THE GEILO MEETING

ON CARDIOVASCULAR AND THORACIC RESEARCH

33rd Annual Geilo Meeting

on Cardiovascular and Thoracic Research

February 6-8, 2025

Dr. Holms Hotel, Geilo, Norway

Program & Abstracts

www.geilomeeting.com

ORGANIZING COMMITTEE

PRESIDENT SSRCTS
Peter Johansen, MSc PhD
Dept. of Electrical and Computer Engineering
Aarhus University
8200 Aarhus N, Denmark
pj@ece.au.dk

VICE-PRESIDENT & WEBMASTER
Alexander Emil Kaspersen, MD
Dept. of Cardiothoracic Surgery
Aarhus University Hospital
8200 Aarhus N, Denmark
alemka@clin.au.dk

SECRETARY GENERAL & WORKSHOP CHAIR
Johannes H. Jedrzejczyk, MD
Dept. of Cardiothoracic Surgery
Aarhus University Hospital
8200 Aarhus N, Denmark
johjed@clin.au.dk

PROGRAM CHAIR
Won Yong Kim, MD PhD DMSc
Dept. of Cardiology
Aarhus University Hospital
8200 Aarhus N, Denmark
yong.kim@clin.au.dk

MEDIA CHAIR
Rasmus Ellerup Kraghede, MD
Dept. of Cardiothoracic Surgery
Aarhus University Hospital
8200 Aarhus N, Denmark
rakrag@clin.au.dk

PR CHAIR
Louise Winding Nielsen, MD
Dept. of Cardiothoracic Surgery
Aarhus University Hospital
8200 Aarhus N, Denmark
louisewinding@clin.au.dk

LOGISTICS CHAIR
Jacob Petersen, BSc
Dept. of Cardiothoracic Surgery
Aarhus University Hospital
8200 Aarhus N, Denmark
jpet@clin.au.dk

ADMINISTRATION
Jeanette Videbæk Therkildsen
Dept. of Cardiothoracic Surgery
Aarhus University Hospital
8200 Aarhus N, Denmark
jvt@clin.au.dk

CONTENTS

WELCOME

Dear colleagues and friends,

It is our great pleasure to welcome you to the **2025 Geilo Meeting on Cardiovascular and Thoracic Research**. Now in its 33rd year, the Geilo Meeting continues to serve as a vital platform for researchers, clinicians, and healthcare professionals across diverse disciplines within cardiovascular, thoracic, and vascular research.

Since its inception in 1989, the Geilo Meeting has evolved from a focused gathering in cardiothoracic surgery to a truly interdisciplinary event, fostering collaboration between clinicians, engineers, and scientists. This broad perspective has become the meeting's hallmark, enabling discussions that bridge fundamental research, experimental studies, and clinical practice.

As always, we are committed to providing a forum for scientific exchange in a setting that encourages both intellectual engagement and social interaction. **Dr. Holms Hotel in Geilo** offers the perfect environment for stimulating discussions, both during and beyond the scheduled sessions. We hope you will take full advantage of this unique opportunity to connect with peers, share your latest research, and build new collaborations.

We look forward to welcoming you to Geilo for what promises to be an inspiring and productive meeting.

On behalf of the organizing committee,

Peter Johansen

President

PROGRAMME

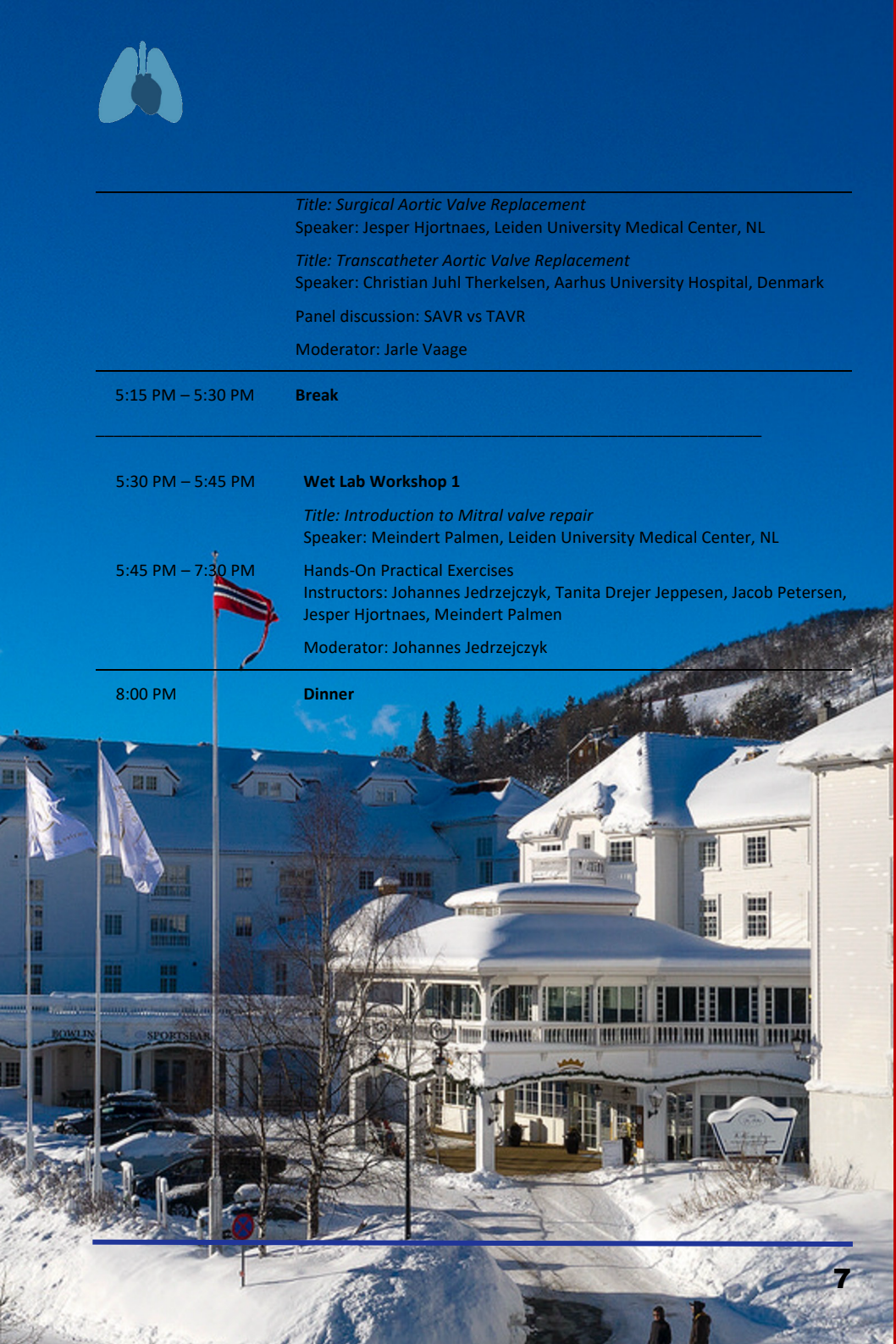
THURSDAY, 6 FEBRUARY 2025	DAY 1

2:00 PM – 2:15 PM	**Arrival and Registration**
2:15 PM – 2:30 PM	**Welcome** Peter Johansen, President of the Geilo Meeting
2:30 PM – 3:45 PM	**Poster Presentations** Chair: Meindert Palmen, Sie Kronborg Fensman and Rasmus Kraghede

1. Johannes Jedrzejczyk *et al*
   Novel Biomaterials for Mitral Valve Repair: A Surgical Feasibility Study
2. Jacob Petersen *et al*
   Non-attendance and drop-out in Cardiac Rehabilitation following open-heart surgery
3. Julian Schütz *et al*
   Effects of butyrate on ischemia reperfusion injury in a porcine model of myocardial infarction
4. Bjarke Sihm Stender *et al*
   The 3FLASH study: Impact of Cardiac CT Protocol on Device Evaluation Following Left Atrial Appendage Occlusion
5. Alexander Møller Larsen *et al*
   Effects of Butyrate Infusion on Cardiac Hemodynamics in a Porcine Model of Cardiogenic Shock
6. Andreas Damgaard *et al*
   Long-Term Outcomes of Coronary Artery Bypass Grafting vs. Percutaneous Coronary Intervention for Isolated Proximal Left Anterior Descending Artery Stenosis
7. Tanita Drejer Jeppesen *et al*
   A novel expansible aortic annuloplasty ring for aortic valve repair
8. Mads Hartlimmer *et al*
   Impact of Intraoperative vs. Postoperative Compression on Wound Complications Following Saphenous Vein Harvest in CABG Surgery

