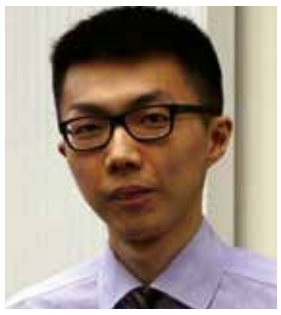
SCTS CONFERENCE NEWS

The official newspaper of the SCTS Annual Meeting 2022 **8–10 May 2022**

In this issue



Welcome to Belfast!

Welcome to the 2022 SCTS Annual Meeting in Belfast. This year's programme covers the many different aspects of cardio-thoracic surgery, emphasising areas that are important in your daily clinical work. As ever, we are hoping to create an interactive meeting with the exchange of knowledge and ideas, facilitating discussions and debates between delegates.

With a wide range of educational formats presenting the latest and the best information on new technologies and techniques in cardio-thoracic surgery, the presentations will be of interest to all cardiothoracic surgeons and allied health professionals.

This year's meeting will include presentations of the highest quality from surgical and masterclass presentations to the latest clinical updates and technical innovations. As ever, the meeting will also witness some outstanding debates presented by some of the foremost experts in their field. This year's keynote lectures include the Heart Research UK Lecture: Myocardial Injury after Heart Surgery by Richard Whitlock (McMaster University Medical Schoolm Hamilton, Ontario, Canada), the BHVS Lecture: How to Follow up a Patient After Heart Valve Surgery by Laura Dobson (Wythenshawe Hospital, Manchester, UK) and the Hunterian lecture: Myocardial Protection in Paediatric Cardiac Surgery: Building an Evidence-based Strategy by Nigel Drury (Birmingham Children's Hospital).

Away from the scientific programme, all delegates are reminded that this year's SCTS Annual Dinner will be held on Monday 9th March at the Hilton Hotel Belfast. Some spaces are still available, Please ask at the registration desk for further details.

The organisers would like to extend their thanks to industry for their continued support of the meeting, and all the presenters who have taken the time to contribute to this year's *SCTS Conference News* newspaper. It is a great pleasure to welcome you to Belfast and the organisers are honoured and delighted with your presence at this meeting.

We hope the information presented will be of great interest. Belfast is a city with a wonderful cultural heritage, and we hope you enjoy the meeting and all this wonderful city has to offer…and remember to make in note in your diaries for next year's meeting that will be held in Birmingham, 19–21 March 2022!

Cardiac Surgery - General I Meeting Room 3B **Monday** 11:00 - 12:30

Identifying predictors of short- and long-term outcome after surgery for infective endocarditis: the RBHT experience

M Yousuf Salmasi, Victoria Rizzo, Maria Comanici, Nandor Marczin, Thanos Athanasiou, Shahzad Raja Imperial College London, and St Thomas, London

Yousef Salmasi

Victoria Rizzo

Surgery for active IE is associated with a high mortality rate and recent advances in surgical procedures and perioperative management do not seem to have changed the outcome of surgery significantly in the last 20 years. Despite improvements in diagnostic testing, antimicrobial treatment, and surgical intervention, factors such as the rise in nosocomial infections and virulent causative organisms (especially Stapholococcus), increase the risk of complications and death in the acute phase of IE.

Several scoring systems (e.g. Risk-E, Palsuse) have been reported in the literature for evaluating clinical predictors of endocarditis. However, very few that have been tested incorporate long-term outcomes and the impact of metabolic dysfunction has not been explored. This study aimed to evaluate the clinical predictors of patient outcome after surgery for infective endocarditis.

Our research

We conducted a retrospective analysis of all consecutive patients undergoing surgery for infective endocarditis at RBHT in the period January 2015 to February 2021. Data pertaining to patient covariates, operative parameters and short-term outcomes were collated from the prospectively collected database (PATS). Data was supplemented retrospectively from hospital records to obtain microbiology, echocardiographic and long-term survival data. Multivariate analysis and survival analysis (including Cox-regression) were conducted to assess predictors of short- and long-term outcomes.

Results

In the study period, 148 patients had surgical management of endocarditis. Within the group, 43 patients (29%) had had previous cardiac surgery, 34 patients (25%) had prosthetic valve endocarditis, 50 patients were reported as having subacute/chronic endocarditis (vs 99 patients acute), 15 patients had double valve endocarditis, 53 (44%) patients had at least a single positive blood culture prior to surgery, of these 18 were staphylococcus. Valve tissue provided a positive culture in 66% of patients.

Logistic regression analysis was used to assess the influence of clinical parameters on mortality. The involvement of the aortic valve was a stronger predictor of worse outcome. Conversely, neither age, LV function or microbiology were predictors of mortality.

Long-term survival (at 5 years) was 88.9%. Haemofiltration post endocarditis surgery is a significant predictor for worse survival outcome (filtration 45% vs no-filtration 96%, logrank test, p<0.001). There was an early effect of death rates which levelled out over the years. The existence of prosthetic valve endocarditis, blood culture positivity or redo surgery were not predictors of mortality (logistic regression, P>0.05) or survival outcome (logrank, p>0.05).

Clinical implications

The study highlights the strong influence of renal dysfunction on short and long-term outcomes after cardiac surgery. In septic states (such as that in IE) the release of many pro-inflammatory mediators into the circulation leads to deleterious systemic effects. Although this effect may in part be modified through anti-inflammatory mediators, sustained effects may lead to relative immunoparesis. The downstream effect on renal function and need for haemofiltration is strongly indicative of disease severity. As a result, our group is conducting an in-depth analysis of vasoplegia markers to assess the influence of vasoplegia status and end-organ perfusion on short/long-term outcomes and potential methods for patient-specific management.

2021 SCTS Prize Winners

Ronald Edwards Medal
Best scientific oral presentation
HARDEEP AUJLA
The Effect of Intravenous Sildenafil Citrate on Post Cardiac Surgery AKI: A Double Blinded, Randomised, Placebo-controlled, Clinical Trial

John Parker Medal
best clinical presentation
LU WANG
The North East Frailty Score (NEFS) – A New Comprehensive Frailty Tool for Elective Cardiac Surgery Patients – Results of the Pilot Study

Bob Bonser Aortic Surgery Prize
ARNALDO DIMAGLI
Neuroprotective Strategies in Acute Aortic Dissection. An Analysis of the UK National Adult Cardiac Surgical Audit

Society Thoracic Medal
best thoracic presentation
MARCUS TAYLOR
Can measures of systemic inflammation accurately predict short and long-term outcomes after lung cancer resection?

BASO Prize
ANDREAS GKIKAS
Systematic review of the reported outcomes in invasive management of malignant pleural mesothelioma: The COS-iMeso Initiative

Best Cardiac Surgical Movie-
CHARLOTTE HOLMES
Implantation valve and redo avr 5 years following transcather aortic valve implantation

Best Thoracic Surgical Movie-
NICOLE ASEMOTA
Video assisted thoracoscopic, parenchymal sparing 'rotational' bronchoplasty for managing bronchial carcinoid tumour

Best Congenital Surgical Movie
NABIL HUSSEIN
Perfecting the Norwood Operation Using 3D-Printed Models

Best Cardiothoracic Forum Presentation
MAXINE READ
Introducing an Innovative Electromagnetic Navigational Bronchoscopy Service to a Regional Centre: The Experience of the Multi-disciplinary Team

Best Cardiothoracic Forum Poster
LIBBY NOLAN
Minimising Blood Transfusion in Cardiac Surgery

Best Cardiac Poster
FIRAS ALJANAD
Are Rapid Deployment Valves a Good Alternative to Conventional Bioprosthetic Aortic Valve Replacement?

Best Thoracic Poster
MICHAEL GOOSEMAN
Training in VATS Lobectomy is not Dependent on Conventional Lobectomy Experience.

Patrick G. Magee Student Prize – best student oral presentation
MADHIVANAN ELANGO AND RIA PATEL
Gender Representation of Authors Accepted for Presentation at the 2020 SCTS AGM

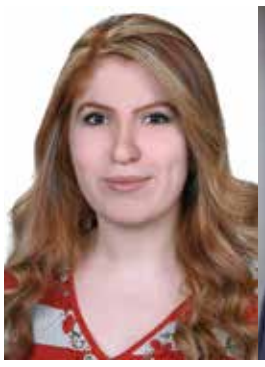
Patrick G. Magee Student Prize – best student poster presentation
SAM JENKINS, PATRICK KNOWLES, NORMAN BRIFFA
Portable ultrasound of jugular venous pressure accurately estimates volaemic status in post-cardiac surgery patients from the University of Sheffield and Sheffield teaching hospital

Trainee Video Operative Prize 2021
Cardiac: ***SAMAIL SHAHJAHAN***
Direct Axillary Artery Cannulation
Thoracic: ***NORA MAYER***
Thymectomy SVC Resection

Cardiac Surgery - General I Meeting Room 3B **Monday** 11:00–12:30

Current trends in the surgical management of infective endocarditis: The UK-IE Survey

Lubna Bakr, Shahzad G Rajam Harefield Hospital, UK



Lubna Bakr

Shahzad G Rajam

Objectives: Surgical valve replacement is the cornerstone of infective endocarditis (IE) management in the presence of severe valvular destruction, uncontrolled infection, or large vegetation. The prosthetic valve choice, however, is not easy. Our aim is to explore the current trends in the surgical management of IE in the UK to improve our understanding of the current practice.

Methods: We developed the UK-IE survey and disseminated it to consultant cardiac surgeons around the UK through SCTS Weekly Updates.

Results: Biological valve was the most considered choice in the aortic position whether it was native or prosthetic valve IE. It was offered by 74% of responders to patients <70 years and 98% to patients ≥70 years. Biological valves remained favourable in the mitral position in 81% of patients ≥70. However, mechanical ones were preferred by 76% of responders for patients <70. Biological valves were offered to patients with double-valve IE and right-sided IE (87% and 77%, respectively). Valve repair was considered in 65% of right-sided IE and 45% of native mitral IE patients ≥70. Local antiseptics were considered by 58% of responders, mostly Betadine and/or topical antibiotics. Mechanical valves were preferred in young adults (18-40 years) while biological ones were preferred in women of childbearing age, injection drug users, dialysis patients and patients with liver cirrhosis. 86% of surgeons would not consider a monobloc aorto-mitral homograft or cardiac transplantation. 77% of surgeons are confident in their valve choice to prevent IE recurrence basing it mostly on personal preference (Fig. 1). Responses were received from across the UK (England 84%, 3.2% for each of Wales, Scotland and Northern Ireland) and the Republic of Ireland (7%) (Fig. 2) with 81% of centres having a specialist IE MDT.

Conclusions: Biological valves were preferred in all IE cases except young adults and mitral IE <70 where mechanical valves were offered. 87% of choices were based on personal preference.

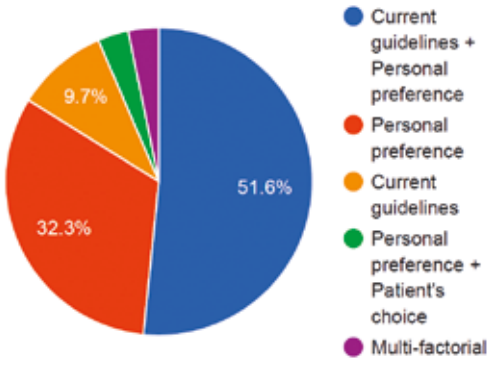


Figure 1: Choices based on the UK-IE

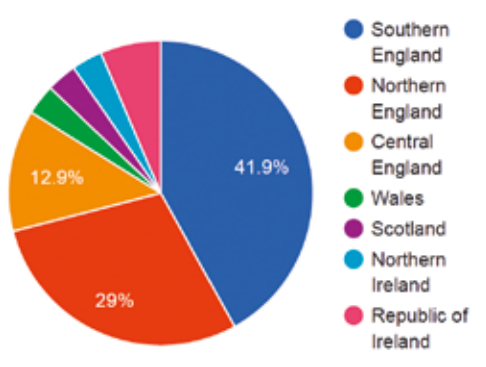


Figure 1: Choices based on the UK-IE

Innovation Meeting room 1 **13:30–15:00** Monday

Return to work and activity after rib-fixation for acute chest trauma: a retrospective matched-cohort study

Andrew Blythe Royal Victoria Hospital, Belfast

'When can I get back to work, doctor?'

This question, asked in the peri-operative period, often provokes hesitation and an awkward feeling in the pit of any surgeons' stomach. The temptation is to give a vague answer to provide hope tempered with reality. We are unable to control the plethora of factors that might affect a patient's return to function after significant surgery, and so any straightforward answer is often unrealistic. However, acting within a duty of candour and to ensure Montgomery principles are upheld, it is important that we do not neglect getting an answer to this question.

Return to work (RTW) after surgical stabilization of rib fractures (SSRF) for trauma is not well documented. There is good evidence that SSRF in patients with severe chest trauma improves mortality and morbidity rates in the acute setting, but the long-term post-operative period is less well studied. In their retrospective comparison study of over 1400 patients, Marasco and colleagues showed no significant difference in quality-of-life (QOL) scores or RTW rates after surgery versus conservative management1. However, since SSRF is often done in patients with multiple trauma and that the commonest reasons in all studies for patients not returning to work is due to the sequelae of head injury and major limb injuries. Another pitfall in the study was a lack of a suitable questionnaire to ensure accurate data collection.

It was our aim to study the cohort of patients who received SSRF for severe chest trauma injuries and compare their RTW rates to a matched cohort of non-fixed patients. Our secondary outcomes were pain and QOL. This work was done in conjunction with the Belfast Trauma and Orthopaedic Research

Charity, a testament to the teamworking and multi-disciplinary approach to the polytrauma patient.

All patients who had SSRF for trauma and met inclusion criteria were matched to a group of similar patients who had their rib fractures managed conservatively. These two cohorts were put through exclusion criteria and their injury patterns compared on computerized tomography scans. A final cohort of 38 pairs of patients were identified and asked to complete a validated questionnaire, the Work Productivity and Activity Impairment Instrument (WPAI). This was discovered during the literature search for the study and proved an invaluable patient-reported outcome measure (PROMs) tool. It was injury-specific and scored objectively. We also used validated PROMs for pain and QOL – the Brief Pain Index (BPI) and EQ-5D-5L.

At the end of data collection, 30 pairs of patients had completed the questionnaires. Our results suggested there was no significant difference between the two groups in RTW, QOL or pain scores. However, the SSRF group had longer length-of-stay in ICU and in hospital than the non-SSRF group, indicating an injury-profile difference in the two groups. The SSRF patient cohort were chosen to help wean from ventilation or to stabilize their torso to facilitate rehabilitation and it is therefore not surprising that a considerable number failed to return to their previous level of work.

Regardless, we evaluated a validated PROM tool for accurate assessment of post-operative functional outcomes in this patient group. Rib fractures continue to be a common presentation in polytrauma and are debilitating to patients, resulting in long ICU/HDU stays, need for ventilatory support and chest infections. Surgical fixation may be helpful in the short and long-term, and we hope that our identification and application of the WPAI will allow us to give such patients and their relatives information that will help decide the best options for treatment.

Coronary Artery Bypass Grafting Hall 2B **11:00–12:30** Monday

Off-pump coronary artery bypass grafting reduces in-hospital mortality and need for renal replacement therapy in patients with moderate renal dysfunction

Sheena Garg Harefield Hospital, London, UK

Patients with end-stage renal disease are known to be at higher risk for operative death after coronary artery bypass grafting (CABG). However, the effect of lesser degrees of renal impairment on patient outcomes has not been well described. The majority of published studies have utilized serum creatinine as the determinant of the severity of renal failure, but compared with creatinine levels, estimated glomerular filtration rate (eGFR) has been considered as the most reliable index of renal function. Moreover, the effect of the avoidance of cardiopulmonary bypass on patients with preoperative moderate renal dysfunction (eGFR 30–59 mL/min/ 1.73 m2) has not been well studied. Moderate renal dysfunction has been consistently identified as a major predictor for postoperative renal failure and increased mortality after on-pump CABG. The real benefit of off-pump CABG on outcomes in this high-risk cohort of patients has not been extensively investigated. We hypothesized that off-pump CABG in patient with preoperative moderate renal dysfunction results in improved outcomes compared to on-pump CABG.

We analysed our institutional database to determine the impact of offering off-pump CABG on in-hospital mortality and need for renal replacement therapy (RRT) for this high-risk cohort of patients. From January 2007 to December 2019, 2850 patients with moderate renal dysfunction underwent isolated first-time CABG at our institution. Multivariable logistic regression was used to investigate the effect of off-pump CABG on in-hospital mortality and need for RRT. Propensity score matching was used to compare the two matched groups. Over the study period, 1383 off-pump CABG and 1467 on-pump CABG were performed for this cohort. Fewer in-hospital deaths (11 [0.80%] vs 25 [1.81%]; p=0.029) and reduced need for RRT (3 [0.22%] vs 9 [0.65%]; p=0.048) was observed for the matched off-pump group compared to on-pump group. Off-pump CABG was associated with a significantly lower incidence of in-hospital death (odds ratio: 0.44; 95% confidence interval [0.21–0.89]) and need for RRT (OR: 0.33; 95% CI [0.09-1.23]).

The beneficial impact of off-pump CABG can be attributed to the well-recognised elimination of renal hypoperfusion and blunting of the systemic inflammatory response that might prevent progressive renal impairment. This study is a retrospective, non-randomized single-centre analysis over a long period of time that is subjected to the effects of selection bias. Nevertheless, no relevant differences among the study groups were found after propensity score adjustment. This statistical methodology has been used in addition to multivariable analyses to reduce the effect of selection bias. Despite its well-acknowledged limitation, this study using eGFR as the most reliable index of renal function validates the safety and efficacy of off-pump CABG and makes a strong case for off-pump CABG to be preferentially offered to patients with moderate renal dysfunction.

This promotional article was initiated and funded by Nordic Pharma Ltd.

Is there still a place for aprotinin for patients undergoing isolated coronary artery bypass (ICABG)?

APROTININ
10,000 KIU/ml Injection BP

SCTS Conference News spoke with **Professor Mahmoud Loubani** (Consultant Cardiothoracic Surgeon and Honorary Professor of Cardiothoracic Surgery at Castle Hill Hospital (CHH), Co-Chair SCTS Academic and Research Subcommittee, Yorkshire and Humber NIHR CRN Lead for Cardiothoracic Surgery) who outlined the rationale, indications and outcomes when his centre reintroduced aprotinin for patients undergoing isolated-CABG.

Aprotinin is indicated for prophylactic use to reduce blood loss and blood transfusion in adult patients at high risk of major blood loss undergoing isolated cardiopulmonary bypass graft surgery. Aprotinin should only be used after careful consideration of the benefits and risks, and alternative treatments[4]

Prior to the re-launching aprotinin for patients undergoing isolated-CABG, how did you manage without aprotinin and what were the subsequent challenges due to not having this drug available?

Aprotinin was used for several years to reduce bleeding during and after surgery and was used very widely during my training period. However, several papers were published reporting increased morbidity and mortality of its use and subsequently, many units stopped using it. This meant we now had limited choices to reduce intra – and post-operative bleeding in patients who were at high-risk from bleeding. We used alternatives such as tranexamic acid, but this was not as effective as aprotinin in patients at high risk, and had its own side-effects.[1]

As a result, we had to be very cautious when operating on patients with bleeding tendencies, often resulting in a delay in surgery and increased hospital stay. Therefore, there was an urgent need to either use aprotinin or find a suitable alternative. Over time, more papers were published supporting the use of aprotinin and questioning the findings of previous publications. This resulted in more surgical units beginning to use aprotinin with positive results. In addition to the clinical literature, there were also positive outcomes demonstrated from the Nordic Aprotinin Patient Registry (NAPaR) in isolated-CABG patients.[2]

When and why did you start using aprotinin for patients undergoing isolated CABG at CHH?

Isolated-CABG patients are not the typical group of patients we would have thought were the ideal patients for aprotinin. However, isolated-CABG patients can be at an increased risk of bleeding, especially in the current era where we are operating on a lot of urgent cases, who present with a non-ST-elevation myocardial infarction (NSTEMI) and are placed on dual antiplatelet therapy, and then referred for surgery.

There is good evidence that we should continue with the dual antiplatelet therapy but that would put them at an increased risk of bleeding once we operate on them and when restarting dual antiplatelet therapy post-surgery.[3] All these considerations made us think again about aprotinin.

In 2018, we had a number of consultations and discussions about reinstating aprotinin on our formulary. It was particularly helpful to receive the latest information and data from the Nordic Aprotinin Patient Registry (NAPaR)[2] and the approved indications for aprotinin in isolated-CABG patients.[4] We developed a standard operating procedure for the use of aprotinin in this group of patients, which was widely consulted on and included all the stakeholders, from surgeons and perfusionists to anaesthesiologists. We were subsequently granted approval by the drugs and therapeutics committee in May 2019.

What criteria do you use for identifying patients requiring aprotinin?

We identify patients who would be suitable for treatment with aprotinin based on their characteristics that put them at increased risk of perioperative bleeding.

For patients undergoing isolated-CABG, these characteristics included:

- Previous cardiac surgery
- Hepatic dysfunction affecting clotting
- Inherited or acquired abnormalities
- Low platelet count <150
- Documented hepatic dysfunction affecting clotting dysfunction
- Dual antiplatelet therapy
- Oral anticoagulant therapy
- Jehovah's Witness or another reason to refuse blood transfusion.

It is important to refer to the aprotinin summary of product characteristics to identify patients for whom aprotinin is not suitable, including patients who are hypersensitive or have been exposed. to aprotinin in the previous 12 months.

Would you be happy to help share your experiences with aprotinin for patients undergoing isolated-CABG with other centres?

There is a reluctance among some surgeons to consider using aprotinin for patients undergoing isolated-CABG under its current licence. The important message to other centres and surgeons is that although we want to use aprotinin for the more complex procedures, there are a cohort of isolated-CABG patients that do benefit from aprotinin.

Aprotinin has been proven to be an effective drug at reducing blood loss[1]. It is very helpful to have it in the armamentarium of the cardiac surgeon to deal with the very common problem of bleeding during and after cardiac surgery. We need every tool at our disposal and aprotinin is one we can use to help improve our outcomes. I would be happy to share my experience with aprotinin in isolated-CABG patients to outline the positive outcomes for the hospital and patient.

References

1. Fergusson DA et al. A Comparison of Aprotinin and Lysine Analogues in High-Risk Cardiac Surgery. N Engl J Med. 2008;358:2319–2331.
2. NAPaR data on file
3. Wallentin et al. Ticagrelor versus Clopidogrel in Patients with Acute Coronary Syndromes. N Engl J Med 2009; 361:1045-1057
4. Aprotinin summary of product characteristics..

