*, left atrial volume index; *TAPSE*, tricuspid annular plane systolic excursion

P101

Clinical Outcomes After Unprotected Left Main Coronary Artery Occlusion: a retrospective multicentre cohort analysis

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Introduction: Unprotected left main coronary artery (ULMCA) occlusion is a rare and disastrous condition with scarce data on presentation and outcomes. Herein we report data on patients presenting with acute coronary syndrome (ACS) due to ULMCA occlusion at 4 different institutions.

Method: This is an international multicentre observational study. Baseline characteristics were retro- and prospectively collected. Clinical follow-up was prospective. The primary outcome was in-hospital death. Patients surviving the index hospitalisation were compared to non-survivors to find predictors of survival.

Results: The study population consisted of 55 patients. Eight patients (15%) died in the cath lab, and 23 (42%) died in-hospital. Three (6%) deaths were non-cardiac and due to major bleeding. Thirty-two (58%) patients survived the index hospitalization and were discharged. These patients were followed for a median of 17.5 months during which 3 cardiac deaths occurred. Repeat revascularization was performed in 25% (n = 8). Overall mortality at maximum follow-up was 47% (n = 26). The only significant predictor for hospital survival was left ventricular ejection fraction (OR 1.10 (per 1 point increase); 95% CI: 1.02-1.19; p = 0.02).

Conclusion: ULMCA occlusion carries a high short-term mortality. Patients who survive index hospitalization have similar mortality rates as compared to other STEMI-patients.

Conflict of interest: Research grants to the institution from Medis Medical Imaging Systems, Abbott, and Bangerter-Rhyner Stiftung, and personal research grant from the Swiss National Science Foundation, outside the submitted work.

P102

Delirium in patients with cardiogenic shock and percutaneous mechanical circulatory support

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Introduction: Delirium is a common complication in patients with cardiogenic shock and is associated with poor outcome. Percutaneous mechanical circulatory support with the micro-axial pump Impella (Abiomed, Danvers MA, USA) is increasingly used in patients with cardiogenic shock. The aim of this study was to evaluate the incidence and impact of delirium in patients treated with Impella.

Method: From an ongoing prospective registry, consecutive patients with cardiogenic shock managed with Impella in our tertiary centre between 2014 and 2022 were screened for presence of delirium by using validated assessment tests. Patients without neurological recovery and who died in the first 24 hours were excluded, as were those in whom the onset of delirium was prior to Impella implantation.

Results: A total of 192 patients (76.0% male, aged 66.1 ± 10.7 years) were analysed. Delirium occurred in 61 (31.7%) patients. Male sex, pre-existing neurological comorbidities, active infection, shock severity, new-onset acute kidney injury and duration of Impella support were correlated with delirium onset. Delirium was associated with longer intensive care unit stay (p <0.00001). Overall, 30-days mortality was 20.3% without a significant difference between patient with and without delirium (p = 0.1).

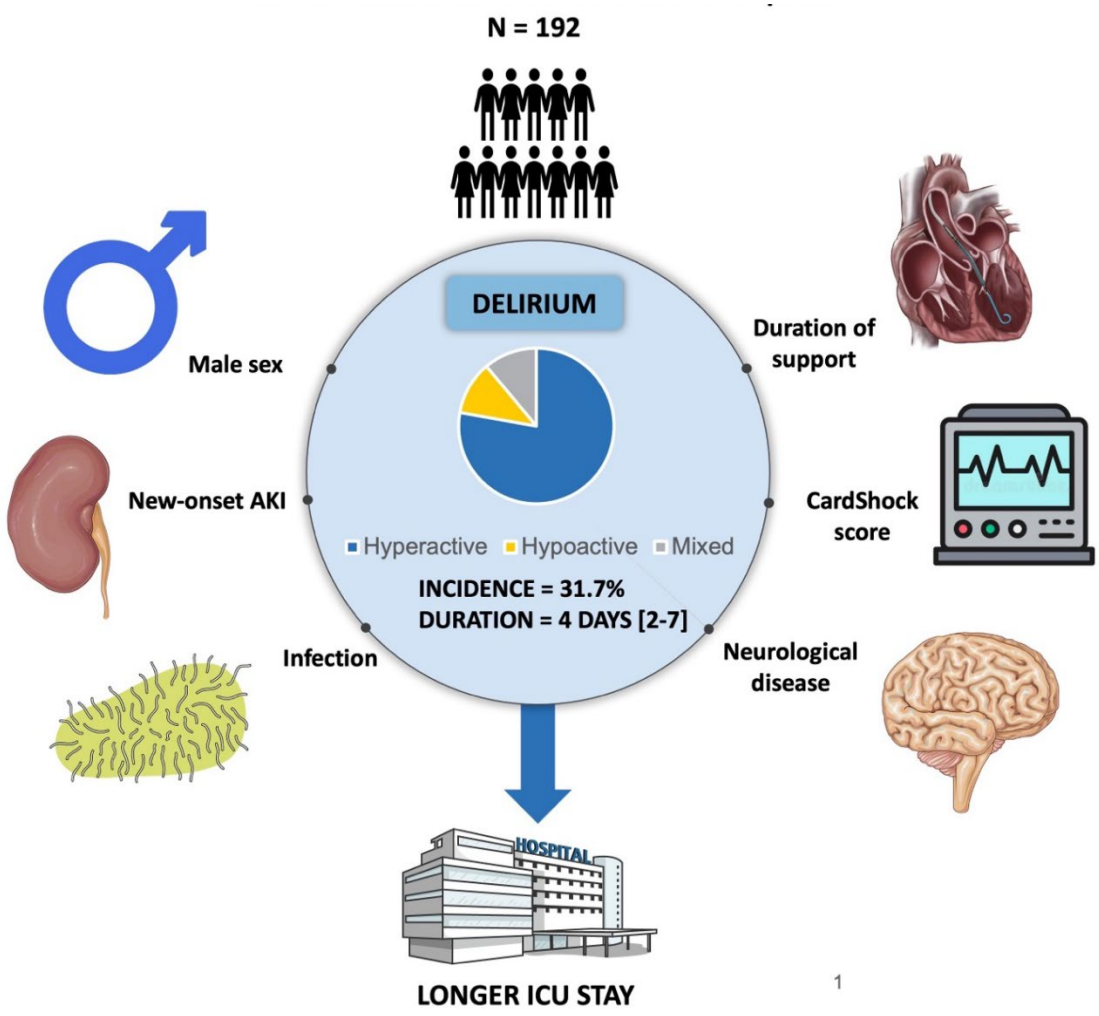
Conclusion: Among patients with cardiogenic shock requiring mechanical circulatory support with Impella, delirium is highly prevalent and is associated with presence of many risk factors and longer intensive care unit stay.

Conflict of interest: No

Table. Baseline characteristics and outcomes. AKI, acute kidney injury; BZD, benzodiazepines; ICU, intensive care unit.

Variable	No delirium (n=131)	Delirium (n=61)	P-value
Age, yrs	66.2 ± 10.5	65.9 ± 11.3	0.86
Male sex, n	94 (71.2%)	52 (85.2%)	**0.046**
CardShock score, pts	3 [2-4]	4 [4-6]	**< 0.0001**
Psychiatric diseases, n	15 (11.5%)	8 (13.1%)	0.81
Neurological diseases, n	8 (6.2%)	11 (18.3%)	**0.02**
Substance abuse, n	11 (8.8%)	7 (12.7%)	0.43
In-hospital use of BZD, n	82 (62.6%)	36 (59.0%)	0.64
Active infection, n	47 (36.4%)	44 (72.1%)	**< 0.0001**
Duration of Impella support, hrs	38.6 [18.5-57.6]	49.9 [24.9-83.8]	**0.02**
New onset AKI, n	33 (25.6%)	28 (45.9%)	**0.01**
ICU stay, days	4 [2-7]	11 [6-19]	**< 0.0001**
30-days mortality, n	31 (23.6%)	8 (13.1%)	0.1

Visual abstract. Incidence, duration, subtypes, and risk factors of delirium in patients with cardiogenic shock and percutaneous mechanical circulatory support. AKI, acute kidney injury; ICU, intensive care unit.



POSTER WALK: BASIC SCIENCE AND EPIDEMIOLOGY

P103

Comparison of ventilatory parameters with nasal versus oral breathing during submaximal exercise in patients with cardiac disease and healthy people

Pietro Calamai[1], Anja Kalberer[1 2], Sarina Huber[1], Dominic Käsermann[3], Annina Fritsche[3], Matthias Wilhelm[1 3], Prisca Eser[1 3]

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Introduction: Inefficient ventilation, namely a high ventilation/carbon dioxide production ratio (VE/VCO_2) is a well established predictor for disease progression and mortality in patients with heart failure (HF). Two previous studies in healthy people have found improved ventilatory efficiency with nasal compared to oral breathing during submaximal exercise. No study has compared nasal with oral breathing in patients with HF or coronary heart disease.

Method: Four study groups were recruited: Patients with HF, patients with acute or chronic coronary syndrome (ACS/CCS), old healthy controls (age>45 years) and young healthy controls (age>20 years and <35 years). Acute measurements of 5 min (after 3 min warm-up) with nasal and 5 min with oral breathing in randomized order were performed at 50% peak power. Ventilation parameters were averaged over the last minute of each condition and analysed by linear mixed models adjusted for body mass index.

Results: We present data of 8 patients with HF, 8 with ACS/CCS, 10 old and 15 young healthy controls. Minute ventilation, breathing frequency and end-tidal oxygen partial pressure ($P_{ET}O_2$) were significantly lower and tidal volume and end-tidal carbon dioxide partial pressure ($P_{ET}CO_2$) significantly higher during nasal compared to oral breathing in all groups (Figure 1). Differences between breathing modes were between 5-20% and similar in all groups except for breathing frequency that declined more from oral to nasal breathing, namely by 27%, in patients with HF compared to the other groups. The largest discrepancies between patients and healthy controls were found for VE/VCO_2 ratio, $P_{ET}CO_2$ and $P_{ET}O_2$.

Conclusion: Nasal breathing during submaximal exercise significantly improved the abnormal breathing pattern of patients with HF and ACS/CCS. Nasal breathing during exercise may be promising in patients with inefficient ventilation as it increases $P_{ET}CO_2$ and is likely to increase arterial partial CO_2 pressure, a known vasodilator, herewith facilitating perfusion of the working musculature.

Conflict of interest: Employee of Boehringer Ingelheim (Schweiz) GmbH

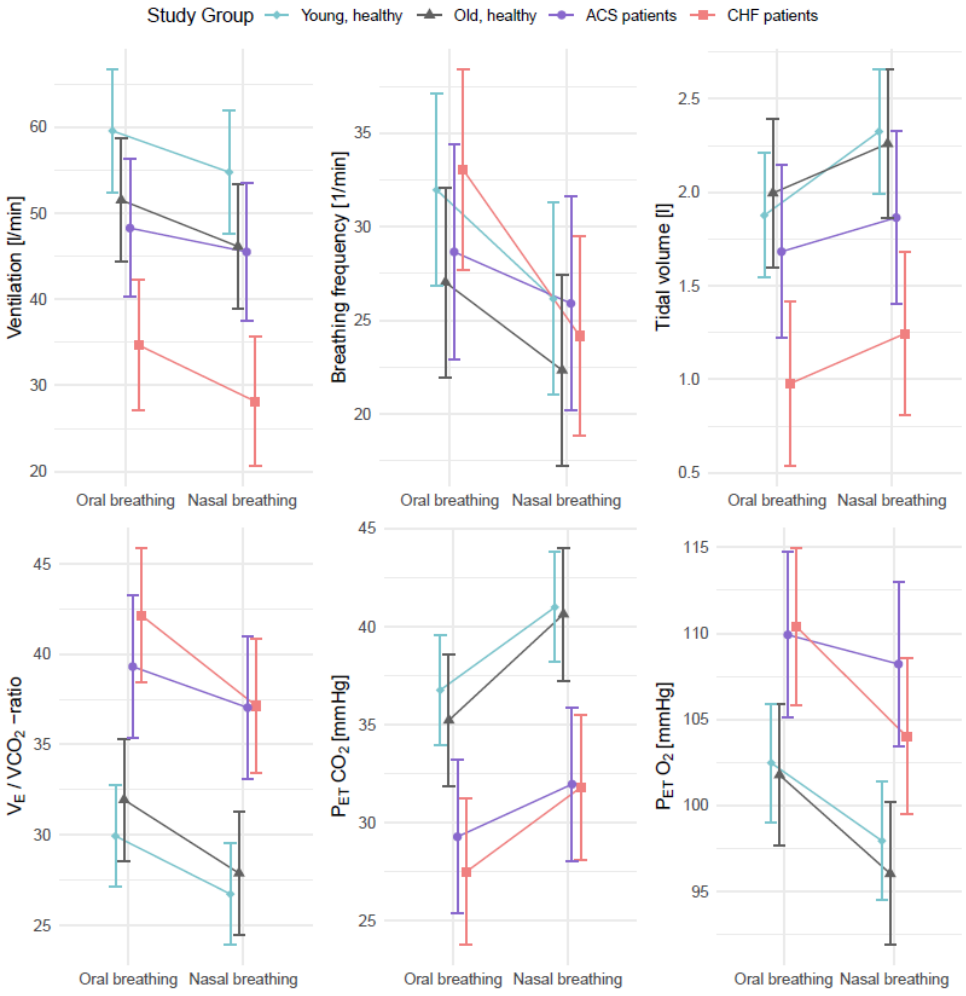

Figure 1: Interaction plot of effects of breathing modes and groups on ventilation (top left), breathing frequency (top middle), tidal volume (top right), VE/VCO2 ratio (bottom left), PETCO2 (bottom middle) and PETO2 (bottom right).

P104

Effect of supervised exercise training on cardiorespiratory fitness, quality of life and objectively measured physical activity in patients undergoing anthracycline-based chemotherapy – a randomised controlled study

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Introduction: Exercise training based cardio-oncologic rehabilitation programmes (ET) were shown to counteract the loss in cardiorespiratory fitness and quality of life (QoL) and reduce cancer fatigue during anthracycline-based chemotherapies (AC). It is unknown whether these changes are due to greater volumes of physical activity (PA) induced by ET and whether ET is associated with greater objectively measured daily PA compared to guideline-based recommendation of PA.

Method: Patients with breast cancer or lymphoma receiving AC were recruited from four cancer centres in Switzerland and randomly assigned to three months centre-based ET during (EXduringAC) or after (EXpostAC) AC. All patients were counselled on guideline directed PA and PA was measured with an activity tracker. Primary endpoints were peak VO_2, fatigue and QoL after AC (AC-end) and at 3 months follow-up. PA and steps were compared between days with and without centre-based training session.

Results: Data of 51 patients were available. Neither Intention-to-Treat (ITT) nor Per-Protocol (PP) analyses revealed between group differences with regard to peak VO_2, fatigue, and QoL at neither AC-end nor follow-up (Figure 1). Compared to EXpostAC, in EXduringAC, the steep decline in PA and steps in AC cycles 3 and 4 was prevented (PP analysis, Figure 2). PA on days with centre-based training sessions was 28 (95% confidence interval 24-32) min higher and patients performed 4382 (3995-4768) steps more compared to days without centre-based training sessions.