3:45 PM – 4:00 PM	**Refreshments**
4:00 PM – 5:15 PM	**Workshop: The Aortic Valve**

	Title: Surgical Aortic Valve Replacement Speaker: Jesper Hjortnaes, Leiden University Medical Center, NL
	Title: Transcatheter Aortic Valve Replacement Speaker: Christian Juhl Therkelsen, Aarhus University Hospital, Denmark
	Panel discussion: SAVR vs TAVR
	Moderator: Jarle Vaage
5:15 PM – 5:30 PM	**Break**
5:30 PM – 5:45 PM	**Wet Lab Workshop 1**
	Title: Introduction to Mitral valve repair Speaker: Meindert Palmen, Leiden University Medical Center, NL
5:45 PM – 7:30 PM	Hands-On Practical Exercises Instructors: Johannes Jedrzejczyk, Tanita Drejer Jeppesen, Jacob Petersen, Jesper Hjortnaes, Meindert Palmen
	Moderator: Johannes Jedrzejczyk
8:00 PM	**Dinner**



FRIDAY, 7 FEBRUARY 2025 **DAY 2**

2:30 PM – 3:45 PM	**Workshop: Revascularization** *Title: Current status of CABG* Speaker: Jarle Vaage, University of Oslo & Oslo University Hospital *Title: Current status of PCI* Speaker: Bent Roni Ranghøj Nielsen, Aarhus University Hospital, Denmark Panel discussion: CABG vs PCI Moderator: Jesper Hjortnaes
3:45 PM – 4:00 PM	**Refreshments**
4:00 PM – 5:00 PM	**Podium Presentations** Chair: Jesper Hjortnaes and Anders Lehmann Dahl Pedersen 1. Daria Evensen *et al* The Role of Valve Endothelial Cells in Aortic Valve Calcification 2. Katrín Hólmgrímsdóttir *et al* Safety of Novel Oral Anticoagulants Compared to Warfarin for Postoperative Anticoagulation following Mitral Valve Repair 3. Birta Rakel Óskarsdóttir *et al* Association of Mitral Annular Calcification with Warfarin Use 4. Christoffer Overgaard *et al* 3D isotropic upscaling of Coronary MR angiography using deep learning based super-resolution
5:00 PM – 5:15 PM	**Break**
5:15 PM – 5:30 PM	**Wet Lab Workshop 2** *Title: Introduction to aortic surgery* Speaker: Jesper Hjortnaes, Leiden University Medical Center, NL
5:30 PM – 7:15 PM	Hands-On Practical Exercises Instructors: Johannes Jedrzejczyk, Tanita Dreier Jeppesen, Jacob Petersen, Jesper Hjortnaes Moderator: Johannes Jedrzejczyk
7:30 PM	**Dinner and Entertainment**

SATURDAY, 8 FEBRUARY 2025 **DAY 3**

2:30 PM – 3:00 PM **Keynote Talk**

Title: Fraud in Science
Speaker: Jarle Vaage, University of Oslo & Oslo University Hospital

Moderator: Won Yong Kim

3:00 PM – 4:00 PM **Podium Presentations**

Chair: Bent Roni Ranghøj Nielsen and Tanita Drejer Jeppesen

1. Alexander Emil Kaspersen *et al*
   Preoperative anemia is associated with increased short- and long-term mortality in patients undergoing coronary artery bypass grafting: a large nationwide cohort study
2. Anders Lehmann Dahl Pedersen *et al*
   Differences in myocardial structure, function and fibrosis in asymptomatic moderate or severe versus severe symptomatic aortic stenosis
3. Sie Kronborg Fensman *et al*
   Biopsy screening of patients undergoing Carpal Tunnel Syndrome Surgery for early diagnosis of Wild-type Transthyretin Amyloidosis Cardiomyopathy
4. Jens Toft Eschen *et al*
   Impact of Anticoagulation Management on Thrombin Generation During Surgery for Acute Aortic Dissection – A randomized controlled trial

---

4:00 PM – 4:15 PM **Refreshments**

4:15 PM – 5:15 PM **Podium Presentations**

Chair: Jarle Vaage and Alexander Emil Kaspersen

5. Andrea Camera *et al*
   Differences in Mitochondrial Reactive Oxygen Species (ROS) Production in Rat Heart and Liver at 37 and 38 degrees Celsius
6. Zineb Chaabi *et al*
   Dual biomarker analysis with CK-MB and Troponin T and early postoperative mortality after cardiac surgery
7. Andreas Overgaard *et al*
   Timing of Catheter Directed Mechanical Aspiration Thrombectomy in Acute Porcine Pulmonary Embolism
8. Rasmus Kragnede *et al*
   Intratracheal Tracheostomy Sealing: Three feasibility studies.

5:15PM – 5:45 PM	**Award Committee Meeting** Jarle Vaage, Won Yong Kim, Bent Roni Ranghøj Nielsen, Peter Johansen
5:45 PM – 6:00 PM	**Awards**
6:00 PM – 6:30 PM	**Evaluation**
7:30 PM	**Presidential Dinner**

ABSTRACTS

POSTER PRESENTATIONS

P1 *Novel Bio Scaffolds for Mitral Valve Repair: A Surgical Feasibility Study*
Johannes H. Jedrzejczyk et al.

P2 *Non-attendance and drop-out in Cardiac Rehabilitation following open-heart surgery*
Jacob Petersen et al.

P3 *Effects of butyrate on ischemia reperfusion injury in a porcine model of myocardial infarction*
Julian Schütz et al.

P4 *The 3FLASH study: Impact of Cardiac CT Protocol on Device Evaluation Following Left Atrial Appendage Occlusion*
Bjarke Sihm Stender et al.

P5 *Effects of Butyrate Infusion on Cardiac Hemodynamics in a Porcine Model of Cardiogenic Shock*
Alexander Møller Larsen et al.

P6 *Long-Term Outcomes of Coronary Artery Bypass Grafting vs. Percutaneous Coronary Intervention for Isolated Proximal Left Anterior Descending Artery Stenosis*
Andreas Ruelykke Damsted et al.

P7 *A novel expansible aortic annuloplasty ring for aortic valve repair*
Tanita Dreier Jeppesen *et al*

P1

Novel Bio Scaffolds for Mitral Valve Repair: A Surgical Feasibility Study

Johannes H. Jedrzejczyk[1,2], Tanita Jeppesen[1,2], Jesper Hønge[1,2], Jacob Petersen[1,2], Rasmus Kraghede[1,2], Mads Harthimmer[1,2], Leila Benhassen[1,2], Meindert Palmen[3], Jesper Hjortnaes[3], Mark Hazekamp[3], Shintaro Nemoto[4], J. Michael Hasenkam[1,2]

1. Department of Clinical Medicine, Aarhus University, Aarhus, Denmark; 2. Department of Cardiothoracic and Vascular Surgery, Aarhus University Hospital, Aarhus, Denmark; 3. Department of Cardiothoracic Surgery, Leiden University Medical Centre, Leiden, Netherlands; 4. Department of Thoracic and Cardiovascular Surgery, Osaka Medical College, Osaka, Japan

BACKGROUND

Mitral valve repair is preferred over replacement due to superior long-term outcomes. Still, current biomaterials, such as CorMatrix, CardioCel, and autologous pericardium, are limited by calcification, inadequate durability, and poor recellularization. A novel synthetic biomaterial combining crosslinked gelatine, poly-lactic acid, and polyethylene terephthalate has shown promise for in situ tissue restoration in preclinical models. This study evaluates the surgical feasibility of two variants, Bio Scaffold I, and Bio Scaffold II, for anterior mitral valve leaflet reconstruction in a porcine model. Bio Scaffold I incorporates a biodegradable component replaced by autologous tissue, which has demonstrated tissue ingrowth in an aortic implant model and is in clinical use for congenital cardiac surgery in Japan. Bioscaffold II has yet to be evaluated in vivo.