APR/22/011
Date of Preparation April 2022

NORDIC PHARMA

APROTININ

10,000 KIU/ml
Injection BP

NAME OF THE MEDICINAL PRODUCT: Aprotinin 10,000 KIU/ML Injection BP. **PRESENTATION:** Each 50ml vial contains aprotinin concentrated solution, corresponding to 500,000 KIU (Kallikrein Inhibitor Units) in sterile 0.9% sodium chloride solution. **Indications:** Aprotinin is indicated for prophylactic use to reduce blood loss and blood transfusion in adult patients who are at high risk of major blood loss undergoing isolated cardiopulmonary bypass graft surgery (i.e. coronary artery bypass graft surgery that is not combined with other cardiovascular surgery). Aprotinin should only be used after careful consideration of the benefits and risks, and the consideration that alternative treatments are available. **Posology and method of administration:** Posology: An appropriate aprotinin-specific IgG antibody test may be considered before administration of aprotinin. *Adult*: Owing to the risk of allergic/anaphylactic reactions, a 1 ml (10,000 KIU) test dose should be administered to all patients at least 10 minutes prior to the remainder of the dose. After the uneventful administration of the 1 ml test dose, the therapeutic dose may be given. A H1-antagonist and a H2-antagonist may be administered 15 minutes prior to the test dose of aprotinin. In any case standard emergency treatments for anaphylactic and allergic reactions should be readily available (see section 4.4 of Summary of Product Characteristics (SmPC)). A loading dose of 1 – 2 million KIU is administered as a slow intravenous injection or infusion over 20 – 30 minutes after induction of anaesthesia and prior to sternotomy. A further 1 – 2 million KIU should be added to the pump prime of the heart-lung machine. To avoid physical incompatibility of aprotinin and heparin when adding to the pump prime solution, each agent must be added during recirculation of the pump prime to assure adequate dilution prior to admixture with the other component. The initial bolus infusion is followed by the administration of a continuous infusion of 250,000 – 500,000 KIU per hour until the end of the operation. In general, the total amount of aprotinin administered per treatment course should not exceed 7 million KIU. *Paediatric population* – The safety and efficacy in children below 18 years of age have not been established. Refer to SmPC for use in other specific patient populations. Aprotinin should be infused using a central venous catheter. The same lumen should not be used for the administration of any other medicinal product. When using a multi-lumen central catheter, a separate catheter is not required. Aprotinin must be given only to patients in the supine position and must be given slowly (maximum 5–10 ml/min) as an intravenous injection or a short infusion. **Contraindications:** Hypersensitivity to the active substance or any of the excipients. Patients with a positive aprotinin specific IgG antibody test. If no such test is possible prior to treatment, administration of aprotinin to patients with a suspected previous exposure including in fibrin sealant products during the last 12 months is contraindicated.
Special warnings and precautions for use: Aprotinin should not be used when CABG surgery is combined with another cardiovascular surgery because the benefit risk balance of aprotinin in other cardiovascular procedures has not been established. *Laboratory monitoring of anticoagulation during cardiopulmonary bypass:* Aprotinin is not a heparin-sparing agent and it is important that adequate anticoagulation with heparin be maintained during aprotinin-therapy. Elevations in the partial thromboplastin time (PTT) and celite. Activated Clotting Time (Celite ACT) are expected in aprotinin-treated patients during surgery, and in the hours after surgery. **Therefore, the partial thromboplastin time (PTT) should not be used to maintain adequate anticoagulation with heparin. In patients undergoing cardiopulmonary bypass with aprotinin therapy, one of three methods is recommended to maintain adequate anticoagulation: Activated Clotting Time (ACT), Fixed Heparin Dosing, or Heparin Titration (see below). If activated clotting time (ACT) is used to maintain adequate anticoagulation, a minimal celite-ACT of 750 seconds or kaolin-ACT of 480 seconds, independent of the effects of haemodilution and hypothermia, is recommended in the presence of aprotinin**. *Important:* aprotinin is not a heparin-sparing agent. *Graft Conservation:* Blood drawn from the aprotinin central infusion line should not be used for graft preservation. *Re-exposure to aprotinin:* Administration of aprotinin, especially to patients who have received aprotinin (including aprotinin containing fibrin sealants) in the past requires a careful risk/benefit assessment because an allergic reaction may occur. Standard emergency treatment for allergic/anaphylactic reactions should be readily available during treatment with aprotinin. *Renal impairment:* Results from recent observational studies indicate that renal dysfunction could be triggered by aprotinin, particularly in patients with pre-existing renal dysfunction. An analysis of all pooled placebo-controlled studies in patients undergoing coronary artery bypass graft (CABG) has found elevations of serum creatinine values >0.5 mg/dL above baseline in patients with aprotinin therapy. Careful consideration of the balance of risks and benefits is therefore advised before administration of aprotinin to patients with pre-existing impaired renal function or those with risk factors (such as concomitant treatment with aminoglycosides). An increase in renal failure and mortality compared to age-matched historical controls has been reported for aprotinin-treated patients undergoing cardiopulmonary bypass with deep hypothermic circulatory arrest during operation of the thoracic aorta. Adequate anticoagulation with heparin must be assured. *Mortality:* An association between aprotinin use and increased mortality has been reported in some non – randomized observational studies while other non-randomized studies have not reported such an association. In these studies, aprotinin was usually administered to patients who had more risk factors for increased mortality before surgery than patients in the other treatment groups. Most of the studies did not adequately account for these baseline differences in risk factors and the influence of these risk factors on the results is not known. Therefore, interpretation of these observational studies is limited and an association between aprotinin use and increased mortality can neither be established nor refuted. Thus, aprotinin should only be used as authorized in isolated CABG surgery, after careful consideration of the potential risks and benefits. A publication by Fergusson et al 2008 analysed data from a randomized controlled trial, Blood Conservation Using Antifibrinolytics in a Randomized Trial (BART), and reported a higher mortality rate in aprotinin-treated patients compared to those treated with tranexamic acid or aminocaproic acid. However, due to several methodological deficiencies no firm conclusion on cardiovascular risks can be made on the BART study results. **Undesirable effects:** Refer to the Summary of Product Characteristics for full details of the safety of the product. *Summary of the safety profile:* The safety of aprotinin has been evaluated in more than forty-five phase II and phase III studies including more than 3800 patients exposed to aprotinin. In total, about 11% of aprotinin-treated patients experienced adverse reactions. The most serious adverse reaction was myocardial infarction. The adverse reactions should be interpreted within the surgical setting. *Tabulated summary of adverse reactions:* Adverse drug reactions (ADRs) based on all placebo-controlled clinical studies with aprotinin sorted by CIOMS III categories of frequency (aprotinin n=3817 and placebo n=2682; status: April 2005) are listed in the table in SmPC: Frequencies are defined as: Common: ≥ 1/100 to < 1/10; *Uncommon:* ≥ 1/1,000 to < 1/100; *Rare:* ≥ 1/10,000 to < 1/1,000; *Very rare:* < 1/10,000; *Not known:* cannot be estimated from the available data. *Uncommon:* Myocardial ischaemia, coronary occlusion/thrombosis, myocardial infarction, pericardial effusion, thrombosis, Oliguria, acute renal failure, renal tubular necrosis. *Rare:* Allergic reaction, anaphylactic/anaphylactoid reaction, Arterial thrombosis (and its organ specific manifestations that might occur in vital organs such as kidney, lung or brain). Very rare: Anaphylactic shock (potentially life threatening), disseminated intravascular coagulation, coagulopathy, pulmonary embolism, injection and infusion site reactions, infusion site (thrombo-) phlebitis. **Basic NHS cost:** £79.00 for 1 vial. **Legal classification:** POM. **MA number:** PL 40621/0020. **MA holder:** Nordic Group B.V. Siriusdreef 41, 2132 WT Hoofddorp, The Netherlands. **Further information available from:** Nordic Pharma Ltd., Unit 3 Commerce Park, Brunel Road, Theale, Reading, Berkshire RG7 4AB. **Date of preparation:** March 2021. **Item code:** APR/21/18.

ADVERSE EVENTS SHOULD BE REPORTED.
Reporting forms and informarion can be found at **www.mhra.gov.uk/yellowcard**.
Adverse events should also be reported to Nordic Pharma on 0800 121 8924.

APR/22/011
Date of Preparation April 2022

NORDIC PHARMA

Covid Meeting room 1 **Monday** 11:00 – 12:30

The Surgical Management of COVID-19 Pulmonary Complications in Patients requiring Extracorporeal Membranous Oxygenation (ECMO)

Jacie Jiaqi Law, Karen Chien Lin Soh and Giuseppe Aresum Royal Papworth Hospital NHS Foundation Trust, Cambridge, UK

Jacie Jiaqi Law

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) infection induces capillary micro-thrombosis, alveolar haemorrhagic necrosis and pulmonary infarction. This mediates a myriad of uncommon complications which challenges interventional radiologists and cardiothoracic surgeons. For instance, complex pleural effusions, pneumothoraces, fatal pulmonary haemorrhages and necrotising pneumonia. Extracorporeal membranous oxygenation (ECMO) support has become an established rescue therapy for severe acute respiratory distress syndrome (ARDS) related to SARS-CoV-2 infection with retrospective study demonstrating poor survival amongst this patient cohort. The need for therapeutic anticoagulation under ECMO and coagulopathy associated with critically ill COVID 19 patients also results in clinically evident pulmonary haemorrhage necessitating surgical intervention. Concurrently, high post-operative mortality exists in COVID-19 patients undergoing thoracic surgery. In this single centre retrospective case series study, we aim to explore the surgical management, post-operative outcomes and multidisciplinary care in a patient subgroup with the highest COVID-19 disease severity.

From 2018 to 2021, 133 severe COVID-19 patients commenced on venous-venous (VV) ECMO at our institution. Eight patients further underwent surgical management of COVID-19 complications, of which three were female and five male. In this study, the mean patient age was 42.8 years old with a mean BMI of 30.9 and median Charlson Comorbidity index of 0. Five patients were of ethnic minority (n=5). The mean time from COVID positivity to ECMO cannulation was 8.2 days with a median duration of ECMO support of 76.25 days.

All patients received computed Tomography (CT) imaging in the form of whole-body CT scans including post-contrast CT chest abdomen and pelvis and CT pulmonary angiogram which were performed during peri-ECMO initiation, patient clinical deterioration and pre-operative assessment (summary A). The predominant CT chest morphology includes bilateral dense consolidation (8 patients),high pulmonary embolism load characterised by bilateral segmental and subsegmental artery involvement (2 patients), intrathoracic bleeding with no active bleeding point (6 patients) and pulmonary infarction (2 patients). CT guided chest drain insertions were performed in five patients.

Three patients underwent emergency right-sided anterolateral thoracotomy for haemothorax evacuation with no intraoperative findings of obvious bleeding points. One right-sided salvage lower lobectomy was performed for a case of COVID-10 induced necrotizing pneumonia. The remaining four patients underwent uniportal video-assisted thoracoscopic (VAT) washout. Fatalities are high within this case series, with four out of eight fatalities reported as inpatient death and one patient deceased prior to three months post discharge. Poor clinical outcome was observed in patients with critical COVID-19 complicated with pleural effusion, high pulmonary vascular thrombosis load, concurrent presentation with extrapulmonary haemorrhage such as haemorrhagic congestive gastropathy and individuals requiring massive transfusion (12 units of intraoperative transfusion). Gousard *et al* aptly describes the dilemmas of ECMO heparinisation in the context of haemorrhagic COVID-19 pulmonary complications. In this series, all anticoagulation regimen were deescalated or temporarily ceased. All patients also experienced bacterial and fungal superinfection requiring anti-infective agents with one case of invasive pulmonary aspergillus and one case of multi-drug resistant pseudomonas aeruginosa reported.

To the best of our knowledge, this is the first case series to analyse patient characteristics, surgical managements, post-operative complications and survival on cases of severe COVID-19 pulmonary complications in the ECMO subgroup.

Dr. Clarissa Ng Yin Ling, current Academic FY1 with Imperial College London and previous Ionescu Fellowship Awardee, will be delivering three oral presentations at the SCTS Annual Meeting 2022. These studies were conducted in King's College Hospital, supervised by Mr David Bleetman, Mr Habib Khan, Mr Max Baghai, and Prof. Olaf Wendler.

Mitral Valve Surgery Hall 2A **Tuesday** 11:00 – 12:30

Should more patients be offered repair for mitral valve endocarditis? A 15-year single-centre experience.

Both ESC and AATS guidelines recommend mitral valve repair over replacement where possible in surgical treatment for infective endocarditis. Notably, guidelines suggest extensive destruction of a single leaflet, or an abscess does not necessarily preclude valve repair. However, despite these recommendations, repair rates have lagged due to concerns over durability and recurrence of endocarditis. Our retrospective study demonstrates repair was non-inferior to replacement in infective endocarditis (replacement, HR 1.09; 95% CI [0.59-2.00]), supporting more aggressive use of repair. In Kaplan-Meier analysis, there was a trend for MVR patients to have a higher all-cause mortality although there was no significant difference at the endpoint. Subgroup analysis reported that there remained no significant differences even in patients with active infection or non-elective surgery. We encourage other experienced units to increase repair rates as feasible, in line with current guidelines.

Mitral Valve Surgery Hall 2A **Tuesday** 11:00 – 12:30

The impact of complete versus partial preservation of the sub-valvular apparatus on left ventricular function in mitral valve replacement

Partial preservation of the mitral apparatus through preservation of the posterior leaflet (MVR-P) is the gold standard in MVR. However, it is hypothesised that complete preservation of the mitral apparatus with preservation of both the anterior and posterior leaflets (MVR-C) might lend to superior post-operative haemodynamic function by allowing the complete preservation of ideal LV geometry during systole and in maintaining LV diastolic dimensions. Currently, most cardiac surgeons prefer to preserve the posterior leaflet alone due to increased technical complexity, concerns regarding longer bypass and cross-clamp time, and needing to undersize the prostheses. Our retrospective study reports that compared with MVR-P, MVR-C shows favourable short-term impact on LV function with significantly higher LVEF and significantly less worsening of global longitudinal strain at three months post-op. When MVR is indicated, these data support bileaflet preservation if feasible, in an individualised approach to optimise post-operative LV function.

Minimally Invasive Cardiac Surgery Hall 2B Monday 13:30 – 15:00

Right thoracotomy versus conventional median sternotomy in redo cardiac surgery: a 10-year single-centre experience

In redo cardiac surgery, conventional median sternotomy remains the most common surgical approach despite increased technical difficulty due to pericardial adhesions. A valid alternative surgical approach would be minimally invasive surgery through right thoracotomy. While there exists a plethora of literature comparing the outcomes of sternotomy and right thoracotomy, this is the first study to compare long-term outcomes between these two surgical approaches in the context of redo cardiac surgery when the risks of reoperation are higher. We compare elective and urgent, valve only surgery. Our retrospective study reports significantly lower long-term mortality in the right thoracotomy group (HR 0.29; 95% CI [0.09-0.96]), and comparable peri-operative mortality (HR 0.59; 95% CI [0.07-4.94]). Differences in stroke or TIA rates were insignificant. With careful patient selection, these data support right thoracotomy as a safe and effective alternative to redo sternotomy in specialist centres.

Coronary Artery Bypass Grafting Hall 2B **Monday** 11:00 – 12:30

Emergency off-pump coronary artery bypass grafting: A myth or reality?

Giuditta Coppola Harefield Hospital, London, UK

Cardiovascular diseases continue to increase in prevalence over the years and can lead to long-term disability and death. The acute coronary syndrome (ACS) is considered the most dangerous manifestation of it. The treatment for ACS is the coronary revascularization, attained either with percutaneous coronary intervention (PCI) or with coronary artery bypass grafting (CABG). In scenarios of emergency, when PCI is anatomically unsuitable for the revascularization, in presence of multivessel disease and ongoing ischemia, CABG is the treatment of choice. Emergency CABG report higher adverse outcomes compared to the elective treatment, especially in presence of cardiogenic shock, severely impaired left ejection fraction and pulmonary hypertension.

Our study retrospectively analyzed and compared emergency off-pump CABG (OPCABG, Group 1) and on-pump CABG (Group 2) from January 2007 to December 2019 in our institution. The overall sample consisted of 249 patients (pts) and OPCABG was performed in 107 (43%). Mean age was 66.14 months (± 11.86) and 193 patients (77.5%) were male. The NYHA Class III was present in 89 pts (35.7%) and in 149 patients (59.8%) was reported at least one previous myocardial infarction. Three vessels disease was found in 168 pts (67.5%) and left main stem disease in 126 (50.6%). Previous PCI was performed in 42 pts (16.9%) and previous cardiac surgery in 7 (2.8%). In 27 pts (10.8%) was necessary to start preoperative inotropes and 61 (24.5%) pts received preoperative intra-aortic balloon pump (IABP) insertion.

The majority of the operations required sternotomy access (246 pts, 98.8%). In half of the cases was established the cardiopulmonary bypass (142 pts, 57%) and the mean cardiopulmonary bypass time was 57.49 minutes (± 55.22). Total arterial revascularization was performed in 12 pts (11.2%) for group 1 and in 10 (7%) in group 2 without any statistical difference (p-value 0.356). More distal anastomoses were performed in on-pump cohort (47.7% vs 69%; p=0.001). Postoperative IABP was inserted more commonly in group 2 (9.9% vs 2.8%; p = 0.053). No myocardial infarction occurred after the operation in both groups, respiratory failure requiring tracheostomy occurred in 10 pts (7%) of the on-pump cohort and six of the off-pump (5.5%) with a p = 0.845. The percentage of stroke was 2.8% in both the groups. The mean hospital stay was similar (15.44 in group 1 vs 17.60 in group 2, p= 0.281) and the in-hospital mortality was higher in the on-pump cohort although not statistically significant (11.3% vs 8.4%, p = 0.596). After a mean follow-up of 79.21 months (± 44.93), the follow-up death was 24.3% in On-pump group and 19.7% in off-pump with a p = 0.573.

Emergency CABG still remains a challenge for the cardiac surgeon even in expert hands. However, OPCABG can be offered with comparable outcomes to patients needing emergency surgical revascularization in a high volume OPCABG center.

Minimally Invasive Cardiac Surgery Hall 2B **Monday** 13:30–15:00

Propensity matched comparison of outcomes following minimally invasive vs conventional mitral valve repair

Enoch Akowuah[1], Simon Kendall[1], Andrew Goodwin[1], Ralph White[1], Omowumi Folaranmi[1], Mohamed Allam[1], Christopher Taky[2] 1 The James Cook University Hospital, Middlesbrough, UK; 2 Newcastle University Medical School, UK

Isolated mitral valve repair (MVR) may be carried out via a conventional sternotomy or using minimally invasive approaches which include a mini thoracotomy. According to the National Adult Cardiac Surgery Audit, 1,375 isolated mitral valve repair procedures were carried out in the UK in 2019-2020.[1] Of these procedures, in the same year, only 14.8% were carried out using a minimally invasive approach.[2]

Minimally invasive approaches circumvent the lengthy time needed for sternal union in cases where a median sternotomy is used. There are potential benefits associated with this, including shorter recovery time, reduced length of hospital stay, and earlier return to normal activities.[3,4] Other documented benefits in the literature include reduced rate of blood transfusion, better cosmesis, reduced surgical site infection rate.

Recent NICE guidelines published in November 2021[5] for the management of heart valve disease recommend that minimally invasive MVR should be offered to all patients who are suitable, however there is a paucity of comparative data supporting this approach.

We therefore conducted a retrospective study of patients at our institution undergoing MVR between 2015 to 2020. Propensity score matching was performed for closest neighbours using Euroscore, yielding 152 matched cases in total with 76 patients in each group. Cases of active endocarditis, redo cases and emergency cases were excluded. A p value of less than 0.05 was defined as a significant difference.

Omowumi Folaranmi

Mohamed Allam

Mean Euroscore II was the same for both groups at 1.53 ± 1.02 (p = 1.000). There were no cases of in-hospital mortality in the minimally invasive group and one case out of 76 (1.3%) in the conventional group, p = 0.319. This is comparable to previously reported mortality rates for this procedure of around 1%.(1,6) Patients with mild mitral regurgitation or less on postoperative ECHO were 94.7% in the minimally invasive group vs 96.1% in the conventional group, p =0.6804. Although cardiopulmonary bypass and cross clamp times were longer in the minimally invasive group, there was a significant reduction in the mean total length of hospital stay (in days) in the minimally invasive group compared to the conventional group (6.68 ± 3.61 vs 8.62 ± 6.08, p <0.014). Incidence of re-operation in the same hospital episode was lower in the minimally invasive group (2.6% vs 3.9%, p=0.6513). Long-term mortality in both groups at time of data collection was the same at 3.9%. Blood transfusion was the same for both groups at 9.2%. There was no significant difference in the rate of postoperative neurological dysfunction or deep sternal wound infection.

Our study supports evidence that minimally invasive MVR is at least as safe as conventional MVR, and there are potential economic benefits from reduced length of hospital stay. The results of a randomised controlled trial are eagerly anticipated to provide more high-quality comparative evidence of these two approaches to mitral valve repair.

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Covid Meeting room 1 **Monday** 11:00–12:30

Drawbacks of powered air purifying respirators during COVID-19 pandemic

How voice amplifiers improve communication and outcomes during resuscitation – A Single Centre Feasibility Study

Kudzayi Kutywayo[1], Krzysztof Kubiak[2], Sofia Korre[2], Chiraag Karia[1], Rajani Annamaneni[2], Sridhar Rathinam[1] 1 Department of Thoracic surgery, Glenfield Hospital, University Hospital of Leicester NHS Trust, Leicester, United Kingdom; 2 Department of Anaesthesia, Glenfield Hospital, University Hospital of Leicester NHS Trust, Leicester, United Kingdom

The COVID-19 pandemic has caused massive restructuring in policies regarding use of personal protective equipment in aerosolised environments within the hospital. Use of powered air purifying respirators has become more commonplace in operating rooms and intensive care units. This has allowed health provision to continue safely in the wake of a novel droplet infection (SARS-CoV-2). A trade-off for safety is unfortunately, the impediment in communication.

However, PAPRs are associated with some drawbacks

i) Impediment to verbal communications
ii) They tend to cause discomfort the longer they are worn. This tends to be the case with long surgical procedures, typical of thoracic surgery. This is compounded in emergency scenarios.
iii) Protective masks other than surgical masks used as PPE also increase rescuer fatigue in CPR and negatively affect the quality of chest compressions[1], further compromising the outcome of these patients.

Against this background, we sought to investigate whether portable audio amplification equipment would help during cardiopulmonary resuscitation (CPR) in patients with COVID-19.

We carried out a single centre observational study in a tertiary cardiothoracic referral centre to evaluate the impact on communication with the use of voice amplification units (VAUs) worn alongside full-face powered air purifying respirators (PAPR) during simulated cardiopulmonary resuscitation.

Kudzayi Kutywayo

Three teams consisting of four members each were evaluated as they ran through two Advanced life support (ALS) cardiac arrest simulation scenarios. One of the scenarios was performed whilst participants were using a portable electronic voice amplification unit (VAU) [Figure 1] [Figure 2]. Teams consisted of doctors, medical students and nurses. A survey after each scenario was conducted. Video and audio feedback was obtained. Time taken to arrive at critical points in each scenario was assessed. Consent was obtained from all participants to record the simulation and the feedback. A thematic analysis of feedback given was performed.

Figure 1: Simulation set-up

Figure 2 Voice Amplification Unit

Results:

Most of the participants (83.3%) found it difficult to communicate with fellow members of the resuscitation team owing to the respiratory personal protective equipment. A large proportion (91.7%) of participants found the voice amplifier either moderately or significantly better in improving the quality of communication.

Consequently, critical time points were reached quicker when resuscitation was carried out with voice amplification. The reduction in time was significant (p=0.0285). Most participants felt the time added during donning by applying the voice amplifier was not detrimental when entering a COVID resuscitation area.

Use of VAUs improve communication in cardiac arrest and ultimately may help improve resuscitation outcomes in a patient cohort with an already poor outcome. Further study is needed, although initial results are encouraging. Comparable findings from similar studies together with the authors' experience make implementation of VAUs a worthwhile consideration for resuscitation teams involved in cardiac arrest calls in SARS-CoV-2 positive patients.

References:

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Innovation Meeting room 1 **Monday** 13:30–15:00

Is the 3D reconstructive scan a useful tool in lung cancer surgery?

Ghis Tahhan
Cardiff University, Cardiff, UK

As we move into an era of routinely performing more complex sublobar resections the need to have a complete understanding of the patient's anatomy has become paramount. Several options for 3D reconstruction of CT data have come to the market and in our institution we have access to Fuji Synapse 3D.

This software allows the user to generate and manipulate 3D lung models, separating out the segmental and lobar anatomy as well as the bronchial, venous and arterial trees. Among the many functions available, some of the more useful for a thoracic surgeon include estimating segmental volumes, simulating resection effects on either a bronchus or vessel and estimate tumour distance to resection margin. These powerful tools provide the surgeon with incredibly important knowledge to make informed decisions for surgical planning and patient communication. It also enhances the safety of the procedure and facilitates preservation of appropriate anatomy. In addition, it is a great tool for teaching, training and engaging the wider healthcare team.

We conducted a prospective study from March 2021 to June 2021, generating 3D CT reconstructions for 24 thoracic surgery patients prior to lung resection using Fuji Synapse 3D. Inclusion criteria were anatomical lung resection (segmentectomy, lobectomy or challenging wedge resection) for peripheral or central lesions and a pre-operative high-resolution CT thorax with contrast. The main variables for data collection included operation time, postoperative length of stay and intraoperative complications.

We also asked surgeons to complete post-procedure questionnaires focussing on the impact of scans on facilitating the procedure, how it affected surgical decision making and appreciation of vascular variations.

The project cohort of 24 patients underwent VATS segmentectomy (20%), VATS lobectomy (66%), wedge resection (4%) and enucleation (4%). One case was cancelled due to hidden invasion of main bronchus on the CT. There were four conversions to thoracotomy, all due to adherent and/or bleeding lymph nodes in close proximity to the target vessels. Postoperatively, the surgeons' sentiments regarding the scans were very positive, especially for anatomical variations as all anomalous or uncommon bronchioles and vessels were accurately identified by 3D imaging.

Furthermore, there was consensus about the beneficial value of scans in segmentectomy, central lesions and challenging wedge resections (>90% in all cases).

Additionally, in 8% of cases 3D scans played a significant role in surgical decision-making where the pre-operative strategy changed and a smaller resection of lung tissue was achieved.

3D CT reconstructions of vascular and hilar anatomy have significant value in segmentectomy, central lesions and surgical decision-making when considering extent of resection in borderline patients. Sublobar anatomy can be highly variable and is individual to the patient. In the modern era of screening, increased detection of early-stage lung cancers and the expansion of sublobar resections this technology is an invaluable adjunct to the surgeon's toolkit.

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Clinical Challenges and Updates Studio **Tuesday** 11:00–12:30

Short duration ECMO as a Saviour for Pulmonary Hemorrhage in Post Chronic Thrombo Embolic Pulmonary Hypertension (CTEPH) cases

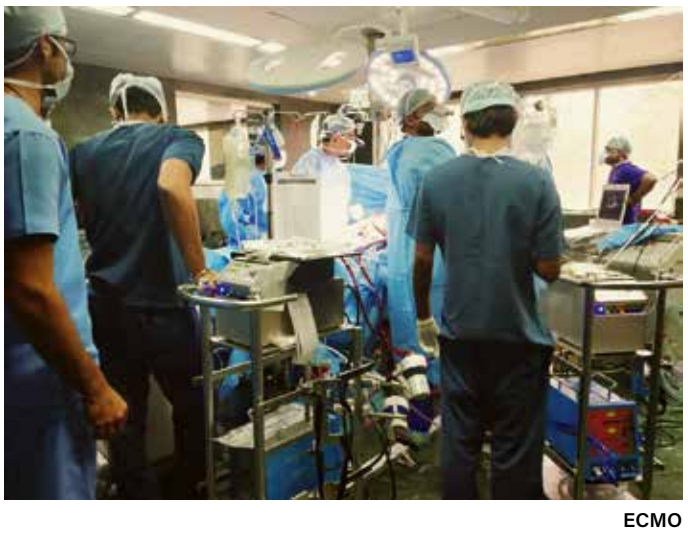
Sam Selvaraj Narayana Health, Bangalore, India

Sam Selvaraj

CTEPH cases are extremely challenging to operate and in some circumstances it possess a high incidence of pulmonary Hemorrhage soon after the endarterectomy. We report our modest experience of six cases which required VA ECMO due to severe pulmonary hemorrhage post surgery. Central VA ECMO was instituted in all the cases to tackle the crisis scenario of Hypoxia, Hypercarbia, Hypotension and Bleeding. The VA ECMO enabled us to come off from Cardio Pulmonary Bypass and gave us a fighting chance to encounter the emergency situation.