Conclusion: ET performed during or after AC had no additional effect on changes in peak VO2, fatigue, or QoL assessed at AC-end or follow-up compared to using an activity tracker alone. This is the first study that objectively measured the effect of ET on PA and daily step count during and following AC. While days with centre-based ET had significantly more PA and steps, this surplus was likely to be compensated on days without centre-based ET.

Conflict of interest: I do participate in adboards of the pharmaceutical industry and get payed for lectures for AZ, GSK, Sanofi, OM, TEVA

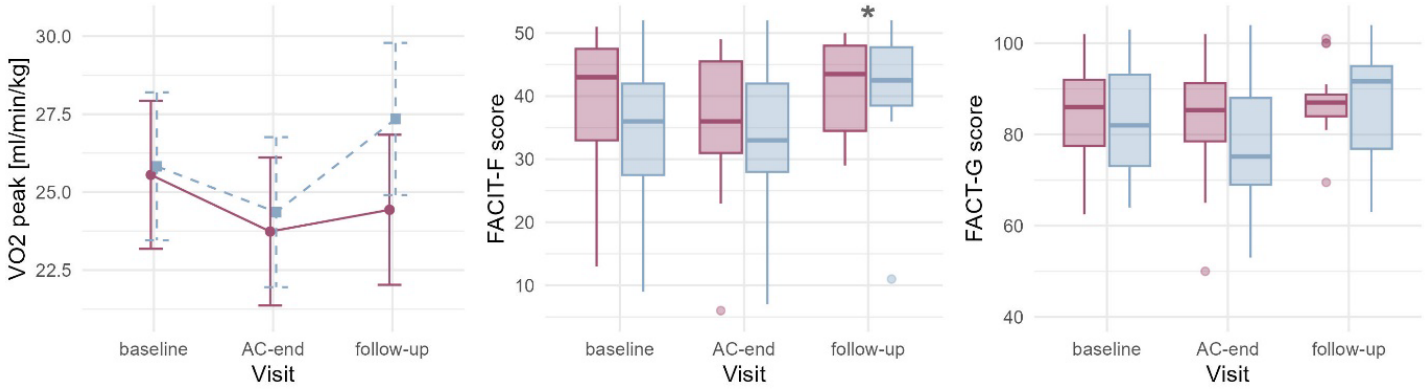

Figure 1: Interaction plot of effects of group and visits (adjusted for standardised age and body mass index) on peak VO2 (left). Box plots are shown for FACIT-F (middle) and FACT-G (right) of the two groups and three visits according to Per-Protocol allocation. EXduringAC is shown in red and EXpostAC in blue.
* p > 0.05 for main time effect with baseline visit and EXpostAC as reference

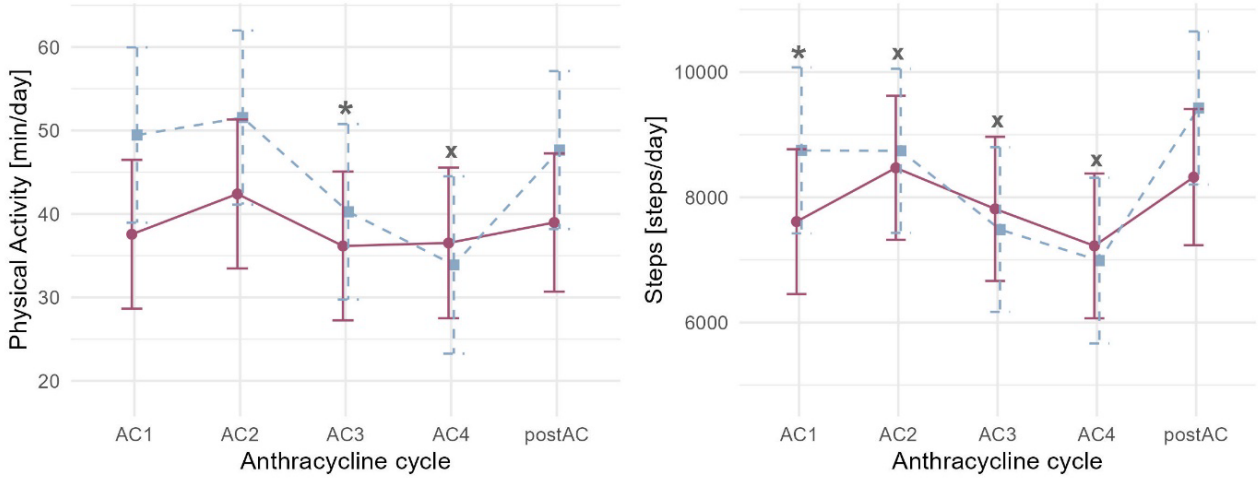

Figure 2: Interaction plot of effects of group and AC cycles (adjusted for standardised age and body mass index) on daily PA (left) and daily steps (right) according to Per-Protocol allocation. EXduringAC is shown in red and EXpostAC in blue.
* p > 0.05 for main time effect with postAC and EXpostAC as reference
x p > 0.05 for time x group interaction with postAC and EXpostAC as reference

P105

Low-load blood-flow restriction strength training in patients with COPD: a randomised controlled pilot study

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Introduction: Patients with COPD often struggle tolerating the high-load strength training (HL-ST) required to elicit muscle adaptations during pulmonary rehabilitation (PR). In healthy elderly and orthopaedic populations, low-load blood-flow restriction strength training (LL-BFR-ST) allows substantial reductions in training load while eliciting equal gains in muscle mass and strength. We aimed to investigate the effects of LL-BFR-ST versus HL-ST on leg muscle strength in participants with stable COPD undergoing regular PR.

Method: COPD patients participating in an outpatient PR programme (24 training sessions, twice weekly) were randomly assigned to LL-BFR-ST or HL-ST for the lower limbs. LL-BFR-ST was done at 70% arterial occlusion pressure, initial training load was 30% of the 1-repetition maximum. Initial training load of HL-ST was 70% of the 1-repetition maximum. All other PR components were identical between groups. Primary outcome was isometric leg strength. We secondarily investigated dynamic strength, functional capacity, physical activity, health-related quality-of-life, adverse events, perceived exertion and subjective feedback on the training.

Results: We recruited 30 participants (63 [59, 68] years, FEV_1 49 [35, 67]% pred.), 6 did not complete the study. No adverse events associated with the intervention were observed. Isometric strength of knee extensor (data are pre-post median [25^{th}, 75^{th} percentile] changes for HL-ST and LL-BFR-ST groups; right leg: 8.9 [-1.3, 35.5] Nm and 8.4 [-2.0, 16.6] Nm; left leg: 8.3 [-0.6, 20.4] Nm and 8.6 [5.6, 11.8] Nm) and flexor (right leg: 6.3 [-3.9, 13.9]Nm and 8.7 [-3.8, 12.8] Nm; left leg: 2.4 [-3.7, 9.6]Nm and 11.8 [-7.6, 16.4]Nm) muscles improved in both groups with no clinically and statistically relevant between-group differences. Interestingly, physical activity (i.e., daily step count) improved only in the LL-BFR-ST group (165 [-645, 1414] and 1854 [1564, 2805] steps/day).

Conclusion: Similar isometric strength gains have been achieved in the LL-BFR-ST and the HL-ST group with LL-BFR-ST eliciting less exercise-induced dyspnoea.

Conflict of interest: Olivier Muller reports grants from Abbott and Edwards. The other authors do not have any disclosure to report.

P106

One-Week Aktiia Cuffless Monitoring Yields Equivalent Daytime Blood Pressure Values to 24-hour Ambulatory Blood Pressure Monitor: Preliminary Results from a Prospective Single-Centre Study

Tiago Paggi de Almeida[1], Meritxell Cortés[1], David Perruchoud[1], Jeremy Alexandre[1], Pascale Vermare[1], Josep Sola[1], Jay Shah[1], Marques Luisa[2], Cyril Pellaton[2]

[1]Aktiia SA, Neuchâtel, Switzerland, [2]Réseau Hospitalier Neuchâtelois (RHNe), Cardiologie FMH – Médecine Interne FMH, Neuchâtel, Switzerland

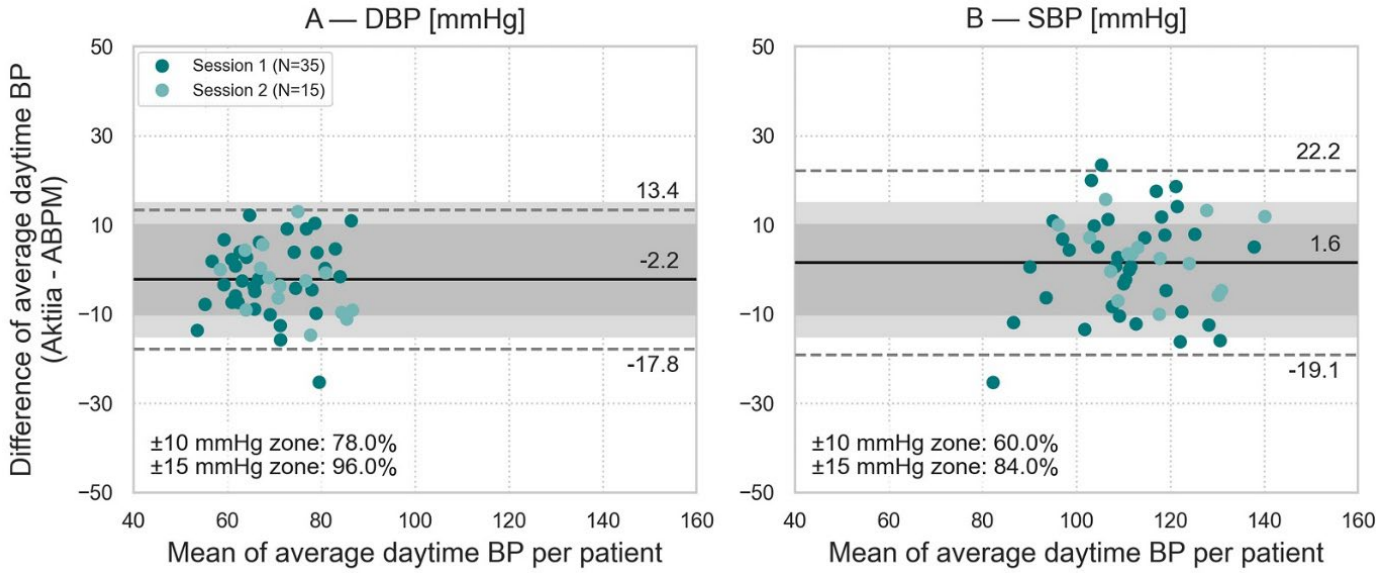
Introduction: There is intense debate whether cuffless blood pressure (BP) devices generate data comparable to ambulatory BP monitors (ABPM). We present preliminary results of daytime BP measurements performed by Aktiia cuffless BP monitor (Aktiia SA, Switzerland) compared to 24-hour ABPM.

Method: 52 out of 63 estimated total patients (NCT04548986, age 53.2 ± 7.1 years, 18.9% female, arm circumference 28.5 ± 2 cm) had been enrolled in a 12-week cardiac rehabilitation (CR) program (Réseau Hospitalier Neuchâtelois, Switzerland). The patients used the Aktiia monitor during the entire CR program, while 24-hour ABPM (Dyasis 3, Novacor, France) was performed on the first and last day of the CR program. Average daytime (9am-9pm) systolic and diastolic BP (SBP, DBP) were calculated – and compared – for 1 day of ABPM and 7 days of Aktiia monitor (session 1: ABPM first day vs. Aktiia first week; session 2: ABPM last day vs. Aktiia last week). Only sessions that had 20 or more valid daytime measurements on both modalities were included in the study.

Results: 50 patients (35 in session 1, 15 in session 2) had 20 or more valid daytime measurements on both modalities, and were included in the study. Bias between Aktiia monitor and ABPM for daytime DBP was (mean ± SD) -2.2 ± 8.0 mmHg (Figure 1A), with agreements of 78% and 96% within ± 10 mmHg (dark grey) and ± 15 mmHg (light grey) regions of interest (ROI), respectively. Bias between Aktiia monitor and ABPM for daytime SBP was 1.6 ± 10.5 mmHg (Figure 1B), with agreements of 60% and 84% within the ± 10/ ± 15 mmHg ROI, respectively.

Conclusion: One-week Aktiia monitor yields equivalent daytime BP values to 24-hour ABPM, which supports the use of Aktiia monitor for long-term, continual daytime BP monitoring. The present preliminary study is limited by the partially recruited population and daytime measurements. Night-time analysis will be covered in subsequent studies.

Conflict of interest: T.P.A., M.C., D.P., J.A., P.V., J.S. and J.S. are employees of Aktiia SA. C.P. serves as a consultant for Aktiia SA. All other authors report no potential conflicts of interest.



P107

Eligibility for marine omega-3 fatty acid supplementation after acute coronary syndrome

Mattia Branca[1], David Carballo[2], Konstantinos Koskinas[3], Dierik Heg[1], David Nanchen[4], Lorenz Räber[3], Klingenberg Roland[5], Sebastian Carballo[6], Stephan Windecker[3], Thomas F. Lüscher[5], Christian Matter[5], Nicolas Rodondi[7 8], François Mach[2], Baris Gencer[2 8]

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Introduction: The 2019 ECS Guidelines for the management of dyslipidaemia consider the use of high-dose marine omega-3 supplementation as an option to lower hypertriglyceridemia in high-risk patients after the positive results of the REDUCE-IT trial on cardiovascular outcomes. The eligibility in real-life patients with acute coronary syndromes (ACS) has been poorly evaluated.

Method: In a prospective Swiss cohort of patients hospitalized for ACS, we modelled the statin intensification effect and an incremental ezetimibe effect on triglycerides levels at one year among patients who were not on high-intensity statins or ezetimibe to estimate omega-3 eligibility. One year after the index ACS, treatment eligibility for marine omega-3 supplementation was defined as triglycerides levels between 1.5 and 5.6 mmol/L as defined by the ESC guidelines.

Results: Of 2521 patients, 98% were treated with statins at discharge (62% high-intensity statins) and 93% at one year (53% high-intensity statins). The use of ezetimibe was 7%

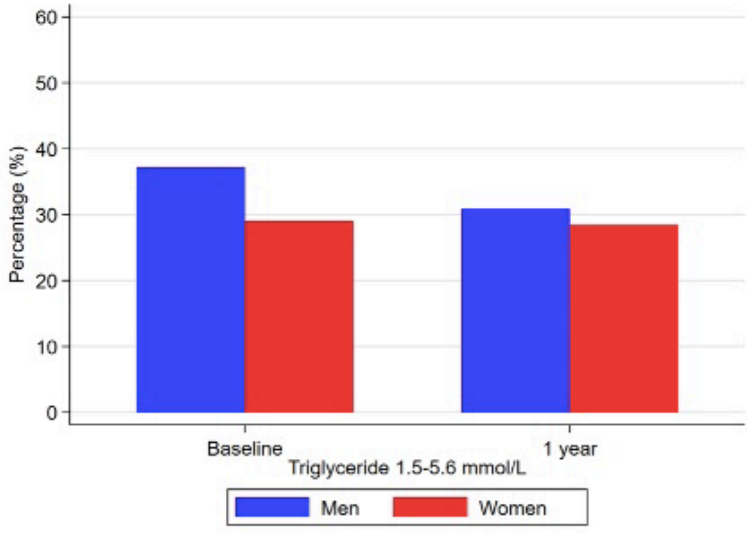
at 1 year. Triglycerides levels between 1.5 and 5.6 mmol/L were found in 30.4% of patients (30.9% in men and 28.4% in women). After modelling the statin intensification, ezetimibe effects and the combination of both, eligibility for marine omega-3 fatty acid supplementation decreased to 29.1%, 23.2% and 22.5% respectively.

