P23

Angiogenesis and lymphangiogenesis in rheumatic mitral valves: immunohistochemical study

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Background & Objectives: Rheumatic heart disease because of acute rheumatic fever is an emerging cardiovascular burden in the Global South.

Methods: Mitral valves from 19 patients with moderate to marked rheumatic mitral stenosis were compared to eight control surgical myxomatous degenerative valves. The study group population had a mean age of 43.8 (± SD 13.3) years and comprised 10 female and nine male patients. The control group included three female and five male patients with a mean age of 61.5 (± SD 16.1) years.

Results: In rheumatic mitral valves, the lymphatic vessel size and count per mm² were increased compared to the degenerative mitral valves. Statistical significance was found in the blood and lymphatic vessel size, and lymphatic vessel count. The combined blood and lymphatic vessel size increased from 1.45µm² (± SD 2.52) in controls to 4.91 µm² (± SD 6.33) in rheumatic mitral valves. The lymphatic vessel count was 1,123.86 per mm² (± SD 2154.68) in the rheumatic mitral valves and 213.08 per mm² (± SD 390.13) in the myxomatous degenerative valves.

Conclusion: Both angiogenesis and lymphangiogenesis characterize rheumatic mitral valves. However, it is yet to be determined whether increased lymphangiogenesis is a cause or a consequence of rheumatic heart disease. Further studies are needed to determine the significance of therapeutic angiogenesis and lymphangiogenesis in clinical setting.

P24

Ross Procedure after TAVR in Young Adults

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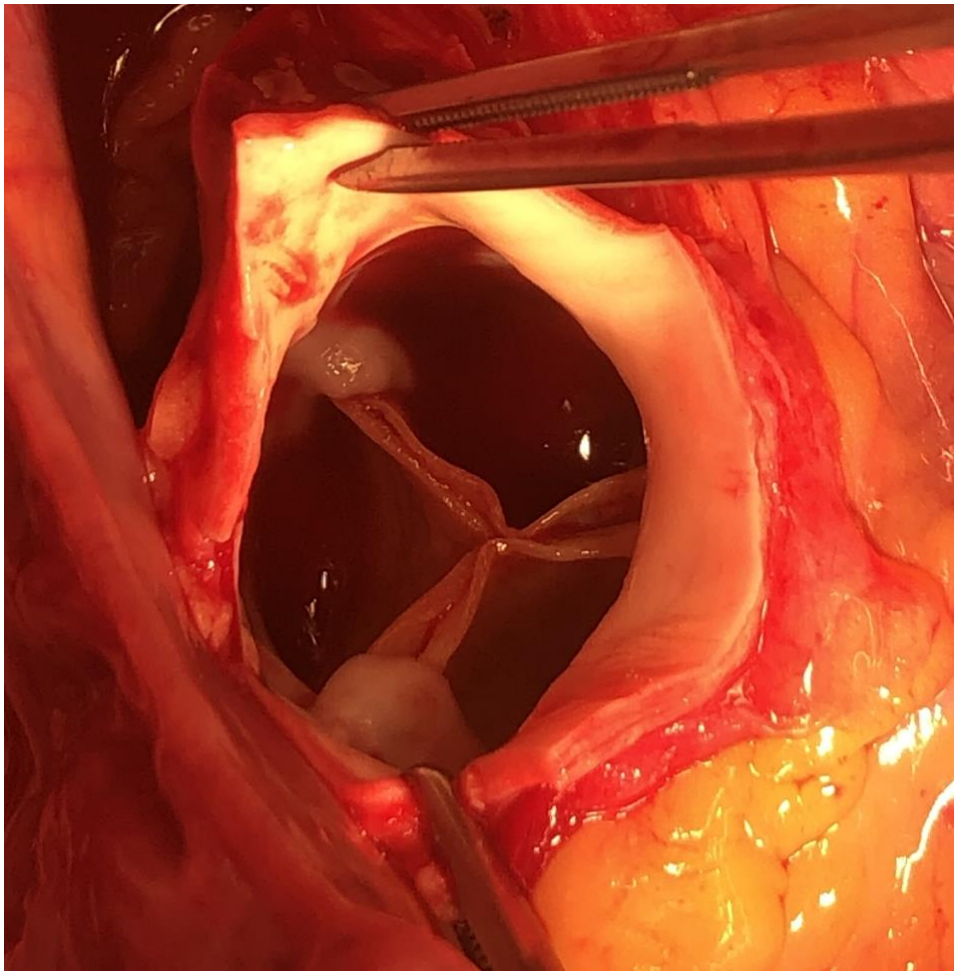
Objective: Surgical aortic valve replacement (SAVR) after prior transcatheter aortic valve (TAVR) is associated with increased morbidity and mortality. This study reports the feasibility of the Ross procedure after TAVR in young adults.