Patients were offered single lung ventilation to isolate the soiling of healthy lung from the severe pulmonary bleeding getting into the air compartment of the lungs. We could completely reverse the Heparin on ECMO with Protamine (Target ACT ~140 Sec). ECMO provides better ventilation perfusion ratio with good tissue perfusion TEG played a vital role to transfuse the blood products to the patient appropriately. Topical agents were used to arrest the bleed. The cell saver was used to salvage the red blood cells. All the six cases were weaned off from ECMO Successfully with the Average ECMO run of six Hours; Lowest being 67 mins and the Maximum of 12 hrs. ACT was brought down to 120-140 secs in all cases. Delta P and the ECMO Circuit was monitored closely as we reversed the heparin completely. A back up circuit was also kept ready in case of any eventuality.

Short duration of VA ECMO in patients with pulmonary hemorrhage after CTEPH helped us to reverse the heparin and to control the bleeding. VA ECMO offered to address the problem of hypotension with better hemodynamics and provided good gas exchange in this critical condition. VA ECMO was the only choice for this subset providing 100% survival results.

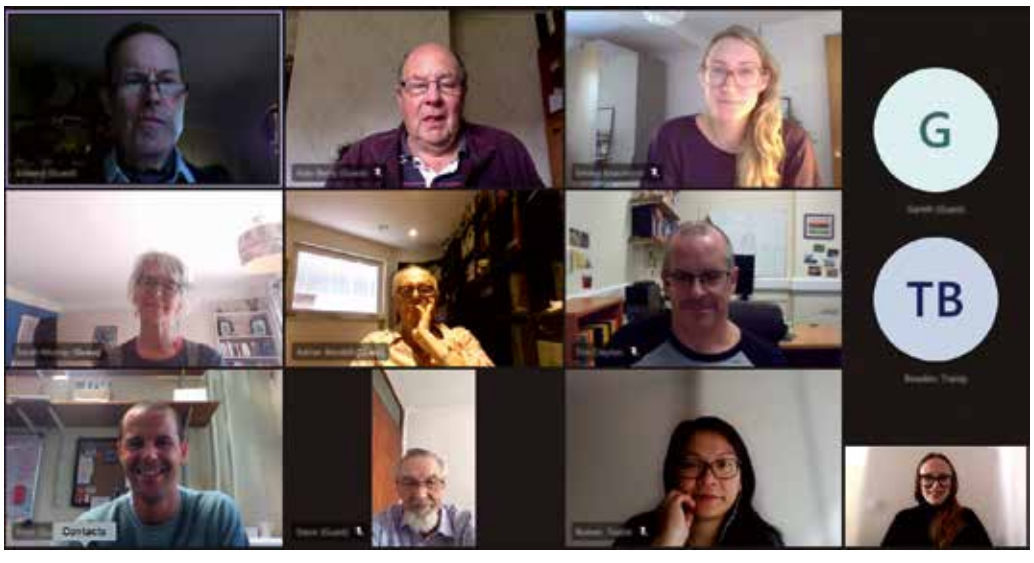


ECMO

Cardiac Surgery General II Meeting Room 3B **Tuesday** 11:00–12:30

Patient recovery from cardiac surgery during the Covid-19 pandemic: One-year outcomes from The CardiacCovid study

Julie Sanders St Bartholomew's Hospital, London, UK



The World Health Organisation declared the outbreak of SARS-CoV-2 (COVID-19) a public health Emergency of international concern on 30 January 2020. By March 2020 there had been almost 34,000 deaths worldwide and patients with underlying cardiovascular disease seemed to have a particularly poor prognosis. Equally, the outbreak of Covid-19 was potentially stressful for everyone, and possibly worse in those having cardiac surgery during the pandemic. Since symptoms of a traumatic event can be delayed by several months, we sought to explore the effect of the pandemic on recovery up to one year from cardiac surgery.

Our study, CardiacCovid, was designed and set-up early with our patient and public involvement (PPI) leads very early in in the pandemic (approvals received 15 April 2020). It is a prospective single centre observational study of patients >18-years-old undergoing any form of cardiac surgery between 23 March 2020 (UK lockdown) and 4 July 2020 (large lifting of lockdown). Patients were consented prospectively where appropriate but for those who had surgery prior to the 15 April, and those where it was not possible to see patients due to COVID-19 protocols, were recruited retrospectively. Those too unwell or unable to give consent/complete the questionnaires were excluded. Participants completed three questionnaires – the EQ-5D (quality of life, QoL), impact of event (IES-R) (anxiety related to COVID-19), depression (CES-D) electronically (Amplitudeô system) or on paper and returned by post. Each questionnaire was completed at baseline, one week after hospital discharge, and six weeks, six months and 1-year post-surgery.

In total 196 participants completed our study. Most participants were male (75.0%), of white background (79.6%) undergoing urgent or emergency surgery (59.7%) with a median EuroSCORE of 1.6. Median length of post-operative stay was nine days and of those enrolled into the study one patient (0.5%) died in-hospital. No patients had COVID-19 at time of surgery. Retrospective completion of baseline questionnaires occurred in 143/196 (73.0%) and overall questionnaire completion was >75.0% at all timepoints, except one week after surgery (67.3%).

Overall, anxiety due to the pandemic was high (baseline to six months after surgery) and was greater in women and younger patients at all timepoints. Women also had lower QoL and higher depression (all time-points), although overall rates of depression were within ranges observed in other studies in non-COVID-19 times.

Although our study is limited by only including questionnaire-related responses with respect to event-related anxiety, depression and QoL were measured), at the suggestion of our PPI group we are also conducting a complementary qualitative study to further understand the lived experience and impact of having cardiac surgery during a global pandemic.

In conclusion, the COVID-19 pandemic caused greater anxiety in patients undergoing cardiac surgery with women and younger participants particularly affected. Psychological support pre – and post-operatively in further crises or traumatic times, should be considered to aid recovery.

More information available at: https://aorticdissectionawareness.org/barts-cardiaccovid-study-reaches-1-year-milestone/Clinicaltrials.gov: NCT04366167

Process Meeting room 1 **Tuesday** 13:30 – 15:00

Introduction of Macmillan Community Thoracic Specialist Nurse, South Tees Hospitals NHS Foundation Trust

Stacey Stockdale, Rachel Calvert, Leanne Connelly, Hayley McNaught
South Tees Hospitals NHS Foundation Trust, UK

Macmillan Community Thoracic Specialist nurse project

The Thoracic Surgical service cares for around 800 patients/year, serving a population of 1.5million covering North Yorkshire, Teesside and County Durham who undergo thoracic procedures for diagnostic, therapeutic or palliative intent for both benign and malignant disease. The introduction of Community Thoracic Specialist Nurse who can visit the patient at home 24-48 following discharge, allowing a nurse with specialist knowledge in relation to thoracic surgery to review the patient, manage symptoms, provide reassurance and support, whist facilitating earlier discharge from hospital and reducing readmissions. We know that patients and their relatives have experienced heightened levels of anxiety relating to attending hospital and having to undergo treatment for cancer, we believe there is an increased need to protect patients requiring thoracic surgery.

The role of the Macmillan Community Thoracic Specialist Nurse was introduced to visit patients 24-48 hours post discharge in order to improve patient experience, support early discharge, prevent readmissions and to reassure patients of ongoing support post operatively as they are often not only struggling with having surgery as a treatment for cancer but the anxiety associated with COVID 19. We know that this is beneficial for patients but it does cause anxiety for them and their relatives due to the quick turnaround and inability to retain all discharge information. This is more important than ever in COVID times as relatives have not being able to visit during hospital admission and speak to staff face to face. This post allows the thoracic nurses to support patients during their transition to community care following early discharge – providing expertise in their own home, allowing for early intervention for psychological and emotional support – answering questions relating to surgery and expected recovery, symptom management; pain control – optimising analgesia as necessary; breathlessness management, identify and treat wound issues and also to complete their surgical journey by providing their post-operative histology results and informing them of any onward referrals for further treatment.

We have shown a significant reduction in length of stay to average of 4.1 compared to national average of 6.6 days (GIRFT data) and we believe over the coming year this could be reduced further as LOS has increased by one day throughout COVID due to no Day of Surgery admissions. Our initial data shows a reduction in readmissions to 11% from 29% and 36% (VIOLET study VATS vs OPEN lobectomy). We identified appropriate patients who required readmission, issues were recognised during visit, bloods and COVID swab taken, we were able to readmit directly to our ward avoiding high risk COVID areas such as A&E, AAU and outlying hospitals. Patient experience feedback has been overwhelmingly positive with 50% response rate. Patients have told us how valuable they feel this service is in terms of reassurance and support.

Since introducing this service we have constantly adapted to change and surpassed all of our initial expectations and achieved our initial goals in improving patient experience, reducing length of stay and reducing readmission rates.

Mitral Valve Surgery
Hall 2A **Tuesday** 11:00 – 12:30

Use of anti-thrombotic medications after heart valve surgery: A cross-sectional survey of contemporary practice in the United Kingdom

Dr Nabila Laskar and Dr Benoy Shah
University Hospital Southampton, UK


Nabila Laskar

North American and European guidelines vary in their recommendations on the use of anti-thrombotic drugs after heart valve surgery. A cross-sectional survey was conducted aiming to understand the current practice amongst United Kingdom (UK) cardiac surgeons.

Using the SCTS database, NHS hospital websites and direct e-mail confirmation, all UK consultant cardiac surgeons across 36 surgical centres were e-mailed a link to a survey. The survey asked their current practice regarding the use of antiplatelet and/or anticoagulant drugs (and their duration) following bioprosthetic aortic valve replacement (AVR), mitral valve replacement (MVR) and mitral valve repair (MVrep) for patients in sinus rhythm with no other clinical indication for antithrombotic medications. They were also asked about the choice of anticoagulant (warfarin vs NOAC) in patients with MVrep that are in atrial fibrillation (AF).

260 consultant cardiac surgeons in the UK were identified, 103 (40%) of whom replied to the survey. This showed wide variation in practice amongst surgeons in all fields. After AVR, the most popular option was lifelong aspirin (64%), followed by three months aspirin (25%) and three months anticoagulation followed by lifelong aspirin (8%). After MVR, 37% of surgeons prescribe anticoagulation for three months followed by lifelong aspirin and 35% of surgeons opt for lifelong aspirin only. Other responses included three months anticoagulation only (16%) and three months aspirin only (10%). After MVrep for sinus rhythm patients, the most popular option was lifelong aspirin (42%), followed by three months anticoagulation then lifelong aspirin (26%) and three months anticoagulation only (19%). After MVrep for AF patients, 38% of surgeons recommend warfarin, 37% recommend a NOAC and the remaining 25% were happy for either to be used.

There are wide variations in practice across the UK regarding the use of anti-thrombotic drugs after heart valve surgery. In this survey, we highlight these and also demonstrate the variability in inter-hospital and intra-hospital practice across the country. This reflects a lack of high-quality evidence and underscores the need for randomized trials to address these questions.

Modernising Cardiothoracic Surgical Pathways
Studio **Monday 13:30 – 15:00**

Designated preoperative assessment clinic for cardiac surgery – pathway to enhanced recovery after cardiac surgery

Lekha Rajan, Mater Misericordiae
University Hospital, Dublin, Republic of Ireland


Lekha Rajan

Enhanced Recovery after Cardiac Surgery (ERAS) is a multimodal, transdisciplinary approach to promote recovery of patients undergoing surgery throughout their surgical journey. Introduction to ERAS was rolled out in February 2019 in the national cardiac surgery unit where 900 cardiothoracic surgeries are done each year.

The ERAS program aims to reduce complications and promote earlier return to normal activities for our patients. It also aims to reduce the hospital length of stay, to reduce cancellations due to inadequate patient workup for surgery and therefore optimise activity.

A dedicated pre-operative assessment clinic was set up to optimise patient assessment and workup prior to surgery. This includes collecting length of stay (LOS) data, surgical site infection (SSI) rates and patient satisfaction score.

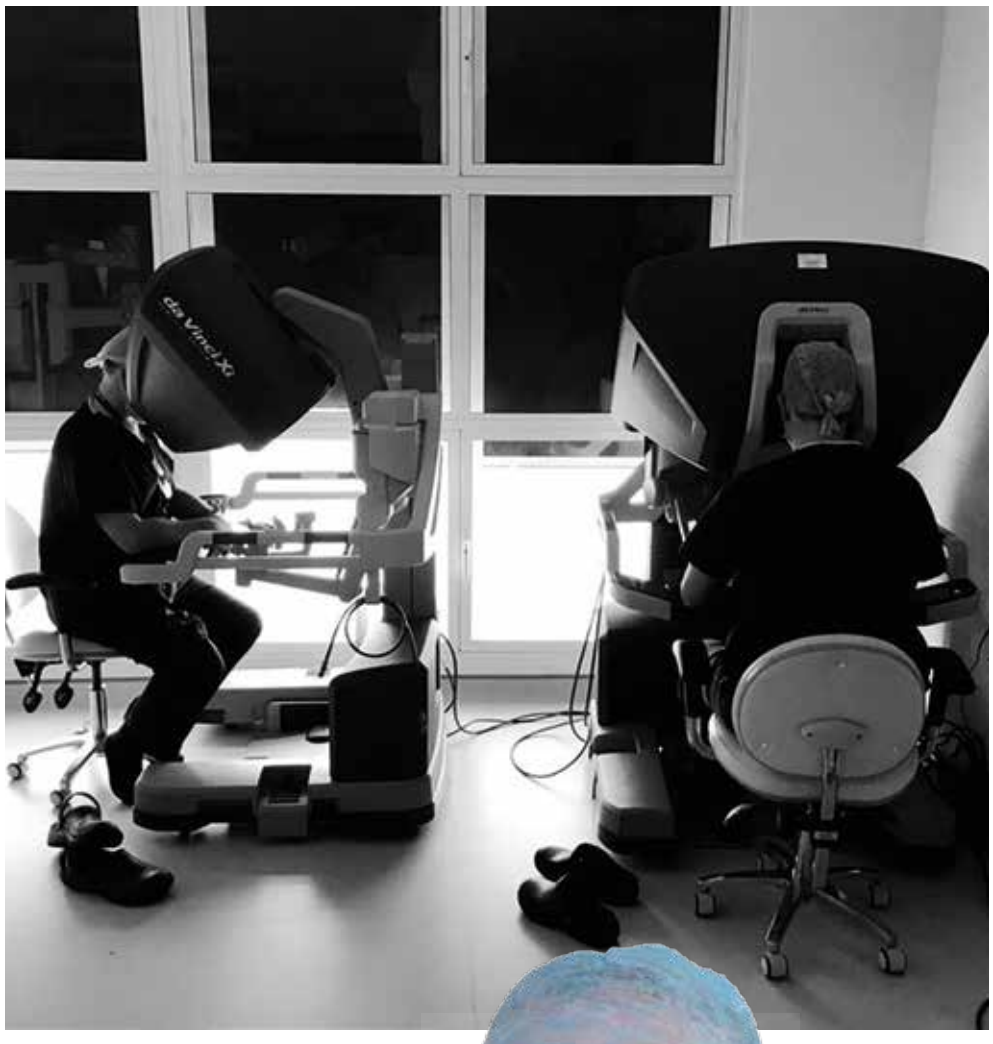
Preoperative Strategies includes preoperative measurement of Hemoglobin A1c, Albumin, smoking and hazardous alcohol consumption for risk stratification. Patient engagement tools and prehabilitation.

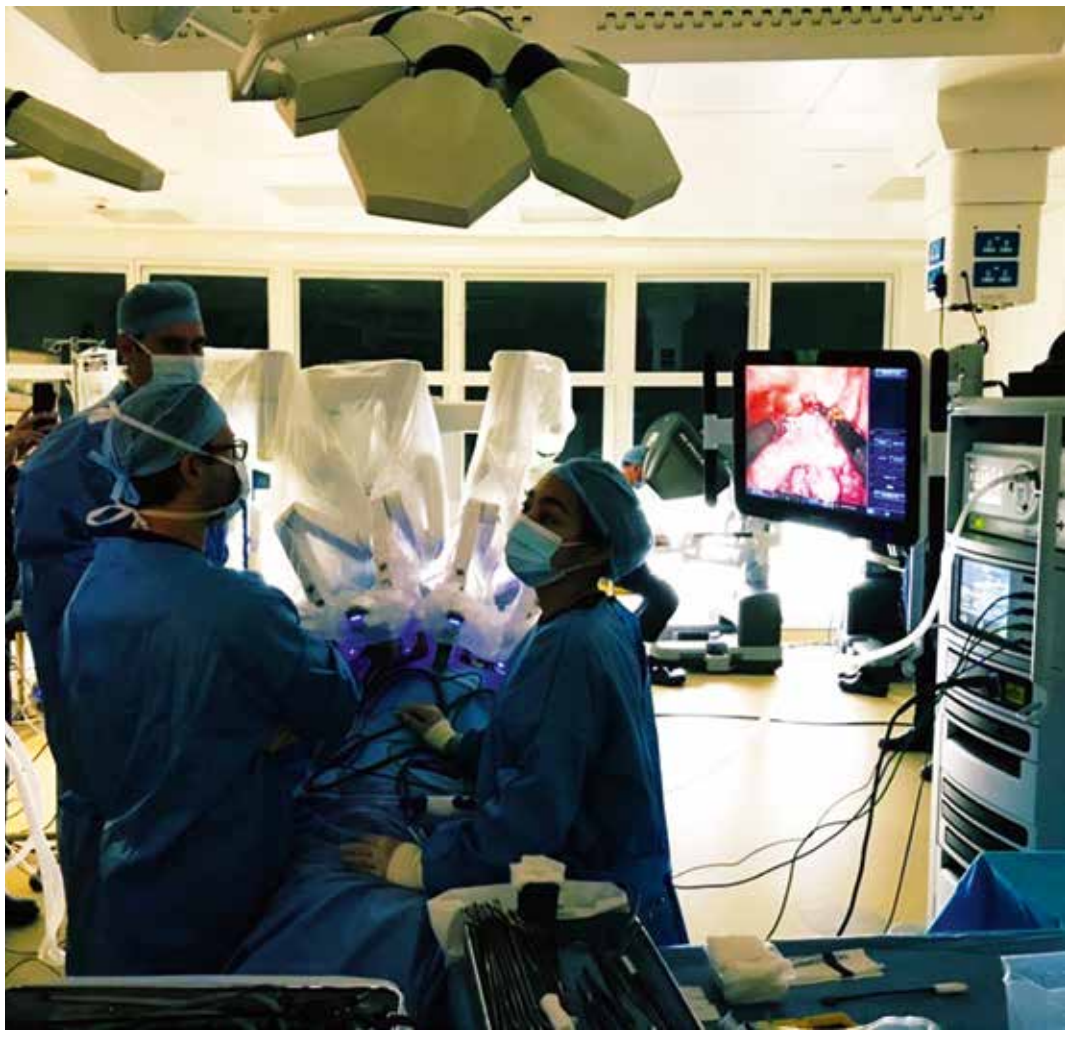
The post-operative LOS improved in 2019 compared to 2017 with 20% improvement in discharge within seven days; this has been difficult to measure in 2020 as all surgical activity was reduced during the covid 19 pandemic. Despite the pandemic impacting activities with ERAS almost 50% of patients were discharged within seven days post-surgery. Furthermore the introduction of pre – operative decolonisation illustrated a reduction in the SSI 7.6% in 2019 to 3% in 2020. The patient feedback reported 90% of the patient and family received adequate information to prepare for surgery and discharge planning.

The introduction of a dedicated cardiac ERAS programme has shown a reduction in length of stay, reduced SSI and improved patient information, education and support by dedicated ERAS Clinical Nurse Specialist in Cardiac Surgery.

Minimally Invasive Surgery Meeting Room 2 **Tuesday** 11:00 – 12:30

Significantly reduced blood loss from the first case: Early outcomes of a new robot-assisted lobectomy programme





Oliver J Harrison
Senior Robotic Fellow, Guy's Hospital, London

The UK has seen an explosion in robot-assisted thoracic surgery (RATS) in the last five years. Surgeons enjoy the enhanced ergonomics, 3D visualisation and cleanliness of dissection, trainees want to future-proof their careers and industry competition is booming with emerging platforms from CMR, Medtronic and Johnson & Johnson to rival the mighty Da Vinci from Intuitive. But perhaps most importantly, patients are increasingly asking about robotic lung resections.

Whilst no randomised evidence is available, a number of large metanalyses have suggested benefits versus open and video-assisted surgery (VATS); reduced conversion rate, increased nodal upstaging, reduced blood loss and shorter hospital stay to name just a few. However, robotic surgery is expensive and this coupled with the lack of evidence prevented NHS England routinely commissioning RATS in 2016. What about the learning curve? Well its quite quick; just 20 – 60 cases for VATS experienced surgeons, although smaller improvements in operative time may extend beyond 100 cases. The question we tried to answer was how early in the learning curve can the benefits of RATS lobectomy be seen?

In May 2021 the RATS lobectomy programme began in Southampton. Since then over 50 resections have been performed robotically. We looked at the outcomes of the first 20 cases and compared these to an equally matched cohort of VATS cases performed by the same VATS-experienced surgeon.

Oliver J. Harrison

Perhaps unsurprisingly we found significantly increased operative time in the RATS vs. VATS groups (168 vs. 140 minutes, p=0.008) which one would expect during the learning curve. More surprising was a significant reduction in blood loss (30ml vs. 50ml, p=0.016) in the RATS group. Most would agree, beating a very respectable mean blood loss for VATS lobectomy of 50ml would be quite tough. The fact that this could be beaten within 20 cases using a new technique is quite impressive. You may argue that such small volumes may not be accurately measured by the standard intraoperative suction canisters (particularly when the scrub team tell you it's 'just a splash'). However, those who have experienced RATS will know how clean the dissection can be. Augmented by a gentle gust of CO_2, the tissue planes open up, tiny vessels are tamponaded and very low levels of blood loss can be achieved. This can only be a good thing; excessive blood loss means more blood transfusions, more SIRS response, more organ dysfunction and more morbidity.

Optimising the training pathway for a new RATS surgical team is undoubtedly critical to achieving success when establishing a new RATS programme which in turn helps flatten the learning curve. We talk a little more about this in the presentation so please do join us in Lung Cancer II, meeting room 1AB at 11:16 on Tuesday 10 May.

Training in Cardiothoracic Surgery Hall 2B **Tuesday** 13:30 - 15:00

ST1 Run-through programme survey of cardiothoracic surgery in Great Britain and Northern Ireland between 2013-2018

Alan G. Dawson, Nathan J. Tyson, Carol Tan, Marjan Jahangiri and Sridhar Rathinam
On behalf of the Society for Cardiothoracic Surgery in Great Britain and Northern Ireland and the Specialty Advisory Committee in Cardiothoracic Surgery

The ST1 run-through training programme was initiated in August 2013 in Great Britain and Northern Ireland. From 2013-2018, 49 trainees have been appointed (Figure 1)*. The average number of ST1 appointments has been eight per year. We aimed to evaluate the experiences of trainees in the run-through cardiothoracic surgery training programme during the first six years. This is to identify the strengths of the programme, in addition to any weaknesses perceived by the trainees. Additionally, we sought to evaluate the trainees' views on how the programme prepared them for ST3 training, particularly when compared to their uncoupled counterparts.

Alan G. Dawson

Nathan J. Tyson

All trainees in Cardiothoracic Surgery who were appointed at the ST1 entry point from 2013 to 2018 were invited to complete an electronic survey. The survey was designed and created using the SurveyMonkey platform (Momentive Inc., California, USA). The survey comprised 69 questions and was endorsed by the Society for Cardiothoracic Surgery in Great Britain and Ireland (SCTS) and the Specialty Advisory Committee (SAC) in Cardiothoracic Surgery. The link to the survey was disseminated by the SCTS through Isabelle Ferner from 01 September 2020 and 31 October 2020 with weekly reminders sent out to trainees to encourage survey completion. The survey had five sections titled:

- Section 1: Trainee demographics
- Section 2: ST1 Application
- Section 3: Early ST1/ST2 years
- Section 4: After ST2
- Section 5: Reflections on ST1 run-through training

Over the six-year period, 49 trainees were appointed to the ST1 run-through programme. Three trainees had left the ST1 run-through programme leaving 46 potential respondents. Thirty-four responses were obtained giving an overall response rate of 74%. The majority of ST1-appointed trainees were male (65%) with a median age of 27 years (IQR: 26-29 years) and 97% were graduates from a University in the United Kingdom and Northern Ireland. The majority of trainees (76%) were appointed from Foundation Year 2 or from the Core Surgical Training programme. Two-thirds of trainees had identified Cardiothoracic Surgery as their career choice at medical school (Figure 2) and 71% of ST1 appointees were successful on their first attempt.

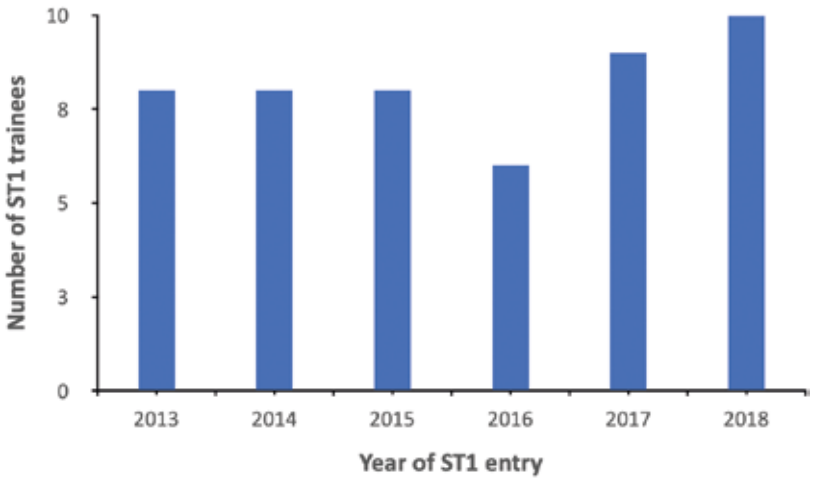


Figure 1: The number of ST1-appointed trainees between 2013 and 2018

Two-thirds of trainees appointed to the run-through programme had completed a Bachelor of Science Degree with the majority being completed as part of an intercalated degree during medical school. As expected, the majority of projects were completed in another field separate from Cardiothoracic Surgery. At the time of appointment, ten respondents had at least one postgraduate qualification.