The proportion of patients eligible for omega-3 supplementation was higher in those younger than 70 years (32.3% vs 25%), current smokers (35.7% vs. 26.8%), diabetic (44.9% vs. 27.9%), obese (44.1% vs. 21.3%) and those with familial hypercholesterolemia (34.0% vs 24.8%, all with p-value <0.001).

Conclusion: Approximately 22-30% of ACS patients would theoretically be eligible for marine omega-3 fatty acid supplementation one year after an index coronary according to the ESC guidelines recommendations. Our results underline the importance of measuring triglycerides levels after ACS to guide preventive therapies.

Conflict of interest: AA has received consulting and speaker fees from SIS Medical. HMG received institutional grant support from Biotronik, Boston Scientific, Medtronic, Abbott, Neovasc, Shockwave, Philips, and CorFlow. MB has received consulting and speaker fees from Abbott Vascular, Abiomed, Amgen, Astra Zeneca, Bayer, Daichii, Mundipharma and SIS Medical. FC has received consulting and speaker fees from Abbott Vascular, Abiomed and SIS Medical.

Figure 1 : Proportions of patients with eligible triglyceride levels at baseline and at 1 year (separated men and women)[7]



(Men-Women)
Vertically, proportion of patients
Horizontally, at baseline and 1 year

P108

Sirtuin-1 directly binds and deacetylates hepatic proprotein convertase subtilisin/kexin type-9 (PCSK9) to inhibit low-density lipoprotein receptor degradation

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[1]University of Zürich, Center for Molecular Cardiology, Schlieren, Switzerland

Introduction: Low-density lipoprotein cholesterol (LDL-C) is causally involved in atherosclerotic cardiovascular disease (ASCVD). We have previously shown that pharmacological activation of Sirtuin-1 (SIRT1), a NAD^+-dependent deacetylase, reduces plasma LDL-C levels by decreasing PCSK9 and increasing hepatic LDLR expression, thus exerts atheroprotective effects in mice; however, the mechanism of SIRT1 action remains elusive. Diminished levels of circulating SIRT1 in atherosclerotic mice may promote dysregulated lipid metabolism and ASCVD in humans. Herein, we aimed to restore the reduced systemic Sirtuin-1 plasma levels in ASCVD by injecting recombinant murine Sirtuin-1 (rmSIRT1) in atherosclerotic mice.

Method: Twelve-week-old apolipoprotein E-deficient (*ApoE*$^{-/-}$) male mice fed a high-cholesterol diet (1.25% w/w) were randomized to receive rmSIRT1 (n = 6; 0.3mg/kg BW i.p.) or vehicle treatment (n = 6) every third day over 4-weeks. Mice were euthanized and organs were harvested to study the lipid metabolism and ASCVD progression.

Results: Boosting circulating SIRT1 levels increased hepatic LDLR expression, reduced plasma LDL-C levels and decreased progression of plaques in *ApoE*$^{-/-}$ mice. rmSIRT1 treatment did not change hepatic expression of total PCSK9 but increased its deacetylated status. Mechanistically, rmSIRT1 directly bound to hepatic PCSK9 and deacetylated PCSK9 at 3 sites: Lys243, Lys421 and Lys506 as shown by Surface Plasmon Resonance and mass spectrometry, respectively. *In vitro* mutagenesis to triple deacetylation mimetic (3KR) in hepatocytes (Huh7 cells) reduced SIRT1-induced PCSK9 activity, as evidenced by increased cellular binding and association of ^{125}I-LDL through LDLR in Huh7cells. Finally, plasma levels of SIRT1 and PCSK9 were assessed at baseline in patients with acute coronary syndromes (ACS) where plasmaSIRT1 showed an inverse correlation with PCSK9 and conferred a reduced risk of major adverse cardiovascular events.

Conclusion: SIRT1 directly binds PCSK9 and decreases its activity by deacetylation, thereby enhancing LDL-C clearance by hepatic LDLR upregulation. Increased circulating SIRT1 exerts atheroprotective effects and is associated with improved prognosis in patients with ACS.

Conflict of interest: No

P109

The n3 Alpha-Linolenic Acid: A novel senolytic agent in endothelial cells

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[1]Center for Molecular Cardiology, Schlieren, Switzerland, [2]Cantonal Hospital Baden, Department of Internal Medicine, Baden, Switzerland, [3]National Heart and Lung Institute, Imperial College, London, United Kingdom, [4]Heart Division, Royal Brompton & Harefield Hospitals, London, United Kingdom

Introduction: Aging is a strong risk factor for cardiovascular disease. Endothelial senescence leads to inflammation, oxidative stress and impaired angiogenesis which are underlying pathophysiological mechanisms of vascular dysfunction. The omega-3 fatty acid (n-3 FA) α-linolenic acid (ALA) is known to reduce cardiovascular mortality and its benefits in the prevention of vascular aging are gradually emerging. Recent studies found that n-3 FAs could upregulate SIRT1 expression, a well-known aging regulator whose functions are linked to the cellular metabolism. Here, we aim to determine the senolytic effects and the mechanism of ALA through the modulation of SIRT1 in senescent endothelial cells.

Method: We studied the effect of ALA treatment in primary human aortic endothelial cells (HAECs) in proliferating (PECs), replicative senescent (SECs) and stress induced-premature senescent cells using H_2O_2 (SIPS-ECs) to determine cell viability, apoptosis, senescent markers, cell cycle arrest markers, SIRT1 expression and endothelial Nitric Oxide Synthase (eNOS) regulation on endothelial homeostasis using trypan blue exclusion methods, β-galactosidase staining, light microscopy and immunoblot.

Results: We found that ALA differentially decreased senescent, but not proliferating endothelial cell viability in a concentration- and time-dependent manner. ALA effectively reduced the β-galactosidase-positive cell number, γ-H2AX (telomere shortening marker) and p53 expression (cell cycle arrest marker). We also found that ALA exclusively promoted pro-apoptotic effects in senescent ECs by increasing BAX and decreasing Bcl-2. The upregulations of SIRT1 and NAMPT (a rate-limiting enzyme for NAD+ biosynthesis), however, were observed in both proliferating and senescent ECs after treatment with ALA.

Conclusion: ALA exerts senolytic effects by differentially inducing apoptosis in senescent, but not proliferating endothelial cells. This could further favor a nutritional role of ALA in the prevention of age-related cardiovascular disease.

Conflict of interest: No

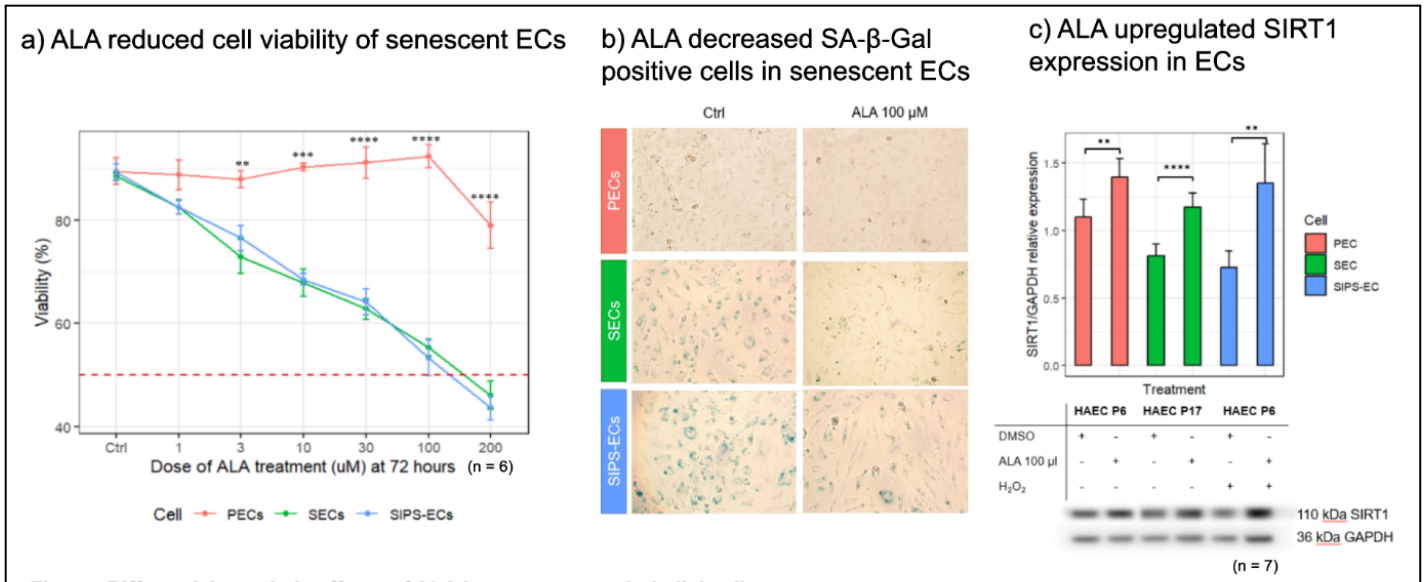

Figure: Differential senolytic effects of ALA in senescent endothelial cells
a) Cell viability after ALA treatment in PECs, SECs and SIPS-ECs using trypan blue exclusion method.
b) Light microscopy of ECs with SA-β-Gal staining (green) after treatment with ALA 100 µM using Senescence β-Galactosidase Staining Kit
c) SIRT1 expressions after treatment with ALA 100 µM using immunoblot. GAPDH expression was used as loading controls.
Data are presented as mean ± SD. * p < 0.05, ** p < 0.01, *** p < 0.001, **** p < 0.0001
Abbreviations: PECs Proliferating Endothelial Cells, SECs Senescent Endothelial Cells, SIPS-ECs Stress-Induced Premature Senescent Endothelial Cells

P110

Flt3-targeting tyrosine kinase inhibitor therapy exhibits a "hidden cardiotoxicity" in the infarcted murine heart

Riccardo Bernasconi[1 2], Lifen Xu[1 2], Vera Lorenz[1 2], Vivienne Grüterich[1 2], Daria Monogiou-Belik[1 2], Michael Bücher[1], Otmar Pfister[2], Leonore Wigger[3], Parisa Aghagolzadeh[4], Thierry Pedrazzini[4], Gabriela Kuster[1 2]

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Introduction: Tyrosine kinase inhibitors (TKIs) can be cardiotoxic. This may hold particularly true in the diseased heart, in which many targets of TKIs are upregulated and act compensatorily. We have previously shown that Flt3 is protective in the infarcted mouse heart and now investigated the effects of a Flt3-targeting TKI therapy, as used for leukemia treatment, during myocardial infarction (MI).

Method: Mice treated with quizartinib (or vehicle) were subjected to MI or sham surgery and cardiac dimensions and function were assessed by echocardiography before and one-week post-surgery. Hearts were harvested for (immuno)histochemistry and molecular studies including RNA-sequencing of total heart homogenates. *In vitro* studies were conducted in neonatal rat cardiomyocytes and H9c2 cells.

Results: Quizartinib did not alter cardiac morphology or function in healthy and sham-operated hearts, but aggravated maladaptive remodeling post-MI by augmenting left-ventricular dilatation and apoptosis. Flt3 gene expression was upregulated after MI irrespective of quizartinib-treatment. Quizartinib did not affect gene expression in sham-operated hearts. In contrast, roughly twice as many genes were significantly altered in quizartinib/MI vs. quizartinib/sham as compared to vehicle/MI vs. vehicle/sham hearts. Downregulated genes in quizartinib/MI were enriched for gene sets related to cardiac contraction and energy handling. Among single genes, MMP9, a known mediator of adverse cardiac remodeling, was among the strongest upregulated genes in quizartinib/MI. *In vitro*, quizartinib dose-dependently decreased cell viability and increased apoptosis, which was potentiated by H_2O_2. Quizartinib/H_2O_2 also potentiated the phosphorylation of p38MAPK, which had previously been implicated in MMP9 expression, contractile dysfunction and apoptosis. Accordingly, quizartinib/H_2O_2–induced apoptosis was prevented by a p38 inhibitor.

Conclusion: Quizartinib exhibits a "hidden cardiotoxicity", which manifests in the infarcted heart and is at least in part mediated by p38. Pending further studies, p38 may represent a potential therapeutic target to mitigate TKI-induced cardiotoxicity in leukemia patients with underlying heart disease.

Conflict of interest: No

P111

Chronic SIRT1 supplementation in diabetic mice improves endothelial function by suppressing oxidative stress

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Introduction: Enhancing SIRT1 activity exerts beneficial cardiovascular effects. In diabetes, plasma SIRT1 levels are reduced. We aimed to investigate the therapeutic potential of chronic recombinant murine SIRT1 (rmSIRT1) supplementation in diabetic mice (db/db) to alleviate endothelial and vascular dysfunction.

Method: Left-internal mammary arteries from patients undergoing coronary artery bypass grafting (CABG) with or without a diagnosis of diabetes diabetic patients and age-sex-matched non-diabetic patients were assayed for SIRT1 protein levels. Twelve-week-old male db/db mice and db/+ controls were treated with vehicle or rmSIRT1 i.p. for 4 weeks. Carotid artery pulse wave velocity (PWV) and energy expenditure/activity were assessed by ulstrasound and using metabolic cages, respectively. Aorta, carotid, and mesenteric arteries were isolated to assess endothelial and vascular function using myograph system.

Results: Arteries obtained from diabetic patients had significantly lower levels of SIRT1 than non-diabetic controls. Likewise, aortic SIRT1 levels were decreased in db/db mice compared to db/+ mice, while rmSIRT1 supplementation restored it to levels of controls. Mice treated with rmSIRT1 displayed increased physical activity and improved vascular compliance as reflected by reduced PWV and collagen deposition. Furthermore, aorta of rmSIRT1-treated mice exhibited significantly increased endothelial nitric oxide (eNOS) activity, and endothelium-dependent contractions of their carotid arteries were significantly decreased. Mesenteric resistance arteries of treated db/db mice had preserved hyperpolarization. Incubation with reactive oxygen species (ROS) scavenger Tiron and NADPH oxidase inhibitor apocynin revealed that rmSIRT1 preserved vascular function by supressing NADPH oxidase (NOX)-related ROS synthesis. Chronic SIRT1 treatment suppressed the expression of NOX-1 and NOX-4, in line with a reduction in aortic protein carbonylation and plasma nitrotyrosine levels.

Conclusion: In diabetic mice, chronic rmSIRT1 supplementation significantly improves endothelial function and vascular compliance by increasing eNOS activity, downregulating NOX-1 and NOX-4 and attenuating oxidative stress. Thus, SIRT1 supplementation may be a novel therapeutic strategy preventing diabetic vascular disease.

