Supplementum 23

Joint Annual Meeting of the Swiss Society of Cardiology (SSC) and the Swiss Society of Cardiac and Thoracic Vascular Surgery (SSCC)
Interlaken, June 11–13, 2014
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Effect of cardiac catheterization timing on postoperative renal failure in patients undergoing on-pump coronary artery bypass grafting

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Introduction: Acute kidney injury (AKI) represents one of the most significant complications of coronary artery surgery and is associated with increased postoperative mortality. Since contrast induced nephropathy has been considered as a risk factor for AKI after cardiac surgery, the optimal timing between cardiac catheterization and cardiac surgery appears to be crucial. The aim of this retrospective study is to evaluate the impact of this time interval on the development of postoperative AKI in patients undergoing coronary artery bypass grafting (CABG).

Method: This is a single-center retrospective analysis of a prospectively collected data. From September 2011 to February 2013, 208 patients (age 67.7 ± 10 years, 15% female) undergoing isolated on-pump CABG were enrolled. AKI was defined according to RIFLE criteria (Risk, Injury, Failure, Loss of function, End-stage renal disease). The association of postoperative AKI and time between cardiac catheterization and operation was evaluated using univariate analysis and multivariate logistic regression modeling.

Results: Postoperative AKI occurred in 28 (13.4%) patients, 26 (12.5%) were in RIFLE Risk class and 2 (0.09%) in RIFLE Injury class. The median number of days from cardiac catheterization to cardiac surgery operation was 4 days (25th to 75th percentile: 1 to 14 days). 50 (24%) patients were operated within 24 hours from the cardiac catheterization (group A). The incidence of AKI was significantly higher in these patients compared to those operated more than 24 hours (group B) after the catheterization (22 % vs. 10.8%, p = 0.04). In a multivariate logistic regression analysis, the 24 hours' time interval represented a preventive factor for the development of AKI (p= 0.03, OR=0.4, 95% CI=0.17-0.96). The median increase of creatinine was 17 µmol/L in group A and 8 µmol/L (p=0.006).

Conclusion: If possible, delaying coronary surgery beyond 24 hours of exposure to contrast agents could be useful to reduce the impact of postoperative AKI in on-pump CABG.

Disclosure of Interest: None declared
Nonagenarians more frequently presented with worse cardiac function (Killip class>2 was 8.3% in the reference group, 11.8% in octogenarians and 16.6% in nonagenarians; p<0.001), more comorbidities, in particular more renal diseases (reference group 9.1%, octogenarians 18.7%, nonagenarians 27.8%; p<0.001) and heart failure (reference group 4.9%, octogenarians 9.0%, nonagenarians 14.0%; p<0.001). In all age groups, Killip class>2 was the most important independent predictor but in nonagenarians it was the only independent predictor of in-hospital mortality.

Figure 1. PCI in ACS patients according to age groups and admission period
Figure 2. In-hospital mortality of ACS patients according to age groups and admission period

Conclusion: In very old ACS patients, PCI use showed a marked increased over the past 12 years and in-hospital mortality slightly decreased at the same time. An impaired cardiac function at admission was associated with a worse outcome in all groups, particularly in nonagenarians.

Disclosure of Interest: None declared

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Short- and long-term access site complications after transradial coronary angiography and percutaneous coronary intervention

Introduction: The incidence of short- and long-term access site complications after transradial coronary angiography and percutaneous coronary intervention (PCI) were investigated using color duplex ultrasonography and non-invasive angiological tests.

Method: Between January 2010 and June 2012 604 patients underwent transradial coronary angiography or PCI in our institution. Patent hemostasis was achieved using the TR Band (Terumo Medical Corporation). Of these 604 patients, 395 agreed with an angiological follow-up examination including color duplex ultrasonography and non-invasive angiological tests. They were examined between October 2012 and October 2013.

Results: There were 86 females (21.7%) and 309 males (88.3%), mean age of the examined patients was 66 years (range 41-90 years). In 201 (50.88%) patients a PCI was performed. Crossover to transfemoral approach was needed in 21 patients (5.3%). Mean compression time was 4.17 (+/- 1.26, range 1.5-10) hours. Mean procedure time was 51.2
minutes (+/- 36.38). Only two patients were diagnosed with an acute access site complication. One patient was treated surgically after rupture of a false aneurysm resulting compartment syndrome. Another patient underwent surgical thrombectomy due to acute occlusion of radial artery. On long-term follow-up, occlusion of the radial artery was diagnosed using color Duplex ultrasound in 7 patients (1.77%, 95% CI 0.05-0.31). None of the patients with occluded radial artery had symptoms.

**Conclusion:** Acute access site complications after transradial coronary angiography and PCI are very uncommon. Radial artery occlusion on long-term-follow-up is a rare complication with a good prognosis and no clinical or hemodynamic significance for the perfusion of the fingers.

**Disclosure of Interest:** None declared

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**Predictors for a prolonged delay in first medical contact to revascularization in patients suffering from ST-segment elevation myocardial infarction: Insights from stemi fast track registry Fribourg, Switzerland**

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**Introduction:** Primary PCI is the therapeutic modality of choice in patients presenting with STEMI if it can be performed within 120 minutes after first medical contact. The current guidelines of the European Society of Cardiology even recommend treatment within 90 minutes. To date, different strategies have emerged in order to respect these guidelines. The HFR Fribourg implemented a new procedure in August 2008 called ‘STEMI FAST Track’ whose scope is to reduce the delay between first medical contact and revascularization. The goal of the present study is to find variables that significantly influence the delay between the first medical contact (FMC) and the revascularization (R), and to evaluate the impact of this delay on subsequent clinical outcome in our population.

**Method:** A total of 233 patients with a definite diagnosis of STEMI were prospectively enrolled in the STEMI Fast Track registry. FMC-R delay and survival free from Major Adverse Cardiac Events (MACE) were the primary and secondary outcome measures, respectively.

**Results:** Median FMC-R delay in our population was 1h34. Patients that were transferred from a secondary hospital present a mean FMC-R delay of 02:02:00, 01:40:00 when they referred themselves directly to HFR Fribourg, and 02:12:00 when referred by a general practitioner. Patients addressed by their general practitioner were 4 times more likely to present a prolonged FMC-R delay (OR 4.49; 95%CI: 1.1-18.42; p=0.04). Being treated by one of the attending physicians (OR 0.31; 95%CI: 0.16-0.57; p<0.001), inferred a significant decrease in odds for a prolonged FMC-R delay. Survival free from MACE according to Kaplan-Meier estimates did not significantly differ between the group with an FMC-R ≤ 90min and the group > 90min (Log-rank p-value=0.68).

**Picture / graph:**

<table>
<thead>
<tr>
<th>Variables in the Equation</th>
<th>p-value</th>
<th>Odds Ratio</th>
<th>95% C.I. for Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male gender</td>
<td>0.41</td>
<td>0.76</td>
<td>0.41 - 1.44</td>
</tr>
<tr>
<td>Previous CABG</td>
<td>0.18</td>
<td>4.66</td>
<td>0.49 - 43.80</td>
</tr>
<tr>
<td>Age</td>
<td>0.07</td>
<td>1.02</td>
<td>0.99 - 1.05</td>
</tr>
<tr>
<td>Transfer from GP</td>
<td>0.04</td>
<td>4.49</td>
<td>1.10 - 18.42</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>0.06</td>
<td>2.18</td>
<td>0.98 - 4.86</td>
</tr>
<tr>
<td>Operator number 2</td>
<td>&lt;0.001</td>
<td>0.31</td>
<td>0.16 - 0.57</td>
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**Table 7 : Binary logistic regression**
Conclusion: The delay in FMC-R in HFR Fribourg is good and dependent on the operator and the site of referral. There is no difference with regard to MACE between patients presenting an FMC-R delay over less and of more than 90 minutes in our sample.

Disclosure of Interest: None declared

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Mid-term results in minimally invasive direct coronary artery bypass grafting

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Introduction: Minimally invasive direct coronary artery bypass (MIDCAB) has gained wide acceptance as treatment option for revascularization of the left anterior descending artery (LAD). Here we present our specialized single centre experience with 180 consecutive patients.
Method: All patients undergoing MIDCAB through a left anterior mini-thoracotomy between January 1st 2009 and December 31st 2013 were included. Preoperative, intraoperative, postoperative and follow-up information about major adverse cardiac and cerebrovascular events (MACCE) and need for re-intervention were collected. Seven patients with multi-vessel disease and high predicted mortality for conventional surgery were intentionally treated with MIDCAB despite incomplete revascularization.

Results: Mean age was 64.4 ±11 years, median Euroscore 3 (0-11), 83% were male patients. All patients except for one were successfully operated without extracorporeal bypass. Seven patients with unexpected severely calcified LADs were electively converted to sternotomy (3.8%), two emergently. 85 patients (47%) were extubated in the theatre and 82 (45%) on the day after surgery. 23 patients (13%) were transferred directly to intermediate care. Median intensive care unit stay was 1(0-97) days and hospital stay was 7(1-49) days. 30-day mortality was 1.9% and there was no stroke. Re-exploration for bleeding was necessary in five patients (2.7%). 171 patients (96%) did not need red blood cell transfusion. Mean follow up was 19 months and was completed in 161 patients (91%) with 91±2.8% survival. Two patients had a re-intervention of the LAD resulting in a 96.8±1.4% MACCE-free survival.

Conclusion: MIDCAB is a safe procedure in specialized centres with low postoperative morbidity, mortality and favourable mid-term MACCE-free survival and freedom from re-intervention.

Disclosure of Interest: None declared

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Preoperative ejection fraction and postoperative outcome in off pump coronary bypass surgery
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Introduction: Poor ejection fraction (EF) has been considered risk factor for worst outcome after heart surgery and as such incorporated in many risk-stratification models for patient under going coronary bypass surgery. The purpose of this study was to investigate the effect of preoperative ejection fraction on postoperative morbidity and mortality in patients undergoing isolated off-pump coronary artery bypass grafting(OPCAB).

Method: The data of patients who underwent OPCAB between 1/2008-12/2010 was retrieved form our data bank. An association between EF and postoperative outcome: troponin, Creatin-Kinase Muscle-Brain (CKMB), noradrenalin requirement, use of intra-aortic balloon pump (IABP), creatinine, atrial fibrillation, intubation time, ICU days and mortality was evaluated.

Results: From 1/2008 to 12/2010, 494 OPCAB were isolated. The average preoperative EF was 54%. Postoperative average values were: Troponin 3.498 mcg/L, CKMB 20.01mcg/L, noradrenalin requirement 8.67 mcg/mi, creatinine102 mmol/L, intubations time 13 hours, ICU days 2.7. 15% had postoperative atrial fibrillation, 4% required postoperative IABP and mortality was 1%. There was no association between preoperative EF and postoperative troponin, CKMB, noradrenalin requirement, creatinine, atrial fibrillation, intubation time, ICU days and mortality. EF was significantly related to preoperative IABP (p=0.003) but not to postoperative IABP use.

Conclusion: In OPCAB surgery preoperative EF has no impact on postoperative outcome.

Disclosure of Interest: None declared
Prevalence of falls and reporting of fall history in patients with sinus node disease undergoing pacemaker implantation

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Introduction: Falls are the leading cause of injury and among the leading causes of death in persons aged 65 years and older. Syncope, bradycardia, and dizziness are typical manifestations of sinus node dysfunction (SND) and typical causes of falls in the elderly. The prevalence of falls in patients with SND remains largely unknown.

Method: Swiss multicenter cohort study with nine participating centers (ClinicalTrials.gov Identifier NCT01037426). Consecutive patients aged 50+ with SND eligible for pacemaker implant according to the ESC 2007 guidelines were included (N=87). Fall history during the 12 months pre-implant was collected based on patient recall and GP records. Falls were defined as an “unexpected event where a person falls on the ground from an upper or the same level”.

Results: Median age was 75.7 years (interquartile range 70.3 – 81.6), 49.4% were men. SND was characterized by sinus arrest (49.4%), bradycardia-tachycardia syndrome (31.0%), sinus bradycardia (51.7%), chronotropic incompetence (5.7%), sinus exit block (4.6%). An atrio-ventricular block of the 2nd or 3rd grade was present in 16.1%. Pre-pacemaker implant signs and symptoms were: syncope (46.0%), dizziness (43.7%), bradycardia (28.7%), dyspnea (10.3%) and fatigue (10.3%).

<table>
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<th>Past 12 months</th>
<th>Patient recall (N=87)</th>
<th>GP medical records (N=81)</th>
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<td></td>
<td>Number of patients (%)</td>
<td>Number of events</td>
</tr>
<tr>
<td>Any falls</td>
<td>47 (54.0%)</td>
<td>182</td>
</tr>
<tr>
<td>Of which:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Falls with injury</td>
<td>25 (53.2%)</td>
<td>40</td>
</tr>
<tr>
<td>Falls requiring medical attention</td>
<td>28 (59.6%)</td>
<td>48</td>
</tr>
<tr>
<td>Falls with fracture</td>
<td>6 (12.8%)</td>
<td>7</td>
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During the 12 months preceding pacemaker implant in patients with SND, falls are frequent and often require medical attention due to subsequent injury. Compared to patient recall, GP medical records numerically underestimated the absolute number of patients with falls but appropriately reflected the proportions of fallers presenting with an injury, requiring medical attention, and fractures.

Conclusion: The prevalence of falls in patients with SND is high and there appears to be underreporting of falls at the primary care physician level.

Disclosure of Interest: R. Brenner: None declared, P. Ammann: None declared, S.-I. Yoon: None declared, St. Christen: None declared, J. Hellermann: None declared, G. Girod: None declared, U. Knauss: None declared, F. Duru: None declared, N. Krasniqi: None declared, D. Ramsay: None declared, Ch. Sticherling Grant/ research support from: Medtronic, Consultant for: Medtronic, M. Kühne Grant/ research support from: Medtronic, Paid Instructor for: Medtronic

Axillary vein puncture for implantation of 4F catheter-delivered pacing leads in children

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Introduction: Endocardial pacemaker implantation in children is most commonly performed with a subclavian vein puncture, although it carries a risk of pneumothorax, hemothorax, and subclavian crush syndrome. Contrast-guided axillary vein puncture is an alternative technique which could improve safety but is not commonly used in this patient population.
The Medtronic 3830 lead is a 4F lumenless catheter-delivered lead that may be particularly well suited for use in the pediatric population due to the reduction in intravascular material and possibility for selective site lead placement in complex anatomies.

**Method:** Data on pediatric patients at our institution aged ≤15 years who underwent transvenous pacemaker implantation using contrast-guided axillary vein puncture were retrieved. Contrast-guided axillary vein puncture was performed in all patients as the primary approach, using an 18G needle and a 0.035" guidewire under general anesthesia (figure A). Separate punctures were performed in case >1 lead was implanted. A 4F catheter-delivered pacing lead (Medtronic 3830 model) was used for atrial and right-ventricular pacing, with adequate slack to accommodate for growth (figure B).

**Results:** We retrieved data from 13 patients (6 males), aged 8.2±4.3 yrs (range 2-15yrs) at time of intervention, and weighing 23.3± 10.0 Kg (range 11.3 to 38.0 kgs). We placed 8 right atrial leads, 12 right ventricular leads and 1 coronary sinus lead. Axillary vein puncture was successful in all patients. There were no procedure-related complications (hemo/pneumothorax or lead dislodgements) and lead electrical parameters were within normal limits in all patients after a mean follow-up of 16 months.

**Conclusion:** Contrast guided axillary vein puncture is a safe and effective method for pacemaker implantation in children. Furthermore, the thin-bodied 3830 lead provides stable pacing parameters while reducing bulk of intravascular material.

**Disclosure of Interest:** None declared

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**Use of ICD and life years gained in patients with a secondary prevention ICD indication**

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**Introduction:** Secondary prevention is a class Ia indication for ICD implantation, independent of underlying cardiomyopathy. In 2013, 32% of ICDs were implanted in Switzerland for this indication. However, data on subsequent ICD therapies, the life years gained and associated costs are scarce.

**Method:** Out of a registry encompassing 1’120 patients, all patients with a secondary prevention indication (n=524) were identified. We excluded patients with structural or electrical disease (e.g. long-QT, HOcM…; n=81) but not those with idiopathic VT or VF in order to compare them to patients with ischemic and dilated cardiomyopathy.
To calculate hardware costs per life year saved, a hypothetical sum of 50’000 CHF was estimated. Life years saved were calculated as the difference between last follow-up or death and month of the first appropriate ICD therapy (ATP or shock).

**Results:** 443 patients were included, 325 with ischemic, 80 with non-ischemic cardiomyopathy and 38 with idiopathic VT/VF. Mean age was 64±12 years, 13% were female, median follow-up was 74 (IQR 38-177) months. Overall 244 patients (55%) experienced any ICD therapy and 172 (39%) died during follow-up. The cumulative incidences of ICD use (= any appropriate ICD therapy independent of cut-off rate) and mortality at 5 and 10 years are shown in the table, a Kaplan-Meier curve of first-ever ICD therapy is seen in figure 1. Total estimated hardware costs were 36.3 Mio CHF (726 ICDs x 50’000 CHF) and 16’779 months were "saved", accounting for costs of 26’000 CHF per year.

![Kaplan-Meier curve of first-ever ICD therapy](image)

<table>
<thead>
<tr>
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<th>Ischemic</th>
<th>Non-ischemic</th>
<th>Idiopathic VT/VF</th>
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<tbody>
<tr>
<td>5 year ICD use</td>
<td>59%</td>
<td>52%</td>
<td>23%</td>
</tr>
<tr>
<td>10 year ICD use</td>
<td>66%</td>
<td>64%</td>
<td>52%</td>
</tr>
<tr>
<td>5 year mortality</td>
<td>25%</td>
<td>22%</td>
<td>7%</td>
</tr>
<tr>
<td>10 year mortality</td>
<td>52%</td>
<td>41%</td>
<td>23%</td>
</tr>
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</table>

**Conclusion:** Patients with a secondary prevention indication for ICD therapy show a high use of their ICD with a 10-year therapy rate of about 65%. Costs per life year saved are 26’000 CHF and thus can be considered as appropriate according to generally accepted values.

**Disclosure of Interest:** None declared

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**23**

**A batteryless cardiac pacemaker powered by cardiac motion**

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**Introduction:** The battery is one of the most limiting factors of modern pacemaker designs. Battery replacements require repeated surgical interventions with associated morbidities and costs. Alternative power sources not relying on stored energy become essential to improve a patient’s quality of life.
Harvesting cardiac energy might provide a continuous autonomous energy source for modern pacemakers. A device, which is able to convert cardiac motion into electrical energy, would allow powering pacemakers without the use of primary batteries.

Motion induced energy generators are found in automatic wristwatches: the movement of a person’s wrist accelerates an eccentric mass in the clock housing. An integrated generator converts the rotation into electrical energy. The gained energy therefore directly depends on the externally applied motion.

**Method:** A harvesting device was derived from the clockwork of an automatic wristwatch (ETA 204, ETA SA, Grenchen, Switzerland). The clockwork was freed from all time indicating parts. Its custom-made housing (total mass 16.7g, figure 1) allowed it to be anchored on the heart. For an in-vivo study with a 60 kg domestic pig, a sternotomy was performed to suture the prototype onto the anteroapical part of the left ventricle. Subsequently, the harvesting device was connected to a custom-built single-chamber pacemaker. A 47 µF capacitor was integrated to overcome the energy shortage between consecutive generator signals. Finally, an epicardial bipolar pacing wire (TME 66T, Osypka, Germany) was used to deliver the pacemaker stimulus.

**Results:** The heart successfully accelerated the energy harvesting device. It supplied the pacemaker with enough energy to performed continuous VVI pacing (pacing threshold 1.0 V / 0.5 ms, sensing 9.8 mV, impedance 1279 Ω) at 130 bpm (pacing output 1.6 V / 0.8 ms, arrows in figure 2 indicate pacing stimuli). Simultaneously, the harvesting device generated a mean output power of 52 µW over an additional load resistor of 1kΩ.

**Picture / graph:**
Conclusion: We demonstrated the feasibility of pacing the heart using its own mechanical activity. The harvested energy exceeded the power requirement of a modern pacemaker (~10 µW). Furthermore, we expect to increase the performance by optimising this first-generation prototype. However, the presented results were obtained from a single scenario. Further investigations have to be done to show for instance the influence of the additional weight on the heart or the optimal implantation site.

Disclosure of Interest: None declared

Implantation of a novel batteryless sunlight-powered pacemaker

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Introduction: Contemporary pacemakers (PM’s) are powered by batteries offering a limited energy storing capacity. When the battery lifetime ends, the device has to be replaced. This intervention is costly and bears the risk of complications. To overcome this limitation, a batteryless PM is desirable. We investigated the feasibility of energy harvesting inside the body by a subcutaneously implanted solar module. The solar module converts light, which penetrates the skin, into electrical energy. This approach would allow building batteryless PM’s powered by sunlight.

Method: We developed a custom-built PM powered by a solar module (figure 1). The device consists of a solar module (3 x KXOB22-12X1, IXYS, USA) embedded in translucent silicone and connected to a dedicated PM circuit. An IS-1 connector enables the connection of PM leads. First, the solar modules’ power output was measured in vivo after subcutaneous implantation in the lateral abdominal wall of a 60 kg pig. Subsequently, the PM was re-implanted subcutaneously in the neck to connect it to a PM lead (Safio S60,
Biotronik, Germany) via the right internal jugular vein. The skin-covered PM was then irradiated using a solar simulator (mimicking solar irradiation on a sunny spring day at 11 a.m. in Bern) to pace the pig's heart.

**Results:** The implanted solar module was covered by a 2.4 mm skin flap. During irradiation, the module delivered 24'000 µW electrical power. The PM lead was implanted in the low right atrium (pacing threshold 1.0 V / 0.5 ms, sensing 1.9 mV, impedance 532 Ω). Subsequently, successful A00 pacing (output 4.0 V / 0.5 ms) at a rate of 120 beats per minute was performed during irradiation (figure 2, arrows in ECG lead II indicate pacing stimuli).

**Picture / graph:**

![Image 1](image1.png)

**Picture / graph - 2:**

![Image 2](image2.png)
Conclusion: Ambient sunlight may provide sufficient energy to pace a heart. The power consumption of a modern PM lies around 10 µW while we harvested 24'000 µW. Thus, <1 minute of direct sunlight exposure may be sufficient to power a PM for 24 hours. This performance can be explained by the excellent skin penetration of infrared light. Since sunlight is ubiquitous and solar irradiance in the neck region is high, subcutaneous solar modules may allow designing PM’s without primary batteries. However, long-term tests are necessary to assess the influence of fibrosis around the device on the solar modules’ power output. Furthermore, an energy buffer needs to be integrated to power the PM during darkness (e. g. at night).

Disclosure of Interest: None declared

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The effect of pacemaker implantation on falls and fall characteristics in patients with sinus node dysfunction

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Introduction: Falls, defined as an “unexpected event where a person falls on the ground from an upper or the same level”, are the leading cause of injury and among the leading causes of death in persons aged 65 years and older. Falls are frequent in patients with sinus node dysfunction (SND). Pacemaker (PM) implant in these patients is expected to reduce the fall rate. However, the magnitude of fall frequency and severity reduction in patients with SND implanted with a PM is unknown.

Method: Ambispective (retro- and prospective) Swiss multicenter cohort study with 9 participating centers (ClinicalTrials.gov Identifier NCT01037426). Patients aged 50+ with SND eligible for PM implant according to the ESC 2007 guidelines and willing to participate were included (N=87). A history of falls was not a prerequisite for inclusion. Fall history during the 12 months pre-implant was recorded based on patient recall (retrospective). Falls occurring during the 12 months following PM implant were recorded prospectively. Follow-up was available for all but 7 patients, 3 of which died during the course of the study. Pre- and post-PM implant fall rates were compared based on an intention-to-treat analysis.

Results: Median age was 75.7 years (interquartile range 70.3 – 81.6), 49.4% were men. After PM implant, the proportion of SND patients experiencing ≥ 1 fall over 12 months was reduced from 54.0 to 20.7% (Odds ratio = 0.22; 95% confidence interval 0.11 to 0.45, p<0.0001). The proportion of patients experiencing ≥ 1 fall with injury or requiring medical attention was also significantly reduced (OR = 0.36 (95%CI 0.15-0.83) and 0.37 (0.16-0.82), respectively). The annual total number of falls was significantly reduced by 62.6% (from 182 to 68, p=0.001) with reductions in the number of falls with injuries and requiring medical attention of similar magnitude (-67.5%, p=0.001 and -72.9%, p<0.0001, respectively). Before PM implant, 6 falls caused 7 fractures compared to no falls causing a fracture after PM implant.

Number of SND patients with ≥ 1 fall, fall with injury, fall requiring medical attention or fall with fracture during 12 months pre- vs. post PM implant

Absolute number of falls, falls with injury, falls requiring medical attention and falls with fracture during 12 months pre- vs. post PM implant:
Conclusion: In patients with SND, the implantation of a PM was associated with a statistically significant and clinically relevant decrease in the number and severity of falls.

Disclosure of Interest: P. Ammann: None declared, R. Brenner: None declared, S.-I. Yoon: None declared, St. Christen: None declared, J. Hellermann: None declared, G. Girod: None declared, U. Knauss: None declared, F. Duru: None declared, N. Krasniqi: None declared, D. Ramsay: None declared, Ch. Sticherling Grant/ research support from: Medtronic, Consultant for: Medtronic, M. Kühne: None declared
Left main stem coronary artery spasm appearing after ablation of right ventricular outflow tract ventricular extrasystole

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Introduction: Ablation of ventricular arrhythmia originating from RVOT has a good success rate. Most commonly, the focus can be target at the anteroseptal part of the RVOT and the complication related to this procedure remained low.

Method: A 60-year-old healthy female was referred for RF ablation of symptomatic PVC originating within the RVOT (figure A). TTE at rest and during maximal effort showed normal left ventricular function without signs of ischemia.

Results: After activation mapping and an angiogram of the RVOT, PVC focus was localized at the anteroseptal part of the RVOT, where a pre-systolic potential was present (*). Seven RF applications were delivered with an irrigated catheter (power-controlled 25-30W, RF time 6.4 min.), advanced through a steerable sheath, permitting complete abolition of PVC (figure B-D). However, right after the last ablation, the patient developed chest pain and ECG showed diffuse ST segment-depression and ST elevation in aVR, disappearing progressively after 20 minutes. A coronary angiogram performed 35' after ablation was normal. At 6 months of clinical follow-up, the patient remained free of symptoms. This clinical presentation is probably caused by a vasospam of the left main coronary artery related to thermal injury. Anatomical studies evaluated the minimal distance to be < 4 mm between the RVOT septal and the left main coronary artery.
Conclusion: When performing RF ablation of the septal part of the RVOT, every electrophysiologist must be aware of the proximity of the major coronary arteries. Progressive power titration could possibly reduce the risk of this underestimated complication.

Disclosure of Interest: None declared

Bidirectional ventricular tachycardia and severe thrombocytopenia due to digoxin toxicity: A case report and a review of the litterature
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Introduction: An 86-year old male was transferred to our emergency department for congestive cardiac failure. He was known to have paroxystic AF on oral anticoagulation treatment and amiodarone, dilated cardiomyopathy with a left ventricular ejection fraction of 45%, and an atrioventricular conduction defect leading to bradycardia that was managed by implantation of a pacemaker 4 years previously. The ECG at admission showed AF at a ventricular rate of 120 bpm. The patient had received high doses of digoxin (0.5 mg three times daily over 8 days) and in addition to his baseline therapy by diuretics, oral anticoagulation, and ACE inhibitor, beta-blocker, and calcium antagonist.

An ECG performed 2 days before admission at an outside hospital showed bidirectional ventricular tachycardia at 133bpm (Figure 1) without any complaints by the patient. At admission his serum digoxin level was very elevated (22 nmol/L [normal range = 1.2-2.6]) and the serum potassium and magnesium levels were normal. The hemogram showed thrombocypenia (platelets count 64G/L [normal range = 150-350]). The evolution of serum digoxin level and platelet count is shown in Figure 2.

The patient was transferred in an intermediate cardiac care unit and he received digitalis antitoxine injections (Digifab®). After 4 days of Digifab therapy with potassium and magnesium supplementation, the ECG showed AF at an average of 86 bpm with some rare premature ventricular beats. The serum digoxin level decreased to a normal level of 2.5nmol/L. By the 15th day, serum platelets level decreased to 25G/L and then normalized to 192G/L by the 19th day. True thrombocytopenia was confirmed by a blood smear.

Method: N/A

Results: N/A

Picture / graph:
Conclusion: Digoxin is the oldest cardiac medication used in medical practice with complex pharmacokinetic properties and a narrow therapeutic index. The incidence of digoxin toxicity increases with age, in principal because it is mainly used in case of congestive heart failure and atrial fibrillation (AF), which are more prevalent in elderly. At supra-therapeutic levels of digoxin or in case of intoxication, the inhibition of cardiac sodium-potassium adenosine triphosphatase pump cause severe manifestations such as ventricular arrhythmias and severe thrombocytopenia. Treatments of digoxin toxicity include digoxin-specific antibodies prescribed as first-line therapy, principally in case of potentially life-threatening arrhythmias.

Disclosure of Interest: None declared

Aorto-ventricular tunnel: Think about and treat early

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Introduction: Aorto-ventricular tunnels are rare, congenital, extracardiac channels between the ascending aorta and the cavity, mostly of the left ventricle (LV). Depending on the size of the tunnel, symptoms vary between none and overt cardiac failure. Echocardiography shows diastolic backflow from the aorta into the LV, leading to LV enlargement in spite of a normally developed aortic valve.

Method: We present two cases with aorto-LV tunnel diagnosed at different ages.

Results: In the first patient, diagnosis was made in the 35th week of gestation and confirmed after birth by echocardiography. After an unremarkable postnatal adaptation, the newborn quickly developed cardiac failure and, on echo, progressive LV dilation and decreased contractility. Surgical repair with pericardial patch closure was performed at the age of 18 days without complications and with immediate normalisation of LV size and function. After a follow-up of 4.5 years, LV and aortic valve function is normal.

The second patient was assessed for a heart murmur at the age of 5 years, and diagnosis of aortic regurgitation was made. During follow-up, severe arterial hypertension with remarkably low diastolic blood pressure values and a progressive LV dilation due to regurgitant flow into the LV were documented at regular cardiologic examinations. Correct diagnosis of aorto-LV tunnel was finally established by a congenital cardiologist at the age of 15 years, as all clinical signs of aortic run off with severe LV dilation and a slightly reduced contractility were present (EF 50%). Cardiac surgery with patch closure of the aortic ostium and direct closure of the ventricular ostium was immediately initiated.
The postoperative course was prolonged due to a moderately decreased LV function and postpericardiotomy syndrome. The patient was discharged on cardiac medication, and 6 months later LV size and function (EF 52%) are still abnormal with moderate aortic regurgitation present.

**Conclusion:** Aorto-LV tunnel is a rare lesion mimicking aortic valve regurgitation. Diagnosis should be suspected in the presence of LV dilation and severe run off in the aortic arch without obvious aortic valve lesions. Early diagnosis and surgical intervention prevent long term sequelae such as LV dysfunction.

**Disclosure of Interest:** None declared

Right of left-sided atrial flutter? A case of situs inversus, transposition of the great arteries, atrial switch and interruption of the inferior vena cava in a 40-year-old lady

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**Introduction:** We report the case of a 40-y old lady complaining of alternating periods of tachy- and bradycardia due to a sustained atrial flutter (panel A of the figure). She was born with a situs inversus, a transposition of the great arteries and an interrupted inferior vena cava (IVC). An atrial switch was performed at the age of 3 years as shown in panel B (MRI reconstruction). Note the interrupted left-sided IVC draining into the azygos vein (Azyg, in red), connecting with a left-sided superior vena cava (SVC, in red). The systemic venous baffle (SVB, black arrow) starts from the SVC lying above the neo-left atrium (neo-LA, transparent yellow), travels to the right of the patient, and connects with the neo-right atrium (neo-RA, in red) before entering the pulmonary left ventricle (LV, green). Likewise, the pulmonary venous baffle (PVB) is connected to the tricuspid annulus of the systemic right ventricle (RV, not shown).

**Method:** A left internal jugular vein (IJV) puncture was performed in general anesthesia that allowed direct access to the SVC and SVB as shown in panel C (3D electro-anatomical reconstruction). A bipolar voltage map of the SVB and of the neo-RA revealed normal values compatible with native atrial tissue suggestive of a Senning-type correction rather than a Mustard one. Post-pacing intervals (PPI) were short at the venous interatrial septum and along the SVB, preventing any ablation line that could have precluded the SVB patency. A “transseptal” puncture was performed under transoesophageal echocardiography guidance between the floor of the SVC (red arrow, panel C) and the neo-LA roof using a radiofrequency transseptal system (Baylis Medical Company Inc. Montreal, CA). A guidewire was successfully advanced through the systemic RV within the aorta, upon which an SL0 guiding sheath was successfully advanced.

**Results:** Figure C shows the reconstructed neo-LA on the left hand-side. Activation times covered 100% of the atrial flutter cycle length around the tricuspid annulus, suggestive of a peritricuspid flutter, confirmed by short peri-annular PPIs. The delivery of ablation on the septal side (red dots) of the tricuspid annulus abruptly stopped the flutter (panel D).
Conclusion: We report here an unusual case of pericricuspid atrial flutter ablated within the neo-LA because of an atrial switch that required a left IJV puncture and a transseptal puncture through the floor of the SVC to access the PVB because of an interrupted IVC and a situs inversus.

Disclosure of Interest: None declared

A fancy cocktail of epinephrine and atropine for triggering a right ventricular outflow tract tachycardia in a young athlete

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Introduction: Idiopathic ventricular tachycardia from the right ventricular outflow tract (RVOT VT) usually has a benign course but may occasionally be the harbinger of arrhythmogenic right ventricular cardiomyopathy/dysplasia (ARVC/D). Differentiating between the two is essential for appropriate management and counselling, especially in competitive athletes. Early diagnosis may be challenging in children because of significant overlap between RVOT VT and the concealed phase of ARVC/D.

Method: A 13-year-old competitive soccer player presented with chest pain and presyncope on exertion. A stress test showed sustained monomorphic VT from the RVOT after achieving a sinus heart rate (HR) of 208 bpm at the 18th minute of the Bruce protocol (Figure 1A). Resting ECG, echocardiogram, 24-h Holter and cardiac MRI were all normal. He was started on beta-blockers and prohibited from strenuous activity. A first electrophysiologic study (EPS) failed to induce the VT with programmed electrical stimulation and infusion of isoproterenol (ISO, 20 mcg/min), dopamine (400 mcg/min) and norepinephrine. However, the maximum HR achieved was 160 bpm. A second EPS triggered the VT from the RVOT with a combination of 15 mcg/min of ISO, 15 mcg/min of epinephrine, and up to 1.5 mg of atropine.
The VT was triggered after the sinus HR reached 185 bpm, and was successfully ablated (black dot, Figure 1B) at the base of the RVOT, above the His (orange dot). Endomyocardial biopsies showed normal histology and expression of desmosomal proteins on immunohistochemistry (Figure 1C - plakoglobin expression).

**Results:** A stress test one month after the ablation failed to trigger the VT at a maximum HR of 207 bpm. A diagnosis of RVOT VT was considered most likely, although concealed ARVC/D could still not be excluded. Therapy with beta-blockers was discontinued and the patient was allowed to resume low-intensity exercise pending further follow-up.

**Conclusion:** Our case illustrates several important aspects in the evaluation of exertional symptoms in young athletes. Exercise stress testing should be tailored to reproduce the symptoms. Aggressive pharmacologic stimulation including epinephrine infusion may be required to trigger a VT during an EPS. Despite the difficulty in differentiating between RVOT VT and ARVC/D in young patients, an accurate diagnosis is paramount as it has important prognostic implications. A conservative approach to resuming exercise is warranted if ARVC/D cannot be excluded.

**Disclosure of Interest:** None declared
Recurrent postpartum ventricular fibrillation in a patient with a mitral valve prolapse and a common genetic variant in the KCNH2 gene

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Introduction: A previously asymptomatic and apparently healthy 27 year-old woman experienced a cardiac arrest whilst dining in a restaurant, 5 weeks after delivery of her first child. Bystander cardiopulmonary resuscitation was initiated and ventricular fibrillation (VF) was successfully defibrillated 5 minutes after collapse. Coronary angiography was normal. Apart from mild mitral valve prolapse (MVP) with minimal regurgitation, echocardiography and magnetic resonance imaging showed normal findings. The patient had a full recovery and a single chamber ICD was implanted. Subsequently she remained asymptomatic and without arrhythmias. Three years later, she had an uneventful second pregnancy with delivery of a healthy child. Four weeks later, she experienced an episode of VF while breastfeeding, successfully terminated by her ICD. This episode of VF was preceded by a short-long-short sequence. To reduce the risk for further events, a betablocker and VVI pacing at 80 bpm were initiated. In addition, medical ablation was performed. After a few weeks, betablocker therapy had to be tapered due to orthostatic symptoms with dizziness. Five weeks after the incident and after restoration of a menstrual cycle, the pacing rate was reduced stepwise to 60 bpm. Eight days later, another episode of VF with adequate termination by the ICD occurred. As a result, the pacing rate was increased to 90 bpm for a total of 6 months and betablocker therapy restarted. During this period no further arrhythmias were recorded.

Method: N/A

Results: N/A

Conclusion: The most common cause for VF during the postpartum period in absence of structural cardiac disease is long QT syndrome type 2 (LQTS2). However, in our patient only the initial 12-lead ECGs directly after mechanical resuscitation and during hypothermia showed a prolonged QTc interval with a maximum of 509 ms. After recovery, the QT interval remained normal. Genetic testing of LQTS genes revealed the heterozygous KCNH2 variant p.K897T which is considered to be a modifier of congenital LQTS2 associated with a major gene mutation, which in our case could not be identified. However, also for MVP, an association with sudden cardiac death has repeatedly been described (and in light of its high prevalence, controversially discussed). This is the first report of a patient with both, KCNH2 variant p.K897T and MVP, exhibiting a pronounced susceptibility to VF during the postpartum period, which in this case likely served as a third stimulus leading to VF induction.

Disclosure of Interest: None declared
Oral Session 4
Imaging and congenital «methodological aspects»

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Contrast echocardiography for screening of pulmonary arterio-venous fistula in children with portal hypertension
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Introduction: The hepato-pulmonary syndrome consists of intrapulmonary shunting (IPS) secondary to pulmonary arterio-venous fistulas (PAVF) in the setting of chronic liver disease and portal hypertension. The objective of this study was to establish the diagnostic value of contrast echocardiography (CE) as a screening technique for IPS in children with portal hypertension using lung scintigraphy as the gold standard.

Method: CE was performed in children with portal hypertension using an intravenous line inserted preferably in the antecubital region. CE was done using microbubbles created by hand-agitated saline solution. IPS positivity was defined as the appearance of microbubbles in the left atrium within < 5 heart cycles after complete opacification of the right atrium. A lung scintigraphy was performed within 4 weeks with IPS presence graded from 1-4 according to the amount of shunt.

Results: 30 children with portal hypertension underwent CE and lung scintigraphy. The mean age was 9.9 ± 3.8 years (2.1–16.6), with no difference in gender distribution (18 girls, 60%). The origin of portal hypertension was pre-hepatic in 6 (20%), intra-hepatic in 22 (73%) and secondary to a congenital or surgical shunt in 2 (7%). Scintigraphy was negative in 24 (80%) and positive for IPS in 6 (20%). All patients with a negative lung scintigraphy had a negative CE. In the 6 patients with a positive lung scintigraphy, 5 had a positive CE while 1 had a negative CE (false negative). The sensitivity of CE was 83% (CI 36.5–99.1) with a specificity of 100% (CI 82.8–100). The negative likelihood ratio was 0.17 (CI 0.03–0.99) and the negative predictive value 96%.

Conclusion: CE is a simple and reliable screening tool for PAVF and IPS in children with portal hypertension, with a sensitivity of 83% and a negative predictive value of 96%. Technical limitations may be an issue particularly in small children when rapid saline injection is limited by the small size of the intravenous catheter. Detection of IPS is of utmost importance because hepato-pulmonary syndrome is now considered an indication for liver transplantation since the shunting disappears following liver transplantation.

Disclosure of Interest: None declared

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Cardiac magnetic resonance based management of coronary artery disease at 3.0 Tesla:
Insights from a large single center experience
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Introduction: Cardiac magnetic resonance (CMR) has become a robust diagnostic tool for the assessment of coronary artery disease (CAD). However, little is known about the role of CMR at 3.0 Tesla for guiding management of CAD. This study was therefore aimed to describe the role of stress-perfusion / viability CMR at 3.0 Tesla for guiding the clinical management of a large and heterogeneous collective of patients with known or suspected CAD.

Method: This was an observational single center study. Consecutive patients (n=847) undergoing stress / viability CMR on a 3.0 Tesla system at our institution were stratified according to CMR findings of myocardial ischemia and scar, and followed for clinical events. Multiple aspects such as appropriateness of CMR-driven coronary angiography (cath) in ischemia positive patients, diagnostic accuracy of stress-perfusion CMR into a coronary territory analysis and its prognostic value were described.
Results: Myocardial scar was detected in 298 patients (35%) and ischemia in 214 patients (25%). Among patients with evidence of myocardial ischemia, 126 (59%) underwent CMR-driven cath. The ischemic score was significantly higher in patients undergoing cath as compared with patients followed conservatively in spite of myocardial ischemia (median [IQR] 4 [2-5] vs. 2 [1-3]; p < 0.001). Events rates of cardiac death or non-fatal myocardial infarction were significantly lower in patients without myocardial ischemia or scar as compared to others (rate per 100 person / year [95% CI] = 0.23 [0.03-1.62] vs. 2.30 [1.20-4.42]; p = 0.036). The same was true for the combined end-point of cardiac death, non-fatal myocardial infarction and need of coronary revascularization (rate per 100 person / year [95% CI] = 1.85 [0.93-3.70] vs. 3.39 [1.87-6.26]; p < 0.001). Sensitivity and specificity of CMR at detecting a significant coronary lesion (> 50% stenosis) were of 74% and 87%, respectively, resulting in a 94% rate of CMR-driven cath in ischemia positive patients being clinically appropriate (i.e. evidence of > 50% stenosis and/or revascularization performed).

Conclusion: CMR guided management of CAD at 3.0 Tesla is associated with a very good diagnostic accuracy at detecting significant CAD, an efficient down-stream utilization of cath and a very good cardiac prognosis.

Disclosure of Interest: None declared

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Evaluation of chronic mitral regurgitation by 3-D color doppler echocardiography vs cardiac magnetic resonance imaging as the reference method

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Introduction: Assessment of mitral regurgitation (MR) by 2-D echocardiography using the Proximal Isovelocity Surface Area (PISA) method assumes the PISA to be hemispheric. Three-dimensional color Doppler echocardiography (3-DE) with direct measurement of the PISA should overcome the inaccuracies relating to this erroneous assumption, which is required in the context of 2-D PISA determination.

Method: In patients suffering from chronic MR, a transesophageal echocardiogram and a cardiac magnetic resonance imaging (CMR) were performed the same day. Cine loops were acquired using electrocardiographically triggered multiple-beat 3-DE. For each patient, all PISA visible during systole were 3-D reconstructed using a customized software (figure 1). Regurgitant volume (RVol in ml) of each PISA was calculated as: Nyquist velocity x PISA x time between frames. Total RVol equals the sum of these volumes. By CMR, RVol was derived as ventricular stroke volume (SV) minus the SV in the ascending aorta.

Results: Sixty patients were included, 72% had organic MR. Temporal resolution of 3-DE was 32±7Hz. Four patients were excluded from the final analysis: two because of poor image quality of the 3-D cine loops (97% feasibility) and 2 because of flow artifacts in the aorta during CMR. PISA-3-D total RVol was directly associated with CMR-RVol (figure 2). The Bland-Altman analysis showed a significant underestimation of the total RVol by the Doppler technique (bias -6.5, 2SD [-28.2, 15.3]). By ROC analysis, the PISA-3-D RVol cutoff with the maximal surface under the curve was 48ml for detecting a severe MR (AUC 0.99, Sensitivity 100%, Specificity 96%).

Picture / graph:
Conclusion: Mitral regurgitation measurement by PISA-3-D is feasible and accurately determines CMR-derived MR volumes.

Disclosure of Interest: None declared

A novel compressed sensing multi-slice CMR approach for the assessment of left ventricular volumes and function in one breath-hold
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Introduction: CMR is generally accepted as the gold standard for left ventricular (LV) volumes and function assessment. The conventional CMR approach involves several breath-holds to cover the LV with short-axis acquisitions. Recently, compressed sensing (CS) emerged as a means to accelerate data acquisition. The application of CS has three requirements: 1) transform sparsity, 2) incoherence of undersampling artifacts and 3) nonlinear reconstruction. PURPOSE: to compare a novel prototype CS single breath-hold multi-slice cine technique with the standard multi-breath-hold technique for the assessment of LV volumes and function

Method: Twelve volunteers (75% male, age 33±8y) and 21 patients (86% male, age 63±14y) with different LV pathologies were included in the study. The novel prototype single breathhold multi-slice CS cine sequence was implemented on a 1.5T MAGNETOM Aera (Siemens) MR System. Three long-axis and 4 short-axis slices were acquired in a single breath-hold of 14 heart beats (temporal/spatial resolution: 30ms/1.5 x 1.5mm², acceleration factor: 11.0) (Fig.1A). The CS cine data were analyzed by the Argus 4DVF software (Siemens) which is based on a 3D LV-model that takes the motion of the mitral valve plane into account (Fig.1B). For gold standard comparison, a conventional stack of cine SSFP images was acquired (temporal/spatial resolution 40ms/1.2 x 1.6mm², slice thickness/gap: 8mm/2mm) and analyzed by the Argus VF software (Siemens). As a reference for the LV stroke volume (LVSV), the aortic flow (AoFlow) was measured by a phase-contrast acquisition (temporal/spatial resolution 40ms/1.8 x 1.8mm²). To evaluate the intra- and inter-observer reproducibility of the CS technique, the images were analyzed by two experienced cardiologists (GV and PM).

Results: CS-LVEF and standard LVEF were similar (48.5±15.9% vs 49.8±15.8%, p=0.11) with an excellent correlation (r=0.96, slope=0.97, p<0.00001). Agreement of CS-LVSV with AoFlow was superior to standard LVSV (overestimation vs AoFlow: 5.6±6.5ml vs 16.2±11.7ml, respectively, p=0.012) with less variability (r=0.91,p<0.00001 vs r=0.71,p<0.01, respectively).The intra-/inter-observer agreement for all CS parameters was good (slopes: 0.93-1.06, r: 0.90-0.99).
Conclusion: Rapid, accurate and reproducible measurements of LV volumes and function can be obtained with this novel prototype CS single breath-hold multi-slice cine technique, with potential clinical application.

Disclosure of Interest: None declared
**Oral Session 5**

**Blood pressure and heart function**

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**Renal denervation leads to reduction of blood pressure without orthostatic hypotension in a cohort of Swiss patients with treatment-resistant hypertension**

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**Introduction:** Hyperactivity of the sympathetic nervous system plays a pivotal role in the development and progression of hypertension. Catheter-based renal sympathetic denervation has been shown to significantly reduce blood pressure (BP) in patients with treatment-resistant hypertension.

**Method:** 38 patients (mean age 60.5±13.2 years, 61% men) with treatment-resistant hypertension (systolic BP≥160 mmHg on ≥3 antihypertensive drugs, including a diuretic, confirmed by 24h-ABPM) were screened at the University Hospital Zürich and underwent renal denervation with different ablation systems (Symplicity™, EnligHTN™ and Vessix™) between 2010 and 2012.

**Results:** Baseline values included mean office BP of 175.9/94.6±36.4/20.6 mmHg, patients had a mean 4.5±1.3 antihypertensive drugs. Postprocedural office systolic/diastolic BPs were reduced by 23.0/9.6, 30.5/10.8, 25.1/8.8, and 27.1/9.0 mmHg, at 1, 3, 6, and 12 months, respectively (all statistical significant vs. baseline). The 24-hour BP was also significantly reduced as compared to baseline. The orthostatic changes in blood pressure (change in systolic BP 4.2, 6.7, 6.4, and 4.5 mmHg at baseline, 3, 6 and 12 months) were stable during the entire follow-up without evidence of development of orthostatic hypotension. No procedure-related complications and no change in renal function were observed.

**Conclusion:** In conclusion, in patients with treatment-resistant hypertension, catheter-based renal sympathetic denervation results in a substantial reduction in BP up to 12 months without significant adverse events and without development of orthostatic hypotension in patients with therapy-resistant hypertension.

**Disclosure of Interest:** None declared

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**A standardized treatment approach combined with medication adherence monitoring normalizes blood pressure in 53% of 17 refractory hypertensives**

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**Introduction:** Low medication adherence and physician inertia are believed to be two principal causes for treatment-resistant hypertension. We have previously shown that electronic monitoring of medication adherence is associated with significant improvements of blood pressure (Burnier et al, Journal of Hypertension 2001,19:335). The objective of this study was to determine the prevalence of truly resistant hypertension after 6 weeks of a standardized triple anti-hypertensive regimen combined with electronic monitoring of treatment adherence.

**Method:** Patients referred for resistant hypertension to one of the three tertiary hypertension excellence centers could be included into the prospective, open-label, clinical trial. The anti-hypertensive therapy at referral was stopped in all patients and replaced by olmesartan (40mg), amlodipine (10mg), and chlorthaldone (25/50mg). Beta-blockers were continued if required for a non anti-hypertensive indication. All study medications were administered using a medication event monitoring system (MEMS®) to assess the proportion of prescribed doses taken. BP was assessed by 24h ambulatory blood pressure measurement (ABPM) at baseline and 6 weeks.