During ST1 and ST2, the majority of trainees had a Cardiothoracic Surgeon as their assigned educational supervisor (88% and 81%, respectively). Approximately, 75% of trainees have declared their cardiothoracic subspecialty of interest with adult thoracic surgery comprising 31% and adult cardiac surgery comprising 25%. One quarter of respondents had not yet decided on their subspecialty that they wished to pursue (Figure 3).

On reflection, the majority of trainees felt that the ST1/ST2 years of the run-through programme prepared them well for ST3 training and they felt as prepared as an ST3 recruited from an uncoupled training programme. In addition, the majority of trainees felt supported in their training within the run-through programme and would apply for ST3 entry had they been unsuccessful at ST1 recruitment. However, the majority of trainees expressed concerns with regard to post certificate of completion of training employment opportunities and this is reflective of the number of posts available and the number of trainees applying (Figure 4).

The majority of respondents indicated that they had access to a local educational teaching programme within their Deanery. However, one-quarter of the trainee population highlighted that there was no local educational programme. The majority of trainees were aware of the National SCTS portfolio of curriculum-aligned courses and were satisfied with the quality of the courses provided.

This is the first comprehensive review of the ST1 run-through programme in Cardiothoracic Surgery from its inception and is endorsed by both the SCTS and SAC. The majority of appointed trainees decided on a career in Cardiothoracic Surgery during their medical school years. The findings have demonstrated that ST1 recruitment has been successful, prepares the trainee well for ST3 training in the specialty and is the preferred mode of entry. Indeed, following the pilot study, and taking effect from August 2017, the General Medical Council, have approved the ST1 run-through training pathway in Cardiothoracic Surgery and 2022 will be the last year of recruitment to ST3 with all subsequent recruitment cycles recruiting to the ST1 programme only. Therefore, the information obtained from this survey will be fundamental to improve the ST1 run-through programme in Cardiothoracic Surgery for future years.

* During this time period, Northern Ireland did not recruit any ST1 trainees and therefore, this survey will not reflect the training programme in this Deanery.

Figure 2: When did you decide on a career in Cardiothoracic Surgery?

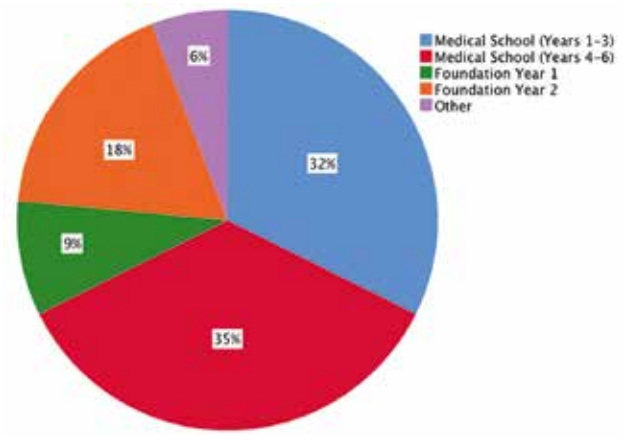


Figure 3: Which Cardiothoracic subspecialty have you decided to pursue?

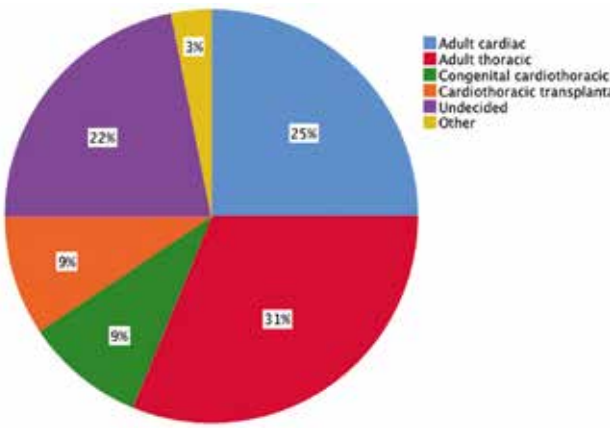
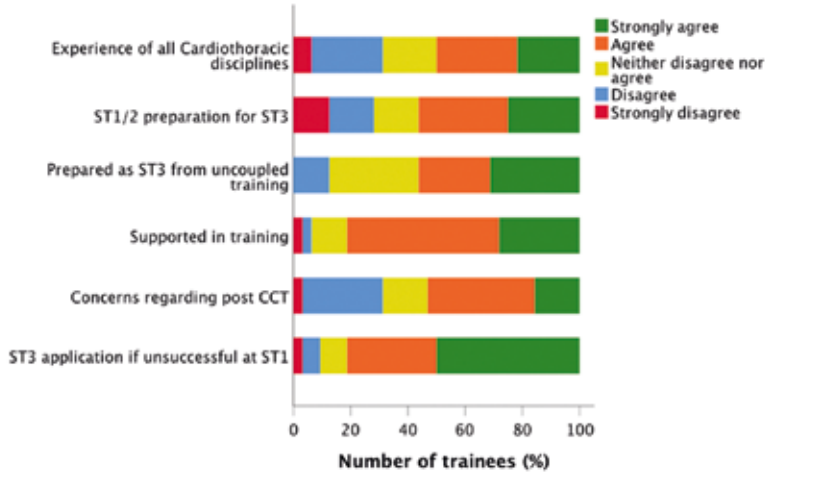


Figure 4: Reflections of the ST1 run-through Cardiothoracic Surgery programme



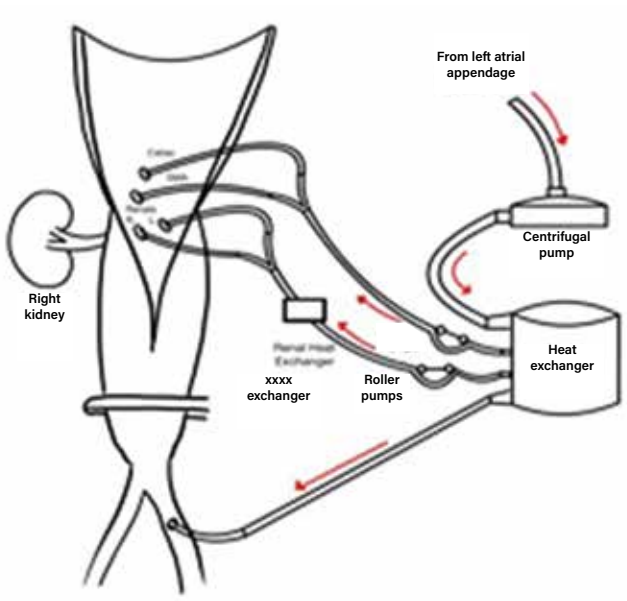
Aortic Aneurysm Location: Hall 2A **Monday** 11:00 – 12:30

Risk factors for haemofiltration following surgery on the descending thoracic and thoracoabdominal aorta.

James Bennett Liverpool Heart and Chest Hospital NHS Trust

The origins of the specialised aortic service at Liverpool can be traced back to 1996, when surgeons at the Cardiothoracic Centre performed their first surgical repair of a thoracoabdominal aortic aneurysm (TAAA). Now known as Liverpool Heart and Chest Hospital (LHCH), we are the largest aortic centre in the UK, providing a 24/7 service that covers Merseyside, Cheshire, North Wales and the Isle of Man.

TAAA surgery is a frequent challenge for both patient and clinician, requiring continuous refinement of surgical and adjunctive techniques. Practices employed at LHCH have undergone significant evolution over the past two decades, initially guided in consultation with Mr Safi, Houston. An elective TAAA repair at LHCH now typically includes the use of left heart bypass, cerebrospinal fluid drainage, motor evoked potential neuromonitoring, platelet-rich plasmapheresis and selective visceral perfusion. Studies show that these practices lead to improved renal and neurologic outcomes.



Despite continuous advancement in methods of organ protection, post-operative morbidity is a persistent thorn in the side of any aortic surgeon. Acute Kidney Injury (AKI) is a common complication, found in approximately 20-30% of all cases. AKI results from a pathological matrix that encompasses ischaemia-reperfusion injury, inflammation, vasoconstriction and intravascular haemolysis. Patients with AKI are likely to require renal replacement therapy (RRT) which increases the length of time spent on intensive care and is linked to early mortality. Ameliorating rates of AKI following TAAA repair is a key aim of the aortic team at LHCH. We hope to tease apart the mechanisms of renal pathophysiology and improve the preservation of kidney function in a collaborative project with researchers at the University of Liverpool.

This year, in Belfast, I will be presenting the results of our retrospective study into risk factors for AKI and RRT following surgery on the descending thoracic and thoracoabdominal aorta. I will be focussing on the patient characteristics and operative techniques linked to the onset of AKI. Our results form the basis for our future research into improved standards of care for the benefit of our patients.

British Heart Valve Society Session: Aortic Valve Interventions Hall 2A **Tuesday** 13:30 – 15:00

Perioperative outcomes and long-term survival of octogenarian patients undergoing re-sternotomy for aortic valve replacement

Hannah Masraf, Mr Suvitesh Luthra MCh, FRCS(CTh) (supervising consultant) Wessex Cardiac Surgery Research Group, University Hospital Southampton NHS Foundation Trust, UK

Hannah Masraf

The gold standard for patients developing structural degeneration of bioprosthetic aortic valves has been surgical aortic valve replacement (SAVR). However, transcatheter aortic valve implantation (TAVI) has emerged over the last decade as a compelling treatment option in high – to intermediate – risk cases. The proportion of octogenarians requiring redo-SAVR will continue to grow with the predicted longer life expectancy and vitality of the elderly population. This patient group suffers from multiple comorbidities and re-sternotomy increases the operative risk manifold. Our study was designed to evaluate whether it is still feasible to consider redo-SAVR in this high risk group of octogenarians, who could instead be referred for TAVI.

Over the 19 year period of our study, 163 patients underwent resternotomy for SAVR at University Hospital Southampton. The mean follow-up was 4.2 +/ – 3.5 years. The median age was 83 (81-85 years). The median logEuroSCORE was 19.2% (13.0-26.7). Of the patients involved, 94 (57.7%) underwent redoSAVR with a concomitant cardiac procedure (the associated redoSAVR group), and 69 (42.3%) underwent an isolated redoSAVR procedure (the isolated redoSAVR group). Baseline demographic variables as described for EuroSCORE (European System for Cardiac Outcomes Risk Evaluation) were compared and were broadly similar, with the exception of the isolated redoSAVR group having fewer pervious Mis compared to the associated redoSAVR group (8.7% vs 23.4% respectively, p=0.01). Inpatient mortality was 4.9% (1.4% vs 7.4% for isolated and associated redoSAVR respectively p=0.08). There were no differences in post-operative markers of re-exploration rates, deep sternal wound infection, haemofiltration and post-operative cerebrovascular accidents,

Perioperative outcomes on inpatient mortality were analysed using uni – and multi-variable logistic regression analyses. COPD, LVEF<30%, Logistic EuroSCORE, CPB time, haemofiltration and post-operative cerebrovascular accidents were significant predictors of inpatient mortality on univariable analysis. COPD was a predictor of inpatient mortality on multivariable logistic regression analysis (Odds ratio: 8.86 95% CI: 1.19-66.11 p=0.03).

Overall survival from discharge was 88.7% at one year, 86.4% at 2 years, 70.1% at five years and 26.3% at 10 years. There was no difference in survival between isolated RedoSAVR and associated redoSAVR (logrank p=0.36). Cox regression analysis identified COPD (Hazard Ratio {HR} 2.31 95% CI: 1.08, 4.95 p=0.03), post-operative cerebrovascular accident (HR 5.32 95% CI: 1.27 to 22.32) and length of stay (HR 1.03 95% CI: 1.00 to 1.05 p=0.04). Compared to an age-sex – matched general population cohort (using ONS data for the UK 2018), survival was significantly lower (logrank p=0.015).

Our findings demonstrate that redoSAVR in octogenarians is associated with acceptable but significant morbidity and mortality both short – and long-term. We believe that moving forward, holistic decision making should consider the emerging safety profile of transcatheter therapies when offering treatment options in high risk patients.

Cardiac Surgery General II Meeting Room 3B **Tuesday** 11:00 – 12:30

Are super obese patients at higher risk for cardiac surgery?

Results from our last decade's experience

Ammar Mustafa, Giuseppe Rescigno Royal Wolverhampton NHS Trust, UK

The relationship between Body Mass Index and Cardiac Surgery outcomes has historically been reported to be U-shaped. Both the leaner and the morbidly obese are challenging groups of patients that warrant focused metabolic assessment and thorough health status evaluation prior to Cardiac Surgery.

Obesity is an increasing globally prevalent phenomenon with significant healthcare burdens. The UK currently occupies the 10th position in the ranking of the heaviest countries out of the list of the 36 members of the wealthy nations of the Organization of Economic Cooperation and Development (OECD) world-wide while in Western Europe, the UK is indeed the most obese country with one of the faster growing rates more than most other European countries. UK obesity statistics in March 2022 revealed that 28% of the adult population are obese and up to 36% of adults are classified as overweight at present with a projection of 10% rise in the obesity rates during the following decade.

Morbid obesity represents a concerning factor for Cardiac Surgery including technical challenges, prolonged hospital stay and increased risk of some postoperative complications. Previous studies in the literature have not shown a significantly increased risk. However, these studies were mostly focused on CABG operations and frequently with limited number of patients. Interestingly, a few number of studies reported even lower in hospital mortality rates in obese patients undergoing Cardiac Surgery when compared to the non-obese patients (Obesity Paradox).

The aim of this study was to retrospectively review the in-hospital postoperative outcomes of all the patients who underwent open heart procedures with a BMI > 40 Kg/squared meter in our institution for the last 10 years between April 2011 and March 2020. 179 patients were identified, the majority were Caucasians (91.6%) mostly males (56%) and the mean age was 61.2 years old. The mean SCTS EuroSCORE was 1.6 and the type of admission was mostly elective (65.9%), in-hospital transfer in 31.2% and 2.7% of the patients underwent emergency surgery. Regarding the type of operation, 45.8% had isolated CABG, 34% isolated valve, 12% CABG + Valve, 3.9% major aortic and 3.3% others.

In-hospital mortality among the super obese patients was 1.6% (3 patients) and the mean hospital stay was 8.4 days. Two permanent strokes were recorded (1.1%) and eight patients (4.4%) required hemofiltration for postoperative AKI. 14 patients required prolonged ventilatory support (7.8%) and there were two deep sternal wound infections (1.1%).

In conclusion, our expected and observed in-hospital mortality were similar, we had reasonably acceptable postoperative outcomes for the super obese patients and the dreadful sternal complications were not frequent. Our results correspond to previous reports confirming that extreme obesity per se is not recommended to be a contraindication for cardiac surgery. However, a thorough preoperative risk profile assessment is required for these technically challenging subjects.

SCTS CONFERENCE NEWS

Publisher
Dendrite Clinical Systems Ltd
Managing Director
Peter K H Walton
peter.walton@e-dendrite.com
Managing Editor
Owen Haskins
owen.haskins@e-dendrite.com

Lead Journalist
Martin Twycross
martin.twycross@e-dendrite.com
Design and layout
Peter Williams
williams_peter@me.com

Head Office
Dendrite Clinical Systems Ltd
5th Floor Reading Bridge House
George Street
Reading
RG1 8LS
UK
Tel +44 (0) 1491 411 288
Fax +44 (0) 1491 411 399

Website
www.e-dendrite.com

SCTS ANNUAL MEETING 2022

ICC Belfast 8-10 May

Sunday 8 May 2022

	Hall 2A Level 1	Hall 2B Room 3 Level 1	Meeting Room 1 Level 3	Meeting Room 2 Level 3	Meeting Room 3 Level 3	Studio Level 1
09.00	***09.00-10.30*** Mitral	***09.00-10.30*** Coronary 1	***09.00-10.30*** Becoming Research Active in Cardiothoracic Surgery	***09.00-10.30*** Current Management of Early Stage Lung Cancer	***09.00-10.30*** Cardiac Wetlab	***09.00-10.00*** Welcome to the day and 'Hands on Skills in Cardiothoracic Surgery
10.30	***Coffee***					
11.00	***11.00-12.30*** British Heart Valve Society Infective Endocarditis Session	***11.00-12.30*** Coronary 2	***11.00-12.30*** Clinical Academic Careers in Practice	***11.00-12.30*** Sublobar Resection - Technical Aspects	***11.00-12.30*** Cardiac Wetlab	***11.00-12.30*** Educating the Surgeons of the Future Part 1
12.30	***12.30-13.30*** Lunchbox Session: The landscape for Aortic Dissection	***12.30-13.30*** Lunchbox Session: Decision-making in Aortic Valve Surgery	***12.30-13.30*** Lunchbox Session: Why Treat AF?	***12.30-13.30*** Lunchbox Session: Digital Adjuncts to Thoracic Surgery	***Lunch***	
13.30	***13.30-15.00*** Aortic Dissection	***13.30-15.00*** Contemporary Approaches to Transplantation and Mechanical Life Support	***13.30-15.00*** Getting started with Audit in Cardiothoracic Surgery	***13.30-15.00*** Clinical Decision Making	***13.30-15.00*** Thoracic Wetlab	***13.30-15.00*** Educating the Surgeons of the Future Part 2
15.00	***Coffee***					
15.30	***15.30-17.00*** Aortic General	***15.30-17.00*** AF Surgery		***15.30-17.00*** Thymic Tumours	***15.30-17.00*** Thoracic Wetlab	***15.30-17.00*** Scientific Abstract Session
17.00						***17.00-19.00*** Trainees Meeting

ADULT CARDIAC
CONGENITAL
THORACIC
SATELLITE
CT NAHP
PAT MAGEE
LUNCHBOX
VIDEO / WEBINAR / POSTER

17.00-19.00 The Welcome Reception - ***Exhibition Hall***

Monday 9 May 2022

	Auditorium Level 1	Hall 2A Level 1	Hall 2B Level 1	Boardroom 1 Level 2	Boardroom 2 Level 2	Meeting Room 1 Level 3	Meeting Room 2 Level 3	Meeting Room 3A Level 3	Meeting Room 3B Level 3	Studio Level 1	Exhibition Hall Level 1
08.00		***08.00-09.00*** WiCTS	***08.00-09.00*** Terumo Symposium			***08.00-09.00*** Intuitive Symposium		***08.00-09.00*** Ethicon Symposium	***08.00-09.00*** The Utilization of NPWT		
09.15	***09.00-10.30*** Main Plenary										
10.30	***Coffee***										
11.00		***11.00-12.30*** Aortic Aneurysm	***11.00-12.30*** Coronary Artery Bypass Grafting		***11.00-12.30*** Cardiac Surgery Research Collaborative	***11.00-12.30*** Cardiac Surgery - General 1	***11.00-12.30*** Perioperative	***11.00-12.30*** Technology in Congenital Heart Disease	***11.00-12.30*** Cardiac Surgery - General 1	***11.00-12.30*** NAHP Leadership - Education, Innovation, Evolution	***11.00-12.30*** Moderated Poster Session 1
12.30	***Lunch***										***12.30-13.00*** Movies: Session 1
13.30		***13.30-15.00*** Cardiac Outcomes from Registry Data	***13.30-15.00*** Minimally Invasive Cardiac Surgery	***13.30-15.00*** PACES Trial Investigators Meeting		***13.30-15.00*** Innovation	***13.30-15.00*** Lung Cancer 1	***13.30-15.00*** Valve Surgery A lifelong Journey!	***13.30-15.00*** Transplant & ECMO	***13.30-15.00*** Modernising Cardio-thoracic Surgical Pathways	***13.30-15.00*** Moderated Poster Session 2
15.00	***Coffee***										
15.30	***15.30-17.00*** Plenary Session: Enhanced Recovery After Surgery			***15.30-17.00*** Acute Aortic Dissection				***15.30-16.30*** LVOT Extreme Anatomy ***16.30-17.00*** Hunterian Lecture		***15.30-17.00*** Infection Prevention and Management in Cardio-thoracic Surgery	
17.30						***17.30-18.30*** BD Symposium	***17.30-18.30*** Improving the early stage NSCLC pre-operative molecular synthesis	***17.00-18.00*** Medtronic Symposium	***17.00-18.00*** Abbott Symposium		

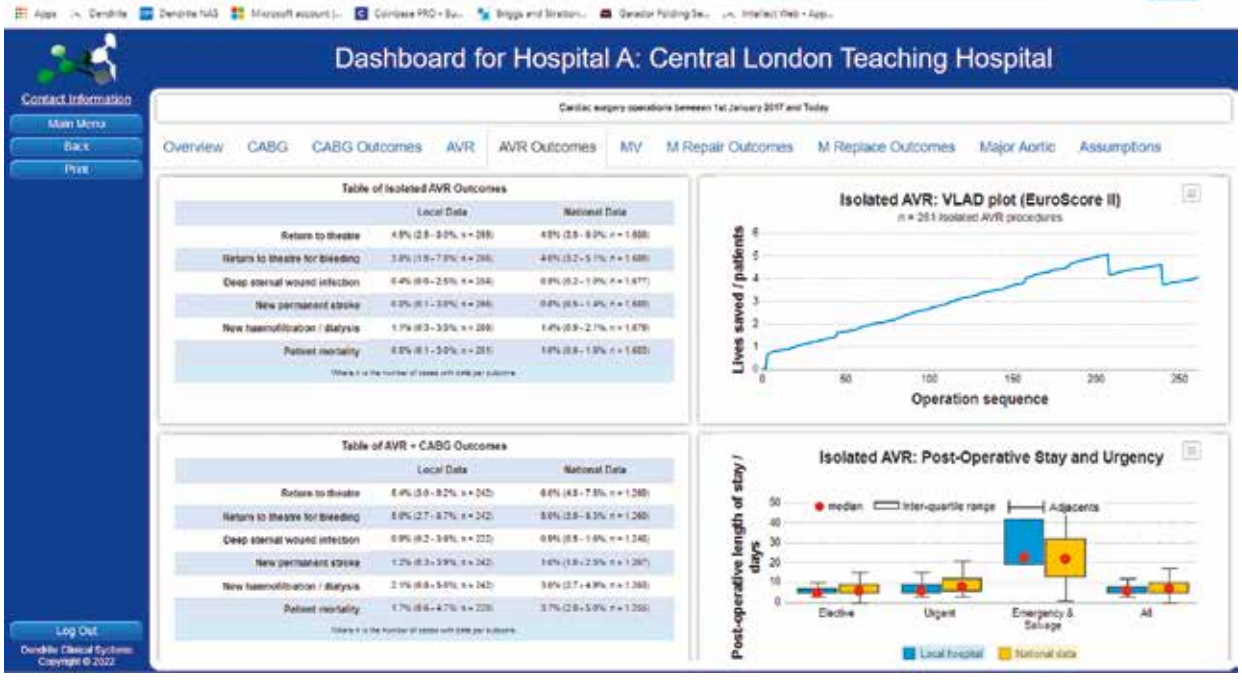
Tuesday 10 May 2022

	Hall 2A Level 1	Hall 2B Level 1	Boardroom 1 Level 2	Boardroom 2 Level 2	Meeting Room 1 Level 3	Meeting Room 2 Level 3	Meeting Room 3A Level 3	Meeting Room 3B Level 3	Studio Level 1	Exhibition Hall Level 1
08.00			***08.00-09.00*** Education Committee							
09.00	***09.00-10.30*** Main Plenary									
10.30	***Coffee***									
11.00	***11.00-12.30*** Mitral Valve Surgery	***11.00-12.30*** Aortic Dissection	***11.00-12.00*** Thoracic Committee		***11.00-12.30*** Lung Cancer 2	***11.00-12.30*** Minimally Invasive Surgery		***11.00-12.30*** Cardiac Surgery General 2	***11.00-12.30*** Clinical Challenges and Updates	***11.00-12.30*** Moderated Poster Session 3
12.30			***12.30-13.30*** Audit Committee	***Lunch***						***12.30-13.00*** Movies: Session 2
13.30	***13.30-15.00*** British Heart Valve Society Session: Aortic Valve Interventions	***13.30-15.00*** Training in Cardiothoracic Surgery		***13.30-15.00*** NICOR Stakeholders Meeting for Congenital Surgery	***13.30-15.00*** Process	***13.30-15.00*** Miscellaneous Thoracic Oncology	***13.30-15.00*** Equality, Diversity & Inclusion Committee	***13.30-15.00*** Heart Research UK Lecture	***13.30-15.00*** Research and Innovations in Cardiothoracic Surgery	***13.30-15.00*** Moderated Poster Session 4
15.00	***Coffee***									

On-line, real-time benchmarking at the touch of a button

Uday Trivedi

Example of a Cardiac Surgery Dashboard for isolated-CAGB



Example of a Cardiac Surgery Dashboard comparing local vs national data

Dendrite Clinical Systems, working in close cooperation with the SCTS and several cardiac centres, has developed a series of 'Dashboards' that allow users to access to their unit's surgical outcomes and compare them to national results in real-time. By uploading their data to the central Dendrite National Cardiac Surgical Registry, individual units or centres can instantly benchmark their results via an on-line database for internal consumption to assist units with their own clinical governance and for auditing purposes.