Conflict of interest: No

P112

Single-cell transcriptomics reveals Mfsd2b in bone marrow-megakaryocyte progenitors as a regulator of vascular senescence

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[1]University of Zurich, Center for Molecular Cardiology, Schlieren, Switzerland, [2]Cantonal Hospital Baden, Department of Internal Medicine, Baden, Switzerland, [3]Institute of Food, Nutrition and Health, ETH Zurich, Schwerzenbach, Switzerland

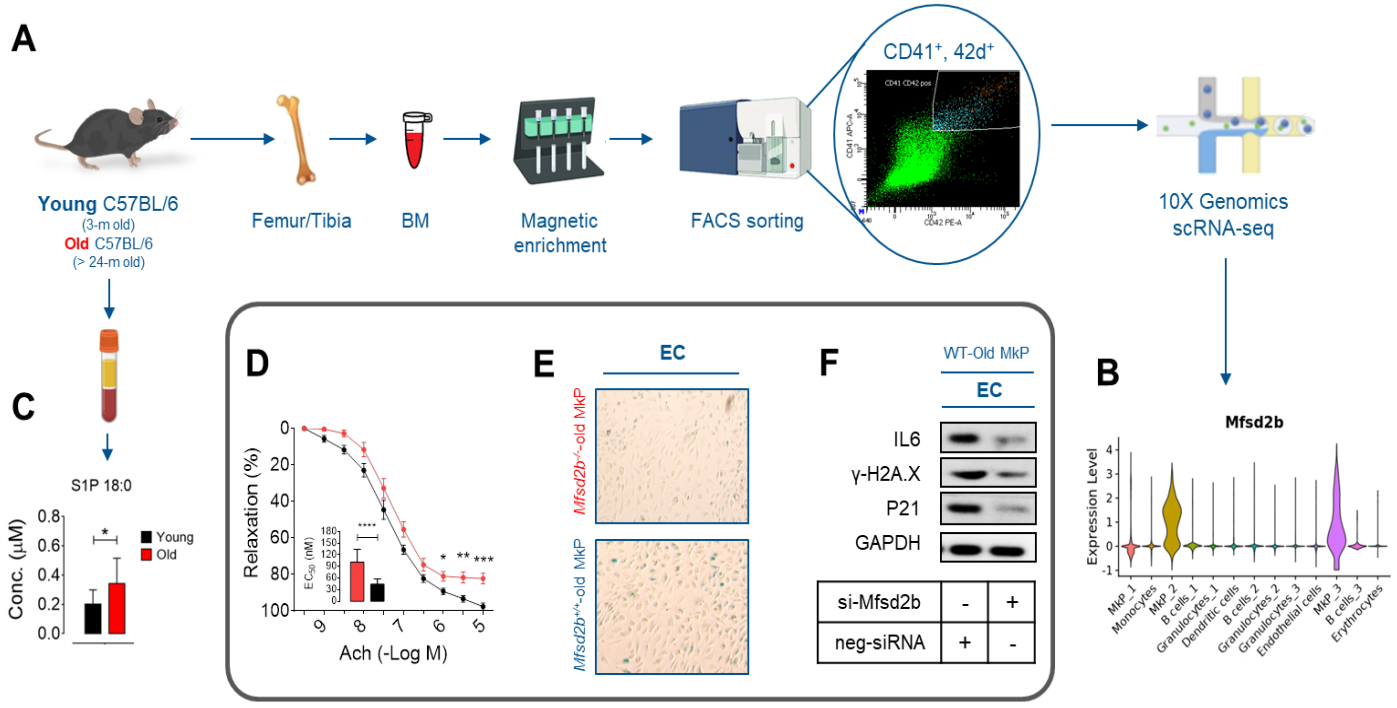
Introduction: Accumulation of endothelial cell (EC) senescence advances with age and contributes to the development of atherosclerosis. Bone marrow-megakaryocyte progenitors (MkPs) orchestrate platelet function, by which contribute to prothrombotic response and atherosclerosis. However, diversification and function of MkPs in regulating EC senescence and dysfunction upon aging remain largely unknown.

Method: Here, we defined the roles and trajectory of MkP subpopulations in bone-marrow of old (>24-moths) and young (3-months) wild-type C57BL/6 mice, using single-cell RNA-sequencing. We further identified *Mfsd2b* in rare MkP subpopulations as a functional regulator of S1P efflux, which thereby regulate a potential link between S1P homeostasis and EC senescence upon aging.

Results: Single-cell transcriptomic profiles of mouse MkPs delineate two distinct clusters of *Mfsd2b*-expressing cells enriched in bone-marrow of old mice. Our data show that age-dependent *Mfsd2b* upregulation in MkPs leads to higher circulating S1P-18:0 (measured by LC-MS/MS), which is positively correlated with vascular dysfunction represented by lowered vasorelaxation capacity (in response to acetylcholine). In line with this, we observed an increase in the expression of senescence markers SA-β-galactosidase, γ-H2A.X (telomere shortening), and p19 and p21 (cell-cycle arrest), accompanied by increased SASP cytokines IL1β and IL6 in young aortic ECs co-cultured with old MkPs. Employing RNAi approach, *Mfsd2b*-knockout in old MkPs reduces S1P secretion and thereby rescues EC senescence by reducing numbers of SA-β-galactosidase-positive cells and downregulating cell-cycle arrest and SASP markers, leading to increases in angiogenic capacity represented by increased EC migration and tube formation.

Conclusion: Our findings gain a deeper understanding of both the heterogeneous expression of *Mfsd2b* in distinct bone marrow-MkP subpopulations upon aging and a complex crosstalk of MkP-*Mfsd2b* to endothelial senescence by regulating S1P-pathway. We suggest *Mfsd2b* in specific MkP subpopulations as a potential target for personalized vascular regeneration.

Conflict of interest: No



Aging affects Mfsd2b-expressing MkP subpopulations in bone marrow which regulate S1P homeostasis, and thereby promote vascular senescence. **(A)** Schematic illustration of the experimental 10X Genomics scRNA-seq for CD41b$^+$ CD42d$^+$ MkPs from bone-marrow of old and young mice; **(B)** Violin plot for *Mfsd2b* demonstrates its markedly higher abundance in specific MkP subpopulations compared to other cell types; **(C)** A marked increase in plasma concentrations of S1P 18:0 in old *versus* young mice; **(D)** A significant reduction in vasorelaxation responses (%) *ex vivo* to acetylcholine (Ach), an endothelial-dependent mechanism, in aortic rings from old mice versus young mice; **(E)** Numbers of SA-β-galactosidae-positive ECs show a marked increase in response to co-culture with old wild-type (*Mfsd2b*$^{+/+}$) MkPs rather than old Mfsd2b-KO (*Mfsd2b*$^{-/-}$) MkPs; **(F)** Exploiting Mfsd2b-siRNA, senescence markers including IL6, γ-H2A.X and p21 were remarkably suppressed in proliferating ECs co-cultured with old wild-type MkPs. (n=6-10) *P<0.05, **P<0.01, ***P<0.001, ****P<0.0001.

P113

The effect of antibody-mediated PCSK9 neutralization on bare-metal stent implantation outcome

Yustina Puspitasari[1], Stefano Ministrini[1 2], Luca Liberale[3 4], Ana Vukolic[1], Philine Baumann-Zumstein[5], Erik Holy[6], Fabrizio Montecucco[3 4], Thomas F. Lüscher[1 7], Giovanni G. Camici[1 8]

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Introduction: Percutaneous coronary intervention (PCI) is the gold standard for the management of acute coronary syndrome. Despite advances in pharmacotherapy and device innovation, in-stent restenosis (ISR) and stent thrombosis (ST) remain serious complications following percutaneous coronary intervention (PCI) procedure with stent implantation. Proprotein convertase subtilisin kexin type 9 (PCSK9) is an enzyme known for its role in plasma cholesterol homeostasis and PCSK9 inhibition recently became a pivotal treatment strategy for hypercholesterolemia. However, whether PCSK9 inhibition affects outcomes after stent implantation remains unknown.

Method: C57Bl/6 mice underwent carotid artery bare-metal stent (BMS) implantation which then a parallel assessment of various inflammatory mediators was performed. To inhibit PCSK9, alirocumab was administered weekly to antiplatelet-treated mice started before stent implantation. Animals were sacrificed 6 weeks after the stent implantation procedure, followed by histomorphometric analysis of the stented vessels. *In vitro* migration and senescence assay was also performed on alirocumab-treated primary human aortic endothelial (EC) and vascular smooth muscle cells (VSMC).

Results: Compared to sham intervention, stent implantation was associated with increased expression of several inflammatory mediators, including PCSK9. The increase in PCSK9 level was confirmed in the stented vascular tissue, but not in plasma. Interestingly, PCSK9 inhibition results in an increased intimal hyperplasia in the stented vascular segment of alirocumab-treated animals compared to controls. *In vitro*, alirocumab promoted migration and inhibited the onset of senescence in primary human VSMC. Conversely, it blunted the migration and increased the senescence of EC

Conclusion: The results of this study demonstrated that antibody-based PCSK9 inhibition worsen bare-metal stent implantation outcome in mice by promoting in-stent intimal hyperplasia and blunts vascular healing, which is mediated in part by a differential effect on VSMC and EC senescence. The hereinreported data warrant additional investigations concerning the use of PCSK9 inhibitors in patients undergoing PCI with stent implantation.

Conflict of interest: No

POSTER WALK: CLINICAL HEART CASES

P114

The first case of an DBD Heart transplantation with Organ Care System from in Switzerland

Paul Potratz[1], Bruno Schnegg[2], Hansjörg Jenni[1], Jolanda Consiglio[1], Daniel Sidler[3], Ioannis Chanias[4], Michael Daskalakis[4], Fabienne Schwitz[5], Corina Thomet[5], Markus Schwerzmann[5], Franz Immer[6], Sarah Longnus[1], Michele Martinelli[2], Lukas Hunziker[2], Matthias Siepe[1], David Reineke[1]

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Introduction: In patients with congenital heart defects who require transplantation as adults, multiple operations in childhood and exposure to transfusions can lead to a difficult situation, both surgically and immunologically.

At the age of 27, our patient was diagnosed with a bicuspid aortic valve. She was initially treated with a mechanical valve prosthesis. Five years later, reoperation was required for biventricular obstruction. She underwent a Konno repair to dilate the LVOT and RVOT, followed by multiple revisions. The patient's overall condition deteriorated. She was listed for transplantation in 2021.

Method: In preparation for transplantation, sensitisation was quantified using virtual panel reactive antibody (vPRA) and found to be 100%. Immunomodulatory therapy was started with rituximab, followed by two immunoadsorption (IA) runs. Although successful in reducing B lymphocytes, HLA antibodies were found to be unaffected. We intensified treatment with an anti-CD-38 antibody (daratumumab), followed by another IA cycle. Within three weeks, an HLA-matched donor was found. On the day of transplantation, IA and eculizumab (anti-C5) were administered.

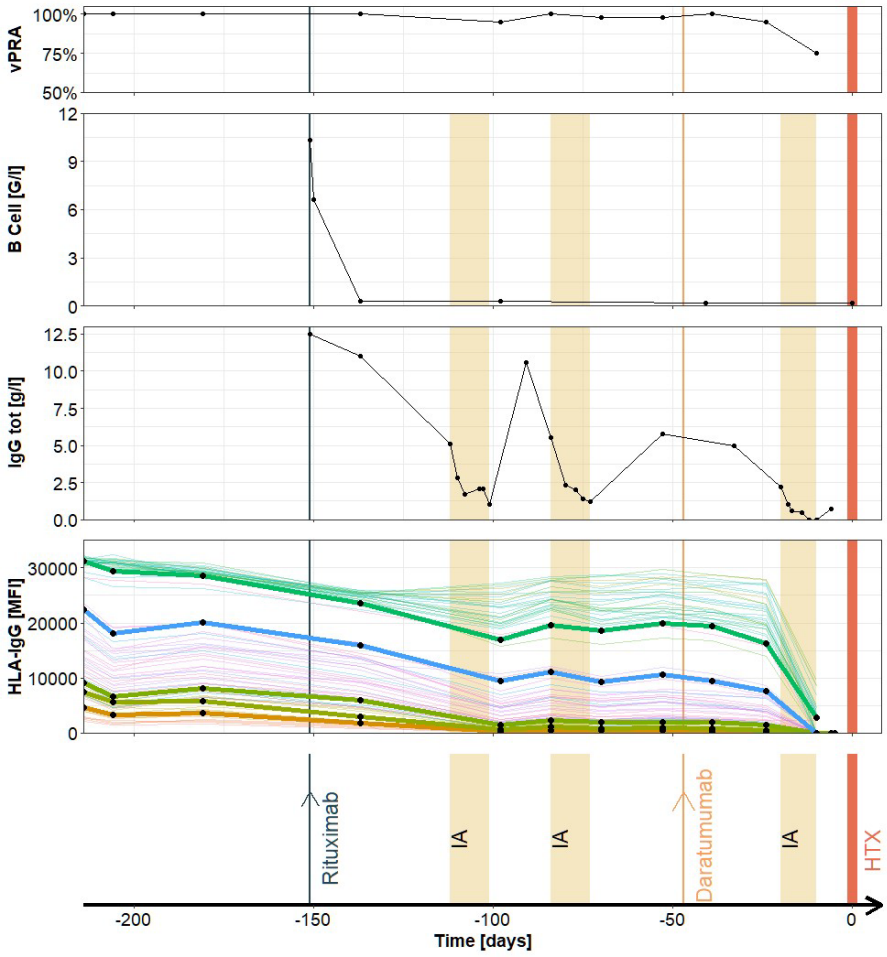
Results: We anticipated difficulties in coordinating donor explantation and recipient thoracic preparation in the context of multiple reoperations. The Organ Care System (OCS, TransMedic) was therefore chosen.

The OCS is a heart support device that can be in place for many hours. While supported, the heart receives warm, oxygenated blood and continues to beat. The total cold ischaemic time was 88 minutes, but the support on the OCS lasted 4 hours. Without the OCS, CIT would have been more than 5 hours, a major risk for primary graft failure.

The post-operative course was uneventful. However, desensitisation had to be restarted on week 2 for antibody-mediated rejection.

Conclusion: In patients with difficult-to-predict thoracic preparation, OCS allows a significant reduction in cold ischaemia time. Used together with monoclonal antibody therapy in immunosensitised patients, it has allowed previously ineligible patients to transplant.

Conflict of interest: No



P115

Effusive-constrictive pericarditis after endoscopic needle-knife intervention complicated by cardiogenic shock

Moreno Testorelli[1], Judith Schwaiger[2], Julia Stehli[2], Micha T. Maeder[1], Felix C. Tanner[2], Philipp Baier[1]

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Case description: A 42-year-old female underwent an endoscopic needle-knife treatment for symptomatic stenosis of esophagojejunal anastomosis after bariatric Roux-en-Y gastric bypass. Because of postinterventional retrosternal pain radiating to the neck, transthoracic echocardiography (TTE) was performed with proof of a small pericardial effusion. In absence of evidence for rheumatologic disease or a bacterial infection (no fever, normal leucocytes and procalcitonin, no mediastinitis in CT scan of the chest, no suspicion of perforation in esophagogastroduodenoscopy) a non-infectious pericarditis was suspected.