**Results:** Nineteen patients were included in the study. The mean age was 56 years and 37% were female. Fifteen patients were of European, two of African, and two of Asian / Middle Eastern origin. 53% / 39% of patients had a maternal / paternal history of hypertension. An average of 4 anti-hypertensive drugs was used. Average baseline office SBP/DBP values were 160/95±21/15 mmHg. Two of the 19 patients had normal 24h ABPM levels (<135/85mmHg). After 6 weeks of standardized treatment regimen using MEMS, 9 of 17 patients (53%) normalized the 24h ABPM (average 24h BP drop 17/12±16/10 mmHg; p=0.001 for both SBP and DBP) – see Figure.

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Conclusion: A treatment protocol of adequately dosed long-acting anti-hypertensive drugs combined with adherence monitoring is yielding large treatment effects in more than half of patients referred for resistant hypertension to three tertiary hypertension centers. The impact of this therapeutic approach needs to be confirmed in a larger trial and the long-term impact needs to be quantified. If favorable effects are confirmed, such an approach may represent an efficient treatment option for treatment-resistant hypertension.

Disclosure of Interest: G. Ehret Grant/ research support from: Daiichi Sankyo, Speakers bureau: Daiichi Sankyo, R. Schoenenberger: None declared, G. Wuerzner: None declared, G. Wagner: None declared, B. Ponte: None declared, M. Pruijm: None declared, P.-Y. Martin: None declared, F. Mach: None declared, M. Bochud: None declared, P. Erne: None declared, M. Burner: None declared, A. Pechère-Bertschi: None declared

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Arterial hypertension and cardiac remodeling in middle-aged endurance athletes
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Introduction: Extensive endurance training leads to cardiac adaptations and is an established risk factor for atrial remodeling and arrhythmias in the aging athlete. We investigated the contribution of a mildly elevated blood pressure (BP) to cardiac remodeling and supraventricular arrhythmias.

Method: Amateur athletes who participated in the Grand Prix of Bern, a popular Swiss 10 mile race, were included. Athletes with an office blood pressure >140/90 mmHg were excluded. 24 hour ambulatory blood BP measurement was performed and athletes were stratified into a normotension (NT) and a hypertension (HT) group based on established cut-off values. Left atrial and left ventricular end-diastolic volume indices (LAVI, LVEDVI), left ventricular mass index (LVMI), left ventricular mass/volume index (LVMVI), tissue Doppler annular early diastolic velocity (Ea), and signal-averaged P wave duration (SAPWD) were measured. 24 hour Holter monitoring was performed and premature atrial contractions (PAC) were recorded.

Results: 87 runners were included in the final analysis. Mean age was 42±8 years. 33 (38%) athletes fulfilled the criteria for HT. Groups did not differ with respect to age, body mass index, cumulative training hours, an 10 mile race time. Mean systolic and diastolic BPs were significantly higher in the HT group (130±7 vs. 120±5 mmHg; P<0.001, and 84±4 vs. 76±3 mmHg; P<0.001).
Hypertensive athletes had a higher LVMVI (0.95±0.21 vs. 0.85±0.16 g/ml; P=0.025), and a lower Ea (11.3±1.6 vs. 12.5±2.1 cm/s; P=0.006), compared to normotensive athletes. LAVI, LVEDVI, LVMI, and SAPWD showed no significant differences between the groups. 12 (14%) runners had more than 1 PAC/hour (1.3 to 77.9) with no significant differences between the groups. In logistic regression models, including age, cumulative training hours and presence of HT, HT was an independent predictor for LVMVI and Ea. Cumulative training hours were independently associated with LAVI, SAPWD, LVEDVI, and LVMI.

**Conclusion:** In our study, one third of runners with a normal office blood pressure fulfilled criteria for HT. Already modest BP elevations were associated with alterations of LV structure and diastolic function, but not with atrial remodeling or atrial ectopy.

**Disclosure of Interest:** None declared

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**ECG P-wave duration increases with age and lean body mass but not with components of the metabolic syndrome in the general population**

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**Introduction:** The ECG P-wave duration (PWD) reflects bi-atrial activation time. Its prolongation is a well established marker of atrial remodeling, and is associated with an increased risk of atrial fibrillation (AF). The determinants of the PWD, however, have not been fully established.

**Method:** The Swiss kidney project on genes in hypertension (SKIPOGH) is a Swiss multicenter cohort including families selected from the general population. PWD was automatically measured on the standard ECG tracing (Schiller AT-104PC) recorded at rest. Body fat mass and lean body mass were measured with electrical bio-impedance. Associations of PWD with determinants of the metabolic syndrome and anthropometric variables were assessed using multivariable mixed linear regression.

**Results:** The 506 men and 557 women had the following characteristics (mean±SD): age of 47±18 and 48±17 years, weight of 81±13 and 65±12 kg, lean mass of 63±23 and 44±7 kg, fat mass of 18±9 and 21±10 kg, body mass index (BMI) of 25.9±4.2 and 24.2±4.6 kg/m2, waist circumference of 93±12 and 83±13 cm, respectively. Hypertension was present in 28% and 19%, and diabetes in 7% and 3% of the cases, respectively. The final model of the multivariable mixed linear regression is presented in the table. There was a significant sex by age interaction in the determination of PWD (P = 0.012). The positive association of PWD with age was stronger in women (β ±SE = 0.48±0.06, P <0.001) than in men (β ±SE = 0.38±0.06, P <0.001). Interestingly, PWD was significantly associated with lean body mass in men (β±SE =1.85±0.76, P<0.05) but not in women (β±SE =0.33±0.70, P=0.6). PWD was not associated with obesity expressed as BMI, body fat mass or waist circumference, nor with other components of the metabolic syndrome such as mean office blood pressure, diabetes and lipid profile.
Conclusion: PWD significantly increases with age in a sex-specific manner, but no component of the metabolic syndrome was independently associated with PWD in both genders. Lean body mass was independently associated with PWD in men, but not in women. It might be involved in the atrial remodeling leading to AF in overtrained subjects, but further studies are warranted to clarify the mechanisms of these sex-specific associations.

Disclosure of Interest: None declared
Anti-apolipoprotein A1 autoantibodies induce tissue factor activity and expression: A role in atherothrombosis

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Introduction: Autoimmune-mediated inflammation may play a role in atherosclerosis and atherothrombosis, two essential features for cardiovascular disease (CVD) manifestations. Anti-Apolipoprotein A1 (ApoA-1) IgG was shown to be an independent predictor of poor cardiovascular outcome in different clinical settings, to promote inflammation and atherogenesis \textit{in vitro} and \textit{in vivo}, and to be associated with increased atherosclerotic plaque vulnerability in humans and mice.

The aim of this work was to determine whether anti-apoA-1 IgG are associated with TF expression within atherosclerotic plaque in humans, and whether those autoantibodies could in vitro modulate the expression and activation of Tissue factor (TF), a key molecule regulating the extrinsic coagulation pathway involved in atherothrombosis known to underly the majority of acute CVD manifestations.

Method: Atherothrombosis features were explored \textit{in vivo} by immunohistochemical TF staining on human carotid atherosclerotic plaques from (n=102) patients with severe carotid stenosis and \textit{in vitro}, on human monocyte derived macrophages (HMDM), TF expression and pro-coagulant activity detected by cytofluorimetry and chromogenic assay respectively.

Results: \textit{In vivo} atherosclerotic biopsies derived from patients with high circulating levels of anti-apoA-1 IgG (n=20) displayed a higher TF expression when compared to biopsies from patients with low anti-ApoA-1 IgG levels (9.3\% vs 3.3\% p<0.0001). Spearman correlation reported a significant association between the circulating levels of those autoantibodies and TF expression (r=0.41, p<0.001), as well as between CD68 atherosclerotic plaque expression and TF expression (r=0.33, p=0.004). On HMDM, anti-ApoA-1 IgG induced a significant dose-dependent increase in TF expression and a pro-coagulant activity only in supernatants and cells treated with anti-ApoA-1 IgG (p=0.02, p<0.0001, p=0.0006 respectively).

Conclusion: These results extend previous findings by demonstrating that anti-ApoA-1 IgG are associated with higher propensity to atherothrombosis. Furthermore, our \textit{in vitro} results suggest that those autoantibodies could per se induce TF expression in human macrophages, supporting a possible causal link between anti-ApoA-1 IgG and atherothrombosis.

Disclosure of Interest: None declared

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The adaptor protein p66\textsubscript{shc} mediates hypertension associated, cyclic stretch-dependent, endothelial damage

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Introduction: Increased cyclic stretch to the vessel wall, as observed in hypertension, leads to endothelial dysfunction through augmented free radicals production and reduced nitric oxide bioavailability. Genetic deletion of the adaptor protein p66\textsubscript{shc} protects mice against age-related and hyperglycemia-induced endothelial dysfunction, as well as atherosclerosis and stroke. Moreover, p66\textsubscript{shc} mediates vascular dysfunction in hypertensive mice. However, the direct role of p66\textsubscript{shc} in mediating mechanical forces-induced free radicals production is unknown, thus we studied the effect of cyclic stretch on p66\textsubscript{shc} activation in primary human aortic endothelial cells and in the aorta of hypertensive rats.

Method: Primary human aortic endothelial cells were exposed to different cyclic stretch (0.5 Hz) regimens (2\%, 8\%, or 15\%) with different interval times (1 h, 3 h, 6 h). Moreover, regulation of p66\textsubscript{shc} by stretch was studied in the aorta of Wistar-Kyoto rats and spontaneously hypertensive rats.
Results: Exposure of endothelial cells to cyclic stretch led to a stretch- and time-dependent p66Shc phosphorylation at Ser36 downstream of integrin alpha5beta1 and c-Jun N-terminal kinase. In parallel, nicotinamide adenine dinucleotide phosphate oxidase activation as well as production of reactive oxygen species was increased while nitric oxide bioavailability was decreased. Silencing of p66Shc blunted stretch-increased superoxide anion production and nicotinamide adenine dinucleotide phosphate oxidase activation and restored nitric oxide bioavailability. In line with the above, activation of p66Shc was increased in the aorta of spontaneously hypertensive rats as compared to normotensive ones.

Conclusion: Pathological stretch by activating integrin alpha5beta1 and c-Jun N-terminal kinase phosphorylates p66Shc at Ser36, augments reactive oxygen species production via nicotinamide adenine dinucleotide phosphate oxidase, and in turn reduces nitric oxide bioavailability. This novel molecular pathway may be relevant for endothelial dysfunction and vascular disease in hypertension.

Disclosure of Interest: None declared

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Increased GLP-1 levels restore vascular and endothelial protective HDL functions after RYGB
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Introduction: Roux-en-Y gastric bypass (RYGB) reduces weight and long-term cardiovascular risk in obese patients. Glucagon like peptide-1 (GLP-1) increases after RYGB and activates eNOS. We investigated whether GLP-1 improves obesity-induced endothelial and HDL dysfunction in rats 8 days after RYGB, prior to significant weight loss

Method: Diet-induced obese (7 weeks of 60% fat, 1.25% cholesterol diet) male Wistar rats undergoing RYGB received vehicle (RYv) or GLP-1 receptor antagonist exendin (9-39) (RY-Exe) chronically for 8 days (D8); sham-operated ad libitum fed rats were treated with vehicle (ALv) or with the GLP-1 agonist liraglutide (AL-lira). Cumulative relaxation responses of the thoracic aorta were performed to insulin (10⁻¹¹-10⁻⁹mol/L) and GLP-1 (7–36) amide (10⁻¹²-10⁻⁸mol/L) after submaximal contraction with norepinephrine (10⁻⁶mol/L) and repeated after pre-incubation with eNOS-inhibitor (L-NAME, 10⁻⁴mol/L) or with exendin (9-39) (10⁻⁶mol/L). HDL isolated by ultracentrifugation was tested for its capacity to stimulate NO production and reduce the expression of VCAM-1 in endothelial cell in vitro.

Results: D8 post-surgery body weight difference among the four groups was not yet significant. Fasting GLP-1 and bile acid levels increased in both RYv and RY-Exe rats compared to ALv rats. Insulin- and GLP-1-induced vasorelaxation was improved in RYv compared to sham ALv rats. L-NAME inhibited both insulin and GLP-1-induced vasodilation and pre-incubation with exendin (9-39) partially inhibited GLP-1-induced vasodilation, suggesting eNOS and GLP-1 receptor activation. AL-lira rats also showed an improved insulin- and GLP-1-induced vasorelaxation similar to RYv, while the response of RY rats chronically treated with exendin 9 was similar to that of ALv rats, indicating that GLP-1 agonism and antagonism were able to respectively mimic and block the effects of RYGB. HDL-induced endothelial NO production similarly improved in both RYv and AL-lira rats compared to ALv. Endothelial VCAM-1 expression, which was increased in Sham AL rats, was similarly reduced after RYGB and Liraglutide treatment of sham AL rats, suggesting that GLP-1 is involved in the improvement of HDL functions after RYGB.

Conclusion: Our study shows that increased GLP-1 may be a crucial mediator of the endothelial and HDL function improvement observed immediately after RYGB, indicating a novel weight-independent mechanism for the cardiovascular protective effects of RYGB.

Disclosure of Interest: None declared

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Titrating connexin43 in immune cells decreases atherosclerotic plaque development in mice
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Introduction: Ubiquitous reduction of the gap junction protein connexin43 (Cx43) in mice provides beneficial effects on progression and composition of atherosclerotic lesions. Cx43 is expressed in multiple atheroma-associated cells, such as endothelial cells, smooth muscle cells and macrophages, but the exact contribution of Cx43 in each cell type during atherogenesis is not known.
Method: To examine specifically the role of Cx43 in immune cells, atherosclerosis-susceptible LDL receptor-deficient mice were lethally irradiated and reconstituted with Cx43+/+ or Cx43-/- hematopoietic fetal liver cells. After 14 weeks of cholesterol-rich diet (HCD), atherosclerotic plaque progression and composition were analyzed. Neutrophil properties were evaluated by in vitro endothelial adhesion and transmigration assays and in vivo alveolar transmigration assay.

Results: The three groups displayed similar increases in body weight and serum cholesterol after HCD. The progression of atherosclerosis (% lipid deposition) was significantly lower in aortic roots of Cx43+/+ chimera’s (11.4±1.0%; N=8; P<0.01) compared with Cx43-/- (16.3±1.9%) and Cx43-/- (17.9±1.0%) chimera’s. Plaque composition was comparable in the three groups for macrophages (CD68), T lymphocytes (CD4) and extracellular matrix (Masson Trichrome, Picosirius Red), but Cx43+/+ chimera’s plaques contained significantly less neutrophils (Ly6G: 1.9±0.7%; N=8; P<0.05) compared with Cx43-/- (6.0±1.6%) and Cx43-/- (6.5±1.4%) chimera’s plaques. Cell proliferation (Ki67) and apoptosis (TUNEL) in the bone marrow as well as the relative proportions of circulating neutrophils, lymphocytes and monocytes were comparable between the three groups of mice. Functional tests for neutrophils showed no difference between neutrophils from Cx43+/+ and Cx43-/- mice. However, the chemotraction of wildtype neutrophils, which did not express Cx43, was reduced in response to supernatant secreted by Cx43-/- macrophages (2.7±0.5%; P<0.05) in comparison with the ones of Cx43+/+ (4.5±0.8%) and Cx43-/- (3.8±0.6%) macrophages.

Conclusion: Our study shows that reduction of Cx43 expression in immune cells reduces atherosclerotic plaque formation and infiltration of neutrophils into the lesion, whereas deletion of Cx43 from immune cells abrogates this protective effect. As neutrophils are devoid of Cx43, the mechanism likely involves differential secretion of chemoattractant molecules by other Cx43-expressing immune cells such as macrophages.

Disclosure of Interest: None declared

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Sphingosine-1-phosphate cardioprotection against ischemia/reperfusion injury


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Introduction: Apolipoprotein M (apoM) is a plasma lipoprotein that mainly associates with high-density lipoproteins (HDL) and that serves as a carrier of the bioactive lipid Sphingosine-1-Phosphate (S1P). Recent studies indicate that S1P binding to G-protein-coupled receptors, known as S1P-receptors, in the heart activates signalling pathways promoting cardiomyocyte survival, but downstream targets are largely unknown. Here, we investigate the putative role of the apoM-S1P axis in relation to cardioprotection against ischemia/reperfusion (IR) injury.

Method: ApoM transgenic (Apom-Tg) mice, in which plasma S1P is increased by >250%, and wild-type (WT) mice were subjected to IR in vivo or ex vivo. In vitro experiments were performed on neonatal rat ventricular cardiomyocytes. Cardiomyocytes were treated for 5 min with S1P after pre-incubation with PKC kinase inhibitors or with specific antagonists of S1P receptors. Gap junctional communication between cardiomyocytes was evaluated by dye coupling assay.

Results: In vivo, we found a reduction of infarct size in Apom-Tg mice (15±1%) in comparison with WT mice (29±4%, N=8-9, p<0.01). In agreement, neutrophil infiltration into the infarcted area was lower in Apom-Tg mice (14.8±0.2% vs. 25.9±5.1 in WT, N=3, p<0.05). Interestingly, 5 min of S1P treatment at the onset of reperfusion reduced infarct size in response to 30 min of no-flow global ischemia (control: 23±3%, S1P-treated: 11±2%, N=5, p<0.05) in ex vivo Langendorff perfused hearts, suggesting that S1P exerts a direct protective effect on cardiomyocytes. Moreover, the sensitivity to ex vivo IR of Apom-Tg mice was not different from WT mice, further supporting that the cardioprotective effect observed in vivo is due to increased plasmatic S1P in these mice. In vitro, we found by Western blot that S1P induced phosphorylation of the gap junction protein Cx43 on Serine 368 by a PKC-dependent mechanism and that this phosphorylation was mediated by S1P2 and S1P3 but not by S1P1 receptors. Finally, 5 min of S1P treatment reduced gap junctional communication between cardiomyocytes (9±1 cells, N=29) in comparison to control conditions (15±2 cells, N=34, p<0.01).

Conclusion: Increased plasma apoM-S1P in mice protects the heart against IR injury. The molecular mechanism might involve reduced cardiomyocyte death by activation of S1P2 and S1P3 receptors, which leads to PKC-dependent phosphorylation of Cx43 and reduction of cell-to-cell coupling.

Disclosure of Interest: None declared
Endothelial lox-1 protects against arterial thrombosis via activation of the OCT-1/SIRT1 pathway


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Introduction: The lectin-like oxLDL receptor-1 (LOX-1) promotes the endothelial uptake of oxidized low-density lipoprotein (oxLDL). However, LOX-1 is involved in several other biological processes and its role in arterial thrombus formation remains unknown. The present study was designed to investigate whether LOX-1 activation plays a role in thrombus formation in vivo.

Method: Endothelial-specific LOX-1 transgenic mice were generated using the Tie2 promoter (LOX-1TG). Arterial thrombus formation was assessed using an in vivo photochemical injury model.

Results: While plasma levels of oxLDL were comparable, carotid tissue oxLDL content was markedly increased in LOX-1TG as compared to wild type (WT). Time to arterial occlusion was prolonged in LOX-1TG as compared to WT (Fig. 1). In line with this, tissue factor (TF) expression and activity were reduced by about 50% in the carotid arteries of LOX-1TG mice (Fig. 1). This effect was mediated by the activation of the transcription factor Oct-1 leading to upregulation of mammalian deacetylase SIRT1 via binding to its promoter and subsequent inhibition of NF-κB signaling as demonstrated by siRNA experiments. This was further confirmed in LOX-1TG endothelial cells (EC) where expression of Oct-1 and SIRT1 was increased upon exposure to oxLDL. Increased expression of SIRT1 was further associated with decreased DNA-binding of RelA/p65 subunit of NF-κB.

Picture / graph:
**Conclusion:** LOX-1 activates a novel compensatory pathway which protects against arterial thrombus formation *in vivo*. These unexpected findings suggest that Oct-1/SIRT1 signaling may represent a novel target for the prevention of arterial thrombus formation in the setting of hyperlipidemia and atherosclerosis (Fig. 2).

**Disclosure of Interest:** None declared
Concomitant atrial fibrillation ablation and left atrial appendage occlusion
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Introduction: In selected patients with atrial fibrillation (AF) left atrial appendage (LAA) occlusion is an alternative to oral anticoagulation since the LAA is the source of thrombi in more than 90%. Combining transseptal radiofrequency AF ablation and LAA occlusion in symptomatic patients with AF and at high thromboembolic risk might be elegant and convenient. However, outcome data of concomitant AF ablation and LAA occlusion are scarce. We report our experience with combined procedures using a simplified approach.

Method: We assessed all consecutive patients who underwent concomitant transseptal AF ablation and LAA occlusion using Amplatzer devices (St. Jude Medical, Plymouth, MN, USA) between 2002 and 2013. All patients had LAA occlusion performed under local anesthesia (one exception) at the end of the AF ablation procedure. LAA occlusion was guided by fluoroscopy only and without intraprocedural transesophageal echocardiography.

Results: The concomitant procedure was performed in 20 patients (14 males), aged 66±9 years, CHA2DS2-VASc-score 2.4±1.5 with an acute success rate of 100%. However, there were one bleeding from the femoral access site and one aneurysm formation both requiring surgical intervention as well as one subacute device embolization. The embolized device was retrieved using a vascular snare and the LAA was occluded with another device in the same session. After a mean follow-up of 30 months (4 to 119 months) there was no device embolization or cerebrovascular event. One patient died from congestive heart failure 10 years after the procedure. AF recurred in 9 patients (50%) compared to an overall success rate after the last procedure of 68% in patients with AF ablation alone in our center within the same time period (n=676; p=0.1).

Conclusion: Concomitant LAA occlusion and transseptal AF ablation is feasible without intraprocedural echocardiographic guidance or general anesthesia. However, the acute complication rate for the combined approach is higher than expected for an AF ablation alone. The long-term safety is good. Compared to overall success rates of AF ablation alone AF recurrences may be more frequent.

Disclosure of Interest: S. H. Baldinger: None declared, S. Weretka: None declared, S. Shakir: None declared, M. Schmid: None declared, L. Roten: None declared, J. Seiler: None declared, F. Noti: None declared, A. Medeiros-Domingo: None declared, J. Fuhrer: None declared, B. Meier: Grant/ research support from: St. Jude Medical, H. Tanner: None declared

Improved outcome following cardiac resynchronization therapy is related to higher doses of ACE inhibitors, angiotensin receptor antagonists and beta blockers and lower doses of diuretics
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Introduction: Cardiac resynchronization therapy (CRT) is an established treatment option for patients with chronic heart failure (CHF), who are on optimal medical therapy. The impact of CHF medication optimization following CRT, however, has never been comprehensively examined. In the present study, we therefore examined the effect of CHF medication dosage on clinical outcome in CHF patients after CRT implantation.

Method: A total of 185 patients were retrospectively followed up after CRT implantation. CHF medication of patients with a complete 24-month follow-up (or who reached a mortality endpoint prior to this time point) was continuously assessed. Patients with an improvement of the end-systolic volume index (ESVI) of ≥ 40% were considered super-responder. The primary endpoint (death, heart transplantation, assist device implantation, or hospitalization for CHF) occurred in 83 patients over a mean follow-up of 44.6 months.

Disclosure of Interest: S. Schmidt: None declared, D. Hürlimann: None declared, Ch. Th. Starck: None declared, A. M. Saguner: None declared, L. Haegeli: None declared, Th. Wolber: None declared, C. Brunckhorst: None declared, F. Duru: None declared, Th. Lüscher: None declared, F. Ruschitzka: None declared, J. Steffel: None declared
Results: Following CRT implantation, we observed a reduced risk for the primary combined endpoint as well for all-cause mortality in univariate and multivariate analysis for higher dosages of angiotensin converting enzyme inhibitors (ACE-I) or angiotensin receptor blockers (ARB) (p<0.001) and beta blockers (p<0.001), as well as lower dosages of loop diuretics (p<0.001) and thiazides (p=0.001). In contrast this correlation was not seen for aldosterone antagonists or digitalis. The dosage of loop diuretics was on average decreased by 20 % in super-responders, while it was increased by 30 % on average in non-responders (p<0.03). We identified 52 (34.2 %) patients as super-responder. The percentage of patients with a documented increase in loop diuretics (17.3 vs. 49 %, p<0.001) or thiazides (0 vs. 12%, p<0.01) was lower in super-responder vs. non-responder.

Conclusion: Treatment with higher dosages of ACE / ARB and beta blockers, and lower dosages of diuretics is associated with an improved morbidity and mortality after implantation of a CRT-device. Our data indicate that forcing neuro-hormonal blockade is important cornerstone for the treatment of patients following CRT implantation.

Disclosure of Interest: S. Schmidt: None declared, D. Hürllmann Consultant for: Biotronik, Medtronic, St. Jude Medical, Speakers bureau: Biotronik, Sorin, St. Jude Medical, Medtronic, Conflict with: Educational grants: Boston Scientific, Medtronic, Ch. Th. Starck: None declared, A. M. Saguner Grant/ research support from: Biotronik, Sorin, L. Haegeli: None declared, Th. Wolber: None declared, C. Brunkhorst: None declared, F. Duru: None declared, Th. Lüscher Grant/ research support from: Biotronik, Medtronic, St. Jude Medical, F. Ruschitzka Grant/ research support from: Biotronik, Consultant for: Biotronik, Speakers bureau: Biotronik, Boston scientific, J. Steffel Grant/ research support from: St. Jude Medical, Biotronik, Medtronic, Consultant for: Biotronik, Sorin, St. Jude Medical, Medtronic

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Intrathoracic pressure swings promote heart rhythm disturbances in patients with paroxysmal atrial fibrillation

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Introduction: There is preliminary evidence for a link between obstructive sleep apnoea (OSA) and arrhythmias such as paroxysmal atrial fibrillation (PAF) and sudden cardiac death (SCD) but underlying mechanisms remain largely unknown.

Method: We evaluated whether intrathoracic pressure changes, induced by simulated OSA, trigger premature cardiac beats and alter measures of cardiac repolarisation [QTc and Tpeak-to-Tend intervals (TpTe)] in patients with PAF. 12-lead-electrocardiograms were recorded continuously in 44 patients, while simulating obstructive apnoea (Mueller manoeuvre, MM), obstructive hypopnoea (inspiration through a treshold load, ITH), end-expiratory central apnoea (AP), and during normal breathing (NB) in randomised order. The prevalence of OSA was assessed by a sleep study.

Results: Atrial premature beats (APBs) occurred more frequently during MM (55% of patients) and ITH (32%), but not during AP (14%), compared to NB (9%); (p<0.001, p=0.006 and p=0.688, respectively). MM led to a significant prolongation of QTc and TpTe- intervals (+17.3 ms, p<0.001 and +4.3 ms, p=0.005). ITH significantly increased QTc (+9.6ms, p<0.001) but not TpTe. AP did not alter QTc and TpTe- intervals. According to the sleep study, 56% of patients had OSA [apnoea hypopnoea index (AHI)≥5]. In a multivariate regression analysis, severity of OSA (AHI) was independently associated with left atrial end-systolic diameter (LAESD) as assessed by echocardiography.

Conclusion: Simulated OSA induces APBs which are thought to be important in patients with PAF, because the majority of episodes of PAF are triggered by APBs. Simulated OSA alters cardiac repolarisation times, thus increasing the susceptibility to sudden cardiac death.

Disclosure of Interest: None declared

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The crucial role of interlesion distance in addition to catheter-tissue contact force to ensure durable pulmonary vein isolation in patients undergoing radiofrequency ablation for atrial fibrillation

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Introduction: Optimal catheter tip to tissue contact is mandatory to achieve transmural RF lesions and enable durable pulmonary vein isolation (PVI). We prospectively assessed both (1) the maximum interlesion distance and (2) minimum catheter-tissue contact force (CF) that ensures durable pulmonary vein isolation (under Adenosine challenge).

Method: Forty symptomatic AF patients underwent wide circumferential PV isolation (PVI) with SmartTouch™ CF sensing catheter at 25-30 W. The exact locations of acute PV isolation sites (PVI) and spontaneous or adenosine-provoked PV reconnection sites (PVR) were annotated on CARTO map.

Results: 153 PVs were isolated by 1926 RF applications. PVR occurred in 35(23%) PVs: CF were significantly lower at PVR vs. PVI sites: mean CF 5 g vs 11 g (p < 0.0001) and force-time-integral (FTI) 225 gs vs 415 gs (p < 0.0001). Most (86%) PVR occurred with a mean CF < 10 g (FTI < 400 gs). The remaining 14% of PVR, which occurred despite mean CF ≥ 10 g (FTI > 400 gs), showed a low lesion-density with an interlesion distance ≥ 5 mm. Multivariate analysis revealed “Interlesion distance ≥ 5 mm” as an independent predictor for PV reconnection. Most (80%) of PVR sites were located in the anterior portion of PVs.

Conclusion: Acutely durable PV isolation can be achieved when RF lesions are delivered with a mean CF ≥ 10 g (FTI >400 gs) and an interlesion distance < 5 mm. The majority of PVR occur anteriorly due to inadequate CF or long interlesion distances.

Disclosure of Interest: None declared

Benign versus malignant inferolateral early repolarization: The T wave makes the difference

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Introduction: Inferolateral early repolarization (ER) has a high prevalence and is associated with idiopathic ventricular fibrillation (IVF). However, our ability to identify the malignant variant is limited. We sought to explore the benefit of T wave parameters to discriminate benign and malignant ER.

Method: We compared ECGs of patients with ER and IVF with controls. The IVF group consisted of patients from our international registry on IVF and ER (n=92). Patients with ER from the French MOPOP study served as controls (n=248).

Results: Compared to controls, the IVF group had longer QTc intervals (388ms vs 377ms; p=0.001), taller J wave amplitudes (0.23mV vs 0.17mV; p<0.001), higher prevalence of dysmorphic T waves (29% vs 3%; p=0.001) and lower mean T/R ratios in leads II (25% vs 37%; p<0.001) and V5 (20% vs. 33%; p<0.001). The figure shows the ROC curves to discriminate benign and malignant ER based on T/R ratios in leads II and V5 (area under ROC curve 0.744 and 0.763, respectively). Combining the presence of dysmorphic T waves, a QTc interval >400ms, a T/R ratio <25% in leads II or V5 and a J wave amplitude >0.2mV was 91% sensitive and 52% specific for malignant ER.
Conclusion: Patients with malignant ER have a higher prevalence of dysmorphic T waves, a lower T/R ratio in leads II and V5 and a longer QTc interval. Combining these parameters with J wave amplitude allows to identify malignant ER with high sensitivity.

Disclosure of Interest: None declared

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Usefulness of electrocardiographic abnormalities for risk prediction in arrhythmogenic right ventricular cardiomyopathy
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Introduction: The value of electrocardiographic findings in predicting adverse outcome in patients with arrhythmogenic right ventricular cardiomyopathy (ARVC) is not well known. We hypothesized that ventricular depolarization abnormalities on the 12-lead surface electrocardiogram (ECG) predict adverse outcome in patients with ARVC.

Method: ECGs of 111 patients who fulfilled the 2010 ARVC Task Force Criteria (TFC) from three Swiss tertiary-care centers were digitized and analyzed with a digital caliper by two independent observers blinded for the outcome. ECGs were compared in two patient groups: (1) patients with major adverse cardiovascular events (MACE: a composite of cardiac death, heart transplantation, survived sudden cardiac death, ventricular fibrillation, sustained ventricular tachycardia or arrhythmic syncope) and (2) all remaining patients.
**Results:** 51 (46%) patients experienced MACE during a follow-up period with median of 4.6 (IQR 1.8-10.0) years. Kaplan-Meier analysis revealed a reduced MACE-free survival among patients with repolarization abnormalities according to TFC (p=0.009), a precordial QRS amplitude ratio ($\frac{\sum QRS_{mV V1-V3}}{\sum QRS_{mV V1-V6}}$) of ≤0.48 (p=0.019), and QRS fragmentation (p=0.045). In multivariable Cox regression, a precordial QRS amplitude ratio ≤0.48 (HR 2.92; 95% CI 1.39-6.15; p=0.005), inferior T wave inversions (TWI; HR 2.44; 95% CI 1.15-5.18; p=0.020), and QRS fragmentation (HR 2.65; 95% CI 1.1-6.34; p=0.029) remained as independent predictors of MACE.

**Conclusion:** In conclusion, in this multicenter observational long-term study, ECG findings were useful for risk stratification in patients with ARVC, with repolarization criteria according to TFC, inferior TWI, a precordial QRS amplitude ratio of ≤0.48, and QRS fragmentation constituting valuable variables to predict adverse outcome.

**Disclosure of Interest:** None declared
Oral Session 8
Antithrombotic therapy and coronary revascularization

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Short versus standard 12-month dual antiplatelet therapy duration after drug-eluting stent implantation
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Introduction: Current guidelines recommend up to 12 months dual antiplatelet therapy (DAPT) after drug-eluting stents (DES) implantation, however optimal DAPT duration after DES implantation is still a matter of debate. We aimed to evaluate clinical outcomes with short-term (<12 months) DAPT as compared to standard 12-months DAPT in patients treated with DES.

Method: In December 2013, we searched PubMed and conference proceedings for randomized trials directly comparing short-term (<12 months) versus 12-months DAPT after DES implantation. Random-effects meta-analyses were performed comparing clinical outcomes at 12 months in patients allocated to short-term DAPT and patients allocated to 12-months DAPT. Heterogeneity was assessed with I²-squared. The primary safety and efficacy endpoints were bleeding and the composite of cardiac death and myocardial infarction, respectively. The secondary safety endpoint was definite or probable stent thrombosis according to ARC criteria.

Results: We identified 3 trials: EXCELLENT (6-months vs. 12-months DAPT, N=1,443), RESET (3-months vs. 12-months DAPT, N=2,117), and OPTIMIZE (3-months vs. 12-months DAPT, N=3,119) – including a total of 6,679 patients with 12-months follow-up. At 12 months, short-term DAPT was associated with a reduced risk of any bleeding (RR 0.68, 95%CI 0.47-1.00) and a trend towards a reduced risk of major bleeding (RR 0.59, 95%CI 0.30-1.10) as compared to 12-months DAPT. With respect to efficacy, risks cardiac death or myocardial infarction (RR 1.10, 95%CI 0.82-1.47) and stent thrombosis (RR 1.30, 95%CI 0.50-3.36) did not differ between patients allocated to short-term DAPT compared with 12-months DAPT. Noteworthy, landmark analyses at the time of DAPT interruption showed that risks of cardiac death or myocardial infarction (RR 0.96, 95%CI 0.60-1.58) as well as stent thrombosis (RR 1.34, 95%CI 0.17-10.76) did not differ between the two groups after DAPT interruption up to 12 months follow-up. No evidence of significant heterogeneity was observed across trials for any of the analyzed endpoints.

Conclusion: Compared with standard 12-months DAPT, short-term DAPT reduces the risk of bleeding without compromising efficacy as indicated by similar risks of cardiac death, myocardial infarction and stent thrombosis throughout 12-months follow-up.

Disclosure of Interest: None declared

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Frequency and predictors of gastrointestinal bleeding in unselected patients undergoing percutaneous coronary intervention
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Introduction: Patients undergoing PCI with subsequent need for dual antiplatelet therapy are at risk for gastrointestinal bleeding (GIB) complications.

Method: Between March 2009 and June 2012, 6,190 patients with coronary artery disease underwent PCI at a tertiary care center and were prospectively followed for one year. Bleeding was assessed according to the BARC criteria (Type 2-5). Predictors of bleeding were examined using a case control design (1 case vs 5 controls). All patients were prescribed dual antiplatelet therapy consisting of aspirin and clopidogrel for a duration of 12 months, with the exception of STEMI patients who were treated with prasugrel instead of clopidogrel since September 2009 and NSTE-ACS patients who were treated with ticagrelor instead of clopidogrel since November 2011.

Results: A total of 210 patients (3.4%) had a bleeding event at one year follow-up, of which 62 (1%) bleeding events were due to gastrointestinal bleeding (GIB). GIB bleeding events were categorized as BARC 2 bleeding events in 24%, as BARC 3a bleeding events in 29%, and as BARC 3b bleeding events in 46% of cases.”
No GIB case was fatal (BARC 5a or b). In univariate analyses, current smoking (OR 1.9, 95%CI 1.1 – 3.9, p=0.02), anemia at admission (OR 1.9, 95%CI 1.05 – 3.5, p=0.035), and history of malignancy (OR 2.4, 95% CI 1.2 – 5.0, p=0.02) were predictors of GIB. In multivariate analyses, history of malignancy emerged as the only independent predictor of GIB (OR 2.3, 95% CI 1.0-5.1, p=0.049).

**Conclusion:** In this unselected PCI cohort, one third of all bleedings were gastrointestinal with a frequency of 1% at one year. History of malignancy emerged as the only independent predictor of GIB.

**Disclosure of Interest:** None declared

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**Safety and efficacy of concurrent administration of clopidogrel and prasugrel loading doses among patients with acute myocardial infarction undergoing primary percutaneous coronary intervention**

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**Introduction:** Current STEMI guidelines recommend the use of prasugrel in clopidogrel-naïve patients. We assessed the safety and efficacy of the concurrent administration of a clopidogrel and prasugrel loading dose (LD) among patients with acute STEMI undergoing primary PCI.

**Method:** Between September 2009 and October 2012, 2,025 STEMI patients were enrolled into the randomized COMFORTABLE AMI trial and the SPUM ACS cohort study. Patients were divided into three groups according to type of peri-procedural antiplatelet loading: (1) clopidogrel and subsequent prasugrel LD [CP], (2) prasugrel LD [P] (3) clopidogrel LD [C]. Safety was assessed by the composite of BARC type 3, 4, and 5 bleeding and efficacy by the composite of cardiac death, nonfatal MI and stroke, both at 30 days.

**Results:** Out of 2,025 patients, 428 (21.1%) had received CP, 447 (22.1%) P, and 1,150 (56.8%) C. At 30 days, the safety endpoint was observed in 1.9% of CP, 3.1% of P, and 2.9% of C patients (CP vs C adjusted HR 0.91; 95% CI 0.40-2.03). CP vs P adjusted HR 0.60; 95% CI 0.24-1.49). The efficacy endpoint tended to occur less frequent among CP compared with C patients (1.9% vs. 5.0%, adjusted HR 0.46; 95% CI 0.20-1.06) and no difference was observed between CP and P patients (1.9% vs 2.9%, adjusted HR 0.55; 95% CI 0.21-1.43).
Figure 1A.
Kaplan Meier curves for primary safety endpoint BARC 3,4, and 5

A

P+C vs P
HR (95%CI)=0.59 (0.25-1.41)
p=0.24

P+C vs C
HR (95%CI)=0.67 (0.31-1.44)
p=0.30

Number at risk
Clopidogrel 1150 1108 1089 1080 1077 1074 1069
Prasugrel 447 431 428 425 425 424 411
Prasugrel+Clopidogrel 428 417 414 414 413 413 404

Days since index procedure

Figure 1B
Kaplan Meier curves for primary efficacy endpoint cardiac death, non-fatal MI, and non-fatal stroke.

B

P+C vs P
HR (95%CI)=0.64 (0.26-1.54)
p=0.32

P+C vs C
HR (95%CI)=0.37 (0.18-0.78)
p=0.009

Number at risk
Clopidogrel 1150 1116 1098 1085 1084 1082 1076
Prasugrel 447 438 433 431 430 429 415
Prasugrel+Clopidogrel 428 422 419 419 417 417 408
Conclusion: Among STEMI patients pretreated with a clopidogrel and undergoing primary PCI, the concurrent loading with prasugrel appears to be safe and potentially more effective than loading with clopidogrel alone.

Disclosure of Interest: None declared
Use and impact of prasugrel in patients with acute coronary syndrome in Switzerland. Results from the amis plus registry

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Introduction: The anti-thrombotic effect of prasugrel is superior to clopidogrel in patients with acute coronary syndromes (ACS). However, an increased risk of bleeding in specific subgroups of patients may limit its widespread use. The aim of this study was to follow the impact of prasugrel on clinical outcomes from its introduction on the Swiss market and to compare it to a clopidogrel-based strategy.

Method: Consecutive ACS patients enrolled in the AMIS Plus Registry between January 1, 2010 and December 31, 2013 were included in the analysis. Patients were stratified according to the P2Y12 inhibitor they received (prasugrel vs. clopidogrel) and in-hospital outcomes were compared using propensity score matching for six key predictive factors.

Results: Out of 8,082 patients, 2,770 received prasugrel (34%) and 5,312 clopidogrel (66%). Prasugrel use increased from 20.4% in 2010 to 48.1% in 2013, while clopidogrel use decreased from 76% to 51.9% (both <0.001). Among patients receiving prasugrel, 7.4% were aged >75 years, 4.5% weighed <60 kg, and 2.0% had a history of a cerebrovascular ischemic event. Prasugrel-treated patients were younger than those receiving clopidogrel (59.3±10.7y vs. 68.5±12.7y; p<0.001), had less pre-existing coronary artery disease (23.7% vs. 36.1%; p<0.001), fewer comorbidities (Charlson Comorbidity Index ≥2 13.1% vs. 26.8%; p<0.001), and underwent percutaneous coronary intervention (PCI) more frequently (97.0% vs. 82.5%; p<0.001). Prasugrel had a good safety profile with no differences in the unadjusted bleeding rate (3.9% vs. 3.3%; p=0.09), and good efficacy with similar rates of reinfarction (0.8% vs. 0.8%; p=0.69) and stroke (0.4% vs. 0.7%; p=0.07). Crude in-hospital mortality was reduced in prasugrel vs. clopidogrel treated patients (1.4% vs. 4.6%; p<0.001). After propensity score matching (n=2,153 patients in each group), prasugrel patients had a higher rate of bleeding (4.0% vs. 2.4%; p=0.002) but lower in-hospital mortality (1.3% vs. 2.8%; p=0.001).

Conclusion: In Switzerland, prasugrel is predominantly used in younger STEMI patients treated with PCI. In the propensity score-matched analysis prasugrel exerted a significant net clinical benefit.

Disclosure of Interest: None declared

Impact on clinical outcome of high/low on-clopidogrel platelet reactivity according to concordant platelet function tests

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Introduction: To evaluate the impact of high and low on-clopidogrel platelet reactivity (HPR/LPR) on clinical outcome according to the number of concordant platelet function tests (PFT).

Method: HPR and LPR were prospectively identified in 624 patients exposed to a maintenance dose of aspirin and clopidogrel for at least 7 days having at least 2 different PFT techniques performed simultaneously. HPR and LPR were defined as VASP PRI ≥50% / <15%, P2Y₁₂ reaction units (PRU) ≥208 / <86 (VerifyNowP2Y₁₂ assay) or a residual platelet aggregation (RPA) ≥46.2% / <10% (light transmission aggregometry), respectively. The primary composite end point of all-cause mortality, non-fatal myocardial infarction, stent thrombosis, sudden cardiac death, urgent revascularization, and stroke was analyzed according to one PFT only, 86 (14%) and 50 (8%) according to two and three PFT, respectively. Independent predictors of HPR (defined with ≥ 1 test) were diabetes status and carriage of the loss-of-function allele CYP2C19*2. The primary endpoint occurred in 3.8 % of the patients with good response as compared to 9.0 % of the patients with HPR (OR 2.53, 95% CI 1.27-5.05, p=0.007). There was a stepwise increase according to the number of PFT demonstrating HPR (7.7 % vs. 7.0 % vs. 16.0 % according to 1, 2 and 3 concordant tests, respectively, p for trend = 0.0054).
The presence of 3 concordant tests remains independently associated with the occurrence of the primary endpoint during follow up after multiple adjustments (adjusted OR 3.62, CI 1.49-8.81). The primary safety endpoint did not differ significantly according to LPR status and according to the number of PFT demonstrating LPR.

**Conclusion:** Multiple testing may reflect better the complexity of platelet function, improving the specificity of HPR and prediction of future cardiovascular ischemic events. This finding should deserve consideration in future clinical trials of personalized antiplatelet therapy.

**Disclosure of Interest:** None declared

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**Prasugrel increases bleeding complications and surgical re-exploration rates compared with clopidogrel in coronary artery bypass surgery**

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**Introduction:** We hypothesized that patients treated with prasugrel compared with those treated with clopidogrel prior to coronary artery bypass surgery (CABG) are at increased risk of hemorrhagic complications and of needing transfusions, and are more likely to need surgical re-exploration.

**Method:** Pre- and postoperative clinical data were collected prospectively on 143 consecutive patients treated preoperatively with prasugrel (n=59) or clopidogrel (n=84) before undergoing isolated CABG at our institution from January 2011 to October 2012.

**Results:** Patients receiving prasugrel showed a slightly higher additive Euroscore I compared with those treated with clopidogrel (7 vs. 5, p=0.001), and more often underwent urgent/emergent CABG (47% vs. 27%, p=0.01). Patients treated with prasugrel were more likely than those treated with clopidogrel to need perioperative platelet transfusions (25% vs. 12%, p=0.04). The numbers of transfusions of red blood cells, fresh frozen plasma or fibrinogen were high in both groups but showed no statistical differences. Patients treated with prasugrel, however, more often needed surgical re-exploration for bleeding complications (8% vs. 1%, p=0.03). Logistic regression revealed that preoperative therapy with prasugrel (RR 2.9, p=0.01) and urgent/emergent surgery (RR 2.2, p=0.04) were predictors for the composite endpoint “need for perioperative platelet transfusion and/or surgical re-exploration”.

**Conclusion:** Pretreatment with prasugrel, compared with clopidogrel, in patients undergoing isolated CABG is associated with an increased need for platelet transfusions and a higher risk of surgical re-exploration for bleeding complications.

**Disclosure of Interest:** None declared
Is a short cut better? Transapical versus transfemoral transcatheater aortic valve implantation
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Introduction: Transcatheter Aortic Valve Implantation (TAVI) is a valid option for high risk patients (pts) needing aortic valve replacement. The transapical (TA) route offers obvious technical advantages due to the direct access to the aortic valve but is more invasive than the transfemoral (TF) approach. We compare acute procedural results using both approaches.

Method: This is a single-center retrospective analysis of a prospectively collected data. From December 2008 to December 2013, 101 patients (age 82.7 ± 6.6 years, 41% female) undergoing TAVI. 74 pts (73.3%) had a percutaneous trans-femoral access (group TF), while the remaining 27 (26.7%) had been operated via a trans-apical surgical approach (group TA).

Results: The two groups were similar in terms of age, gender and logistic Euroscore as shown in Table 1. The TA approach resulted in shorter operation times, less radiation exposure and contrast dye utilization (Table 2). Early mortality (30 days), mayor complications and postoperative length of stay (postoperative LOS) were similar between the groups (Table 2).

Table 1. Preoperative Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Group TA (n=27)</th>
<th>Group TF (n=74)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, years</td>
<td>82.8 ± 5.2</td>
<td>82.7 ± 7.07</td>
<td>0.9</td>
</tr>
<tr>
<td>Female gender(%)</td>
<td>8 (29.6%)</td>
<td>34 (45.9%)</td>
<td>0.2</td>
</tr>
<tr>
<td>Log Euroscore</td>
<td>27.93±18.07</td>
<td>22.7±18.8</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Picture / graph:
Conclusion: The TA-TAVI is more efficient and results in similar early outcomes compared to the TF approach in our setting.

Disclosure of Interest: None declared

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Validation of the valve academic research consortium definition of bleeding among patients undergoing transcatheter aortic valve implantation

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Introduction: Bleeding is a common complication after transcatheter aortic valve implantation (TAVI) and associated with impaired clinical outcome. The Valve Academic Research Consortium (VARC) has recently proposed an updated version of endpoint definitions. Whether the bleeding definition according to VARC is best in predicting clinical outcomes among patients undergoing TAVI has not been evaluated.

Method: Between August 2007 and April 2012, 489 patients underwent TAVI using different devices and access routes. Bleeding events were prospectively collected and assessed according to VARC, Bleeding Academic Research Consortium (BARC), Thrombolysis in Myocardial Infarction (TIMI) and the Global Use of Strategies to Open Occluded Arteries (GUSTO) definition. The primary outcome was all-cause mortality at 30 days.
Results: Overall 152 bleeding events occurred in 130 patients (26.6%) during the peri-procedural in-hospital stay and were mainly related to access-site complications (n=101, 66.4%). Life-threatening bleeding (LT) according to VARC was associated with a significant increase in 30-day (HR 4.3, 95%CI 2.0-9.4) and one-year mortality (HR 2.0, 95%CI 1.2-3.5). The predictive accuracy of VARC LT bleeding for all-cause mortality at 30 days was 86% with a sensitivity of 36% and a specificity of 89%. The predictive ability of a multivariate model for 30-day mortality (c-statistics 0.744) was improved after adding LT bleeding according to VARC (c-statistics 0.773, p<0.001) to an extent similar to the criteria of BARC≥3 (c-statistics 0.776, p=0.002), TIMI major (c-statistics 0.768, p=0.001) and GUSTO severe or LT (c-statistics 0.791, p<0.001).

Conclusion: Life-threatening bleeding according to the VARC criteria in the peri-procedural phase after TAVI was associated with a significant increase in all-cause mortality at 30-days and one-year after the intervention. The predictive ability of LT bleeding according to VARC for all-cause mortality at 30-days was comparable to the definition of BARC≥3, TIMI major and GUSTO severe or LT.

Disclosure of Interest: None declared

Localization and natural course of paravalvular regurgitation after implantation of the self-expanding corevalve: Insights from serial tee measurements

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Introduction: Evidence indicates that paravalvular regurgitation (PAR) may improve after transcatheter aortic valve implantation (TAVI) in a subset of patients. However, precise assessment of PAR is difficult with transthoracic echocardiography, and the degree of improvement is unknown.

Method: Transoesophageal echocardiography (TEE) studies were performed at 30 days and 1 year after transcatheter aortic valve implantation (TAVI) with a CoreValve for the treatment of severe native aortic valve stenosis. In addition to conventional measurements, PAR orifice area, angle, and length were assessed in the cross-sectional short axis view at the level of the native aortic annulus (Figure 1).