"There are several organisations in the United Kingdom that already examine surgical data and report a variety of clinical and organisational outcomes such as the National Cardiac Benchmarking Collaborative (NCBC). For several years the SCTS, working with the National Institute for Cardiovascular Outcomes Research (NICOR) as part of the National Cardiac Audit Programme, has been seeking to gather data on outcomes other than mortality," explained Mr Uday Trivedi, Consultant Cardiothoracic Surgeon, from the Royal Sussex County Hospital, Brighton and Hove, and SCTS Adult Cardiac Surgery Audit Lead. "As the overall mortality from cardiac surgery is now so low, we really require data on additional outcomes such as complications like renal failure, stroke and bleeding, as well as length of hospital stay, patient surgical group demographics etc, to try and assess how we improve the quality of care for our patients. The Dashboards now give individual centres the ability to compare these complications at a national level. This is important data - not just for the multi-disciplinary surgical teams - but also for hospital managers and administrators."

The Dashboards are exclusively for adult cardiac procedures and therefore excludes all congenital and thoracic procedures, as well as transplantation. During the development phase of the Dashboards, it was decided they would include the volume and type of procedures expected to be carried out by most surgeons or centres. As a result, the Dashboards report data on coronary surgery, aortic valve procedures and mitral valve procedures.

In addition to coronary and aortic and mitral valve procedures, a separate area for major aortic procedures is currently under development to try and ascertain how much major aortic work is performed in an emergency and/or elective setting. Specifically, this will help determine how many dissections are performed, by which units and reveal the outcomes from these procedures.

"One of the first things we had to decide was how to work around the information governance issues and GDPR requirements," added Mr Trivedi. "Using only anonymised data, the process for data collection and analysis was mostly concerned with establishing suitable definitions, applying caveats to risk-modelling and risk-adjusted analyses."

The desire for surgeons to benchmark themselves against national standards has always been a goal for the speciality. However, the ability to do this is dependent on several factors including how often data are submitted, it what form the data are submitted, how often and to what extent the data are analysed. By using the central Dendrite National Cardiac Surgical Registry, the ability to benchmark your data against national standards is realised with the push of a few buttons. Initially, the pilot Dashboards were rolled out to five centres and an additional 15 centres have expressed an interest in using them.

The Dashboards are not exclusive to units that only use Dendrite's 'Intellect Web' software and are available for all units and centres across the develop nations. For example, units in Scotland can benchmark themselves against UK standards. Moreover, the intuitive Dashboards also allow users to take a more in-depth look at patients demographics and groups without the need for any additional coding or SQL queries on the part of users.

It is important to note that cardiac units can only look at their own data and benchmark their data to the national standard. The Dashboards cannot be used to compare one unit to another unit, and units cannot look at another unit's data.

One key advantages of the Dashboards is the speed at which units can analyse their data, whether units unload their data monthly or quarterly, comparisons can be made in an instant. The data is presented in useful graphs and tables with the additional functionality of a data export facility to allow the data to be presented at governance and management meetings.

"We know that within centres, surgeons have different degrees of experience and seniority etc. This can lead to a skewed patient population for individuals. The SCTS has agreed with many national NHS bodies that the cardiac outcome data should be done on a unit level only and to move away from individual reporting. One of the tenets of this approach is for units to look for any negative variation in their outcomes on a quarterly basis. The Dashboards provide units with the tools to look for this variation," Mr Uday concluded. "Clinical outcomes are the result of care provided by many clinical teams throughout the department or unit, not just one single surgeon or operation. By making the outcomes unit based, it provides both individual and collective responsibility for outcomes, creating awareness and therefore, driving quality improvement processes."

"At the push of a single button and in just four or five seconds, surgeons can generate 37 comprehensive graphs and tables that illustrate surgical activity and outcomes at their hospital benchmarked against nationally collected data," said Dr Peter Walton, Managing Director of Dendrite. "Dendrite is very pleased to be able to provide this added-value service to the UK community of adult cardiac surgeons."

If you or your surgical unit would like to know more about Dendrite's innovative, benchmarking Dashboards and to have a Dashboard demonstration, please visit the Dendrite Stand no.23b in the Exhibition Hall.

MiECS randomised controlled trial to assess MiECC vs. cCPB

Researchers led by the Clinical Research Unit at the Special Unit for Biomedical Research and Education (SUBRE), Aristotle University of Thessaloniki School of Medicine, Greece, have initiated a randomised control trial (RCT) that will compare minimally invasive extracorporeal circulation (MiECC) with conventional cardiopulmonary bypass (cCPB). According to the researchers, the 'Minimally invasive extracorporeal circulation versus conventional cardiopulmonary bypass in patients undergoing cardiac surgery (MiECS)' trial will be one of the largest multicentre RCTs on extracorporeal circulation. The study will be conducted under the auspices of Minimal Invasive Extracorporeal Technologies International Society (MiECTiS).

"This study is ultimately designed to address the emerging effectiveness of MiECC systems in the light of modern perfusion practice worldwide," explained Professor Kyriakos Anastasiadis, Professor of Cardiac Surgery, School of Medicine, Aristotle University of Thessaloniki, Greece, and Chief Investigator of the trial. "The primary hypothesis is that MiECC, as compared to cCPB, reduces the proportion of patients experiencing serious perfusion-related postoperative morbidity after cardiac surgery."

According to the researchers, the MiECS study will overcome most limitations of previous trials of MiECC as it will focus on specific perfusion-related clinical outcomes after cardiac surgery that could be potentially affected by MiECC, and should also target for higher-risk patients undergoing complex procedures that are more likely to develop complications and, thus, benefit from the advanced technology.

The study will be conducted in ten to 15 cardiac surgery centres worldwide (Germany, Greece, Italy, United Kingdom, Switzerland, Turkey and Canada). Leading cardiac centres in MiECC have agreed to participate. Professor Andreas Liebold, Ulm University will be the Lead Principal Investigator for EU Countries, while Professor Prakash Punjabi, Imperial College London, will be the Lead Principal Investigator for non-EU countries. Main Principal Investigators taking part in the study are MiECTiS President Cyril Serrick, Toronto University Health Network, MiECTiS Vice-President Professor Serdar Gunaydin, Ankara University and Dr Aschraf El-Essawi, Goettingen University. Any surgeon with an experience of more than 50 patients operated on MiECC is eligible to take part. Patients will be recruited if they are having coronary artery bypass surgery, aortic valve replacement or both. The research objectives will be addressed by randomising participants (1:1 ratio) to have surgery using MiECC system or cCPB.

The MiECTiS investigators

The trial will be powered by Dendrite Clinical Systems' Intellect Web software that will collect patient demographic, procedural, complication/s and outcomes data. In addition, the innovate software features automatic patient randomisation - once the inclusion and exclusion criteria are completed, a random number generator automatically randomises the patient to a treatment group.

"This intuitive system is incredibly easy to use whether it is a cardiac surgeon, perfusionist or nurse entering the data. In addition, investigators can monitor each patient record as the trial continues. With a paper-based system, one has no idea who is enrolling patients, who has put in incomplete data etc without directly monitoring them," explained Dr Peter Walton, Managing Director of Dendrite Clinical Systems. "Our system allows researchers to keep a track on patient randomisation and importantly, ensure centres were adhering to protocol etc. "A web-based platform for data collection offers unprecedented access by investigators across multiple sites, allowing real-time supervision of patient enrolment. Our web-based system can be adapted for national and international clinical registries and trials in any clinical setting."

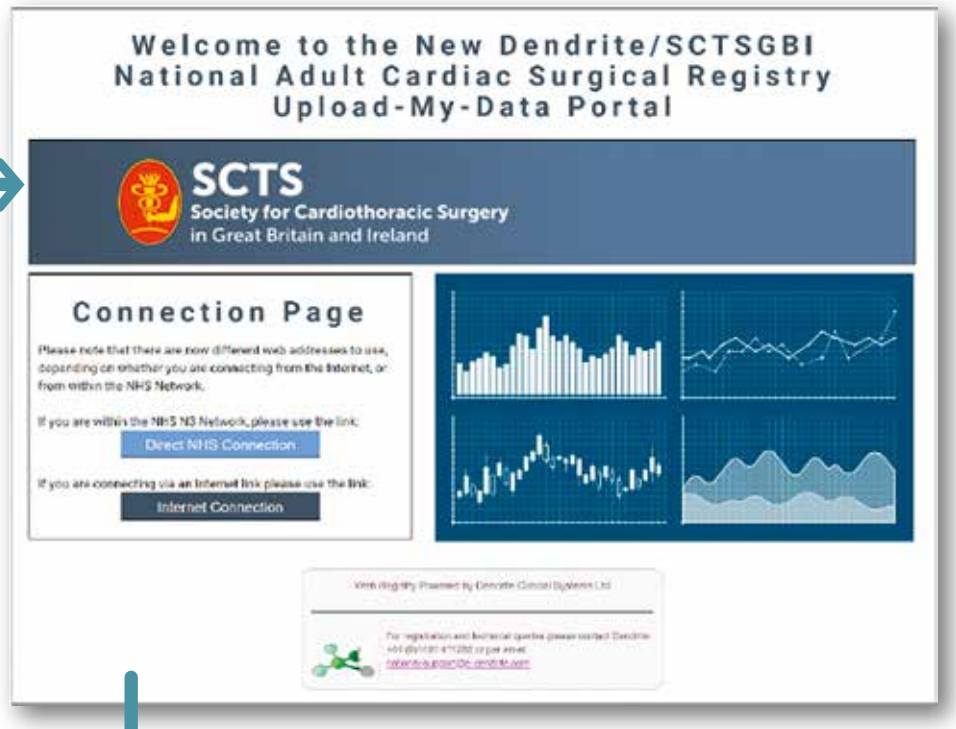
A total of 1,300 participants will be randomised in two arms over a period of 36 months. The composite primary outcome consists of death, myocardial infarction, stroke, acute kidney injury, reintubation, tracheostomy, mechanical ventilation for more than 48 hours, or reoperation up to 30 days after surgery.

"If MiECC is shown to be effective in such a trial, the technology is available and could be rapidly implemented in clinical practice providing a significant healthcare benefit," Professor Anastasiadis concluded.

DENDRITE'S SCTS DASHBOARDS
ON-LINE REAL-TIME BENCHMARKING

Individual units or centres can instantly benchmark their results via an on-line database for internal consumption for clinical governance and for auditing purposes

Hospitals upload their data to the central Dendrite National Cardiac Surgical Registry



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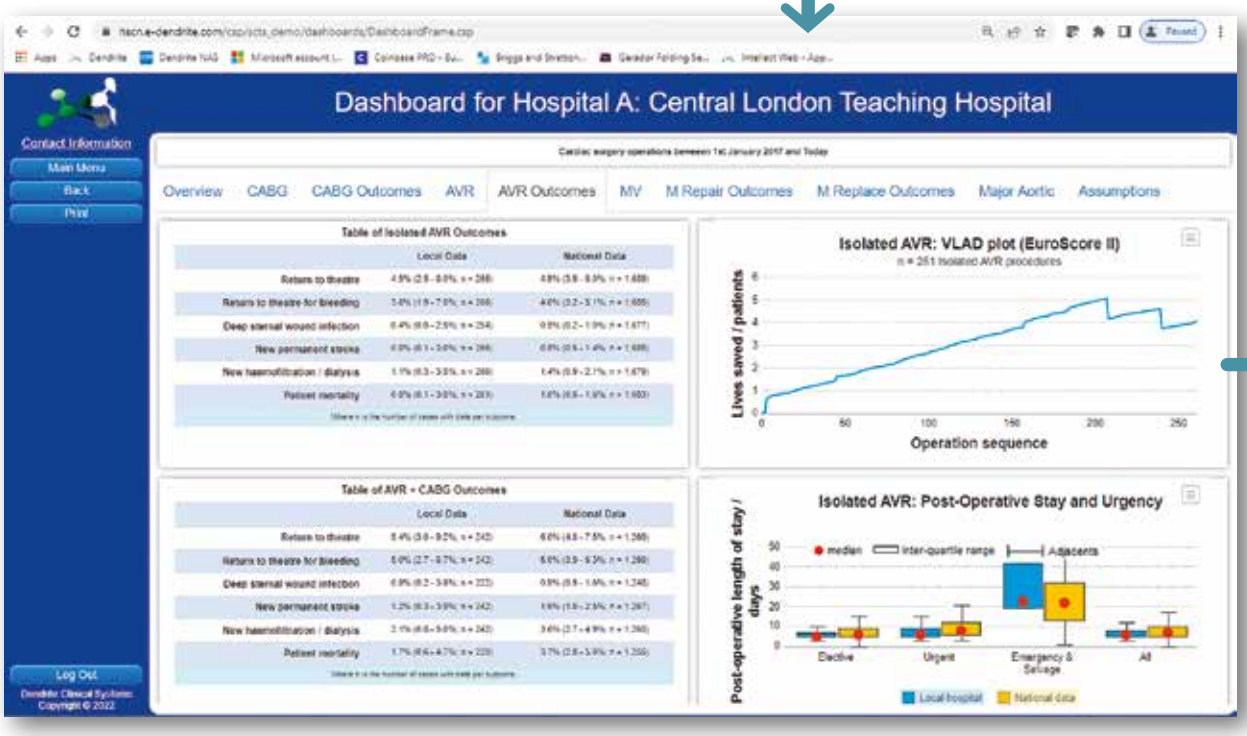

- ✓ Instant
- ✓ on-line
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- ✓ risk-adjusted analyses results

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Innovation Meeting room 1 **Monday** 13:30 – 15:00

What really drives the cost of robotic lobectomy?

Ben Shanahan Cork University Hospital, Ireland

It has traditionally been assumed that the elevated capital and operating costs associated with robotic lobectomy are the principal drivers behind it's increased cost compared to the VATS and open approaches. But is this really the case? By designing a micro-cost analysis to assess the cost drivers for robotic, VATS and open lobectomy, we set out to answer this question.

Our group, consisting of thoracic surgeons, a health economist and a biostatistician, designed a micro-cost model to reflect the lobectomy patient's pathway from admission through the first 30 days after surgery, modelled for the robotic, VATS and open approaches. We assessed four overall 'cost components'; staff costs, consumable equipment costs, postoperative costs and capital costs. Data was drawn from previously performed meta-analyses published by our group, single centre observation and expert opinion.

As expected, total cost for the robotic approach (€13,321) was significantly higher than the VATS (€11,567) and open (€12,582) approaches. Detailed evaluation suggested that the increased cost of the robotic approach was driven more by the cost of consumable equipment than by anything else (robotic consumables were €1106 euro more expensive than their VATS counterparts, accounting for 63% of the cost difference). Increased operating room staff costs, driven by the increased operating time compared to VATS/open, was also a significant contributor.

Interestingly, capital costs accounted for a mere 34% of the cost difference between the robotic and VATS approaches, suggesting that even if programmes were to significantly increase the utilisation of their equipment (i.e. perform six cases a day instead of three, use the robot at night/weekends etc), the impact on per case cost difference would be minimal.

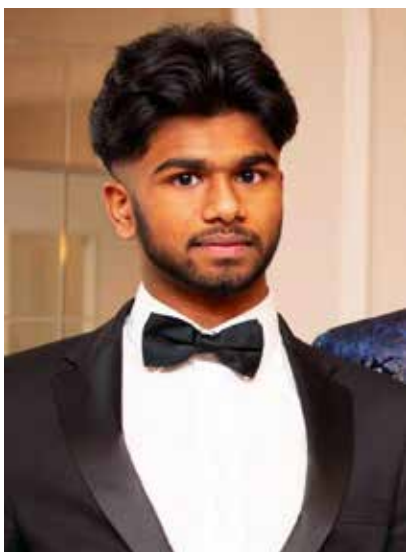
Our analysis was performed for an Irish/UK setting, but with minimal adjustment it could certainly be generalisable to many other jurisdictions. We offer it as a useful tool for surgeons, hospital management and service commissioning agencies to accurately and comprehensively determine where cost savings can be applied in their programme, maximising the cost efficiency of robotic lobectomy.

On a personal note I would like to acknowledge the huge amount of work put in by our team over several years, namely Professor Karen Redmond, Professor Jan Sorenson, Ms Usha Kreaden and Mr Steven Stamenkovic. We have published our work recently in the Journal of Robotic Surgery, and look forward to presenting it on Monday afternoon in the innovation session. See you there!

Pat Magee: Scientific Abstract Session Studio **Sunday** 15:30 – 17:00

Cardiothoracic surgery – levelling the playing field

Sathyan Gnanalingham
UCL Medical School, London, UK



Cardiothoracic surgery has been stereotyped as lacking in diversity, equality and inclusion. Given the rapidly diversifying nature of medical school cohorts, could these stereotypes dissuade the best and brightest from applying for the speciality?

We conducted a cross-sectional observational study investigating how gender, ethnicity, and disability influence medical students' interest in cardiothoracic surgery as a career choice. We distributed a 26-item Google Forms online survey to all 37 UK medical schools via social media outlets in 2021. All current UK medical students were eligible to participate in this study and we received 258 responses with an average age (20 ± 0.2 years) [Table 1, Figure 1].

Survey participants were invited to individually rank the importance of 'factors of interest' [Column 1, Table 2]. Responses were cross analysed between gender, ethnicity and disability.

Interestingly, there was a significant difference between genders. Males were almost twice as likely to consider a career in cardiothoracic surgery than females. Females were five times more likely compared to male respondents to perceive their 'gender' and a 'lack of a cardiothoracic mentor of the same gender' as important regarding career choice. Also, more female compared to male respondents perceived 'long working hours and physical demands of the job' (77% vs 56%) as important in their career choice [Table 2].

Somewhat surprisingly there were no difference in response amongst ethnic groups, for example regarding interest in cardiothoracic surgery (24% Caucasian vs 25% non-Caucasian). This may reflect the current UK cardiothoracic workforce, with an over-representation of minority ethnic groups within the specialty and the greater availability of mentors: the typical UK cardiothoracic trainee is male and of an ethnic minority background [EDI report – SCTS Bulletin Issue 11, 2022].

A minority (11%) of respondents confirmed 'long-standing illness or disability.' Interestingly, their responses did not differ from the rest of the respondents, for example regarding their interest in cardiothoracic surgery (27% Disabled vs 27% non-disabled). Given the average age of our survey participants being millennials (20 years; range 18-28), could it be that the new generation of medical professionals hold fewer biases?

Thus, gender, more than ethnicity or disability, is an important factor for UK medical students when considering cardiothoracic surgery as a career. In UK, currently about 55% of medical students are female, however the number of female surgical consultants has only increased from 3% (1992) to 13% (2020) [Statistics-Royal College of Surgeons, 2022]. Gender diversity in surgery has been suggested to have a positive impact both for workplace welfare and potentially patient outcomes [BMJ 2017;359: j4366]. However, in terms of the percentage of female consultants (10%) cardiothoracic surgery is ranked the 3rd lowest surgical speciality [Statistics-Royal College of Surgeons, 2022].

The lack of a mentor of the same gender and long working hours seem to be important factors that discourage female medical students from the specialty. In addressing the gender disparity, increasing mentorship opportunities for female medical students via the recently developed SCTS women in cardiothoracic surgery network may help.

Furthermore, a team-based approach could help lessen the impact of the long-working hours in this speciality, but this may also have an impact on the way surgical outcome is assessed in this speciality, teams and units rather individuals.

Overall, this study highlights the potential recruitment issues in cardiothoracic surgery from a medical student perspective and provides an impetus for change.

Question	N (%)
Sex	
Male	97 (38%)
Female	161 (62%)
Disability	
None	230 (89%)
Longstanding illness/disability	28 (11%)
Ethnicity	
White (or Caucasian)	116 (45%)
Asian or Asian British	114 (44%)
Black, African, Caribbean	7 (3%)
Mixed (or multiple ethnicity)	10 (4&)
Other ethnic group	11 (4%)
Year of medical school	
1	22 (9%)
2	146 (57%)
3	68 (26%)
4	14 (5%)
5 or 6	8 (3%)

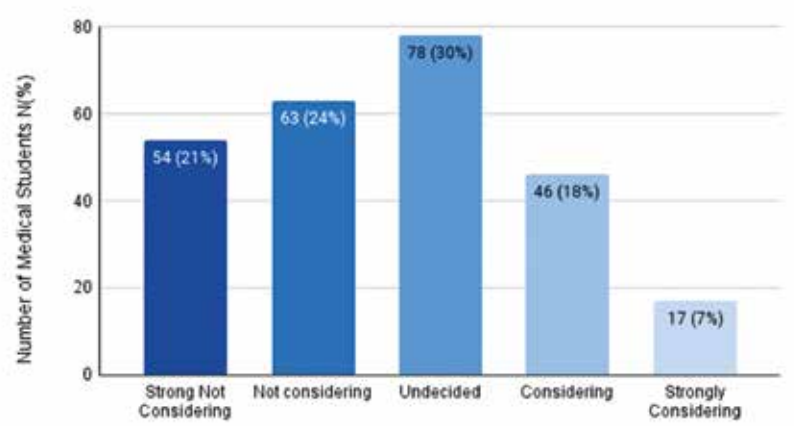


Figure 1: A bar chart showing medical student interest in a career in cardiothoracic surgery (N=258).

Table 1

Questions	Male (N=97)	Female (N=161)
To what extent are you considering a career in cardiothoracic surgery	32 (33%)	31 (19%) **
Responsibilities of family life/work-life balance	58 (60%)	112 (70%)
Respondents gender	5 (5%)	38 (24%) **
Lack of a cardiothoracic mentor of the same gender	6 (6%)	39 (24%) **
Perceived prestige of cardiothoracic surgery	26 (27%)	35 (22%)
Long working hours and physical demands of the job	54 (56%)	124 (77%) **

Table 2: Differences in response between male (N=97) and female (N=161) medical students. For each question, the response was assessed on a 1-5 Likert scale (1= very unlikely/not important, 5= very likely/very important) and the number of respondents scoring four or five for these responses is depicted in the table below (N, %). **P<0.01 on Chi squared test.

Infection Prevention and Management in Cardiothoracic Surgery Studio **Monday** 15:30 – 17:00

SSI Champions: Managing surgical site infection prevention strategies through inter-disciplinary network collaboration

Randolph Antolin[1], Trixia Mikaela Arcegono[2], Kristia Basilio[1], Joyce Beverly Blair[1], Rosalie Magboo[1], Luzviminda Sebastian[3], Cheryl Uy[1] 1 Intensive Care Unit, St Bartholomew's Hospital; 2 Operating Department, St Bartholomew's Hospital; 3 Pre-admission Clinic, St Bartholomew's Hospital

Surgical site infection (SSI) is the most dominant healthcare-associated infection affecting surgical patients. A recent national survey of SSI prevention strategies demonstrated significant variation in care in cardiac surgery centres (CIRN, 2020), which is also reflected locally. To address the issue, a cross-department network of SSI champions has been established at Barts Heart Centre (BHC) in London.

The SSI champions work together to standardise local practices for the prevention of SSI after heart operations. They deliver a series of multidisciplinary teaching to keep all the staff informed and promote adherence to the new local SSI prevention protocol. They conduct regular snapshot audits on various SSI prevention strategies to continuously assess staff compliance and quickly identify areas for further teaching. Run charts were also produced to analyse trends, with annotations marking the interventions made.


Barts SSI champions

The champions' initial strategy to implement the SSI prevention protocol was based on Kurt Lewin's model of unfreezing, changing and refreezing, which is a very simple approach in managing change. Subsequently, his force field analysis framework was used to critically examine the driving and restraining factors affecting stakeholders' acceptance of change. The main driving forces found in the implementation include: visibility of the SSI champions in the clinical area, ongoing feedback on each department's practices and collaborative working with the multidisciplinary team. However, differences in patient management between surgical teams, quick changeover of staff and staffing shortages resulting to an increase in the number of bank and agency nurses across the board were seen as significant restraining factors.

As a result of this initiative, compliance rate to some prevention strategies had improved considerably particularly on timing of antibiotic prophylaxis, wound chart documentation, postoperative antiseptic wash and use of appropriate dressing. However, further interventions are needed to improve compliance on SSI risk assessment, preoperative antiseptic wash and postoperative wound management.

Finally, despite the variability in the protocol uptake at BHC, the visibility of the SSI champions in the clinical area has been instrumental in embedding the agreed standard local practice for SSI prevention after cardiac surgery. The challenges faced will be addressed in further plan-do-study-act (PDSA) cycles and future audits will include comparison of SSI rate pre and post protocol implementation.