MATERIAL AND METHODS

Ten 80 kg pigs were randomized into two groups to undergo A2 segment reconstruction via modified left thoracotomy under extracorporeal circulation. Group A received Bio Scaffold I, and Group B received Bio Scaffold II, with a six-month follow-up. Intraoperative epicardial echocardiography assessed valve competency immediately post-reconstruction. Follow-up evaluations will include echocardiography, histology, biomechanical testing, and micro-CT.

RESULTS

The first subject has been successfully included in the study, and data collection is ongoing to assess feasibility.

PERSPECTIVES

This research aims to evaluate these novel materials' surgical handling, degradability, and tissue integration. If successful, the findings could guide the development of durable, biocompatible options for reconstructive mitral valve surgery, addressing significant limitations of current biomaterials.

P2

Non-attendance and drop-out in Cardiac Rehabilitation following open-heart surgery

Jacob Petersen[1,2], Bente Skovsby Toft[1,2], Ivy S. Modrau[1,2]

1.Department of Cardiothoracic and Vascular Surgery, Aarhus University Hospital, Aarhus, Denmark; 2. Department of Clinical Medicine, Faculty of Health, Aarhus University, Aarhus, Denmark.

BACKGROUND

Many patients experience reduced physical capability and psychosocial wellbeing after seemingly successful cardiac surgery. Cardiac rehabilitation is an acknowledged secondary intervention aiming to improve the patient´s physical status, risk factor management, medical treatment, disease understanding, and psychosocial situation. Despite these seemingly great initiatives, previous studies have shown that many patients fail to complete or even attend rehabilitation programs. We aim to quantify the current participation rates in cardiac rehabilitation following heart surgery, provide reasons for non-attendance and dropout, and investigate which demands patients report to be unmet or unsatisfactory in relation to their rehabilitation.

MATERIAL AND METHODS

Retrospective population based cross-sectional study comprising both survey and registry data. We will include patients recruited from the 1st of September 2023 following open-heart surgery at two Danish heart centres. A self-developed questionnaire about cardiac rehabilitation experience and unmet needs and demands will be sent to patients by electronic post. From the Western Denmark Heart Registry, we will acquire information regarding comorbidity and postsurgical complications. We will quantify the referral rates through medical journals.

RESULTS

As of November 10th, 2024, 123 out of 148 patients have responded to the survey (response rate: 83%). 84.6% of patients report participating in physical cardiac rehabilitation. The three main patient-reported reasons for non-participation are good health (39.3%), a preference for managing independently (23.2%), and poor health preventing participation (14.3%). Additionally, 24.5% of patients express dissatisfaction with post-rehabilitation psychological support, although only 15.8% report being offered this service.

CONCLUSION

Preliminary results suggest a high participation rate in physical training through cardiac rehabilitation programs among heart surgery patients in Denmark. The study indicates that the area patients currently find insufficient is psychological support after surgery.

P3

Effects of butyrate on ischemia reperfusion injury in a porcine model of myocardial infarction

Julian Schütz[1,2], Shan Awzhin Ali[2], Klaes Vincent Lenbroch[1,2], Sebastian Jakobsen[2], Lasse Juul Christensen[1,2], Alexander Møller Larsen[1,2], Oskar Kjærgaard Hørsdal[1,2], Rebekka Vibjerg Jensen[1,2], Kristoffer Berg-Hansen[1,2], Maja Brøgger Thomassen[2,3], Roni Nielsen[1,2]

1. Department of Cardiology, Aarhus University Hospital, 2. Institute of Clinical Medicine, Aarhus University, 3. Department of Heart, Lung and Vascular Surgery, Aarhus University Hospital

BACKGROUND

Acute ST-segment elevation myocardial infarction (STEMI) significantly impacts global health. Ischemic reperfusion (IR) injury occurs during treatment, but some tissue is salvageable. Recent research shows potential benefits of monocarboxylates like 3-hydroxybutyrate, lactate, and butyrate on heart function. Butyrate infusion has demonstrated substantial hemodynamic effects in animal studies, including a 50% increase in cardiac output in pigs and protective effects against IR injury in rats. These promising results warrant further investigation in human-sized animals to elucidate the mechanistic and protective effects of butyrate administration on IR injury before proceeding to human trials. We aim to investigate the potential IR protection of butyrate following myocardial infarction in a porcine model.

MATERIAL AND METHODS

This randomized, assessor-blinded study involves 24 pigs, comparing Na-butyrate infusion to saline control. The primary endpoint is the salvage index, with secondary endpoints including hemodynamic parameters and mitochondrial function. This open chest model employs 75 minutes of LAD occlusion followed by 120 minutes of reperfusion. Cardiac function is evaluated using thermodilution and pressure-volume measurements, while mitochondrial function is assessed from LV biopsies. Myocardial microdialysis is applied to sample interstitial ischemic markers.

RESULTS

This research year study is ongoing since 1st of September 2024. The experimental phase is planned to conclude in March 2025. Results pending.

PERSPECTIVES

Novel insights into the acute hemodynamic and cardiometabolic effects of butyrate in the context of myocardial infarction have the potential to pave the path for clinical trials. Ultimately, butyrate could offer innovative treatment approaches for individuals suffering from myocardial infarction.

P4

The 3FLASH study: Impact of Cardiac CT Protocol on Device Evaluation Following Left Atrial Appendage Occlusion

Bjarke Sihm Stender[1], Kasper Korsholm[1], Anders Dahl Kramer[1], Jens Erik Nielsen-Kudsk[1] Jesper Møller Jensen[1]

1.Department of Cardiology, Aarhus University Hospital, Aarhus, Denmark

BACKGROUND

Left atrial appendage occlusion (LAAO) is a viable alternative to oral anticoagulation for stroke prevention in atrial fibrillation. Peridevice leak (PDL) and device-related thrombosis (DRT) remain key challenges in post-procedural follow-up, as both are linked to thromboembolic risk. Cardiac computed tomography (CCT), now often preferred over transoesophageal echocardiography, is instrumental in detecting PDL and DRT. However, it has revealed new findings, such as hypo-attenuated thickening (HAT) and left atrial appendage (LAA) contrast patency, which may be undetectable with TEE. LAA patency may indicate incomplete device endothelialization; however, supporting evidence is lacking. HAT is graded as low-grade or high-grade, clinically interpreted as either a healing phenomenon or pathological DRT, respectively. Variations in CCT protocols, particularly the timing of scan acquisition relative to contrast injection, may influence LAA patency, HAT, and device healing assessment. This study aims to clarify the underlying mechanisms of LAA patency and secondarily investigate the effect of an advanced CCT protocol on the classification of PDL and HAT after LAAO.

MATERIAL AND METHODS

This single-center prospective study will include 90 patients undergoing Watchman LAAO at Aarhus University Hospital. Patients with a known allergy to iodine contrast or renal impairment with a glomerular filtration rate <30 mL/min will be excluded.

All patients undergo CCT two months after LAAO. Patients will undergo a triple-flash CCT protocol, acquiring images at T=0, T=+4, and T=+10 seconds, in contrast to the current standard single-flash CCT protocol (T=0). Patients will serve as their own control, allowing a direct comparison between single- and triple-flash protocols. Primary analyses will evaluate LAA contrast patency, PDL, and HAT using standardized Hounsfield unit thresholds and ratios within the LAA.

RESULTS

Results pending.

PERSPECTIVES

This study will contribute to a better mechanistic understanding of LAA patency, particularly whether it represents contrast passage through the device membrane (incomplete endothelialization) or passage of contrast through micro channels adjacent to the device (PDL). This may prove clinically relevant to distinguish during clinical follow-up when tailoring antiplatelet therapy and duration. Finally, the study will allow

P5

Effects of Butyrate Infusion on Cardiac Hemodynamics in a Porcine Model of Cardiogenic Shock

Alexander Møller Larsen[1,2], Lasse Juul Christensen[1,2], Oskar Kjærgaard Hørsdal[1,2], Rebekka Vibjerg Jensen[1,2], Jacob Seefeldt[1,2], Niels Moeslund[2,3], Hans Erik Bøtker[2], Kristoffer Berg-Hansen[1,2], Nigopan Gopalasingam[1,2], Roni Ranghøj Nielsen[1,2]

1.Dept. of Cardiology, Aarhus University Hospital, Denmark; 2. Institute of Clinical Medicine, Aarhus University, Denmark; 3. Dept. of Heart, Lung and Vascular Surgery, Aarhus University Hospital, Denmark

BACKGROUND

Cardiogenic shock (CS) is a severe condition caused by low cardiac output frequently due to acute myocardial infarction with left ventricle failure, which results in end-organ hypoperfusion. Although early revascularization treatment is initiated in patients with CS in hospital-mortality remains high. Butyrate infusion may be a novel treatment in the acute treatment of CS. Butyrate serves as substrate for oxidative phosphorylation, and the failing heart upregulates key enzymes in the process.