Despite treatment with ibuprofen / colchicine inflammation markers rose significantly, and symptoms worsened with progressive reduced general condition, weight gain, and occurrence of edema and pleural effusions. A follow-up TTE revealed a persistent small pericardial effusion without compression of right-sided heart chambers but showed a constrictive pattern (increased respiratory variation in mitral inflow, ventricular interdependence). An acute liver failure occurred, which in the context of a hemodynamically stable patient and known polymorphism of liver enzymes was attributed to a possible drug toxicity. Despite cessation of possible toxic drugs, the patient showed progressive clinical deterioration with severe acute kidney injury and went into cardiogenic shock with pulseless electrical activity. TTE demonstrated effusive-constrictive pericarditis (ECP) with cardiac tamponade (increased respiratory variation in mitral/tricuspid inflows, ventricular interdependence, annulus reversus, hepatic vein expiratory diastolic flow-reversal). During a prolonged cardiopulmonary resuscitation including insertion of a veno-arterial ECMO, pericardiocentesis was performed (400ml purulent fluid, Streptococcus anginosus) with a subsequent return of spontaneous circulation. Multiorgan failure subsequently improved. In parallel, the constrictive echocardiographic pattern resolved without pericardiectomy, and the patient recovered.

Conclusion: ECP is a rare condition characterized by the echocardiographic and clinical features of combined pericardial effusion and pericardial constriction, potentially leading to tamponade despite an only small pericardial effusion. The constrictive hemodynamic features persist after pericardiocentesis, but may be reversible after treatment of the underlying condition.

Conflict of interest: No

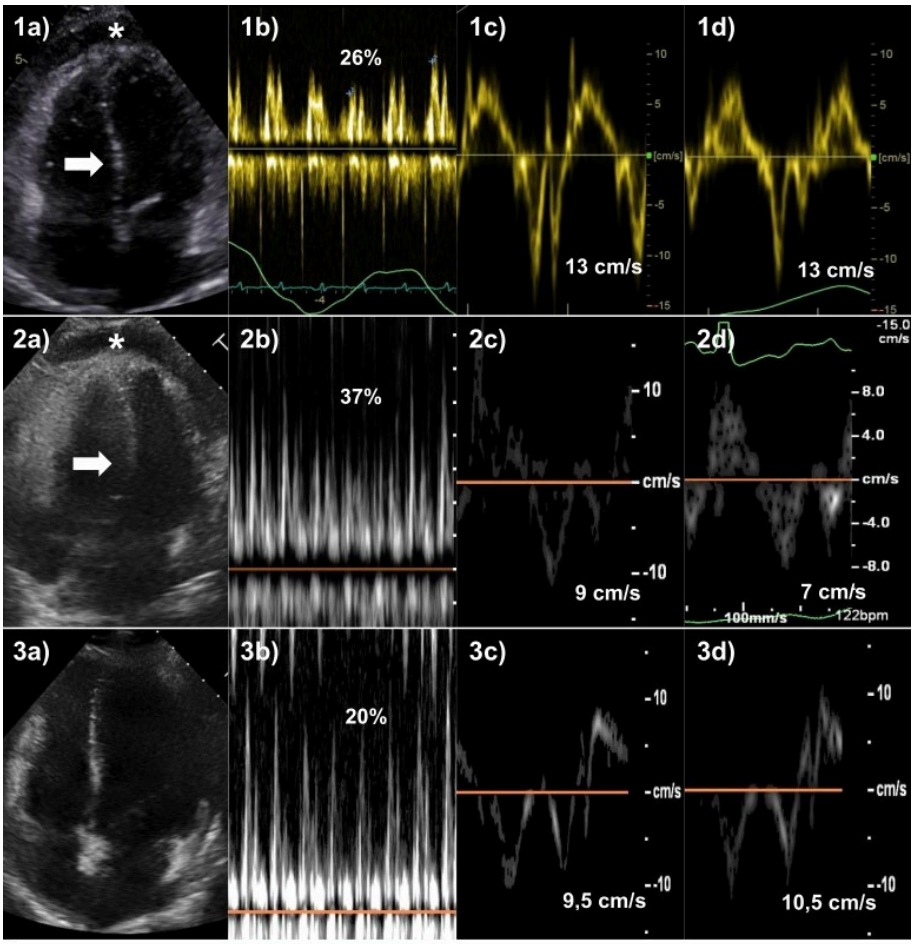

Figure
1/2/3) Transthoracic echocardiogram: after hospital admission (1), shortly before cardiogenic shock with pulseless electrical activity (2), before discharge (3).
a) Apical four chamber with pericardial effusion (*) and respiration-related ventricular septal shift (arrow).
b) Transmitral inflow assessed by pulsed wave Doppler with respiratory phase variation (%).
c/d) Septal (c) and lateral (d) peak early mitral annular velocity (cm/s) assessed by pulsed wave tissue Doppler.

P116

S-ICD extraction: three case studies illustrating possible pitfalls after S-ICD-implantation and feasibility of complete extraction by rotating mechanical dilator sheath

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Since its first approval by the FDA in 2012, the number of implantations of subcutaneous cardioverter-defibrillators (S-ICD) for primary and secondary prevention are increasing each year due to significant advantages like absence of vascular complications, lower infection rates, absence of structural lead complications and preserved venous access [1, 2]. Large trials like the PRAETORIAN-trial prove its non-inferiority compared to transvenous ICDs [3]. Limitations of S-ICD include the absence of delivery of ATP and pacing, anatomical configurations without adequate sensing and device-related local pain[4].

In this case study we want to report three patients with different indications for S-ICD-extraction: two S-ICDs implanted for primary prevention in a 65-year-old patient with dilated cardiomyopathy in 2017 and a 59 year-old patient with hypertrophic cardiomyopathy in 2018 had to be extracted because of oversensing of atrial fibrillation and noise with inappropriate charging/shock delivery (figure 1). The third patient is a 32-year-old patient who survived sudden cardiac death due to VF in 2016 with consecutive S-ICD implantation for secondary prevention who complained about continuous disabling pain at the site of the implanted device. The patient insisted on complete extraction of the S-ICD instead of a box change at ERI in 2022.

The three cases provide an example of the limitations and pitfalls of S-ICDs, the importance of adequate patient selection with thorough vector screening and shared decision making with the patient for the choice between a subcutaneous and a transvenous ICD. Furthermore, these cases demonstrate the feasibility of complete and uncomplicated extraction of S-ICDs implanted more than five years ago with a rotating mechanical dilator sheath for extraction of the S-ICD-lead (figure 2).

Conflict of interest: No

Figure 2

Suprasternal lead extraction by rotating mechanical dilator sheath

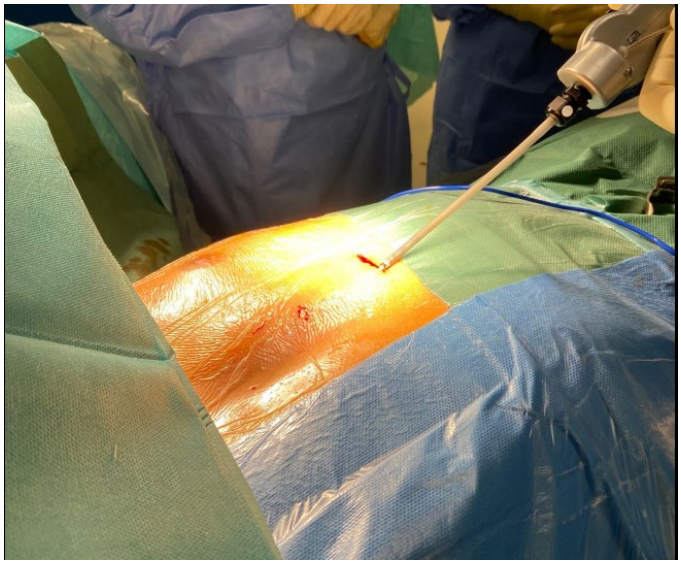
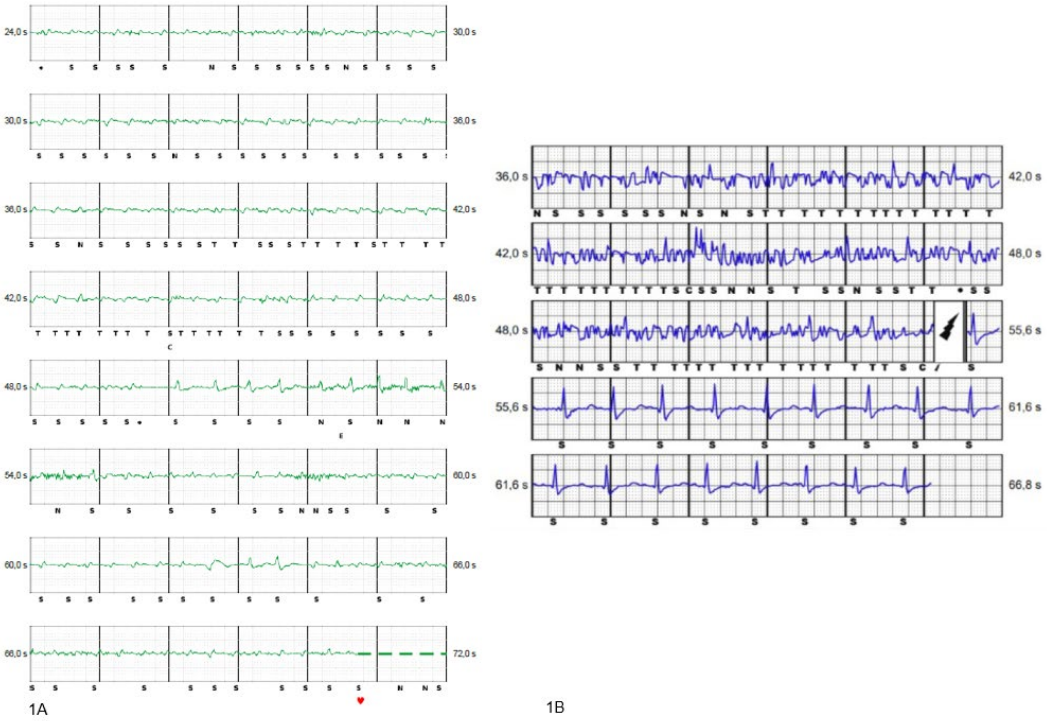


Figure 1:

Oversensing of atrial fibrillation (1A) and noise with inappropriate shock (1B) in patients 1 and 2



1A 1B

P117

Double complex coronary artery abnormalities fortuitously discovered during an acute coronary syndrome

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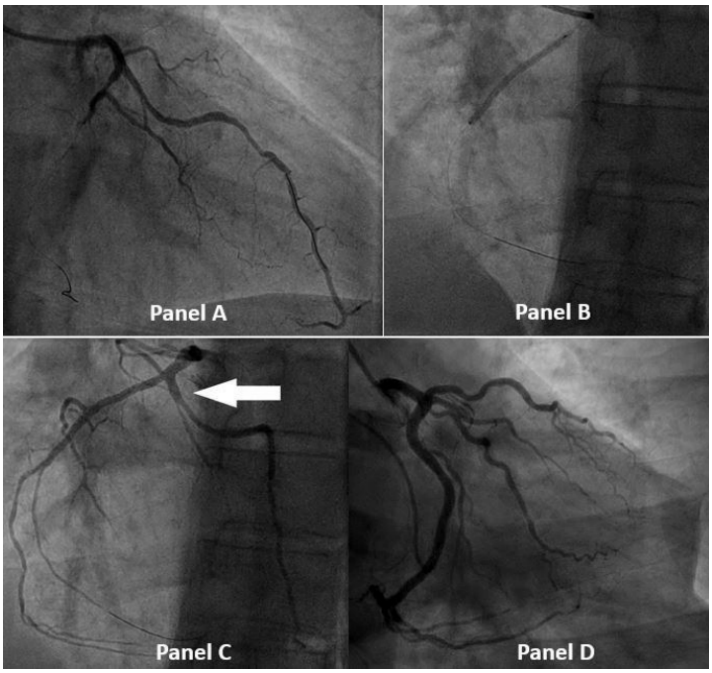
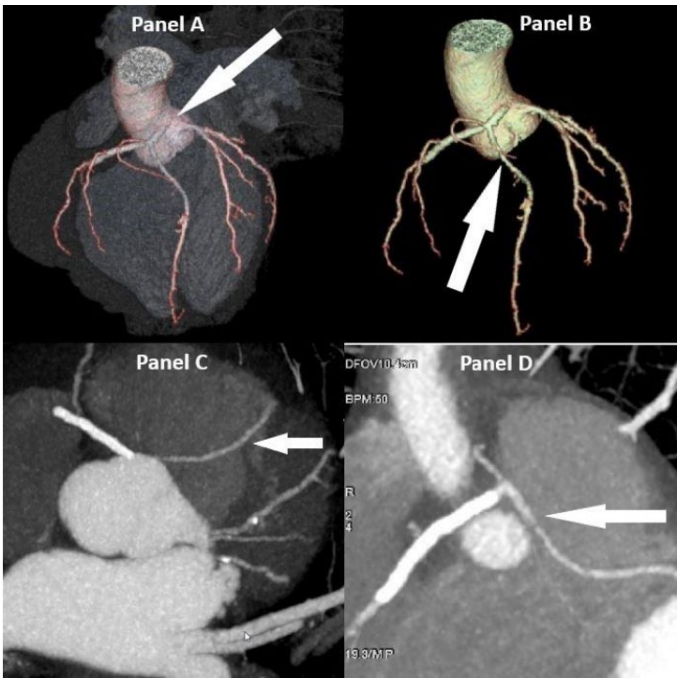
Introduction: Complex coronary artery abnormalities (CAA) are rare, even more double CAA, and there are no well established guidelines for their management. CAA are characterized by a wide spectrum of clinical manifestations, from asymptomatic to myocardial infarction or sudden cardiac death. The optimal management strategy in adult patients with coronary artery anomalies at risk remains debated.

Case summary: We report the case of a 49-year-old male, without known past medical history, who was incidentally diagnosed for a double congenital complex coronary artery abnormalities during an hospitalisation for an acute coronary syndrome. The coronary angiogram showed an acute occlusion of the right coronary artery that was treated by a drug eluting stent. Transcatheter angiograms as well as the coronary computed tomography (CT) revealed a double congenital complex CAA, with an ectopic right artery from the left cuspid with interarterial course, and a left anterior descending artery emerging of the right coronary artery (Figures 1-2). This kind of course is associated with a higher risk of sudden cardiac death at young age. The investigations were completed by stress tests to reproduce real-life conditions. According to the stress scintigraphy, the congenital coronary artery abnormalities had no impact on the myocardial perfusion. Stress test was performed to reproduce real-life conditions, because pharmaceutical stress with adenosine induces hyperaemia but not real-life stress. The findings were discussed with a multidisciplinary team specialized in coronary abnormalities, and it was decided to do not correct the anatomy in this asymptomatic patient.

Discussion: Our case illustrates a very rare and potentially lethal double CAA in previously asymptomatic adult male. It highlights that ischemia in patients with CAA are not always due to the congenital disease and highlights that in asymptomatic adult patients, the absence of correction of the CAA might be a safe alternative after a full evaluation and functional tests.

Conflict of interest: No





P118

Managing spontaneous coronary dissection with cardiogenic shock with temporary mechanical circulatory support

Thomas Seiler[1], Grüter Daniel[1], Mehdi Madanchi[1], Adrian Attinger-Toller[1], Federico Moccetti[1], Mathias Wolfrum[1], Stefan Toggweiler[1], Richard Kobza[1], Florim Cuculi[1], Matthias Bossard[1]

[1]Lucerne Cantonal Hospital, Cardiology, Luzern, Switzerland

Introduction: A 54-year-old woman was admitted in severe cardiogenic shock (CS) to our institution after successful cardiopulmonary resuscitation for 30 minutes, after having complained about non-specific abdominal pain.