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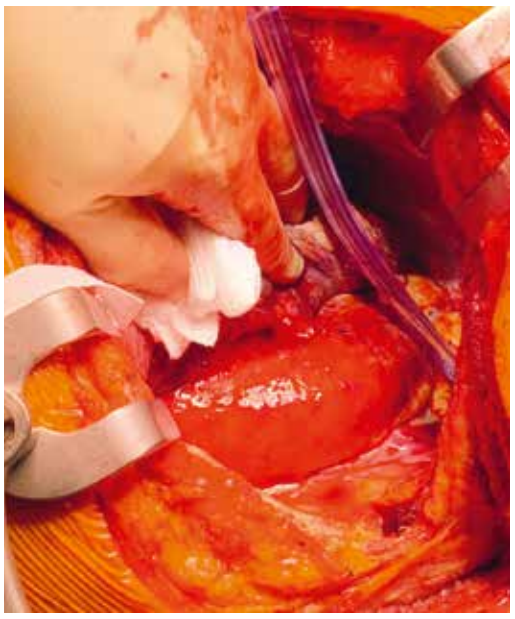
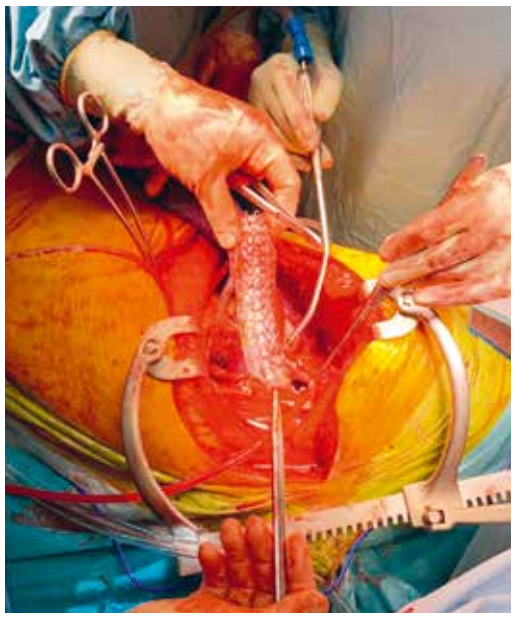
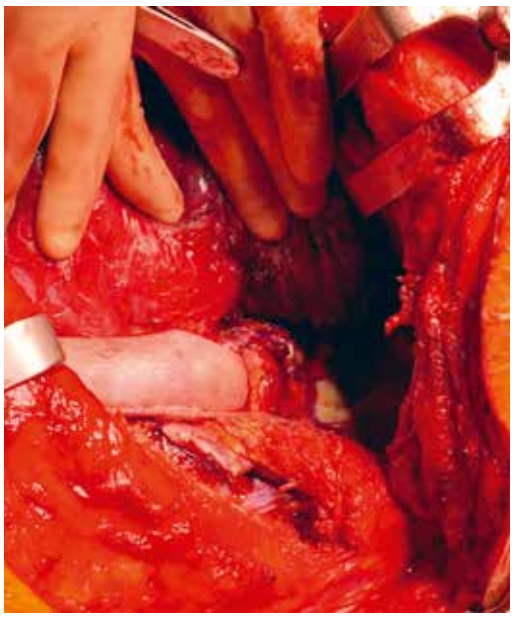
Movies Session #1 Exhibition Hall **Monday** 12:30 – 13:00

Infected TEVAR explantation, descending thoracic aorta repair, and repair of aorto-oesophageal fitsula

Monicka Shehata, Victoria Rizzo, Nicolas Price, Amit Chawla, Morad Sallam, Michael Sabetai
St Thomas' Hospital, London, UK







Aorto-oesophageal fistulas (AOF) have a rare incidence and can be classified as primary or secondary. The most common causes of primary AOF are thoracic aortic aneurysms, oesophageal malignancies, ingested foreign bodies, and infection. If left untreated, thoracic aortic aneurysms may result in fistula formation due to erosion of the oesophageal wall.

We present the case of a 60-year-old gentleman who was found to have a descending thoracic aortic aneurysm associated with an aorto-oesophageal fistula.

The patient with a background of epilepsy, smoking, and alcohol excess presented to his local hospital following an episode of haematemesis. He was under on-going investigation for a possible upper gastrointestinal malignancy after reporting dysphagia and weight loss of approximately one stone over the past month. On examination he was haemodynamically stable and admission bloods revealed a haemoglobin level of 71g/L. A subsequent computerised tomography (CT) scan of the chest, abdomen, and pelvis revealed a contained rupture of a proximal descending thoracic aortic aneurysm. A sac measuring approximately 3cm in diameter was visualised. Surrounding low attenuation material causing extrinsic indentation on the mid-oesophagus and mild oesophageal wall thickening was suggestive of an aorto-oesophageal fistula. Stenting via an emergency thoracic endovascular aneurysm repair (TEVAR) was used to stabilise the patient.

Following a review in clinic one month later, the patient was readmitted due to pyrexia and rising inflammatory markers. A positron emission tomography (PET)-CT scan demonstrated increased radioisotope uptake of the stent, suggestive of stent infection. He was therefore treated with antimicrobial therapy and become medically stable.

At operation, a posterolateral thoracotomy incision was made and an adherent inflamed descending thoracic aorta (DTA) was dissected off the lung lobes. Cardiopulmonary bypass was then established through an 8mm Dacron graft via an end-to-side anastomosis to the femoral artery and venous cannulation of the left femoral vein and superior vena cava. Deep hypothermia at 20oC was achieved. A cross-clamp applied to the distal DTA enabled perfusion of the lower body whilst keeping the upper body under circulatory arrest.

The DTA was excised and the infected thoracic stent explanted. The distal aortic arch was transected. A bovine pericardium tube was anastomosed end-to-end to the distal aortic arch. The tube was then cannulated and the anastomosis pressurised. Upper and lower body perfusion was achieved as the upper cross clamp was placed just distal to the left subclavian artery and the lower cross clamp at the distal DTA. The distal anastomosis was performed simultaneously, after which systemic re-warming commenced.

The fistula was managed with a primary repair and superimposed by a pre-prepared intercostal pedicle.

The patient recovered very well and follow-up biochemistry and imaging revealed improvement and resolution.

In such cases of complex aortic diseases requiring surgical management we recommend a multi-disciplinary team (MDT) approach with the involvement of cardiac-aortic surgeons, vascular-aortic surgeons, cardiac anaesthetists and infectious disease specialists.

Research and Innovations in Cardiothoracic Surgery Studio **Tuesday** 13:30 – 15:00

Cloud-based clinical charting – a technological revolution service improvement to assist in the cardiothoracic organ retrieval process

Joao Pedro Nunes
Royal Papworth Hospital NHS Foundation Trust, Cambridge, UK

Cloud-based Clinical Charting is a project currently in development by the team of Donor Care Physiologists (DCP). Recently renamed Documentation of National Organ Retrieval Service (DoNORS), the objective of this pioneering and innovative project is three fold. Firstly, simplify documentation during the role of the DCP whilst participating on organ retrieval. Secondly, to go paperless as recently there has been increasingly green incentives to help the environment. Finally, this project attempts to achieve the "Leading World Technological Innovation" set out by the National Health Service (NHS), in 2019.

In an effort to simplify and automate documentation during Scouting and Donation after Brain Death (DBD) Retrievals our team has developed an excel spreadsheet available through the Office 365 Cloud to different members of retrieval and recipient teams. A new spreadsheet is created for each Scouting or DBD retrieval and a link to all those involved in the decision making process for that retrieval have access to real time data documented by DCPs while they actively manage donors and optimise their organs in order to provide recipients with better outcomes and enable donors to be able to give the gift of a new life to more recipients.

Currently, the cloud-based clinical charting system has been employed in two DBD retrievals, we are at the stage of training different members of the team in order to be able for it to be adequately used by all members involved in the donor retrieval process; this will allow the system to be used in a larger number of retrievals, becoming the new standard of documentation in order to aid the Donor Care Physiologists in monitoring and decision making of donors, therefore being essential in organ optimisation and, consequently organ utilisation.

DoNORS is still at it's early stages, yet the commitment of the team to pioneer new ideas and employ new technologies to compliment their current practice, shows the dedication of the team of Donor Care Physiologists at Royal Papworth Hospital to be a key element in the National Organ Retrieval Service, offering a holistic approach to the dynamics of organ retrieval. Furthermore, DoNORS continues to be developed, with plans to extend this future standard of documentation to Donation after Circulatory Death (DCD) retrievals, as well as future medical devices to improve organ management and utilisation.

Lauren Dixon

Cardiac Surgery General II Meeting Room 3B **Tuesday** 11:00 – 12:30

Impact of sex on outcomes after cardiac surgery: a systematic review and meta-analysis

Ettorino Di Tommaso, Lauren Dixon
University Hospitals Bristol, Bristol, UK

Advancements in surgical technology and peri-operative care have led to improvements in outcomes following cardiac surgery. However, female sex is still considered a risk factor for both mortality and morbidity. As more women are undergoing surgical management of cardiovascular disease, it is important to understand this sex-related risk discrepancy. The aim of this project was to investigate sex-related discrepancies in cardiac surgery outcomes in modern practice.

Firstly, we conducted a meta-analysis of published literature from 2010 onwards that reported outcomes of males and females following cardiac surgery. We found females are at a greater risk of short-term mortality and post-operative stroke than males following coronary artery bypass grafting and valve surgery combined with coronary grafting. However, we didn't find a significant difference for isolated aortic valve replacement. Long-term mortality (after 30 days) was equivalent in both sexes.

Cardiac Outcomes from Registry Data Hall 2A **Monday** 13:30 – 15:00

Female sex is a risk factor for short-term mortality after cardiac surgery: Insights from a national database

Lauren Dixon, Ettorino Di Tommaso
University Hospitals Bristol, Bristol, UK

Secondly, we performed an analysis of the National Adult Cardiac Surgery Audit (NACSA) to compare outcomes between males and females after cardiac surgery from 2010 to 2019.

In the risk-adjusted population, female sex is an independent risk factor for mortality following coronary artery bypass grafting, aortic valve replacement and mitral valve replacement/repair. Following coronary surgery, female sex was also associated with increased post-operative dialysis, deep sternal wound infections and length of hospital stay.

Despite surgical advancements, female sex remains an independent risk factor for poor outcomes following cardiac surgery. Future research should aim to understand the underlying mechanisms that lead to this effect. This will allow us to develop sex-specific strategies to mitigate the increased risk of mortality of morbidity that females undergoing cardiac surgery face.

Minimally Invasive Cardiac Surgery Hall 2B **Monday** 13:30 – 15:00

Does concomitant tricuspid valve repair impact outcomes of minimal access endoscopic mitral valve surgery?

Mukesh Karuppannan, Abdelrahman Abdelbar, Palanikumar Saravanan, Andrew Knowles, Grzegorz Laskawski, Rachel Argyle, Joseph Zacharias
Lancashire Cardiac Centre, Blackpool Victoria Hospital,UK

Mukesh Karuppannan

Mitral valve disease is often associated with concomitant tricuspid valve regurgitation in patients with long standing mitral regurgitation. The decision to manage tricuspid regurgitation at the time of mitral valve surgery remains a topic of debate. Consequently, the frequency of concomitant tricuspid valve repair varies at different centres around the world. Although the concerns on whether or not to perform concomitant tricuspid repair often revolves around longer-term outcomes such as heart failure progression and survival, operative outcomes are an important consideration as well. It is also unclear whether performing these operations by an endoscopic minimal access approach, impacts operative outcomes.

As minimal access cardiac procedures are gaining momentum, more evidence is available confirming the parity of minimally invasive endoscopic mitral valve surgery over the traditional conventional sternotomy approach. Very few studies have analysed the outcomes of combining tricuspid surgery to endoscopic mitral valve surgery .The aim of this study was to evaluate the impact of tricuspid repair (TVR) during endoscopic mitral valve surgery on operative and long-term outcomes based on experience with this approach in our unit. This study was a single-centre, retrospective analysis of patients who underwent endoscopic minimal access mitral valve surgery (EMVS) in our institution between January 2007 and December 2020.Patients were primarily grouped by those undergoing isolated EMVS against EMVS+TVR. Short and long-term outcomes were analysed from a prospectively collected departmental database .A total of 329 patients underwent EMVS out of which 52 (15.90%) underwent concomitant TVR.Our results show, patients that needed a tricuspid valve intervention during mitral valve surgery are older, more likely to be female, in atrial fibrillation and in higher NYHA class. In this selected group, intraoperative times did not appear to be significantly different. Postoperatively there were no significant differences in early outcomes or mortality in both the groups .There was a trend towards more permanent pacemaker implantation in the combined procedure group.

FIve-year survival in both groups matched.Our findings of higher NYHA class and higher incidence of preoperative atrial fibrillation supports an earlier referral strategy to endoscopic minimally invasive mitral surgery to reduce the need for tricuspid intervention. It would be interesting to follow long-term TR in both EMVS and EMVS+TVR groups which will certainly be more intriguing and instructive to address tricuspid regurgitation during EMVS as more recent studies support early tricuspid intervention.

The cosmetic advantages of a EMVS approach is very appealing to patients and is likely to drive earlier acceptance of surgery. This may help reduce the need for intervention on the tricuspid valve as we may be likely to deal with the primary mitral pathology prior to its effects on the right ventricle developing. Despite a steeper learning curve and added complexity when these procedures are performed endoscopically, concomitant TVS can be performed safely by surgeons experienced in EMVS with favourable short and long-term outcomes.

Minimally Invasive Cardiac Surgery Hall 2B **Monday** 13:30 – 15:00

Minimal access aortic valve replacement: impact on outcome in elderly patients

Sobaran Sharma, Sam Poon, Yasir Ahmed, Pankaj Kumar Morriston Hospital, Swansea, UK

Sobaran Sharma

Introduction

Minimally invasive Aortic valve Replacement (mini-AVR) via J-partial sternotomy has been shown to reduce morbidity, blood transfusion, post – operative pain and enable quicker recovery. Not much data is available on the outcomes of mini-AVR in elderly patients.

We assessed the Impact of mini-AVR for Isolated Aortic valve replacement against Full Sternotomy in Elderly patients and compared the outcomes.

Methods

We retrieved the records of Elderly patients (aged 70 years and over) between April 2006 to March 2020 undergoing Isolated Aortic Valve Replacements. Demographics and peri-operative data between two groups undergoing Full Sternotomy (Group A) and mini-AVR (Group B) were compared.

Results

Six hundred and fifty-eight patients (Group A) and 182 patients (Group B) underwent Isolated Aortic Valve Replacement with Full sternotomy and J-partial sternotomy incisions respectively. There was an increased proportion of comorbidities in Group B as reflected in the significantly higher Logistic Euroscore (8.9% vs 10.4% p<0.05). Cardiopulmonary Bypass (101.8 vs 77mis p=0.001) and Cross Clamp times (82.7 vs 64.3mins p<0.01) were shorter in Group B. The Cardiac Intensive care utilisation: more than 24 hours (49.7 % vs 38.3 %, p=0.05) was significantly lower in Group B; who also had a significantly shorter post–operative hospital stay (11 vs 7.6 days, p <0.05). There was a significantly lower re-operation for bleeding (5.5% vs 1.7% P<0.05). There was a significantly lower usage of packed red cell units in Group B (2.3 vs 1.5 units p=0.009).

Conclusions

We have demonstrated that minimal access approach for Aortic valve replacement can provide substantial clinical benefits in the elderly and comorbid patients, in addition to utilising fewer hospital resources such as post-operative care facilities, length of stay and blood transfusion.

Innovation Meeting room 1 **Monday** 13:30 - 15:00

Chest trauma – excess mortality review from a single trauma centre

Ee Phui Kew Thoracic Surgery Registrar, St George's Hospital, London.

According to The Trauma Audit and Research Network (TARN) database, there are about 16000 deaths caused by trauma each year in England and Wales. Trauma is the leading cause of death in children and young adults. Our unit admits around 1200 trauma cases per year and around 20% of these admissions involve chest injuries. Using mortality rate as a measure of quality of care is complicated, as every trauma patient is different. The severity of injuries plays a major role in determining their probability of survival, as well as other factors such as age and pre-existing co-morbidities.

TARN uses a probability of survival (PS) model to calculate the chances of trauma patients surviving their injuries. It uses logistic regression model, taking into account of age, gender, Injury Severity Score (ISS), Glasgow Coma Score (GCS) or intubation, and pre-existing medical conditions. Based on the PS model, the expected number of survivors is then compared with the actual number of survivors.

Our trauma unit receives regular updates from The Trauma Audit and Research Network (TARN) regarding our outcome reports and mortality data. These data include PS and how our mortality data compare to the other major trauma centres in the UK. After reviewing the data from TARN, our major trauma consultants have identified 99 trauma patients who died despite having PS above 75% from 2016 to 2018 in our centre. Of the 99 patients, 11% (n=11) had chest trauma as the main injury. Our aim was to review this group of patients and identify any contributing factors to their mortalities.

55 % (n=6) were female and 45% (n=5) were male, with mean age of 86.9 years old and mean PS of 87.4. Their ISS ranged from 10 to 34 (mean of 19.9). All cases were caused by blunt trauma. Three of the 11 deaths were considered 'unexpected'. One patient died due to aspiration on the ward which led to hypoxic brain injury; another death was due to possible massive pulmonary embolus; the third unexpected death was a patient who was discharged and readmitted with sepsis. All the other eight 'expected 'deaths were from patients aged 80 years-old and above. Six of these patients were frail with multiple pre-existing co-morbidities. The other two patients who were relatively fit and healthy sustained serious traumatic injuries, giving them ISS of 33 and 34 respectively, and their PS were 85.6 and 80.0 respectively.

Further analysis of these three 'unexpected deaths' revealed no significant incidence or clinical mismanagement related to their mortalities. However, this review raised a few points:

1. We found a need for better and quicker anaesthetic service to provide serratus anterior block.
2. Is there any benefit in fixing ribs of elderly patients?
3. PS tends to be overestimated in the elderly population. Although the PS model considers age, ISS and pre-existing medical conditions, it does not take frailty into account.

In conclusion, better access to serratus anterior block for rib fractures in our unit is needed. The PS calculation model needs to be reviewed as the score did not correlate with the actual outcome in elderly patients. A well-designed study is needed to investigate any benefit of rib fixation in elderly patients in terms of prognosis and quality of life.

Research outputs from the Northwest Thoracic Surgery Collaborative

Marcus Taylor1, Stuart Grant1, Udo Abah1, Matthew Smith2, Felice Granato1 and Mike Shackloth2 on behalf of the Northwest Thoracic Surgery Collaborative (NWTSC) 1. Wythenshawe Hospital, Manchester, UK; 2. Liverpool Heart & Chest Hospital, Liverpool, UK

The formation of research collaboratives to pool resources and undertake more meaningful research from larger multi-centre patient groups is not a new concept. It is generally accepted that the first regionally developed surgical research collaborative was the West Midlands Research Collaborative,1 founded by general surgery trainees. As this group began to publish high-quality research in high impact journals,2 similar initiatives were developed in other specialties, including neurosurgery, plastic surgery and cardiothoracic surgery.

The Northwest Thoracic Surgery Collaborative (NWTSC) was formed in 2019 and is a collaboration between two of the busiest thoracic surgery units in the UK: Wythenshawe Hospital and Liverpool Heart & Chest Hospital. According to LCCOP data, the combined number of lung resections performed by these two hospitals equates to over 16% of all lung resections undertaken in the UK.3 We have merged and cleaned our thoracic surgery databases to produce a combined dataset comprising 6600 patients who underwent lung resection between 2012 and 2018. The collaborative is comprised of both consultants and trainees with an interest in research and several presentations will be delivered on behalf of the collaborative during this conference.

Three of the projects being presented focus on the impact of an individual patient variable on outcomes after lung resection for primary lung cancer.

Lung Cancer I Meeting Room 2 Monday 13:30 - 15:00

Outcomes After Lung Resection for Primary Lung Cancer in Octogenarians: Trends Over Time

The first analyses outcomes in patients aged ≥80 years ('octogenarians'). These patients comprised 9.4% of the overall cohort and their mortality fell significantly over time. In the most recent years of the study, there was no significant difference in 90-day and 1-year mortality between octogenarian and non-octogenarian patients.

Pre-existing Pulmonary Fibrosis is Associated with Adverse Outcomes in Patients Undergoing Resection for Primary Lung Cancer

Secondly, outcomes for patients with pre-existing pulmonary fibrosis were analysed. Despite relatively small numbers (n=37), the study demonstrated significantly higher rates of 90-day mortality, 1-year mortality and reintubation for the fibrosis group, as well as reduced overall survival. The 1-year mortality for patients with fibrosis undergoing lung resection was significantly higher than the estimated overall 1-year mortality for patients with fibrosis based on GAP score.

Lung Cancer II Meeting room 1 Tuesday 11:00 - 12:30

Outcomes After Lung Resection for Primary Lung Cancer in Never Smokers

Finally, the impact of smoking was considered by analysing trends and outcomes amongst never smokers. In total, 17% of the cohort were never smokers. Never smokers had significantly better lung function, better functional status and reduced comorbidity burden. Whilst short-term mortality was similar, never smokers had significantly lower rates of respiratory complications. Furthermore, never smokers had a significantly lower risk of 1-year mortality and significantly better overall survival, even after adjustment for lung cancer stage.

Data from the NWTSC is starting to provide important insights into thoracic surgery in the UK. Expansion of the collaborative is underway in collaboration with the SCTS Thoracic sub-committee. It is hoped that with more contributing centres, significant research outputs will be delivered that can translate into meaningful benefits for patients undergoing thoracic surgery.

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Cardiac Surgery - General I Meeting Room 3B **Monday** 11:00 – 12:30

The single clamp box with radio-frequency device vs conventional box lesion for atrial fibrillation ablation

John Massey
Northern General Hospital, Sheffield, UK

The Cox-Maze IV procedure is the gold standard for surgical management of Atrial Fibrillation (AF) however it is underperformed. It has been proposed that the 'box lesion' around the pulmonary veins is the most important part of the procedure. Our centre has described a novel technique for performing the 'box lesion' with a radiofrequency clamp that doesn't involve performing a left atriotomy. This method of a 'single clamp box' is used in our institution for performing the 'box lesion' in both patients undergoing a full Cox-Maze IV and when performing a limited left sided lesion set. We suggest that this technique provides an attractive option to performing the left atrial box without opening the left atrium. Our presentation at this year's SCTS shows its safety and efficacy when compared to performing the traditional 'box lesion' set.

The box lesion aims to electrically isolate the left atrial posterior wall by creating a series of transmural lesions (bilateral pulmonary vein isolation, superior connecting line and inferior connecting line). The single clamp box technique entails creating the four lesions in a single pass of the radio-frequency device. With the heart on cardiopulmonary bypass, this is achieved by passing the device with the right hand around the right side pulmonary veins from inferior to superior. Using the left hand the device is then rotated clockwise with the superior jaw passing under the superior vena cava and the inferior jaw passing into the oblique sinus. The superior jaw then passes through the transverse sinus. The right hand can then be used to raise the left ventricle and the tips of the jaw can then be felt and used to manipulate the left side pulmonary veins between the radio-frequency clamp jaws. The clamp is then closed and the ablation performed.

To show that this procedure is both safe and effective, we present a retrospective comparative study of patients undergoing AF ablation at our institution. Three hundred patients were included in the study and divided into two groups; patients who underwent AF ablation with a traditional box lesion and patients who underwent AF ablation with a single clamp box lesion. Our results showed that compared to the traditional box lesion, the single clamp box was safe, with no difference between the two groups in terms of new permanent pace maker, length of stay or mortality. Additionally we showed that the technique is as effective at restoring sinus rhythm, with 89.8% of patients being in sinus rhythm at discharge from follow-up compared to 80% in the non-single clamp group.

We conclude that performing the single clamp box with a radio-frequency device is both safe and effective. We believe that this technique is easily learnt and can therefore be adopted by cardiac surgeons and may be especially useful if planning to only ablate the left atrium.

LVOT Extreme Anatomy Meeting Room 3A **Monday** 15:30 – 16:30

Necrotising enterocolitis pre cardiac surgery. Damned if you do, damned if you don't.

Mark Boyle, Bernadette Khodaghalian, Caroline Jones and Rafael Guerrero St Thomas' Hospital, London, UK

Objectives

Infants with congenital heart disease (CHD) have the potential to develop Necrotising Enterocolitis (NEC) with devastating consequence. However, simply a suspicion of NEC can delay cardiac surgical intervention causing an increase in mortality and morbidity in patients awaiting a "time critical" procedure. This highlights the necessity of accuracy in diagnosis. Reviewing practice in our centre we assessed the incidence of NEC in infants with CHD awaiting cardiac bypass surgery, the delay such a diagnosis caused and the subsequent impact on outcomes.


Mark Boyle

Methods

This retrospective cohort study over a 24-month period utilised data obtained from NICOR and local surgical databases. We included infants <90 days of age with a diagnosis of CHD and a diagnosis of NEC prior to cardiac surgery requiring bypass. We collected data on demographics, cardiac lesion, feeding patterns, biochemical markers, diagnostic imaging, clinical assessment and patient outcomes.

Results

Of the 770 cardiac surgical procedures in this time period, 24 infants <90 days were diagnosed with NEC prior to a cardiac operation requiring bypass – 38% were born prematurely (less than 36 weeks). Within this cohort, 38% of patients had transposition of the great arteries, 21% arch lesions and 17% pulmonary atresia with lesser incidence of other lesions. (Figure 1.) Feeding methods varied and 71% were on prostaglandin at time of diagnosis. Clinical signs and biomarkers used to determine diagnosis varied, seven patients had an abnormal x-ray, Four patients ultrasound changes (three of which had normal abdominal films). seven cardiac operations were definitively delayed, and four patients underwent surgical management for NEC as it was deemed so severe. Mean ICU stay post cardiac surgery was 11 days with 0% mortality at 30 days.

Conclusions

Necrotising enterocolitis is associated with significant morbidity and mortality. Those born with congenital heart disease are at particular risk and require caution. Our centers experience of suspected NEC in the context of congenital heart disease represented a particular challenge in the significant delays to surgical intervention requiring bypass in infants. Such delays prompted the team to reflect on practice and the rigorousness of the parameters with which we use to diagnose NEC. Reviewing our data we confirm the impact of NEC in our population is not insignificant and presents in a wide variety of lesions. Therefore, the question remains are the typical diagnostic pathways appropriate for our population? Certainly, in our centre the utilisation of ultrasound is under review in light of these findings, as is a review of the feeding recommendations in all our cardiac infants. We ask how should we feeds these infants, is it time to look at new ways of diagnosing NE, should we be incorporating risk stratification in our usual practice?