MATERIAL AND METHODS

The design of the study is a randomized, assessor-blinded study design. 22 pigs are enrolled to receive either a three-hour i.v. infusion with Na-butyrate or equimolar saline (control) after induction of CS, followed by a positive control infusion with dobutamine. Cardiac output is measured continuously with Swan-Ganz catheter and hourly using thermodilution. Endomyocardial biopsies are taken repeatedly before the induction of CS, at the start and at the end of the infusion period and will be analyzed to determine the oxidative capacity of the mitochondria.

When the infusion period has ended the pigs undergoes a midline sternotomy in which a core needle biopsy is taken. This is used for proteomics analysis to explorative investigate any up and down regulation of cardiac metabolic key enzymes.

RESULTS

Data has been collected, but data management is still ongoing. But I do have some preliminary results to present. Cardiac output was increased in the intervention group vs. the control group with 0.5521 L/min (95% CI: 0.01197 to 1.092 L/min; P=0.0456). The rest of the results are still pending.

CONCLUSION

No conclusions have been drawn yet.

PERSPECTIVES

Another interesting aspect of treatment with Na-Butyrate could be looking into if Na-Butyrate exerts cardio protection against myocardial ischemic reperfusion injury. Furthermore, if this study ultimately offer novel insight into the acute cardiac hemodynamics and cardiometabolic effects of Na-Butyrate in the context of CS it may have the potential to pave the path for clinical trials.

P6

Long-Term Outcomes of Coronary Artery Bypass Grafting vs. Percutaneous Coronary Intervention for Isolated Proximal Left Anterior Descending Artery Stenosis

Andreas Ruelykke Damsted[1,2], Alexander Emil Kaspersen[2], Ivy Susanne Modrau[1,2]

1. Department of Clinical Medicine, Faculty of Health, Aarhus University, Aarhus, Denmark; 2. Department of Cardiothoracic and Vascular Surgery, Aarhus University Hospital, Aarhus, Denmark.

BACKGROUND

Single-vessel coronary artery disease affecting the proximal left anterior descending (LAD) artery poses a significant risk of severe outcomes. Treatment possibilities encompasses myocardial revascularization by either coronary artery bypass grafting (CABG) either on or off-pump using the left or right internal mammary artery as grafting material or percutaneus coronary intervention (PCI) with stenting. The European myocardial revascularization guidelines consider the two treatments equal in terms of risk of death, myocardial infarction, and stroke, but evidence has showed a higher risk of repeat revascularization with PCI, and the most optimal treatment remains a subject of debate. This study aims to evaluate and compare the short- and long-term outcomes in patients undergoing PCI versus CABG for isolated LAD disease.

MATERIAL AND METHODS

In this Danish, multicenter, cohort study, elective adult patients who underwent either CABG with grafting of the LAD or PCI for proximal LAD disease from 1 January 2012 to 30 June 2023 in Western Denmark were identified by Nomesco Classification of Surgical Procedures codes in the Western Denmark Heart Registry. Only patients who was treated for proximal LAD disease were eligible. Patients were followed from intervention date to occurrence of the primary outcomes, all-cause mortality or repeat revascularization, or until end of study.

RESULTS

So far, no results have been obtained. The current myocardial revascularization guidelines warrant a need for large studies examining both short- and long-term clinical outcomes of isolated LAD revascularization through surgery or PCI.

CONCLUSION

Findings will enable physicians and patients to tailor more evidence-based and individualized treatment decisions in the future.

P7

A novel expansible aortic annuloplasty ring for aortic valve repair

Tanita Drejer Jeppesen[1,2], Johannes Høgfeldt Jedrzejczyk[1,2], Søren Nielsen Skov[1,2], Mariam Noor [1,2,3], Rasmus Ellerup Kraghede[2,4], Jacob Petersen[1,2], Frederik Thørholm Andersen[1,2], Markus Hasbak[1,2], Mads Rohde Harthimmer[1,2], Peter Johansen[1,2,3], J. Michael Hasenkam[1,2], Leila Louise Benhassen[1,2].

1.Department of Cardiothoracic and Vascular Surgery, Aarhus University Hospital, Denmark; 2. Department of Clinical Medicine, Aarhus University, Denmark; 3. Department of Electrical and Computer Engineering, Faculty of Technical Sciences, Aarhus University, Denmark; 4. Department of Anaesthesiology and Intensive Care, Aarhus University Hospital, Denmark.

BACKGROUND

50% of patients with aortic insufficiency (AI) undergoing aortic valve replacement will experience valve-related complications within ten years. This risk can be reduced to only 12% by repairing the aortic valve instead of replacing it. A subvalvular annuloplasty ring is essential to avoid recurrent AI when performing aortic valve repair. Different annuloplasty rings exist, but none have proven superior in terms of material, shape or position, and no guidelines on the subject of annuloplasty rings exist. Furthermore, none of the currently available annuloplasty rings have a heterogeneous construction. Finally, most are closed and cannot be used for isolated aortic valve repair.

To address this deficiency, our group has developed a physiological, expansible open aortic ring with a heterogenous design; the A-ring. In this study, we evaluate its performance using an acute porcine model.

MATERIAL AND METHODS

An 80 kg porcine model was used to evaluate aortic root motion, haemodynamics and valve performance before and after implementing the A-ring, using epicardial echocardiography, sonomicrometry and pressure catheters. After median sternotomy, establishment of extracorporeal circulation and cardioplegic arrest, the A-ring was inserted around the aortic annulus with 6 U-sutures. The aim was to obtain a mild downsizing of the aortic annulus diameter in systole.

RESULTS

Preliminary results show that the aortic root dynamics of the A-ring were similar to those of the native aortic root. It maintained aortic root distensibility and haemodynamic performance during the cardiac cycle. Moreover, the A-ring downsized the aortic annulus diameter as intended.

CONCLUSION

The A-ring showed physiologic expansibility comparable to that of the native aortic annulus. The results of these initial studies are promising regarding the characteristics required for a supportive aortic annuloplasty ring. They underline that the A-ring has the potential to become a future adjunct for aortic valve repair and valve-sparing aortic root procedures. This affords us a basis for continued functional testing aiming to develop a new surgical device and create the foundation for improving the overall treatment of AI, the benefits of which will affect a broad spectrum of patients.

P8

Impact of Intraoperative vs. Postoperative Compression on Wound Complications Following Saphenous Vein Harvest in CABG Surgery

Mads Harthimmer, Ivy Susanne Modrau

1. Department of Cardiothoracic and Vascular Surgery, Aarhus University Hospital, Aarhus, Denmark

BACKGROUND

Leg wound complications, such as hematoma, oedema, and infection, following saphenous vein harvesting for coronary artery bypass grafting (CABG) present substantial challenges for patient recovery. Compression therapy is standard in wound management after vein harvesting, but the optimal timing for its initiation—intraoperatively or postoperatively—remains under investigation. Compression therapy started intraoperatively can be thought to be more efficient in preventing hematoma, particularly due to the systemic heparinization that CABG patients undergo during surgery. This study aimed to assess the effectiveness of intraoperative versus postoperative initiation of compression therapy in reducing wound complications.

MATERIAL AND METHODS

This comparative study included 258 patients who underwent CABG surgery at our institution. Patients were divided into two cohorts: pre-intervention (before September 1, 2019, n=135) and post-intervention (after intraoperative compression was introduced, n=123): the post-intervention protocol incorporated, modified wound closure procedures, and low-threshold drainage use. The primary outcomes included rates of self-reported wound complications, hospital visits for wound care, and physician-monitored complications. Statistical analyses involved Chi-squared and t-tests.