Results: A total of 47 patients were investigated with TEE at 30 days and at 1 year post TAVI. Figure 2 shows the location and frequency of PAR jets at 30 days (2A) and at 1 year (2B). PAR was predominantly localized at the commissure of the non-coronary and left-coronary cusp (30% of patients) and in the middle of the left-coronary cusp (28% of patients), and much less frequently at other parts of the native valve. At 30 days, 25 patients (53%) had no PAR, 14 (30%) had 1 jet, and 8 (17%) had 2 or more jets (a maximum of 4 jets). At 1 year, there were 28 patients (60%) without PAR, 15 (32%) had 1 jet, and the remaining 4 (9%) had 2 or more jets. Between 30 days and 1 year, cumulative cross-sectional area of regurgitation decreased from 0.11 cm² to 0.06 cm² (p = 0.02), cumulative regurgitation circumference decreased from 31 degrees to 18 degrees (p < 0.01), and cumulative regurgitation length decreased from 6.9 to 3.6 mm (p < 0.01) indicating a decrease of PAR by about 45%.
Figure 1. The principle of paravalvular aortic valve regurgitation assessment
Measurements were performed in the short-axis (30-50 degree) view with transoesophageal echocardiography at 30 days (Figure 1A) and 1 year post procedure (Figure 1B).
Conclusion: PAR following TAVI with the CoreValve is predominantly localized around the left‐coronary cusp. PAR area as visualized by Color‐Doppler TEE in the short axis view decreased by about 45% between 30 days and 1 year post procedure. The reason for this improvement is unknown but annular remodeling, endothelial neoformation and fibrous tissue hyperplasia may play a role.

Disclosure of Interest: None declared

Prosthesis‐specific predictors of paravalvular regurgitation after transcatheter aortic valve implantation: Impact of calcification and sizing on balloon‐expandable versus self‐expandable transcatheter heart valves

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Introduction: Paravalvular aortic regurgitation (PAR) is frequently observed after transcatheter aortic valve replacement (TAVR). As self‐expandable and balloon‐expandable transcatheter heart valves (THV) engage differently with the native aortic valve structures, factors that impact PAR may differ between prosthesis types. Hence, the aim of this study was to investigate prosthesis specific predictors for PAR in self‐expandable versus balloon‐expandable THVs.

Method: 137 TAVR patients with pre‐procedural multi‐slice computed tomography and post‐procedural transthoracic echocardiography were studied. Predictors for PAR including annulus area and perimeter oversizing as well as aortic valve calcification mass and volume were analyzed in a multivariate model.
Results: The Medtronic CoreValve (MCV) prosthesis was utilized in 68 (50%) patients, and the Edwards SAPIEN (ES) in 69 (50%), respectively. More than mild PAR was observed in 43 (32%) patients. In MCV patients, aortic valve calcification volume and mass were higher in patients with more than mild PAR compared to those with none or mild PAR (p=0.04 and p=0.03). In ES patients, annulus area and perimeter undersizing was higher in patients with more than mild PAR compared to those with no or mild PAR (p=0.001). By multivariate logistic regression analysis, aortic valve calcification mass was the only independent predictor for PAR in MCV patients (p=0.02), while in ES patients the only independent predictor was THV undersizing (p=0.001) irrespective of calcific burden.

Conclusion: For self-expandable THV, aortic valve calcification mass was the strongest predictor for PAR, while in balloon-expandable THV, it was prostheses undersizing. Hence, in patients evaluated for TAVI these parameters should guide selection of the prosthesis type.


Long-term clinical outcome of high-risk patients with severe aortic stenosis according to treatment modality: TAVI vs. SAVR vs. medical treatment

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Introduction: To assess long-term clinical outcome of high-risk patients with severe aortic stenosis as a function of treatment allocation to TAVI, surgical aortic valve replacement (SAVR), or medical treatment (MT) after interdisciplinary assessment within the Heart team.

Method: Patients with symptomatic severe aortic stenosis were consecutively enrolled into a prospective single center registry.

Results: Between April 2007 and September 2010 a total of 442 patients (age 82±6 years) at increased risk for surgery (log. EuroSCORE 22±15) were allocated to MT (n=78, STS-score 6.5±4.1), SAVR (n=107, STS-score 4.8±5.3), or TAVI (n=257, STS-score 6.4±5.0). After a mean duration of follow-up of 48±10 months all-cause mortality among patients undergoing MT, SAVR or TAVI amounted to 81%, 37% and 43%, respectively (p<0.001). The hazard ratio for a composite endpoint of death, major stroke, and myocardial infarction was significantly lower in patients treated with SAVR as compared to MT in an adjusted analysis (SAVR versus MT: HR 0.31, 95% CI 0.21-0.46) (TAVI versus MT: HR 0.34, 95% CI 0.25-0.46). No significant difference in the risk of the composite endpoint was documented between patients treated with SAVR as compared to TAVI (adjusted HR 0.88, 95% CI 0.62-1.25). Valve-related repeat interventions beyond 30 days occurred in 3 patients with TAVI and in none of the patients undergoing SAVR. Eleven patients from the MT arm crossed over to TAVI (n=9) or SAVR (n=2) after a mean of 21±12 months and experienced a significant survival benefit as compared to patients with no conversion of treatment strategy. In a multivariate analysis across the entire cohort, SAVR (HR 0.39, 95% CI 0.24-0.61; p<0.001), TAVI (HR 0.37, 95% CI 0.26-0.52), and female gender (HR 0.72, 95% CI 0.53-0.99) were associated with improved survival. In turn, BMI ≤20kg/m2 (HR 1.60, 95% CI 1.04-2.47), diabetes (HR 1.48, 95% CI 1.03-2.12), peripheral vascular disease (HR 2.01, 95% CI 1.44-2.81), atrial fibrillation (HR 1.74, 95% CI 1.28-2.37), and severe pulmonary hypertension (HR 1.43, 95% CI 1.03-2.00) were identified as independent predictors of all-cause mortality.

Conclusion: In this selected cohort of high-risk patients with severe aortic stenosis assessed within the Heart team, long-term clinical outcome through 5 years of follow-up was comparable between patients treated with SAVR or TAVI in an adjusted analysis. Patients with medical treatment had a dismal prognosis.

Disclosure of Interest: None declared
Introduction: The SWISS TAVI Registry was established as a national collaboration among the Swiss Working Group of Interventional Cardiology and the Swiss Society of Cardiac Surgery to prospectively assess the safety and efficacy of TAVI in Switzerland.

Method: The SWISS TAVI Registry is a national, prospective, multicenter, centrally monitored registry, which provides procedural and clinical outcomes of patients undergoing TAVI at Swiss cardiovascular centers. Data are entered in an online database (www.swisstaviregistry), which is maintained and monitored by an independent Clinical Trials Unit.

Results: From 02/2011 to 02/2013, a total of 697 patients were entered into the SWISS TAVI registry and prospectively followed at 30 days. The majority of patients underwent TAVI as treatment for native aortic valve stenosis (98.1%), while 1.6% and 0.3% received TAVI for degenerative aortic bioprosthesis and severe aortic regurgitation, respectively. Patients were elderly (mean age 82.4±6 years), similarly distributed according to gender (females 52%) and highly symptomatic (73.1% NYHA III or IV). Patients with severe aortic stenosis (mean gradient 44.8±17mmHg, aortic valve area 0.7±0.3cm²) either were deemed inoperable or at high risk for conventional surgery (STS Score 8.2±7). Accordingly, comorbidities were commonly encountered: peripheral vascular disease (19.7%), chronic obstructive pulmonary disease (15.6%) and coronary artery disease (56.0%). Patients undergoing TAVI were treated with the Medtronic CoreValve (48.4%), Edwards Sapien (45.7%), JenaValve (3.3%) and Symetis Acurate TA valve (2.4%). The majority of patients received TAVI using the femoral access (79.1%), while 18.1% were treated through the transapical access and in 2.8% alternative access routes were used. All clinical events were reviewed by an independent clinical event committee and adjudicated according to the VARC endpoint definitions. At 30 days, all cause mortality occurred in 4.8%, cerebrovascular events in 3.3% (major stroke 2.5%), bleeding was as frequent as 16.6% (life threatening bleeding 6.3%), vascular access site complications as 11.9% (major vascular complications 6.5%) and acute kidney injury occurred in 7.3% of patients.

Conclusion: The SWISS TAVI registry is a prospective, national, centrally monitored cohort study recording consecutive TAVI procedures in Switzerland. The first outcome report based on independently adjudicated events shows favorable procedural and clinical outcomes in unselected TAVI patients.

Disclosure of Interest: None declared
Histopathological characterization of thrombi harvested from occluded coronary during primary percutaneous coronary intervention - TOC trial

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Introduction: Dynamic evolution of thrombus formation and etiology of sudden occlusive coronary thrombosis are still open questions. Histopathological studies of aspirated intracoronary have been recently initiated in order to identify relationship between thrombi composition and clinical outcomes. Large variability in analytical approaches and reports has impaired the definition of consensual concepts. We analyzed the thrombi composition characterization of retrieved material after aspiration during percutaneous coronary intervention and identified relationship with clinical status.

Method: Thrombi from 70 patients who underwent primary percutaneous coronary intervention (PCI) were harvested from the occluded coronary artery segment. Retrieved material was fixed with paraformaldehyde, embedded in paraffin and processed for histology. Plaque and thrombus components were identified using immunostaining (macrophages, thrombocytes), Movat's Pentachrome (Elastin, Fibrin) and H&E staining. Red Blood Cell (RBC) agglomeration was scored. Non parametric Mann-Whitney U and Kruskal-Wallis tests were performed to compare groups.

Results: Diabetes and hypertension were associated with significant increase in RBC agglomeration indicative of old thrombi. Hypercholesterolemia was associated with lower macrophage density. Thrombi from patients with family cardiac history showed lower fiber and higher RBC contents. Using a cluster hierarchical analysis we observed an important categorization of the thrombi. The only feature that significantly differs among categories was the platelets contents (figure 1). Interestingly the platelet density did not correlate with ischemic time (all ischemic time < 6 hours).

Figure 1: Five categories were obtained from hierarchical clustering. They significantly varied according to their platelets density.
**Conclusion:** Our study does not corroborate the relation between ischemic time and platelet density. When ischemic time is less than 6 hours, the variation in platelets composition of the thrombi may indicate different mechanisms of thrombosis.

**Disclosure of Interest:** None declared

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**Cardiovascular screening in middle-aged individuals engaged in high intensity sport activities: Implications, yield and cost-analysis**

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**Introduction:** the European Association of Cardiovascular Prevention and Rehabilitation (EACPR) has recently edited the recommendations for cardiovascular screening in middle-aged individuals engaged in sport activities. However, very few data exist concerning the impact of such position stand. Our study aimed to assess implications, yield and costs of this preventive evaluation.

**Method:** we conducted a prospective observational multicenter study including individuals aged 35 to 65 years engaged in high intensity sport activities and free from cardiac diseases. Athletes were examined following the EACPR protocol including history, physical examination, 12-lead resting electrocardiogram (ECG) and risk stratification according to the Systematic Coronary Risk Evaluation (SCORE). Athletes with abnormal findings at screening or at high cardiovascular risk underwent additional examinations. The costs of the overall screening program until diagnosis were calculated according to Swiss medical rates.

**Results:** from January to December 2013 we enrolled 761 athletes (73% males, 46.8±7.3 years). Running (33%) and cycling (23%) represented the most popular sports. The mean training volume during the last year was 5.7±4.1 hours/week. A total of 110 athletes (14.4%) required additional examinations: 13 (1.7%) due to history, 34 (4.5%) due to physical examination, 40 (5.3%) because of abnormal ECG and 32 (4.2%) due to high cardiovascular risk (SCORE system). A previously unknown cardiovascular abnormality was established in 20 (2.6%) athletes, severe hypercholesterolemia (> 8 mmol/l) in 8 (1.0%) athletes while type 2 diabetes was discovered in 1 (0.1%) athlete. Three (0.4%) athletes were considered not eligible for high intensity physical exercise (due to hypertrophic cardiomyopathy, old myocardial infarction with ventricular arrhythmia and 50 mm aneurysm of ascending aorta). The cost was 137'503 Swiss Francs (CHF) for the overall program, 181 CHF per athlete and 4’741 CHF per finding.

**Conclusion:** cardiovascular screening in middle-aged athletes allows the detection of a significant number of new cardiovascular abnormalities and major cardiovascular risk factors, precluding in selected cases high intensity physical exercise. The overall screening program seems to be feasible at reasonable costs.

**Disclosure of Interest:** None declared

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**The association between resistin concentrations and the occurrence of cardiovascular disease in older persons: The health, aging and body composition (Health ABS) study**

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**Introduction:** Serum resistin is implicated in promoting insulin resistance and inflammation. Prospective data regarding the association between resistin levels and cardiovascular (CVD) outcomes are sparse.

**Method:** We studied 3044 older adults aged 70-79 years at baseline from the Health, Aging, and Body Composition Study. Using Cox regression model, we assessed hazard ratio (HR) according to quartiles of serum resistin concentrations for the risk of “hard” coronary heart disease (CHD) events, “hard CHD” events plus hospitalization for angina or coronary revascularization (total CHD events), stroke, and total CVD events (CHD and stroke events). We adjusted the association for the age, gender, race, total and HDL-cholesterol, triglycerides, fasting glucose, systolic blood pressure, smoking, body mass index, creatinine, and history of CVD, diabetes, and hypertension.
We further adjusted for biomarkers of inflammation and insulin resistance (HbA1c, insulin, leptin, adiponectin, C reactive protein, interleukin-6 and tumor-necrosis factors-α).

**Results:** During a median follow-up of 11.5 years, 884 participants developed CHD events (559 "hard" events), 333 stroke events and 1106 CVD events; all these events were associated with resistin concentrations. In clinical variables adjusted model, HRs of resistin (highest -24.31 ng/ml vs. lowest quartile-14.01 ng/ml-) were 1.38 (95%CI 1.14-1.67) for CHD events (P=0.002 for trend), 1.47 (95%CI 1.16-1.87) for "hard" CHD events (P=0.001 for trend) and 1.33 (95%CI 1.11-1.58) for CVD events (P=0.003 for trend), but was not significant for stroke 1.27 (95% CI 0.93-1.73; P0=0.13 for trend). After further adjustment for biomarkers of inflammation and insulin resistance, these associations were attenuated; 1.17 (95% CI 0.94-1.47) for CHD events, 1.22 (95% CI 0.92-1.60) for "hard" CHD events and 1.07 (95% CI 0.88-1.31) for CVD events.

**Conclusion:** Among older adults, higher resistin levels were associated with an increased risk of CHD and CVD events independently of clinical variables. The association is partially interdependent with biomarkers of insulin resistance and inflammation.

**Disclosure of Interest:** None declared

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**Plasma endothelin-1 and cardiovascular risk among young and healthy adults**

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**Introduction:** Elevated endothelin (ET-1) levels seem linked to endothelial dysfunction and atherosclerosis. The aim of this study was to assess the relationship between plasma levels of endothelin-1 and cardiovascular risk among young and healthy individuals.

**Method:** We performed a population-based study among 1569 healthy adults aged between 25 and 41 years in the Principality of Liechtenstein. Individuals with prevalent cardiovascular disease, diabetes or a body mass index >35 kg/m² were excluded. ET-1 was measured from plasma samples using a novel single-molecule counting technology (Erenna Immunoassay System, Singulex). Relationships of ET-1 with cardiovascular risk factors were assessed by multivariable regression analyses.

**Results:** Median age of our population was 38 years. Median ET-1 levels across sex-specific ET-1 quartiles were 1.87, 2.33, 2.74 and 3.49 pg/mL. There were significant correlations of ET-1 with systolic blood pressure, C-reactive protein, glomerular filtration (GFR) rate and current smoking. In fully adjusted models, the β-regression coefficients (95% CI) for log-transformed ET-1 levels per 1-point increment were 2.69 (1.16; 4.22), p=0.0001 for systolic blood pressure, 0.21 (95% CI 0.07; 0.35, p=0.003) for C-reactive protein and -2.03 (95% CI -3.68; -0.38, p=0.003) for GFR. Among current smokers, multivariable analysis revealed an odds ratio of 2.28 (95% CI 1.54; 3.39, p<0.0001) per 1-unit increase in log transformed ET-1. Using the PROCAM and Reynolds risk scores as measures for overall cardiovascular risk, highly significant associations with ET-1 were observed on a continuous scale as well as across ET-1 quartiles (Table).
Conclusion: Plasma levels of ET-1 correlate with several major cardiovascular risk factors and global cardiovascular risk among young and healthy adults. These findings underscore the intricacy of endothelial dysfunction and support its central role in the early determination of cardiovascular events.

Disclosure of Interest: M. Bossard: None declared, St. van der Lely: None declared, St. Aeschbacher: None declared, T. Schoen: None declared, Ph. Krisai: None declared, T. Lam: None declared, J. Todd Conflict with: John Todd is an employee of Singulex Inc., M. Risch: None declared, L. Risch: None declared, D. Conen: None declared
Oral Session 11
Imaging and congenital «assessing outcome»

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Long-term outcome of patients with idiopathic left ventricular aneurysms and diverticula presenting with arrhythmic manifestations
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Introduction: Patients with idiopathic left ventricular aneurysms and diverticula (LVA/D) may initially present with arrhythmic manifestations. The clinical outcome of these patients has not been reported to date.

Method: Since 1990, 250 patients were diagnosed to have a congenital LVA/D using transthoracic echocardiography. All patients in the study cohort presented clinically with arrhythmic manifestations at baseline. This included ECG documentation of ventricular tachyarrhythmias or ectopic beats, or clinical symptoms suggesting the presence of an underlying arrhythmia, such as palpitations or presyncope / syncope.

Results: 30 patients had ventricular arrhythmias or presyncope/syncope at initial presentation. During a follow-up of 85 months, spontaneous ventricular tachycardia (VT) occurred in 17 patients (57%). VTs were sustained in 13 patients, with a monomorphic pattern in 9 patients. In 11 patients who underwent electrophysiologic testing, 9 had an inducible VT/VF. 7 of these had a sustained monomorphic VT with the same morphology as during clinical arrhythmia. 20 patients were treated with antiarrhythmic agents. 11 patients received an implantable cardioverter defibrillator (ICD). One patient underwent surgical resection of LVA. Three patients underwent successful catheter ablation for incessant VTs. Two of them were free of any clinically relevant arrhythmia during follow-up. Three patients died 10, 41 and 89 months after initial presentation. In two of them, the cause of death was attributed to ventricular arrhythmia. Among the patients who had received an ICD, appropriate device discharges were observed in 8 patients (73%) during follow-up a follow-up of 61 months.

Conclusion: The clinical outcome of patients with idiopathic LVA/D and arrhythmia is variable. VTs in these patients are often monomorphic and have right-bundle-branch block morphology. The clinical VTs are usually inducible during electrophysiologic study, and hence, this test may play a role in risk stratification. Appropriate discharges are common in ICD recipients with this disorder.

Disclosure of Interest: None declared

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Marfan syndrome and related connective tissue disorders in the current era in Switzerland: A retrospective analysis of 117 patients
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Introduction: Marfan syndrome (MFS) and related connective tissue disorders (CTD) are increasingly recognized. Genetic testing is often performed. There are few data on the exact presentation, evaluation and treatment of patients with these disorders in the current era in Switzerland.

Method: A large cohort of patients (pts) with MFS and related CTD were identified from 5 centers within the canton of Zurich. A retrospective analysis of echocardiographic findings, genetic testing results, medication and need for surgery was performed. MFS was diagnosed using the new Ghent criteria (including FBN1 genetic testing as appropriate), other CTD (Loeys Dietz syndrome or TGFβ mutations) were diagnosed by genetic testing only.

Results: A total of 117 pts were identified (51 index patients, 66 relatives of family members) with MFS (104 pts) or other CTD (13 pts). 54 males (46%), median age was 21yrs (0.5-75). Genetic testing has been performed in 82/117 patients (73%); a FBN1 mutation was present in 66/82 (79%); other mutations could be identified in 5 pts; no mutations yet were found in 11 pts fulfilling the MFS criteria.
The average systemic MFS score according to the new Ghent criteria was 4.4 (range: 0-16). A history of aortic dissection was present in 16/117 patients (14%). Cardiac surgery was needed in 37 cases (32%); aortic root surgery in 35 (31%) and mitral valve surgery in 5 cases (4%); >1 possible. Echocardiographic data were available in 105 patients: Aortic root enlargement (Z score >2) was present in 41 and MVP (mitral valve prolapse) in 64 patients. Medication such as beta-blockers (BB), angiotensin receptor blockers (ARB), or ACE inhibitors were taken by 68 pts (60%): BB by 43 pts, ARB by 44 pts and ACE inhibitors by 14 pts (>1 possible).

Conclusion: In this cohort, probably representative for Switzerland, a high percentage of patients with suspected MFS undergo genetic testing often leading to or confirming the diagnosis MFS. Cardiac surgery is most often needed for the aortic root and rarely for the mitral valve. Only 60% of patients are under therapy with beta-blockers and/or sartans, which needs improvement.

Disclosure of Interest: None declared

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3-D echocardiography to predict arrhythmia recurrence after atrial fibrillation ablation
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Introduction: Arrhythmia recurrence after atrial fibrillation (AF) ablation is high and requires repeat interventions in a substantial number of patients. We assessed the value of 3-D echocardiography to predict AF recurrence.

Method: Consecutive patients undergoing AF ablation were included at a tertiary cardiology center. A 3-D echocardiography was obtained prior to the ablation procedure, and analyzed offline in a standardized manner. The primary endpoint, AF recurrence (>30 sec.) between 3 and 12 months after AF ablation, was independently adjudicated.

Results: We included 178 patients (72% male, mean age 61±10 years). Paroxysmal and persistent AF were present in 123 (69%) and 55 (31%) patients, respectively, 91 (51%) had hypertension, 10 (6%) had a history of coronary disease and 15 (8%) patients had valvular heart disease. Mean ejection fraction and indexed left atrial volume (LAVI) were 53±12% and 42±13 ml/m², respectively. AF recurrence was observed in 79 (44%) patients. Median (IQ) time to AF recurrence was 149 (92; 297) days. In univariate Cox regression models, the only significant predictor for AF recurrence was LAVI with a hazard ratio (HR) of 1.02 per 1ml/m² (95% confidence interval (CI) 1.00 - 1.04), p=0.005. Results of the multivariable Cox models confirmed these findings and are shown in the Table. Quartile specific analysis of LAVI showed a HR of 2.65 (95%CI 1.18 - 5.53) in the highest compared to the lowest quartile.

Conclusion: Our results implicate that 3-D measured LA volume but not 2-D measured LA diameter is an independent predictor of arrhythmia recurrence after AF ablation. These data underscore the potential of 3-D echocardiography in this context.
The effect of septal versus apical right ventricular pacing on left and right ventricular performance: A cardiac magnetic resonance imaging study

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Introduction: The benefit of a septal compared to an apical lead position in right ventricular pacing is controversial. However, this was never investigated using cardiac magnetic resonance imaging (CMR). CMR is superior compared to conventional imaging modalities like echo especially for right ventricular (RV) assessment. Only very recently full body scan magnetic resonance imaging (MRI) compatible pacemakers (PM) became available. We studied the effect of an apical compared to a septal lead position regarding right and left ventricular function using CMR.

Method: All patients had a dual chamber Accent MRI Pacemaker system (St. Jude Medical) implanted. Only patients with a sufficient intrinsic rhythm were included in the study. Patients were first scanned with the PM switched on (PM on), immediately after they had a second scan with the PM switched off (PM off). The pacing mode was set to D00 with a short (100msec) AV delay for all patients to avoid intrinsic conduction during the “PM on” CMR. The base rate was set 10-15 beats above the intrinsic rhythm to avoid concomitant intrinsic atrial activity for the “PM on” CMR.

Results: 8 patients were included in the study (mean age 71.4 ± 9.2, 50% female). All patients had underlying sinus rhythm with normal AV conduction at the time of the CMR. 3 patients had a septal lead position and 5 patients an apical lead position. The indication for the pacemaker was sick sinus syndrome in 4 patients, symptomatic intermittent second degree AV block in 3 patients, and an intermittent complete heart block in one patient. Left ventricular ejection fraction (LVEF) and right ventricular ejection fraction (RVEF) were 60.2 ± 13.4% and 50.5 ± 5.0% respectively. LVEF decreased significantly with right ventricular apical pacing (-8.7%; p=0.01) but not with septal RV pacing (-4.2%; p=NS). In addition, RVEF decreased significantly with RV apical pacing (-8.6%; p=0.05), but not with septal pacing (-0.1% p=NS). Looking at left ventricular (LV) strain there was a significant decrease in LV longitudinal strain with RV apical pacing (-8.2%; P=0.04) but it did not change with RV septal pacing (0.5% p=NS). The MR images exhibited little artefacts in evaluating cardiac structures.

Conclusion: Using CMR imaging we could demonstrate a decrease of LVEF and RVEF with RV apical pacing. Furthermore, LV longitudinal strain is decreased with apical pacing as well. Most of these negative effects of RV apical pacing can be avoided with a septal lead position.

Disclosure of Interest: None declared
Congestive heart failure with concomitant tachyarrhythmia: Predictors for tachycardiomyopathy

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Introduction: Differential diagnosis of tachycardiomyopathy (TC) from other cardiomyopathies remains challenging in patients presenting with new onset congestive heart failure (CHF) and concomitant tachyarrhythmia. Given the benign prognosis of TC defining clinical associates that predict complete resolution of left ventricular systolic dysfunction (LVSD) after rhythm/rate control are utterly needed. Therefore, the aim of this study was to determine the factors that predict complete resolution of LVSD in patients with new onset CHF and concomitant tachyarrhythmia.

Method: Using an institutional echo database we screened for patients with new onset LVSD (LV ejection fraction (LVEF) ≤40%) in the presence of tachyarrhythmia (non-sinus rhythm ≥100 beats per minute (bpm)). Hospital charts of 71 patients meeting inclusion criteria were reviewed with respect to patient characteristics and pharmacologic and non-pharmacologic management. After six months follow-up, baseline characteristics of patients with normalized LVEF≥50% (suspected TC patients) were compared with those of patients with persistent LVSD (LVEF<50%).

Results: Patients were 58 (IQR 51–67) years old, mostly symptomatic (89% NYHA ≥ II), with a median heart rate of 118 bpm (IQR 100–130) and a median LVEF of 30% (IQR 25–38). Arrhythmias included atrial fibrillation (80%), atrial flutter (16%) and ectopic atrial tachycardia (4%). Besides recommended heart failure medication, patients were treated with electroconversion (44%), radiofrequency ablation (31%) and amiodarone (41%). After a median follow-up time of six months median LVEF improved to 50% (IQR 44–55) and median heart rate was 65 bpm (IQR 55–77). Rhythm control (sinus rhythm) was achieved in 48 (68%) patients and adequate rate control in 23 (32%) patients. Thirty-seven (52%) patients exhibited complete normalization of LVEF (≥ 50%). The following baseline parameters were significantly associated with LVEF normalization at follow-up: lack of hypertension (p<0.05), younger age (p<0.02), presence of atrial flutter (p<0.05), better LVEF (p<0.001) and less LV remodeling (p<0.05).

Conclusion: Half of the patients presenting with first onset CHF in the context of significant LVSD and concomitant tachyarrhythmia normalize their LVEF within six month under appropriate therapy. The absence of hypertension or significant LV remodeling and the presence of atrial flutter are strong predictors of LVEF normalization and thus may identify patients with TC.

Disclosure of Interest: None declared
Disclosure of Interest

Results: Mean age was 82.47±4.50 years and 41.7% were females. No differences in the logistic EuroSCORE (36.15±13.59 vs 39.96±13.66%, p=0.41) or STS scores (8.80±5.51 vs 8.70±4.01, p=0.95) were observed at baseline. There were no significant differences in baseline AVA (0.80±0.25 vs 0.77±0.25cm², p=0.68), MG (24.94±9.35 vs 19.52±6.48 mmHg, p=0.052), LVEF (31.56±7.69 vs 27.74±9.67%, p=0.21) or contractile reserve (64.7% vs 84.2%, p=0.18). Pulmonary hypertension (mean pulmonary artery [PA] pressure ≥25mmHg) was observed more frequently (71.4% vs 100.0%, p=0.04) among moderate or severe MR patients on pre-invasive evaluation. Overall, the Medtronic Core Valve, Edwards SAPIEN and Symetis Accurate were implanted in 55.6%, 41.7% and 2.8% of patients, respectively. As compared with mild or less MR, a significantly higher overall mortality was observed among moderate to severe MR patients at 30-days (0.0% vs 21.1%, Log Rank =0.048). As compared with mild or less MR, moderate or severe MR patients had a significantly higher incidence of all-cause mortality at one year (5.9% vs 36.8%, Log Rank =0.031). Compared with baseline, a significant overall improvement in LVEF was observed among surviving patients at discharge (29.15±9.07 vs 34.70±10.60%, p=0.007) with no significant differences in LVEF improvement between groups (p=0.51).

Conclusion: Moderate to severe MR is associated with significantly impaired clinical outcomes among patients with LFLG severe AS undergoing TAVI at both short and medium term follow-up.

Disclosure of Interest: None declared

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Prognostic impact of systolic blood pressure and its changes during titration of medication in patients with chronic heart failure with reduced ejection fraction

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Introduction: In patients with heart failure (HF), low systolic blood pressure (SBP) is a marker of poor prognosis. However, the prognostic impact of changes in SBP during titration of HF medical treatment is not well known.

Method: Patients enrolled in the randomized, controlled multicenter Trial of Intensified Medical therapy in Elderly patients with Congestive Heart Failure (TIME-CHF) with left ventricular ejection (LVEF) <45% [n=499, age 76±8 years, LVEF 30±8 %] were included in this post-hoc analysis. The effects of baseline SBP and changes in SBP from baseline to 6 months during titration of angiotensin-converting enzyme inhibitors/angiotensin receptor blockers (RAS inhibitors) and beta-blockers on 18 months outcomes (survival, HF hospitalization-free survival) were examined.

Results: The mean ± SD baseline SBP in all patients was 118 ± 18 mmHg. A lower baseline SBP was associated with higher mortality (hazard ratio [HR] 0.82 [95% confidence interval [CI] 0.78 - 0.97] per 10mg increase, p=0.01). Patients in the lowest quartile of SBP (SBP<=105 mmHg, n = 127) had a significantly higher risk of death (HR 1.78, 95% CI 1.17-2.70, p=0.007) than patients in the upper three quartiles (mean SBP =126±14 mmHg). The increase in SBP during titration of medication from baseline to 6 months was directly correlated with better outcome [ HF hospitalization and death: HR 0.86, 95% CI 0.78 - 0.95, per 10 mmHg increase; p=0.003], even after adjustment for LVEF, NT-proBNP, age and NYHA class. Patients in the lowest quartile of SBP with the SBP failing to increase by >=10 mmHg or to > 105 mmHg were 3.2 times more likely (p< 0.001) to die or be hospitalized for HF compared to others in the lowest quartile of SBP. In patients with baseline SBP> 105 mmHg, a decrease in SBP by >= 10mmHg from baseline to 6 months was an independent predictor of adverse events (mortality: HR 2.49, 95% CI 1.21-5.11, p=0.01; death or HF hospitalization: HR 1.68, 95% CI 1.09-2.59, p=0.02) and this was not significantly influenced by changes in beta-blockers and RAS inhibitor doses.

Conclusion: In patients with HF low baseline SBP (<=105 mmHg) and a lack of increase in SBP by 10 mmHg or to > 105 mmHg during titration of HF medication is a predictor of poor prognosis. In HF patients with SBP > 105mmHg a decrease in SBP by >= 10mmHg during titration of HF therapy identifies those with poor outcome. The prognostic value of SBP and its changes was independent of other established risk factors.

Disclosure of Interest: None declared
Inferior vena cava parameters predict readmission in patients with decompensated heart failure due to ischemic heart disease

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Introduction: The clinical history of heart failure (HF) is usually characterized by frequent hospitalizations for decompensation. Therefore several markers of subclinical hemodynamic congestion are under investigation. Ultrasound inferior vena cava (IVC) assessment is a promising approach but the effectiveness in the different aetiological categories of HF has not been assessed yet.

Method: In this pilot study, we compared 25 patients admitted for decompensated HF due to ischemic heart disease (IHD) and 23 with HF without IHD (non-IHD). Clinical and biochemical examination, including a blinded bedside assessment of IVC, were performed at both admission and discharge. By recording the rate of re-hospitalization for decompensated HF during the 60 days after discharge, the predictive power of IVC assessment was investigated and compared to N-terminal prohormone B-type natriuretic peptide (NT-proBNP).

Results: The two groups were similar except for gender distribution. During follow-up 16.7% of patients were re-hospitalized for decompensated HF, with a higher prevalence in IHD group (28% vs. 4.3% p=0.031). IVC assessment at discharge significantly predicted readmission in the overall population and in IHD, whereas NT-proBNP failed to predict re-hospitalization in IHD group. At multivariate analysis, only IVC minimum diameter (HR 4.98 [1.37-18.0]; p=0.014) and the changes of IVC minimum diameter during hospitalization (HR 0.95 [0.92-0.98]; p=0.005) significantly predicted readmission. By the ROC curve analysis, an IVC minimum change ≤38% was recognized as best predictor of readmission in IHD patients.

Conclusion: This pilot study showed a higher early readmission rate in HF patients due to IHD. Furthermore, the change in IVC min diameter from admission to discharge was the best predictor of readmission in IHD patients. Considering the safety, cost-effectiveness and feasibility of IVC assessment, we believe that further and larger studies are needed to confirm IVC assessment as a cheap and promising tool for HF management.

Disclosure of Interest: None declared

Outcome and complications in patients with takotsubo cardiomyopathy

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Introduction: Clinical presentation of Takotsubo cardiomyopathy (TTC) mimics acute coronary syndromes (ACS). While ACS is a life-threatening condition, TTC is usually regarded as a non-fatal cardiomyopathy with a favorable long-term outcome. Severe complications have been reported in patients with TTC in the acute stage, however systematic data are lacking. Therefore, the aim of the present study was to assess the short-term outcome in patients with TTC compared to patients with ACS.

Method: 206 patients were included in the present study. 103 consecutive patients with TTC were identified according to modified Mayo Clinic Diagnostic criteria and compared to an age- and gender matched control population with ACS. Medical records were evaluated from the International Takotsubo-Registry at the University Hospital of Zurich and the Zurich Acute-Coronary-Syndrome Registry. Clinical profile and in-hospital mortality as well as cardiogenic shock rate were analyzed.

Results: On admission, patients with TTC presented with a significantly higher heart rate (p=0.03) and a higher diastolic blood pressure compared to patients with ACS (p=0.08). In addition, left ventricular ejection fraction was significantly reduced (p=0.01). We did not observe any differences in resuscitation and catecholamine administration between the two groups on acute presentation (p=n.s). The prevalence of cardiogenic shock (TTC 13.6% vs. ACS 13.6%, p=n.s.) and death (TTC 6.8% vs. ACS 5.8%, p=n.s.) were not significantly different between the two groups.

Conclusion: Our study demonstrates that TTC is a potentially life-threatening disease with the same short-term outcomes compared to patients with ACS. Therefore, intensive monitoring and early treatment must be considered in such patients.

Disclosure of Interest: None declared
Accuracy of echocardiographic cardiac output assessment in subjects with preserved ejection fraction – Implications for studies on the pathophysiology of heart failure with preserved ejection fraction

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Introduction: Echocardiography has been a central technique applied to the diagnosis and pathophysiological characterization of patients with heart failure and a preserved left ventricular ejection fraction (LVEF; HFpEF). However, the accuracy of the echocardiographic assessment of cardiac output (CO) in subjects with preserved LVEF is unknown.

Method: Thirty-three subjects with LVEF >50%, normal sinus rhythm, and a broad spectrum of hemodynamic profiles [healthy controls (n=11), patients with HFpEF (n=14), and patients with pulmonary arterial hypertension (n=8)] underwent comprehensive transthoracic echocardiography immediately followed by right heart catheterization. As the gold standard, CO was assessed using thermodilution (COthermodilution) and the Fick method (COFick). Echocardiographic CO was assessed by four methods: from the left ventricular outflow tract (LVOT) velocity time integral and the LVOT diameter as measured from the 2D image (COLVOT measured) as well as estimated from body surface area (COLVOT BSA), and from stroke volumes as assessed using the biplane (CObiplane) and monoplane (COMonoplane) methods.

Results: The mean COthermodilution, COFick, COLVOT measured, COLVOT BSA, CObiplane, and COMonoplane were 5.8±1.7, 6.0±1.7, 5.3±1.2, 6.4±1.5, 3.8±1.2, and 4.2±1.7 l/min. There were only modest correlations between COthermodilution and COFick and all four non-invasive measures of CO with r² values ranging from 0.21 to 0.52. COLVOT measured underestimated COthermodilution and COFick by 0.5 and 0.7 l/min, COLVOT BSA overestimated COthermodilution and COFick by 0.5 and 0.4 l/min, and CObiplane and COMonoplane underestimated COthermodilution and COFick by 2.0 and 2.2 l/min and 1.6 and 1.8 l/min respectively with large limits of agreement for all comparisons.

Conclusion: In subjects with normal LVEF, flow- or volume-based measures of CO by 2D echocardiography do not accurately reflect COthermodilution and COFick. These findings should be taken into account when interpreting results of hemodynamic studies relying on echocardiographic measures of CO in subjects with normal LVEF. Although it has been suggested that the diversity of findings regarding the CO response amongst HFpEF studies may be explained by the presence of subgroups with different pathophysiology, the present study suggest that some of the differences between studies may be due to differences in methodology.

Disclosure of Interest: None declared
Oral Session 13
Novel techniques and devices in coronary revascularization procedures

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The evolution of coronary flow reserve, index of microcirculatory resistance and fractional flow reserve after ST-elevation myocardial infarction
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Introduction: CFR, IMR and FFR are increasingly used in patients with STEMI but how these indices evolve after PPCI, and what drives these changes is poorly understood.

Method: This study investigated the relationship between invasive measures of the coronary circulation (coronary flow reserve (CFR), the index of microcirculatory resistance (IMR) and fractional flow reserve (FFR)) after ST-elevation myocardial infarction (STEMI) and contrast-enhanced cardiac magnetic resonance imaging (CMR) parameters of microvascular obstruction/haemorrhage (MVO) and final infarct size after primary percutaneous coronary intervention (PPCI).

Results: 46 STEMI patients had pressure wire assessment immediately following successful PPCI, at day 1 and 6 months. 32/46 patients had MVO assessment on CMR at day 1 and 38/46 patients had final infarct size (FIS) assessment at 6 months. Median CFR (interquartile range [IQR]) was 1.5 (1.1-2.3) at PPCI, 2.3 (1.8-2.7) at day 1 and 3.4 (2.3-3.8) at 6 months (p<0.001). Median IMR (was 32.2 (19.4 to 55.5) at PPCI, 25.2 (17.5-41.0) at day 1 and 18.4 (15.5-25.8) at 6 months (p<0.001). In patients with larger FIS CFR was significantly lower at 6 months (p=0.02), with no difference in IMR (p=0.82). MVO at day 1 was present in 29 % of patients with smaller FIS and 75 % of patients with larger FIS (p=0.01). FFR was 0.94 (0.88-0.98) at PPCI, 0.92 (0.88-0.97) at day 1 and 0.90 (0.84-0.94) at 6 months (p<0.001) while the resting gradient remained stable over time (p=0.22) and there was no evidence of angiographic restenosis on quantitative coronary angiography. FFR significantly reduced in those patients with MVO between PPCI and 6 months (p=0.006) but did not change significantly in those without MVO (p=0.21).

Conclusion: In patients with STEMI treated with PPCI coronary microcirculation partially recovers within 24 hours and further by 6 months. CFR at 6 months is significantly higher in patients with smaller FIS. While the resting gradient seems to be a robust measure, which is not influenced by the coronary microcirculation, FFR significantly reduces from baseline to 6 months, especially in patients with MVO indicating that sufficient vasodilation is not possible in patients with severely impaired coronary microcirculation.

Disclosure of Interest: None declared

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The function of natural internal mammary-to-coronary artery bypasses and its effect on myocardial ischemia
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Introduction: The function of naturally existing internal mammary- (IMA) to-coronary artery bypasses and its quantitative effect on myocardial ischemia is unknown.

Method: The primary endpoint of this study was collateral flow index (CFI) as obtained during two 1-minute coronary artery balloon occlusions, i.e., the first with and the second without simultaneous distal IMA occlusion. The secondary study endpoint was the quantitatively determined intracoronary (i.c.) ECG ST-segment elevation. CFI is the ratio between simultaneously recorded mean coronary occlusive pressure divided by mean aortic pressure both subtracted by mean central venous pressure.

Results: A total of 180 pairs of CFI measurements were performed among 120 patients. With and without IMA occlusion, CFI was 0.110±0.074 and 0.096±0.072, respectively (p<0.0001). The difference in CFI as obtained in the presence minus that in the absence of IMA occlusion was highest and most consistently positive during left IMA with left anterior descending artery (LAD), and during right IMA with right coronary artery (RCA) occlusion (ipsilateral occlusions): +0.033±0.04 and +0.025±0.03.
This CFI difference was absent during right IMA with LAD, and during left IMA with RCA occlusion (contralateral occlusions): \(-0.007\pm0.03\) and \(+0.001\pm0.02\) (\(p=0.0002\) vs ipsilateral occlusions). The respective CFI differences during either IMA with left circumflex artery (LCX) occlusions were inconsistently positive. i.c. ECG ST-segment elevations were significantly reduced during ipsilateral IMA occlusions, but not during contralateral or LCX occlusions.

**Picture / graph:**

![Graph showing CFI differences and ECG ST-segment elevations during various occlusions.](image-url)
Conclusion: There is a functional, ischemia-reducing extracardiac coronary artery supply via ipsilateral but not via contralateral natural internal mammary artery bypasses.

Disclosure of Interest: None declared

Initial experience with the absorb bioabsorbable vascular scaffold in all comer patients
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Introduction: Biodegradable stents have been studied in recent years as an attempt to enable natural vessel function for improved long-term outcomes, overcoming the disadvantages of permanent stents. This study aimed to evaluate the clinical outcome of the first 100 patients that underwent bioabsorbable vascular scaffold (BVS, Absorb, Abbott Vascular) implantation at our institution.
Method: Follow-up data, including death, myocardial infarction (MI), target lesion revascularization (TLR), target vessel revascularization (TVR), stent thrombosis (ST), in-stent restenosis (ISR) from the first 100 patients treated by BVS implantation were prospectively collected. Primary outcome was the composite of major adverse cardiac events (MACE=death, nonfatal MI and TLR) at 6-months follow up. BVS delivery failure was encountered in 2 patients.

Results: At 6-month completed follow-up (n=86), incidence of MACE was 9 %, mainly due to TLR (6%). Repeat revascularization was found in 13%. At 1-year, one patient presented with late, definite ST and died (cardiac death 1%). This event followed a full 9-day interruption of the antiplatelet therapy for non-cardiac surgery.

Conclusion: These preliminary data suggest that BVS implantation is feasible and safe in an all-comer population.

Disclosure of Interest: None declared

Skeletonized internal thoracic artery harvesting: Peak plasmablade provides integrity of the vessel wall, less adventitial hemorrhage and intact endothelial layer by means of pulsed radiofrequency in comparison to conventional electrocautery

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Introduction: Electrosurgery is an important prerequisite for precise, fast and bloodless preparation of bypass grafts in cardiac surgery. The PEAK PlasmaBlade is an electrosurgical device that uses pulsed radiofrequency to generate a plasma-mediated discharge along an insulated blade, creating a cutting edge while the blade stays near body temperature. The aim of this running study is to compare the histological samples, cardiac computed-tomographies and clinical outcomes of patients after off-pump coronary artery bypass grafting with preparation of the internal thoracic arteries by conventional electrocautery and the PlasmaBlade.

Method: In 10 patients one internal thoracic artery was prepared with the PlasmaBlade and the other with the conventional electrocauter. Histological samples were sent to pathology to evaluate three crucial factors for potential graft failure: integrity of the vessel wall, endothelial damage and adventitial hemorrhage. For every artery 5 samples were evaluated (cumulative 50 vs. 50) by a specially designed score based on the exposed circumference of the histological sample.

Results: The histological results of cumulative 50 samples per electrocauter and 50 samples per PlasmaBlade showed a significant lower score in all investigated three factors, wall dehiscence (PB: 0.9 (±1.2) vs EC: 2.3 (±1.2)), adventitial hemorrhage (PB: 1.3 (±0.8) vs EC: 1.8 (±1.1)) and endothelial damage (PB: 1.4 (±0.8) vs EC: 2.0 (±1.0)) in the PlasmaBlade group. Additionally, the total score showed a significant difference between both devices demonstrating a better wall integrity, intact endothel and lower adventitial hemorrhage in the PlasmaBlade group (PB: 3.7 (±1.5) vs EC: 6.2 (±2.5)) resulting in a better vessel wall integrity.
**Conclusion:** PlasmaBlade for ITA harvesting is superior to conventional electrocauter, demonstrating a better wall integrity, intact endothel and lower adventitial hemorrhage. Further investigations regarding more histological samples and the final cardiac computed tomographies in all 20 patients remain to be carried out till May 2014.

**Disclosure of Interest:** None declared

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**Incidence and timing of definite stent thrombosis with the use of new generation drug-eluting stents in unselected patients undergoing PCI**

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**Introduction:** New generation drug-eluting stents (DES) have been shown to reduce stent thrombosis in randomized controlled trials compared with early generation DES. Data on the incidence of stent thrombosis in unselected patient cohorts undergoing new generation DES implantation remain scarce.
Method: Between March 2009 and December 2010, 2,537 unselected patients with coronary artery disease (CAD) received new generation DES and were prospectively followed for one year. Patients received dual antiplatelet therapy including aspirin and clopidogrel for one year, with the exception of STEMI patients treated from September 2009 onwards, in whom prasugrel was used. A total of 1,250 (49%) presented with stable CAD, 705 (28%) with NSTE-ACS and 582 (23%) patients with STEMI. The type of DES used were Biolimus-eluting stents (25%), Everolimus-eluting stents (49%), Zotarolimus-eluting stents (22%) and other new generation DES (4%).

Results: The cumulative incidence of definite ST at 1 year amounted to 0.9%. A landmark analysis at 30 days revealed an incidence of ST of 0.2% after 30 days. There were significant differences in ST rates at one year stratified according to the clinical indications stable CAD, NSTEMI and STEMI (0.5% vs. 0.9% vs. 1.9%, overall p=0.03).

Conclusion: In a large cohort of unselected CAD patient treated with new generation DES at a tertiary center, the incidence of ST was low, albeit somewhat higher than published in randomized controlled trials. The incidence of stent thrombosis beyond 30 days has become exceedingly low. The population at highest risk for ST are STEMI patients.

Disclosure of Interest: None declared

Estimating the costs of percutaneous coronary interventions in patients with stable coronary artery disease in the 2012 Swiss DRG environment

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Introduction: Coronary artery disease (CAD) is the health condition with the highest morbidity and mortality, as well as assumably with the highest economic burden in developed countries. Cost-estimations for patients with CAD and acute coronary syndromes (ACS) in Switzerland have been published, but not for the cohort of patients with stable CAD undergoing elective percutaneous coronary interventions (PCI) in general and in the Swiss-DRG environment in specific. Aim of the study was to close this gap.

Method: To determine health care costs from a third party payer perspective, we calculated the hospital reimbursements as defined by Swiss-DRG v 1.0 for patients with stable CAD undergoing in-hospital PCI. The number of procedures, as well as the proportion of drug-eluting (DES) and bare-metal stents (BMS) were taken from the Swiss PCI annual statistics report 2012. Per patient case-weight (CW) determinants were length of hospital-stay (LOS), number of stents placed and intervention involving a bifurcation, respectively. Their distribution was derived from the BASKET-PROVE-cohort of Swiss patients with stable CAD and a LOS between 1 and 3 days. To get the overall costs the resulting case-mix (CM) was then multiplied with a PCI-weighted base-rate, which took into account the intercantonal differences.
Results: The estimated annual number of PCIs in patients with stable CAD was 10’195. Of the 343 patients from the BASKET-PROVE cohort 169 received the Xience® DES and 174 the Vision® BMS. They were 64 +/- 10 years old, were male in 78%, had 1, 2 or 3-vessel disease in 50%, 33% and 17%, respectively and received in mean 1.9 stents. Using bootstrapping analysis with 10’000 samples, we calculated a CW of 1,421 (95%>CI 1,381-1,461) in the DES cohort and 1,437 (95%>CI 1,397-1,476), giving a Swiss-wide CM of 14’506,663. Multiplying this with the PCI-weighted base-rate for 2012 of 10’198 CHF gives the health care cost estimation of 147,9 Mio. CHF. With this number PCI makes up approx. 14% of the annual costs in patients with stable CAD.

Conclusion: Based on our estimations, PCI substantially contributed to health care costs in patients with stable CAD in the era of Swiss-DRG. This baseline number will help to evaluate the economic impact of future medical and reimbursement strategies in this population.

Disclosure of Interest: None declared
A giant right coronary artery aneurysm
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Introduction: Coronary artery aneurysm (CAA) is a rare disease, with an angiographic incidence of 0.15 % to 4.9 %. CAA is defined as a dilated segment greater than 1.5 times the diameter of an adjacent healthy segment. Giant CAA (GCAA) with a diameter greater than 5cm are exceptions. CAAs are often discovered unexpectedly. Main complications include thrombosis, embolization, and rupture being unusual. There is currently no consensus concerning the treatment strategy. We report the case of a patient with multiple CAA, including a giant CAA of 6cm, who successfully underwent resection with coronary bypasses.

Method: A 62-year old man known for hypertension, hypercholesterolemia, and weight excess, presented a 4-month history of progressive chest pain aggravated by physical activity. A catheterization showed a coronary artery ectasial disease with the presence of four CAAs: 3 on the right coronary artery (RCA), including a giant one, and one on the intermediate branch. Left ventricular ejection fraction was normal (65%). Intraoperatively, we found two proximal RCA CAAs of 2cm each, a 6cm distal RCA CAA partially thrombosed, and a 3cm CAA on the intermediate branch.