Methods: A retrospective review was performed of young adults between ages 16 and 30 who underwent the Ross operation following prior TAVR.

Results: Three patients underwent TAVR explant and Ross procedure. Patient 1 (16 M) had prior 29mm Sapien 3 for unicuspid valve; time to TAVR explant was 38 months. Patient 2 (17 F) had prior 20mm Sapien after two prior operations for bicuspid AS; time to TAVR explant was 49 months. Patient 3 (20 M) had prior 29mm Sapien 3 for bicuspid valve; time to TAVR explant was 37 months. Mechanism of TAVR failure was mixed AS/AI in one patient, moderate AS and root dilation in one patient, and large perivalvar leak in one patient.

All three patients had aortic wall ingrowth and extensive damage to the native aortic annulus (figure 1). One patient required reconstruction of aorto-mitral continuity and one patient required Ross-Konno left ventricular outflow tract enlargement. There was no mortality or neurologic injury. One patient required permanent pacemaker placement. At 2 years, all patients were clinically well with no autograft or homograft dysfunction.

Conclusion: The Ross procedure can be safely performed after prior TAVR but there are significant technical challenges and increased morbidity. TAVR in the native aortic root in young adults should be discouraged due to root destruction and early failure.



P25

3D-CT for Surgical Planning in Anomalous Coronary Artery

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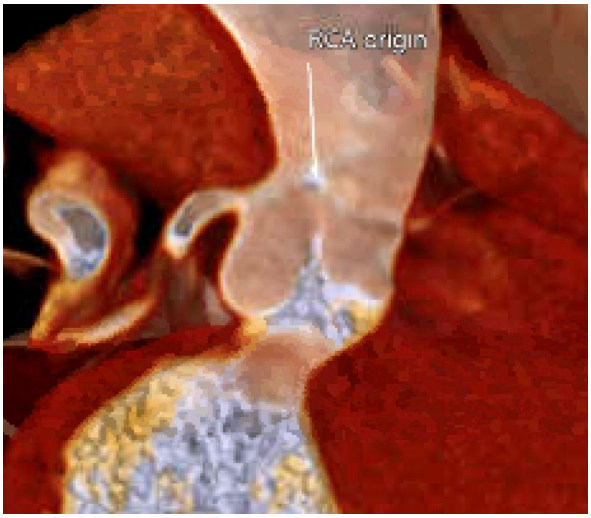
Background: Anomalous aortic origin of coronary artery (AAOCA) can result in recurrent chest pain, arrhythmias and sudden death. Preoperative imaging with 3D-CT provides high-resolution detail to risk stratify these heterogenous lesions and guide surgical technique.