RESULTS

Data revealed no statistically significant differences in complication rates between the two cohorts (see Figure 1). Specifically:

- Self-reported complications were observed in 21% (pre-intervention) vs. 25% (post-intervention); p=0.39.
- Hospital contact due to wound issues occurred in 21% vs. 24%; p=0.58.
- Wound care under physician supervision was required in 20% vs. 24%; p=0.49.
- Surgical intervention was necessary in 4% vs. 3%; p=0.75.
- Antibiotic treatment was initiated in 17% vs. 18%; p=0.86.

Baseline characteristics (Table 1) showed no significant differences between cohorts, with mean age 67±8 years (pre) and 68±7 years (post), and BMI 28.3±3.5 and 28.4±4.3, respectively.

CONCLUSION

The findings suggest that intraoperative initiation of compression does not significantly reduce wound complication rates compared to postoperative initiation. These results provide insight into optimizing operative protocols, potentially informing resource allocation and procedural guidelines in CABG surgery.

PODIUM PRESENTATIONS

O1 *The Role of Valve Endothelial Cells in Aortic Valve Calcification*
Daria Evensen et al.

O2 *Safety of Novel Oral Anticoagulants Compared to Warfarin for Postoperative Anticoagulation following Mitral Valve Repair*
Katrín Hólmgrímsdóttir et al.

O3 *Association of Mitral Annular Calcification with Warfarin Use*
Birta Rakel Óskarsdóttir et al.

O4 *3D isotropic upscaling of Coronary MR angiography using deep learning based Super-resolution*
Christoffer Vase Overgaard et al.

O5 *Preoperative anemia is associated with increased short- and long-term mortality in patients undergoing coronary artery bypass grafting: a large nationwide cohort study*
Alexander Emil Kaspersen et al.

O6 *Differences in myocardial structure, function and fibrosis in asymptomatic moderate or severe versus severe symptomatic aortic stenosis*
Anders Lehmann Dahl Pedersen et al.

O7 *Biopsy screening of patients undergoing Carpal Tunnel Syndrome Surgery for early diagnosis of Wild-type Transthyretin Amyloidosis Cardiomyopathy*
Sie Kronborg Fensman et al.

O8 *Impact of Anticoagulation Management on Thrombin Generation During Surgery for Acute Aortic Dissection – A randomized controlled trial*
Jens Toft Eschen et al.

O9 *Differences in Mitochondrial Reactive Oxygen Species (ROS) Production in Rat Heart and Liver at 37 and 8 degrees Celsius*
Andrea Camera et al.

O1

The Role of Valve Endothelial Cells in Aortic Valve Calcification

Daria Evensen[1,2], Arsenii Zabirnyk[1,2], Krizia Sagini[3], Hanne Haslene-Hox[4], Alicia Llorente Martinez[3], Mari-Liis Kaljusto[5], John-Peder Escobar Kvitting[5,6], Kåre-Olav Stensløkken[1], Jarle Vaage[1,2,6]

1. Institute of Basic Medical Sciences, University of Oslo, Norway; 2. Dept. of Research and Development, Oslo University Hospital, Norway; 3. Dept. of Molecular Cell Biology, Institute for Cancer Research, Oslo University Hospital, Norway; 4. SINTEF, Trondheim, Norway; 5. Dept. of Cardiothoracic Surgery, Oslo University Hospital, Norway; 6. Institute of Clinical Medicine, University of Oslo, Norway

BACKGROUND

Aortic valve calcification (AVC) is a leading cause of cardiovascular disease, affecting 25% of people over 75 years old. Valve interstitial cells (VICs) play a main role in calcification. Experimentally induced calcification in cultured VICs is a standard model to study AVC in vitro. It has been suggested that valve endothelial cells (VECs) may stimulate pro-osteogenic changes in the valve tissue. This study aimed to investigate the role and possible mechanisms of VECs in promoting calcification of VICs.

MATERIAL AND METHODS

A 2D co-culture system of human aortic VECs and VICs was established to study their interaction. In another model, extracellular vesicles (EVs) from VECs were isolated, characterized, and added to VICs. Proteomic analysis was performed on VECs from healthy and calcified valves to identify differentially expressed proteins.

RESULTS

Co-cultivation of VECs with VICs enhanced calcification in vitro compared to VICs monocultures with p value = 0.008. Addition of VEC-derived EVs to VICs undergoing experimentally induced calcification did not promote calcification. Proteomic analysis identified 3378 proteins across all samples, with 3342 proteins present in VECs from both healthy and calcified valves. Nitric oxide synthase 3 and Hedgehog-interacting protein were increased in VECs from calcified valves with p values = 0.005 and 0.002 respectively. Further bioinformatic analysis is ongoing.

CONCLUSION

VECs from calcified valves stimulated calcification of VICs. Extracellular vesicles did not mediate this effect. The proteomic profiles of VECs from healthy and calcified valves showed several changes. VECs may promote calcification in VICs by paracrine factors or direct cell-to-cell interaction.

PERSPECTIVES

Further investigation should be concentrated on the mechanisms behind direct intercellular communication, which may be involved in pro-osteogenic changes in aortic valve tissue.

O2

Safety of Novel Oral Anticoagulants Compared to Warfarin for Postoperative Anticoagulation following Mitral Valve Repair

Katrín Hólmgrímsdóttir[1], Birta Rakel Óskarsdóttir[1], Bjarki Leó Snorrason[1], Andrea Amabile[2], Arnar Geirsson[2]

1. Faculty of Medicine, University of Iceland, Reykjavík, Iceland; 2. Division of Cardiac Surgery, Yale School of Medicine, New Haven, CT, USA

BACKGROUND

Anticoagulation guidelines for mitral valve repair are not well-established due to limited evidence. We evaluated the safety of novel oral anticoagulants (NOACs) compared to warfarin for postoperative anticoagulation following mitral valve repair.

MATERIAL AND METHODS

We conducted a single-center, retrospective cohort study of 188 patients who underwent mitral valve repair between April 2020 and October 2022. Exclusion criteria included re-repair, follow-up period shorter than 6 months, or receipt of only antiplatelet therapy. Patients were stratified by initial anticoagulation strategy: warfarin (n=165) and NOACs (n=23). Composite outcomes of bleeding and thromboembolic events, as well as readmissions, all occurring within 6 months postoperatively, and 30-day mortality were compared. Patients who changed their anticoagulation strategy during the follow-up period were censored at the time of change. Statistical analysis included descriptive statistics, logistic regression, and Kaplan-Meier survival analysis to compare the anticoagulation groups.

RESULTS

Postoperative bleeding events were generally similar between the two groups, except for a significantly higher incidence of gastrointestinal bleeding in the NOACs group (5/23, 21.7% vs. 3/165, 1.8%; p=0.010; see Figure 1). No significant differences were observed in thromboembolic events, including stroke. The readmission rate was significantly higher in the NOACs group (6/23, 26.1% vs. 9/165, 5.5%; p=0.039). One 30-day mortality occurred in the warfarin group. During the 6-month follow-up, 58 of the 188 patients (30.9%) changed their anticoagulation strategy, with 54 patients switching from warfarin to NOACs. The main reasons for changing anticoagulation were subtherapeutic INR and patient preference for NOACs due to preoperative atrial fibrillation.

CONCLUSION

Anticoagulation with NOACs following mitral valve repair may be associated with an increased risk of gastrointestinal bleeding and readmission, although it is equally effective for thromboembolic prophylaxis compared to warfarin. Further randomized clinical trials are needed to validate these findings and enhance clinical practice.

O3

Association of Mitral Annular Calcification with Warfarin Use

Birta Rakel Óskarsdóttir[1], Bjarki Leó Snorrason[1], Katrín Hólmgrímsdóttir[1], Makoto Mori[2], Arnar Geirsson[2]

1. Faculty of Medicine, University of Iceland, Reykjavik, Iceland 2. Division of Cardiac Surgery, Yale School of Medicine, New Haven, CT, USA

BACKGROUND

Mitral Annular Calcification (MAC) is the accumulation of calcium deposition within the mitral annulus. MAC possesses an operative risk and is associated with worse surgical outcomes. Previous research has shown an association of warfarin use with cardiovascular calcification, including mitral annular calcification. The aim of this case-control study was to evaluate the potential association of warfarin use to the presence of MAC.