The two largest CAAs were resected and two saphenous graft bypasses were performed. One year after the surgery, the patient is still doing well.

Results: The most common cause of CAA is atherosclerosis. Other etiologies described are congenital, Kawasaki disease, coronary angioplasty, infectious, and some connective tissue disorders or inflammatory diseases. Most GCAA develop on the RCA. It seems to be promoted by low pressure of the right atrium and the atrioventricular sulcus. Prognosis differs between studies, but most of them show an increase of infarct or mortality connected to CAAs, independently of coronary artery disease. Baman and al describe a predicted 5-year mortality of 29.1%. Therapeutical options include medical treatment (antiaggregation, anticoagulation), percutaneous coronary angioplasty and surgery. Results of observational or conservative management (antiplatelet or anticoagulation treatment), in the few cases of GCAA described in literature, appear to have poor results.

Picture / graph:
Conclusion: As GCAAs implie a high mortality rate in conservative management, we believe that aggressive management is necessary, by surgery or angioplasty, depending on the aspect of the lesions and of the global coronary disease of the patient.

Disclosure of Interest: None declared
Intramyocardial hematoma mimicking anterior acute myocardial infarction


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Introduction: A 63-year-old male was admitted to the Emergency Department complaining of a 12-hour persisting typical central chest pain at rest. He had suffered a chest trauma while practicing judo six weeks earlier. His only cardiac risk factor was hypercholesterolaemia. ECG upon admission was consistent with an anterior STEMI. On blood analysis Troponin I was raised to 1.18 μg/l. Loading doses of Aspirin 500 mg iv, Prasugrel 600 mg po, Heparin 5'000 UI iv bolus were administered. Coronary angiography demonstrated occlusion of the LAD with impossible guidewire progression. Transthoracic echocardiogram revealed a large pericardial effusion with signs of pre-tamponnade and presence of a large subepicardial hematoma (40x45 mm) in front of the LV anterior wall and compressing the RV apex. The patient was initially managed conservatively and a cardiac CT angiogram performed two days following coronary angiogram demonstrated a parietal detachment localized at the level of the mid LAD followed by a calcified plaque suggesting coronary artery dissection of the LAD extending through a voluminous parietal hematoma localized in the anterior interventricular groove, measuring 45x34 mm. At day three, the patient developed signs of cardiac tamponnade requiring urgent cardiac surgery. A circumferential pericardial effusion compressing all four cardiac cavities was noted. 320 ml of blood was removed and no active hemorrhage was localized. The pericardial surface showed a large hematoma of the LAD (15 mm diameter, 30 mm length.)

Method: Conservative treatment was decided and the postoperative evolution of the patient was favorable.

Results: The control CTCAs performed at day 16 showed a stable subepicardial hematoma with signs of active resorption and a minimal residual pericardial effusion. At two months follow-up, the patient remained symptom free. At one year follow-up the control cardiac MRI showed regression of the organized encapsulated hematoma (20x29x34 mm), no intramyocardial scar, preserved LV function without WM abnormalities.

Picture / graph:
Conclusion: Intramyocardial hematoma is a unusual form of cardiac rupture, caused by dissecting hematoma along the myocardial fibers thus creating a cavity contained by the myocardium- which differentiates it from pseudoneurysm consisting in complete rupture of the myocardial wall, contained by the pericardium. Leading causes of intramyocardial hematoma comprise myocardial infarction and chest trauma, they also occur spontaneously or as complication of cardiac surgery or PCI.

Disclosure of Interest: None declared
Consecutive symptomatic spontaneous dissection of carotid, coronary and renal arteries in a 45-years-old woman with suspected fibromuscular dysplasia


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Introduction: Spontaneous carotid (SCaAD), coronary (SCAD) and renal artery (SRAD) dissection are respectively rare and underdiagnosed causes of stroke, acute myocardial and renal infarction, affecting predominantly young and middle-aged patients and young women (SCAD). The risk of a recurrent dissection in an unaffected artery is about 2 percent during the first month and higher in patients with a heritable arteriopathy or fibromuscular dysplasia (FMD). Therefore spontaneous multiple dissection are exceptional events.

Method: A 45 years old woman was admitted at the stroke unit on December 2013 because of transient right hemiparesis, afasia and moderate frontal headache onset while running. No family history of premature cardiovascular (CV) events, recent infections, CV risk factors, physical exam (i.e. clinical evidence of heritable arteriopathies or pseudoxantoma elasticum), blood tests and ECG abnormalities were present. Multisection CT angiography showed possible 1 cm long cervical-petrous segment junction dissection of the left internal carotid artery (LICA) confirmed by MR angiography. Multimodal MRI excluded recent ischemic lesions. Total body CT angiography excluded thoracic aorta and further arterial dissections. Antithrombotic therapy with aspirin 100 mg was started for SCaD. Ten days later the patient was admitted because of acute chest pain at rest and mild dyspnoea. ECG showed mild inferior ST-segment elevation, transthoracic echocardiography inferior and mid-septal wall dyskinesia and serum troponin was 1.78µmol/l, 7.17 µmol/l after 6 hours (n.v. ≤0,09), thus diagnosing STEMI. Subsequent coronary artery angiography from radial access disclosed a 1.5 cm long possible occlusive dissection of distal posterior descending (PD) artery in the absence of any atheromatosis (Fig. 1a). Aortic dissection was also excluded. Due to distal PD location and its small diameter a conservative approach was chosen.

Results: Four days later the patient reported right back pain: non selective renal artery angiography showed a right long SRAD as well as side branch “string of beads” lesions almost pathognomonic for FMD (Fig. 1b). In the absence of further specific clinical and immunological evidences in a patient with multiple consecutive artery dissections, the diagnosis of FMD was retained.

Picture / graph:

Fig 1a. Posterior descending artery (PD); Posterolateral artery (PL); ➔ Coronary occlusive dissection
Fig 1b. Right renal artery dissection; ○ side branch “string of beads” lesions; ➔ non selective renal artery angiography
Conclusion: This is very rare case of three consecutive multiorgan artery dissections occurring within 14 days in a 45 years old female patient with strong suspicion of FMD.

Disclosure of Interest: None declared

Delayed annulus rupture after transcatheter aortic valve implantation

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Introduction: Aortic annulus rupture is a rare but serious complication of transcatheter aortic valve implantation (TAVI) and in most cases associated with worse clinical outcome. The association of balloon-expanding TAVI prosthesis and heavily calcified aortic annulus anatomy has been described, whereas annulus rupture after self-expanding TAVI has been rarely reported.

Method: A 88 y/o female with critical aortic valve stenosis (peak/mean gradient 118/77mmHg, AVA 0.4cm2) was referred for treatment evaluation. The estimated risk of peri-procedural mortality was 17.8% according to the EuroScore, and 9.0% according to the STS score and the patient was considered at high risk for surgical aortic valve replacement. Due to insufficient diameter of the femoral vasculature a transapical TAVI procedure was planned. Due to severe calcification of the aortic annulus, Symetis Acurate TA (S-size) prosthesis was selected.

Results: After preparation of the cardiac apex and insertion of a stiff guidewire through the calcified aortic valve, an 18mm Osypka balloon was used for balloon aortic valvuloplasty. Insertion of the 33Fr Symetis Acurate delivery system was followed by controlled deployment of the prosthesis under tactile feedback. Heavy calcification of the aortic annulus precluded complete expansion of the aortic bioprosthesis resulting in moderate to severe paravalvular aortic regurgitation. Post-dilation of the Symetis Acurate TA (S-size) was performed using a 20mm LomaVista balloon with a reduction to trace paravalvular aortic regurgitation. After surgical closure of the left ventricular apex and the lateral thoracotomy, the patient was extubated and transferred to intensive care unit (ICU). Shortly after ICU admission, significant bleeding from the thoracic drain was noted followed by cardiac arrest. Immediate resuscitation and cardiac massage was initiated, however unsuccessful and the patient died a few hours after the intervention. Autopsy revealed aortic annulus rupture with subsequent aortic dissection as cause of death.
Conclusion: Annulus rupture after TAVI is associated with a dismal prognosis. While the majority of events have been reported with balloon-expanding TAVI bioprosthesis, we report a rare case of delayed aortic annulus rupture with a self-expanding aortic bioprosthesis. The mechanisms of this adverse event are likely to be associated with the postdilation of the TAVI prosthesis and the heavily calcified aortic annulus.

Disclosure of Interest: None declared
Transseptal transcatheter mitral valve implantation for severely calcified mitral stenosis
Hospital Bichat, Paris, France

Introduction: Surgical mitral valve replacement for patients with severe mitral annulus calcification (MAC) is associated with a high operative risk. We present the case of a patient who underwent transspetal (TS) transcatheter mitral valve implantation (TMVI) for mitral stenosis and severe MAC.

Method: Multimodality imaging and endovascular treatment.

Results: A 72-year woman, with prior aortic valve replacement and tricuspid annuloplasty, was referred for heart failure. Echocardiography showed mitral stenosis (mean gradient 12 mmHg, area 0.8 cm²) with severe MAC (Fig. 1A). Computed tomography demonstrated a nearly circumferential distribution of the calcification (Fig. 1B). Due to the high surgical risk (Logistic EuroSCORE 17%, EuroSCORE II 10%, STS 11%), severe MAC and long-term corticosteroid therapy for rheumatoid arthritis, the Heart team planned TMVI through a TS approach, which was considered as less invasive than the transapical route. The procedure was performed from the right femoral vein, under general anesthesia and guidance by transesophageal echocardiography (TEE). After TS puncture and dilatation of the atrial septum with a 14 mm balloon, an Amplatz Extra-Stiff guidewire (Cook Medical, Bloomington, IN) was positioned in the left ventricle. Then, a 26mm SAPIEN XT valve (Edwards Lifesciences, Irvine, CA) was successfully implanted within the mitral annulus, using slow inflation during rapid ventricular pacing (Figure 2A-C). TEE showed mild paravalvular regurgitation and a mean gradient of 4 mmHg (Figure 2D-E). Post-procedure CT-scan showed an optimal position of the transcatheter heart valve within the mitral annulus (Figure 2F). Hospital stay was uneventful and the patient was discharged 7 days after the intervention. The patient was asymptomatic (New York Heart Association class I) on 3-month follow-up.

Picture / graph:
Conclusion: TMVI has been previously described through a transapical or an open left atrial approach. The present case suggests that the transspetal route may represent a less invasive approach for this novel technique in selected patients with severely calcified mitral stenosis at high-risk for surgery.


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Recurrent intracardiac thrombus as a complication of essential thrombocytemia: A case report

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Introduction: N/A
Method: N/A
Results: A 54 years old man was first admitted in our hospital in 2010 for an ischemic stroke. The etiology was found to be an intracardiac thrombus located at the left ventricular apex. Treatment with aspirin and vitamin K antagonist was started. Follow-up cardiac MRI performed one month later showed the disappearance of the thrombus. Afterwards patient was lost to medical follow-up except for sporadic INR controls. Recently, while still on coumarine and antiaggregation, the patient was referred to our hospital for sudden-onset aphasia and dysarthria. Cerebral CT scan at admission showed multiple recent ischemic cerebral lesions in the territory of several patent vessels, raising the suspicion of cardioembolic origin. transthoracic echocardiography showed a dilated left ventricle (LV) with a moderate to severe dysfunction on a large apical akinesia and a very huge and mobile thrombus of 25-40 mm (picture 1), which seemed to be attached at the...
Facing a case of recurrent massive LV thrombus with the patient still on aspirine and vitamin K antagonist, a research of possible etiologies for hypercoagulable state was performed. Coagulation studies for protein C and S deficiency, factor V Leiden or prothrombin gene mutation were negative, as well as the detection of antiphospholipid syndrome. Blood cell count showed an elevation of platelet count (763G/l) without abnormalities of the other cell lines or infective state. For that reason, essential thrombocytopenia was suspected and confirmed by the presence of V617F mutation of the JAK-2 gene. We decided to continue aspirine prescription unchanged and to switch from vitamin K antagonist, which was obviously not effective in preventing or treating LV thrombus, to fondaparinux. Causal therapy of the myeloproliferative syndrome with Litalir was initiated at the same time. After 3 weeks, control echocardiography showed the complete disappearance of the LV thrombus (picture 2). By chance, dissolution of the thrombus was achieved without new cerebral embolism, as shown by sequential cerebral MRI studies performed at admission and after resolution of the LV mass.

**Picture / graph:**

![Echocardiogram showing LV thrombus](image)
Conclusion: This case is an impressive example of a rare cause of LV thrombus. Only sporadic cases of LV thrombus due to myeloproliferative syndromes are described in the literature. This enhances the relevance of searching for hematologic causes of LV thrombus, even with underlying segmental dysfunction, on treatment and prognosis.

Disclosure of Interest: None declared
Oral Session 15
Conventional valve surgery

253

Single-center experience with the 3RD generation freedom solo stentless valve in 147 consecutive patients
Cardiovascular Surgery, Inselspital, Bern, Switzerland

Introduction: The third generation Freedom SOLO (FS; Sorin Group, Saluggia, Italy) bovine pericardial stentless valve prosthesis is implanted in the supra-annular, subcoronary position using a single continuous suture line. The present study reviews our clinical experience with the FS.

Method: Between January 2005 and November 2009, a total of 147 patients (mean age 73.6±8.7 years, 68 (46%) female) underwent isolated (n=74) or combined (n=73) aortic valve replacement (AVR) using the FS. Concomitant procedures were CABG (n=66), MVR ± tricuspid annuloplasty (n=7), ablation (n=3), PFO-closure (n=8) and replacement of the ascending aorta (n=6). Two cases were redo procedures and one patient had active endocarditis. The hemodynamic performance was investigated echocardiographically at discharge, 6 months and yearly thereafter. Follow-up was 100% complete with an average observation time of 5.4±2.3 years (max. 8.7 years) and a total of 789 patient years.

Results: The mean log Euroscore was 7.5±2.9 for the total cohort, and 6.6±1.9 and 8.5±3.4 for the groups of isolated and combined AVR, with corresponding 30 days (in-hospital) mortalities of 2.04%, 1.35% and 2.73%, respectively. No death was valve-related. Preoperative peak (74.2±23.0 mmHg) and mean (48.6±16.3 mmHg) gradients decreased to 15.6±5.4 (8.8±3.0), 14.7±4.7 (7.9±2.5), 14.3±5.5 (8.2±2.9) and 15.4±4.9 (8.5±2.6), 14.0±6.1 (7.7±3.2) and 12.5±2.9 (7.7±3.6) mmHg at 1 month, 1, 2, 3, 4 and 5 years, respectively. The postoperative mean effective orifice area (EOA) for the valve sizes 19, 21, 23, 25 and 27 were 1.49, 1.67, 1.92, 2.16 and 2.28, respectively, resulting in absence of prosthesis-patient mismatch (PPM). Only one patient with initial sinus rhythm (SR) needed a permanent pacemaker before hospital discharge (0.9%). Ten prostheses required explantation due to valve-independent dysfunction (n=3) and valve-dependent failure (acute rupture, n=4; severe stenosis, n=3). Freedom from explantation at 5, 6, 7 and 8 years was 96%, 96%, 93% and 85%, respectively.

Conclusion: The Freedom SOLO stentless aortic valve is safe to implant and shows excellent hemodynamic performance and early- and mid-term results up to 5 years. Freedom from explantation decreased markedly after 7 years which requires close clinical follow-up of these patients.

Disclosure of Interest: None declared

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The self-expanding Symetis aacute does not generate increased cerebral microembolic load when compared to the balloon-expandable Edwards sapien prosthesis. A transcatheter doppler study in patients undergoing transapical aortic valve implantation
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Introduction: Transcatheter aortic valve implantation (TAVI) is associated with cerebral microembolization, which is detectable as high intensity transient signals (HITS) on transcranial Doppler (TCD) ultrasound. Increased peak HITS occurrence has been reported during deployment of self-expanding TAVI devices when compared to balloon-expandable devices. Recently, the Symetis Acurate TA™ revailing system has been introduced for transapical TAVI (TA-TAVI). The Symetis Acurate TA™ aortic bioprosthesis is self-expanding and is deployed by a specific two-step implantation technique. Whether this novel method increases the load of intra procedural HITS or not is not clear. The aim of this study was to quantify potential differences in HITS count, frequency and pattern during TA-TAVI, by comparing the Symetis Acurate TA™ (SA) with the balloon-expandable Edwards Sapien™ (ES) system.
Method: TCD recordings of thirty-one consecutive patients undergoing TA-TAVI using SA or ES were analyzed for HITS during the following procedural intervals: instrumentation (IN) prior to valvuloplasty, balloon aortic valvuloplasty (BAV), prosthesis deployment (PD), and post-implantation including any maneuvers until transapical access closure (PI). The total number of bilateral HITS (median [Q1;Q3]) and HITS load during each procedural period were compared.

Results: Twenty-two patients (n=11 in each study arm, median logistic EuroScore 20%, median STS score 7%) displayed continuous TCD signals of good quality throughout the entire TA-TAVI procedure and were included in the final analysis. No significant differences were detected in total procedural or interval-related HITS load (SA: 303 [200;594], ES: 499 [285;941]; p=0.16). With both devices, HITS peaked during PD, whereas significantly fewer HITS occurred during IN (SA: p=0.002; ES: <0.001) or PI (SA: p=0.007; ES: <0.001). PD-associated HITS amounted to almost half of the total HITS load. One patient (ES) suffered new stroke. Thirty-day mortality amounted to 13.6 % (3 of 22 patients).

Picture / graph:

Conclusion: Simplified transapical delivery using the self-expanding SA device does not increase HITS despite of a two-step deployment technique with more interactions with the native aortic valve when compared to the balloon-expandable ES valve. The similarity in HITS count, frequency and pattern with the two systems suggests a common mechanism for the release of cerebral microemboli.

Disclosure of Interest: None declared
Intraoperative monitoring of spinal cord perfusion is essential to avoid paraplegia during descending thoracic aorta surgery
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Introduction: The physiopathology of spinal cord ischemia during descending aortic aneurysm (DAA) repair assumes that spinal cord is normally irrigated, which is not always the case. Monitoring spinal cord functioning during surgery helps to understand how disease has modified spinal perfusion and drives the surgical repair.

Method: Patients scheduled for open repair of type I DAA under femoro-femoral CPB received lumbar drain to control Cerebrospinal Fluid (CSF) pressure and Motor Evoked Potentials (MEPs). After gathering baseline values, aorta was cross-clamped; MEPs detected spinal cord ischemic distress and surgeon selective irrigated intercostals arteries using retrograde cardioplegia lines. Repeated MEPs associate to combinations of arteries perfusion allowed the identification of keys arteries for optimal spinal blood supplying. Only these arteries were re-implanted into graft. Results: 30 consecutive patients showed signs of spinal cord distress during aortic cross-clamp. Six (20%) were clearly paraplegic; 24 (80%) had asymmetric legs motor response. CSF pressure was kept below 12mmHg. Mean CSF drained was 46±19ml (range 15 to 65ml). One up to 3 intercostals branches out of 4 to 6 were identified as key arteries for spinal cord perfusion and re-implanted into graft. 1/30 developed paraplegia day 2.

Conclusion: The asymmetric motor response during aortic cross-clamp is not physiologic and confirms that DAA could unpredictably affect spinal cord perfusion. Blindly re-implant all intercostals arteries is technically demanding and possibly useless. Repeated MEPs with selective intercostals artery perfusion seems to be an effective tool to select which artery provides the appropriate blood supply, speeding up the procedure and possibly improving results.

Disclosure of Interest: None declared

Are neurologic symptoms still a contraindication for surgery in acute type A aortic dissection?
Heart and Vascular Clinic, Inselspital, Bern, Switzerland

Introduction: Severe neurological deficit due to type A aortic dissection was considered as contraindication for surgery because of poor prognosis. More recently, a liberal indication for surgery despite neurological symptoms has shown acceptable clinical results. The aim of this study was to evaluate mid-term outcome of patients with type A aortic dissection presenting with severe neurological deficit.

Method: Data from 53 patients with new onset neurological deficit such as focal motor or sensory deficit, hemiplegia, paraplegia, convulsions or coma undergoing surgical repair for type A aortic dissection between 2005 and 2012 at our institution were retrospectively reviewed. Neurological symptoms were evaluated preoperatively using Glasgow Coma Score (GCS) and Modified Rankin Scale (MRS), postoperatively at discharge and 3-6 months after surgery using GCS, MRS and the National Institutes of Health Stroke Scale (NIHSS). Involvement of major cerebral vessels was assessed in the preoperative CT scan. Logistic regression analysis was performed to detect predictive factors for detrimental outcome.

Results: Of the 53 patients, 54.7% (29) showed complete recovery from neurological deficit at follow-up. Neurological symptoms persisted in 45.3% (24) of patients, of which 33% (8) died without neurological assessment at follow-up. Between the groups with recovery and persistence of neurological deficit there was no significant difference regarding age (58.6±13 vs. 61±10.5 years), male gender (62% vs. 71%) or duration of deep hypothermic circulatory arrest (28±14 vs. 36±20 min). Multivariate analysis showed significant differences for the preoperative MRS between the two groups (p<0.007). High preoperative MRS was associated with persistence of neurological symptoms (p< 0.02). Cardiovascular risk factors, age or involvement of supra-aortic branches showed no predictive value in our cohort.

Conclusion: More than half of our patients recovered completely from neurological deficit due to type A aortic dissection after surgery. Severity of clinical symptoms seems to have predictive value. Clinical presentation with neurological deficit in patients with type A aortic dissection as such should not preclude emergency surgery.

Disclosure of Interest: None declared
Postoperative thrombocytopenia in patients with stentless, stented, and sutureless aortic valve prostheses

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Introduction: The bovine pericardium Freedom SOLO (FS) stentless valve has demonstrated very satisfying early clinical results. However the widespread use has been limited by yet unexplained postoperative thrombocytopenia. Speculations include microhaemodynamic effects, implantation technique, tissue biocompatibility, and transient chemical effects of the manufacturers unique detoxification treatment. The FS and the new Perceval sutureless valves (Sorin Group) are fundamentally different in design but share the identical tissue and chemical fixation/detoxification treatment. Comparison with stented bovine pericardium prosthesis (Perimount; Edwards) and sutureless equine pericardium prosthesis (3F Enable; Medtronic) could help explain the potential cause of FS-associated thrombocytopenia.

Method: Clinical data including daily platelet counts were collected and analysed from patients receiving FS (n=403), Enable (n=51), Perimount (n=188) and Perceval (n=51) valve prostheses.

Results: Patient groups had comparable demographic characteristics and platelet counts before surgery. The postoperative course was nearly identical for the FS and Perceval prostheses with a maximum platelet decrease (mean 61% and 59%, p=.329) on the third postoperative day (p=.525) and recovery on day 10 (p=.384). In comparison, the Perimount and Enable valve prostheses both showed the same maximum platelet decrease (mean 44% and 45%, p=.424) on the second postoperative day (p=.278) and discharge values (p=.326). The differences between both pairs were highly significant for minimum platelet counts (p<.0001), time of maximum decrease (p<.0001) and discharge values (p=.03), that were not explained by the type of procedure.

Conclusion: Our results indicate that mechanisms associated with the Sorin-specific tissue treatment (used in both the FS and Perceval valves) are associated with transient postoperative thrombocytopenia, but not design, tissue nor implantation technique.

Disclosure of Interest: None declared

Is the video-assisted mitral valve repair with artificial chords reproducible and applicable in routine surgery?

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Introduction: A variety of resectional techniques and chordae transfer are used for the repair of the prolapsed segments. These techniques are difficult to apply in video-assisted mitral surgery. The application of artificial chordae in the setting of the video assisted mitral surgery allow for efficient repair. The aim of this study was to demonstrate the effectiveness and reproducibility of this method in the setting of routine surgery and assess the stability of the « figure of eight-without pledget» implantation of the neochords.

Method: From February 2008 to October 2013, 424 consecutive patients were operated under video assisted mitral repair for degenerative disease or healed endocarditis of the posterior, anterior or both leaflets. Were excluded the patients with stenotic mitral disease, active endocarditis, peripheral artery disease or previous right thorax surgery. Mean age was 55±18 years, LVEF of 60±8% and mean NYHA class II (87.5%). We have used in all patients neochordae and in 47 of them an association of leaflet resection and artificial chordae.

Results: Mean clamping time was of 106±28min and cardiopulmonary bypass (CPB) time of 133±30 min. A very low incidence of residual leakage, grade I/IV (3.5%) were discovered postoperatively. Fifteen patients required multiple mitral repair attempts and had longer CPB times with good final result. For the 25% was a fast track procedure with extubation on the operating table and the remaining in the six post-operative hours. Hospital stay was 5 ± 1.3 days. No patient required reoperation. Five patients (1.2%) required re-exploration for bleeding. One patient had a permanent cerebral attack. The 30-day mortality was of 2.7%. Follow-up ranged from 3-60 months (trans-thoracic echocardiography at one month, 6 months and yearly after the operation) during which all of the patients remained with none or trace mitral regurgitation. No desinsertion or rupture of any chord loops was noticed.

Conclusion: Artificial chords provide high rate of valve repairability in the setting of the video assisted mitral repair. Chords implantation without pledget is very stable and reproducible over time. These results associated to the low rate of complications and the applicability of the method to the routine surgery makes it our preferred technique for mitral valve surgery.

Disclosure of Interest: None declared
Poster Session 1
Cardiovascular biology (Including all abstracts with in vitro or in vivo investigations)

P001

Cell-specific off-target effects of ticagrelor but not clopidogrel-active metabolite in endothelial dysfunction
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Introduction: Anti-platelet drugs targeting the ADP-receptor P2Y12 have shown different beneficial effects in clinical trials; particularly, ticagrelor has been reported to reduce mortality in ACS patients compared to clopidogrel. However, P2Y12 receptors are not only found on platelets but also on other cell types; therefore, some of the beneficial effects may be mediated in a platelet- or even P2Y12 receptor-independent manner.

Method: To investigate potential endothelium dependent effects of P2Y12 antagonists, primary human aortic- (HAECs), brain microvascular- (HBMVECs) and cardiac microvascular-endothelial cells (HCMVECs) were stimulated with TNFa (10 ng/ml) and treated with increasing concentrations of clopidogrel-active metabolite (CAM) (1.5 x 10⁻⁸M – 1.5 x 10⁻⁴M), which binds to the P2Y12 receptor after CYP 450 activation or ticagrelor (10⁻⁸M – 10⁻⁴M). Effects of anti-platelet drugs on endothelial activation was determined by expression of pro-coagulant tissue factor (TF) and its counter-player TF pathway inhibitor (TFPI), expression and activity of eNOS, expression of COX-1, COX-2 and the adhesion molecules VCAM-1 and ICAM-1 by western blotting. Additionally, underlying signal transduction pathways were assessed. The expression of P2Y12 receptors was investigated by qrt-PCR.

Results: Ticagrelor, unlike CAM showed anti-coagulant properties by reducing TF expression in a concentration-dependent manner in HAECs and HBMVECs but not HCMVECs. The observed effect was mediated via PI3 and p70S6 kinase. Further, activation of eNOS by phosphorylation (Ser1177) was increased by ticagrelor via PI3 kinase in HAECs but not in microvascular endothelial cells, whereas total eNOS levels were not altered. CAM treatment did not affect eNOS activation in either cell type. Ticagrelor compared to CAM decreased VCAM-1 expression and augmented COX-2 protein levels via the MAP Kinase p38 at the highest concentration tested (10⁻⁵ M). No effect was observed on COX-1 and ICAM-1 protein levels. Surprisingly, P2Y12 receptor mRNA was not detected in endothelial cells.

Conclusion: Ticagrelor, unlike CAM displays 1) an anti-coagulant and anti-inflammatory profile and 2) enhances activation of eNOS. The effects were observed to be cell-specific and appeared to be mediated independently of P2Y12 receptor. These findings may have additional implications for ticagrelor in cardiovascular disease.

Disclosure of Interest: M. F. Reiner Grant/ research support from: AstraZeneca, Sanofi Aventis, S. Stivala: None declared, A. Akhmedov: None declared, R. D. Spescha: None declared, G. Savarese: None declared, Th. Lüscher: None declared, J.-H. Beer Grant/ research support from: AstraZeneca, Sanofi Aventis, G. Camici Grant/ research support from: AstraZeneca, Sanofi Aventis

P002

Anti-apo-1 auto-antibodies increase cardiovascular mortality in atherosclerotic mice
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University of Geneva, Genève, Switzerland

Introduction: Anti-ApolipoproteinA-1 auto-antibodies (anti-ApoA-1 IgG) have been shown to be associated with increased atherosclerotic plaque vulnerability, to predict poor cardiovascular outcome in humans, and to promote inflammation and atherogenesis in vivo. The aim of this study is to investigate the impact of anti-ApoA-1 IgG passive immunization on mortality rate and electrocardiogram (EKG) changes in mice.

Method: Eleven-week old adult male apolipoprotein (apo)E knockout (ApoE-/-) mice under normal diet were intravenously infused with 50 microg/mouse of lipopolysaccharide-free polyclonal anti-ApoA-1 IgG (n=28), control isotype IgG (n=23) or vehicle (NaCl 0.9%, n=16) every two weeks for 16 weeks. A subgroup of 4 mice was equipped with telemetry devices, allowing continuous monitoring of EKG changes during the procedure.

Results: Anti-ApoA-1 IgG-recipient mice exhibited a 25% (7/28) mortality rate against 4% (1/23) in mice exposed to isotype IgG (LogRank p=0.004) during follow up. No deaths were observed in vehicle-recipient. Furthermore, none of the mice including the anti-ApoA-1 IgG- treated ones displayed changes in body weight or activity.
Over the 16 weeks of telemetry data acquisition, a significant ST-segment depression was observed in anti-ApoA-1 IgG-treated mice as compared to isotype IgG (-0.07 vs. 0 mv, p<0.0001, n=2 per group), indicative of a sustained sub-endocardial ischemia. In addition, in one anti-apoA-1 IgG-recipient mice that died during telemetry acquisition, an acute ST-segment elevation indicative of transmural myocardial infarction was observed, and followed within minutes by mice death.

**Conclusion:** These preliminary results suggest that passive immunization with anti-ApoA-1 IgG in apoE-/- mice is associated with an increased mortality rate, possibly related to myocardial ischemia.

**Disclosure of Interest:** None declared

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**P003**

**P66shc adaptor protein protects from short-term ischemic myocardial injury via intracellular salvage pathways**

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**Introduction:** Formation of reactive oxygen species (ROS) contributes to many pathophysiological processes. Although ROS production is also involved in some physiological processes, the imbalance between their generation and removal, i.e. oxidative stress, plays a major role in myocardial injury caused by ischemia/reperfusion (I/R). The mammalian Shc locus encodes three Shc isoforms: p46\(\text{Shc}\), p52\(\text{Shc}\) and p66\(\text{Shc}\). The p66\(\text{Shc}\) is not involved in mitogenic signals as p46\(\text{Shc}\)/p52\(\text{Shc}\), but it functions as a critical mediator of intracellular oxidative signal transduction. Various studies relate p66\(\text{Shc}\) to cardiovascular disease; however, few data are available on the role of p66\(\text{Shc}\) in myocardial I/R.

**Method:** 8-12-week-old male p66\(\text{Shc}\) deficient (p66\(\text{Shc}\)-/-) mice and corresponding C57Bl/6 wild-type (WT) control mice were subjected in vivo to different durations of ischemia (30, 45 and 60 min) followed by 24h of R. Infarct size was assessed morphologically.

**Results:** After 30 min of ischemia, p66\(\text{Shc}\)-/- mice developed markedly larger infarcts as compared to WT (Fig. 1). This effect was confirmed by in vivo silencing of p66\(\text{Shc}\) prior to I/R. Both genetic deletion and silencing of p66\(\text{Shc}\) displayed increased post-ischemic levels of serum cardiac troponin I. However, the observed effect on infarct size was limited to 30 min of ischemia since by increasing ischemia duration to either 45 or 60 min infarct size did no longer differ between p66\(\text{Shc}\)-/- and WT mice (Fig. 1). Moreover, differently from WT, infarct size in p66\(\text{Shc}\)-/- was not significantly larger with increasing duration of ischemia (from 30 to 60 min). On the molecular level the observed effect was linked to the inhibition of phosphorylation of protein kinase Akt and transcription factor STAT3 – two key members of prosurvival pathways RISK and SAFE, respectively. Inhibition of STAT3 activation further led to mitochondrial swelling and cellular apoptosis in cardiac tissue of p66\(\text{Shc}\)-/- mice (Fig. 2).
Picture / graph - 2:

A

B

C

D

TUNEL

WT

p66Δc

Relative area (%)

Scr siRNA

p66 siRNA

Relative area (%)
Conclusion: Our data suggest that genetic deletion of p66Shc leads to an increased sensitivity to myocardial infarction with larger infarcts with shorter, but not prolonged ischemia, and that prosurvival pathways are involved. Therefore, activation of p66Shc may provide resistance to ischemia and represent a novel therapeutic target in the early phase of myocardial infarction.

Disclosure of Interest: None declared

P004

The role of MIR-483-3P in endothelial homeostasis and response to vascular injury

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Introduction: We have investigated the role of the micro-RNA miR-483-3p - which has previously only been known to be involved in modulating hepatocarcinoma growth - for the maintenance of endothelial homeostasis and for the response to acute vascular injury.

Method: Expression of the miR-483-3p was assessed by RT-qPCR in human aortic endothelial cells (HAEC) and in myeloid early outgrowth cells (EOC) obtained from healthy volunteers (H), as well as from patients with stable coronary artery disease (CAD) with or without additional type 2 diabetes mellitus (T2D). HAEC or EOC were transfected with precursor of miR-483-3p (mi483) or Power Inhibitor of miR-483-3p (anti483), as compared to scrabled oligonucleotide control (scr). After 24h, survival, proliferation and contribution of the transfected cell to in vitro and in vivo re-endothelialization were assessed.

Results: We observed 1.7-fold to 3.0-fold higher expression levels of miR-483-3p in EOCs from CAD-T2D patients as compared to H controls and non-diabetic CAD patients (respectively; P<0.05). Transfection of HAEC with mi483 induced apoptosis in HAEC (mi483: 13.6±3.1% vs. scr: 4.2±1.7%; p=0.004) and impaired HAEC in vitro re-endothelialization capacity (mi483: -0.5±3.2% vs. scr: 7.9±1.0%; p=0.03). Transfection of EOC from H volunteers with mi483 reduced their capacity to support re-endothelialization in vitro and in a mouse model of acute vascular injury (mi483: 33.5±3.2% vs. scr: 24.8±2.3%; p=0.05). Vice versa, transfection of EOC obtained from CAD-T2D patients with anti483 enhanced their capacity to support in vivo re-endothelialization (anti483: 31.2±3.1% vs. scr: 21.6±2.6%; p=0.03).

Conclusion: Upregulation of miR-483-3p under high glucose conditions and in T2D may jeopardize a fast and efficient re-endothelialization response after acute vascular injury. This effect could result from two different mechanisms. While overexpression of miR-483 within endothelial cells can directly induce endothelial cell apoptosis, enhanced miR-483 levels in paracrinally active “accessory” cells, such as EOC, may affect their secretory support for the re-establishment of a homogenous endothelial layer. The repression of miR-483-3p levels in patients with T2D might therefore partially rescue the capacity of endothelial cells to mount a fast and efficient response to vascular injury.

Disclosure of Interest: None declared

P005

T-cadherin alters insulin sensitivity, contractile competence and cell-matrix interaction in vascular smooth muscle cells

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Introduction: Expression of atypical GPI-anchored T-cadherin (T-cad) on vascular smooth muscle cells (VSMC) is upregulated in pathological vascular conditions (e.g. atherosclerosis and restenosis) associated with insulin resistance. Functions for T-cad and signal transduction pathway utilization in VSMC are unknown. We investigated consequences of T-cad overexpression on constitutive and insulin-induced Akt/mTOR pathway activity, VSMC contractile competence and cell-matrix interaction.

Method: To achieve a situation of chronic T-cad upregulation rat and human VSMC were stably transduced to overexpress T-cad protein (Tcad+)VSMC. Effects of T-cad on signal transduction (by immunoblotting, RhoA activity assay) and function (in 3D-collagen-gel) were investigated.
Results: Tcad+VSMC exhibited elevated constitutive levels of phosphorylated Akt$^{thr473}$, GSK3β$^{ser19/21}$, S6RP$^{ser240/244}$ and IRS-1$^{ser636/639}$. Total IRS-1 levels were reduced. Contractile machinery was also constitutively altered in a manner indicative of reduced intrinsic contractile competence, namely decreased phosphorylation of MYPT1$^{thr696}$ or thr653 and MLC20$^{thr118/ser119}$, reduced RhoA activity and increased iNOS expression. Tcad+-VSMC-populated collagen lattices exhibited greater compaction which was due to increased collagen fibril packing/reorganization. Insulin-induced alterations in Akt/mTOR axis signaling, phosphorylation of MLC20 and MYPT, compaction of free-floating lattices and also collagen fibril reorganization were attenuated in Tcad+-VSMC.

Conclusion: T-cad expression on VSMC is a determinant of Akt/mTOR axis signalling activity, insulin sensitivity, contractile potential and VSMC-matrix interactions.

Disclosure of Interest: None declared

P006

Characterization of human induced pluripotent stem cell-derived cardiomyocytes and cardiac fibroblasts in scaffold-free 3D microtissue co-culture compared to standard cell culture

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Introduction: Cardiomyocytes are terminally differentiated cells in the adult heart but ischemia and cardiotoxic compounds can lead to cell death and irreversible decline of cardiac function. Hence, an in vitro model comprising the advantages of 3D cell culture and the availability of induced pluripotent stem cells (iPSC) from human origin was developed and characterized.

Method: iCell cardiomyocytes (Cellular Dynamics Intl.) and human cardiac fibroblasts were cultured in standard 2D culture for 10 days and examined using immunofluorescence microscopy and Western blotting. Cardiac microtissues (MTs) were generated by self-assembly in hanging drop GravityPLUS™ cultures. After MT formation they were transferred to non-adhesive multiwell assay plates for further culture and analysis.

Results: After 10 days in 2D culture iCell cardiomyocytes showed well-formed myofibrils and cell-cell contacts positive for connexin-43. Several proteins typically expressed in primary cardiomyocytes were detected by Western blotting. The cells reacted to pro-hypertrophic growth factors with a substantial increase in myofibrils and sarcomeric proteins. Histological analysis of MTs cultured for up to 1 month showed a homogeneous tissue structure with myomesin-positive cells throughout the spheroid and no necrotic core. MTs showed spontaneous contractions that were recorded by optical motion tracking. The response of contractile activity to drugs was tested with isoproterenol, phenylephrine, blebbistatin, and doxorubicin and MTs responded accordingly. Spontaneous contraction frequency was temperature-dependent (at 37°C = 48±15 beats per minute) and MTs reacted to electrical field pacing. Calcium transients were recorded by confocal microscopy after loading with fluo4-AM. Ca$^{2+}$-transients responded to caffeine-induced Ca$^{2+}$-release and were inhibited by reduction of extracellular calcium. Scaffold-free 3D culture led to a normalization of cardiac fibroblast activation status measured by the expression of alpha-smooth muscle actin. The addition of 25% cardiac fibroblasts to cardiomyocyte MT led to a persistent higher spontaneous contraction frequency.

Conclusion: Morphological and functional characterization emphasizes that the combination of 3D culture with iPSC-derived human cardiomyocytes and fibroblasts creates a fully functional model system and a promising approach for the cardiotoxicity evaluation of new cancer therapies.

Disclosure of Interest: None declared

P007

Vascular dysfunction, arterial hypertension and insulin-resistance in offspring of restrictive diet pregnancy in mice: Prevention by sildenafil

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Introduction: In humans, offspring of mothers with preeclampsia display generalized vascular dysfunction and premature cardiovascular morbidity, but the underpinning mechanisms and possibilities for prevention are poorly understood. In mice, restrictive diet pregnancy (RDP), a model mimicking several aspects of preeclampsia in humans, induces endothelial dysfunction, arterial hypertension and insulin resistance in the offspring, offering thereby an opportunity to study interventions aimed at preventing these problems.
In preeclamptic rats, administration of the phosphodiesterase-5-inhibitor sildenafil, increases birth weight in the offspring by improving uteroplacental and fetal perfusion. We hypothesized that sildenafil administration during RDP in mice prevents vascular dysfunction and insulin resistance in the offspring.

**Method:** We assessed systemic endothelial function in vitro (acetylcholine induced mesenteric artery dilation), and arterial blood pressure (carotid artery) and insulin sensitivity (hyperinsulinemic euglycemic clamp studies) in vivo in 12-weeks old offspring of RDP born from mothers treated with Sildenafil (40 mg/kg/day in the drinking water from day 7 until the end of pregnancy) or vehicle and in control mice.

**Results:** As expected, offspring of RDP displayed impaired acetylcholine-induced mesenteric artery dilation (P<.001 vs. ctrl), arterial hypertension (119±7 vs. 112±5 mmHg, X±SD, P=.04 vs. ctrl) and insulin resistance (Glucose infusion rate, 77.4±10.7 vs. 96.7±12.2 mg/kg/min, P<.001 vs. ctrl). Sildenafil administration during RDP prevented these problems in the offspring (all P>.5 vs. ctrl).

**Conclusion:** We show for the first time that in mice, sildenafil administration during RDP prevents arterial hypertension and insulin resistance in the offspring. We speculate that in humans sildenafil administration during preeclampsia has similar beneficial effects in the offspring.

**Disclosure of Interest:** None declared

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**P008**

**Cardioprotective effect of eplerenone in acute and chronic anthracycline-induced cardiotoxicity**

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**Introduction:** Chemotherapy significantly improves survival with cancer. However, it may induce cardiac toxicity with subsequent heart failure as shown for anthracyclines. This agent triggers production of reactive oxygen species (ROS) in cardiomyocyte, leading to oxidative stress and cell death. Cardiotoxicity is associated with activation of the renin-angiotensin-aldosterone system which may further increase the ROS load upon activation of the mineralocorticoid receptor by aldosterone. More recently, anthracyclines have also been shown to deplete the pool of cardiac progenitor cell (CPC), which should decrease the regenerative capacity of the heart. We hypothesize that blockade of the mineralocorticoid receptor should decrease ROS production and CPC depletion. In order to prepare this interventional study we present results from the pilot study conducted in mice treated with doxorubicin.

**Method:** Wild type mice were treated with doxorubicin (15 mg/kg) for 7 days. CPC pool was quantified with immunolabelling for Nkx2.5, BrdU and c-kit in heart sections, and activation of energetic stress-sensing pathways assessed using western blot analyses. In addition, in vitro experiments for further analysis of activation of signaling pathways were performed using neonatal mouse ventricular cardiomyocytes (NMVM) treated with doxorubicin.

**Results:** Doxorubicin treated animals loosed 20% of body weight within 7 days. Heart weight to tibia length ratio also decreased in treated animals and cardiac loss was accompanied by an increase in fibrosis after 5 days of treatment. Immunostaining of heart sections revealed that 5 days of doxorubicin treatment drastically impaired proliferation of non-cardiomyocyte cells (NMC) as well as of CPC, while we observed a 50% increase in the number of non proliferative NMC that express Nkx2.5. Parallel western blot analyses showed dynamic impairments in the expression of key components of the AMPK and mTOR pathways as well as of the sirtuin isoform SIRT1.

In vitro analyses of NMVM treated with Doxorubicin showed, compared to controls, an increase in apoptosis as revealed by Cleaved-Caspase 3 staining, a decreased activation of AMPK after 16h, paralleled by an increased expression of SIRT1 and followed after 24h by an increased activation of AKT and ERK.

**Conclusion:** Preliminary results indicate that anthracyclines treatment impairs cardiomyocyte survival and CPC proliferation, suggesting reduced cardiac regenerative activity.

**Disclosure of Interest:** None declared

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**P009**

**Assessing energy metabolism in the ischemic rat heart with hyperpolarized C-13 pyruvate**

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Introduction: The application of MR methods to follow the biological conversion of (HP) $^{13}$C-labelled metabolites provides a non-invasive means to study metabolism in real time and has the potential clinical application to detect the changes in cardiac metabolism that result from heart failure or ischemic injury. Prior studies in ex vivo ischemic rat hearts using HP $^{13}$C-labelled pyruvate have observed the shift towards more anaerobic metabolism. We have adapted a rat model of reversible myocardial ischemia for in vivo HP metabolic studies.

Method: Animal Model. Male Wistar rats were anesthetized with isoflurane and intubated. Catheters were installed in the femoral arteries for monitoring and in a femoral vein for infusion. Myocardial ischemia was affected by occlusion with a snare installed around the left coronary artery. The occlusion was in place for 15min (omitted in controls) and HP [1-$^{13}$C]pyruvate was infused afterward. The extent of the ischemic area was checked by Evans blue staining.

MR acquisition. A Varian 9.4T 31cm horizontal scanner was used. A dual-tuned $^1$H/$^{13}$C surface coil was positioned over the heart. Following the infusion, a series of 40 single pulse $^{13}$C spectra was acquired (IBP & resp. gated) using a 30º BIR4 pulse.

Data analysis. Metabolite spectral peaks were quantified by fitting, and areas under curve (AUC) for metabolite signal time courses were calculated using the spectral signal amplitude and the time between the gated acquisitions. Ratios of $^{13}$C-bicarbonate-to-$[1-^{13}$C]lactate (Bic-to-Lac) AUCs acquired before and after the ischemic occlusion were compared.

Results: The HP metabolites $[1-^{13}$C]lactate, $[1-^{13}$C]alanine and $^{13}$C-bicarbonate were detected before and after myocardial ischemia. Quantitation of the peak areas revealed a significant reduction in the Bic-to-Lac ratio, 1.51 ± 0.10 fold lower, compared to 0.93 ± 0.21 in control experiments ($p<0.01$), reflecting the shift away from oxidative metabolism and to anaerobic, glycolytic metabolism. While the Bic-to-Lac ratio varied between animals, its variation between consecutive infusions was smaller and more consistent.

Conclusion: This study demonstrates the feasibility of using HP $^{13}$C MRS to detect metabolic changes in rat myocardial metabolism in vivo after a brief ischemic episode, which provides the opportunity to investigate changes in energy metabolism with other probes, as well as to assess the effects various interventions, such as metabolism-modulating drugs.

Disclosure of Interest: None declared
Poster Session 2
Pacemaker, defibrillator and electrophysiology

P010

ICD interventions in ischemic heart disease patients with ventricular tachycardia and preserved left ventricular ejection fraction
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Introduction: Current guidelines recommend internal cardioverter defibrillator (ICD) implantation in ischemic heart disease patients with ventricular tachycardia (VT) and preserved left ventricular ejection fraction (LVEF ≥40%). However, data on the rate of ICD interventions and associated clinical findings is limited in this population.

Method: From 2009 to 2013 a total of 484 ICDs were implanted at our institution. Ischemic heart disease with preserved LVEF and VT was the reason for ICD implantation in 28 patients (6%). We analyzed appropriate and inappropriate ICD interventions during follow up, VT cycle length and antiarythmic drug (AAD) therapy in these patients.

Results: Out of 28 patients (mean age 66.4±8 years; 93% male) 13 patients (46%) had appropriate ICD interventions (median 2 interventions [range 1-62]; mean time to intervention 0.9±0.7 years) after a mean follow-up of 2.1±1.6 years (figure 1). A VT storm occurred in 1 patient and 5 patients (18%) had inappropriate ICD interventions (3 atrial fibrillation; one sinus tachycardia; one oversensing caused by cauterization during surgery). After ICD implantation 9 patients (32%) had AAD therapy (8 amiodarone; one dronedarone). The rate of appropriate ICD intervention in patients on AAD therapy was not different compared to the remaining patients (44% versus 47%; p=0.5 by the log rank test). Delta VT cycle length (recurrent VT cycle length minus VT cycle length before ICD implantation) was significantly longer in patients on AAD therapy after ICD implantation (median +100 ms versus +7 ms; p=0.05; figure 2). Out of 4 patients with recurrent VT on AAD therapy all patients with an increase in delta VT cycle length were on amiodarone (n=3). The patient on AAD therapy with nearly unchanged VT cycle length was on dronedarone (figure 2).

Picture / graph:

![Figure 1](image1.png)

![Figure 2](image2.png)
Conclusion: The rate of both appropriate and inappropriate ICD interventions in ischemic heart disease patients with VT and preserved LVEF is high. The rate of appropriate ICD interventions is not different in patients on AAD. However, a significantly longer recurrent VT cycle length should be anticipated in patients on amiodarone.

Disclosure of Interest: None declared

P011

Cost-effectiveness of systematic ECG screening to prevent sudden cardiac death in psychiatric adult population

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Introduction: Resting ECG is not systematically performed at the hospital admission in psychiatry, although detection of drug-induced long corrected QT (LQTc) could reduce the occurrence of torsades de pointes (TdP), and sudden cardiac death (SCD). We evaluated the cost-effectiveness of LQTc detection with systematic ECG screening compared with no ECG screening in the psychiatric adult population.

Method: We built a decision tree model to conduct the cost-utility analysis from a health care perspective with a 20-year time horizon. We perform elicitation of 15 experts (cardiologist, pharmacologist, and internist) to estimate the risk of TdP in LQTc patients and we assumed a TdP related mortality of 12% and a TdP rate reduction of 65% after LQTc detection. The proportion of LQTc in the study population was derived from an in hospital survey. Model uncertainty was assessed with two-way and probabilistic sensitivity analyses.

Results: The incremental cost-effectiveness ratio (ICER) was CHF 21,759 per quality-adjusted life year gained (QALY) with systematic ECG screening compared with no ECG screening. At a willingness-to-pay of CHF 50,000 for one QALY, the probability of cost-effectiveness is 81.3% for systematic ECG screening compared with no ECG screening. Systematic LQTc detection at admission has the highest probability of cost-effectiveness when subsequent intervention following LQTc detection reduces the TdP rate of 65% or more.

Conclusion: Systematic ECG screening in psychiatry is likely to be cost-effective to reduce the number of SCD (< CHF 50,000 for one QALY).