Method:

Results: The initial assessment showed no ST-segment elevation (STE), but a reduced left ventricular ejection fraction (LVEF) and wall motion abnormalities in the left anterior descending coronary artery territory. Due to bloody secretion in the endotracheal tube and difficult mechanical ventilation, a computed tomography (CT) was performed where bilateral rib fractures, significant pulmonary aspiration and a forming tension pneumothorax were confirmed and urgently treated with a chest drainage.

An urgent coronary angiography was performed, where a multivessel SCAD Type 2 in the proximal and distal left anterior descending artery, as well as in the right coronary artery with total occlusion of the posterior descending artery was identified. In absence of ST-segment elevation and persistent flow through the LAD and proximal RCA, a conservative approach with single antiplatelet therapy (SAPT) was chosen. However, due to continuous hemodynamic instability despite high-dose catecholamines, a temporary percutaneous microaxial left ventricular assist device (pLVAD) (Impella CP Smart Assist®, Abiomed, Denver, USA) was implanted to ensure continuous unloading of the left ventricle and provide ongoing hemodynamic support.

In the further course, the patient was referred to our intensive care unit. The pLVAD was successfully weaned and a pharmacological treatment with angiotensin converting enzyme inhibitor, β-blocker and loop diuretics was established. After 5 months of conservative treatment, LVEF normalized and CT showed complete healing of all coronary arteries.

Conclusion: In patients with SCAD, a primarily conservative treatment should be opted in the absence of STE, as spontaneous healing rates are high. SAPT may be the preferred antithrombotic regimen, as large registries showed a higher rate of complication for DAPT. Coronary CT may be considered for follow-up.

Conflict of interest: No

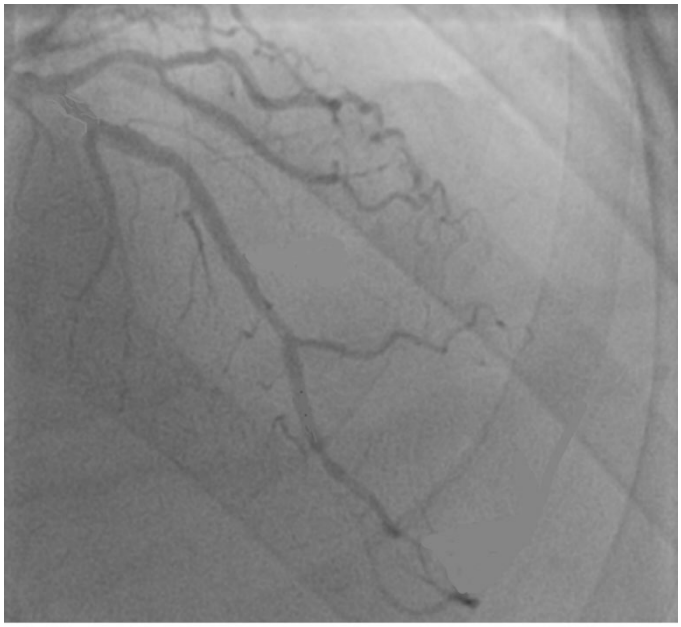


Figure 1: SCAD of the proximal and distal left descending coronary artery

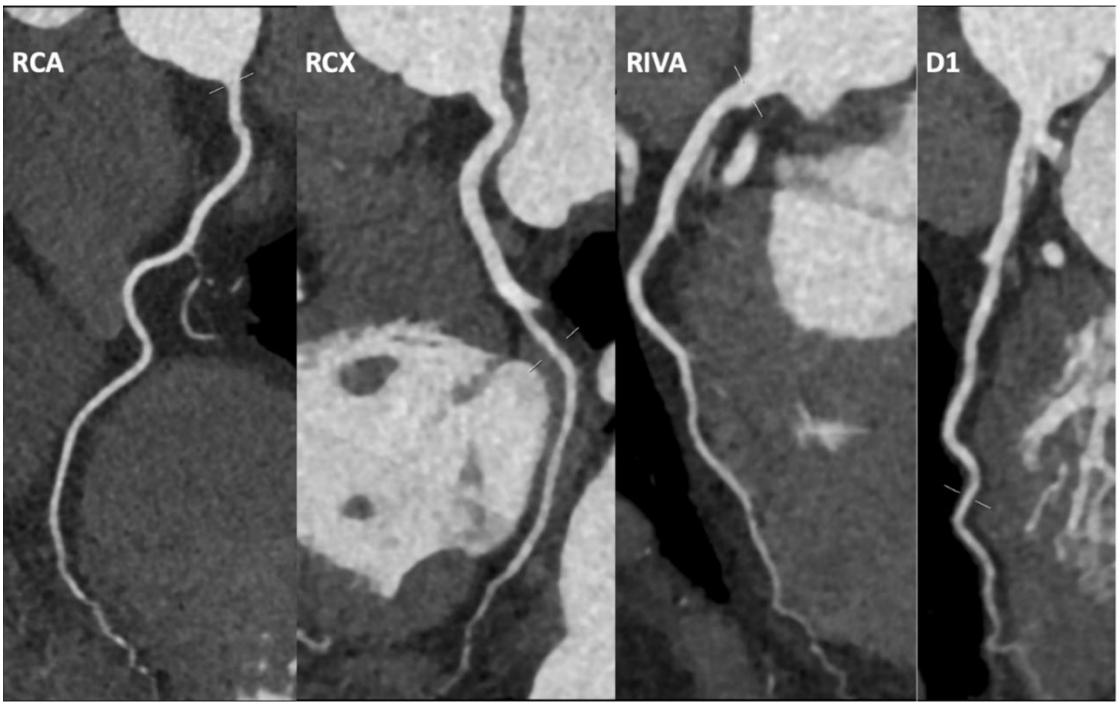


Figure 2: Coronary CT at follow-up (RCA = right coronary artery; RCX = Ramus circumflexus; RIVA = Ramus interventricularis anterior; D1=Ramus Diagonalis 1)

P119

Intra-cardiac Hemangioma: a rare primary tumor with non-specific symptoms

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Introduction: A 49-year-old patient known for active smoking was admitted for headaches associated with left hyposensitivity and photophobia. He described several syncope episodes, an increasing dyspnea NYHA III and atypical chest pain on exertion since few months. We retained diagnosis of migraine with aura and patient was hospitalized for further medical explorations.

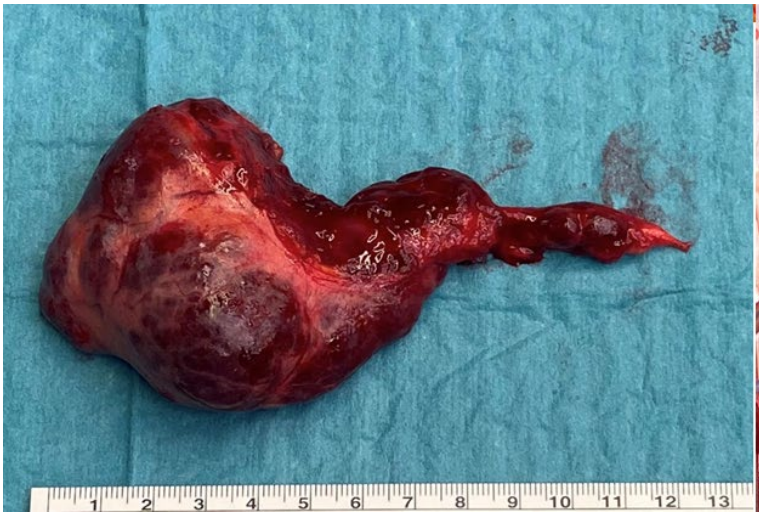
Method: A cerebral MRI excluded ischemic lesions or neoplasia. Trans-Thoracic Echocardiography revealed a normal biventricular function, without valvulopathy or pericardial effusion. However, it showed a 50x67 mm mass in the right atrium wall without tricuspid or venous drainage obstruction. Cardiac MRI confirmed the intramural right atrial mass location with MRI distinctive characteristics: T2 hypersignal, T1 isosignal, lack of fat. Furthermore, the mass presented of a special contrast enhancement: a first peripheral mass enhancement involving, at the late stage, to on an intensive homogenous mass enhancement.

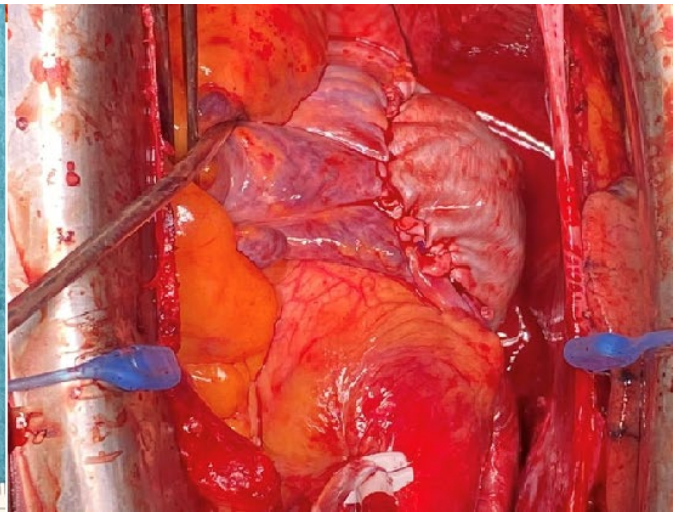
According to the right atrial wall location, the evolving symptoms and future hemodynamic repercussions, a surgical resection was planned.

Results: After median sternotomy, CPB was established between ascending aorta and a dual venous cannulation (superior vena cava and right femoral vein). Aorta was cross clamp and the mass was resected in toto with sinus node area preservation. A pericardial patch replaced a large defect area extending between twice vena cava and the inter-atrial septum. Post-operative course was uneventful. Patient discharged hospital after seven post-operative days with temporary oral anticoagulation. Histological samples concluded to a voluminous benign cavernous hemangioma.

Conclusion: Hemangioma is a rare primary cardiac tumor with an <5% of all cardiac tumors incidence. Found at any stage of life and cardiac chamber, some of these tumors appear in atrium. Symptoms are unspecific (arrhythmias, dyspnea, tamponade, compression or embolization) according to their locations and growth. Cardiac MRI is the exam of choice for diagnosis and surgical complete resection remained the gold standard.

Conflict of interest: No





P120

Type A aortic dissection following innominate arterial trunk replacement for isolated symptomatic aneurysm: would there have been a better strategy in first place?

Alexandre Pelouze[1], Sebastien Colombier[1], Claude Haller[2], Dominique Delay[1]

[1]Sion Hospital, Cardiac Surgery, Sion, Switzerland, [2]Sion Hospital, Vascular Surgery, Sion, Switzerland

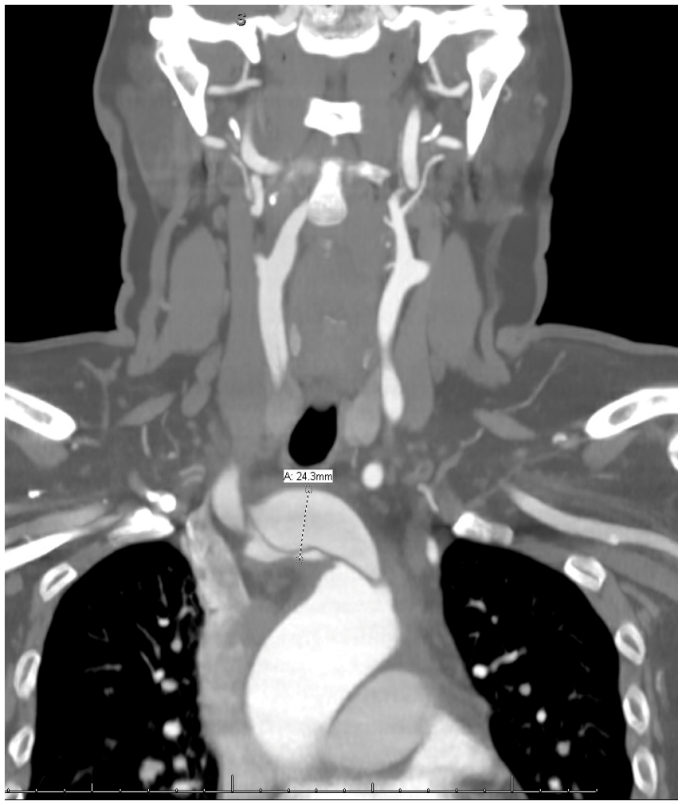
An 64-year-old woman was admitted to the emergency department for acute retrosternal pain with cervical and right arm extension. Physical exam revealed a 30mmHg arterial pressure gradient between both arms. Computed tomography (CT) showed a 24 mm innominate artery aneurysm with a dissecting flap but without aortic involvement. Dissection extended into the right common carotid artery up to the bifurcation. Few days later, the patient described headache, transitional blurred vision and right arm claudication. CT-Scan showed a 3 mm increase of the aneurysm size. Facing new symptoms and aneurysm evolution, surgical treatment was planned. After sternotomy, an aorto-right carotid bifurcation and aorto-right subclavian artery bypass with a branched 18/9 mm graft was successfully performed with tangential ascending aortic clamping without cardiopulmonary bypass support. Post-operative was uneventful with satisfactory Angio-CT control.

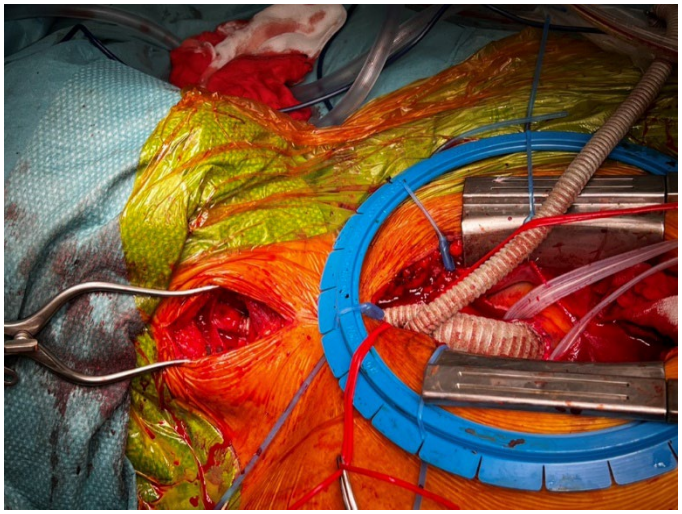
At day-6, patient developed acute chest pain and a type A aortic dissection was diagnosed on Angio-CT together with the right subclavian branch of the prosthesis. Patient benefited of an emergent ascending aorta replacement associated with AMDS® stent implantation under cardiopulmonary bypass, moderate hypothermia and right selective cerebral perfusion through the graft. In addition, we anastomosed the right common carotid artery graft on the aortic prosthesis and ligated the thrombosed right subclavian prosthetic branch. Post-operative course was complicated by mediastinal bleeding requiring packing. Patient was discharged from the hospital at day-22 without symptoms and satisfactory Angio-CT control.

We report a rare case of isolated non-traumatic innominate artery symptomatic aneurysm with dissection and unfavorable evolution. Our first surgical strategy appeared satisfying with complete resection of the aneurysm, however, the occurrence of a major complication questioned our choice.

Considering the rarity of this pathology, its scarce description in the literature renders guidelines concerning its management difficult to establish.