MATERIAL AND METHODS

From a dataset with 1156 patients aged ≥ 60 years with TTEs between 2014-2018 and with history of atrial fibrillation or atrial flutter, 197 had MAC. These 197 patients were defined as the case group and were matched to patients without MAC from the same dataset in the ratio 1:2 based on 12 covariates. Information regarding anticoagulant use (NOACs and warfarin), degree of mitral annular calcification, and the date of the oldest TTE available where MAC was noted, were collected for the final 591 patient cohort. History of warfarin use was then compared between the case-control groups and across different MAC severity groups.

RESULTS

There was no significant difference in warfarin use between the case-control groups. Although not significantly, warfarin use was more common in the control group, with 33.2% (131 out of 394) compared to 28.4% (56 out of 197) in the case group (p-value = 0.274). The median [IQR] duration of warfarin use (in days) differed significantly, with 457.00 [187.25, 714.50] for the case group and 795.50 [448.50, 1325.25] for the control group (p-value < 0.001). Median [IQR] for the duration on warfarin was the longest for patients with mild MAC, 510 [580.5], but the shortest for patients with severe MAC, 169 [136] (p-value= 0.1609).

CONCLUSION

This study did not provide a clear association between warfarin use and mitral annular calcification, nor did it show any correlation between warfarin use and the severity of mitral annular calcification.

O4

3D isotropic upscaling of Coronary MR angiography using deep learning based Super-resolution.

Christoffer Vase Overgaard[1,2], Gregory John Wood[2], Andreas Kabel, Won Yong Kim[1,2]

1. Department of Cardiology, Aarhus University Hospital, Aarhus, Denmark; 2. Department of Clinical Medicine, Aarhus University, Aarhus, Denmark; 3. 3MR Research Collaborations, Siemens Healthcare Limited, Camberley, UK; 4. School of Biomedical Engineering and Imaging Sciences, King's College London, London, United Kingdom.

BACKGROUND

Coronary artery disease (CAD) is the leading cause of cardiovascular morbidity and mortality worldwide. Coronary CT Angiography (CCTA) is the recommended first line investigation in symptomatic patients, however, the patient is exposed to ionising radiation and potentially nephrotoxic contrast agents. Coronary Magnetic Resonance Angiography (CMRA) is a non-invasive scan, with zero contrast agents, and is free of ionising radiation. However, the current image quality and acquisition speed for CMRA remains inferior to CCTA. One possible approach to accelerate CMRA is to use Deep learning (DL)-based super-resolution (SR) techniques to enhance spatial resolution from a lower resolution acquisition, reducing motion artifacts and increasing speed.

MATERIAL AND METHODS

We propose a convolutional deep-learning based 3D SR model. The Enhanced Deep Residual Network (EDSR) has been used as a reference framework and was trained on low-Resolution (LR) isotropic CMRA created retrospectively from a high-resolution (HR) counterpart using Fourier truncation and variable density (VD) compensation. A retrospective and prospective cohort of 64 and 10 patients is evaluated using quantitative and qualitative measures. Using the whole volume CMRA in image space, the PSNR (Peak signal to noise ratio) and SSIM (structural similarity index).

RESULTS

Significant improvement was shown in vessel sharpness ($P<0.02$) when comparing SR on the prospective dataset and HR scans, while vessel length had no significant worsening. Signal to noise ratio (SNR) and contrast to noise (CNR) was increased, showing a significant difference using the SR network. From the test set we obtained PSNR and SSIM values of 31.2 and 0.80 respectively.

CONCLUSION

The 3D EDSR model increased vessel sharpness while there was no adverse effect on the vessel length. The model was not able to recover distal parts of the coronary arteries as in the HR acquisition.

PERSPECTIVES

The diagnostic accuracy of the proposed 3D EDSR model will be investigated in an international multicenter study with the participation of 5 heart centres in Denmark and England. The purpose of the multicenter study is to compare CMRA versus CCTA in a cohort of 200 patients to be investigated for possible CAD. The hypothesis is that CMRA can reliably rule out significant CAD and can thus be used as an alternative, more safe examination.

O5

Preoperative anemia is associated with increased short- and long-term mortality in patients undergoing coronary artery bypass grafting: a large nationwide cohort study

Alexander Emil Kaspersen, MD [1,*], Susanne J. Nielsen, RN PhD [2,3], Ivy Susanne Modrau, MD [1,4], Alexandra Aldis Heimisdottir, MD [5], Tomas Gudbjartsson, MD PhD [5,6], Anders Jeppsson, MD PhD [2,3]

1. Department of Cardiothoracic and Vascular Surgery, Aarhus University Hospital, Aarhus, Denmark; 2. Department of Cardiothoracic Surgery, Sahlgrenska University Hospital, Gothenburg, Sweden; 3. Department of Molecular and Clinical Medicine, Institute of Medicine, Sahlgrenska Academy, Gothenburg University, Gothenburg, Sweden; 4. Department of Clinical Medicine, Faculty of Health, Aarhus University, Aarhus, Denmark; 5. Department of Cardiothoracic Surgery, Landspitali University Hospital, Reykjavik, Iceland; 6. Faculty of Medicine, University of Iceland, Reykjavik, Iceland.

BACKGROUND

Anemia is associated with inferior early outcome after cardiac surgery. However, the association between preoperative anemia and long-term mortality after coronary artery bypass grafting (CABG) has not previously been sufficiently investigated.

MATERIAL AND METHODS

In this observational, nationwide cohort study, including patients from the SWEDEHEART registry, all patients who underwent first-time isolated CABG in Sweden 2009-2015 were eligible. Exclusion criteria were age < 18 years, previous or simultaneous cardiac surgery, or/and a missing preoperative hemoglobin value (n=5,840). The WHO definition of anemia was used (hemoglobin concentration <130 g/L for males, <120 g/L for females). Kaplan-Meier curves and multivariable Cox regression models adjusted for age, sex, renal function, previous bleeding, heart failure, previous stroke, previous myocardial infarction, left ventricular ejection fraction, diabetes, atrial fibrillation, peripheral vascular disease, pulmonary disease, hypertension, and history of cancer, were utilized to compare anemic and non-anemic patients.

RESULTS

Of 16,041 patients included, 3,308 (20.6%) had anemia, 19.5% among males and 25.7% among females. The incidence of all-cause death during follow-up in anemic and non-anemic patients was 4.6 and 1.7 per 100 patient years, respectively. The overall unadjusted hazard ratio (HR) of mortality with 95% confidence interval was 2.73 (2.43-3.07) for preoperative anemia. When adjusted, the HR was 1.53 (1.35-1.73). Furthermore, the sex-specific adjusted HRs for males and females were 1.62 (1.40-1.86) and 1.23 (0.93-1.61), respectively.

CONCLUSION

Preoperative anemia is independently associated with an increased long-term mortality after CABG, more strongly for males than females. These results suggest closer surveillance postoperatively for patients with preoperative anemia.

O6

Differences in myocardial structure, function and fibrosis in asymptomatic moderate or severe versus severe symptomatic aortic stenosis

Anders Lehmann Dahl Pedersen[1,2], Marte Saevik[4], Christian Alcaraz Frederiksen[1,2], Jonas Agerlund Povlsen[1,2], Won Yong Kim[1,2], Henrik Wiggers[1,2], Øyvind Haugen Lie[5], Per Steinar Halvorsen[3,4], Steen Hvitfeldt Poulsen[1,2]

1. Department of Cardiology, Aarhus University Hospital, Aarhus, Denmark; 2. Aarhus University, institute of Health, Aarhus Denmark; 3. The Intervention Centre, Rikshospitalet, Oslo University Hospital, Oslo, Norway; 4. Faculty of Medicine, University of Oslo, Oslo, Norway; 5. Department of Cardiology, Rikshospitalet, Oslo University Hospital, Oslo, Norway

BACKGROUND

Symptom burden is a key marker for determining the timing of aortic valve replacement in severe aortic stenosis (AS). Symptomatic-AS seems to develop late in the disease course and has been associated with irreversible myocardial fibrosis. It is as yet undetermined at which stage in the disease course the fibrosis develops.