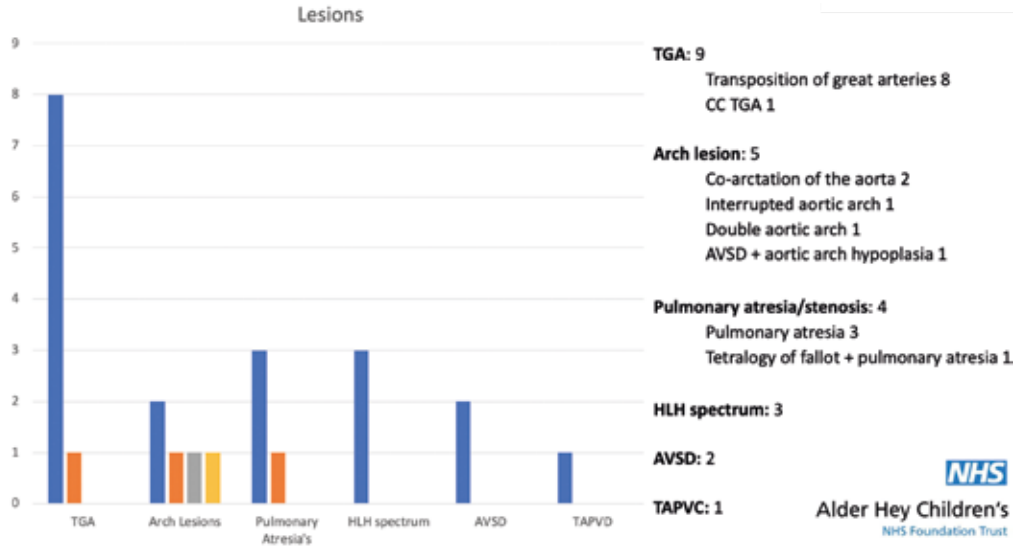


Figure 1. Breakdown of Lesions in infants <90 days old with CHD and pre cardiac surgery diagnosis of NEC

Clinical Challenges and Updates Studio **Tuesday** 11:00 – 12:30

A review of mechanical insufflation: exsufflation as a treatment for patients undergoing extended pleurectomy-decortication surgery

A service evaluation carried out at st. Bartholomew's hospital

Zelie Husemann and Emma Streets Barts Health NHS Trust, London, UK

Barts Thorax Centre sits alongside the Barts Heart Centre, the largest cardiovascular centre in Europe. The Thorax Centre is a regional mesothelioma centre and offers radical extended pleurectomy-decortication (EPD) surgery for epithelial mesothelioma under the MARS-2 trial.

EPD surgery can be associated with an increased risk of post-operative complications including atelectasis, sputum retention and pneumonia (Martino *et al,* 2018). Anecdotal evidence at our Trust has supported a proactive approach to the use of mechanical insufflation: exsufflation (MI:E) as a treatment option for thoracic surgery patients. MI:E is a positive pressure cough assist device which can be used to aid sputum clearance and facilitate recovery after surgery. Whilst literature exists for the use of MI:E in other patient groups, there is a paucity of high-grade evidence for its use in the thoracic surgery cohort.

At St. Bartholomew's Hospital we work closely alongside the Thoracic Consultants to ensure safe application of MI:E with our EPD patients and to confirm positive pressure limits during treatment. Intervention is given with close monitoring of the patient due to the known changes to intrathoracic pressures and its potential effect on cardiovascular stability. Whilst no adverse effects had been noted whilst using this treatment with our patient cohort, no formal review had been completed by the physiotherapy team.

The aim of the service evaluation was to investigate the feasibility and safety of the use of MI:E with EPD patients and to evaluate any adverse effects. We completed a 12-month retrospective review of all patients undergoing EPD surgery between June 2020 to June 2021. Electronic patient records were analysed to highlight patient tolerance to the intervention and to identify any adverse effects during or after treatment. A total of 21 patients were included in the analysis with one patient being excluded due to in-hospital mortality. Out of the 21 patients reviewed, nine patients (43%) received MI:E as a intervention with an average number of six treatment sessions (± 5.13).

The data collection included reviewing respiratory and cardiovascular observations pre and post-treatment as well as highlighting any changes to the intercostal pleural drains. Of the patients who received MI:E, one patient experienced a minor transient adverse effect of haemo-dynamic instability but required no medical intervention. It is pertinent to note the patient had experienced some arrhythmias post-operatively prior to the physiotherapy treatment which was agreed and consent given for MI:E use by the Thoracic Consultant.

Within this review, the use of MI:E following EPD surgery at St. Bartholomew's Hospital has been shown to be safe and feasible. No lasting adverse effects were highlighted and the physiotherapy service will continue to use MI:E as a treatment option for this patient cohort where indicated. A larger observational, multi-centre review would however be beneficial to further validate this finding.


Zelie Husemann

Cardiac Outcomes from Registry Data
Hall 2A **Monday** 13:30 – 15:00

On vs off pump coronary revascularisation in the octogenarian: A propensity-matched analysis from the UK National Database.

Jeremy Chan, Arnaldo Dimagli, Tim Dong, Daniel P Fudulu, Shubhra Sinha, Gianni D Angelini
University of Bristol, Bristol, UK

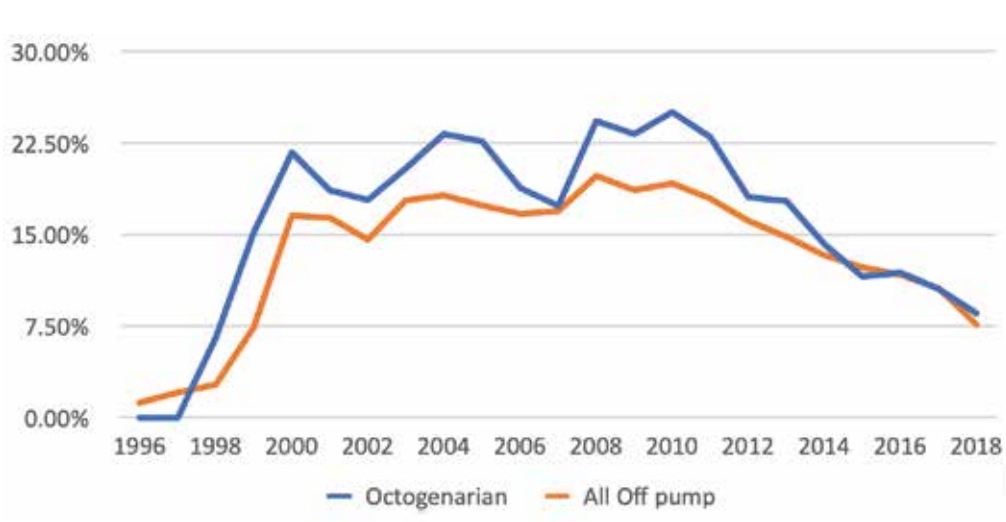
Coronary artery bypass grafting (CABG) remains a good revascularisation strategy in octogenarian with good clinical outcome and quality of life postoperatively. The benefits of off-pump over on-pump CABG in the elderly population are still controversial. We investigated this issue in the UK national registry.

We performed a retrospective analysis of the UK national audit database in octogenarians undergoing non-emergency, isolated CABG from 1996 to 2019.

17,745 patients were included. The proportion of CABG performed in octogenarians with off pump technique has dropped since 2010. After adjustment of baseline characteristics, Off pump CABG were more likely to be performed in elective setting and in patients with lower BMI.

No differences were observed in mortality, return to theatre rate and incidence of deep sternal wound infection. However, octogenarian undergoing off pump CABG were less likely to develop postoperative TIA/stroke but more likely to require renal dialysis.

The data show similar in hospital mortality in octogenarians regardless of the revascularisation technique used. Off pump when compare with on pump CABG is associated with a lower incidence in postoperative neurological events but a higher need for renal dialysis.




Jeremy Chan


Gianni D Angelini

Coronary Artery Bypass Grafting
Hall 2B **Monday** 11:00 – 12:30

Arterial revascularisation trends in coronary artery bypass grafting: a report from the UK national database

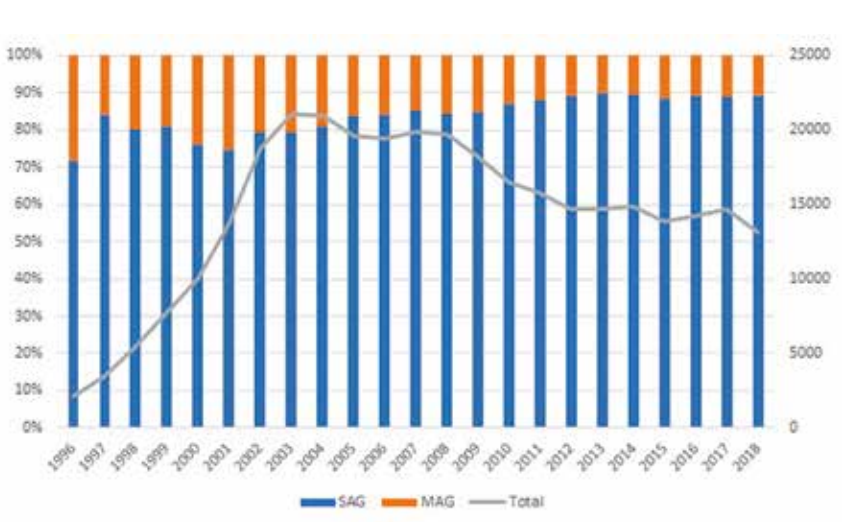
Jeremy Chan, Arnaldo Dimagli, Tim Dong, Daniel P Fudulu, Shubhra Sinha, Gianni D Angelini
University of Bristol, Bristol, UK

The benefits of multiple arterial grafting (MAG), including a reduction in the need for repeat revascularisation, major adverse cardiac events, and new myocardial infarction, compared to single arterial grafting (SAG) has been widely reported. Both European and American guidelines recommend the use of a second arterial conduit in selected patients. However, the adoption of MAG varies widely both regionally and nationally, ranging from 3.9% to 27.8%.

We report the trend of MAG used in isolated coronary artery bypass grafting (CABG), and identify factors predicting the use of MAG in the United Kingdom from 1996 to 2018 using the UK national database.

A total of 336,321 patients were included, of which 84.44% received single arterial grafting. The use of multiple arterial grafting after an initial increase from 1996 to 2001, steadily decreased thereafter, particularly in the use of radial artery. MAG was likely to be performed in younger patients and males.

The use of multiple arterial grafting in CABG in the United Kingdom from steadily decreased after peaked in 2001. This is likely to be multi-factorial and a better understanding of the main causes responsible may contribute to establishing the best indication for multiple arterial grafting in everyday clinical practice.



Modernising Cardiothoracic Surgical Pathways Studio **Monday** 13:30 – 15:00

Non – pharmacological nursing interventions to relieve pain in adult critical care – a review of contemporary literature and plan for integration into modern critical care nursing

Siobhan Giblin
Galway University Hospital, Galway, Ireland

Pain remains an unmet need for many critically ill adult patients in critical care, with up to 70% of patients reporting moderate to severe pain during their ICU stay. Unrelieved acute pain causes patient distress and can transition to chronic pain with long lasting physical, psychological and emotional implications.

Following an extensive literature review, the following interventions were found to have the most robust evidence base. Simple Massage – the use of simple massage on the hands and/or feet of the patient by the bedside nurse or a family member. Music therapy – music therapy based on patient preference was found to aid in the alleviation of both procedural and continual pain perception. Cognitive engagement linked with family involvement in aiding comfort within the critical care setting. Cryotherapy – primarily the use of icepacks as a pre-procedural agent in chest drain removal. Early mobility – increased movement for each patient from admission and throughout the critical care journey. Finally, the reduction of environmental stressors within the patient's surroundings to include noise reduction and sleep promotion.

The implications of moulding such interventions into an individualised holistic care plan would include education of staff to increase awareness and improve time management skills to integrate such aspects into routine care. Acquiring physical resources to implement interventions which would involve an initial financial investment must also be taken into consideration. Auditing and evaluating the use and results of a specific intervention or a combination of interventions on the alleviation of pain in this specific population must also be a nursing priority.

Through reviewing the literature, the results of integrating non-pharmacological nursing interventions to aid the alleviation of pain on the patient and their families include the following – reduced need for breakthrough analgesia, increased efficacy from their current analgesic regime and increased satisfaction in critical care journey. Additionally, the risk of developing complications such as pneumonia and delirium are reduced throughout the patient's critical care journey.

In the authors opinion, the future for this topic must include further rigorous research on the above individual interventions and their use in combination. The development of a standardised nursing intervention protocol for pain management within critical care may aid the implementation, auditing and increase the feasibility of conducting rigorous research on this topic. Furthermore, as technology develops the use of virtual reality within the remit of pain management and its use in critical care may be explored further.

Heart Research UK Session Meeting Room 3B **Tuesday** 13:30 – 15:00

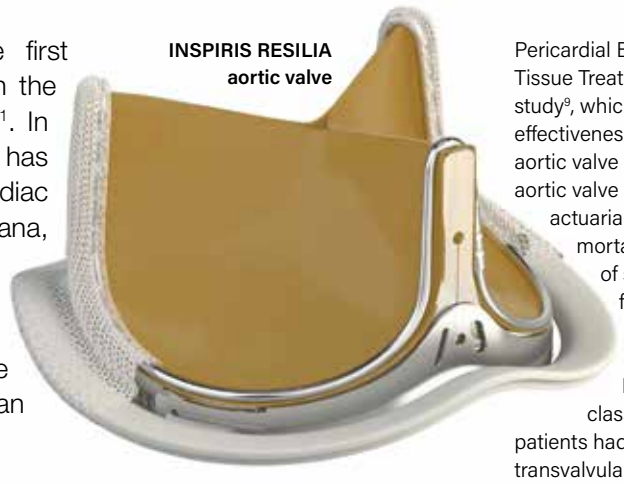
Investigating estimated blood loss and haemoglobin level after cardiac surgery; a potential new transfusion trigger?

Nadine Soliman University of Manchester, Manchester, UK

Currently in cardiothoracic clinical practice, Hemoglobin (Hb) is used as the sole indicator for blood transfusion following cardiac surgery. However, due to the hemodilution effect of peri-operative IV fluids, the Hb value after surgery may decrease irrespective of actual blood loss. This could result in unnecessary transfusions that increase the risk of multiple complications such as TACO, TRALI, and post-operative infection. As a result, there is a need for new biomarkers that can estimate post-operative blood loss and predict the need for post-operative blood transfusions. A review of the literature was conducted to find suitable biomarkers for analysis in the context of cardiac surgery. To be included, the biomarkers had to use variables routinely measured in clinical practice. Scoring systems, visual measures, and markers such as Shock Index and Brain Oxygen Saturation Monitoring with Near-Infrared Spectroscopy (INVOS) were excluded as they were not routinely measured in cardiac surgery. The OSTHEO method was chosen as it calculated blood volume loss (VLRBC) using height, weight, gender, and pre – and post-operative Hct. Percentage decrease in Hb was then compared to blood volume loss in 40 patients undergoing cardiac surgery from 13.04.21 to 27.05.21. Pearson's correlation coefficients were computed for Hb, and the OSTHEO Method volume loss of RBCs (VLRBC). This study compared the percentage decrease in Hb to the percentage of blood loss estimated using the OSTHEO method to determine the most reliable measure of blood-loss and transfusion following cardiac surgery. There were statistically significant differences in the Hb percentage decrease compared to the VLRBC calculated using the OSTHEO method. Patients experienced an average Hb drop of 32.3% but an estimated blood loss of only around 12.6%. Additionally, it was calculated that patients gained around 100mL of blood volume post-operatively which could be attributed to perioperative IV fluids. Compared to the sole use of Hb as a marker for blood loss, VLRBC calculated using the OSTHEO method may provide a more accurate estimation of post-operative blood loss in patients undergoing cardiac surgery by including blood volume changes and patient weight in the calculations. However, a larger sample size is needed to see if the difference in estimated blood loss remains. Additionally, further research needs to be conducted to determine the threshold of VLRBC at which the patient would require a blood transfusion. Also, it may be useful to calculate BV using different equations present in the literature to see if there is significant effect on the final VLRBC. For future studies, it may be worth trialling different equations that measure blood or haemoglobin loss to see if the results correlate with those calculated using the OSTEHO method.

Heart valves: limitations, advantages and future possibilities

Seventy years ago, Dr Charles Hufnagel implanted the first 'sutureless valve', an heterotopic valvular heart prosthesis in the descending aorta of a patient with aortic valve regurgitation[1]. In the subsequent decades, heart valve repair and replacement has undergone a rapid evolution thanks to innovations by cardiac pioneers such as Albert Starr, Lowell Edwards, Manuel Villafana, Nina Braunwald, Demetre Nicoloff, Alain Carpentier and Alain Cribier, to name but a few. These giants of cardiac surgery, working closely with engineers and industry, inspired research into new materials, technologies and techniques to overcome the infinite challenges of replacing a natural structure with an artificial implant.[2]



INSPIRIS RESILIA aortic valve

Today's Cardiac Teams have an array of open and minimally invasive options available to them when performing the most complex heart valve repairs and replacements. *SCTS Conference News* talked to Mr Gianluca Lucchese (Consultant Cardiac Surgeon at Guy's and St Thomas' NHS Foundation Trust and Honorary Senior Clinical Lecturer at King's College London) and Mr Reuben Jeganathan (Consultant Cardiac Surgeon at Royal Victoria Hospital, Belfast), who discussed the advantages and disadvantages of current mechanical and tissue heart valves, what influences their decision-making when choosing the optimal valve type and possible future heart valve innovations.

"The main advantage of a mechanical valve is their proven durability, there is plenty of evidence in the literature that demonstrates that they generally last for a patient's lifetime," Mr Lucchese explained. "However, the main drawback is the life-long anticoagulation and, despite innovations in technology, this has not really resulted in a significant change in anticoagulation treatment."

"The key advantage of mechanical valves is durability and for this reason, the trend is to implant these devices in younger patients. This strategy is supported in the medical literature and one notable study by Andrew Goldstone[3] clearly demonstrated a benefit of implanting mechanical heart valves for aortic-valve replacement in patients below the age of 54 years," Mr Jeganathan added. "This long-term mortality benefit with a mechanical valve, as compared with a biologic prosthesis, continued for those aged 70 years undergoing mitral-valve replacement."

Over the years, there are a whole array of mechanical valves available on the market from the ball and cage, single titling disc to the bi-leaflet and tri-leaflet valves. All these designs had their merits, but also their own limitations. According to Mr Jeganathan, the On-X Aortic Valve is quite unique in the sense that it is a high-profile valve and its design keeps the leaflets

OnX-Heart valve

inside the mechanism thereby preventing the intrusion of the suturing material around the housing. It is made of pure carbon and is currently the only mechanical valve approved to be used safely with less warfarin.

Mr Jeganathan said that in his centre, patients will usually have a target International Normalised Ratio (INR) of 2-2.5 for any bi-leaflet valve. In comparison, after three-months, patients who received an On-X valve can have their INR reduced to 1.5-2. These patients are required to be on concomitant aspirin but several studies, including the PROACT Clinical Trial[4], demonstrated that the reduction in anticoagulation significantly reduced the long-term risk of bleeding in these patients.

Gianluca Lucchese Reuben Jeganathan

This is important because long-term anticoagulation use increases the risk of bleeding, transfusion and hospitalisation, and the risk is accrued each year (between 0.5-1% per year), which is not insignificant if the patient lives for another 30 years. There are also issues around patient compliance and strict adherence to their anticoagulation regimen.

"There are mechanical valves now available that allow a lower anticoagulation requirement, however long-term anticoagulation therapy still increases the haemorrhagic risk in the gastrointestinal system, the brain and of course, for trauma events," Mr Lucchese expanded. "There are some controversial reports in the literature that claim anticoagulation therapy only results in a mild risk of increased bleeding, but it is a fact that patients struggle with their anticoagulation regimen and this also increases their risk of having thromboembolic events."

According to Mr Jeganathan, another disadvantage effecting a small group of patients is the 'clicking' sound of the mechanical valve, adding that it was important to highlight this disadvantage to patients when discussing their treatment options.

Tissue valves

The key advantage with tissue valves is that they eliminate the need to take life-long anticoagulation, so the increased risk of bleeding is drastically reduced. However, the main drawback of tissue valves, is durability.

"The opposite is of course true of tissue heart valves - they do not require life-long anticoagulation and allow the patient to continue a normal life with constant self-medication. But, tissues valves degenerate sooner compared to mechanical valves. In general, tissue valves may last for 15 years on average but you must take into consideration that they are implanted in a relatively older population. For younger patients with tissue valves the degeneration is more profound, probably around eight years," explained Mr Lucchese. "We know the degeneration occurs because of calcification but it has never been demonstrated why this accelerated deterioration occurs in younger patients. The methods used to preserve the valve tissue with Glutaraldehyde has been associated with calcification but why this process is much slower in the older population remains unknown."

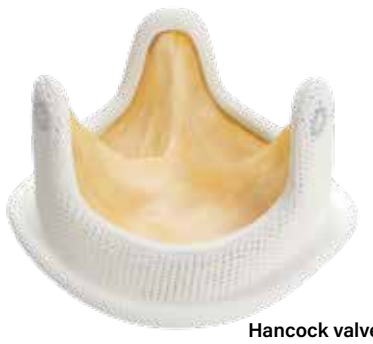
Indeed, a paper by Thierry Bourguignon in 2015[5], which examined the probability of reoperation based on patients age, reported the younger you place a tissue valve in a patient the shorter the valve would last. Whereas, if you placed the valve in an older patient the valve lasts longer.

For this reason, tissue valves are rarely used in younger patients unless there are specific needs such as contraindications to anticoagulation therapy such as a pregnant women or very active sports men and women (increased risk of injury).

There are a multitude of different tissue valve designs available, including stented and not stented. The stent valves include the Epic (Abbott) or Hancock (Medtronic)valve, which use porcine tissue, whereas the Perimount (Edwards Life Sciences) valves uses bovine pericardial tissue. And although the performance of both of these tissue types is similar, the mechanism of failure is slightly different Mr Jeganathan explained.

The porcine valves tend to tear and rupture along the hinge points, so these patients tend to present with aortic

Epic valve



Hancock valve

regurgitation. Patients with bovine valves tend to present with calcification. As this calcification takes time their symptoms present slowly but can over time cause fatal valve failure.

INSPIRIS RESILIA aortic valve

The INSPIRIS RESILIA aortic valve (Edwards LifeSciences) was specifically developed to address the shortcomings of current tissue valves – deterioration caused by calcification. The INSPIRIS RESILIA aortic valve is built upon the ground-breaking Carpentier-Edwards PERIMOUNT valve (Edwards LifeSciences). First proposed by Alain Carpentier[6], traditional tissue valves are treated with, and many are stored in, glutaraldehyde, a chemical that attracts calcium. The INSPIRIS valve is made of RESILIA tissue. It is a bovine pericardial tissue treated with a special integrity preservation technology that, as demonstrated in animal studies, effectively eliminates free aldehydes, a key factor in tissue calcification, while protecting and preserving tissue.[7] This prolongs the valve's durability[8], which also has the capability for dry storage making it more compatible for combined aortic root replacement.

The INSPIRIS RESILIA stent structure is built over three semi-rings instead of the conventional one ring structure. According to Mr Jeganathan, this is an important innovation as this facilitates a valve-in-valve procedure in required in the future.

The latest five-year outcomes from the ProspeCtive, nOn-randoMized, MulticENter Clinical Evaluation of Edwards Pericardial Bioprostheses With a New Tissue Treatment Platform (COMMENCE) study[9], which is evaluating the safety and effectiveness of the INSPIRIS RESILIA aortic valve in patients undergoing surgical aortic valve replacement, showed Five-actuarial freedom from all-cause mortality, and crucially, no evidence of structural valve deterioration. At five years, the effective orifice area was 1.6±0.5 cm^2, mean gradient was 11.5±6.0 mm Hg, 97.8% of patients were class I/II, and 97.8% and 96.3% of patients had none/trace paravalvular and transvalvular regurgitation, respectively.

"The COMMENCE outcomes not only revealed excellent freedom from mortality but importantly, 100% freedom of structural degradation of the valve. In my opinion is it the best in the sub-set of tissue valves," said Mr Lucchese. "But we only have mid-term results and we need long-term data to prove consistent durability."

"We know from animal studies that the INSPIRIS RESILIA aortic valve, when compared to the Carpentier-Edwards PERIMOUNT aortic valve, show much reduced levels of calcium. In human studies, such as the COMMENCE Clinical Trial, the five-year data is very, very encouraging," added Jeganathan. "But as a surgeon, I want data out to 15, 20 and 25 years."

According to Mr Lucchese, the decision-making process when deciding the optimal valve for patients cannot be standardised.

"I remember when I was a younger surgeon, if a patient was younger than 65 they had a mechanical valve, and if they were older than 65 they had a tissue valve. Now, the decision is much more complicated. Firstly, it depends on the indications for surgery – some valves do not need to be replaced and can be repaired, particularly in the context of aortic regurgitation. In this subgroup of patients, a good repair gives the best results – in terms of the best long-term outcomes."

The Ross Procedure

He explained that another option is a different type of valve replacement that does not need either a tissue or mechanical valve - the Ross Procedure. This ensures the patients does not require long-term anticoagulation. When the procedure was first proposed by Donald Ross[10], it seemed the ideal solution with excellent potential durability.

"But the Ross procedure is a technically complex and is characterised by high re-intervention rates. So, in my opinion, it is not really a largely suitable alternative and has a defined niche of application. There are several studies that have reported better survival of the Ross procedure compared to tissue of prosthetic valves and I think this has created a renewed interest in the procedure, particular in younger patients. However, these outcomes are not reflected in our experience on 1,500 patients over ten years and presented at

Carpentier-Edwards PERIMOUNT Magna Ease Aortic Valve

the EACTS meeting last year."

Mr Jeganathan said that when deciding which valve to implant, he considers the patient's age, preference, lifestyle, comorbidities such as liver disease with the risk of bleeding or neurological conditions in patient who are suspectable to falls and therefore increases the risk of bleeding if they were on anticoagulation therapy. He also assesses the annular size to avoid a patient-prosthetic mismatch.