Conflict of interest: No





POSTER WALK: CONGENITAL & PEDIATRIC CARDIOLOGY

P121

Use of ultrasound for vascular access during cardiac catheterization in children with congenital heart disease: A Swiss Quality Multicentric Study

Adil Salihu[1], Isabelle Celine Windheuser[2], Julie Wacker[3], Martin Gloeckler[2], Stefano DI Bernardo[4]

[1]Department of Cardiology, Lausanne University Hospital and University of Lausanne, Lausanne, Switzerland, [2]Department of Cardiology, Pediatric Cardiology, University Hospital Bern, Bern, Switzerland, [3]Pediatric Cardiology Unit, Department of Woman, Child, and Adolescent Medicine, Geneva University Hospital, Geneva, Switzerland, [4]Pediatric Cardiology Unit, Women-Mother-Child Department, Lausanne University Hospital and University of Lausanne, Lausanne, Switzerland

Introduction: Patients with congenital heart disease (CHD) undergo many central vascular cannulations (CVC) during their lifetime. There is no recommendation for the routine use of ultrasound (US). Our study aims to examine the current use of US and anatomical landmark (ALM) guidance for CVC in children with CHD in Switzerland.

Method: A prospective observational non-interventional multicentric study was conducted in three university hospitals in Switzerland. We included patients with CHD from 0 to 18 years old who were scheduled for elective cardiac catheterization. Data were collected anonymously and included the baseline characteristics, procedural arterial and venous CVCs, and related complications.

Results: A total of 178 arterial and 250 venous CVC in 253 patients were analyzed. The median age was 4.4 years old [IQR 1.2-8.8]. The femoral artery and femoral vein were preferred vessels for cannulation. US guidance was used in 65% of the procedures as the initial approach. The overall success rate for venous and arterial cannulation, including all vessel punctures, identified no significant difference. A significant difference in first-attempt success rate was found for arterial (80 vs 65%, p <0.0001) and venous (80 vs 47%, p <0.0001) cannulation with US guidance. The overall complication rate was 10.5%. Among others, an uncomplicated hematoma occurred most frequently. However, the two techniques demonstrated no significant difference in complications rate for venous and arterial CVC.

Conclusion: US guidance for localization and vessel cannulation is the preferred technique for cardiac catheterization in our three pediatric cardiology departments in Switzerland. Our data show that the most successful technique is US-guided vessel access during cardiac catheterization. Further research is needed to assess if US guidance can lower the complication rate. Thus, Training junior doctors for CVC under US guidance should be encouraged.

Conflict of interest: No

P122

The Swiss Neurodevelopmental Outcome Registry for Children with CHD (ORCHID) -– First results of collaborative research on neurodevelopmental outcome after postoperative necrotizing enterocolitis after neonatal cardiac surgery

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Introduction: Swiss neurodevelopmental Outcome Registry for CHIldren with complex Congenital Heart Disease (ORCHID) has been founded in 2018 on neurodevelopmental (ND) outcome of patients undergoing early neonatal cardiac surgery or hybrid palliation at <6 weeks of age. The impact of postoperative necrotizing enterocolitis (NEC) on ND outcome was analyzed as a first prospective observational study.

Method: Based on the ORCHID patients registered between 2019 and 2021 we analyzed clinical characteristics, rate of postoperative NEC (≥ Bell stage II), and one year ND outcome (Bayley III).

Results: 101 patients (n = 63 female) were included. Cardiac diagnoses were biventricular (n = 75) univentricular (n = 21), or borderline CHD (n = 4). Surgery was conducted with (n = 86) or without (n = 15) cardiopulmonary bypass (CBP) at a median age (IQR) of 8 (6) days, most patients within RACHS category 3 or 4 (n = 73). CPB time was 213 ± 85 min, cross clamping time 125 ± 51 min, including selective cerebral perfusion (n = 53) at lowest core temperature of 31.2 ± 4.0 °C. Postoperative cardiogenic NEC occurred in 16 patients, representing the second most frequent complications (n = 35). NEC was treated by antibiotics/parenteral nutrition for ≥ 5 days (n = 15) resp. abdominal surgery (n = 1). On average, the Bayley III scores at 11.5 ± 1.5 months of age showed cognitive (102.2 ± 14.9), language (93.8 ± 13.0), and motor composite scores (88.7 ± 15.8) in the normal range, with a trend towards lower values in patients after NEC. Length of ICU (13.5 with vs. 8 days without NEC, p <0.05) resp. hospital stay (49 with vs. 31.5 days without NEC, p <0.05) were longer in patients with NEC.

Conclusion: Postoperative NEC is associated with longer ICU/hospital stay, but does not affect ND outcome at one year as a solely covariate. Nation-wide registries such as Swiss ORCHID with ever-growing patient populations serve as an excellent research platform to better understand the impact of perioperative risk factors on the long-term ND outcome.

Conflict of interest: No

P123

Quality of Life Level and Predictors in Adults with Transposition of the Great Arteries – A Post Hoc Analysis of the SERVE Trial's Cohort

Alessandro Castiglione[1], Fabienne Schwitz[1], Wustmann Kerstin[1 2], Judith Bouchardy[3 4], Ronny Büchel[5], Reto Engel[6], Michael Freese[7], André Frenk[1], Harald Gabriel[8], Matthias Greutmann[9], Dierik Heg[10], Christian Müller[7], Javier Ruperti[11], Tobias Rutz[3 12], Jürg Schwitter[3 12], Daniel Tobler[11], Matthias Wilhelm[13], Markus Schwerzmann[1]

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Introduction: This study aims to describe the Quality of life (QoL) in adults with a systemic right ventricle (RV) and to identify its clinical predictors.

Method: The analysis was carried out on the SERVE trial's cohort of patients with congenitally corrected transposition of the great arteries or complete transposition of the great arteries who underwent either a Mustard or a Senning procedure. Patients were randomized to Tadalafil (20 mg p.o.) or placebo for three years in a double-blind fashion. The results of the trial are still to be published.

The QoL was assessed using the Linear Analog Scale (LAS) and the Satisfaction with Life Scale (SWLS). QoL were collected at baseline, after 12 months and after 36 months, together with clinical parameters, imaging data, cardiopulmonary exercise testing (CPET) and neurohormones.

Results: The median QoL was 80/100 on LAS and 29/35 on SWLS both at the beginning and after 3 years without significant differences between the treatment groups. CPET maximum work rate and maximum oxygen uptake correlated positively with QoL (respectively: r = 0.308, p = 0.002, and r = 0.245, p = .015). Patients with a higher than median QoL on the LAS score had significantly smaller indexed end-diastolic RV volumes (118.8 ± 3.3 ml/m2 vs. 137.7 ± 7.4 ml/m2, p = 0.008) quantified by cardiac magnetic resonance and lower NT-proBNP concentrations (353.8 ± 42.6 pg/mL vs. 677.5 ± 215.1pg/mL, p = 0.034). A significant association between QoL improvement over the trial duration and treatment with β-blockers ($\chi 2$ p = 0.042) or ACE inhibitors ($\chi 2$ p = 0.037) was observed when comparing a subgroup with improved QoL with a subgroup with deteriorating QoL.

Conclusion: Patients with a systemic RV report good QoL. QoL seems to be associated with better exercise capacity, and less signs of heart failure. Conventional heart failure medication is associated with improvements in QoL over time, despite the lack of evidence regarding their efficacy in a systemic RV.

Conflict of interest: No

P124

Evaluation of efficacy of direct oral anticoagulants in patients with cyanotic and complex congenital heart disease

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Introduction: Today, most patients with congenital heart disease (CHD) survive into adulthood. Because of hemodynamic abnormalities due to their distinct anatomy, CHD patients often develop atrial arrhythmias requiring oral anticoagulation (OAC). Vitamin K antagonists (VKA) are the standard treatment. However, the increased hematocrit in patients with secondary erythrocytosis due to cyanotic CHD impairs the correct measurement of the international normalized ratio (INR). Certain studies suggest that direct oral anticoagulants (DOAC) are an effective and safe alternative to VKA in these patients but data are still scarce. The aim of the present work was to investigate whether monitoring of D-dimers and DOAC trough levels could help to evaluate the efficacy and safety of OAC in these situations.

Method: This is a retrospective study including cyanotic and complex CHD patients with indication for OAC. An analysis of clinical data, cardiac imaging (echocardiography, cardiac magnetic resonance) and hematologic data (INR, D-dimers, trough levels of DOAC) was performed before and after start of DOAC.

Results: Twelve CHD patients were included (see table for patients' characteristics). For 11 patients D-dimers and trough levels were in target range demonstrating efficient OAC (Figure, example 1). In one patient, a constant increase of D-dimers was observed despite increase of DOAC dose, suggesting insufficient DOAC efficacy. Of note, D-dimers decreased within therapeutic range after switch to VKA (Figure, example 2). In three patients, minor bleeding and thrombo-embolic complications occurred (Table). No major complications were observed. Two patients died during follow-up with death not related to OAC.

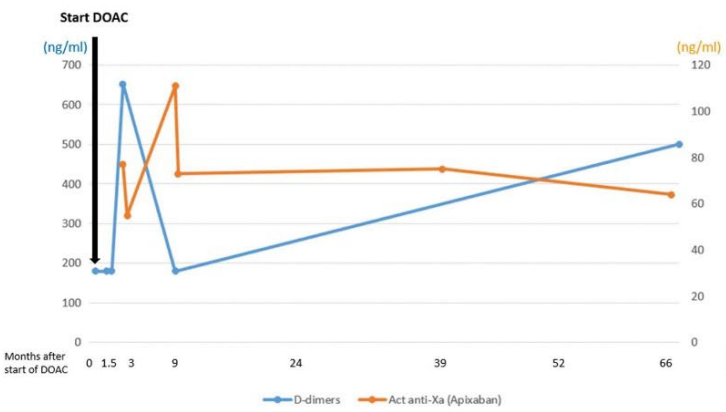
Conclusion: OAC with DOAC was effective and safe in most of included patients. However, determination of D-dimers and DOAC trough levels revealed in one patient a subtherapeutic OAC requiring switch to VKA. This strategy helped to prevent a potentially catastrophic event in a patient with history of stroke.

Conflict of interest: No

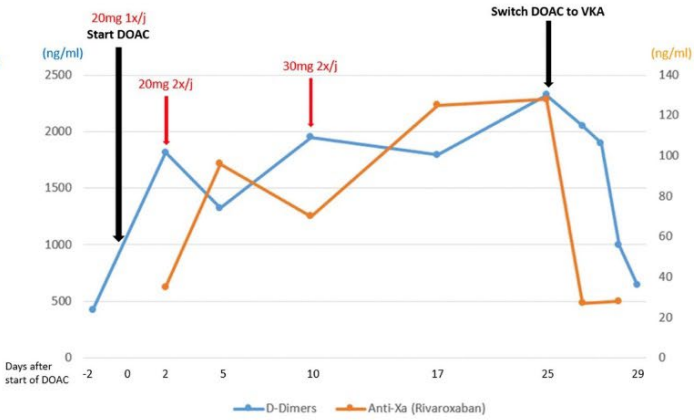
Patient	Age	Sex	Cardiac diagnosis	Co-morbidity	NYHA	Palpitations yes/no	eGFR (mL/min), (Cockroft-Gault)	Concomitant medication	Cyanotic yes/no	PAH yes/no	Living/ deceased	Reason for anticoagulation	Reason for switch to DOAC	Type of DOAC	Complication under DOAC yes/no	Duration of DOAC treatment
1	30	M	Non corrected univentricular heart	Amiodarone induced hyperthyroidism	3	Y	50	Betablocker, Amiodarone	Y	Y	Living	aFib	INR lability	Apixaban	Superficial venous thrombosis	5.5 years
2	33	F	Non corrected univentricular heart, VSD	Cowden syndrome, liver cirrhosis (Child-Pugh B) , factor II, VII, X deficiency	3	N	135	ACE-inhibitor / AT-1 inhibitor, Betablocker, Levothyroxine	Y	N	Deceased	DVT, aFib	Existence of antidote of Dabigatran	Dabigatran	Cutaneous hematoma	3 months
3	48	M	Corrected univentricular heart, TGA	Diabetes type 2	3	Y	104	ACE-inhibitor / AT-1 inhibitor, Betablocker, Diuretics	Y	N	Living	Suspicion of shunt Glenn thrombosis	Hyperkaliemia under LMWH	Rivaroxaban	N	25 days
4	21	M	Fontan circulation	hepatic fibrosis, factor VII deficiency	2	N	148	Betablocker	N	N	Living	Recurring SVT	Incompliance with VKA	Rivaroxaban	N	3 years
5	60	F	Eisenmenger syndrome	Amiodarone induced Hyperthyroidism	3	Y	79	Amiodarone, Spironolactone, Macitentan, Sildenafil, Diuretics	Y	Y	Deceased	aFib	Treatment simplification	Apixaban	N	3 years
6	28	F	Univentricular heart, TGA	-	2	N	86	ACE-inhibitor / AT-1 inhibitor	Y	N	Living	Ischemic vascular accident	Treatment simplification	Apixaban	N	3 years
7	54	F	ASD, pulmonary hypertension	COPD GOLD 1, Scheuermann's Kyphosis, Hashimoto's disease, femoral arteriovenous fistula	3	Y	71	ACE-inhibitor / AT-1 inhibitor, Amiodarone, Macitentan, Sildenafil, Diuretics, Levothyroxine	N	Y	Living	aFib, IART	Treatment simplification	Apixaban	N	2 years
8	45	M	Univentricular heart, VSD, pulmonary hypertension	Trisomy 21	2	N	71	Diuretics	N	Y	Living	Prevention of thrombo-embolic complications due to residual intracardiac shunt	De novo introduction	Rivaroxaban	N	1.5 years
9	43	F	d-TGA	Situs inversus	1	Y	127	ACE-inhibitor / AT-1 inhibitor	N	N	Living	IART	Treatment simplification	Apixaban	Epistaxis	7.5 years
10	38	M	Fontan circulation	focal epilepsy, Normal pressure hydrocephalus	2	Y	122	ACE-inhibitor / AT-1 inhibitor, Diuretics	N	N	Living	IART	Treatment simplification	Rivaroxaban	N	1.5 years
11	47	F	ASD, pulmonary hypertension	status post multiples pulmonary embolisms	3	N	175	Betablocker, Spironolactone, Macitentan, Sildenafil, Diuretics	Y	Y	Living	IART	Treatment simplification	Apixaban	N	8 months
12	19	F	Non corrected univentricular heart	Athyreosis, thoracolumbar scoliosis	2	Y	72	ACE-inhibitor / AT-1 inhibitor, Spironolactone, Levothyroxine, Diuretics	Y	N	Living	aFib	De novo introduction	Apixaban	N	3 months

Abbreviations: M: male, F: female, Y: yes, N: no, ASD: atrial septal defect, VSD: ventricular septal defect, TGA: transposition of the great arteries, COPD: chronic obstructive pulmonary disease, NYHA: New York Heart Association heart failure classification, PAH: pulmonary arterial hypertension, aFib: atrial fibrillation, IART: intra-atrial re-entry tachycardia, DVT: deep venous thrombosis, SVT: supraventricular tachycardia, DOAC: direct oral anticoagulants

Example 1



Example 2



P125

The Importance of Regional Centers in the Management of Adult Congenital Heart Disease Patients in Switzerland

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Introduction: In Switzerland, adult congenital heart disease (ACHD) patients are followed in specialized ACHD-centers. We aimed to assess the extent of cardiac-related hospitalizations managed in regional ACHD-centers (no on-site congenital heart surgery).