We aimed to assess the burden of myocardial fibrosis using cardiac magnetic resonance (CMR) in patients with severe symptomatic-AS compared to asymptomatic moderate or severe AS.

MATERIAL AND METHODS

In this international, dual-center, prospective study, 157 patients were included, 52 with asymptomatic-AS and 105 with symptomatic AS. Evaluation included CMR with late gadolinium enhancement for T1 mapping and extracellular volume (ECV) assessment, blood samples and echocardiography. Patients with symptomatic-AS were examined < 2 months before transcatheter aortic valve implantation.

RESULTS

Demographics were similar for the two groups, except symptomatic-AS were of higher age, had marginally lower renal function and higher Nt-proBNP than asymptomatic-AS (Table 1). Systolic function assessed by left ventricular (LV) ejection fraction (LVEF) was similar between the groups, but CMR- and echo-derived global longitudinal strain was more impaired in symptomatic-AS patients (14.0% +/- 2.6 vs. 12.6% +/- 2.8, p<0.01) (Figure 1). No differences in diastolic function or LV mass were encountered. When assessing CMR markers of fibrosis, patients with symptomatic-AS had higher native T1 values (1026 ms +/- 33 vs 1004 ms +/- 53, p=0.02) and higher ECV (29.3% +/- 3.3 vs 27.5% +/- 4.0, p=0.02) compared to asymptomatic-AS.

CONCLUSION

The progression from asymptomatic moderate or severe AS to symptomatic severe AS seems associated with increased myocardial fibrosis and impairment of LV strain, with similar LVEF, LV mass and diastolic function. These slight changes suggest that development of symptoms might be associated to increasing myocardial fibrosis with concurrent slight impairment of LV systolic function not detectable by LVEF.

O7

Biopsy screening of patients undergoing Carpal Tunnel Syndrome Surgery for early diagnosis of Wild-type Transthyretin Amyloidosis Cardiomyopathy

Sie Kronborg Fensman[1], Bertil Ladefoged[1], Charlotte Hartig-Andreasen[2], Christina Stilling[3], Steen Hvitfeldt Poulsen[1]

1 Department of Cardiology, Aarhus University Hospital, 2 Department of Orthopedic Surgery, Aarhus University Hospital, 3 Department of Pathology, Aarhus University Hospital

BACKGROUND

Wild-type transthyretin cardiac amyloidosis (ATTRwt-CM) is an underdiagnosed progressive cardiomyopathy that leads to heart failure and poor prognosis in elderly patients. ATTRwt-CM arises from transthyretin (TTR) that misfolds and aggregates, forming amyloid fibrils, which deposit in the myocardium. ATTRwt-CM is associated with carpal tunnel syndrome (CTS).

MATERIAL AND METHODS

We are conducting a prospective multicenter cohort study including an estimated 150 consecutive patients (men ≥ 65 years and women ≥ 75 years) undergoing surgery for idiopathic CTS. Patients with biopsies from the tenosynovial tissue in the carpal tunnel confirming amyloid deposition undergo a cardiac evaluation for ATTRwt-CM. The primary aim is to assess the prevalence of amyloid deposition in carpal tunnel biopsies and the prevalence of ATTRwt-CM in this population. A control cohort of age- and gender-matched clinically-diagnosed symptomatic ATTRwt-CM patients will be included to compare disease stages with screening-detected ATTRwt-CM patients.

RESULTS

Preliminary results include 83 patients (50 men and 33 women) undergoing surgery for idiopathic CTS. Biopsies confirmed amyloid deposition in 41 (49.4%; 95% CI 38.4-60.6) patients. 33 patients underwent further evaluation, revealing 8 patients (24.2%; 95% CI 11.1-42.3) with ATTRwt-CM.

CONCLUSION

In an aged and predominantly male population undergoing idiopathic CTS surgery, 49.4% (95% CI 38.4-60.6) had amyloid deposition in biopsies from the carpal tunnel, and 24.2% (95% CI 11.1-42.3) of those evaluated further were diagnosed with ATTRwt-CM.

PERSPECTIVES

These findings suggest that idiopathic CTS may serve as an early marker for ATTRwt-CM. With further research within this study, we expect to show that screening-diagnosed ATTRwt-CM patients are in an early clinical disease stage compared to clinically-diagnosed ATTRwt-CM patients. We hope to contribute to methods for diagnosing ATTRwt-CM in a significantly earlier disease stage, making it possible to enable targeted treatment while there is still a great potential to avoid severe disabilities and improve prognosis.

O8

Impact of Anticoagulation Management on Thrombin Generation During Surgery for Acute Aortic Dissection – A randomized controlled trial

Jens Toft Eschen[1], Andreas Ruelykke Damsted[1], Julie Brogaard Larsen[2], Peter Fast Nielsen[1], Mariann Tang Jensen[1], Michael Kremke[3], Ivy Susanne Modrau[1]

1. Dept. of Cardiothoracic and Vascular Surgery, Aarhus University Hospital, Denmark; 2. Dept. of Clinical Biochemistry, Aarhus University Hospital, Denmark; 3. Dept. of Anesthesiology and Intensive Care, Aarhus University Hospital, Denmark.

BACKGROUND

Acute aortic dissection (AAD) is a life-threatening condition often complicated by severe bleeding, leading to significant morbidity and mortality. Current intraoperative management of anticoagulation and consumptive coagulopathy lack robust empirical support. This study will compare the effects of an individualized anticoagulation strategy versus a conventional approach on blood coagulation and clinical outcomes.

MATERIAL AND METHODS

We present a randomized controlled trial comparing two anticoagulation strategies in 26 patients with AAD (Stanford type A). Patients are stratified upon clinical signs of organ dysfunction and anticoagulation therapy before surgery prior to 1:1 randomization. We compare individualized heparin management based on heparin dose-response curve for anticoagulation during cardiopulmonary bypass (CPB) with a conventional activated clotting time approach. The primary outcome is prothrombin fragment F1+2 after heparin reversal as a measure of thrombin generation. Secondary outcomes include other coagulation and fibrinolysis markers up to 48 hours post-surgery and clinical outcomes up to 90 days.

RESULTS

Patient enrollment is completed and blinded data analysis is ongoing. Final results will be ready and presented at GEILO2025. Registered at https://clinicaltrials.gov/study/NCT05484830.

CONCLUSION

The CAAD trial will evaluate whether an individualized anticoagulation strategy during CPB offers benefits over conventional methods for AAD patients. The trial will also provide a comprehensive assessment of pre- and perioperative consumptive coagulopathy.

PERSPECTIVES

Treatment of AAD remains a significant challenge and lacks a solid evidentiary base. This trial will provide detailed valuable insight into the impact of different guideline- approved anticoagulation management strategies and their effects on the coagulation system and changes over time that have never been compared head-to-head in these acute patients. We aim to expand our understanding of the impact of intensified anticoagulation management strategies and their effects on the coagulation system during complex surgical procedures with CPB and the impact on clinical outcome. The results may potentially improve the treatment of this devastating and challenging disease, providing stronger evidence-based treatment regiments for these critically ill patients.

O9

Differences in Mitochondrial Reactive Oxygen Species (ROS) Production in Rat Heart and Liver at 37 and 8 degrees Celsius

Andrea Camera[1], Lucie Gerber[2], Ngoc-Trang Thi Huynh[1], Gustavo Silva[1], Tawhidul Islam[1], Marte Bliksøen[3], Kåre-Olav Stensløkken[1]

1. Section for Physiology, Department of Molecular Medicine, Institute of Basic medical Sciences, University of Oslo, Oslo, Norway; 2. Section for Physiology and Cell Biology, Institute of Biosciences, University of Oslo, Oslo, Norway; 3. Section for Transplantation Medicine, Rikshospitalet, Oslo University hospital, Oslo, Norway

BACKGROUND

Machine perfusion is an emerging technique to improve and assess function after harvesting organs before transplantation. Perfusion may be with different solutions at different temperatures to reduce organ injury and to restore physiological functions. We use animal models to investigate machine perfusion strategies in marginal livers and hearts from circulatory death donors.
After organ harvesting and ischemia, disruption of mitochondrial physiology triggers excess production of reactive oxygen species (ROS) like hydrogen peroxide (H_2O_2). One way to reduce post-ischemic injury is cold reperfusion or perfusion.