Disclosure of Interest: None declared
How frequent is ventricular pacing after pacemaker implantation subsequent to transcatheter aortic valve replacement?

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Introduction: Data about the need for long-term ventricular pacing (VP) after transcatheter aortic valve implantation (TAVI) is limited.

Method: Consecutive patients (pts) undergoing transfemoral and trans-subclavian TAVI between 2007 and 2011 without previous pacemaker (PM) implantation were included. In pts subsequently undergoing PM implantation, VP was determined at first PM follow-up in the intervals 1-7, 8-19, 20-31, and 32-43 months after PM implantation, respectively. Pts with pre-existing right-bundle branch block (RBBB) were compared to pts without RBBB.

Results: A total of 304 pts (male, 125 [41.1%]; age, 82.9±5.1 years; RBBB, 26 [8.6%] pts) underwent TAVI (CoreValve, 209 [68.8%] pts; Edwards Sapien valve, 95 [31.3%] pts). Ninety-five (27.8%) pts (male, 46 [48.4%]; age, 82.9±4.5 years; CoreValve, 77 [81.1%] pts; Edwards Sapien valve, 18 [18.9%] pts; RBBB, 19 [20.0%] pts) subsequently underwent PM implantation (single-chamber, 72 [75.8%] pts; dual-chamber, 21 [22.1%] pts; resynchronization PM, 2 [2.1%] pts) after a median of 3 days. Complete atrio-ventricular block was the indication for pacing in 43 (45.3%) pts. Nine (9.5%) pts died before the first PM follow-up. The proportion of pts with VP at PM follow-up is shown in Figure 1; pts with RBBB had more frequently VP compared to those without RBBB, but this difference was not significant.

Conclusion: Long-term VP is frequent after PM implantation subsequent to TAVI. We could not find a significant difference in VP between pts with pre-existing RBBB and pts without RBBB.
Disclosure of Interest: V. Weberndoerfer: None declared, St. Stortecky: None declared, J. Fuhrer: None declared, St. Gloekler: None declared, L. Roten: None declared, H. Tanner: None declared, St. Windecker: None declared, P. M. Wenaweser: None declared, J. Seiler Conflict with: The spouse of Dr Seiler is employee of Boston Scientific.

P013

Duration of left atrial activation time recorded by esophageal ECG as a surrogate marker for silent atrial fibrillation

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Introduction: Paroxysmal atrial fibrillation (AF) is common and may have severe consequences. Detection of AF by long-term ECG can be difficult, if AF burden is low and patients are asymptomatic. A reliable method to identify patients suffering from paroxysmal AF despite uneventful long-term ECG is desired. Surrogate markers for AF might help to identify patients with silent AF, who likely would benefit from repeated and prolonged long-term ECG’s. Esophageal ECG (eECG) offers excellent atrial signals which may reveal such surrogate markers for AF (figure 1).

Method: In a case-control design, 46 patients (23 cases with known paroxysmal AF and 23 healthy controls) were matched for age and gender. Control patients had no history suggestive for AF and AF was ruled out by at least one negative continuous 7-day ECG within one year prior to inclusion. In the study, a long-term eECG was performed in all cases and controls. Subsequently, the right, left and total atrial signal duration were measured in the signal-averaged eECG. Left atrial signal duration was defined to begin at the major up- or downstroke of the atrial signal (slope >45° or < -45°, indicated by an arrow in figure 1) and to last till the end of the signal (in concordance to eECG literature). Sinus rhythm was verified immediately prior to eECG registration by a standard 12-channel ECG.

Results: Median patient age was 69 years (interquartile range 61-76 years), 14/46 patients were females. Median total atrial signal duration was 11 ms longer in patients with known AF compared to controls (95% - CI: 4-22 ms, p = 0.002, figure 2, left panel). This difference was due to a prolonged median left atrial activation time in patients with known AF compared to controls (10 ms, 95% - CI: 2-18 ms, p = 0.007, figure 2, right panel). Right atrial signal duration was not different (p = 0.49).

Picture / graph:
Conclusion: Patients with AF exhibit a longer left atrial signal duration in sinus rhythm compared to controls. This surrogate marker may help to identify patients who likely suffer from silent AF.

Disclosure of Interest: None declared

P014

Performance of the accent MRI pacemaker system in patients undergoing high-power thoracic MRI scanning

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Introduction: MRI conditional pacemaker systems are designed to withstand the harsh environment of MRI scanners. We sought to evaluate the performance of the Accent MRI Pacemaker system under high power thoracic MRI scans

Method: Patients enrolled in the SVAMRI study (NCT01798043) designed to evaluate cardiac structure were implanted with an Accent MRI pacemaker system (St Jude Medical, all dual chamber systems) and underwent a high power baseline thoracic MRI scan ≥6 weeks post-implant. Pacemaker functionality was evaluated pre and post MRI and one week later. 1.5T scanners were mandatory

Results: A total of 14 patients (9 M, 73 ± 9 yrs), underwent thoracic MRI scans of 25.7 ± 7 min and whole body averaged specific absorption rate (SAR) 1.36 ± 0.12 W/kg. Post- vs pre-scan RV / RA thresholds changed by 0.04 ± 0.09 (p = 0.5) and 0.0 ± 0.1 V (p = 0.9), respectively. There were no significant changes in post- vs pre-scan R- and P-wave amplitudes (-0.05 ± 0.73 [p = 0.9] and 0.01 ± 1.49 mV [p = 0.8], respectively). There were no significant changes in post- vs pre-scan RV and RA lead impedances (average change in impedance 4 ± 23 [p = 0.6] and 6 ± 18 ohms [p = 0.5], respectively). One week post-scan variables were similarly unremarkable. No patients have yet experienced any adverse events in this study. As illustrated in the representative MRI (picture 1), the MR images from this study exhibited little artefact in evaluating cardiac structures.
Conclusion: In this study, the Accent MRI pacemaker system performed safely during and after thoracic MRI scanning, allowing for reliable MR images of quality and evaluable of cardiac structures
Disclosure of Interest: None declared

P015

Systolic dyssynchrony index as a predictor for cardiac resynchronization therapy responders: A cardiac magnetic resonance imaging study

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Introduction: 30-40% of heart failure patients that undergo cardiac resynchronization therapy (CRT) are non-responders. There’s a need for a simple parameter to predict clinical outcome after CRT therapy. Systolic movement of the different segments of the left ventricle (LV) using the 16-segment model can be analyzed in a three-dimensional model after imaging the LV by cardiac magnetic resonance imaging (CMR). The resulting systolic dyssynchrony index (SDI) is a potential novel predictor of clinical outcome after CRT therapy.

Method: All patients underwent a spiroergometry, a transthoracic echo and a CMR at baseline and received a CRT device. CMR was done on a 1.5 Tesla GE scanner using a standard CMR protocol. All patients had an echo and a spiroergometry at follow-up. CMR cine images were analysed using TomTec 4D LV analysis software.

Results: 24 patients (17% female, mean age 65.1 ± 9.3 years) were included in the study. 58% of the patients had heart failure due to coronary artery disease (CAD), 42% due to dilated cardiomyopathy. Average QRS width was 160.6 ± 21.3 msec, mean New York Heart Association (NYHA) class was 2.4 ± 0.5. Left ventricular ejection fraction (LVEF) at baseline was 26.9 ± 6.0 % and increased significantly by 6.4% (p=0.003) after a mean follow-up time of 425 ± 145 days. Maximum oxygen uptake increased significantly from 14.7 ± 3.6 ml/min/kg body weight to 16.4 ± 4.9 ml/min/kg body weight (p=0.01). Mean SDI at baseline was 12.3 ± 4.7. SDI at baseline correlated significantly with the increase in maximum oxygen uptake achieved during follow-up (p=0.004; r=0.67) and (to a lesser extent) with the increase in exercise performance measured in watt (p=0.05; r=0.47). Conversely, QRS width or the presence/absence of CAD did not correlate with the increase in exercise performance.

Conclusion: SDI assessed before CRT implantation by CMR shows a good correlation with CRT response. This could be a novel marker for CRT response.

Disclosure of Interest: None declared

P016

Electrocardiogram in young and middle-aged athletes: Differences in characteristics and prevalence of abnormalities

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Introduction: the common training-related alterations and the pathological findings in the electrocardiogram (ECG) of young athletes (YA) are well described. Conversely, little is known about the ECG characteristics in middle-aged athletes (MA). The aim of this study was to compare the characteristics and prevalence of ECG abnormalities in YA and MA.

Method: ECGs of a cohort of YA aged 14 to 34 years were compared to ECGs of a cohort of MA aged 35 to 65 years. ECGs were analysed according the “Seattle criteria”.

Results: the two cohorts included 1070 YA (19.7±6.3 years, 75% males) and 761 MA (46±7.3 years, 73% males) respectively. The table shows the prevalence of common training-related ECG changes and the abnormal ECG findings in the 2 populations.

<table>
<thead>
<tr>
<th>Common ECG findings</th>
<th>Young athletes (1070), n (%)</th>
<th>Middle-age athletes (761), n (%)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sinus bradycardia &lt; 50 bpm</td>
<td>81 (7.6)</td>
<td>81 (10.6)</td>
<td>0.023</td>
</tr>
<tr>
<td>Ectopic atrial rhythm</td>
<td>55 (5.1)</td>
<td>19 (2.5)</td>
<td>0.005</td>
</tr>
<tr>
<td>Prolonged PR interval (&gt; 200 msec)</td>
<td>34 (3.2)</td>
<td>53 (7.0)</td>
<td>0.0002</td>
</tr>
<tr>
<td>Incomplete right bundle branch block</td>
<td>105 (9.8)</td>
<td>53 (7.0)</td>
<td>0.032</td>
</tr>
<tr>
<td>Voltage criteria left/right ventricular hypertrophy</td>
<td>197/31 (18.4/2.9)</td>
<td>50/8 (6.6/1.1)</td>
<td>&lt;0.0001/0.007</td>
</tr>
<tr>
<td>Early repolarisation (infero-lateral)</td>
<td>383 (35.8)</td>
<td>173 (22.7)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Total</td>
<td>599 (60.0)</td>
<td>332 (43.6)</td>
<td>&lt;0.0001</td>
</tr>
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</table>

Abnormal ECG findings

| ST-T abnormalities                          | 21 (2.0)                     | 16 (2.1)                       | 0.812   |
| Abnormal Q-waves                            | 1 (0.1)                      | 2 (0.3)                        | 0.377   |
| Complete bundle branch block                | 1 (0.1)                      | 7 (0.9)                        | 0.008   |
| QRS axis deviation                          | 6 (0.6)                      | 9 (1.2)                        | 0.146   |
| Pre-excitation                              | 3 (0.3)                      | 0 (0)                          | 0.144   |
| Prolonged QT interval                       | 2 (0.2)                      | 1 (0.1)                        | 0.772   |
| Ventricular premature beats                 | 6 (0.6)                      | 3 (0.4)                        | 0.615   |
| Left atrial enlargement                     | 1 (0.1)                      | 2 (0.3)                        | 0.377   |
| Total                                       | 38 (3.6)                     | 39 (5.1)                       | 0.098   |
Conclusion: the common training-related ECG alterations, especially regarding early repolarisation and isolated voltage criteria for ventricular hypertrophy, are less prevalent in MA than in YA. Conversely, the prevalence of abnormal ECG findings is similar between YA and MA.

Disclosure of Interest: None declared

P017

AV-junction ablation and pacemaker implantation for symptom control after failed catheter ablation of atrial fibrillation: Who takes the ultimate step?

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Introduction: Catheter ablation (CA) of atrial fibrillation (AF) is an established therapy for symptomatic patients (pts). Nevertheless, some pts need to undergo an ablate-and-pace (AaP) bailout approach after failed CA. The aim of this study is to characterize this patient population.

Method: We analyzed patient characteristics and echocardiography data of a large patient cohort who underwent AaP treatment after failed CA of AF from 06/2001 to 12/2013 and compared it to pts with CA of AF without an AaP approach.

Results: We included 672 consecutive pts (males, 75%; age, 58±10 years) with available follow-up undergoing CA of AF. After failed CA, 32 pts (5% of all, and 16% of failed CA) were treated by AaP. As compared to pts without AaP approach, pts with AaP were older (age, 65±7 vs. 58±10 years, p<0.001), had more persistent AF (50% vs. 31%, p=0.03), an AF duration of 81 vs. 65 months, p=0.2, and more previous CA of AF procedures (2.2±0.9 vs. 1.6±0.7, p<0.05). In addition, they had a higher prevalence of arterial hypertension (75% vs. 52%, p<0.01), congestive heart failure (34% vs. 10%, p<0.01), previous thromboembolism (22% vs. 8%, p=0.02), and higher hospitalization rates due to AF prior to the first CA of AF (78% vs. 41%, p<0.01). AaP group had larger left atrial dimension (parasternal long axis, 48±6mm vs. 43±7mm, p<0.01). Left ventricular ejection fraction was not different (58±2% vs. 59±9%, p=0.4). The reasons for AaP were: patient preference after failed CA (n=26, 81%), indication for cardiac resynchronization therapy (n=4, 13%), difficulties in transseptal access (n=1, 3%), and persistent symptomatic sinus node dysfunction (n=1, 3%).

Conclusion: After CA of symptomatic AF, 5% of patients required an AaP approach in our cohort. These pts were older, had a higher prevalence of arterial hypertension, heart failure, persistent AF, had more advanced left atrial dilatation, and a higher number of previously failed CA of AF as compared with pts not undergoing an AaP approach. Patient preference was the main reason for AaP after failed ablation.

Disclosure of Interest: None declared

P018

Transseptal puncture for radiofrequency ablations in a paediatric population

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Introduction: In adults, transseptal puncture (TSP) for radiofrequency catheter ablations of cardiac arrhythmias within the left atrium is a frequent procedure with a low rate of complications. In children and adolescents, literature on this topic is rare. In this age group, the conditions are different due to smaller size of the vessels and the atria, suggesting a technically more challenging procedure. The aim of this study was to describe the practicability and safety of the procedure of TSP in a paediatric cohort.

Method: Retrospective analysis of all consecutive patients below 18 years of age with attempted TSP for electrophysiology procedures in two centres from 2005 through 2013. All procedures were performed under general anaesthesia. The TSP was performed using a Brockenbrough needle in a Mullins sheath under biplane fluoroscopic guidance with a coronary sinus catheter marking the anatomical structures. After the puncture, blood was withdrawn and a guide wire was positioned in the left superior pulmonary vein to secure the position of the sheath within the left atrium. Transesophageal echocardiography (TEE) was used if deemed necessary. At the end of the procedure, absence of a pericardial effusion was confirmed in all patients by echocardiography.

Results: The study cohort consisted of 157 patients with a median age of 12.5 years (range 1.1 – 17.9) and a median weight of 42 kg (range 9.0 – 97.0) with the following diagnoses: Left sided accessory pathway (WPW 91%, PJRT 2%), ectopic atrial focus 6%, and atypical AVNRT 1.3%. 3 patients had a congenital heart defect (cc-TGA, d-TGA, left pulmonary artery agenesis).
The size of the sheath ranged from 6 – 8.5 F (6F in 15%, 7F in 16%, 8F in 67%, and 8.5F in 2%). Successful TSP was possible in all but one patient in whom the atrial septum was very floppy and the left atrium small. In 3 patients, additional TEE was necessary. 98.1% of patients underwent successful radiofrequency ablation. Median procedure time was 120 min (range 60 to 450) with radioscopy duration of median 10.5 min (range 1.8 to 75). There was no complication, i.e. no pericardial effusion, no puncture of the aortic root, no stroke or ischemic event, and no death.

**Conclusion:** In children and adolescents, transseptal puncture is a feasible and safe procedure. It creates a direct access to the left atrium allowing radiofrequency ablation not only on the mitral valve annulus, but also within the whole left atrium with a high success rate.

**Disclosure of Interest:** None declared

**P019**

Assessment of clinical utility of transesophageal echocardiography monitoring during transvenous lead extraction procedure

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**Introduction:** Data assessing the clinical utility of transesophageal echocardiography (TEE) to monitor transvenous lead extraction procedure (TLE) remain scarce. The present study evaluated the use of TEE in this setting.

**Method:** From January 2009 to January 2014 TLE of 232 leads in 162 pts (mean age 69± 13 yrs, 125 male, LVEF 37±13%, NYHA class 2.3) was performed. Indication for TLE was lead dysfunction (56.5%), upgrade (.28.0%), infection (12.4%), and others in 3.1% of patients. Techniques combined mechanical approach amended by laser technique if required. Extraction procedures were performed in general anaesthesia under continuous arterial blood pressure and TEE monitoring. TEE monitoring was possible in all patients except 1 with known oesophageal varicose. TEE images in different projections were acquired and stored before and immediately after the extraction of each lead.

**Results:** TLE was complete for 227 out of 232 (97.8%) leads; in the 5 leads not completely extracted, silicon rubber tines’ tips of pacemaker electrodes remained in situ (4,1.7%) and 1 (0.4%) dual coil ICD electrode could not be removed. New TEE findings following TLE were observed in 7/161 cases (4.3%): pericardial effusion (mild: 4 pts; severe: 1 pt, 0.6%, Panel 1) and worsening of tricuspid valve insufficiency (2 pts, 1.2%). Severe PE observed occurred after laceration of superior vena cava, requiring immediate rescue surgery (0.6%, CI 0.02-3.4). In all the other cases, TEE findings did not entail immediate diagnostic or therapeutic measures.

**Picture / graph:**
Conclusion: New TEE findings produced during TLE necessitating immediate therapeutic measures occurred in only 0.6% of cases (less than 1 patient for every 100 patients monitored). These data suggest that there is limited clinical utility for routine continuous TEE monitoring during TLE.

Disclosure of Interest: None declared

P020

Intermediate to long-term follow-up of idiopathic ventricular fibrillation ablation

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Introduction: Catheter ablation of idiopathic ventricular fibrillation (VF) targeting ventricular premature beats (VPB) originating from the ordinary myocardial muscle or within the Purkinje system has been shown to be very effective for the prevention of VF recurrences.

Method: Patients were referred for ablation of idiopathic VF triggered by short coupled VPBs after exclusion of a macroscopic arrhythmogenic substrate by extensive diagnostic workup including physical exam, blood tests, Holter monitoring, cardiac ultrasound and coronary angiography. They all had experienced cardiopulmonary resuscitation due to an episode of idiopathic VF and multiple VF episodes terminated by their ICD before radiofrequency (RF) ablation. RF ablation was guided by activation and pace mapping and aimed to abolish all clinical VPBs.

Results: Three male patients (29, 55 and 58 yrs) underwent the ablation procedure. All three patients had experienced multiple appropriate ICD shocks for VF. VPBs showed LBBB morphology in all of them, had an ectopic QRS duration of 138, 168 and 158 ms and a coupling interval initiating VF of 384, 291 and 378 ms, respectively. Triggering VPBs originated from the RV apex, the anterior wall of the RVOT and the RV anterior muscular wall, respectively. In two patients, RF delivery triggered polymorphic non sustained VT even at sites without Purkinje potentials and subsequently eliminated ectopy and Purkinje potentials at sites where best pace map was achieved. Suppression of reproducibly induced mechanical and RF provoked polymorphic VT and VF from a localized site in the RV anterior wall (with best pace map) was observed in one patient, suggesting combined suppression of trigger and local substrate. Ablation dramatically reduced the percentage of VPBs in two patients as confirmed by Holter ECG monitoring at maximal follow-up (1 and 10 VPBs), while one patient showed a recurrence of clinical VPBs. However, none of them experienced VF recurrence during a follow-up time of 5 years, 8 months and 10 years, respectively, as confirmed by interrogation of the ICD.

Conclusion: Ablation of short coupled VPBs triggers shows a high efficacy in preventing VF recurrence in an intermediate and long-term follow-up in patients with idiopathic VF.

Disclosure of Interest: None declared

P021

Video-assisted thoracoscopic left ventricular lead implantation for cardiac resynchronization therapy


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Introduction: Endovascular insertion of left ventricular (LV) lead for cardiac resynchronization therapy fails in about 10% of cases. Moreover, lead complications during follow-up may require an alternative approach for LV lead placement. We report our experience with video-assisted-thoracoscopic (VAT) LV-lead implantation after endovascular LV lead failure.

Method: Patients with failed endovascular LV lead insertion or LV lead complications during follow-up referred to our cardiac surgeons for LV lead implantation were included. Reasons for endovascular LV lead failure, procedural characteristics and follow-up data were analyzed.

Results: Between 2010 and 2013 a total of 23 patients (females, 9) were included. Endovascular failure was due to implant failure in 15 (65%) patients: subclavian vein occlusion (n=2), LV lead dislocation (n=4), coronary sinus dissection (n=2), unsuitable cardiac vein anatomy (n=4), phrenic nerve stimulation (n=2), high pacing threshold (n=1). Endovascular failure during follow-up occurred in 8 patients (35%): LV lead dislocation (n=3), lead fractures (n=3), high pacing threshold (n=1), and phrenic nerve stimulation (n=1).
From 17 patients without previous cardiac surgery, 13 (72%) successfully underwent VAT, 3 (17%) were converted to mini-thoracotomy due to pleural adhesion or scar, and one failed (pleural adhesions/high risk for thoracotomy). From 6 patients with previous cardiac surgery, VAT LV-lead implantation was successful in 2 patients (33%) and was converted to mini-thoracotomy in one patient (pleural adhesions), while primary mini-thoracotomy was performed in 3 patients (50%). No major complications occurred. Mean procedural duration was 83±31min (VAT only, 71±19min), median hospital stay was 5 days (range, 3-12). Follow-up was available in 19 patients, of whom 16 (84%) reported improved symptoms. Mean baseline NYHA class was 2.6 and improved to 2.2 at one year and to 2.0 at last follow-up; the respective values for LV ejection fraction were 25%, 29% and 31%. Electrogram amplitudes and pacing thresholds remained stable over time (figure).

**Conclusion:** VAT LV-lead implantation after endovascular LV-lead failure is feasible and has a high success rate, especially in cases without previous cardiac surgery. Responder rate is excellent and lead function is stable during medium-term follow-up. VAT LV-lead implantation should be considered in all cases with endovascular LV lead failure.

**Disclosure of Interest:** None declared

### P022

**Cardiac sodium channelopathies and genotype-phenotype correlation: What have we learned?**

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**Introduction:** Mutations in SCN5A encoded the sodium channel NaV1.5 are associated with inherited cardiac arrhythmia syndromes and early sudden cardiac death. Dissecting the phenotype-genotype correlation allow the identification of crucial functional ion channel regions with important implications in genotype-guided therapy and risk stratification.
**Method:** We performed a genotype-phenotype correlation of the *SCN5A* mutations reported to date to determine if mutation location influences the Gain Of Function clinical Phenotype (GOFPh) or long QT syndrome, Loss Of Function clinical Phenotype (LOFPh) or Brugada syndrome, cardiac conduction defects, idiopathic ventricular fibrillation or/and sick sinus syndrome or Mixed Phenotype (MixPh) defined as GOFPh+LOFPh. We performed an extensive search of all published mutations in *SCN5A* and analyzed their distribution across all the different NaV1.5 segments. We correlated the reported variants with the phenotype registered.

**Results:** We found 564 *SCN5A* genetic variants reported and excluded 17 from dilatated cardiomyopathy, sudden infant death syndrome and arrhythmogenic right ventricular cardiomyopathy since the status of GOFPh/LOFPh could not be determined. Among 547 variants, 52 (9%) were in controls (ctrls) and 495 (91%) in cases. All ctrls variants were missense mutations (MM). In cases, 367 (74%) variants were MM and 128 (26%) radical mutations (RM) including frame-shifts, insertions, deletions, non-sense and splice-site mutations. Among the 367 MM, 213 (58%) conferred LOFPh, 138 (38%) GOFPh and 33 (9%) MixPh. Among 128 RM, 111 (87%) were LOFPh. Among 15 MM in the DIII-DIV loop 14 (93%) were GOFPh (p<0.001) whereas 61 out of 68 (90%) MM at the pore forming region were LOFPh (p<0.001). In the transmembrane segments (TS) S1, S2 and the voltage sensor S5, 48 out of 54 (89%) MM conferred LOFPh (p<0.001). Among 76 MM in the TS S3, S4 and S6 of all domains, 40(53%) were LOFPh, 4(5%) MixPh and 32 (42%) were GOFPh. In ctrls, 33 out of the 52 (63%) reported MM localized in the DI-DII, DII-DIII loops or C-terminus.

**Conclusion:** Nearly 2/3 of the pathogenic mutations in *SCN5A* conferred LOFPh. Most of RM conferred mainly LOFPh only. Among the MM, DIII-DIV loop is a hot spot for GOFPh while the pore region, S1, S2, and the voltage sensor S5 host mainly LOFPh. MM across the TS S3, S4 and S6 can be either GOFPh or LOFPh.Ctrls MM localize more often in the intracellular loops or C-terminus.

**Disclosure of Interest:** None declared.
Poster Session 3
Cardiac failure, valvulopathies, cardiomyopathies, pericardiopathies, heart transplantation

P023

Outcome of super-responders to cardiac resynchronization therapy defined by endpoint-derived parameters of left ventricular remodeling - A two-center retrospective study
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¹Cardiology, University Hospital, ²Biostatistics, Institute of Social and Preventive Medicine, University of Zürich, Zürich, Switzerland, ³Electrophysiology, Heart Center, Leipzig, Germany

Introduction: Various studies have attempted to identify super-responders to cardiac resynchronization therapy (CRT) by echocardiographic parameters of reverse remodeling. However, scientific evidence regarding those parameters is scarce. This study was designed to validate the definition of super-response to CRT based on the following frequently employed echocardiographic parameters: left ventricular ejection fraction (LVEF), end-diastolic volume index (EDVI), and end-systolic volume index (ESVI).

Method: We retrospectively investigated echocardiographic data and outcomes of 542 patients after CRT implantation. The primary endpoint comprised all-cause mortality, heart transplantation, ventricular assist device implantation (VAD), and hospitalization for heart failure. Secondary endpoints were hospitalization for heart failure, and the combination of all-cause mortality, heart transplantation and VAD. Two approaches were employed to define super-response based on improvement of echocardiographic parameters: one derived from the negative predictive value (NPV) for the clinical endpoints, and the second from best quartiles of improvement.

Results: Using the NPV method, an absolute 25% increase in LVEF, a relative 38% reduction in EDVI, and 46% in ESVI were calculated as optimal cut-offs identifying 4.9%, 18.5%, and 21.3% as super-responders, respectively. The best quartiles method resulted in lower cut-off values, i.e. 14 % increase in LVEF, 26 % reduction in EDVI, and 36 % in ESVI classifying 39.5%, 40.8% and 37.3% patients as super-responders. All cut-offs except LVEF ≥25% were significantly associated with improved outcomes after 5 years (median follow-up 35.7 months).

Conclusion: NPV- and best-quartile based cut-offs validate previously applied empirical echocardiographic cut-offs to define super-response to CRT. These data hence provide evidence for using these empirical cut-offs in daily practice and facilitate inter-study comparability.

Disclosure of Interest: S. Schmidt: None declared, D. Hürlimann Grant/ research support from: Biotronik, St. Jude Medical, Sorin, Consultant for: Biotronik, St. Jude Medical, Sorin, Conflict with: Educational grants: Boston Scientific, Medtronic, B. Seifert: None declared, A. M. Saguner Grant/ research support from: Biotronik, Sorin, G. Hindricks: None declared, Th. Lüscher Grant/ research support from: Biotronik, Medtronic, St. Jude Medical, F. Ruschitzka Grant/ research support from: Biotronik, Consultant for: Biotronik, Speakers bureau: Biotronik, Boston Scientific, J. Steffel Grant/ research support from: St. Jude Medical, Biotronik, Medtronic, Consultant for: Biotronik, Medtronic, St. Jude Medical, Sorin

P024

Management of vascular complications following transcatheter aortic valve implantation
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Introduction: Over 10 years, transcatheter aortic valve implantation (TAVI) has rapidly increased in popularity. Since vascular complications (VC) are the most frequent adverse events, their optimal management is critical. In this study, we report our single-center experience of VC in patients undergoing transfemoral TAVI (TF-TAVI). VC were defined according to the Valve Academic Research Consortium-2 (VARC-2) criteria.

Method: From August 2008 to December 2013, 102 consecutive patients with severe aortic stenosis underwent percutaneous TF-TAVI. All endpoints were evaluated at 30 days according to VARC-2 criteria and VC were stratified as major or minor. VC percutaneous treatment success was defined as a final angiographic result showing vessel revascularization with residual stenosis <30%, and absence of residual blood extravasation, and the absence of surgical or repeat endovascular intervention at 30 days.
Results: Twenty-two patients (21.6%) experienced VC. Major VC (n=5, 4.9%) included one occlusive dissection, one percutaneous vascular device closure device failure, one major hematoma, one aorto-ventricular junction rupture and one distal embolization. Minor VC (n=17, 16.7%) included non-occlusive (n=8) and occlusive dissections (n=2), pseudoaneurysms (n=5) and minor hematomas (n=2). A 5.9% (n=6) 30-day all-cause mortality was reported. Three of the deaths occurred among the five patients with major VC. Mortality was significantly higher in patients with major VC than patients without major VC (60.0% vs. 3.0%, p = 0.001). Patients with VC had more life-threatening or major bleeding (22.7% vs. 5.0%, p=0.02) but no difference in terms of need for packed red blood cell transfusion was reported. A percutaneous treatment of VC was successful in 11 of 13 attempted cases (85%). In our early experience one patient developed massive bleeding after covered stent implantation for a common femoral perforation resulting in death despite emergent surgical rescue. In the second case the patient had an external iliac and common femoral stent placed for an acute vessel occlusion and required thereafter additional percutaneous intervention for acute stent thrombosis. At 30 days, all patients remained asymptomatic.

Conclusion: Despite significant efforts devoted to improve clinical outcomes, vascular complications following TAVI remain frequent. However, most complications can be managed percutaneously and surgery is rarely needed. Major VC remain rare but are associated with a high mortality.

Disclosure of Interest: None declared

P025

Heart transplantation in Switzerland since the introduction of the Swiss organ allocation system
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Introduction: With the coming into force of the Swiss transplantation law on the 1st of July 2007, organ allocation policy changed from a centre-oriented to a patient-oriented national allocation. Along with this, the Swiss Organ Allocation System (SOAS) was implemented which, based on donor/recipient data and an allocation algorithm, calculates the candidates’ positions on the waiting list. In this study, we aimed to provide an overview of heart allocation and transplantation in Switzerland since the introduction of SOAS.

Method: This study is a retrospective analysis of SOAS data related to heart allocation and transplantation between July 1st, 2007 and June 30th, 2013. It includes all patients newly waitlisted for a heart transplantation, all heart donors and all recipients of a cardiac transplant in Switzerland. Study endpoints were the number of individuals in each group, patient characteristics of donors and recipients, acceptance rate and origin of heart offers, percentage of emergency transplants and waiting list mortality.

Results: During the 6-year study period, 300 patients were newly waitlisted for a heart transplant in Switzerland, 199 were transplanted and 52 deceased on the waiting list. Of the 723 hearts offered by Swisstransplant to the three university hospitals with a heart transplant programme (Bern, Lausanne and Zürich), 199 (27.5%) were transplanted. Of these, 183 (92.0%) were procured in Switzerland and 16 (8.0%) were offered by a foreign organ procurement organisation. 52 hearts were transplanted to patients who were listed in urgent status, equalling an emergency transplant rate of 26.1%. While the overall waiting list mortality was 19.0%, it was as high as 31.8% in patients older than 60 years.

Conclusion: Our study showed an increasing Swiss heart transplant waiting list, as significantly more patients were newly waitlisted than transplanted. Compared with the international data, the acceptance rate of heart offers and the rate of emergency transplantsations were relatively low, while the waiting list mortality was elevated. The fact that the waiting list mortality was highest in candidates aged 60 and above suggests that the new generation of left ventricular assist devices as destination therapy should be considered as an alternative to transplantation in selected patients.

Disclosure of Interest: None declared

P026

The myocardial release of B-type natriuretic peptide is strongly related to the maximal cardiopulmonary exercise response in humans
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Introduction: B-type natriuretic peptide (BNP) has been found to be associated with exercise capacity in patients with heart failure and other patient populations.
However, in these studies, circulating BNP concentrations in peripheral plasma, i.e. the net effect of production and elimination, rather than the cardiac release of BNP have been assessed, and thus these data allow only limited conclusions on the relationship between the cardiac BNP production and pathophysiological parameters. The aim of the present study was to assess the relationship between myocardial BNP release and exercise capacity and its determinants in subjects without overt cardiac disease and no or little pathological activation of the BNP system with a view to better understand the regulation of cardiac BNP production in humans.

**Method:** We studied 10 asymptomatic subjects (age 64±11 years, two females) with preserved left ventricular function (left ventricular ejection fraction 62±5%, averaged early diastolic mitral annular velocity 9±3 cm/s) and low BNP (BNP in venous plasma [BNPv] <100 ng/l). All subjects underwent measurement of BNP in arterial (BNPA) and coronary sinus (BNPCS) plasma for the calculation of the transcadiacal BNP gradient (delta BNPACS) as a measure of the myocardial BNP production, cardiopulmonary exercise testing, and echocardiography and right heart catheterization at rest and during exercise.

**Results:** The median (range) BNPv, BNPA, BNPCS, and delta BNPCS were 62 (16-71), 60 (23-69), 110 (30-146), and 44 (13-84) ng/l. There were inverse correlations between higher delta BNPCS and lower peak oxygen consumption (r=-0.84; p=0.002), lower peak oxygen pulse (r=-0.74; p=0.01), and lower arterio-venous oxygen difference during exercise (r=-0.58; p=0.08). In contrast, there were no significant associations between delta BNPA and cardiac output and stroke volume during exercise, pulmonary capillary wedge pressure at rest and during exercise, and systolic and diastolic left ventricular wall stress at rest (p>0.5 for all).

**Conclusion:** This study in subjects with a BNPv in the normal range demonstrated a close inverse association between delta BNPA,C as a measure of yocardial BNP production and peak VO₂, and this association was stronger than between delta BNPA,C and cardiac output and other measures of cardiac performance. These data suggest a close and complex interaction between the myocardial BNP release and the global cardiopulmonary reserve and underscore the central role of BNP in human physiology.

**Disclosure of Interest:** None declared

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**P027**

**Iron-deficiency and associated factors in patients with congestive heart failure in Switzerland: Insights from the EVITA-RAID-HF-registry**


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**Introduction:** Iron deficiency (ID) represents an important co-morbidity and independent predictor of outcome in patients with chronic heart failure (CHF). Although screening for ID is recommended by current guidelines, little is known about the prevalence and predictors of ID in CHF patients presenting in everyday clinical practice in Switzerland.

**Method:** In an interim analysis of the ongoing multicenter “Registry Analysis of Iron Deficiency in Heart Failure” (RAID-HF) we determined the prevalence and associated clinical factors of ID in consecutive patients presenting with a left ventricular ejection fraction (LVEF) ≤40% and a history of CHF of more than three months. ID was defined as a ferritin level <100 μg/L (absolute ID) or ferritin 100-299 μg/L with a transferrin saturation <20% (functional ID). Patients were grouped according to their iron status and baseline characteristics, quality of life (QOL), physical impairment and outcomes were compared.

**Results:** By December 2013 a total of 223 patients were included in RAID-HF (59% inpatients and 41% outpatients). Patients were 69±11 years old, predominantly male (76 %) with a median LVEF of 27% (interquartile range 20-35%) and a NYHA class ≥III in 60%. Main etiologies of CHF included ischemic heart disease (53%) and dilative cardiomyopathy (27%). Of the patients with available ferritin, transferrin- saturation and serum-iron (199/223), 35% (70/199) had an absolute and 18% (35/199) had a functional ID. Patients with an absolute ID suffered more often of dilative cardiomyopathy, were more likely to have diabetes (p<0.057), a COPD (p<0.007) and higher levels of B-type natriuretic protein (BNP) (827,0 vs. 566;6; p=0.018). Their QOL and activities of daily living were significantly reduced (MLWHFQ-Score 47 vs. 32; p<0.004). Importantly, at inclusion patients with an absolute ID less likely qualified as having stable disease (p<0.009), were more likely hospitalized (67,1% vs. 49,6%; p<0.017) and the main reason to seek medical attention was due to worsening heart failure (47,1% vs. 31,0%; p<0.024).

**Conclusion:** Iron Deficiency is affecting more than half of Swiss CHF patients and is significantly associated with a higher morbidity and restraints in activities of daily living as well as in quality of life. These findings underline the magnitude of ID in this population and places emphasis on screening for this comorbidity.

**Disclosure of Interest:** None declared
Sutureless aortic valve replacement: Single center comparison of the 3F enable and the Perceval S valves

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Introduction: The 3F Enable and Perceval S aortic valves are new generation devices of Nitinol-stented bio-prostheses, designed for sutureless aortic valve replacement (AVR). Direct comparison of the different sutureless biological prostheses is lacking. Primary objective of this trial was to assess clinical performance of both devices and to compare hemodynamic variables.

Method: Up to November 2013, 106 patients (pat) with severe aortic stenosis underwent sutureless AVR either with the 3F Enable (n=55) or the Perceval S valve (n=51). Concomitant procedures (CABG, PFO-closure, or carotid endarterectomy) were performed in 13 (24%) and 18 (35%) pat, respectively (p=.135). Clinical and echocardiographic follow-up was performed at discharge, after 3-6 months, and annually thereafter.

Results: Mean aortic cross-clamp time was longer in the 3F Enable group (40 ± 14 min vs 30 ± 8 min in the Perceval S group (p=.001) in pat without concomitant procedures and 50 ± 21 min vs 41 ± 10 min respectively in pat with concomitant procedures (p=.131). Hemodynamic parameters are shown in the table. A high rate of intra-prosthetic regurgitation in the Perceval S group was noticeable, sig different to the 3F Enable group (p=.001). All leaks of 3F Enable devices were mild, however, 4 pat in the Perceval S group revealed moderate and 1 moderate to severe leaks. During follow up of 837 +/- 815 d in the 3F Enable group and 758 +/- 424 d in the Perceval S group 5 pat (9%) and 3 pat (6%) died. All deaths were not device related. Reoperation with replacement of the 3F Enable valve was required in 4 pat (7%) and in neither pat in the Perceval S group.

Conclusion: Our results confirmed the clinical efficacy of sutureless AVR with the 3F Enable and Perceval S valves during short and mid-term follow up. The risk of reoperation due to major paravalvular leak was higher in the 3F Enable cohort. Implantation time seems to be shorter with the Perceval S prosthesis, however, hemodynamic parameters of the 3F Enable prosthesis during follow-up are more favourable.

Disclosure of Interest: None declared


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<td>3F Enable</td>
<td>11.9±4.8</td>
<td>10.8±4.2</td>
<td>11.1±2.8</td>
<td>10.6±3.7</td>
<td>10.2±2.8</td>
<td>9.6±3</td>
<td>8.1±2.1</td>
<td>8.5±3.9</td>
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<td>14.2±4.7</td>
<td>13.4±4</td>
<td>12.6±4.2</td>
<td>12.3±4</td>
<td>14.2±3.5</td>
<td>19.5±9.1</td>
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<td>Peak Systolic Grad (mmHg)</td>
<td>3F Enable</td>
<td>21.4±9</td>
<td>20.1±7.9</td>
<td>20.9±5.5</td>
<td>20.5±6.4</td>
<td>19.4±5.6</td>
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<td>25.4±9.6</td>
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<td>24±8.4</td>
<td>23.6±7.3</td>
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<td>36.5±14.1</td>
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<td>EOA (cm²)</td>
<td>3F Enable</td>
<td>2±0.6</td>
<td>2±0.5</td>
<td>2±0.4</td>
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<td>2±0.5</td>
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<tr>
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<td>Perceval S</td>
<td>2±0.4</td>
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<td>1.9±0.4</td>
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P029

In vivo valvulogenesis: Initial experience with atrioventricular valve leaflet augmentation with Cormatrix® extracellular matrix scaffolds

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Introduction: Atrioventricular valve (AV) repair using patch augmentation has poor results, often due to patch retraction. Valvulogenesis using extracellular matrix scaffolds holds the promise of creating autologous leaflet tissue and improving results. The purpose of this report is to review our initial experience using a commercially available scaffold (CorMatrix® Cardiovascular Inc., Alpharetta, GA) in AV repair.

Method: Among 181 mitral and 251 tricuspid valve procedures from 2009 to 2012, 25 patients (median age 4.8 years, range 3 days-27 years) underwent AV repair using CorMatrix patch leaflet augmentation, 18 in the mitral and 7 in the tricuspid position. The lesion was predominantly regurgitation in 13 patients, stenosis in 3 and mixed in 9 patients. A control group of contemporary valve repairs included 25 patients with patch augmentation using conventional materials (24 glutaraldehyde-treated pericardium and 1 endocardial patch).
Results: There were no deaths in either the CorMatrix or the control groups. Early post-operative echocardiography showed a mean AV regurgitation grade of 1.7±0.7 (trivial-mild; 5 patients with moderate, 12 with mild regurgitation, 8 trivial or none) and a mean transvalvular gradient of 3.8±3.2 mmHg in the CorMatrix group, compared to a regurgitation grade of 1.7±0.7 (P = 0.99) and a mean inflow gradient of 3.2±3.4 mmHg (P = 0.48) in the control group. During a mean follow-up of 12.1±11.1 months, 14/50 patients required an AV reoperation, 8 in the CorMatrix group and 6 in the control group (P = 0.38), all for the mitral valve. The indication for reoperation was patch retraction in 4 patients in the control group, while the CorMatrix group showed no patch retraction (P = 0.11). The mean late AV regurgitation grade was 2.3±0.9 (mild), with inflow gradients of 5.8±4.6 mmHg in the CorMatrix group, compared to 2.2±0.9 (P = 0.75) and 6.3±5.5 mmHg (P = 0.36), respectively, in controls.

Conclusion: AV leaflet patch augmentation is used in a selected group of patients, with a particularly high burden of reoperation. Extracellular scaffolds did not show retraction, compared to traditionally used materials. CorMatrix represents a novel tool in the surgical armamentarium for valve repair, possibly leading to in vivo valvulogenesis.

Disclosure of Interest: None declared

P030

Long-term results of minimally invasive open heart surgery
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Introduction: We report the long-term results of a single Center approach through a right minithoracotomy for the treatment of routine open heart surgery of the adults.

Method: From Jan.2002 to Nov.2013, 163 patients were operated through a right minithoracotomy in the 4th intercostal space. Mean age was 63 years old, and 51% were males. 17 cases were REDO operations. Mean Euroscore was 5.3±6.8. High Thoracic Epidural Anesthesia (HTEA) was used in 101 patients. Aortic valve disease was present in 56 cases (46 stenosis, 7 regurgitation and 1 fibroelastoma); mitral valve disease in 89 (7 stenosis, 79 regurgitation and 3 prosthesis disfunction); tricuspid valve disease in 7 (6 regurgitation and 1 fibroelastoma), 6 atrial septal defects, 4 mixomas and 2 patients with mitro-aortic-tricuspid disease.

Patients received 56 aortic valve replacement (21 mechanical prostheses, 35 biological prostheses), 89 mitral valve procedures (25 mechanical prostheses, 6 biological prostheses, 58 mitral valve repairs); 2 mitro-aortic replacement with mechanical prostheses; 2 atrial septal defect closure; 5 fibroelastoma/mixoma exeresis and 9 tricuspid valve procedures (5 valvuoplasty, 3 biological replacement and 1 fibroelastoma replacement).

In 29 patients the following associated procedures were performed: 11 Nicks procedures, 7 Maze ablations, 1 CABG, 3 PFO closure, 1 femoral Tromboendoarterectomy and 1 pulmonary bilobectomy.

All patients were investigated during the follow-up period by phone interviews.

Results: Hospital mortality was 1.8% (3 patients). Mean cardiopulmonary bypass time and X-clamp time were 123.6±42 and 68.8±40.2 minutes respectively. 2.4% of the patients needed a sternotomy conversion. Most frequent in-hospital complications were: atrial fibrillation (22.1%), hemotrasfusion (27.6%) and reoperation for bleeding (8.6%). No infections were reported in the whole series.

At a mean follow-up of 90.3 months (7,5 years) 1 patient were reoperated 2 months later for a mitral prostheses leak, one for a mechanical aortic valve prostheses leak 6 months later, one for a mitral valve replacement after cerebral embolic event 8 months later, one for a Bentall operation 10 months later, one for mitral valve replacement associated to tricuspid valve plasty 3 years later.

Conclusion: The right minithoracotomy approach for the treatment of non-coronary heart disease offers good short and long term outcomes and the advantage of a better cosmetic result.

Disclosure of Interest: None declared

P031

Risk score assessment and prediction of clinical outcomes among patients undergoing transcatheter aortic valve implantation
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Introduction: Patient selection for transcatheter aortic valve implantation (TAVI) is the key for a successful procedure. Surgical risk score algorithms, namely the EuroScore and the STS risk score, are currently used to guide the Heart Team for appropriate patient selection. However, neither the EuroScore nor the STS score were specifically developed or adapted to predict outcomes among patients undergoing TAVI. Therefore, the aim of this study was to investigate the predictive ability of available risk score algorithms in patients undergoing TAVI and to identify the score that performs best in predicting peri-procedural outcomes in this patient population.

Method: Patients with symptomatic, severe aortic stenosis undergoing TAVI, using different devices and access routes, were deemed eligible for this study. Peri-procedural outcome was estimated using the additive and logistic EuroScore, EuroScore II, STS Risk Score, Ambler and ACEF Risk Score and was compared to observed event rates of mortality, cardiovascular mortality and the VARC safety endpoint.

Results: In total, 439 patients with severe aortic stenosis, underwent TAVI between 08/2007 and 01/2012. The estimated risk for mortality at 30 days was calculated with 24.0±14% using the logistic EuroScore, 10.6±2% with the additive EuroScore, 8.6±8% with the EuroScore II, 6.8±5% with the STS Score, 8.7±2% with the Ambler Risk Score, and 6.6±10% according to the ACEF Mortality risk algorithm. After 30 days of follow-up, all-cause mortality was observed in 6.4%, cardiovascular mortality in 5.2% and the VARC combined safety endpoint was reached in 22.3% of patients. Receiver operating characteristics (ROC) curve analysis illustrates an area under the curve (AUC) for all-cause mortality at 30 day follow-up of 0.72 for the STS Score, 0.61 for the logistic EuroScore, 0.58 for the additive EuroScore, 0.62 for the EuroScore II, 0.54 for the Ambler and 0.60 for the ACEF Risk Score. For cardiovascular mortality at 30 days AUC was 0.75, 0.65, 0.64, 0.63, 0.59 and 0.63 respectively, whereas for the VARC safety endpoint the AUC amounted to 0.61, 0.61, 0.59, 0.59, 0.55 and 0.59.

Conclusion: Among well-selected patients undergoing TAVI, the STS Risk algorithm performs best in risk estimation and prediction of all-cause and cardiovascular mortality at 30-days follow-up. However, overall risk discrimination is still moderate and a dedicated TAVI risk score is required to guide decision making in this patient population.

Disclosure of Interest: None declared

Blood loss and transfusion rates associated with transcatheter aortic valve replacement:

Recommendations for patients who refuse blood transfusion

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Introduction: Transcatheter aortic valve replacement (TAVR) is less invasive than surgical aortic valve replacement and may be preferred for patients, who refuse blood transfusions. Our study sought to define transfusion rates in TAVR, identify predictors and develop recommendations for patients, who refuse transfusions.

Method: A large cohort of consecutive patients undergoing TAVR was prospectively studied. Blood loss and transfusion rates were observed in patients undergoing transfemoral (TF-TAVR) and transapical TAVR (TA-TAVR). Predictors for transfusion were investigated in a multivariate model.

Results: Of 373 consecutive patients, 270 underwent TF-TAVR and 103 TA-TAVR. Transfusion rates were significantly lower in TF-TAVR than TA-TAVR (11.1 % versus 41.7 %; p < 0.001). In patients who did not receive transfusions, blood loss was significantly lower in TF-TAVR than TA-TAVR (23.6 ± 12.2 g/l versus 28.9 ± 13.7 g/l; p = 0.004), but did not differ in transfused patients (36.9 ± 12.9 g/l versus 33.4 ± 21.2 g/l; p = 0.428). Predictors for transfusions were low baseline hemoglobin, female sex, low body weight and decreased renal function. In 7 Jehovah’s Witness patients, who refuse transfusions, no vascular complications occurred and clinical outcome was excellent.

Conclusion: In patients, who refuse transfusions, TAVR may be performed with good clinical outcomes provided a high baseline hemoglobin level, careful management of the access site and strict measurements to reduce blood loss. TF-TAVR is associated with less blood loss and a lower rate of transfusions than TA-TAVR, and may be the preferred option for patients, who refuse transfusions.

Disclosure of Interest: None declared
P033

Pilot assessment of an educational mobile application for patients with heart failure
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1Cardiology, 2Communication and Marketing, HUG, Genève, 3Cardiology, CHUV, Lausanne, 4General Internal Medicine, HUG, Genève, Switzerland

Introduction: Current heart failure (HF) guidelines strongly recommend to include patients in disease management programs in which patient education plays a major role. However, few modern educational tools are available for patients with chronic HF. We aimed to evaluate the feasibility of use in this elderly population of an educational tool based on a mobile tablet application.

Method: We created a mobile tablet application (ELIPS-IC) based on 4 educational topics: definitions and causes of HF, worsening signs, medications, and lifestyle. Each topic contains short texts accompanied by pictures and video clips from an educational film. Two interactive tools are also included: (1) a medical diary enabling to enter daily weight, blood pressure and heart rate; (2) a treatment card allowing to update the medication list and to set an alarm reminding patients of the time of medication intake. Each patient hospitalized for HF in the cardiology and internal medicine wards at the Geneva University hospital (HUG) is proposed a 45-minute semi-structured interview by a nurse specialized in patient education with the support of ELIPS-IC. In a selection of patients who accepted to participate, an iPad® was left during 2 hours after the nurse interview to explore the application. A 21-item Likert scale questionnaire evaluating both the form and the content of the application was then completed with the patient.