Methods: ACHD patients from the SACHER-registry followed at the University Hospital of Basel (USB), the Kantonspital St. Gallen (KSSG) and the Luzerner Kantonspital (LUKS) were included. Baseline data related to demographics, clinical and surgical history, follow-up duration, and cardiac-related hospitalizations during follow-up were assessed by means of chart review.

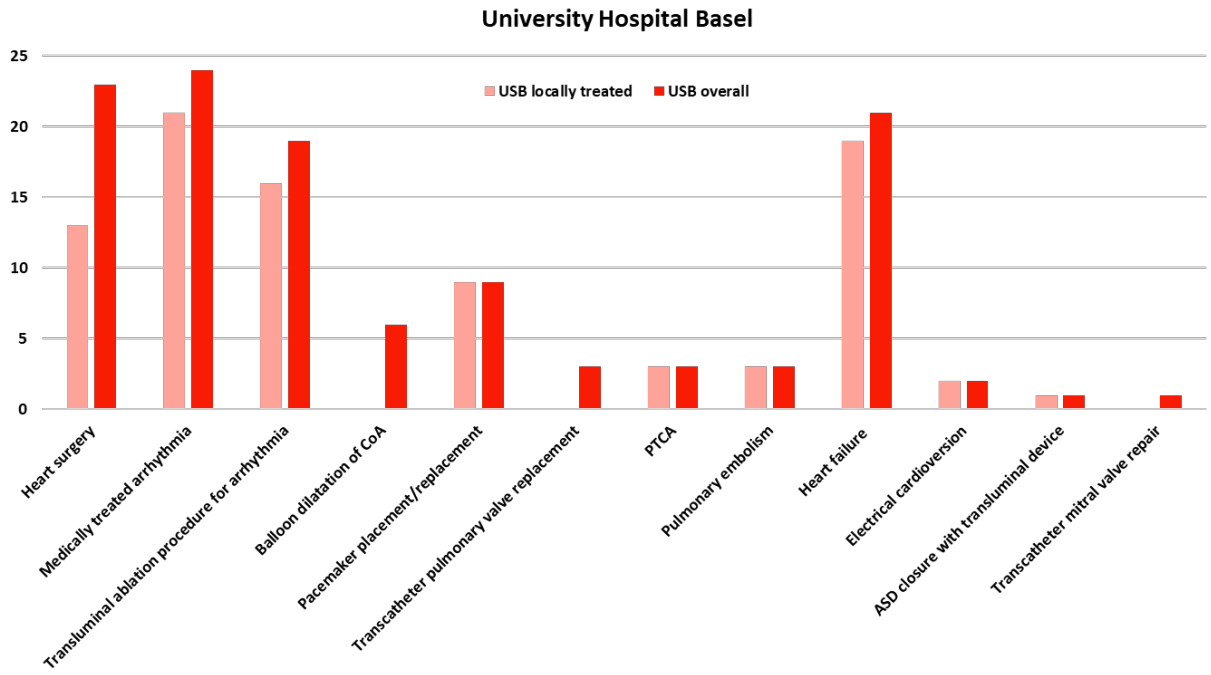
Results: Patients followed at these ACHD-centers accounted for 22% (1019 of 4631 patients) of all Swiss ACHD patients included in SACHER (USB = 559, KSSG = 231, LUKS = 229)**.** Baseline data is depicted in the Table. There were 147 hospitalizations (69 [47%] emergencies) among 74 (7%) patients. Median follow-up was 3 [1, 5] years. Hospitalized patients were significantly older (33 [23, 45] vs 24 [19, 34] years), more often male (69% vs. 55%), and had more often moderate or severe CHD than non-hospitalized patients. Overall, 112 (76%) hospitalizations (and 90% of the emergencies) were managed locally. Causes of hospitalizations and rates of locally managed hospitalizations are depicted in the Figure. On the one hand, hospitalization managed in in supraregional ACHD centers (on-site congenital heart surgery) were mainly related to complex structural interventions (pulmonary valve replacement [3/3, 100%], balloon dilatation of aortic coarctation [6/6, 100%]) and heart surgery (10/23, 43%). On the other hand, arrhythmias (48/52, 92%) and heart failure (19/21, 91%) were mainly managed in regional centers.

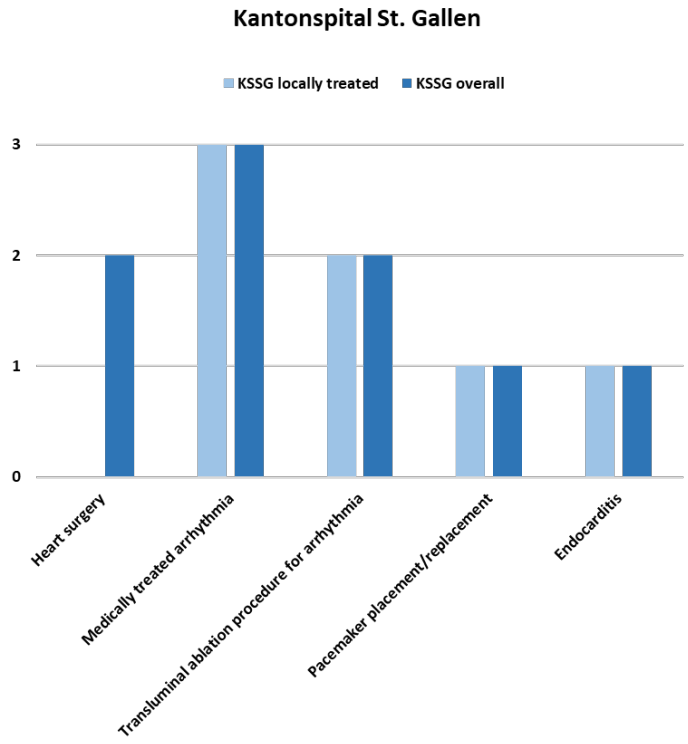
Conclusion: In Switzerland, regional ACHD centers play an important role in the management of a relevant proportion of ACHD patients. Most hospitalization occurring during follow-up were managed locally. This was particularly true for emergency hospitalizations.

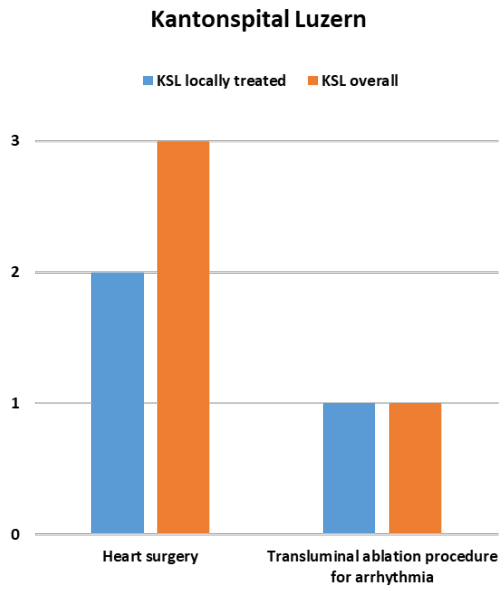
Conflict of interest: No

	Overall (n=1019)	No hospitalization (n=945)	Hospitalization* (n=74)	p
Age at baseline (years)	24 [19, 35]	24 [19, 34]	36 [24, 48]	<0.001
Female (%)	436 (43)	395 (45)	41 (31)	0.004
Follow-up duration (years)	3 [1, 5]	3 [1, 5]	5 [3, 6]	<0.001
CHD complexity				<0.001
Mild	513 (50)	468 (53)	45 (34)	
Moderate	379 (37)	325 (37)	53 (41)	
Severe	127 (13)	94 (10)	33 (25)	
History of (at baseline)				
Palliation	865 (85)	811 (86)	54 (73)	0.003
Subsequent intervention	772 (76)	731 (77)	41 (55)	<0.001
RV-PA conduit	60 (6%)	51 (5)	9 (15)	0.091
Cardiac device	34 (4)	24 (3)	10 (14)	<0.001
Heart failure	20 (2)	12 (1)	8 (11)	<0.001
Stroke	33 (3)	23 (2)	10 (14)	<0.001
Endocarditis	32 (3)	28 (3)	4 (5)	0.528
SVT	19 (2)	16 (2)	3 (4)	0.415
Atrial fibrillation	33 (3)	22 (67)	11 (33)	<0.001
Atrial flutter	41 (4)	28 (3)	13 (18)	<0.001
Ventricular tachycardia	15 (2)	8 (1)	7 (10)	<0.001
AV-Block (>2°)	18 (2)	13 (1)	5 (7)	0.025
Myocardial infarction	3 (0.3)	3 (0.3)	0	0.739
Pulmonary hypertension	13 (1)	10 (1)	3 (4)	0.182
Eisenmenger	9 (1)	7 (1)	2 (3)	0.335

AV-Block= atrio-ventricular block; CHD= congenital heart disease, RV-PA= right ventricular to pulmonary artery; SVT= supra ventricular tachycardia.







ASD= atrial septal defect; CoA= coarctation of the aorta; KSL= Kantonspital Luzern; KSSG= Kantonspital St. Gallen; PTCA= percutaneous transluminal coronary angioplasty; USB= University Hospital of Basel

P126

Warden operation through thoracotomy: a safe procedure

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Introduction: Partial anomalous pulmonary venous connection (PAPVC) can be isolated, but most of them are associated with an atrial septal (ASD) defect. Right sided PAPVC is more frequent, the sinus venosus type is dominating (80%). 1-patch or 2-patch surgical technique are associated with sinus node dysfunction (SND) and superior vena cava (SVC) stenosis. The cavo-atrial anastomosis technique (Warden procedure) seems to reduce these complications.

Method: We identified 28 patients with a Warden procedure between 2012 and 2021. Median age was 13.5years. 11 patients (39%) were adults at the time of operation. PAPVC was found in all patients with right pulmonary (superior and middle) veins draining into the right SVC. ASD was present in 23 patients (82%). An ASD had to be created in the other patients. 7 patients (25%) presented a persistent left superior vena cava (PLSVC). A thoracotomy in the 3rd or the 4th intercostal space, through an axillary incision, was performed in 18 patients (64%), the others were performed through a sternotomy. Ventricular fibrillation, in place of cardioplegic arrest, was used in 8 patients (29%). The anastomosis between the SVC and the atrium was performed directly in 17 patients (61%) and with a short Goretex conduit in 11 patients (39%).

Results: There were no early or late deaths. There were no pulmonary vein stenosis. There was one transitory SND (6%, p = 0.46) in the thoracotomy group. There was one mild SVC stenosis in the thoracotomy group (6%, p = 0.46), which required an angioplasty 4 years later. This patient had a PLSVC and the anastomosis was performed without a conduit, under ventricular fibrillation. The incidence of SVC stenosis under ventricular fibrillation was significative (p = 0.01).

Conclusion: Thoracotomy is a safe procedure for a Warden procedure, even if an ASD must be created. PLSVC and Ventricular fibrillation might be some risk factors for SVC stenosis.

Conflict of interest: No

P127

Perioperative Dynamic Contrast MR Lymphangiography for high output chylothorax in Congenital heart Surgery: Findings and Outcomes

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Introduction: Children undergoing congenital heart surgery are at a significant risk of developing chylothoraxes, due to surgical manipulation near the thoracic duct, Fontan circulation with inherent high central venous. Dynamic Contrast MR Lymphangiography (DCMRL) has emerged as a valuable tool (Fig 1) for the management of these patients.

Method: Ten consecutive perioperative children (2017-2021) subjected to DCMRL were retrospectively analyzed. 2/10 were females. Median age and weight were 71.5(2-1195) days and 4.3(2.6-15.2) kg respectively. 7 DCMRL were performed postoperatively for chylothorax. 3 pre Fontan children underwent prophylactic DCMRL to delineate lymphatic anatomy and take preventive surgical measures.

Results: DCMRL was performed when conservative therapy for high output chylothorax failed (median postop duration 37[16,1790]days). Technical success rate was 100%; no complications occurred. Distribution of chylous collection was L chylothorax(1), R chylothorax(3), bilateral chylothoraxes(4) and bilateral chylothoraxes plus chyloascitis(3). 5/10 responded to continuation of conservative therapy. The remaining 5 showed Pulmonary lymphatic perfusion syndrome(2) and central lymphatic flow disorder(3). Both PLPS patients survived: one each after glue embolization of aberrant lymphatic duct to right lung and Goretex patch fenestration of R diaphragm. All 3 CLFD received pleurodesis, only 1 survived to discharge. In 2 of the 3 pre-Fontan DCMRL, intraoperative isolation of the lung from the thoracic wall with Goretex membrane as well as fenestration led to a smooth post-Fontan outcome without significant chylothoraxes. Survival to discharge was 80%.

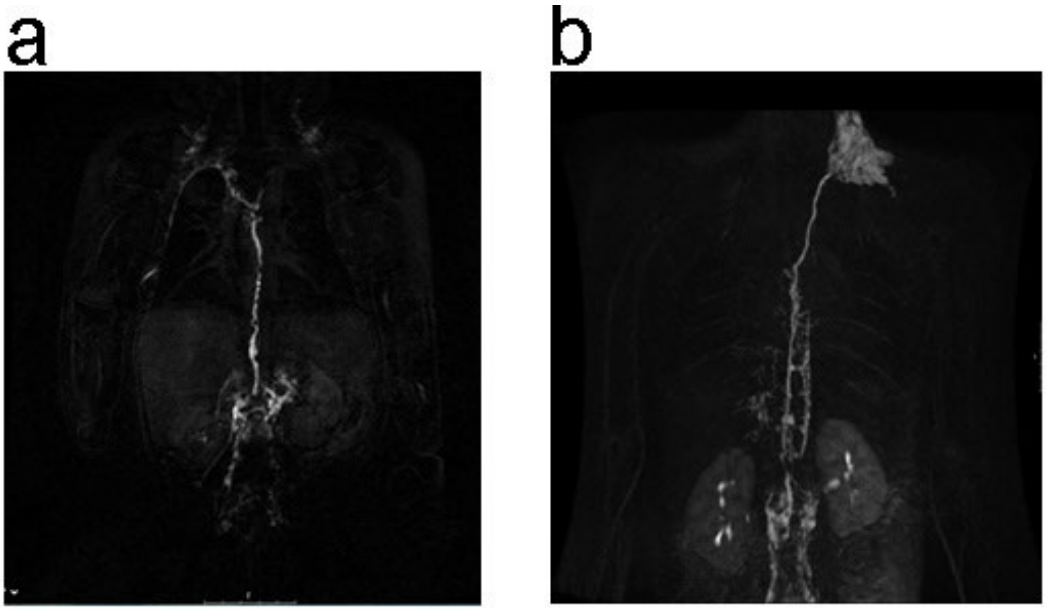
Conclusion: DCMRL has evolved as a useful diagnostic mortality in perioperative high output chylothoraxes. It helps targeted therapy including glue based closure of lymphatic leakage. When used preoperatively it helps plan and decipher prognosis in patients at high risk of postoperative chylothorax.

Conflict of interest: No

Fig. 1

(a) Aberrant thoracic duct draining towards the origin of right SVC

(b) A normal thoracic duct draining towards the left end of the innominate vein



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