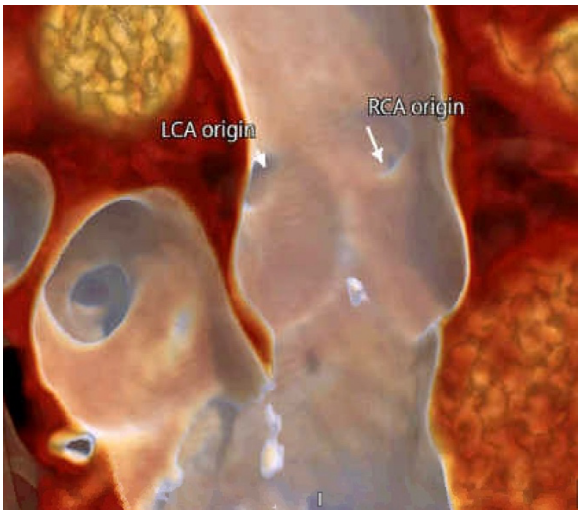
Methods: Cardiac CT images were obtained on a single source scanner (GE Revolution) with EKG gating, image acquisition timed to diastole based on heart rate. Images were reconstructed and formatted on 3D software (Vital Images). The coronary ostia, intramural and interarterial course, relationship of the anomalous coronary to the commissure, sinotubular junction and pulmonary artery were assessed. Imaging details, and clinical testing and presentation were used to determine need for intervention. Post-surgical repair was also assessed with 3D-CT.

Results: 7 patients were evaluated with 3D-CT for anomalous origin of either right coronary artery (RCA) from the left sinus (5 patients) or left coronary artery (LCA) from the right sinus (2 patients). There were 6 female and 1 male patient; mean age was 44 years (range 24-65). 6 patients had symptoms of chest pain and 5 patients had symptoms of light-headedness or syncope. 3 patients with anomalous RCA underwent unroofing and 2 underwent reimplantation. In 2 patients with anomalous LCA, 1 underwent transconal unroofing and 1 was managed non-operatively. There were no deaths. 5 patients had complete resolution of symptoms and 1 patient had persistent post-cardiotomy syndrome.

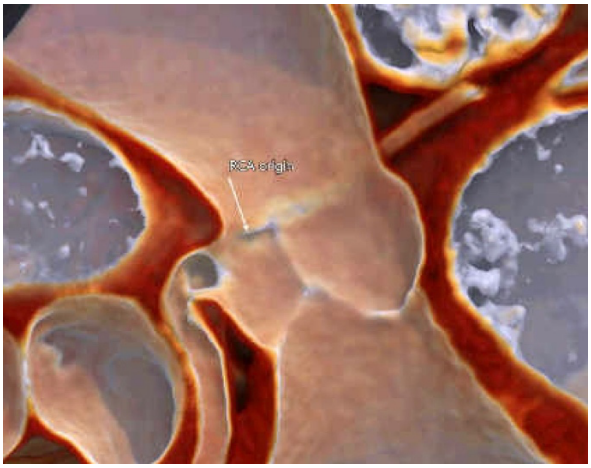
Conclusions: 3D-CT is a useful tool for the pre and postoperative evaluation of adults with AAOCA. High-resolution scans delineate anatomy and provide guidance for surgical technique and non-operative management.