Results: A total of 18 patients participated in the assessment. Mean age was 67.7 years. Seven (39%) patients had a personal touch pad, 15 (83%) wished to have the application, and 10 (56%) wished to use it with a relative. Regarding the design of the application, 16 (88%) patients were satisfied and 11 (65%) were satisfied with provided information. Ten (62.5%) participants were satisfied with the ease-of-use of the application. Seven (39%) patients thought that information was missing or incomplete. More specifically, they wished to have blood sugar and anticoagulation monitoring also included. According to 3 (17%) patients, a “personal notes” item and detailed dietary advices were also lacking.

Conclusion: The application seems to be suitable for selected HF patients under 70 years with no executive function disorders or gripping difficulties. A randomized clinical trial comparing traditional teaching tools (i.e. booklets) with the mobile application is planned. A link to a web-based electronic medical record (www.mondossiermedical.ch) and an extension to other chronic diseases are underway.

Disclosure of Interest: None declared

P034

Safety and efficacy of percutaneous left atrial appendage closure in atrial fibrillation patients with contraindication to oral anticoagulant therapy: A single-center experience
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Cardiology, Cantonal Hospital, Aarau, Switzerland

Introduction: Anticoagulation prevents strokes in patients with atrial fibrillation. For patients with contraindications to anticoagulation percutaneous left atrial appendage (LAA) closure is an alternative treatment strategy. We assessed safety and efficacy of percutaneous LAA closure in patients with contraindications to anticoagulation.

Method: Patients with a high stroke risk (CHA2 DS2-VASc score > 1) were eligible for percutaneous LAA closure if they had a major bleeding event. LAA closure was performed under general anaesthesia using fluoroscopy and (3D) transoesophageal echocardiography (TEE) guidance. The Amplatzer Cardiac Plug (ACP) was used in all patients. The patients were discharged on dual antiplatelet therapy for one month.

Results: A total of 37 patients (28 males, age 77.8 years +/- 7.23 years) underwent percutaneous LAA closure between April 2012 and January 2014. The mean CHA2DS2-VASc and HAS-BLED scores were 3.83 and 2.97 respectively. All patients had a history of previous bleeding (57% intracranial bleeding). LAA closure was successful in all 37 patients. Procedure related complication rate was 8% (3 patients with pericardial tamponade). During follow-up two patients died of noncardiac causes. One patient had an ischemic stroke. There were no procedure-related long term complications.

Conclusion: In this group of elderly atrial fibrillation patients with previous history of major bleeding, percutaneous LAA closure was a safe and efficient alternative to oral anticoagulant therapy.

Disclosure of Interest: None declared
Distensibility of the central pulmonary arteries independently predicts right ventricular function in patients with pulmonary hypertension

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1Cardiology, Inselspital, Bern, Switzerland, 2Adult Congenital Heart Disease and Pulmonary Hypertension, 3Cardiac Magnetic Resonance, Royal Brompton Hospital, London, United Kingdom

Introduction: Pulmonary hypertension (PAH) is associated with increased mortality mainly caused by right ventricular (RV) failure. Whereas pulmonary vascular resistance (PVR) reflects rather small vessel involvement, it has also been shown that the compliance of the central pulmonary arteries (PA) predict survival in PAH. The aim was to study prospectively the influence of compliance of the PAs assessed by cardiac magnetic resonance (CMR) on RV function in patients (pts) with or without PAH.

Method: 21 pts with suspected PAH underwent a CMR scan and diagnostic cardiac catheterisation. RV parameters were assessed by short axis cine stacks from base to apex and analysed for indexed RV enddiastolic and endsystolic volumes (RVEDVi, RVESVi), RV mass and RV ejection fraction (RVEF). Cine SSPF cross sectional scans were performed for the main, left and right PA (MPA, LPA, RPA) and ascending aorta. Vessel distension was calculated as (max systolic cross sectional area - min diastolic area)/diastolic area. Distensibility was defined as vessel distension/(systolic-diastolic pressure). Pulmonary pressures (PAP) and pulmonary vascular resistance (PVR) were obtained from the invasive measurements.

Results: Cardiac catheterisation confirmed PAH in 15 pts (54±19y), whereas 6 pts (49±12y, ns) without PAH served as control group, table. Cross sectional diastolic MPA, LPA and RPA areas were larger in PAH pts. compared to controls (all p<0.01). Distension and distensibility of the central pulmonary arteries were impaired in PAH pts. vs controls (all p<0.001, fig 1). No differences were found for ascending aortic distension and distensibility in both groups. MPA distensibility inversely correlated with RVEF (p<0.0001, fig 2) and PVR (p<0.0001) and positively with indexed RVmass (p<0.0001). By multivariate analysis, MPA distensibility (0.42; 95%CI 22 to 202; p=0.018) and PVR (-0.53; 95%CI -2.1 to -0.45; p=0.004) predict RVEF (r2=0.78) whereas meanPAP is not an independent predictor.

<table>
<thead>
<tr>
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<th>PAH group</th>
<th>Controls</th>
<th>P value</th>
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<tr>
<td>meanPAP, mmHg</td>
<td>48±14</td>
<td>18±5</td>
<td>&lt;0.0001</td>
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<td>PVR, Wood units</td>
<td>10±5</td>
<td>1.5±0.3</td>
<td>&lt;0.0001</td>
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<td>MPA area, mm2</td>
<td>995±335</td>
<td>546±194</td>
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<tr>
<td>MPA distension, no unit</td>
<td>0.18±0.11</td>
<td>0.46±0.11</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>MPA distensibility, 1/mmHg</td>
<td>0.004±0.004</td>
<td>0.028±0.012</td>
<td>&lt;0.0001</td>
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<tr>
<td>RVEDVi, ml/m2</td>
<td>103±30</td>
<td>71±23</td>
<td>0.03</td>
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<tr>
<td>RVmass indexed, g/m2</td>
<td>63±31</td>
<td>22±7</td>
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</tr>
<tr>
<td>RVEF, %</td>
<td>37±11</td>
<td>59±6</td>
<td>0.0002</td>
</tr>
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</table>

Picture / graph:
Conclusion: CMR-derived distensibility of the central pulmonary arteries is impaired in pts with PAH. RV function as a predictor for mortality in PAH pts relies not only on PVR but is also related to impaired compliance of the central PAs. Disclosure of Interest: K. Wustmann Grant/ research support from: SNF, W. Li: None declared, Ph. Kilner: None declared, K. Dimopoulos: None declared, M. Gatzoulis: None declared

P036

High prevalence of low flow severe aortic stenosis among patients undergoing surgical aortic valve replacement

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Introduction: Severe aortic stenosis (AVA ≤ 1 cm2) can be divided into four hemodynamic subgroups according to the mean transvalvular gradient (high if ≥ 40 mmHg, low if < 40 mmHg) and the transaortic flow volume indexed to BSA (normal if ≥ 35 cc/m2, low if < 35 cc/m2): normal flow high gradient (NFG), low flow high gradient (LFH), normal flow low gradient (NFLG) and low flow low gradient (LFLG). We analysed the hemodynamic characteristics of the patients referred to surgery for isolated aortic valve replacement.
Method: Between 2006 and 2012, 720 patients were operated on for AVR and their medical records were retrospectively reviewed. Patients having undergone isolated AVR and for whom a complete preoperative echocardiography was available in our laboratory were included. Exclusion criteria were any associated operation, including intracoronary bypass, replacement of the ascending aorta or associated congenital malformation. The four pre-defined hemodynamic subgroups were assessed by echocardiography.

Results: Hundred and twenty-eight patients were included and their clinical characteristics are summarized in Fig 1. The hemodynamic repartition by echocardiography is presented in Fig 2. Altogether, 68 patients (53%) presented with a low gradient while only 60 (47%) fulfilled the classical definition of a severe aortic stenosis (AVA < 1 cm² or < 0.6 cm²/m², mean gradient > 40 mmHg). Among low-gradient AS, 44 (65%) were LFLG and 24 (35%) were NFLG. Among LFLG AS, 41% had a normal left ventricular ejection fraction (EF > 55%) and represents the paradoxical LFLG group. LFHG was characterised by smaller AVA (mean value of 0.47 cm²) and NFLG had larger AVA (1.02 +/- 0.2). The perioperative mortality rate was very close from the Euroscore/STS score and not significantly different among the subgroups.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Total cohort (n=128)</th>
<th>NFHG (36, 28%)</th>
<th>NFLG (24, 19%)</th>
<th>LFHG (24, 19%)</th>
<th>LFLG (44, 34%)</th>
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<tr>
<td>Male</td>
<td>62.5% (60)</td>
<td>66.7% (24)</td>
<td>54.2% (13)</td>
<td>54.7% (13)</td>
<td>68.2% (30)</td>
</tr>
<tr>
<td>Mean age</td>
<td>74.1 +/- 9.7</td>
<td>73.7 +/- 10.6</td>
<td>74.8 +/- 8.4</td>
<td>74.1 +/- 9.0</td>
<td>73.9 +/- 10.2</td>
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<tr>
<td>NYHA class III-V</td>
<td>39.8%</td>
<td>36.1%</td>
<td>33.3%</td>
<td>50%</td>
<td>40.1%</td>
</tr>
<tr>
<td>Angina</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>37.5%</td>
<td>18.2%</td>
</tr>
<tr>
<td>Syncope</td>
<td>16.4%</td>
<td>8.3</td>
<td>20.1%</td>
<td>33.3%</td>
<td>11.4%</td>
</tr>
<tr>
<td>EUROscore</td>
<td>3.2 +/- 2.75</td>
<td>3.19 +/- 2.03</td>
<td>2.65 +/- 1.51</td>
<td>2.88 +/- 2.01</td>
<td>3.77 +/- 3.50</td>
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<tr>
<td>STS score</td>
<td>2.46 +/- 1.31</td>
<td>2.25 +/- 1.65</td>
<td>2.5 +/- 1.58</td>
<td>2.59 +/- 2.33</td>
<td>2.53 +/- 1.77</td>
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<tr>
<td>Echocardiography</td>
<td></td>
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<tr>
<td>LVEF (%)</td>
<td>57.43 +/- 15.6</td>
<td>62.3 +/- 13.8</td>
<td>65.2 +/- 15.6</td>
<td>54.7 +/- 15.9</td>
<td>50.7 +/- 17.0</td>
</tr>
<tr>
<td>Ejection volume (ml/m²)</td>
<td>35.4 +/- 13.2</td>
<td>47.0 +/- 13.3</td>
<td>44 +/- 6.4</td>
<td>26.3 +/- 5.6</td>
<td>20.2 +/- 6.0</td>
</tr>
<tr>
<td>Mean aortic gradient (mmHg)</td>
<td>39.9 +/- 15.6</td>
<td>53.2 +/- 14.5</td>
<td>30.8 +/- 5.8</td>
<td>50.6 +/- 11.1</td>
<td>20.25 +/- 7.9</td>
</tr>
<tr>
<td>AVA (cm²)</td>
<td>0.72 +/- 0.25</td>
<td>0.74 +/- 0.21</td>
<td>1.02 +/- 0.2</td>
<td>0.47 +/- 0.12</td>
<td>0.7 +/- 0.2</td>
</tr>
<tr>
<td>Outcome</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>In-hospital mortality</td>
<td>3.1%</td>
<td>2.7%</td>
<td>0</td>
<td>4.2%</td>
<td>4.5%</td>
</tr>
</tbody>
</table>
Conclusion: Over half of the patients undergoing AVR for severe AS in our series had low gradient AS. While LFLG severe AS is a recently accepted indication for AVR (class IIaC recommandation from the ESC Guidelines 2012), 19% of the patients undergoing surgery had NFLG AS, a category of patients for which no clear recommendation is made. As regard with the increasing number of patients presenting with LG AS and the lack of strong evidence for AVR in this population, prospective studies are needed to better define the benefit of surgery in this specific population, particularly in the NFLG group.

Disclosure of Interest: None declared

P037

Pulmonary artery compliance assessed by wave intensity analysis and its impact on the right ventricle in patients with or without pulmonary hypertension – First in humans

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Introduction: Wave intensity analysis (WIA) is an established method to assess the speed and energy of forward- and backward-travelling flow and pressure waveforms. It has been used in the systemic and coronary circulation, but never previously in the pulmonary arteries. We aimed to apply WIA in the pulmonary circulation in order to assess compliance of the central pulmonary arteries (PA) in patients with or without pulmonary hypertension (PAH).

Method: 23 pts underwent a diagnostic heart cath and cardiac magnetic resonance scan (21 pts). After assessment of the “conventional” hemodynamic parameters, high-resolution blood pressure and Doppler flow velocity tracing were simultaneously obtained in the main PA (MPA) via a sensor-tipped guide wire (Combowire, Volcano Corp.). Forward- and backward-travelling waves were separated by WIA and wave speed and reservoir pressure (measures of Windkessel function) were calculated. We studied the influence of WIA derived compliance parameters in the LPA on right ventricular (RV) function by CMR.
Results: 17 pts with PAH (meanPAP 48±14mmHg, PVR 10±5WU) and 6 without (=controls; meanPAP 18±5mmHg, PVR 1.5±0.4WU, p<0.0001, resp) were included. Wave speed in the MPA was increased in PAH when compared to controls (9.5±6.4 vs. 2.2±0.4 m/s, p=0.0008). This was not related to heart rate (p=0.4). Reservoir pressure integral reflecting Windkessel function in the MPA was increased in PAH when compared to controls (1.03x10^6±0.34x10^6 vs. 0.46x10^6±0.17x10^6 Pa/s p=0.0008). Close relationships were found between WIA derived compliance parameters when compared to meanPAP, PVR, indexed RVmass and RVEF (Table).

<table>
<thead>
<tr>
<th></th>
<th>Wave speed, m/2</th>
<th>P integral reservoir, Pa/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>meanPAP, mmHg</td>
<td>P&lt;0.0001, r=0.75</td>
<td>P&lt;0.0001, r=0.72</td>
</tr>
<tr>
<td>PVR, Wood units</td>
<td>P&lt;0.0001, r=0.87</td>
<td>P&lt;0.0001, r=0.72</td>
</tr>
<tr>
<td>RVEDVi, ml/m2</td>
<td>P=0.07, r=0.40</td>
<td>P=0.004, r=0.61</td>
</tr>
<tr>
<td>RVmass indexed, g/m2</td>
<td>P&lt;0.0001, r=0.86</td>
<td>P=0.002, r=0.63</td>
</tr>
<tr>
<td>RVEF, %</td>
<td>P&lt;0.0001, r=-0.87</td>
<td>P=0.006, r=-0.58</td>
</tr>
</tbody>
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Picture / graph:
Conclusion: Assessment of pressure and flow velocity-derived waves by WIA in the pulmonary circulation is feasible. Increased wave speed and pulmonary reservoir pressure (Windkessel function) reflect increased arterial stiffness in patients with PAH. This has an impact on RV remodelling. Both parameters may serve as additional outcome measures for diagnosis and treatment of PAH.

Disclosure of Interest: K. Wustmann Grant/ research support from: SNF, J. E. Davies: None declared, F. Borgia: None declared, W. Li: None declared, Ph. Kilner: None declared, K. Dimopoulos: None declared, M. Gatzoulis: None declared

P038

Extensive thoracic aortic surgery: Double arterial perfusion strategy to avoid lower body hypothermic circulatory arrest

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Introduction: Extensive thoracic aortic (incl.arch) surgery in patients with complex aortic anatomy or redo surgery carries a high risk of morbidity and mortality. We analysed the results in patients we used a double arterial perfusion strategy to avoid lower body hypothermic circulatory arrest after extensive thoracic aortic arch surgery.
Method: Intra- and perioperative courses of 12 patients (median age 53 years, median logistic EuroSCORE 17.8) who underwent extensive thoracic aortic surgery with a double arterial perfusion strategy were analysed. The main goal of double arterial perfusion is to separate myocardial and supra-aortic from systemic perfusion. Aortic repair starts at the most distal level of the descending aorta, followed by reinsertion of the supra-aortic vessels, and ends with completion of the proximal anastomosis or by any kind of root repair as needed.

Results: Nine of 12 patients had prior surgery of the thoracic aorta. Indications for surgery were post-dissection aneurysm (5 pts), true aneurysm (4), anastomotic aneurysms (2) and Type B aortic dissection with pseudo-coarctation (1). Surgical access was performed through median sternotomy with hemi-clamshell extension (right side 1, left side 11) in all cases. There was no in-hospital and 30-day mortality or paraplegia. Two patients developed delayed stroke after resuscitation for cardiac tamponade. One patient experienced a permanent stroke and in the other patient neurological symptoms resolved completely during follow-up. Median follow-up was 28 (±21) months. There was no death and no need for additional redo surgery during this observational period.

Conclusion: Using a double arterial perfusion technique in order to avoid lower body hypothermic circulatory arrest for extensive surgery of the thoracic aorta in complex aortic arch and descending aortic pathologies is an attractive treatment option. Further refinements of this technique may enable the safe and effective simultaneous multisegmental treatment of thoracic aortic pathology in patients who would otherwise have to undergo both a two-step surgical approach and a double surgical risk.

Disclosure of Interest: None declared

P039

Transapical jenavalve TAVI compared to the transapical Edwards sapien TAVI: Proof of non-inferiority

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Introduction: The Edwards Sapien (Edwards Lifesciences, Irvine, California) valve is supposed to be the benchmark for transapical (TA) TAVI. Aim of this study was to prove non-inferiority of the self-expandable and repositionable TA TAVI Jenavalve (JV) (Jenavalve, Munich, Germany) compared to the balloon-expandable Edwards Sapien (ES) for the treatment of severe aortic stenosis in high risk patients.

Method: Outcome criteria were in accordance to the Valve Academic Research Consortium (VARC) criteria for 30 days outcome. Between 2008 and 2012 a total of 69 consecutive patients were treated transapically in our centre (ES n=33 vs. JV n=36). There were no significant differences in baseline characteristics in this retrospective study.

Results: Implantation of ES and JV was successful in all cases. Additive Euroscore was equivalent (ES 11.3±2.3 vs. JV 10.4±2.5, p=0.655), as well as 30 days mortality (ES 12% vs. JV 14%, p=0.828), length of stay on ICU (ES 2.1±1.9 days vs. JV 3.0±5.6 days, p=1.000), max. Trop T level (ES 0.8±1.3ng/ml vs. JV 0.6±0.5ng/ml, p=0.861), need for pacemaker implantation (ES 9% vs. JV 6%, p=0.569), apical bleeding with revision (ES 6% vs. JV 3%, p=0.486), wound infection (ES 3% vs. JV 0%, p=0.285), cerebrovascular events (ES 12% vs. JV 8%, p=0.603) and onset of atrial fibrillation (ES 36% vs. JV 25%, p=0.342). Occurrence of paravalvular leakage showed no significant difference: None (ES 64% vs. JV 58%, p=0.758), Mild (ES 15% vs. JV 22%, p=0.419), Moderate (ES 9% vs. JV 3%, p=0.275), Severe (ES 3% vs. JV 0%, p=0.299). There was an advantage in the ES group concerning mean postoperative gradient (ES 8.7±3.9mmHg vs. JV 12.7±5.7mmHg, p=0.001).

Conclusion: According to our data we could show non-inferiority of the Jenavalve TA TAVI compared to the Edwards Sapien TA TAVI. There were no statistically significant differences among the two groups except an advantage for the ES TAVI in post-op gradient. However, crude gradients were on a very low level, with questionable effect on clinical outcome. JV showed a tendency towards less paravalvular leakages and less pacemaker implantation.


P040

Should Marfan patients undergoing mitral valve repair have simultaneous prophylactic aortic root replacement?

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Introduction: Significant mitral regurgitation (MR) could be the first manifestation in Marfan Syndrome, even before the onset of aortic dilatation or aortic regurgitation (AR). We aimed to analyse the role of simultaneous prophylactic aortic root replacement in Marfan patients presenting primarily with MR, undergoing mitral valve repair.

Method: A 4-year (2007 to 2010) retrospective analysis of a single surgeon’s experience included 13 Marfan patients (11 males, 2 females) aged between 12 to 60 years (mean 40.3). Pre-operative MR was Grade III or more in all patients. Mechanisms of MR were anterior leaflet prolapse in 2 patients, and bi-leaflet prolapse in 11. All patients underwent mitral annuloplasty using a biodegradable intra-annular ring along with other mitral valve repair techniques. No patient had significant pre-operative AR, however, the aortic root diameter was greater than the physiologic range for their corresponding BSA, hence, all patients underwent simultaneous prophylactic valve sparing aortic root replacement.

Results: Follow-up was complete in all patients, ranging from 1 to 4 years (mean 2.4). Post-operative MR at 6 months was Grade 0 in 8 patients, and Grade 1 in 5. No further progression was seen in any of the patients during the follow-up period. No progression in AR or aortic root complications were noted in any of the patients. There were no post-operative deaths.

Conclusion: Marfan patients with mitral regurgitation can be successfully repaired, with good short-term results. In patients with an aortic root diameter greater than their normal physiologic range, simultaneous prophylactic aortic root replacement is safe and effective in preventing complications associated with the disease.

Disclosure of Interest: None declared

P041

Constrictive pericarditis and epicarditis in invasive ductal carcinoma
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Introduction: Malignant pericardial and cardiac metastases, diagnosed more frequently than primary cardiac neoplasms, typically have a poor prognosis. Symptoms from this involvement of the pericardium prior to death are often uncommon. Malignant pericardial effusion occurs in up to 21% of oncologic patients which consist of 25% of patients with breast cancer. We report the case of a 42-year-old woman known for invasive ductal carcinoma who presented with cardiac decompensation with low output state.

Method: A 42-year-old woman known for invasive ductal carcinoma diagnosed in 2011 treated with chemotherapeutic and hormone- therapy with progression of the disease and multiple hospitalizations for malignant pericardial and pleural effusions requiring pericardiocentesis. In June 2013 the patient was admitted in the Intensive Care Unit because of cardiac failure. The hemodynamic findings led us to suspect a constrictive pericarditis, confirmed with echocardiography.

Results: In our patient, transthoracic bidimensional echocardiography and CT scan showed a mass adherent to the posterior wall of the right atrium and the right ventricular wall was thickened and suspicious of diffuse neoplastic infiltration. An anterior pericardiectomy was performed in August 2013. The pericardium and epicardium surface of the heart had metastatic lesions. Histopathologic evaluation of excised pericardial tissue disclosed extensive neoplasm infiltration compatible with distinct ductal differentiation.

Despite chirurgical intervention without complications, the patient died one week postoperatively of multiorgan failure due to severe right ventricular dysfunction

Conclusion: The pathophysiological and clinical aspects of cardiac metastases are intriguing, but, whatever the treatment, their clinical evolution is usually disappointing. In many cases, secondary deposits manifest in patients with advanced cancer disease, with the heart being involved in the generalized cancer spread. The treatment depends on tumor origin and patient’s general condition, however, it is usually palliative because of the poor prognosis. Postoperative mortality following surgical treatment is significant. This poor prognosis underlines the importance of selecting an appropriate mode of therapy, taking into consideration each patient individually.

Disclosure of Interest: None declared
Evolution of undiagnosed glucose metabolism disturbances one year after acute coronary syndromes in a large Swiss prospective cohort

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Introduction: Measurement of fasting plasma glucose (FPG) is recommended in patients admitted for acute coronary syndrome (ACS), but controversies exist on initiating anti-diabetic treatment for mildly undiagnosed glucose metabolism disturbances.

Method: 2248 patients with ACS were enrolled in a prospective study from July 2009 to December 2012 in four Swiss university hospitals and had FPG measured during hospitalization. Using the diagnostic criteria of the American Diabetes Association (ADA), we stratified patients in 4 groups: (1) normal glucose metabolism if FPG < 5.6 mmol/l, (2) undiagnosed pre-diabetes mellitus (DM) if FPG 5.6-6.9 mmol/l, (3) undiagnosed DM if FPG ≥ 7 mmol/l and (4) known DM. After 1-year, we assessed FPG and anti-diabetic treatment.

Results: Among 2248 patients admitted for ACS, 525 (23%) had normal glucose metabolism, 814 (36%) undiagnosed pre-DM, 501 (22%) undiagnosed DM and 408 (18%) known DM. Patients with undiagnosed DM presented significantly more ST-elevation on ECG, bigger size of infarction and hemodynamic instability at admission (p<0.001). At 1-year, among patients with initially undiagnosed pre-DM, 287 (42.1%) had persistent untreated pre-DM, while 35 (5.1%) developed untreated DM and 9 (1.3 %) had new anti-diabetic treatment. Similarly, among patients with initially undiagnosed DM, 31 (7.9%) had persistent untreated DM and 150 (38.0%) pre-DM, while 31 (7.9%) had new anti-diabetic treatment. Overall, 534 (49.6%) of patients with undiagnosed pre-DM and DM normalized FPG at 1-year without treatment.

Conclusion: Undiagnosed glucose metabolism disturbances are common in patients admitted with ACS, but reassessment of FPG is needed in stable conditions to adequately classify and initiate treatment.

Disclosure of Interest: None declared

The copeptin-troponin strategy in the emergency room: A pilot trial

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Introduction: Copeptin (Co) has recently emerged as a potential biomarker in combination to troponin (Trop) for early management of patients with suspected acute coronary syndrome. We performed a pilot trial to test whether patients sorting could be improved with the use of copeptin dosage.

Method: Patients (pts) with suspected acute coronary syndrome (ACS) were included. Exclusion criteria were STEMs, age under 18, clear trauma-related thoracic pain, and oral refusal. Patients were managed according to the usual work-out process with Trop dosage (Troponin I Beckman), ECG recording and clinical status. Co (Copeptin Brahms) dosage was performed in all patients. The cut-off value was 12pmol/l, as recommended by the manufacturer.

We hypothesized that patients with both negative Trop and Co dosage could be discharged and managed on an out-patient basis, like patients with 2 negatives Trop dosages at 6 hours interval. Endpoints were: absence of adverse ischemic (STEMI or NSTEMI) events before additional in-hospital or out-patient work-up to rule out ischemic heart disease (stress test, angiography, MRI, cardiac scintigraphy, stress echo).

Results: Over 6 consecutive months 125 patients (men=83, 66%) were included. Mean age was 60±10 years. Typical or atypical chest pain was present in 94 patients (75%). Other symptoms compatible with cardiac ischemia were present in 25 pts (20%). Initial dosage of Trop and Co was normal (Trop-, Co-) in 74 patients (Group 1) (59%). 7 pts (Group 2) (6%) had elevated Trop and normal Co (Trop+, Co-). 28 pts (Group 3) (23%) had normal Trop and elevated Co (Trop-, Co+). Finally 16 pts (Group 4) (13%) had both Trop and Co elevated (Trop+, Co+). Patients in group 2, 3 and 4 had a high incidence of STEMI, NSTEMI and required revascularisation independently of the Trop-Co constellation. In group 1 no patient experienced adverse event related to ischemic heart disease before additional work-up.
Negative predictive value was 100% for a combined dosage of Trop and Co. Three-month follow-up is completed for 99 pts (79%) without adverse events in group 1.

**Conclusion:** Co is a useful, safe and time-saving biomarker in addition to Trop to help in the management of patients with suspected ischemic heart disease. Patients with elevation of Trop or/and Co have a high incidence of high risk ACS.

**Disclosure of Interest:** None declared

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**P044**

**Outcome of patients admitted with acute coronary syndrome and given only palliative treatment**

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**Introduction:** At a time when compliance with guidelines is increasingly used to benchmark the quality of hospital care, very little is known about patients admitted with acute coronary syndromes (ACS) who are treated palliatively. This study aimed to evaluate the baseline characteristics and outcomes of these patients.

**Method:** Using the data of ACS patients enrolled in the AMIS Plus Registry from 1997-2012, characteristics at presentation and outcomes were analysed according to 3 treatment groups: palliative treatment, defined as use of aspirin and analgesics only (no other antithromboses [anticoagulants or antiplatelets, heparins, P2Y12 inhibitors, GPIIb/IIIa] and no reperfusion; conservative treatment, defined as any treatment except pharmacological or mechanical reperfusion; and reperfusion treatment (thrombolysis and/or percutaneous coronary intervention).

**Results:** Among 39,401 ACS patients, 1367 (3.4%) were treated palliatively, 10,865 (27.6%) conservatively and 27,169 (69.0%) underwent reperfusion therapy. In 1997, 6% of all patients were treated palliatively and 60% conservatively. This continuously decreased to below 3% and 17% respectively in 2012. In comparison with conservatively treated patients and those who underwent reperfusion, palliative patients were older (77y vs 72y vs 63.3y;p<0.001), predominantly female (42% vs 35% vs 23%;p<0.001), and suffered more frequently from hypertension (72% vs 65% vs 56%;p<0.001), diabetes (31% vs 25% vs 16%;p<0.001), heart failure (15% vs 8% vs 2%;p<0.001), cerebrovascular diseases (15% vs 11% vs 4%;p<0.001), renal disease (22% vs 15% vs 4%;p<0.001), and dementia (9% vs 6% vs 0.5%;p<0.001). They more frequently required resuscitation prior admission (6% vs 4% vs 4%;p=0.012) and were more often in Killip class III/IV at admission (19% vs 11% vs 5%;p<0.001). Patients treated palliatively had more complications, such as cardiogenic shock after admission (18% vs 8% vs 4%;p<0.001), stroke (1.7% vs 1.2% vs 0.8%;p<0.001) and had a higher hospital mortality than patients treated conservatively or with reperfusion (27.1% vs 11.4% vs 3.5%;p<0.001).

**Conclusion:** ACS patients treated palliatively were older, sicker, with more heart failure at admission and had very high in-hospital mortality. While refraining from more active therapy may often constitute the most humane and appropriate approach, a consensus should be reached on whether such patients should be included in the overall evaluation of ACS patient outcomes.

**Disclosure of Interest:** None declared

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**P045**

**Safety and efficacy of resolute zotarolimus-eluting stents versus everolimus-eluting stents: A meta-analysis of 5 randomized trials including 9,899 patients**

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**Introduction:** Contemporary drug-eluting stents (DES) represent the standard of care for patients undergoing percutaneous revascularization. It is still debated, however, whether the safety and efficacy profile of Resolute zotarolimus-eluting stents (R-ZES) is comparable to everolimus-eluting stents (EES) that are considered the benchmark for safety at this point in time.

**Method:** We searched PubMed and conference proceedings for reports of randomized comparisons of R-ZES and EES until December 2013. Random-effects meta-analyses were performed comparing clinical outcomes in R-ZES treated patients and EES treated patients up to maximum available follow-up.
Analyzed endpoints were ARC definite or probable ST, cardiac death, and target-vessel myocardial infarction (TV-MI) for safety, and target vessel revascularization (TVR) for efficacy. Heterogeneity was assessed by the use of I-squared.

**Results:** Five trials were identified: RESOLUTE All-Comers, TWENTE, ISAR-LM 2, DUTCH-PEERS, and HOST-ASSURE – including a total of 9,899 patients. Compared with EES, R-ZES had similar risks of ST (RR 1.21, 95% CI 0.81-1.81), cardiac death (RR 1.05, 95% CI 0.82-1.34), TV-MI (RR 1.08, 95% CI 0.86-1.36), and the composite of cardiac death and TV-MI (RR 1.08, 95% CI 0.91-1.28). A landmark analysis at 1 year showed that the risk of ST was comparable with R-ZES and EES at 1 year (early/late ST: RR 1.30, 95% CI 0.77-2.21) as well as beyond the first year of follow-up (very late ST: RR 0.84, 95% CI 0.36-1.94). As it relates to efficacy, the risk of TVR was similar with R-ZES and EES up to longest available follow-up (RR 1.03, 95% CI 0.87-1.22). No evidence of heterogeneity was observed across trials for the analyzed endpoints.

**Conclusion:** According to this meta-analysis of 5 randomized trials including 9,899 patients, R-ZES have similar safety and efficacy as compared to EES, with no differences in risks of ST, cardiac death, TV-MI and TVR.

**Disclosure of Interest:** None declared

**P046**

**Spontaneous coronary artery dissection: Single centre experience with systematic angiographic follow-up**

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**Introduction:** Spontaneous coronary artery dissection (SCAD) is a rare cause of acute coronary syndrome. Evidence is based on single case reports, whereas only few larger case series have been published. In particular, there are no studies with systematic angiographic follow-up. We describe clinical characteristics, treatment, and angiographic follow-up of a contemporary SCAD population

**Method:** Over a 15 years period we systematically collected patients presenting with SCAD at our institution. A follow-up angiography was offered to all patients.

**Results:** There were 56 patients with SCAD (mean age 51±11 years, 93% females, three patients with peripartum SCAD). All patients had acute coronary syndrome. The following vessels were affected: left main (n=1), left anterior descending artery (n=25), left circumflex artery (n=28), right coronary artery (n=2). One patient underwent coronary bypass grafting, five patients underwent percutaneous coronary intervention (PCI), and 51 patients were treated medically. One patient with peripartum left main SCAD died from cardiogenic and hemorrhagic shock during emergency PCI. All other patients were discharged in a stable condition. Twenty-nine patients (three of them after PCI) underwent a follow-up angiogram (median) 6 (interquartile range, 5-19) months after the index event: one patient with SCAD of the posterior descending artery who was treated conservatively developed out-of-hospital cardiac arrest a few days after the first angiogram, was found to have a persistent dissection at the second angiogram which was still treated medically, had a complicated clinical course including multiorgan failure but finally survived with only minimal neurological sequelae. Two medically treated patients presented with a second event more than a year after the first event and were found to have SCAD in a second vessel, while the initially affected vessel was angiographically normal. In all other patients (n=26), there was a good angiographic result after PCI (n=3), or the vessel was angiographically normal after medical therapy (n=23).

**Conclusion:** In the majority of cases, SCAD can be treated medically with a good clinical result and complete angiographic resolution of the dissection after months. However, rarely SCAD is a catastrophic event resulting in dead, and in some patients, the dissection persists leading to additional events, and some patients have SCAD in a second vessel.

**Disclosure of Interest:** None declared

**P047**

**Serial greyscale and virtual histology IVUS findings in patients undergoing primary PCI with biodegradable polymer biolimus-eluting stents versus bare metal stents**


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Introduction: Early generation drug-eluting stents (DES) have been associated with delayed arterial healing and positive remodeling when implanted in patients with ST-elevation myocardial infarction (STEMI). Vascular remodeling and changes of plaque composition behind stent struts have not been investigated among STEMI patients treated with new generation biodegradable polymer DES.

Method: Serial IVUS at baseline and 13 months was performed in a total of 80 STEMI patients (42 biolimus-eluting stents (BES) and 38 bare metal stents (BMS)) undergoing primary PCI at five European centers. All patients received evidence base medical treatment and were treated with high dose rosuvastatin (40 mg per day). Stented segments were imaged with IVUS using the Eagle Eye (Volcano Corporation) catheter (20 MHz) and were analysed by an independent Corelab. Statistical analyses were performed at lesion level.

Results: The external elastic membrane (EEM) decreased in both treatment arms (BES: -0.46mm² (-1.4 to 0.39) vs BMS: -1.11mm² (-2.27 to 0.04), p=0.05). This was related to a reduction in plaque media area (BES: -0.59mm² (-1.6 to 0.4) vs BMS: -1.25mm² (-2.18 to -0.16), p=0.07). Neointimal volume was lower in BES (0mm³ (0 to 0.5mm³)) compared to BMS (29.0mm³ (11.9 to 88.4)), p<0.001. A reduction of the necrotic core component in the plaque behind the struts was observed with BES (-0.51% (-2 to 0.63)) but not with BMS (3.64% (0.97 to 6.21)), p<0.001.

Conclusion: The absence of positive remodeling (defined by any increase in EEM area) and a reduction in necrotic core suggests a favorable arterial healing profile of BES when implanted into culprit lesions of STEMI patients treated with high dose of rosuvastatin.

Disclosure of Interest: None declared

P048

Local endothelium-dependent coronary vasoconstriction after abluminal biodegradable polymer biolimus-eluting stent implantation: Vasomotion substudy of the compare ii trial

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Introduction: Drug-eluting stents (DES) have been associated with local endothelial dysfunction in the peristent segments and persistent thrombotic risk in long term follow-up. Little data exists on endothelial function post implantation of new DES with biodegradable polymer. The aim of our study was to compare local endothelial function assessed by exercise induced coronary vasomotion after implantation of a biolimus A9-eluting stent with biodegradable polymer (BES) with an everolimus-eluting stent with durable polymer (EES).

Method: Coronary vasomotion was evaluated with quantitative coronary angiography at rest and during supine bicycle exercise in nine patients with EES and thirteen patients with BES 14 months after stent implantation. Minimal luminal diameter, stent diameter, and proximal, distal, and reference vessel diameter were determined.

Results: The reference vessel showed exercise-induced vasodilatation in both groups (+7.3+/−8%). Vasomotion in the stented vessel segment was abolished. There was exercise induced vasoconstriction in both groups in the segments proximal (EES: -9.6+/−4%; p=0.005; BES: -4.31+/−5.2%, p=0.02) and distal to the stent (EES: -3.2+/−8.7%; p=0.41, BES: -8.63+/−7.7%, p=0.005). Sublingual nitroglycerin was associated with maximal vasodilatation of the proximal and distal vessel segments.

Conclusion: Alike DES with durable polymer, stents with a bioresorbable polymer are associated with exercise-induced paradoxical coronary vasoconstriction of the adjacent vessel segments. These data suggest that endothelial dysfunction after DES implantation is not primarily caused by the durability of the polymer coating.

Disclosure of Interest: None declared

P049

Implementation of a regional network to reduce reperfusion times in the management of patients with st-segment elevation myocardial infarction undergoing primary percutaneous coronary intervention: The Lausanne experience

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Introduction: Current guidelines for the management of ST-segment elevation myocardial infarction (STEMI) recommend a door-to-balloon (D2B) time of 90 minutes or less for patients undergoing primary percutaneous coronary intervention (PCI).

Observational studies have shown that improved D2B times are strongly associated with reduced mortality rates in patients with STEMI. Whether implementation of a regional network to promote locally primary PCI for the management of patients with STEMI is associated with reduced reperfusion times is not known.

Method: In January 2013, Canton of Vaud (721,561 habitants) introduced a novel coordinated regional network designed to deliver primary PCI rapidly and effectively for patients with STEMI. The STEMI pathway focus was to reduce time to primary PCI by the direct transfer of patients with STEMI from the site of first medical contact, including hospitals that do not perform primary PCI, to a unique 24/7 primary PCI center. We analyzed retrospectively trends in reperfusion times from consecutive patients included in this novel STEMI pathway based on clinical and ECG criteria, as compared to patients who underwent primary PCI for STEMI during the same period in 2012.

Results: Between January and July 2013, 120 patients (median age 63 years) were eligible for the STEMI pathway. Final diagnoses were acute STEMI in 92%, non-obstructive coronary artery disease (coronary vasospasm, (myo-)pericarditis, severe aortic stenosis) in 4%, Takotsubo cardiomyopathy in 2% and unobstructed coronary arteries in 2% of the patients. Median time from symptom’s onset to first medical contact (FMC) was 85 minutes (IQR 169). Among patients with confirmed STEMI, the median 2DB time (44 vs. 80 minutes, p<0.05) and time from FMC to PCI (93 vs. 140 minutes, p<0.05) were significantly reduced, as compared to the same period of 2012. Interestingly, time between FMC and arrival at the primary PCI center did not differ significantly during the study periods (53 vs. 62 minutes, p=0.31).

Conclusion: Implementation of a coordinated regional network for patients with STEMI significantly reduces reperfusion times, as assessed in terms of D2B and FMC to PCI times. However, our data suggest that further efforts to reduce time before arrival at the primary PCI center are needed in order to reduce the total ischemic time. Whether regional STEMI networks are associated with reduction in mortality rates in patients undergoing primary PCI needs to be confirmed during the follow-up period.

Disclosure of Interest: None declared

P050

Liver disease in patients with acute coronary syndrome

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Introduction: Although there is evidence that liver disease could interact with coronary artery diseases, scarce data are available from daily clinical practice. This study aimed to evaluate baseline characteristics, treatment and outcomes in patients with liver disease who were admitted for acute coronary syndrome (ACS).

Method: Data were used from the Swiss national registry AMIS Plus (Acute Myocardial Infarction in Switzerland), which prospectively collects data on patients with ACS. All ACS patients enrolled from 2002 to 2013 were included and patients with liver disease were compared to those without. Mild liver disease was defined if patients had increased transaminase levels less than twice the upper normal limit, moderate to severe if transaminase levels were above twice the upper normal limit and/or patients had coagulopathy. The main outcome was in-hospital mortality.

Results: From the 34,749 patients enrolled for ACS, 1093 patients (3.1%) had missing data on liver disease, 249 patients (0.8%) had mild and 190 patients (0.6%) moderate to severe liver disease. There were no differences between patients with and without liver disease in age (67.3y vs. 66.3y; p=0.13), gender (24.1% vs. 27.1%; p=0.20), rate of resuscitation prior admission (3.7% vs. 4.2%; p=0.71) and STEMI prevalence (52.5% vs. 51.1%; p=0.15). Patients with liver disease compared to those without had worse cardiac functions (Killip class>2, 10.3% vs. 6.5%; p<0.001), more frequently diabetes (35.7% vs. 20.4%; p<0.001), hypertension (71.4% vs. 61.6%; p<0.001), heart failure (10.0% vs. 3.4%; p<0.001), renal disease (14.6% vs. 7.0%; p=0.001), were often on regular oral anticoagulants (10.6% vs. 5.9%; p<0.001), and they presented later (300 min (IQR 150, 757 min) vs. 221 min (IQR 110, 615 min); p<0.001)). Liver disease patients were less likely to receive guideline recommended therapies such as ASA (90.3% vs. 95.0%; p<0.001), P2Y12 inhibitors (64.7% vs. 77.2%; p<0.001) and percutaneous coronary interventions (63.6% vs. 78.9%; p<0.001). Crude in-hospital mortality was 11.8% in liver disease patients and 5.2% (p<0.001) in those without. After adjusting for all differences, liver disease was an independent predictor of in-hospital mortality (OR 1.83, 95%CI 1.26 to 2.65).

Conclusion: Liver disease patients who were admitted for ACS are high risk patients and should be followed more intensively. There appears to be potential room for improvement in the care of these ACS patients.

Disclosure of Interest: None declared
Balance of bleeding and ischemic adverse events among unselected patients undergoing percutaneous coronary intervention according to clinical presentation

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Introduction: The balance of efficacy (prevention of ischemic adverse events) and safety (bleeding) is of pivotal importance to guide antithrombotic therapy among patients undergoing percutaneous coronary intervention (PCI). Differences in the risks of bleeding and ischemia according to clinical presentation (STEMI, NSTEMI and stable coronary artery disease (CAD) among unselected patients undergoing PCI is not well understood.

Method: Between March 2009 and December 2010, 3,334 patients with CAD underwent PCI and were prospectively followed for one year. All patients received a loading dose of 600mg Clopidogrel and were prescribed dual antiplatelet therapy for the duration of 1 year. STEMI patients were treated with prasugrel from September 2009 onwards (469/860).

Bleeding was defined as any bleeding according to BARC/TIMI or GUSTO.

Results: A total of 860 (25.8%) presented with STEMI, 865 (25.9%) with NSTE-ACS and 1609 (48.3%) with stable CAD. The composite ischemic end point of cardiovascular death, non-fatal MI and non-fatal stroke was highest among STEMI patients (10.5%) compared with NSTE-ACS (6.9%) and stable CAD patients (5.4%, p<0.001). A landmark analysis revealed that differences in ischemic risk were entirely limited to the first 30 days (8.0%, 3.9%, 2.9%, p<0.001) after PCI with no significant differences observed during follow-up between 30 days and 1 year (30-360 days 2.9%, 3.2%, 2.9%, p=0.78, p interaction =0.003, Figure 1A). Bleeding events showed a trend towards a higher risk among STEMI patients compared with NSTE-ACS and stable CAD patients at one year (3.6%, 2.6%, 2.1%, P=0.07). Differences were most pronounced during the first 30 days (2.5%, 1.2%, 1.0%, p=0.005) and no longer present during follow-up between 30 days and 1 year (1.2%, 1.2%, 1.2%, p= 0.94, p-interaction=0.08, Figure 1B).

Picture / graph:

Figure 1A. Ischemia related events (cardiac death, myocardial infarction or stroke) during 0-30 days and during 30-365 days.

Figure 1B. Bleeding related events (TIMI/GUSTO/BARC 3-5) during 0-30 days and during 30-365 days.
Conclusion: In this unrestricted registry of consecutive PCI patients, STEMI patients have the highest risk for both bleeding and ischemic adverse events compared with NSTE-ACS and stable CAD patients at one year. However, differences in risk appear limited to the early peri-procedural period with subsequent attenuation during longer term follow-up.

Disclosure of Interest: None declared

P052

Impact of peptic ulcer disease on treatment and outcome in patients hospitalized for ST-elevation myocardial infarction. Insights from the nationwide AMIS plus registry from 2002-2013

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Introduction: Some studies showed that patients with peptic ulcer disease (PUD) have a higher risk of myocardial infarction compared with the general population. This study aimed to evaluate the impact of PUD on treatment and outcome in patients who were admitted for ST-elevation myocardial infarction (STEMI).

Method: Data were used from the Swiss national registry AMIS Plus (Acute Myocardial Infarction in Switzerland), which prospectively collects data on patients with acute coronary syndrome. All STEMI patients enrolled from 2002 to 2013 were included and patients with PUD were compared to those without. The main outcome measurements were in-hospital mortality and the composite endpoint of major cardiac and cerebrovascular events (MACCE) including reinfarction, stroke and/or death.

Results: From the 18,502 patients enrolled for STEMI, 17,775 patients (96.1%) were included and of these, 319 had PUD (1.8%). These patients were older (72±12y vs.65±13y; p<0.001), presented more frequently with atrial fibrillation (7.9% vs. 4.3%; p=0.005) and with worse cardiac functions (Killip class>2 11.6% vs. 7.2%; p=0.003) than the patients without PUD. Proton pump inhibitors were regularly used by 57.6% of patients with PUD compared with 12.3% in patients without PUD (p<0.001), but the difference in the regular use of oral anticoagulants was not significant (6.6% in patients with PUD versus 4.7% in patients without; p=0.13). Patients with PUD were less likely to receive guideline recommended therapies, such as ASA (92.1% vs. 96.2%; p=0.001), P2Y12 inhibitors (65.4% vs. 80.8%; p<0.001), statins (67.5% vs. 76.0%; p=0.001) and percutaneous coronary intervention (66.8% vs. 85.0%; p<0.001). The complications rate in PUD patients was higher (30.1% vs. 20.6%; p<0.001), but the rate of bleeding was similar (4.2% vs. 2.8%; p=0.20) and from all the STEMI patients who suffered bleeding, only 2.3% of these were ulcer patients. Crude in-hospital mortality was 11.6% in patients with PUD and 6.1% (p<0.001) in those without. MACCE was 12.1% in PUD patients vs. 7.6% in those without (p=0.004). However, after adjustment for all differences, PUD was neither an independent predictor of in-hospital mortality (OR 1.23, 95%CI 0.81 to 1.86) nor of MACCE (OR 1.01, 95%CI 0.66 to 1.53).

Conclusion: A small part of the patients admitted for STEMI had PUD. These patients were older and sicker, however, after adjustment this comorbidity did not affect outcome.

Disclosure of Interest: None declared

P053

Predictors of patient-oriented and device-oriented outcomes among patients undergoing primary percutaneous coronary intervention

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Introduction: The aim of this study was to identify predictors of adverse events among patients with ST-elevation myocardial infarction (STEMI) undergoing contemporary primary percutaneous coronary intervention (PCI).
**Method:** Individual data of 2,655 patients from 2 primary PCI trials (EXAMINATION, N=1,504; COMFORTABLE-AMI, N=1,161) with identical endpoint definition and event adjudication were pooled. Predictors of patient-oriented (death or reinfarction) and device-oriented (definite stent thrombosis [ST] and target-lesion revascularization [TLR]) outcomes at 1 year were identified by multivariable Cox regressions analysis.

**Results:** Killip class III or IV was the strongest predictor of death or reinfarction (OR 5.11, 95%CI 2.48-10.52), definite ST (OR 7.74, 95%CI 2.87-20.93), and any TLR (OR 2.88, 95%CI 1.17-7.06). Impaired left ventricular ejection fraction (OR 4.77, 95%CI 2.10-10.82), final TIMI flow 0-2 (OR 1.93, 95%CI 1.05-3.54), hypertension (OR 1.69, 95%CI 1.11-2.59), age (OR 1.68, 95%CI 1.41-2.01), and peak CK (OR 1.25, 95%CI 1.02-1.54) were independent predictors of death or reinfarction. Allocation to treatment with DES was an independent predictor of a lower risk of definite ST (OR 0.35, 95% CI 0.16-0.74) and any TLR (OR 0.34, 95%CI 0.21-0.54).

**Conclusion:** Killip class remains the strongest predictor of death or reinfarction among STEMI patients undergoing primary PCI. Noteworthy, DES use independently predicts a lower risk of TLR and definite ST.

**Disclosure of Interest:** None declared
Multivessel minimally invasive coronary artery bypass grafting: The quest of the proximal anastomosis
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Introduction: Minimally invasive coronary artery bypass grafting (MICS-CABG) through a mini anterolateral thoracotomy is an alternative option for surgical coronary revascularization in selected patients. An issue with this technique is the proximal anastomosis of non in situ left internal mammary artery (LIMA) grafts.

Method: Prospectively collected one center observational data were analysed.