AIM

To assess mitochondrial function and ROS production in vitro at different temperatures relevant for transplantation procedures.

MATERIAL AND METHODS

Mitochondria were isolated from rat heart and liver after circulatory death. High resolution respirometry (O2K, Oroboros Instrument) was used to assess mitochondrial function like oxygen consumption and H_2O_2 production by Amplex-UltraRed assay, at 37 and 8°C.

RESULTS

1) ATP-linked respiration was lower at 8°C compared to 37°C and lower in the liver than in the heart at both temperatures. 2) Mitochondrial coupling efficiency (which estimates mitochondrial function) in the heart was at 8°C 24% higher than at 37°C ($p<0.05$). In the liver it was 11% higher at 8°C ($p<0.05$). 3) H_2O_2 production decreased 69% in the heart ($p<0.05$) and 65% in the liver ($p<0.05$) at 8°C compared to 37°C. This reduction of H_2O_2 production is not explained by the concurrent decrease in oxygen consumption 4) H_2O_2 production was five-fold higher in the liver compared to the heart ($p<0.05$).

CONCLUSION

Temperature reduction alone has an independent effect in limiting H_2O_2 production in both heart and liver. Acute exposure to cold temperature did not reduce mitochondrial efficiency. These findings show that exposure to cold temperature preserved mitochondrial function and reduced mitochondrial production of reactive oxygen species. After harvesting organs, cold machine perfusion may be beneficial to reduce post-ischemic injury before transplantation.

O10

Dual biomarker analysis with CK-MB and Troponin T and early postoperative mortality after cardiac surgery

Zineb Chaabi[1], Anders Jeppsson[1]

1.Sahlgrenska University Hospital, Gothenburg, Sweden

BACKGROUND

High postoperative levels of the biomarkers Creatin-Kinase MB (CK-MB) and high sensitive Troponin T (hsTnT) are associated with increased early mortality after cardiac surgery. This study tested the hypothesis that the mortality is higher if both the biomarkers are above defined threshold levels than if only one of these are.

MATERIAL AND METHODS

A retrospective analysis of 843 patients was conducted using data from the SWEDEHEART registry. Two different sets of cut-off levels for the biomarkers were utilized. First, threshold values from the European Association for Cardio-Thoracic Surgery (EACTS) were used. Secondly, thresholds levels based on the SWEDEHEART data set were determined using Youden's index based on receiver operating characteristic (ROC) curve analysis. Thirty-day mortality between the groups were compared with Chi-squared test.

RESULTS

The median maximal postoperative CK-MB was 27 µg/L (interquartile range (IQR) 14–61), and hsTnT s 696 ng/L (IQR312–1671). The EACTS thresholds are 100 µg/L for CKMB and 7500 ng/L for hsTnT. Using these thresholds, 30-day mortality was 35.0% for both biomarkers, 13.9% for CK-MB and 8.3% for hsTnT above threshold (p=0.047). Thresholds levels based on the present dataset was 62.5 µg/L for CK-MB and 1035 ng/L for hsTnT. Thirty-day mortality was 15.6% with both biomarkers above thresholds, 8.3% for only CKMB and 8.6% for only hsTnT above thresholds (p=0.14).

CONCLUSION

CK-MB and Troponin T are complementary biomarkers for identifying patients with high early mortality risk after cardiac surgery. Analyzing both biomarkers may potentially improve outcome prediction.

O11

Timing of Catheter Directed Mechanical Aspiration Thrombectomy in Acute Porcine Pulmonary Embolism

Andreas Overgaard[1,2], Simone Juel Dragsbæk[1,2], Mark Stoltenberg Ellegaard[2,3], Maya Sanjuan[2,3], Sebastian Gustavsen[2,3], Jacob Gammelgaard Schultz[1,2], Asger Andersen[1,2]

1. Dept. of Cardiology, Aarhus University Hospital, Denmark; 2. Dept. of Clinical Medicine, Aarhus University Hospital, Denmark; Dept. of Anesthesiology and Intensive Care, Aarhus University Hospital, Denmark

BACKGROUND

Catheter directed mechanical aspiration thrombectomy (CDT) is a rapidly growing treatment of acute pulmonary embolism (PE). Due to patient- and diagnostic delay, time from onset of PE to CDT varies from hours to several days. As a thrombus ages it becomes incorporated into the vessel wall. Consequently, this transformation might pose a challenge for CDT procedures. Using a PE porcine model, with stepwise increased time delays between PE to CDT treatment, we aim to investigate if the efficacy of CDT decreases with time following acute PE in pigs.

MATERIAL AND METHODS

A total of 18 pigs all received acute pulmonary embolism and were randomized into three groups receiving CDT intervention on day zero (D0 n=6), day three (D3 n=6) or day 14 (D14 n=6). At the day of CDT, hemodynamic measurements, blood samples and CT pulmonary angiography were performed before and after treatment. Modified Qanadli CT obstruction percentage will be evaluated from the CTPAs. Histology is performed of pulmonary arteries to investigate changes in clot type over time including fibrosis, endothelization, and neointima.

RESULTS

Data collection is completed. Data analysis is ongoing, and the results will be presented at Geilo Meeting.

PERSPECTIVES

PE is the third most common cause of cardiovascular death. This study will provide better understanding of treatments possibilities for patients suffering from PE. Evidence regarding CDT of PE is still limited, despite rapidly increased clinical use. Optimal timing and planning of procedures may be challenging due to delay from symptom to treatment as clot clearance may be more difficult with older clots. This study will provide insights regarding clot clearance with CDT in relation to the age of the PE and may aid in decision making regarding treatment of PE patients with CDT.

O12

Intratracheal Tracheostomy Sealing: Three feasibility studies

Rasmus Ellerup Kraghede[1,2,3], Karen Juelsgaard Christiansen[3], Stig Dyrskog[3], Louise Winding Nielsen[1,2], Alexander Emil Kaspersen[1], Esben Beier Gynning[2], Jens Toft Væsel[1], Louise Devantier[4], Micheal Pedersen[2,5], J. Michael Hasenkam[1,2]

1.Department of Cardiothoracic and Vascular Surgery, Aarhus University Hospital, Aarhus, Denmark; 2. Department of Clinical Medicine, Faculty of Health, Aarhus University, Denmark; 3. Department of Anaesthesiology and Intensive Care, Aarhus University Hospital, Aarhus, Denmark; 4. Department of Otorhinolaryngology, Head and Neck Surgery, Aarhus University Hospital, Aarhus, Denmark; 5. Comparative Medicine Lab, Aarhus University Hospital, Aarhus, Denmark

BACKGROUND

Tracheostomy decannulation leaves an open airway passage, leading to potential pulmonary dysfunction and reduced voice quality. Conventional bandage-based sealing methods often fail, necessitating an innovative approach. Our studies explore the feasibility, tissue compatibility of an intratracheal silicone-based sealing device, and impact on lung function and voice quality.

MATERIAL AND METHODS

Three studies were conducted: (1) A clinical feasibility study with 15 ICU patients evaluating spirometry (FVC, FEV1, PEF) and voice quality pre- and post-sealing; (2) A porcine model assessing tissue compatibility of a prototype silicone disc in 20 pigs across three groups; (3) A feasibility study at Intensive Care Units at Aarhus University Hospital and Gødstrup Hospital with 10 ICU patients, measuring pulmonary function, wound healing and voice quality over a seven-day sealing period.

RESULTS

Study 1 demonstrated significant improvements in FVC ($p < 0.001$), FEV1 ($p < 0.001$), and voice quality ($p < 0.001$) with sealing, confirming its immediate functional benefits. Study 2 showed tissue compatibility, airtight qualities of our prototype and easy removal once tracheostomy had healed. Study 3's results indicate improvements in lung function and expedited wound healing, supporting its potential role in pulmonary rehabilitation.

CONCLUSION

Intratracheal tracheostomy sealing is a feasible and promising intervention, enhancing lung function, voice quality, and rehabilitation post-decannulation. Further research will investigate if this method enhances patient rehabilitation and reduces in-hospital stay compared to conventional bandaging in ICU patients with tracheostomies.

GEILO MEETING

Cardiovascular and Thoracic Research