A. Transaortic unroofing - preoperative and postoperative images

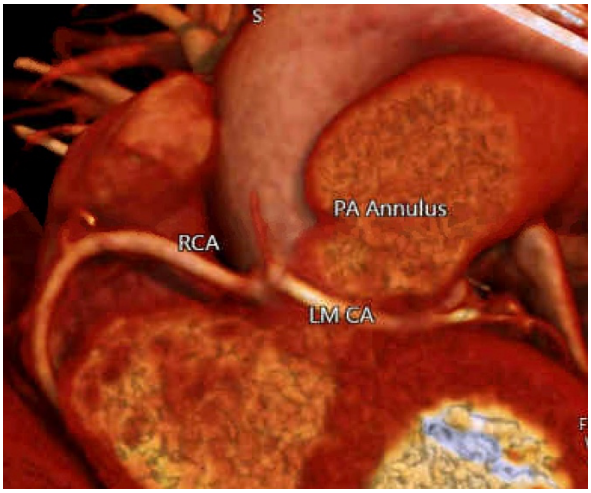


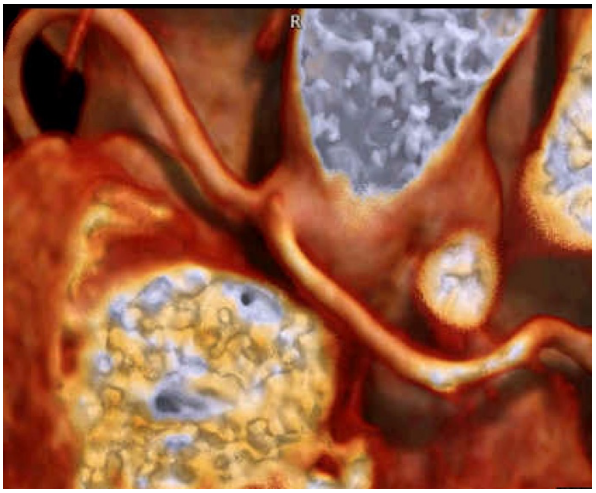


B. Coronary translocation – preoperative and postoperative images



C. Transconal unroofing – preoperative and postoperative images





P26

Financial Implications of Structural Heart Valves on a Large, Not-for-profit Health System

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The authors have chosen not to publish the abstract

P27

Low preoperative heart rate increases the risk of postoperative atrial fibrillation among patients scheduled for elective cardiac surgery

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Background: We investigated the association of preoperative heart rate measured before and after 6-min walk test (6MWT) on postoperative atrial fibrillation (POAF) in patients scheduled for elective elective cardiac surgery (ECS) during the ongoing Personalized intervention to increase physical Activity and reduce sedentary behaviour in rehabilitation after Cardiac Operations (PACO) trial.

Methods: Cardiac patients (n=122) underwent ECS: CABG, AVR and MVS. The patients were tested with 6MWT preoperatively. During the 6MWT heart rate was recorded before the test (HR baseline), at the maximum (HR max), after 1 min (HR 1min rec) and 3 min recovery (HR 3min rec). Postoperatively, POAF was recorded during the first four postoperative days. 48% of the patients experinced POAF during that period.

Results: Patients who experienced POAF had significantly lower HR baseline (69 vs. 77, $p<0.001$), HR max (98 vs. 105, $p=0.019$), HR 1min rec (74 vs. 82, $p<0.001$), and HR 3min rec (71 vs. 78, $p=0.035$) compared to the non-POAF patients. No difference were seen in systolic or diastolic blood pressure, the distance walked during the 6MWT or estimated maximal oxygen uptake between POAF and non-POAF patients.

Conclusions: Surprisingly, heart rate in the resting state, at the maximal level and during the recovery was significantly lower in POAF patients compared to non-POAF patients. This suggest that lower heart rate might be a risk factor for POAF after cardiac surgery. If low heart rate is a risk factor for POAF, it might be useful to recognize these patients before the surgery.

P29

Predicting gastrointestinal complications after cardiac surgery

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Objective: Hypotension during cardiopulmonary bypass may impair perfusion of the gastrointestinal tract and lead to gastrointestinal complications. This study will investigate if the duration and degree of hypotension is associated with gastrointestinal complications

Methods: Patients who have undergone cardiac surgery in Copenhagen University Hospital, Rigshospitalet, during years 2018–2022 will be assessed for eligibility. Patients will be included if they have undergone valve surgery, coronary artery bypass grafting, or surgery on the thoracic aorta. Off-pump surgery will be excluded. The exposure will be the duration and degree of hypotension as assessed by a hypotensive area. The primary endpoint is a composite of gastrointestinal complications, which will be assessed by a multi-state Cox proportional hazards regression with death as a competing risk. Hypotensive area will be defined as the area above the mean arterial blood pressure curve but below a threshold for hypotension. The threshold will be set using a data-driven algorithm on a training sample. Endpoints will be assessed in a separate validation sample.