Results: From 01/2013 to 01/2014 a total of 19 patients underwent MICS-CABG in our institution (mean age 69 ± 8 years, 18 males, 1 female), of which 9 (47%) had more than one graft. The proximal anastomoses of the non in situ LIMA grafts, thus 1 radial artery (RA) and 8 saphenous vein grafts (SVG), were constructed either on the ascending aorta (n = 8) or on another graft (n = 1). The distal anastomoses of those grafts were to diagonal (n = 4), marginal (n = 3), right posterior descending (n = 2), right posterolateral (n = 2) branches and the left anterior descending artery (n = 1). Mean flow was 36 ± 20 ml/min, mean Pulsatility Index was 2.7 ± 1. Out of the 8 anastomoses directly to the ascending aorta (all SVG), 7 were constructed using the PAS-Port anastomotic system and 1 in standard hand sewn fashion and partial side-clamping. Conversion to median sternotomy was indicated in 1 patient due to bleeding from the ascending aorta. In hospital mortality was 0, mean postoperative length of stay was 7± 2 days.

Conclusion: The construction of proximal anastomosis on the ascending aorta through a mini-anterolateral thoracotomy is feasible and safe, requires, however, special care and tools.

Disclosure of Interest: None declared

Circadian dependence of myocardial infarction size from a large national multicenter registry
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Introduction: Different clinical studies have shown circadian variation of ischemic burden among patients with ST-Elevation Myocardial Infarction (STEMI) with controversial results. The aim of this study was to analyze circadian variation of myocardial infarction size and in hospital mortality in a large sample population.

Method: 6223 patients treated with primary angioplasty for STEMI within 6 hours after symptom onset were retrieved from AMIS Plus, a large, prospective Swiss registry. Association between peak Creatine Kinase (CK), in hospital mortality and time at symptom onset was analyzed by harmonic regression method.

Results: Only the 24-hour harmonic was significantly associated with peak CK (p=0.0001), whereas the others (3, 6 and 12 hour cycles) were not. Patients with symptom onset at 23:00 had on average higher peak CK (2315 U/L) than patients with symptom onset at 11:00 (2017 U/L). The amplitude of this difference (298 U/L) was 15%, when compared to the peak CK at 11:00. When we analyzed a subset of patients with Thrombolysis In Myocardial Infarction flow = 0 at the start of the procedure and no history of myocardial infarction nor known coronary artery disease and non-diabetic (n = 654), a circadian cycle of 24 hour period was confirmed and the amplitude between the minimum and maximum peak CK (885 U/L) was even amplified compared to the total population (34%). Same observations were found for sub-period (1999-2004, 2005-2009, 2010-2013). In-hospital mortality was 3.58%. Only the 24-hour harmonic was significantly associated with the probability of death, which was higher for patients with symptom onset occurring at 00:00.
Conclusion: This study confirms a circadian distribution of in-hospital mortality and peak CK among STEMI patients treated with primary angioplasty. Maximal and minimal myocardial infarction size occurs at 23:00 and 11:00 respectively. In-hospital mortality is the highest at 00:00.

Disclosure of Interest: None declared

P056

Initial experience on using the absorb bioresorbable vascular scaffold in an all-comers population with coronary artery disease
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Introduction: The Absorb Bioresorbable Vascular Scaffold (Absorb) has recently been introduced into interventional cardiology and results in small series of selected patients have been promising. However, experience in more complex lesions is very limited. The aim of this report is to describe feasibility and outcomes of the Absorb scaffold in an all-comers population in Switzerland.

Method: This is a single-center prospective registry of patients with coronary artery disease (CAD) treated at the Luzerner Kantonsspital between August 2013 and January 2014. According to local guidelines all patients presenting with stable CAD or acute coronary syndrome (ACS) were eligible to be treated using Absorb scaffolds and the decision was left at the discretion of the interventional consultant. In this report we describe feasibility and acute outcomes.
Results: A total of 80 lesions in 59 patients were treated. The mean age of the patients was 65±12 years and 46 (78 %) were male. 30 patients (51 %) had stable angina while 29 patients (49 %) had ACS: unstable angina (13 %), NSTEMI (22 %) and STEMI (14 %). According to the AHA lesion classification 20 (25 %) were type A, 51 (64 %) type B and 9 (11 %) were type C. 10 lesions (13 %) were in a bifurcation and 31 lesions (39 %) were in-stent-restenosis. All Absorbs scaffolds were successfully deployed and we did not observe scaffold fractures, vessel perforations or early thrombosis.

Conclusion: Our initial experience in treating an all-comers population with Absorb is very promising. Despite treating complex lesions the Absorb scaffold was successfully used in all patients without a single major complication. We would like to share our experience and present a long term follow-up at the annual meeting of the Swiss Society of Cardiology.

Disclosure of Interest: None declared

P057

The short-term outcome of off pump coronary bypass surgery in insulin dependent diabetics and non insulin depended diabetics compared to non diabetic patients

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Introduction: Diabetic patients are recognized having at higher adverse outcomes after coronary artery bypass grafting. We evaluated the short term outcome off pump coronary (OPCAB) revascularization in diabetics (insulin and non insulin dependent) compared to the non diabetic patients.

Method: The data of all patients who underwent off pump coronary bypass surgery between 1/2005-6/2013 were retrieved from our data bank. We evaluated the diabetic and non diabetic patients postoperative endpoints: noradrenalin use, atrial fibrillation, delirium, packed red blood cell (PRBC) transfusion, intubation time, infection, renal insufficiency, ICU days and mortality.

Results: 1243 patients underwent off pump coronary bypass surgery, 17.2% were non insulin and 11.9 % were insulin dependent diabetics. Diabetics in general have preoperative significantly poor ejection fraction and low hämatocrit. Insulin depended diabetics have in addition significantly higher preoperative CRP and BNP. There was no difference between diabetics and non diabetics in regard to noradrenalin use, atrial fibrillation, delirium, intubation time, infection and mortality. There was a significant higher incidence of blood transfusion, ICU days and renal insufficiency in the insulin dependent diabetics (p=0.002, p=0.002, p=0.000, respectively) but not in the non insulin dependent diabetics.

Conclusion: Our analysis shows that in OPBCAB the short term outcome of non diabetics is similar to that of diabetics with the exception that the insulin dependent diabetics have higher incidence of blood transfusion, renal insufficiency and prolonged ICU days.

Disclosure of Interest: None declared

P058

The impact of a modified safe surgery saves lives checklist developed specifically for the cardiac surgical patient

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Introduction: The ‘Safe Surgery Saves Lives’ (SSSL) initiative was established by the World Alliance for Patient Safety as part of the World Health Organization’s (WHO) efforts to reduce the number of surgical deaths across the world. This study was undertaken to evaluate the impact of a modified SSSL checklist developed specifically for the cardiac surgical patient.

Method: Data for all patients undergoing cardiac surgery between 2008 and 2010 and during 2012 were examined retrospectively. Between these two periods a modified SSSL was introduced. The differences in the outcomes of the two groups in regard to surgical time, intubation time, postoperative peak creatinine kinase (CKMB) and the volume of blood transfusion was evaluated. During the time out period of the modified SSSL checklist, all the involved parties which includes surgeons, perfusionists, anesthesiologists and nursing stuff beside reviewing all the exams they also discuss together the surgical course and any complications that may be expected to occur.

Results: A total of 1689 patients were included; 1250 patients underwent cardiac surgery during the control period 2008-2010 and 439 patients during the period 2012. There were no differences in age, gender, diabetes, BMI, creatinine, euro-score or type of surgery between the two periods.
Surgical time, intubation time, postoperative peak creatinine kinase (CKMB) and the volume of blood transfusion were significantly lower in the post-intervention period (p=0.001, p=0.007, p=0.005, p=0.004 respectively). Use of noradrenaline was higher in the post-intervention period (p=0.009).

**Conclusion:** Performing a modified SSSL checklist developed specifically for the cardiac surgical patient results a significant reduction of surgical time, intubation time, ischemia and blood transfusion.

**Disclosure of Interest:** None declared

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**P059**

**Critical preoperative state and off pump coronary bypass surgery**

Triemli Hospital, Zürich, Switzerland

**Introduction:** Critical preoperative state (ventricular tachycardia or ventricular fibrillation or aborted sudden death, preoperative cardiac massage, preoperative ventilation before anesthetic room, preoperative inotropes or IABP, preoperative acute renal failure) has been considered risk factor for worst outcome. This study was undertaken to see if critical preoperative state has any impact in postoperative outcome in patients undergoing off pump coronary bypass surgery (OPCAB).

**Method:** The data of patients who underwent OBCAB between 1/2008-12/2010 was retrieved from our data bank. An association between critical preoperative state and postoperative outcome: troponin, Creatinine-Kinase Muscle-Brain (CKMB), noradrenalin requirement, creatinine, atrial fibrillation, use of intra-aortic balloon pump (IABP), intubation time, ICU days, packed red blood cell (PRBC), platelet transfusion and mortality was evaluated.

**Results:** From 1/2008 to 12/2010, 540 OPCAB were isolated. 8% were in critical preoperative state. Critical preoperative state was significantly related to postoperative intubation time (p=0.001), ICU days (p=0.000), IABP use (p=0.000), CKMB (p=0.000), troponin (p=0.000), platelet transfusion (p=0.002), but not to mortality, use of noradrenalin, PRBC transfusion, atrial fibrillation, creatinine.

**Conclusion:** In OPCAB preoperative critical preoperative state is not associated to mortality, renal failure, atrial fibrillation, PRBC transfusion and the use of noradrenalin.

**Disclosure of Interest:** None declared
Reproducibility of peripheral arterial tonometry measurements in cardiovascular patients


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Introduction: Assessment of endothelial function of the microvasculature by peripheral arterial tonometry (EndoPAT®) has gained increasing popularity in patients with cardiovascular risk factors. Only one previous study has investigated reproducibility in a small group of coronary artery disease (CAD) patients (n = 18). We therefore aimed at quantifying reproducibility of EndoPAT® parameters in a large group of stable CAD patients.

Method: EndoPAT® measurements were performed in 78 male patients (age 66 ± 8 yrs) with CAD on stable medication on two different occasions separated by two weeks by the same operator. We calculated overall mean, standard deviation (SD), coefficient of variation (CV) and intraclass correlation coefficient (ICC) of the following parameters: reactive hyperemic index (RHI) as calculated by the automated algorithm of the manufacturer (Itamar Medical Ltd., Caesarea, Israel), PATratio of the post-occlusion period 90 s - 150 s as used for calculation of the RHI (PATratio_90-150) and 90 s - 120 s (PATratio_90-120) as used for the often employed Framingham RHI (F-RHI), as well as PATratio of the peak hyperemic response (PATratio_peak_response). Based on the within-subject variations, least significant changes for individual subjects and minimum sample sizes for parallel and cross-over design studies were calculated. Minimum sample sizes for parallel arm studies were calculated based on intra-individual differences.

Results: Mean RHI of our CAD population was 1.84 (SD 0.31), and 59 % of patients had RHI values within the healthy range. For RHI, PATratio_90-150, PATratio_90-120, and PATratio_peak_response the CVs were 17.0 %, 25.4 %, 26.1 %, and 25.0 %, respectively, and the ICC were 0.45, 0.49, 0.48 and 0.51, respectively.

Conclusion: CV of RHI in our sufficiently large population of stable CAD patients was with 17.0 % moderate, however, we consider this precision insufficient to monitor changes in individual patients, as they would need to exceed 47 % in order to show values which differed significantly. Usage of the RHI to classify vascular endothelial function of CAD populations is questionable as the majority of our CAD patients had healthy RHI values.

Disclosure of Interest: None declared

Renal sympathetic denervation procedure in patients with resistant hypertension

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Introduction: Arterial hypertension is the leading risk for cardiovascular mortality. Despite maximal antihypertensive therapy, 1/3 of patients do not reach target blood pressure. Catheter-based renal denervation (RDN) could be an adjunctive interventional antihypertensive therapy in patients with resistant hypertension. With the recent firestorm induced by Symplicity-HTN-3, we aimed to evaluate the effectiveness of RDN in our current practice.

Method: Since January 2012, we established a standardized screening program for patients with resistant hypertension.

Results: From the 62 patients referred and after exclusion of pseudo-hypertension, secondary hypertension (renal stenosis, primary hyperaldosteronism), 15 patients finally underwent RDN. All patients were treated with a minimum of 3 antihypertensive drugs, and still ≥ 130/80 mmHg on 24-hour ambulatory BP monitoring (ABPM). We used in 7 patients the Symplicity (Medtronic) renal denervation system and in 8 patients the Enlightn (St-Jude) system. During RDN, 3 renal stenoses were additionally treated by stents implantation.

At 3-month follow-up, ABPM and mean heart rate were significantly reduced after RDN (mean BP -8mm Hg, p<0.05; mean heart rate -8bp versus baseline).

Conclusion: Our data show that implementation of a renal denervation program is effective to improve management of patient suffering from resistant arterial hypertension. This effect is mainly due to the improved screening of secondary causes. Furthermore the effect of RDN on blood pressure is less than expected but still encouraging.

Disclosure of Interest: None declared
Weight changes and cardiovascular risk factors control in overweight and obese patients after an acute coronary syndrome: Results from a Swiss prospective multicenter cohort


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Introduction: Current cardiac rehabilitation (CR) guidelines recommend a 5-10% weight reduction in overweight/obese patients after an acute coronary syndrome (ACS). However, few prospective data are available on weight changes after an ACS. We examined the association between weight changes in overweight/obese patients post-ACS and the achievement of recommended cardiovascular risk factors (CVRF) targets at the one-year follow-up.

Method: We prospectively included 1750 patients admitted with an ACS in 4 Swiss University hospitals. Baseline weight was recorded during hospitalization and measured at the one-year clinical visit. Overweight was defined as a body mass index (BMI) of 25.0-29.9 kg/m² and obesity as a BMI ≥30.0 kg/m². The prospective weight changes in overweight/obese patients were categorized in 3 groups: (1) no reduction (2) 0-4.9% reduction and (3) ≥5% reduction. The association of weight changes with recommended CVRF targets achievement at one year was assessed using odds ratios (OR) and 95% confidence intervals (CI) adjusted in a multivariate model including age, gender, referral to CR and drug therapy.

Results: At baseline, 825 (47.1%) patients were overweight, 369 (21.1%) were obese and 556 (31.8%) had an optimal BMI (<25.0 kg/m²). Only 19.4% of overweight and 23.0% of obese patients achieved the minimal recommended 5% weight reduction during the year. Compared to the group with no weight reduction, the group with ≥5% weight reduction was more likely to achieve all CVRF targets at one year (Table 1).

Conclusion: Weight reduction after an ACS improves CVRF control, but few overweight/obese patients achieve the recommended weight reduction.

Disclosure of Interest: None declared

Table 1. Odds Ratios for One Year Secondary Prevention Target Achievement According to Weight Decrease in Overweight and Obese Patients (N=1194)

<table>
<thead>
<tr>
<th>CVRF Targets</th>
<th>No Weight Decrease OR (95% CI)</th>
<th>1-5% Weight Decrease OR (95% CI)</th>
<th>≥5% Weight Decrease OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDL-C &lt; 1.8 mmol/l</td>
<td>1 (Ref)</td>
<td>1.32 (0.97-1.79)</td>
<td>1.62 (1.13-2.31)</td>
</tr>
<tr>
<td>Glucose &lt; 5.6 mmol/l in non diabetics</td>
<td>1 (Ref)</td>
<td>1.08 (0.80-1.46)</td>
<td>1.71 (1.19-2.46)</td>
</tr>
<tr>
<td>HbA1c &lt; 7% in diabetics</td>
<td>1 (Ref)</td>
<td>1.11 (0.57-2.14)</td>
<td>2.36 (1.10-5.07)</td>
</tr>
<tr>
<td>Systolic Blood Pressure &lt; 140 mmHg</td>
<td>1 (Ref)</td>
<td>1.58 (1.17-2.12)</td>
<td>1.64 (1.14-2.35)</td>
</tr>
</tbody>
</table>

Abbreviations: CI, confidence intervals; CR, cardiac rehabilitation; CVRF, cardiovascular risk factors; LDL-C, low-density lipoprotein cholesterol; OR, odds ratio; Ref, reference

1 Adjusted for age, gender, referral to CR and lipid-lowering treatment

2 Adjusted for age, gender, referral to CR and glucose-lowering treatment

3 Adjusted for age, gender, referral to CR and anti-hypertensive treatment
Arterial age as substitute for chronological age in risk functions could improve coronary risk prediction

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1Cardiolab, 2Vascular Risk Foundation (Varifo), Olten, 3Cardiology, University Hospital Zürich, 4European Centre of Pharmaceutical Medicine (ECPM), Basel, Switzerland, 5Stroke Prevention & Atherosclerosis Research Centre, Roberts Research Institute, London, Canada

Introduction: Chronological age can be dominant over other major independent cardiovascular risk factors in coronary risk functions. Calculating the age of a person at the predicted risk but with all other risk factor levels in normal range is regarded as determining the arterial age. Measuring the total plaque area (TPA), then deriving and validating an arterial age formula using TPA as a surrogate for atherosclerosis could improve coronary risk prediction.

Method: The derivation cohort was selected from two single-centre databases that were prospectively collected. The principle selection criterion was absence of any cardiovascular disease. Presence of plaque was determined to the left and right carotid artery with a high resolution ultrasound linear transducer using a 7.5-12.0 MHz probe, identifying all plaques defined as intimal thickening > 1.0 mm. The mean values of TPA derived from five-year intervals for men and women aged 35 to 79 years were plotted against the chronological age. An exponential function was added and solved to find the age at which any given amount of plaque is found within the population.

Results: The derivation cohort contained 1500 subjects (mean age 59±9 years, mean TPA was 54±52 mm2, 5% were diabetics, 43% were women. The arterial age function was $a_{ar} = [\ln (TPA / 5.4175)] / (0.0426)$ for women and $a_{ar} = [\ln (TPA / 4.1942)] / (0.0392)$ for men. The validation cohort consisted of 684 healthy subjects with a follow up time of 3.3 ± 1.8 years. In ROC analysis the area under the curve (AUC) was 0.65 for AGLAca (95% CI = 0.61 – 0.68, p=0.041) and was (95% CI = 0.75 – 0.81, p<0.0001) for AGLAa. This improvement of 0.13 was statistically significant (p=0.041)

Conclusion: The coronary risk function outperformed the AGLA risk function, when chronological age was substituted by arterial age. The knowledge of arterial age could be a better motivator for patients to adhere to preventive life style and medications, because age is more easily communicated than 10-year risks and categories.

Disclosure of Interest: None declared

Novel insights into the association between obstructive sleep apnea and cardiovascular risk using comprehensive biomarker profiling

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1Cantonal Hospital, St. Gallen, 2University Hospital, Basel, Switzerland, 3City Hospital, Nuremberg, Germany, 4Singulex, Inc, Alameda, United States

Introduction: There is an established association between the obstructive sleep apnea syndrome (OSAS) and a variety of cardiovascular disease including hypertension, atrial fibrillation, and heart failure. However, in contrast to other cardiovascular conditions, the pathophysiological links between OSAS and cardiovascular mortality are incompletely understood, and the role of biomarkers in the characterization and diagnosis of disease are unknown. We aimed to contribute to a better understanding by using comprehensive biomarker profiling quantifying hemodynamic cardiac stress, cardiomyocyte injury, inflammation, endothelial function, matrix turnover and metabolism in OSAS patients and controls.

Method: In 65 patients with moderate or severe OSAS [apnea-hypopnea index (AHI) 39±20/h] and 33 patients with no or mild OSAS (AHI 8±4/h), B-type natriuretic peptide (BNP), N-terminal-pro-B-type natriuretic peptide (NT-proBNP), high-sensitivity cardiac troponin I (hs-cTnl), interleukin-6 (IL-6), vascular endothelial growth factor (VEGF), matrixmetalloproteinase-9 (MMP-9), and insulin were measured before and after sleep, and in a subgroup measurements were repeated in a second night with continuous positive airway pressure (CPAP).

Results: Patients with moderate/severe OSAS had higher insulin before sleep [median (interquartile range), 36.4 (21.9-52.1) vs. 20.8 (10.6-32.8) mU/ml; p=0.006], higher IL-6 after sleep [1.00 (0.73-1.58) vs. 0.72 (0.48-0.94) pg/ml; p=0.005], and more pronounced relative overnight reduction in BNP [-9 (-35-0) vs. -3 (-21-13)%; p=0.04] than those with mild/no OSAS. Insulin before and IL-6 after sleep were also independent predictors of severe OSAS, and when combined provided high diagnostic accuracy (area under the ROC curve 0.80; 95% CI 0.69-0.91). In contrast, there were no significant in differences in NT-proBNP, hs-cTnl, VEGF, and MMP-9 between patients with moderate/severe OSAS and those with mild/no OSAS. Short-term CPAP had no impact on biomarker concentrations before and after sleep.
**Conclusion:** Significant OSAS is characterized by a distinct biomarker profile including high insulin before and high IL-6 after sleep. This profile could be helpful as a diagnostic tool, but possibly also contribute to the development of novel pathophysiological and therapeutic concepts regarding the role of OSAS as a cardiovascular risk factor.

**Disclosure of Interest:** None declared

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**P065**

**Effect of oral nitrate on time-trial performance and pulmonary hemodynamics in severe hypoxia: A randomized placebo controlled trial**

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\(^1\)Cardiology, HUG, Genève, \(^2\)Institut des sciences du sport de l'Université de Lausanne, Lausanne, Switzerland

**Introduction:** Dietary nitrate as salt or in nitrate-rich food like beet root juice is a precursor for nitric oxide (NO). Nitrate may improve aerobic performance, through improved oxidative metabolism and contractile efficiency. NO also contributes to adjust pulmonary arterial tone. Aerobic exercise in severe hypoxia (>4500m) may be limited by hypoxic pulmonary vasoconstriction (HPV). We tested the hypothesis that oral intake of nitrate in hypoxia limits HPV, improves right heart function, and thus allows better maximum time-trial (TT) cycling performance.

**Method:** After a maximal cardiopulmonary exercise test, 11 trained cyclists/triathletes underwent 2 different tests: a) a 15-kilometer TT with measurement of gas exchange, brain and muscle oxygenation (O2Hb) by near-infrared spectroscopy (NIRS), and middle cerebral blood flow velocity (MCAv) by transcranial Doppler; b) a stress echocardiography during submaximal steady-state cycling (50-100-150 Watts) with measurement of indices of right ventricular systolic function (S’ wave by tissue Doppler imaging and tricuspid annulus plane systolic excursion, TAPSE), and right ventricular systolic pressure (RV-RA gradient) estimated by peak tricuspid regurgitation velocity. Each test was repeated 4 times in random order (double blind, crossover design) either on placebo or 3-day oral nitrate (0.1 mmol/kg/day), and in normoxia (Geneva room air) or hypoxia (simulated altitude of 5000 meters). We further measured resting expired NO at rest.

**Results:** Nitrate had no effect on expired NO (P>0.05). Hypoxia reduced TT performance by 23 ± 9%, lowered VO2, cerebral and muscle O2Hb and increased MCAv (P<0.05). Nitrate had no effect (P>0.05). During steady-state exercise there was some effect of hypoxia on TAPSE, RV-RA gradient and S’ wave, compatible with increased pulmonary arterial pressure. Nitrate had no effect (P>0.05).

**Conclusion:** Oral nitrate intake did not reduce exercise pulmonary pressures nor improved time-trial cycling performance, either in normoxia or hypoxia. This contrasts with other findings in the literature and questions any routine use of oral nitrate as a means to improve aerobic exercise performance, in normoxia or hypoxia.

**Disclosure of Interest:** None declared

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**P066**

**Predictors for good and poor response to a comprehensive ambulatory cardiac rehabilitation program**

R. Twerenbold\(^1\), O. Friesewinkel\(^2\), J. Friesewinkel\(^2\), D. Salzmann\(^2\), F. Eckstein\(^3\), R. Jeger\(^4\)

\(^1\)Cardiology, University Hospital, Basel, \(^2\)Herzpraxis Birseck, Arlesheim, \(^3\)Cardiac Surgery, \(^4\)Cardiology, University Hospital, Basel, Switzerland

**Introduction:** Patients with coronary artery disease (CAD), surgery for valvulopathies, or congestive heart failure (CHF) often undergo ambulatory cardiac rehabilitation (CR) as an alternative to in-patient cardiac rehabilitation. However, predictors for good and no response to ambulatory CR are largely unknown.

**Method:** In a prospective single-centre cohort study, 460 patients (352 with CAD, 57 after valve surgery, 38 with CHF, and 13 with functional heart complaints) attending a 7-9-week comprehensive outpatient CR program were evaluated for predictors for good or no response to a CR program. Non-responders were identified at the end of CR if the improvements in physical performance measured by ergometry were ≤10% of the expected value or if no improvements in left ventricular ejection fraction could be achieved.

**Results:** Of all 460 patients, 412 (90%) were responders to CR. Overall, the distribution of baseline characteristics including traditional cardiovascular risk factors was highly comparable between responders and non-responders (Table 1). However, percentage of valvular surgery as indication for CR, the time between event and CR, the time between discharge and CR, and the number of days in the hospital differed significantly between the two groups. Non-responders showed a higher median physical performance before CR as compared to responders (77% vs. 67% of expected value, p<0.001).
In an univariate binary logistic regression analysis, valvular surgery as indication for CR (OR 7.4, p=0.049) and physical performance before CR (OR 1.023, p=0.003) were identified as the only two significant predictors for response to CR, while time between discharge and CR tended to be higher in the non-responder group without reaching significance (OR 0.99, p=0.055; Table 2). In a multivariable model, only impaired physical performance before CR could be identified as an independent predictor for good response to CR. For non-response, no independent predictors could be identified. Of note, sex, age, cardiovascular risk factors and ejection fraction before CR were no predictors for the response to CR (p>0.1 for all comparisons).

Table 1: Baseline Characteristics of the Patients

<table>
<thead>
<tr>
<th></th>
<th>All Patients</th>
<th>Responder</th>
<th>Non-Responder</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n=460) (100%)</td>
<td>(n=412) (90%)</td>
<td>(n=48) (10%)</td>
<td></td>
</tr>
<tr>
<td><strong>Age – yr</strong></td>
<td>66 (76-72)</td>
<td>65 (57-72)</td>
<td>65 (50-74)</td>
<td>0.464</td>
</tr>
<tr>
<td><strong>Male gender – no. (%)</strong></td>
<td>350 (70)</td>
<td>310 (75)</td>
<td>40 (83)</td>
<td>0.190</td>
</tr>
<tr>
<td><strong>Risk factors – no. (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>299 (65)</td>
<td>268 (65)</td>
<td>31 (68)</td>
<td>0.868</td>
</tr>
<tr>
<td>Hypercholesterolemia</td>
<td>287 (63)</td>
<td>253 (61)</td>
<td>34 (72)</td>
<td>0.142</td>
</tr>
<tr>
<td>Diabetes</td>
<td>82 (18)</td>
<td>73 (18)</td>
<td>9 (19)</td>
<td>0.803</td>
</tr>
<tr>
<td>Current smoking</td>
<td>76 (17)</td>
<td>67 (16)</td>
<td>9 (19)</td>
<td>0.560</td>
</tr>
<tr>
<td>History of smoking</td>
<td>102 (25)</td>
<td>146 (35)</td>
<td>16 (34)</td>
<td>0.764</td>
</tr>
<tr>
<td>Family history of CAD</td>
<td>166 (36)</td>
<td>149 (36)</td>
<td>17 (36)</td>
<td>0.783</td>
</tr>
<tr>
<td><strong>Indication for cardiac rehabilitation – no. (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coronary artery disease</td>
<td>352 (77)</td>
<td>312 (76)</td>
<td>40 (83)</td>
<td>0.365</td>
</tr>
<tr>
<td>Valvulopathy, surgically treated</td>
<td>57 (12)</td>
<td>56 (14)</td>
<td>1 (2)</td>
<td>0.033</td>
</tr>
<tr>
<td>Congestive heart failure</td>
<td>39 (8)</td>
<td>32 (8)</td>
<td>6 (13)</td>
<td>0.367</td>
</tr>
<tr>
<td>Functional symptoms</td>
<td>13 (3)</td>
<td>12 (3)</td>
<td>1 (2)</td>
<td>0.949</td>
</tr>
<tr>
<td><strong>Scheduling of cardiac rehabilitation – days</strong></td>
<td></td>
<td></td>
<td></td>
<td>0.040</td>
</tr>
<tr>
<td>Days between event and cardiac rehabilitation</td>
<td>14 (11-21)</td>
<td>14 (11-21)</td>
<td>19 (11-30)</td>
<td>0.040</td>
</tr>
<tr>
<td>Days between discharge and cardiac rehabilitation</td>
<td>9 (5-16)</td>
<td>8 (5-14)</td>
<td>14 (9-26)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Days at hospital</td>
<td>5 (2-8)</td>
<td>6 (2-8)</td>
<td>2 (6)</td>
<td>0.007</td>
</tr>
<tr>
<td>Days at rehabilitation programme</td>
<td>23 (21-24)</td>
<td>23 (21-24)</td>
<td>22 (21-23)</td>
<td>0.101</td>
</tr>
<tr>
<td><strong>Performance Parameters</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LVEF before Rehab - %</td>
<td>56 (48-60)</td>
<td>56 (48-60)</td>
<td>56 (45-63)</td>
<td>0.664</td>
</tr>
<tr>
<td>LVEF after Rehab - %</td>
<td>58 (50-60)</td>
<td>60 (50-60)</td>
<td>50 (40-55)</td>
<td>0.17</td>
</tr>
<tr>
<td>Change in LVEF - %</td>
<td>+5 (0-10)</td>
<td>+5 (0-10)</td>
<td>0 (-1-0)</td>
<td>0.001</td>
</tr>
<tr>
<td>Ergometry Performance before Rehab - % expected Watts</td>
<td>68 (56-83)</td>
<td>67 (55-82)</td>
<td>77 (64-93)</td>
<td>0.003</td>
</tr>
<tr>
<td>Ergometry Performance after Rehab - % expected Watts</td>
<td>101 (7-113)</td>
<td>102 (89-114)</td>
<td>80 (72-99)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Change in Ergometry Performance - % expected Watts</td>
<td>30 (18-42)</td>
<td>31 (21-43)</td>
<td>4 (-1-7)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
Conclusion: Even though the vast majority of patients profit from CR, the prediction of good or poor response is difficult and limited. Impaired physical performance before the CR seems to be a strong independent predictor for good response to an ambulatory CR.

Disclosure of Interest: None declared

P067

Impact of a hospital-based intensive multidimensional educational program early after acute coronary syndromes

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Introduction: Medical societies recommend the development of national programmes to improve secondary prevention in patients with acute coronary syndromes (ACS). We tested the impact of a hospital-based intensive multidimensional educational program (ELIPS) used as add-on to the recommended process of care (standard care) for patients hospitalized with ACS.
**Method:** The ELIPS (multi-dimensionaL prevention Program after acute coronary Syndrome) programme was implemented in 4 main academic hospitals in Switzerland. The ELIPS intervention comprises a number of actions added to standard care and coordinated by designated leaders at each hospital: (1) a patient-centered educational program making use of interactive tools (film, discharge card, informational cards, website, wall chart for motivational interviewing [MI] sessions); (2) training courses for care-providers on MI and cardiovascular health education. In a before-after prospective design, we compared the standard care group (2009-2010) to the ELIPS group (2011-2012) for 1-year adherence to evidence-based therapies (aspirin, beta-blockers, statins, angiotensin-converting enzyme [ACE] inhibitors or angiotensin-receptor blockers [ARB]), attendance to cardiac rehabilitation (CR) and achievement of recommended targets of cardiovascular risk factors (CVRF), adjusting for differences in baseline characteristics.

**Results:** Overall 2732 patients were included, 1335 in the standard care group, and 1397 in the ELIPS group. Mean age of patients (61 vs 64 years), no differences were found in evidence-based therapy at discharge. A greater proportion of ELIPS patients attended to a CR program (73.3% vs 66.3%, p=0.02) compared to the standard group. At 1-year, the use of beta-blockers was higher in the ELIPS group (80.0% vs 75.4%, p=0.01), with similar use of aspirin (97.5% vs 96.8%), statins (92.0% vs 94.2%) and ACE inhibitors/ARB (81.4% vs 80.6%) in the two groups. 1-year control of LDL-C < 100 mg/dl was significantly better in the ELIPS group (74.1% vs 69.4%, p=0.01). No significant differences were observed for other CVRF targets.

**Conclusion:** The implementation of a hospital-based intensive multidimensional educational program early after an ACS (phase I of CR) improved attendance to CR (phase II of CR) and had the potential to improve long-term adherence to secondary preventive targets. Early in-hospital educational initiatives should be systematically implemented and covered by hospital payment system.

**Disclosure of Interest:** None declared

**P068**

**How can we improve attendance to cardiac rehabilitation after an acute coronary syndrome? A multifaceted intervention in Geneva**

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Cardiology, HUG, Genève, Switzerland

**Introduction:** Cardiac rehabilitation (CR) is strongly recommended after an acute coronary syndrome (ACS), but underused in clinical practice. Few studies assessed interventions to improve the accessibility and attractiveness of CR programs in Switzerland.

**Method:** We designed a multifaceted intervention for patients admitted after an ACS at the Geneva University Hospital, which consisted in 3 main areas of focus: (1) to fix systematic early appointment to CR within 7 days after hospital discharge, (2) to offer to all patients free bus passes for Geneva City's transport network during outpatient CR, and (3) to incorporate novel and more stimulating physical activities in the CR program, such as riding electric bicycles, nordic walking and urban training. We compared two main outcomes based on medical records: (1) the CR referral time from hospital discharge to start of the CR program and (2) the number of patients who attended the CR program before (June-December 2012) and after (June-December 2013) the intervention. We also assessed the natural evolution before the intervention using data from 2010 and 2011.

**Results:** Before the intervention, the mean CR referral time gradually increased from 18 days in 2010 to 28 days in 2013 (before June 2013). During same period, the number of participants to our CR program progressively increased by 15.5% each year. After the implementation of the intervention (from June 2013), we observed a significant decrease of the CR referral time to 9.3 days and a significant improvement of 35% of the number of CR participants (130 in June-December 2013 compared to 96 in June-December 2012). (Figure) 2/3 participants received a free bus pass at the start of the program, while others had already an available pass. No participants refused this offer.
Conclusion: Our intervention decreased successfully the CR referral time and increased CR attendance ensuring a continuum and coherence in the process of care of patients with ACS. This multifaceted approach might be cost-effective and should be evaluated in other settings.

Disclosure of Interest: None declared

P069

Effects of cardiac rehabilitation on ventricular repolarisation in patients with coronary artery disease and the impact of diabetes mellitus. First experience in an emergent country

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Centre de Réadaptation Cardiaque de Tunis, Ben Arous, Tunisia

Introduction: Coronary artery disease (CAD) may be responsible for malignant ventricular arrhythmias and sudden cardiac death. Diabetes mellitus may be associated with abnormal ventricular repolarization. Cardiac rehabilitation has demonstrated reduction in major cardiovascular events and CAD mortality.

Method: Sixty patients with CAD, were prospectively studied (mean age 60.5 ± 9.6 years, 83% male, diabetes mellitus 40%, ejection fraction 50 ± 11%). Corrected indexes of ventricular repolarization (QTc, JTc) and their dispersion (QTcd, JTcd) in a surface 12-lead electrocardiogram (ECG) were manually assessed, before and after cardiac rehabilitation and exercise training program.

Results: A significant increase in the measured METs after the training period (+ 29.3 %, p=0.028) was observed. There were decreases in QTc, JTc, QTcd and JTcd after completion of the cardiac rehabilitation and exercise training program (respectively -3%, -7.1%, -17.5% and -9.5%). The decrease was only statistically significant in QTc (p=0.04). These improvements were significantly correlate with diabetes mellitus (p<0.001 for all indexes).

Conclusion: Prevention of fatal arrhythmias remains one the important aim of the treatment and the follow-up of patients with CAD. Cardiac rehabilitation and exercise training effectively contribute in ventricular repolarization indexes improvement, particularly in diabetic patients.

Disclosure of Interest: None declared
Introduction: Managing complex cardiovascular diseases with increasing amount of evidence-based data requires complementary and unbiased approach to patient. The multi-disciplinary team of experts involved in the decision making process called The Heart Team consist of cardiovascular surgeons, cardiologists and cardiac anesthesiologists and can facilitate choosing the best procedure for the selected patients.

Method: We show in our retrospective study the experience with implementation of the Heart Team meetings on weekly basis, where the optimal procedure would be chosen.

Results: In the period from June 2013 to December 2013 we discussed 165 elective cardiovascular patients during 26 meetings. Out of this amount, in 26 cases the treatment strategy was changed. Among 17 patients with aortic valve stenosis and high operative risk we decided conservative treatment in 5 cases, TAVI in 8 cases, conventional valve replacement in 3 cases and combination of valve replacement, aorto-coronary bypass with atrial ablation in 1 case. From the 5 patients with coronary artery disease and suitability for hybrid treatment we opted for stenting in 1 case and conventional aorto-coronary bypass off-pump in 4 cases. In one patient with high operative risk and complex mitral valve disease we decided to treat conservative. In one 80-year old patient with mitral insufficiency, secondary tricuspid insufficiency and coronary artery disease we decided to perform only mitral valve reconstruction. In one patient with coronary artery disease and status after aortic valve endocarditis we decided to make the bypass with valve replacement because of the valve morphology and in one patient with mitral insufficiency we decided to treat also tricuspid valve.

Conclusion: Our population of the discussed patients with CAD was very limited, mainly to those who were considered by the cardiologists eligible for the coronary revascularization and only few with hybrid approach. The Heart Team implemented in the clinical routine of our hospital has become an important element of the strategy towards better quality of treatment and has proven to be a standard structure in our institution. However, there raises the question if the Heart Team should be involved in decision making for patients with less severe CAD from one hand and high risk, complex patients from the other hand, so that conservative therapy could be weighed as a treatment option.

Disclosure of Interest: None declared

Predictors for impaired quality of life in chronic heart disease following an ambulatory cardiac rehabilitation program

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1Cardiology; 2Cardiac Surgery, University Hospital, Basel; 3Herzpraxis Birseck, Arlesheim, Switzerland

Introduction: Patients with chronic heart disease are known to be at higher risk for limited quality of life (QoL). However, predictors for good and impaired QoL in patients undergoing an ambulatory cardiac rehabilitation (CR) program are largely unknown.

Method: In a prospective single-centre cohort study including 274 patients (209 with coronary artery disease (CAD), 32 after valve-surgery, 26 with congestive heart failure (CHF), and 6 with functional heart complaints), QoL was determined by the MacNew Heart Disease Health-related QoL (MacNew) Questionnaire 1 year after completion of a 7-9-week comprehensive outpatient CR program. Global score ranged from 1-9 (higher scores indicating better QoL). Relevant impairment in QoL was defined as a score of less than 5.5 points in the MacNew.

Results: Of all 274 patients, 249 (80%) reported good QoL 1 year after CR with a median global MacNew Score of 6.3, while 54 (20%) patients reported impaired QoL with a median MacNew Score of 4.6 (p<0.001 for comparison). Overall, the distribution of baseline characteristics including traditional cardiovascular risk factors and left ventricular ejection fraction (LVEF) before and after CR was highly comparable between patients with good and impaired QoL (Table 1). Only physical activity measured by ergometry (% of expected Watts) after the CR was significantly reduced in patients with impaired QoL as compared to patients with good QoL (100% vs. 103% of expected Watts, p=0.042). In a univariate binary logistic regression analysis, surgically treated valvulopathies as indication for CR (OR 0.491, p=0.088) and physical performance after the CR (OR 1.022, p=0.013) remained an independent, direct predictor whereas physical performance after the CR (OR 1.022, p=0.013) remained an independent, inverse predictor.
<table>
<thead>
<tr>
<th>Table 1</th>
<th>Baseline Characteristics of all Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All Patients n=274 (100%)</td>
</tr>
<tr>
<td>Age - yr</td>
<td>66 (59-72)</td>
</tr>
<tr>
<td>Male gender – no. (%)</td>
<td>210 (77)</td>
</tr>
<tr>
<td>Risk factors – no. (%)</td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>168 (66)</td>
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<tr>
<td>Hypercholesterolemia</td>
<td>151 (60)</td>
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<tr>
<td>Diabetes</td>
<td>45 (18)</td>
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<tr>
<td>Current smoking</td>
<td>39 (15)</td>
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<tr>
<td>History of smoking</td>
<td>95 (38)</td>
</tr>
<tr>
<td>Family history of CAD</td>
<td>89 (35)</td>
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<tr>
<td>Indication for cardiac rehabilitation – no. (%)</td>
<td></td>
</tr>
<tr>
<td>Coronary artery disease</td>
<td>209 (77)</td>
</tr>
<tr>
<td>Valvulopathy, surgically treated</td>
<td>32 (12)</td>
</tr>
<tr>
<td>Congestive heart failure</td>
<td>26 (9)</td>
</tr>
<tr>
<td>Functional symptoms</td>
<td>6 (2)</td>
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<tr>
<td>Performance Parameters – median (IQR)</td>
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<tr>
<td>LVEF before Rehab - %</td>
<td>55 (48-60)</td>
</tr>
<tr>
<td>LVEF after Rehab - %</td>
<td>55 (50-60)</td>
</tr>
<tr>
<td>Change in LVEF - %</td>
<td>1 (0-10)</td>
</tr>
<tr>
<td>Ergometry Performance before Rehab - % expected Watts</td>
<td>69 (59-84)</td>
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<td>Ergometry Performance after Rehab - % expected Watts</td>
<td>103 (90-113)</td>
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<td>Change in Ergometry Performance - % expected Watts</td>
<td>31 (19-43)</td>
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<td>MacNew Heart Disease Health-related Quality of Life – range 1 to 7</td>
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<tr>
<td>Global Scale – median [IQR]</td>
<td>6.1 [5.7-6.7]</td>
</tr>
<tr>
<td>Emotional Scale – median [IQR]</td>
<td>6.2 [5.3-6.4]</td>
</tr>
<tr>
<td>Social Scale – median [IQR]</td>
<td>6.5 [5.9-6.9]</td>
</tr>
<tr>
<td>Physical Scale - median [IQR]</td>
<td>6.0 [5.2-6.4]</td>
</tr>
</tbody>
</table>
Conclusion: Overall, the prediction of good or impaired QoL 1 year after ambulatory CR is difficult and seems to vary widely between individuals. However, patients undergoing CR after surgically treated valvulopathies as well as maximal physical performance measured by the ergometer after the CR seem to predict best QoL 1 year after CR.

Disclosure of Interest: None declared

Table 2: Univariate Predictors for Successful Response to Cardiac Rehabilitation

<table>
<thead>
<tr>
<th>Variables</th>
<th>Univariate Analysis</th>
<th>Multivariate Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td>p-value</td>
</tr>
<tr>
<td>Age – yr</td>
<td>0.969</td>
<td>0.057</td>
</tr>
<tr>
<td>Male gender</td>
<td>1.342</td>
<td>0.393</td>
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<tr>
<td><strong>Risk factors</strong></td>
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<tr>
<td>Hypertension</td>
<td>1.023</td>
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<tr>
<td>Hypercholesterolemia</td>
<td>0.797</td>
<td>0.488</td>
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<tr>
<td>Diabetes</td>
<td>0.988</td>
<td>0.976</td>
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<tr>
<td>Current smoking</td>
<td>1.156</td>
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<tr>
<td>History of smoking</td>
<td>1.221</td>
<td>0.547</td>
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<tr>
<td>Family history of CAD</td>
<td>1.717</td>
<td>0.126</td>
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<tr>
<td><strong>Indication for cardiac rehabilitation</strong></td>
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<tr>
<td>Coronary artery disease</td>
<td>1.183</td>
<td>0.631</td>
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<tr>
<td>Valvulopathy, surgically treated</td>
<td>0.491</td>
<td>0.088</td>
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<tr>
<td>Congestive heart failure</td>
<td>1.396</td>
<td>0.556</td>
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<td>Functional symptoms</td>
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<td>n.a.</td>
</tr>
<tr>
<td><strong>Scheduling of cardiac rehabilitation</strong></td>
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<tr>
<td>Days between event and cardiac rehabilitation</td>
<td>0.987</td>
<td>0.131</td>
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<tr>
<td>Days between discharge and cardiac rehabilitation</td>
<td>0.985</td>
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<td>Days at hospital</td>
<td>0.997</td>
<td>0.881</td>
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<td>Days attending rehabilitation program</td>
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<td>0.988</td>
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<td><strong>Performance Parameters before and after cardiac rehabilitation</strong></td>
<td></td>
<td></td>
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<tr>
<td>LVEF before Rehab - %</td>
<td>0.987</td>
<td>0.546</td>
</tr>
<tr>
<td>LVEF after Rehab - %</td>
<td>0.944</td>
<td>0.142</td>
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<tr>
<td>Change in LVEF - %</td>
<td>0.988</td>
<td>0.816</td>
</tr>
<tr>
<td>Ergometry Performance before Rehab - % expected Watt</td>
<td>1.013</td>
<td>0.146</td>
</tr>
<tr>
<td>Ergometry Performance after Rehab - % expected Watt</td>
<td>1.020</td>
<td>0.018</td>
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<tr>
<td>Change in Ergometry Performance after Rehab - % expected Watt</td>
<td>1.014</td>
<td>0.160</td>
</tr>
</tbody>
</table>
Parameters influencing the three-dimensional proximal isovelocity surface area: A simulation
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Introduction: The direct measurement of three-dimensional (3-D) proximal isovelocity surface area (PISA) using 3-D color Doppler echocardiography for assessing mitral regurgitation (MR) is a promising method. No geometrical assumption for the PISA shape is needed. However, real 3-D PISA cannot be measured, because color Doppler only depicts the projection of the velocity vectors on the ultrasound beam and "sees" iso-Doppler-shift surfaces and not isovelocity surfaces (fig. 1).

Method: Assuming hemispherical 3-D PISA and using a geometrical model (fig. 2), we calculated the angle (β) of the velocity vector projecting on the ultrasound beam for each ultrasound reflector converging to the regurgitant orifice (RO). Beta depends on the distance between the RO and the transducer (d), on the distance between the RO and the reflector (r), on the sector angle of the ultrasound beam (α) and on the imaging modality (TTE vs. TEE). For a given Nyquist limit and a given regurgitant flow rate Qr, all the reflectors present on a 3-D iso-Doppler surface must have a velocity compatible with following equations: V x cos(β) = Nyquist limit and V = Qr/(2πr²). Using these formulae and customized software, 3-D iso-Doppler surfaces for different Nyquist limits and Qr were simulated for both imaging modality (fig. 1).

Results: The 3-D iso-Doppler surface underestimates the 3-D PISA. For a constant Nyquist limit, when Qr changes from 10 to 300ml/s, the underestimation decreases from 30 to 20% using TEE, and gets larger from 33 to 36% by TTE. For a constant Qr, when the Nyquist limit increases from 10 to 40cm/s, the underestimation becomes bigger from 21 to 25% by TEE, and decreases from 38 to 35% by TTE.

Conclusion: True three-dimensional proximal isovelocity surface area, and thus the regurgitant flow rate, is significantly underestimated by the really imaged 3-D iso-Doppler-shift surface.

Disclosure of Interest: None declared
**P073**

**Right ventricular dilatation in patients with tetralogy of fallot and pulmonary regurgitation: Does it depend on type of surgical repair?**

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**Introduction:** Patients who underwent surgical correction for tetralogy of Fallot (TOF) frequently present with pulmonary regurgitation (PR) and right ventricular (RV) dilatation. This study assesses the impact of different surgical techniques with and without transvalvular patch repair on PR and RV dilatation over time.

**Method:** Fifty-one consecutive TOF patients after surgical correction but without RV outflow tract or pulmonary artery stenosis and no further RV outflow tract intervention underwent two cardiac magnetic resonance (CMR) exams. RV and left ventricular (LV) volumes and pulmonary regurgitation fraction (PR fraction) were measured by CMR.

**Results:** Three groups where compared: transvalvular patch repair (n=22), subvalvular patch repair (n=15) and repair with infundibulectomy and/or pulmonary commissurotomy (n=14). Time between two CMR exams did not differ between groups: 37±20 vs. 37±19 vs. 37±25 months, p=0.998. RV enddiastic volume index (RVEDVI) and PR fraction did not change significantly during follow-up in the whole group: RVEDVI: 118 ± 23 ml/m² vs. 119 ± 23 ml/m², p = 0.684. PR: 32 ± 11% vs. 32 ± 11%, p = 0.772. RVEDVI and change of RVEDVI (ml/m², %) did not differ between groups at last CMR: RVEDVI 122±22 ml/m² vs. 111±23 ml/m² vs. 123±25 ml/m², p=0.301; Change of RVEDVI (ml/m², %): 2.3±16 (2.9±16) vs. -0.8±9.8 (-0.6±9) vs. 0.5±20 (1.9±18), p=0.162 (0.287).

Multivariate linear regression analysis revealed RVEDVI and RV ejection fraction (RVEF) as only parameters significantly and inversely influencing RVEDVI change (%): RVEDVI β = –0.315, p = 0.022; RVEF β = –0.376, p = 0.007. Correlation coefficients: RVEDVI r = 0.31, p = 0.03; RVEF 0.237, p = 0.092.

**Conclusion:** Progression of RV dilatation in patients after TOF repair and pulmonary regurgitation is very slow. Valve sparing repair techniques appear not to preclude from RV dilatation. However patients after subvalvular repair present with less RV dilatation and progression, although this observation was statistically not significant.

**Disclosure of Interest:** None declared

**P074**

**Mechanisms of tricuspid regurgitation in patients with hypoplastic left heart syndrome undergoing tricuspid valvuloplasty**

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**Introduction:** Tricuspid regurgitation (TR) remains a risk factor for morbidity and mortality through staged palliation in patients with hypoplastic left heart syndrome (HLHS). There are limited reports about the mechanisms associated with TR in patients with HLHS. Thus we sought to describe our experience with tricuspid valve (TV) repair in these patients, focusing on the mechanisms of TR and the correspondent surgical techniques.

**Method:** Retrospective single-center review (January 2000-December 2012) of HLHS patients undergoing TV repair and completing a Fontan circulation. We evaluated pre and post-operative echocardiograms, intra-operative findings and surgical techniques utilized.