Discussion: This study evaluates a novel approach to intraoperative hypotension assessment using continuous blood pressure data and algorithmic threshold selection. Under the assumption of pressure-dependent perfusion outside of an autoregulatory plateau, the exposure in this study should better reflect the absolute hypoperfusion than point measures or averages.

P30

CKD-AWARE: a systematic kidney follow-up program after cardiac surgery

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Background:

Based on recent temporal data from two Danish cardiac surgery centers over two decades, nearly 20% of patients lack any kidney monitoring within their first postoperative year, regardless of preexisting kidney dysfunction. While current KDIGO guidelines recommend nephrology referral after acute kidney injury and annual monitoring for chronic kidney disease (CKD) patients, follow-up after cardiac surgery remains largely unstructured.

Methods:

To address this gap, we are developing CKD-AWARE, a systematic follow-up program categorizing patient risk of new-onset CKD within 3 years at discharge. The model uses an explainable AI algorithm already developed and externally validated on large datasets. Before clinical implementation, we plan three key components. First, establishing evidence-based risk stratification thresholds to categorize patients into low (no follow-up), moderate (annual follow-up), and high (biannual follow-up) risk groups. Preliminary findings suggest approximately half of patients fall into the low-risk category. Second, multi-stakeholder engagement through patient interviews co-designed with former cardiac surgery patients, surveys of Danish cardiac surgeons, and focus group interviews with general practitioners will ensure clinical feasibility and program relevance. To assess international perspectives, we will encourage non-Danish cardiac surgeons at SATS 2025 in Reykjavik to participate. Third, developing a freely accessible online risk calculator with potential for automated integration into electronic health records and structured discharge communication.

Expected Outcomes:

CKD-AWARE aims to improve early CKD detection rates and cross-sectorial care coordination. By tailoring follow-up according to individual risk profiles, the program promotes equitable, resource-efficient care while potentially reducing long-term cardiovascular and kidney complications in this high-risk population.

P31

Changes in urinary pO2, pCO2 and lactate are associated with acute kidney injury during cardiac surgery

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Background:

Acute kidney injury (AKI) is common after cardiac surgery and is associated with postoperative morbidity and mortality. Methods to detect AKI after cardiopulmonary bypass (CPB) are hampered by delayed diagnosis or limited availability. The role of intraoperatively measured urinary biomarkers in detecting AKI is unclear.

Method:

We examined 12 patients, with urine collected immediately before CPB and every 15 minutes until weaning of CPB. Urine pO2, pCO2 and lactate were measured with a blood gas analyser. AKI was defined as a 0.3 mg/dl increase in serum creatinine within 48 hours post-CPB. Urine biomarkers were analysed overall and in patients stratified by AKI status. Repeated measures ANOVA and Tukey's HSD was used to compare measurements at different time points, and we characterized intraindividual changes using mixed effect models adjusted for baseline covariates.

Results:

Three patients (27%) developed AKI, with two of these patients having pre-existing chronic kidney disease (CKD). Overall, intraindividual levels of urine pO2 ($p=0.03$), pCO2 ($p<0.001$) and lactate ($p<0.001$) changed significantly. In patients with vs. without AKI, pO2 showed more substantial decline (adjusted slope -0.06 vs. 0.02 kPa/min); pCO2 showed similar decline (-0.07 vs. -0.06 kPa/min); and lactate showed more increase (0.01 vs. 0.003 mmol/L/min) during CPB.

Conclusion:

Urine pO2, pCO2 and lactate show significant changes during CPB. These changes are different in patients with vs. without AKI and suggests that intraoperative urinary measures could be used as biomarkers to detect AKI.

P32

AI-based prediction of chronic kidney disease risk after cardiac surgery

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The authors have chosen not to publish the abstract