**Results:** Fifty-three TV repairs were performed in 35 HLHS patients completing staged palliation. TV repair was carried out at stage II in 15 cases, between stage II and III in 4, at stage III in 27 and post-stage III in 7 cases. All patients survived the procedure. Pre-operative echocardiography showed a dilated TV annulus by lateral and AP dimensions (z scores=3.58±1.86 and 3.37±2.15, respectively) and area (z score=5.60±3.00). Preoperative mean TR assessed by lateral and AP vena contracta was 0.46±0.20 and 0.42±0.17 mm, respectively. In 68% of cases (36/53), the predominant jet of TR emanated along the commissure between the anterior-septal (AS) leaflets, the TR was mainly central in 23% (12/53) patients and posterior in 8% (4/53). Surgical techniques for valvuloplasty were AS commissuroplasty in 35/53 cases, relocation of the anterior papillary muscle in 6/53, triple commissuroplasties in 5/53, septal-posterior commissuroplasty in 5/53, and fenestration closure in 2/53 cases. Additionally, 38% (20/53) of cases had an annuloplasty procedure. Postoperative echocardiogram depicted a significant reduction in TV lat and AP dimensions (z scores=0.62±1.92 and 0.34±1.58, respectively) (p<0.0001) and area (z score=0.60±2.06) (p<0.0001). Regurgitation decreased significantly by lateral and AP vena contracta (0.17±0.24 and 0.22±0.24 mm, respectively) (p=0.0022 and 0.0058). TV plasty did not significantly affect RV systolic function (p=0.17).
Conclusion: Tricuspid regurgitation in HLHS patients commonly emanates from the AS commissure. The associated mechanisms are often annular dilation and anterior leaflet prolapse. Closure of the AS commissure and repositioning of the anterior papillary muscle are effective in addressing the regurgitation in this challenging population.

Disclosure of Interest: None declared

P075

Validation of Osirix 3D imaging software for pre-operative TAVI prosthesis sizing
M. Gumsheimer\textsuperscript{1, 1}, H. Most\textsuperscript{1}, St. Stortecky\textsuperscript{2}, B. Gahl\textsuperscript{1}, V. Göber\textsuperscript{3}, S. Reineke\textsuperscript{3}, Th. Carrel\textsuperscript{1}, St. Windecker\textsuperscript{4}, P. M. Wenaweser\textsuperscript{2}, L. Buvellesfeld\textsuperscript{3}, Ch. Huber\textsuperscript{1} on behalf of Abstract für die SGHC "Herzchirurgie"

\textsuperscript{1}Cardiac and Vascular Surgery, \textsuperscript{2}Cardiology, \textsuperscript{3}Inselspital, Bern, Switzerland

Introduction: Study aim was validation of OsiriX (Pixmeo, Geneva, Switzerland) - an image processing application - to measure multi-slice computed tomography (MSCT) derived annulus diameters for pre-procedural transcatheter aortic valve implantation (TAVI) planning. Thus, we assessed differences between OsiriX measurements and standard imaging modalities in aortic annulus dimensions and its clinical relevance by determining the effect on prosthesis selection.

Method: 137 patients (82 ± 6.5 years, 42.3% male, Euroscore 24.1 ± 14.2%) with severe aortic stenosis underwent standard TAVI assessment including transesophageal echocardiography (TEE), angiography and MSCT. Retrospectively, MSCT DICOM datasets were postprocessed using OsiriX. Intra- and inter-observer variability was assessed for perimeter and area derived aortic annulus diameter (pdD and adD). Inter-modality accuracy was verified comparing OsiriX measurements with conventional 2D CT reconstruction (CT\textsubscript{sag}, CT\textsubscript{cor} and CT\textsubscript{mean(sag and cor)}), TEE and angiography, as well as with a different 3D reconstruction processor, 3mensio (3mensio Medical Imaging BV, Bilthoven, The Netherlands). Correlations and Bland-Altman plots were used to assess the accuracy.

Results: Reliability of the novel OsiriX software was validated with inter-observer mean difference of 0.6 ± 1.4 mm for pdD and 0.6 ± 1.5mm for adD and correlation coefficients of 0.87 and 0.86, respectively. Intra-observer comparison revealed no significant differences (-0.1 ± 1.6mm and -0.2 ± 1.8mm, respectively). Correlation of the two MSCT post-processing softwares OsiriX and 3mensio was strong (correlation coefficient 0.84), measurements differed between 0.3 ± 1.5mm for pdD and 0.8 ± 1.5mm for adD. Inter-modality comparison between OsiriX pdD and angiography or CT\textsubscript{cor} showed significantly larger sizing with OsiriX (0.4 ± 2.2mm and 0.6 ± 2.1mm, respectively) and would have led to a change in valve sizing in 48.0% and 42.8% of patients, respectively. Similarly, TEE and CT\textsubscript{sag} underestimated annulus diameter compared to OsiriX pdD and this would have changed prosthesis selection in 53.9% and 56.2%, respectively. OsiriX pdD based sizing agreed with implanted valve size in 55.5% of cases and was larger in 28.5%.

Conclusion: OsiriX measurements allow accurate and reproducible assessment of the aortic annulus. Sizing with OsiriX was comparable to conventional 2D and 3D imaging with a tendency towards larger perimeter. Careful assessment of valve size will take into account multiple imaging modalities.

Disclosure of Interest: M. Gumsheimer: None declared, H. Most: None declared, St. Stortecky: None declared, B. Gahl: None declared, V. Göber: None declared, S. Reineke: None declared, Th. Carrel: None declared, St. Windecker Conflict with: research grants from Edwards Lifesciences, Medtronic, Boston Scientific and St. Jude Medical and speaker fees from Medtronic, Boston Scientific and St. Jude Medical, P. M. Wenaweser Conflict with: proctor for and receives honoraria from Medtronic and Edwards Lifesciences, L. Buvellesfeld Conflict with: consultant and proctor for Medtronic and Edwards Lifesciences, Ch. Huber Conflict with: speaker honoraria and proctor fees from Edwards Lifesciences

P076

Geometric changes of the mitral annulus during systole before and after implantation of a mitraclip
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Introduction: Little is known about changes of the mitral annulus after reconstruction of the valve with a MitraClip.

Method: Real time 3D-transoesophageal echocardiography data were acquired before and immediately after implantation of a MitraClip. Data were analyzed offline using 4D MV-Assessment 2.0 software (TomTec, Germany).

Results: A total of 13 patients with severe (n=9) or moderate to severe (n=4) mitral regurgitation (MR) were studied. Left ventricular ejection fraction was 51 ± 21%, and systolic contraction resulted in an annular displacement of 7.2 ± 3.6 mm. During systole, mitral valve tenting height was reduced from 10.0 to 7.4 mm (p < 0.001).
Consecutively, the mitral valve annulus became larger, mainly in the antero-posterior, but also in the medio-lateral dimension (Figure, top row images). Mitral valve reconstruction was performed with 1 clip in 9 patients, 4 received 2 clips. MR was reduced to trace in 1, mild in 11, and moderate in 1 patient. Reconstruction of the mitral valve resulted in a significant decrease of the AP dimension from 3.21 to 2.96 cm (a relative reduction of 8%, $p < 0.001$, Figure, bottom row images). Mitral valve area was reduced by 7% compared to baseline ($p = 0.08$). Left ventricular ejection fraction was $47 \pm 19\%$ ($p = 0.12$ vs baseline) and average annular displacement was $7.7 \pm 3.1$ mm ($p = 0.46$ vs baseline). Tenting height was 10.6 mm at the beginning of systole and 8.1 mm at the end of systole.

**Conclusion:** During systole, the mitral valve’s tenting height is reduced and the valve becomes larger. Implantation of a MitraClip immediately altered the geometry of the mitral annulus. Antero-posterior, but not medio-lateral, valve dimensions were significantly reduced. Systolic anterior valve motion was preserved, despite a small decrease in global left ventricular ejection fraction.

**Disclosure of Interest:** None declared
Neonatal mitral valve repair: Indications, techniques and mid-term outcomes

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Introduction: Although mitral valve repair is rarely required in neonates, this population is considered to be at high risk for adverse outcomes. The aim of this study was to review the indications for surgery, mechanisms, repair techniques, and mid-term outcomes of neonatal mitral valve repair.

Method: The demographic, procedural and outcome data were obtained for all neonates who underwent mitral valve repair from 2005 to 2012. The primary endpoints included mortality, transplantation and mitral valve reoperation.

Results: Twenty patients were included during the study period. Median age at operation was 11 days (range 3-25). Eleven patients (55%) presented with mitral stenosis, 3 had regurgitation (15%), and 6 had mixed mitral disease (30%). Nineteen of 20 patients had mild or less regurgitation on immediate postoperative imaging. During a median follow-up of 5 months (1 month – 4.8 years), 6 patients died at a median of 33 months (7-41 months) from repair and one patient required orthotopic heart transplantation. Six patients required mitral valve reoperation, 5 for mitral valve re-repair and 1 for mitral valve replacement. Freedom from death, transplantation, or mitral valve replacement was 84.2±8.4% at 1 month, 71.3±11% at 6 months, 64.1±12% at 1 year and 51.3±15% at 2 years, and was worse for patients presenting with mitral regurgitation compared to stenosis or mixed mitral valve disease.

Picture / graph:
Conclusion: Although mitral valve repair can be performed with acceptable immediate postoperative result, this procedure carries a high burden of late death and mitral valve reoperations.

Disclosure of Interest: None declared

P078

Management of coronary artery fistula in childhood
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Introduction: Coronary artery fistula (CAF) is a congenital anomalous connection between the left or right coronary artery and a cardiac chamber or great vessels bypassing the myocardial capillary network. CAF are usually asymptomatic in childhood, nevertheless relevant CAF may need surgical or catheter interventional approaches due to significant left-to-right shunt with ventricular overload, or myocardial ischemia due to coronary steal syndrome.

Method: In a retrospective analysis we evaluated all patients with relevant CAF in our outpatient clinics database concerning hemodynamic significance and treatment approaches.
Results: 35 patients, diagnosed with relevant CAF between 1983 and 2013, were enrolled in the analysis (n=18 male, mean age 3.1 years, mean follow up 2.6 years). Diagnosis was made by two dimensional and color Doppler echocardiography in all cases. In 8 patients (22.9%) CAF was associated to congenital heart disease (CHD). More commonly CFA arose from left coronary artery (70.4%), draining into either right ventricular or right ventricular outflow tract in most cases (91.4%). From 10 patients (28.6%) who needed treatment of CAF due to hemodynamic relevance, 6 (60%, 0-14 years, 3.8-68 kg) were closed by catheter interventional approach using detachable coil in 3, Amplatzer vascular plug in 2, and Amplatzer Duct Occluder in 1. In 1 of these patients, open heart surgery was necessary due to complications after catheter interventional closure (1 dislocation of occluder after 7 days). 4 patients were treated with primary surgical approach. Those patients who needed intervention had a mean follow up in our hospital of 4 years. In this analysis we focused on patients with catheter interventional CAF closure.

Conclusion: Diagnosis of CAF can be made by two dimensional and color Doppler echocardiography. Diagnosis is often an incidental finding and intervention is rarely needed in childhood. Treatment options include surgical or catheter interventional approaches. In hemodynamic relevant CFA catheter interventional closure of the fistula is possible even in newborns. Although catheter interventional closure is possible in several cases and is considered the treatment of choice when available, our data outlines the limitation of this treatment.

Disclosure of Interest: None declared

P079

Transcatheter closure of large atrial septal defects is effective and safe
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Introduction: Transcatheter atrial septal defect (ASD) closure is well established. However, uncertainty remains about the safety of implanting large devices (diameter >25mm). The aim of this study was to investigate the effectiveness and safety of ASD closure in patients (pts) requiring large devices compared to closure of small defects.

Method: 112 consecutive pts (mean age 49.7±1.5 years) undergoing transcatheter ASD closure was enrolled in a single-center prospective registry. Data was collected at baseline and at six months follow-up.

Results: 42 pts (38%) received a large closure device. Invasive hemodynamics in pts with large ASD revealed greater left-to-right shunt (54.7±3.0% vs. 35.4±2.9%, p<0.0001), and higher pulmonary artery systolic pressure (37.2±2.2 vs. 30.9±2.1 mmHg, p<0.05) compared to pts with small ASD. Transcatheter ASD closure (using predominantly Amplatzer® devices) was equally successful in pts receiving large or small devices (93% vs. 99%, p=0.15), with repeated closure necessary in 3 pts with large and 2 pts with small ASD (p=0.36). Procedure-related complications were minor and equally distributed between groups (Table). At six months follow-up, ASD closure significantly improved dyspnea. The number of pts in NYHA class I increased from 62% to 94% and from 57% to 90% following implantation of large and small devices, respectively (p<0.001), with no difference between groups. Echocardiography revealed a similar rate of residual shunts following ASD closure with large and small devices (27% vs. 16%, p=0.20), with hemodynamic significance in only one patient of each group (p=1.0). Adverse events were rare and did not significantly differ between groups (Table). One patient with large ASD died of a cause unrelated to the closure procedure (p=0.37).

<table>
<thead>
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<th>Procedure-related Complications</th>
<th>Large Devices (n=42)</th>
<th>Small Devices (n=70)</th>
<th>P Value</th>
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<tbody>
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<td>Arrhythmia</td>
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<td>2</td>
<td>0.63</td>
</tr>
<tr>
<td>Bleeding</td>
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<td>3</td>
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</tr>
<tr>
<td>AV-Fistula</td>
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<td>1</td>
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<tr>
<td>Device Embolization</td>
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<td>0</td>
<td>0.38</td>
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</table>

<table>
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<tr>
<th>Adverse Events at 6 Months Follow-up</th>
<th>Large Devices (n=39)</th>
<th>Small Devices (n=66)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Atrial Fibrillation</td>
<td>3</td>
<td>1</td>
<td>0.14</td>
</tr>
<tr>
<td>Device Fracture</td>
<td>1 (Solysafe®)</td>
<td>0</td>
<td>0.37</td>
</tr>
<tr>
<td>Atrial Perforation</td>
<td>0</td>
<td>0</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Conclusion: Transcatheter ASD closure using large or small devices is equally effective and safe with similar complication rates during implantation and medium-term follow-up at six months.

Disclosure of Interest: None declared
Outcomes using the On-X mechanical heart valve in patients with congenital heart disease

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Introduction: The On-X prosthetic heart valve is a bi-leaflet valve made of pyrolytic carbon providing a unique surface with improved biocompatibility. Following FDA approval in 2002, there have been reports in patients with acquired heart valve disease showing acceptable results after implantation. However, in patients with congenital heart disease (CHD) the data remains limited using the On-X heart valve with or without the use of Coumadin.

Method: Forty patients underwent aortic valve replacement (AVR) with an On-X mechanical heart valve between 12/2004 and 02/2013 at Boston Children’s Hospital. The median age was 19 years (range 6-51) and the median number of previous operations was 1 (range 0-5). The patients had the following diagnosis: congenital AS (n=20), conotruncal (n=11), Shones (n=2) and other (n=7). The median valve size implanted was 23 mm (range 19-29). All patients were treated with Coumadin with a goal INR of 2.0-3.0 ± aspirin. Events were defined as structural valve failure, thrombosis, embolism, bleeding, re-operation and death.

Results: The median follow-up after implant was 26 months (range 0-97 months). There was no evidence of structural valve failure or deterioration. No patients had greater than mild AR and one patient had moderate AS. No patients had evidence of valve thrombosis, embolism or other bleeding complications. There was 100% freedom from valve re-operation at latest follow-up. Survival was 98% at 1, 5 and 8 years.

Conclusion: Mid-term durability is acceptable in patients with CHD undergoing AVR with the On-X heart valve. Complications related to thrombosis, embolism and bleeding were rare when anticoagulated with coumadin. Based on this early limited experience in patients with CHD, the On-X mechanical heart valve appears to be an acceptable alternative with the theoretical advantage of the need for less aggressive anticoagulation. However, further evaluation and longer-term follow-up is necessary.

Disclosure of Interest: None declared

Speckle tracking in the clinical practice. Results and analysis of its impact in 500 consecutive patients undergoing transthoracic echocardiography

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Introduction: Two-dimensional speckle tracking echocardiography (2DSTE) has been recommended as a helpful tool especially to diagnose coronary artery disease and to assess myocardial function in cardiomyopathies, valvular or congenital heart disease. A GLS value of >16-18% has been quoted as the normal cut-off. However, little is known about its performance in daily practice.

Method: Between Oct 1, 2013 and Dec 31, 2014; in 406 consecutive patients (pts) undergoing transthoracic echocardiography, 2DST was attempted from the 3 apical views (resulting in average global longitudinal strain GLS values). All diagnoses, echocardiographic parameters and image quality (excellent, average, bad) were prospectively collected and analyzed. All studies were done with the GE Vingmed System E9 4D BT12 and analyzed during the study (or offline for interobserver variability on the Echopac system).

Results: The mean age was 64±16 years; body mass index 25.4±4.8kg/m2. The average ejection fraction (EF) was 57±10%; regional wall motion abnormalities (RWMA) were present in 129 pts (32%), left ventricular hypertrophy (LVH) in 80 pts (20%), abnormal diastolic function (DF) in 158 of 349 pts (45%). It was possible to do 2DSTE in 378 pts (93%). Interobserver variability was acceptable in good and average image quality, only. The most important reasons for inability to do 2DSTE was echocohality (p<0.0001), a higher body mass index (p=0.002). In patients with severely diminished echocohality, GLS could only be done in 65%. The average GLS was -16.7±5.9% (in patients with excellent image quality -18±6% versus -16±5% in those with bad image quality, p<0.0001). An echocardiographic exam with a normal left ventricle was found in 132 pts (without DF in 113 pts). A GLS of <16% was present in 122 pts (32%) and of <18% in 188 pts. (50%). Table: number of patients (no.), unless otherwise indicated.
Conclusion: Assessment of GLS by 2DSTE is feasible in most patients. Feasibility and interobserver variability are critically dependent from image quality. A cut-off value greater -18% or -16% may not reasonable as many seemingly abnormal, puzzling results can occur – especially in the presence of diminished image quality and diastolic dysfunction. For every day practice, a cut-off of average GLS of -14% would be advisable.

Disclosure of Interest: None declared

P082

Modified trans-septal repair for total anomalous pulmonary venous connection repair in all age groups

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Introduction: Little data is available in later presenting children with unobstructed totally anomalous pulmonary venous connection. The transeptal approach to the pulmonary veins has previously been described for TAPVC repair in neonates requiring deep hypothermic circulatory arrest. Little data is available on using this technique in older children, and avoiding circulatory arrest. We report our experience over the past 11 years using a modified transatrial technique in children of all ages.

Method: Eleven consecutive patients (3 females) who underwent modified transatrial direct anastomosis repair of TAPVC between 2001 and 2012 were included in the present study. The median age at repair was 6.5 months (range 7 days – 7.1 years). Eight patients had supracardiac TAPVC, 2 had infracardiac, and 1 had mixed TAPVC. None were obstructed. All patients operated using the modified transeptal approach is reported herein. The primary endpoint was early mortality; secondary endpoints were hospital length of stay and reinterventions for pulmonary venous stenosis. Echocardiographic follow-up was performed in all patients from 2001 to 2012.

Results: All procedures were carried out at normothermia, without having to resort to deep hypothermic circulatory arrest. The median aortic cross-clamp time was 37 minutes (range 25-50 minutes). Early post-operative echocardiogram showed widely patent pulmonary venous anastomosis without stenosis in all patients. During a median follow-up of 8.7 years (range 3-11.7 years), no patient developed stenosis of the pulmonary venous anastomosis and no patient required a reintervention or reoperation. All patients were in normal sinus rhythm and none presented atrial tachyarrhythmias at late follow-up.

Conclusion: This modified transeptal approach for TAPVC repair appears safe and effective, minimizing distortion and tension on the anastomosis, and provides excellent outcomes even in patients with late referral or access to surgical repair.

Disclosure of Interest: None declared
Skill-grade-mix model for a pediatric cardiac and cardiosurgical intensive care unit

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Introduction: New staffing models, such as the introduction of skill and grade mix, arise initially as a result of the fast changing and developing progress in medical care, and/or out of a persisting or emerging long-term manpower shortage. Some national and international hospitals have shown that it is possible to introduce skill and grade mix even in highly specialized units such as a pediatric cardiac and cardiosurgical intensive care units. These new staffing models must fit and reflect the characteristics of the particular units.

Method: This requires a thorough a literature review, an analysis of the patient population, the level of nursing and medical care provided, as well as a differentiated examination of the current situation, in order to effectively plan the future distribution of tasks, skills and roles.

Results: This breakdown of the tasks, skills and rolls should be accompanied by educational programs to train personnel in all professional categories. Prior to the introduction of this new model, the evaluation criteria have to be defined. No specific criteria exist at present although there are various recommendations. In order to achieve a successful implementation of the skill and grade mix model, it is beneficial to invite all of the involved professional groups to participate in the discussions early on in the planning stages and ensure that their wishes and concerns are heard and considered. If not, it will be difficult to achieve an acceptance and support in the clinical practice. When defining the changes in skills required and responsibilities, autonomous areas of responsibility should be in the foreground in order to preserve work satisfaction, safety and quality.

Conclusion: Nevertheless, change and a new delegation of responsibilities will initially result in opposition and anxiety. This is an important area that must be approached with care and tactfulness by the nursing managers during the preparatory phase. Only when the employees feel that their needs and concerns are taken seriously will a team spirit arise that enables the successful implementation of a skill and grade mix model.

Disclosure of Interest: None declared
Poster Session 7
Clinical cases (All clinical cases have to be submitted in this topic)

**P084**

**Severe hypertrophic cardiopathy secondary to conn syndrom**

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**Introduction:** An obese 46-year old patient known for arterial hypertension for several years was addressed to our ambulatory heart failure clinic for hypertrophic cardiopathy of undetermined origin associated with NYHA functional class III. His medical history was noteworthy for two emergency admission for blood pressure of 180/100mmHg with sudden weakness, dizziness and atypical chest pain. The ECG showed lateral T wave inversion, the blood test marked a mild hypokalemia, the echocardiogram revealed a severe concentric hypertrophy of the left ventricle (LV) motivating enlargement of the present antihypertensive treatment (irbesartan/hydrochlorothiazide + amlopidine) by spironolactone. Despite of well-conducted anti-hypertensive treatment as documented by 24h blood pressure monitoring, severe LV hypertrophy persisted. In the absence of clinical signs of long-standing arterial hypertension (only mild renal insufficiency, only moderate hypertensive retinopathy), a hypertrophic cardiomyopathy was suspected. A cardiac MRI excluded cardiac amyloidosis and showed a diffuse late gadolinium enhancement that was more pronounced at the apex and in the lateral and infero-lateral walls, compatible with hypertrophic cardiomyopathy.

**Method:** A primary hyperaldosteronism was suspected because of persistent mild hypokalemia despite of angiotensin II receptor and mineralocorticoid receptor antagonism. The plasma renin activity was diminished (0.13 ng/ml/h; N: 0.2-2.8 ng/ml/h) in the presence of elevated plasma (402 pg/ml; N: 42-202 pg/ml) and urinary (32.9 µg /24h) aldosterone. Since abdominal CT-scan did not show adrenal adenoma, selective adrenal vein catheterization was executed confirming right-sided aldosterone secretion (aldosterone/cortisol lateralization ratio 10 times higher on the right side). Laparoscopic right adrenalectomy was performed and histopathology showed corticoadrenal nodular hyperplasia.

**Results:** However, after adrenalectomy the patient still needs antihypertensive treatment for moderate arterial hypertension likely due to obesity (BMI 37 kg/ m\(^2\)). Nevertheless, cardiac MRI one year after intervention showed an impressive regression of LV remodelling (LV mass/LV end-diastolic volume) from 1.69 to 1.03g/ml (normal <1.0g/ml), while LV mass was still slightly increased (93g/m\(^2\), normal <78g/m\(^2\)) compatible with the postoperatively normalized serum aldosterone levels.

**Conclusion:** This suggests that cardiac hypertrophy was at least in part secondary to long-standing primary hyperaldosteronism.

**Disclosure of Interest:** None declared

**P085**

**Melody valve implantation in mitral valve position**

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**Introduction:** Children suffering from left atrioventricular valve disease not amenable to repair represent a significant challenge. While mitral regurgitation presents some options to reconstruct the valve because of the associated annular dilatation, mitral stenosis in a child presenting early in life allows limited room for repair.

We describe the implantation of a Melody valve in mitral (left AV) valve position in a child suffering from left AV valve (LAVV) stenosis.

**Method:** A 2.5- year-old boy was admitted with a severe LAVV stenosis nearly 2 years after a satisfactory correction of a complete AV canal defect. Echocardiography showed a small LAVV annulus, with thickened anterior leaflet, as well as juxtaposed papillary muscles and subvalvular crowding. The stenosis of the LAVV became apparent in the course of a cardiorespiratory decompensation that coincided with the diagnosis of acute myeloid leukemia. The LAVV was accessed transseptally. The incision across the anterioseptal tricuspid valve commissure was extended across the VSD patch. A generous sized xenopericardial patch to enlarge the left atrium.
**Results:** Intraoperative echocardiography showed a good result with a minimal central jet and a mean gradient of 5 mmHg. There was no obstruction to the pulmonary venous flow. In the subsequent course during the 1st postoperative week, the LVOT gradient stabilized to <20 mm Hg.

**Conclusion:** This case describes the successful implantation of the Melody valve in LAVV position in a high-risk patient. The technique of implantation is relatively simple and the immediate postoperative result very good. However, a larger experience and longer follow-up is needed to answer questions about potential risks and complications.

**Disclosure of Interest:** None declared

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**P086**

**Successful surgical treatment of effusive - constrictive pericarditis in a 67-years-old man**

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**Introduction:** Effusive-constrictive pericarditis (ECP) is an uncommon pericardial disease characterized by both tamponade, due to pericardial effusion (PE), and constriction, due to visceral pericardium. It may be missed in patient presenting with cardiac tamponade.

**Method:** A 67 years old man affected by moderate mitral regurgitation (MR) due to valve prolapse was admitted at the emergency room (ER) because of progressive NYHA III class dyspnea during previous three weeks with suspected cord rupture. Ankle swelling, pleural effusion, ascitis, and 4/6 systolic murmur were present. Furthermore evident jugular venous pressure at 45° and Kussmaul’s sign disclosed high central venous pressure (CVP) and acute right heart failure (ArHF). Thoracic X-ray confirmed bilateral pleural effusion, ECG showed low voltage and transthoracic echocardiography (TE) revealed a moderate diffuse PE with some fibrin, mild hyperechoic pericardium and paradoxic septal shift with inspiration (Fig 1); severe MR due to rupture of posterior leaflet cord was confirmed. ArHF therapy was administrated. No history or clinical evidence of trauma, thoracic surgery, radiation, tumor, coagulopathies, tuberculosis and recent infections were present. Thus pericardiocentesis (170 ml essudate) and biopsies were performed with partial patient relieve. Subsequent microbiological cultures and biopsies resulted negative. Suspecting ECP a cardiac MRI (CMR) was performed showing persistent mild PE, early diastolic septal notch, ventricular septal shift with inspiration and diffuse 12 mm thickening of visceral and parietal pericardium (Fig. 2). Right heart catheterization demonstrated high CVP, equilibration of ventricular diastolic pressures and dip-plateau waveform, thus diagnosing idiopathic ECP. Four weeks later the patient was admitted to the ER because ArHF recurrence. Constrictive findings without increasing PE and MR were present.

**Results:** Therefore the patient underwent pericardectomy from median sternal approach. A 4-6mm thickened, non calcified pericardium was easily removed without haemorrhagic PE and post-operative complications. One year follow-up showed complete clinical relieve. On echocardiography and CMR no signs of ECP apart from small residual pericardium in the atrio-ventricular groove and moderate MR were still present.

**Picture / graph:**

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![Figure 1.](image-url) Diffuse Pericardial effusion; Thickened parietal pericardium; Paroxismal ventricular septum shift

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Conclusion: Despite typical feature of decompensated ECP, thank to early diagnosis a successive surgical treatment without myocardial sequel were possible.

Disclosure of Interest: None declared
Renal infarction after migration of an atrial septal defect occlusion device
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Introduction: We present the case of a patient who suffered from renal infarction after migration of an atrial septal defect (ASD) occlusion device.

Method: Clinical assessment and multi-modality imaging.

Results: A 23-year old male with Ebstein’s anomaly underwent percutaneous closure of a large ostium secundum atrial septal defect (ASD). A few hours after the procedure, the patient complained of abdominal pain. The clinical exam was normal, without any sign of vascular access complication. Transthoracic echocardiography showed the absence of the ASD occlusion device at the level of the atrial septum. The patient was taken to the catheterisation laboratory, and the ASD occlusion device was located in the abdominal aorta facing the L1 vertebra (Figure 1A). Percutaneous extraction of the device was successfully achieved using a snare from the left femoral artery.

On the next day, the patient developed fever (40 °C) and acute renal failure (creatinine 193 µmol/l). There was no sign of local or systemic infection. Blood pressure remained within the normal range. An abdominal echography showed the patency of the renal arteries. A renal magnetic resonance angiography (MRA) showed superior and inferior renal arteries on both sides, which were all patent in their proximal segment. However there was an interruption of the prehilar segment of the superior right renal artery (Figure 1B) associated with an infarction of the right kidney (Figure 2A). The patient was discharged after spontaneous resolution of symptoms and renal failure.

At 7-months follow-up, the patient was asymptomatic and the renal function was normal. Furthermore, an abdominal contrast-enhanced CT showed remodelling of the right kidney without any clinical impact (Figure 2B).

Picture / graph:
Conclusion: Migration of an ASD closure device may result in renal infarction. MRA can be helpful for the assessment of the renal perfusion and the extent of infarction in such a setting.

Disclosure of Interest: None declared

P088

Malinterpretation of recurrent echocardiograms due to obesity and obstructive sleep apnea
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Introduction: Partial anomalous pulmonary venous connection is a rare cause of pulmonary hypertension. If you find another possible explanation for pulmonary hypertension it can be overlooked although the patient was at different cardiologists and cardiologic departments including a university hospital.

Method: We report the case of a 37 year old male, who was assigned for coronary angiography due to a pathologic stress test. He was seen in an ambulatory setting for preoperative assessment before a third bariatric intervention. During at least 10 years the patient’s diagnosis was pulmonary hypertension due to obstructive sleep apnea by adipositas per magna (172 cm, 160 kg, BMI 54.1)

Before performing the coronary angiography we performed an echocardiogram

Results: echocardiography with left side contrast:
- eccentric hypertrophy of the right ventricle with obtained function, dilatation of the the right atrium and V. cava inferior,
- elevated right atrial pressure, pulmonary hypertension RV/RA 49 mmHg, mild pericardial effusion in front of the right heart, mild dilatation of the left ventricle with mildly reduced left ventricular function (LVEF 52%).
- left to right shunt with suspected partially anomalous pulmonary venous connection.

Right and left side catheterisation: partial anomalous pulmonary venous return left to right shunt. Qp:Qs=2.5:1, exclusion of a coronary disease.

Thoracic angio CT: confirmation of the partially anomalous pulmonary vein.

The patient was sent for correction of the partially anomalous pulmonary vein.

Eight weeks later the pulmonary hypertension began to drop and the dyspnea began to decrease.

Conclusion: Although you have an easy explanation for the echocardiographic findings, think whether what you think correlates to the results of your corresponding examination. If not, think what pathophysiologic mechanism could explain what you see and then perform the examinations that could show you the explaining pathologic finding.

Disclosure of Interest: None declared

P089

Neoatherosclerosis as reason for stent failures beyond five years after drug-eluting stent implantation
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Introduction: Neoatherosclerosis has been recently described as particular disease entity being responsible for very late stent failures.

Method: A 69-year-old male (CASE 1) was admitted due to acute non-ST-segment elevation myocardial infarction (NSTEMI). Eight years earlier, he had previously undergone treatment with a sirolimus-eluting stent (SES). Four years after stent implantation, a follow-up angiography was obtained showing a patent stent without obstructive in-stent restenosis (Panel A). Angiograms obtained at the time of NSTEMI (Panel B) disclosed subtotal occlusion in the middle of SES (arrowheads). Optical coherence tomography (OCT) revealed a signal intense luminal layer with an underlying, highly attenuating, diffusely demarcated area, suggestive for instent fibroatheroma (Panel D) with a minimal cap thickness of 80 µm. Accordingly, ischemia was caused by the high degree of stenosis (Panel E).

Results: Similarly, a 59-year-old male (CASE 2) was admitted due to STEMI. Nine years before, he had received a paclitaxel-eluting stent (PES). Five years after stent implantation, a follow-up angiography revealed a patent stent (Panel F). Angiograms obtained at the time of STEMI (Panel G) disclosed total occlusion in the proximal of PES (arrowheads). OCT showed a rupture of thin cap fibroatheroma within stented segment (Panel I). The thin cap fibroatheroma caused the severe stenosis with thrombosis (Panel J).
Conclusion: These two cases illustrate that the presence of a favourable long-term angiographic result years after DES implantation does not exclude a future neoatherosclerosis-related event (restenosis or stent thrombosis). Large observational and long-term intracoronary imaging studies are required to fully elucidate the dynamics and clinical relevance of neoatherosclerosis.

Disclosure of Interest: None declared

P090

Cobalt cardiomyopathy and cardiac resynchronization therapy: A case report

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Introduction: Several cases of arthroprosthetic cobaltism with cardiomyopathy are described in the medical literature. We report the case of a 73 year-old female with severe cardiomyopathy and elevated cobalt levels, 5 years after metal-on-metal hip replacement surgery. Cardiac Resynchronization Therapy (CRT) improved cardiac function, allowing for optimal conditions for prosthesis revision.

Method: Does not apply.

Results: A 73 year-old female had a history of systemic sclerosis, rate-controlled permanent atrial fibrillation (AF) and right total hip arthroplasty 5 years earlier (metal-on-metal, chromium cobalt). Echocardiogram prior to hip surgery showed normal left ventricular ejection fraction (LVEF, 65\%). She was referred for a yearlong worsening dyspnea with marked limitation of physical activity (NYHA III). A 3-months earlier echocardiogram showed declining LVEF (32\%) and elevated estimated pulmonary arterial systolic pressure (51mmHg). At admission, physical examination revealed no signs of heart failure. The right hip was tender upon palpation and mobilization, with the patient reporting chronic mild pain for the past 4 years. ECG showed AF with ventricular response at 90bpm and left bundle branch block. Echocardiogram showed severely impaired LVEF (15-20\%).
global hypokinesia and severe left ventricular dilation. Cardiac catheterization showed a normal coronary angiogram and mild post-capillary pulmonary hypertension (mean Pulmonary Arterial Pressure, 27mmHg; Capillary Wedge Pressure, 21mmHg). Cardiac MRI (CMRI) showed no myocardial lesions. Cardio-pulmonary progression of systemic sclerosis was ruled-out because of the absence of arterial pulmonary hypertension or signs of interstitial lung disease on CT scan, normal titers for markers for disease activity, and absence of myocardial infiltration on CMRI. A heavy metal screen showed elevated levels of cobalt (282.5nmol/l; normal: <15nmol/l) and chromium (311nmol/l; normal <10nmol/l), leading to a diagnosis of probable arthroprosthetic cobaltism associated cardiomyopathy. CRT with thermo-ablation of the atrio-ventricular node led to improvement of LVEF (30% at 3 months follow-up) and functional status. Under these conditions, non-complicated prosthesis revision (steel-on-ceramic) was performed 6 months later.

**Conclusion:** This case-report suggests the benefit of CRT for improvement of cardiac function in severe cases of arthroprosthetic cobalt cardiomyopathy prior to prosthesis revision.

**Disclosure of Interest:** None declared

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**P092**

Unmasked brugada pattern at the electrocardiogram: A case report

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**Introduction:** A 62 year old male patient is admitted to our emergency room for an altered mental status and fatigue following an attempted suicide with a flecainide dose of 1 gram (about 25 pills of flecainide of 50 mg) and an unknown quantity of lamotrigine and quetiapine. His medications included: lamotrigine, quetiapine, flecainide and anti vitamin K. His past medical history is known for bipolar disorder, paroxysmal atrial fibrillation and a fronto-parieto-temporal stroke. On admission, his physical exam was normal. The initial electrocardiogram (ECG) shows a regular sinus rhythm, with a first degree AV block and a coved ST segment elevation in leads V1 and V2, typical of a type 1 Brugada pattern (Fig.1). The patient is admitted to the cardiology unit for continuous rhythm monitoring and all his medications are interrupted. The day after, the ECG shows a regular sinus rhythm and Brugada pattern is disappeared (Fig.2). A rate control treatment with a beta blocker is introduced, we continued the anti vitamin K and we avoided anti arrhythmic medications. From the psychiatric point of view, a treatment with lithium and benzodiazepine are chosen instead of lamotrigine and quetiapine.
Method: NA
Results: NA
Picture / graph:
**Conclusion:** The typical Brugada ECG pattern type 1 can be difficult to see as the ECG changes are dynamic and variable. Our clinical case describes a patient with atrial fibrillation that presented a type 1 Brugada pattern on the ECG triggered by a flecainide overdose, a class Ic antiarrhythmic drug, in association with a toxic level of lamotrigine, a neuronal voltage-gated sodium channel blocker. After an oral ingestion of flecainide, peak blood levels are reached after 4-6 hours. Elimination is mostly renal with a half-life of about 20 hours. A toxic dose of flecainide can unmask a typical Brugada ECG pattern. Cases of lamotrigine toxicity that induced Brugada ECG pattern have been also already described. Although it is not currently contraindicated in Brugada syndrome, the antiepileptic lamotrigine, at toxic levels, may lose the neuronal specificity and exerts an effect on cardiac sodium channels. In addition, a relationship between AF and Brugada syndrome has been well identified and it has been known that, in young patients, AF can be the first manifestation of latent Brugada syndrome. Our clinical case reports an interesting unmasked Brugada ECG pattern, in a patient with atrial fibrillation, due to a potentially synergistic interplay of toxic doses of flecainide and lamotrigine.

**Disclosure of Interest:** None declared

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**Surgical treatment of constrictive pericarditis: Video presentation**

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**Introduction:** Constrictive pericarditis is the end stage of a chronic inflammatory and non-inflammatory process that results in a thick, fibrotic, constricting, and sometimes calcific, pericardium. Early pericardiectomy has been advocated once the diagnosis has been confirmed, before severe constriction and myocardial atrophy occurs. We report in this video presentation, a didactic case elaborating surgical techniques, as well as pre-and post-operative imaging.

**Method:** A 63-year-old male was hospitalised for severe anasaric oedema of 2 weeks duration. He had NYHA Class IV symptoms and severe pre-tibial oedema, gross ascites, and bilateral pleural effusion. There was a history of STEMI 12 months earlier, from which he recovered without any complications. Trans-thoracic echocardiography and MRI demonstrated severe diastolic dysfunction, and increased pericardial thickness. Cardiac catheterisation confirmed diastolic dysfunction secondary to pericardial constriction.

**Results:** Surgical pericardiectomy was performed via median sternotomy. The anterior pericardium was first removed, and the rest of the operation is completed on beating heart under cardiopulmonary bypass, instituted by femoral-femoral cannulation. Complete pericardial resection was undertaken, except posterior to the left atrium, with special attention paid in order to preserve the right and left phrenic nerves. Post-operative recovery was event free, except for extended pleural drainage. Pericardial biopsy demonstrated inflammation with a suspicion of a previous haemorrhage. Post-operative follow-up at 3 months confirmed complete clinical and cardiac recovery, as documented by echocardiography and MRI.

**Conclusion:** Complete investigation using non-invasive and invasive imaging help confirm the diagnosis of constrictive pericarditis, and exclude restrictive cardiomyopathy. Once the diagnosis is confirmed, pericardiectomy, with complete decortication (if technically feasible) is the treatment of choice for constrictive pericarditis, and it provides good symptomatic relief.

**Disclosure of Interest:** None declared

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**Total lymphoid irradiation as rescue therapy for a 50-years-old heart transplantation recipient with recurrent acute cellular rejection beyond 2 years follow-up**

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**Introduction:** Acute cellular rejection (ACR) represents a major cause of death in the first year after heart transplantation (HT) and rare in late follow-up. Severe and recurrent ACR are associated with significant morbidity and mortality due to either graft loss or aggressive immunosuppression (IS) consequence. Total Lymphoid Irradiation (TLI) is used as a second line salvage therapy for patients with severe or recurrent ACR to reduce subsequent rejection episodes.
Method: A 50 years old man affected by terminal idiopathic dilative cardiomyopathy on NYHA III-IV class underwent HT in 2011. Other relevant conditions were stage II chronic kidney disease (CKD) and antiHBe+ chronic hepatitis B. Follow-up, endomyocardial biopsy (EMB) and ACR treatment were performed according to ISHLT (International Society of Heart and Lung Transplantation) guidelines.

Results: Persistent ISHLT 1A/1R ACR on weekly EMB was present. Thus an intensive oral IS with prednisone, mycophenolate mofetil (MMF), everolimus and tacrolimus was administered. Cyclosporine was not administered due to CKD and tacrolimus was subsequently stopped for adverse reaction. Early post-HT follow-up was characterized by several complication and not-well controlled immunosuppressive drug serum concentrations, especially regarding MMF (Img.1C). First ACR remission was obtained after about 5 months (Img.1A). On mid-term follow-up, it was difficult to get optimal IS and several ACR episodes occurred, without acute heart failure episodes. A few times patient compliance with drugs was called into question before and after HT, nonetheless he experienced several ACR episodes even on optimal IS (Img. 1A; C). Thus the patient underwent TLI for recurrent ACR after 22 months follow-up. A 6.4 Gy TLI was performed administering twice weekly 0.8 Gy fractions. TLI was split in two subsequent sessions due to leukopenia (nadir 2.4x10E9/l). Decision to complete assigned radiation dose was taken due to a new ACR episode occurring after the first session. The patient experienced several intensive IS side effects (Tab.1).

Picture / graph:
**Conclusion:** In order to avoid recurrent ACR and aggressive immunosuppression therapy dire consequences, TLI was performed and early beneficial effect was expected. Despite TLI and optimal IS medical therapy, the patient experienced new ACR episodes even though they were of milder intensity and lower frequency. Subsequent follow-up will show TLI effectiveness in reducing mid-long-term ACR episodes.

**Disclosure of Interest:** None declared
**Left atrial dissection after mitral valve replacement**

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**Introduction:** Left atrial dissection is a rare complication after mitral valve replacement, with only a few cases reported in the literature. We review the presentation, imaging and management of a patient with left atrial dissection.

**Method:** Single center retrospective review of case of left atrial dissection.

**Results:** An 80 year-old gentleman was referred for two vessel coronary artery disease and severe mitral regurgitation due to myxomatous P2 prolapse. The patient underwent coronary artery bypass grafting and mitral valve repair, which despite multiple attempts and due to highly fragile tissue, required mitral valve replacement during the same operation. A bioprosthetic valve was implanted using everting pledgeted stitches placed on the atrial aspect of the mitral annulus, to avoid the risk of atrioventricular disruption given tissue fragility. Post-bypass echocardiography showed a trivial paravalvar leak with no significant gradient across the valve. The patient presented transient hypertension after transfer to the ICU, with a maximal systolic pressure of 170 mmHg. He later presented hemodynamic instability, prompting echocardiography to rule out tamponade, which showed a cavity within the left atrial (LA) wall, with high velocity flow (>3.5 m/s) originating from the posterior left ventricular (LV) wall, diagnostic for a left atrial dissection. There was no significant paravalvular leak and a small pericardial effusion (*). There was minimal flow from the dissection cavity to the LA. The absence of flow within the pericardium and stable hematocrit indicated this was a contained rupture into the left atrial wall. There was no supramitral stenosis. Hemodynamics stabilized with fluid resuscitation and vasoconstriction.

**Conclusion:** Left atrial dissection is a rare complication after mitral valve replacement, and represents a variant of contained atrioventricular disruption. We preferred medical management given the friable tissue and technical difficulty in repairing this dissection, and critical state of this elderly patient.

**Disclosure of Interest:** None declared
Aortic valve replacement by ross procedure - Total root technique: Video presentation
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\textbf{Introduction:} The Ross procedure (RP) is the replacement of the patient's pathological aortic valve (AV) with his own pulmonary valve (PV), and the replacement of the PV with a pulmonary homograft (PH). In this video presentation we describe a step-by-step approach of the Ross total root technique.

\textbf{Method:} A median sternotomy is performed. The aorta is cannulated in the aortic arch and bicaval cannulation is used. After cross-clamping and cardioplegia induction, a low transverse aortotomy is performed.

\textbf{Results:} Following AV leaflet resection, PV autograft is harvested. The first septal artery is avoided by keeping the incision line 2mm below the attachment of the cusps. Pulmonary autograft harvesting is completed by a transverse incision proximal to the pulmonary artery bifurcation to ensure the widest diameter for the distal homograft anastomosis. After examining the pulmonary autograft, the infundibular muscle is trimmed down to 2mm below the insertion of the cusps in order to exclude the devascularised muscular part. The autograft is then implanted as a total root using interrupted 4-0 prolene sutures. The coronary artery ostia are reimplanted using a running 6-0 prolene. The proximal line anastomosis of the PH is performed using a running 4-0 prolene. The distal suture line is performed using a running 5-0 prolene. Before completing the distal anastomosis of the autograft, the remaining pulmonary artery is cut 2-3mm above the level of the sinotubular junction in order to reduce the risk of autograft dilatation by the systemic blood pressure.

\textbf{Conclusion:} The RP is a not complex operation, but it requires attention to several technical details which have a direct impact on short and long-term outcomes. These details can be learned through video presentations.

\textbf{Disclosure of Interest:} None declared

What seemed to be a typical pneumonia
L. Mossaz\textsuperscript{1}, D. Lebowitz\textsuperscript{2}, M. Louis-Simonet\textsuperscript{3}, H. Muller\textsuperscript{1}\textsuperscript{1}\textsuperscript{1}\textsuperscript{1}\textsuperscript{1}, Cardioiology, Internal Medicine, HUG, Genève, Switzerland

\textbf{Introduction:} The diagnosis of endocarditis can be difficult to make. We report the case of a 65 years old patient presenting with the typical clinical features of pneumonia, for which echocardiography was finally the key element for diagnosis.

\textbf{Method:} A 65 year old man had a history of bioprosthetic mitral and aortic valve replacement following endocarditis X years earlier. An echocardiogram performed one month earlier showed normal function of the two bioprosthetic valves. The patient was admitted to the emergency room with acute fever, cough, and dyspnea. Physical examination disclosed fever, hypoxemia (SpO2: 90%, FiO2: 40%), tachypnea, and pulmonary rales heard over the right lung. There was a 2/6 systolic murmur suspicious for mitral regurgitation, as described in previous hospital records. Chest X-Ray showed a right pulmonary infiltrate. The patient was then admitted to the intermediate care unit for management of severe pneumonia, treated with IV antibiotics (Amoxicilline/clavulanic acid and Clarythromycine). Blood cultures were negative. After 2 days of treatment, clinical evolution was unfavorable with worsening hypoxemia, persistent fever, and development of symptoms and signs of heart failure, including orthopnea, leg edema and an S3 heart sound, which were absent upon admission. A trans-thoracic echocardiogram showed an abnormal motion of the mitral prosthesis and suspected paraprosthetic regurgitation. The patient was then intubated to perform a trans-oesophageal echocardiogram which confirmed major dehiscence of the mitral valve prosthesis (over 40% of the annulus circumference). This was particularly well visualized using three dimensional "en face" view. There were no signs of disease of the aortic prosthesis.

\textbf{Results:} cf. conclusion.

\textbf{Conclusion:} Presumptive diagnosis of infective endocarditis was made. Blood cultures were negative presumably due to the prescription of 2 tablets of Levofoxacine by an on-call house doctor the day before admission, as we learned later. The patient was then successfully operated with replacement of the mitral bioprosthesis. Endocarditis was confirmed by culture of the removed prosthesis and adjacent tissue, which yielded positive results for \textit{Staphylococcus lugdunensis}.

\textbf{Disclosure of Interest:} None declared
Infant delirium after cardiac surgery - A challenge for nursing staff

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Introduction: Post-operative delirium is a significant but underestimated complication in pediatrics. Impairment in concentration, perception, language, memory and orientation is frequently observed in children as they awaken from anesthesia. Restlessness with inconsolable crying and fiddling is seen in infants. At present, in our cardiac intensive care unit, we do not routinely use any instruments to detect delirium in infants and children nor do we have an interprofessional program for the prevention and treatment of delirium. As a result, there are no structured preventive measures being carried out for the high-risk patients, and delirium often remains unrecognized and inadequately treated.

Method: Based on a literature review and our observations of a 2 ½ year-old girl post cardiac surgery who was treated in our intensive care unit, we identified the main symptoms and triggers of infant delirium, and we established a protocol for prevention and management of post-operative delirium.

Results: The literature shows that children and the elderly have an increased risk of delirium. The delirium cascade can be triggered by systemic diseases or iatrogenic interventions such as hypoxia, infection, electrolyte and metabolic disorders. Surgical trauma such as blood loss, transfusion and hypothermia can trigger a non-specific inflammatory response. Delirium in children is often associated with accidental extubation and removing catheters, prolonged ventilation time, prolonged hospital stays and can elevate the risk of mortality. Children have delusional memories and experiences of their stay in ICU, which may result in a post-traumatic stress syndrome. The effects are more difficult to detect in infants.

We observed restlessness in the 2 ½ year old girl and she stopped verbal communication over several days, only whined and gritted her teeth. Delirium presents a higher risk of long-term damage to the child's perception and development.

Conclusion: A coherent treatment concept is required in order to improve the early detection and treatment of delirium in children. Delirium presents in a wide variety of symptoms and characteristics depending on the child, his/her age and medical condition. This necessitates the routine use of a sensitive and highly specific instrument by healthcare professionals in order to distinguish delirium from a withdrawal syndrome. Measures such as noise reduction, coordination of medical and nursing interventions, involvement of parents in the care of their child, keeping favourite toys close to the child and the use of a primary nursing system positively affect the duration and outcome of delirium.

Disclosure of Interest: None declared
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