"If we are going to be using tissue valves in younger patients of 55 or 50, and patients are living longer we need tissue technology that's going to last longer, such as the INSPIRIS RESILIA technology. Currently, anyone below the age of 60, I would strongly consider a mechanical valve and over 60, a tissue valve. However, given the fact that patients are living longer we must be very mindful that the risk-benefit to the patients is not only relevant now - but with the possibility of having a re-intervention to manage the tissue valve - in ten or twenty years from now. For those reasons, I try to minimize the handling of tissue, consider smaller incisions and ensuring the pericardium is closed to reduce dense adhesions during any possible future reinterventions."

The future

"One of the biggest bones of contentions I have is how surgeons approach aortic valves. We have a whole myriad of valves and there are a number of ways you can implant them, such as non-everting pledgeted suture, single interrupted suture, continuous suture and figure-of-8 suture, but there is no standardisation. This is in stark comparison to transcatheter aortic valve implantation (TAVI)," said Mr Jeganathan. "The way a surgeon stitches a valve does have an impact on the hemodynamics of the valve. One way to standardise this is using the Rapid Deployment Intuity Elite Valve (Edwards LifeSciences) or Sutureless Perceval Valve. Everyone does it the same way – you excise the native valve, debride the annulus, size it according to the annulus and insert three guiding sutures with subsequent balloon

Intuity Elite Valve

inflation. That's it. It removes the variability in suturing and implantation technique."

He added that the current data shows that compared to other tissue valve, the Intuity Valve performs better because it has a sub-annular skirt that opens up the left ventricular outflow tract. Therefore, the blood going across the valve is laminar with very little turbulence and increases this the effective orifice area.

"From a surgical point of view, when you operate a patient you would not want to see that patient again for a procedure related problem or a re-occurrence of the same problems," Mr Lucchese concluded. "We need a prosthesis that does not require anticoagulation, that is characterised by excellent hemodynamics even for the small sized devices and has a long-term durability without the susceptibility to degradation from calcification. The current mid-term data shows that the INSPIRIS RESILIA aortic valve addresses these aspects."

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Miscellaneous Thoracic Oncology Meeting Room 2 **Tuesday** 13:30 – 15:00

Pulmonary metastasectomy outcomes for sarcoma: should we always operate?

Solveig Hoppe St Mary's Hospital, Isle of Wight NHS Trust, UK

After epithelial tumours, sarcomas are the most frequent tumour metastasising to the lung (1). Approximately 20% of patients with soft-tissue sarcoma, and 40% with bone sarcoma, will experience pulmonary metastases, and indeed, in 19% of cases the lung is the only location of spread of disease (2). Presence of pulmonary metastases has a negative impact on prognosis, and untreated carries high mortality (2). Chemotherapy is a mainstay of treatment but offers limited success. It has previously been reported that, in resectable disease, metastasectomy can provide a 5-year survival of between 15%-50.9% (2). Unfortunately, due to the nature of the disease, a high proportion of patients require multiple operations, with

reported numbers as high as 43% (3).

We aimed to review the survival outcomes of patients with primary sarcomas and metastases to the lungs, who underwent pulmonary metastasectomy in our institution. We reviewed single surgeon outcomes from patients who had undergone this operation between October 2013 to March 2020, looking at primary tumour characteristics, number and location of metastases, methods of treatment, and survival.

45 patients were included, of which eight had positive margins at resection of their primary tumour. The median number of thoracic metastases removed in a single operation was one, but ranged from one to ten, and 28 patients underwent more than one pulmonary metastasectomy over time (range one to six operations). The size of the metastases resected ranged from 2mm to 110mm, with the median size being 10mm.

In our cohort, the 30-day mortality was 0%. 29 patients are still alive. Of the 16 patients who died, the mean survival from pulmonary metastasectomy was 21.3 months. Actual 5-year survival was 50%. Most of the patients had other treatment in addition to surgical resection. 28 patients had radiotherapy, of which 13 received adjuvant therapy to their primary site. 26 patients received chemotherapy, of which 20 were adjuvant. Three patients had one or more pulmonary metastases ablated.

The mean disease-free interval from resection of primary tumour to detection of metastases was 28.4 months. Median follow-up time after metastasectomy was 32.1 months.

In our cohort, pulmonary metastasectomy was associated with no post-operative mortality. This was the case despite several patients undergoing multiple operations, with multiple metastasectomies in both an anatomical and non-anatomical fashion, including one right pneumonectomy. Survival in selected cases reach five years and beyond. We therefore conclude that, in our centre, pulmonary metastasectomy is an acceptable treatment option for sarcoma patients with pulmonary metastases, and that this treatment option can safely be used for repeat resections.

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Cardiac Surgery - General I Meeting Room 3B **Monday** 11:00 – 12:30

Cardio-thoracic interdisciplinary research network (cirn) – Consent in cardiac surgery: a national multicenter audit

Ann Cheng, Luke J. Rogers, Brianda Ripoll, Ricky Vaja, Mahmoud Loubani, Gavin Murphy Cardiothoracic Interdisciplinary Research Network

The Cardiothoracic Interdisciplinary Research Network (CIRN) has continued to develop interdisciplinary collaborative research with a strong focus on patient and public involvement. This couldn't be more evident than at this year's SCTS Annual Conference where CIRN Patient and Public Co-Lead Keith Wilson, presents the findings of the snapshot "Consent in Cardiac Surgery: A National Multicenter Audit" and the future plan of work.

Not only was this audit the first CIRN project to involve committed and dedicated medical students from across the UK and Ireland but it is also developing into a program of work that we hope will underpin a grant application.

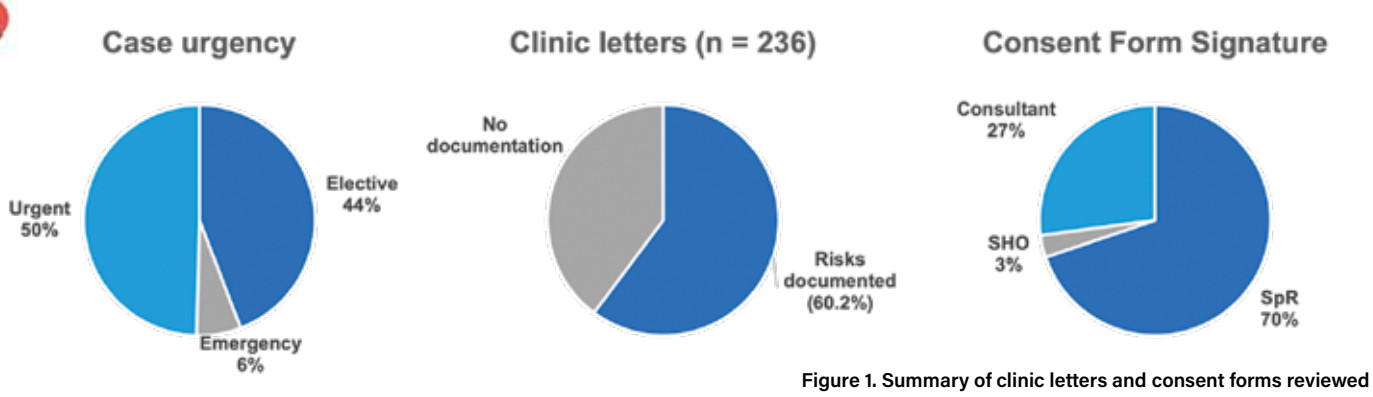

Figure 1. Summary of clinic letters and consent forms reviewed

Consent in Cardiac Surgery: A National Multicentre Audit

In the wake of the Montgomery v Lanarkshire case of March 2015, one can't help but wonder: are we, as clinicians, allowing patients the choice of informed consent?

Regular Patient and Public Involvement and Engagement events as part of the James Lind Alliance Priority Setting Partnership "Infection Prevention" Clinical Study Group 7 identified intrigue around the consent process for cardiac surgery. Keith Wilson's statement resonated with others and highlighted uncertainty amongst clinicians. This kickstarted a national, multicentre rapid review, to illustrate and describe current practice of the consent process; with conception to completed data extraction only three weeks!

In total, 17 adult UK cardiac centres participated including 420 patients. Figure 1 summarises this data and the frequency complications were discussed and a quantified risk provided are documented in Table 1. Mortality and stroke are unsurprisingly the major complications which surgeons frequently disclose. However, risk is not quantified in most circumstances, for most complications. Furthermore, and arguably more importantly variation in practise has been demonstrated across the UK and Ireland.

> "Patients cannot provide wholly informed consent without being aware of all the associated risks and their incidence"
>
> **Keith Wilson, PPI lead**

Future Directions

Ultimately, our plan is to ensure shared decision making between patients and healthcare professionals. It is essential that this is standardised and comprehensive yet personalised to each individual undergoing cardiac surgery.

Utilising a mixed method study our PPIE Leads with the support of the CIRN and newly appointed associate Surgical Specialty Leads (aSSLs) Miss Ann Cheng (Sheffield University Teaching Hospitals) and Miss Brianda Ripoll (Castle Hill Hospital, Hull University Teaching Hospital) plan to develop a core information set (CIS) in the consent process. This will identify key questions important to patients and will facilitate the development of a national cardiac surgery consent framework.

If you have any expertise in the ethical, moral or legal aspects surrounding consent, or just simply want to be involved with this collaborative work please get in touch either via email (CIRNetwork@outlook.com) or Twitter (@CIRNetwork).

You can also catch our team members Mr Keith Wilson and Mr Luke J. Rogers at the presentation! We look forward to seeing you there.

Complication	Complication documented	Quantified risk documented
Mortality	99.3%	80.8%
Stroke	92.9%	57.9%
MI	54.5%	20.5%
Renal Failure	67.4%	17%
Arrythmias	77.6%	17.8%
Wound Infection	82.6%	12.7%
Bleeding	86.4%	18.7%

Table 1. Commonly documented risks and their quantification on consent forms

Research and Innovations in Cardiothoracic Surgery Studio **Tuesday** 13:30 – 15:00

A three-case series review of intra-operative nursing care during Combined Navigational Bronchoscopy Cone Beam CT and Image-guided Robotic Assisted Thoracic Surgery

Trixia Arcegono Barts Health NHS Trust, London, UK

Background

Innovative approaches to conducting lung resections have been fast rising in parallel to the increasing public preference for minimally invasive thoracic surgeries. In 2021, a unique surgical approach of combined Navigational bronchoscopy Cone Beam CT Guided Fiducial Marker insertion and image guided robotic assisted lung resection has been designed and carried out by the thoracic surgical team at St. Bartholomew's Hospital (SBH). The complexity in combining these two highly advanced surgical technologies warranted the need for collaborative discussion between the multi – disciplinary teams to facilitate sustainable and evidence – informed practice of ascertaining patient safety whilst in theatres.

Method

Utilizing conceptual frameworks has been integral in systematically assessing the presence of multiple, interactive forces that impact the intra – operative nursing care for the patient. The Knowledge-to-Action (KTA) Process Framework by Graham, et al (2006) underpinned the discussion points used to critically appraise the processes and interventions undertaken during the initial three – case series. Theatre team debrief records and adjunct communication tools were reviewed to facilitate discussions involving: a. problem identification and knowledge inquiry, b. adaptation of interventions against recognized barriers; and c. evaluation of outcomes and sustained knowledge use.

Discussion

On the bases of the Perioperative Care Collaborative (PCC) general perioperative practice principles clinical statements (2017), NICE Guidelines for Venous thromboembolism in over 16s (2018) and local SBH perioperative regulations of ionizing radiations (2017), the main clinical priorities emerged following the critical discussions were: (a) patient care and safety, (b) radiation protection, (c) specialist skills proficiency and (d) collaborative team communication.

The average total procedure time for all three – cases was 9.38 hours and although the length of procedure consistently decreased throughout the series, important considerations had been taken to safeguard the identified critical points when required and as needed. For example, patient care and safety concerns such as pressure area management, thermoregulation and VTE prophylaxis were provided for each case, while urinary catheter insertion was omitted on the last case in an attempt to reduce the introduction of invasive medical devices to. This ascertained that some interventions, such as urinary catheter insertion, would still be evaluated based on individual cases and upon patient needs and concerns. In contrast, topics such as radiation safety, adept skill proficiency and reliable team communication were reckoned imperative for each case to establish seamless case flow.

Conclusion

The increasing frequency of novel surgical approaches concurrently highlights the importance of collaborative communication in intra – operative safety and quality patient care. As a consequence, there is an urgent need within our profession to constantly adapt to novel surgical procedures and guarantee safe patient care via the utilization of evidence based practice and critical consideration of patients individual needs. A problem based learning approach as displayed in the use of conceptual frameworks and evidence – based practice models encourage collaborative thinking and active learning not only within the nursing groups, but also across the wider multidisciplinary teams.

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SCTS ANNUAL DINNER 2022

Monday 9th May 2022

Hilton Hotel Belfast – 4 Lanyon Place, Belfast, BT1 3LP

Dress Code: Black Tie & Cocktail Dresses

19:30-20:30 Drinks Reception
20:30 Sit down for dinner
22:30 DJ entertainment
01:00 Carriages

If you have pre-booked a ticket please make sure you collect your ticket from the registration dinner desk by Monday 9th May 12pm.

Research and Innovations in Cardiothoracic Surgery Studio **Tuesday** 13:30 – 15:00

How far can we go... nurses involvement in novel technologies

Jennifer Baxter Royal Papworth Hospital NHS Foundation Trust, London, UK

Through the dedication, commitment and team work of the nurses in our National Organ Retrieval Service (NORS) we have been able to establish an incredibly effective, efficient and forward thinking team who are always willing to take on new challenges, push boundaries and drive new initiatives forward in Cardiothoracic organ retrieval.

At Royal Papworth Hospital we have recognised and identified the importance of nurse involvement in the use of novel technologies and have identified that extended skills within our nursing team has enabled nurse progression and involvement; empowering our nurses and promoting best practice in a team culture in order to provide the best outcomes for our donors, their families and our recipients.

The organ perfusion device is used for all DCD heart retrievals (Donation following Circulatory Death). Our nursing team have been trained in the set-up, maintenance and running of this machine through a thorough training regime and competency sign off. The OCS is a portable ex-vivo organ perfusion system which can preserve a donor heart in a near-normothermic beating state from retrieval until it is dismounted for transplant.

The success of this established nursing initiative has prompted a further development with a member of our NORS nursing team being trained to dismount the heart from the device following support and training from our retrieval surgeons. This trial further evidences the vital role, innovative thinking and constantly extending roles of our nursing team but also the desire of our surgeons to help empower our nursing team.

Training and support enabled a nurse to dismount hearts from the perfusion device ready for transplantation; this was achieved under the guidance from experienced in-house surgeons. Through the use of reflection on best practice we have designed and introduced a competency pack including Standard Operating Procedure (SOP) to reflect this novel development in our nursing practice. The SOP contains a step by step guide to the process, questions and answers, a troubleshooting guide, videos and pictures of equipment and process and competencies to ensure safe practice.

We now have a nurse who is competent in leading the dismount of a heart from the perfusion device, with the clinical ability to give instruction of the process to others and independently dismount the heart and pass to the implanting surgeon.

By sharing this experience from a centre which has the greatest volume of DCD heart retrievals in the world, lessons can be learnt to benefit other transplant centres by evidencing the contribution and benefits of extended roles within the nursing team.

Guidelines are in place for best practice based upon this experience and the aim moving forward will be to increase nurse involvement in this technique empowering nurses and increasing both skills set and knowledge.

Infection Prevention and Management in Cardiothoracic Surgery Studio **Monday** 15:30 – 17:00

The clinical impact of the NHSEI Covid-19 harm review on patients currently on the cardiac surgical waiting list: one unit's experience

Christina Bannister, Georgina Kirk, Ioana Clapon, Oksana Shinn and Sunil Ohri University Hospital Southampton NHS Foundation Trust.

In September 2021 a Harm Review was undertaken to clinically review all P2 patients currently waiting for cardiac surgery in the Covid-19 era. P2 patients, according to the RCS, need surgery that can be deferred for up to four weeks; patients with severe AS, MR and unstable coronary symptoms. The aim was to identify those most at risk, patients who were increasingly symptomatic, to maintain safety for those waiting, to reassess in clinic any patient with worsening symptoms, & to reprioritise any deteriorating patient due to clinical need &/ or admit them directly for urgent surgery.

For the first review 152 P2 patients received a call to ascertain their current clinical symptoms. Using the NHSEI guideline, each patient's waiting time was identified along with the reasons for their surgical delay, patient/GP involvement and their current clinical harm rating (none, mild, moderate or severe harm). Patients with similar or no worsening symptoms to their original OPA were rated as mild and those with progressive symptoms but who felt they did not need or want a surgical review were rated as moderate. The third group with progressive symptoms needing an outpatient review were planned to be rated at the time of that reassessment to accurately identify their clinical harm rating and reprioritise if necessary.

Of the 152 patients contacted 60 were given a mild rating and 64 a moderate rating. The third group of 28 patients were reassessed within the outpatient footprint over the Autumn period and given either a moderate or severe rating based on their symptoms and clinical status. One such outpatient clinic with three Harm Review patients seen resulted in two patients continuing on the waiting list as P2 priorities, however the third patient had deteriorated significantly and was admitted from the clinic and listed as an inpatient for urgent cardiac surgery.

Following the first review, subsequent assessments were undertaken in November 2021 and March 2022. These contained some of the previous patients called who had not had surgery due to clinical, Trust or personal reasons. Another 81 P2 patients were added to the second review, with a further 89 subsequently.

The Trust acknowledged the impact of these reviews and began to support the cardiac patients as a surgical priority. NSHEI also recognised the severity of the situation and closed the cardiac surgery inter-hospital transfer system for a period of four weeks, diverting patients to other cardiac centres close-by. By implementing the review, the patients most at risk, severe category, have all had cardiac surgery with a majority of the moderate patients also undertaking their operations.

The Harm review is a useful tool to ensure safety for patients waiting for cardiac surgery. Most patients found the calls reassuring and welcomed the continued contact with the nursing team during prolonged waiting times. The review enables the surgical team an effective means of expediting deteriorating patient's surgery and minimises the risk for all those currently on that waiting list.

Coronary Artery Bypass Grafting Hall 2B **Monday** 11:00 – 12:30

Using Hospital Episode Statistics data to investigate the effect of frailty on revascularisation rates of patients with acute coronary syndrome

Joanne Miksza University of Leicester, Leicester, UK

Objectives

We investigated the impact of frailty on survival and revascularisation rates in patients with acute coronary syndrome (ACS) and whether frailty explained the regional differences in revascularisation rates. We investigated if revascularisation was associated with survival in frail patients.

Background

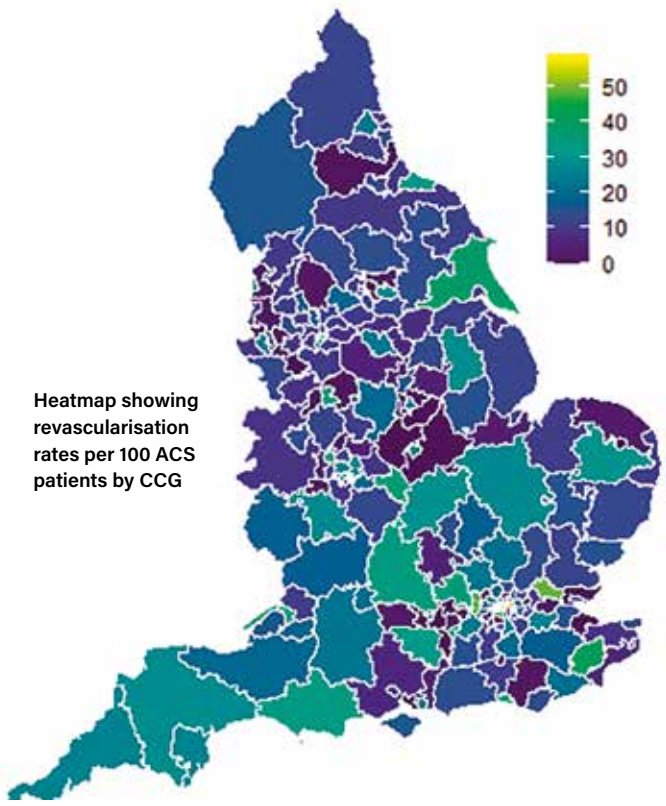
Clinical trials are generally regarded as the gold standard of research methods and inform NICE treatment guidelines for acute coronary syndrome (ACS) patients. Although the methodology of clinical trials can provide reliable results for the population of patients that they include in their research they underrepresent certain groups of patients, such as the elderly and those with comorbidities. With an ageing population, ACS patients are becoming older and more frail and there is less evidence available to determine if these patients would benefit from revascularisation. Hospital Episode Statistics (HES) data provides detailed information on all patients using NHS hospitals and enables us to identify a national cohort of ACS patients in England.

Methods

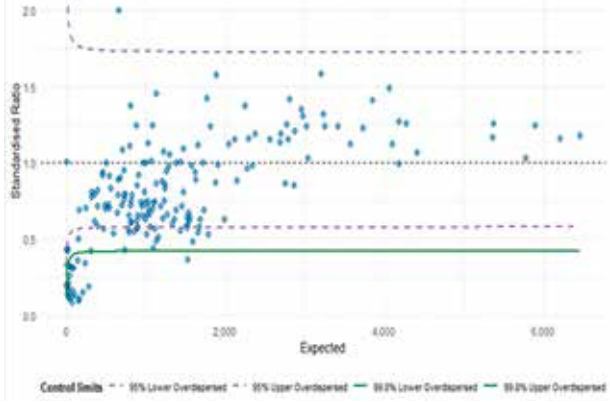
All patients with diagnosis code for ACS including STEMI (ICD10 I21.0-I21.3, I22.0, I22.1, I22.8 and I22.9), NSTEMI (ICD10 I21.4 and I11.9) and stable angina (ICD10 I20) from 2010-2015 were identified from the HES admitted patient care (APC) dataset and the first incidence of ACS was identified as the index date. The Hospital Frailty Risk Score (HFRS) was calculated from records within two years prior to ACS index date and categorised as low (<5), medium (5-15) or high (15+). HES data and the national death registry within one year following ACS index date was used to identify outcomes. The primary outcome of interest is 1-year survival.

Regional revascularisation rates by Clinical Commissioning Group (CCG) of hospital of diagnosis were calculated and a logistic regression model was fitted with revascularisation as the dependent variable and adjusted for age, sex, ethnicity, social deprivation, diagnosis and prior comorbidities, to calculate the expected regional revascularisation rate for each CCG. This was compared with the observed revascularisation rates using a funnel plot.

Recursive bivariate probit models were fitted, stratified by frailty level, to investigate the association between revascularisation and one year mortality by frailty level, adjusted for patient level variables, with the revascularisation rates by CCG included as an instrumental variable to adjust for confounding.



Heatmap showing revascularisation rates per 100 ACS patients by CCG



Funnel plot of standardised ratio of revascularisation rates byt CCG

Results

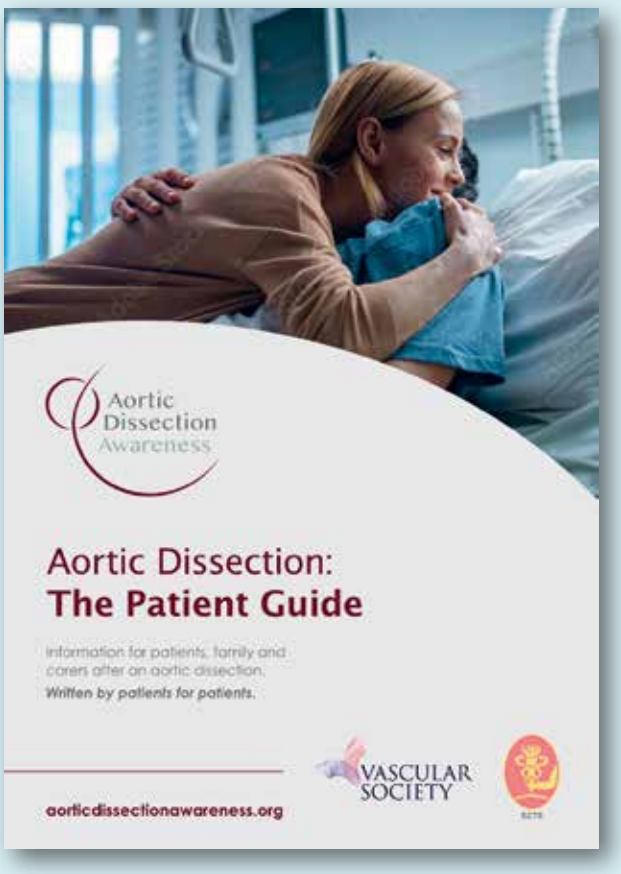
The final cohort included 1,421,830 ACS patients of whom 3.5% had a high frailty risk 10.1% an intermediate frailty risk. ACS patients with a high frailty risk had higher mortality during the year after their ACS event (low risk: 12.4%, intermediate risk: 34.5%, high risk: 48.2%). Patients with high frailty were 84% (CI: 83%-86%) less likely and intermediate risk 67% (CI: 66%-69%) less likely to receive a revascularisation procedure compared to low risk patients. Seven out of 202 (3.5%) had a standardised revascularisation ratio which was outside the limits of the 99.8% confidence interval. The instrumental variable analysis showed that the risk difference of revascularisation on survival at one year was higher for frail patients (low risk: 0.064 (CI: 0.062-0.065), intermediate risk: 0.151 (CI: 0.142-0.161), high risk: 0.154 (CI: 0.126-0.182)).

Conclusion

Frailty is associated with poorer survival and lower revascularisation rates in ACS patients. Regional variation in revascularisation persisted after adjustment for frailty and other patient factors suggesting unwarranted variation in the provision of care for ACS patients. Frail patients had a bigger difference in one year survival of revascularized patients compared to patients with no revascularisation, than non-frail patients.

NEW BOOK LAUNCH

AORTIC DISSECTION: THE PATIENT GUIDE

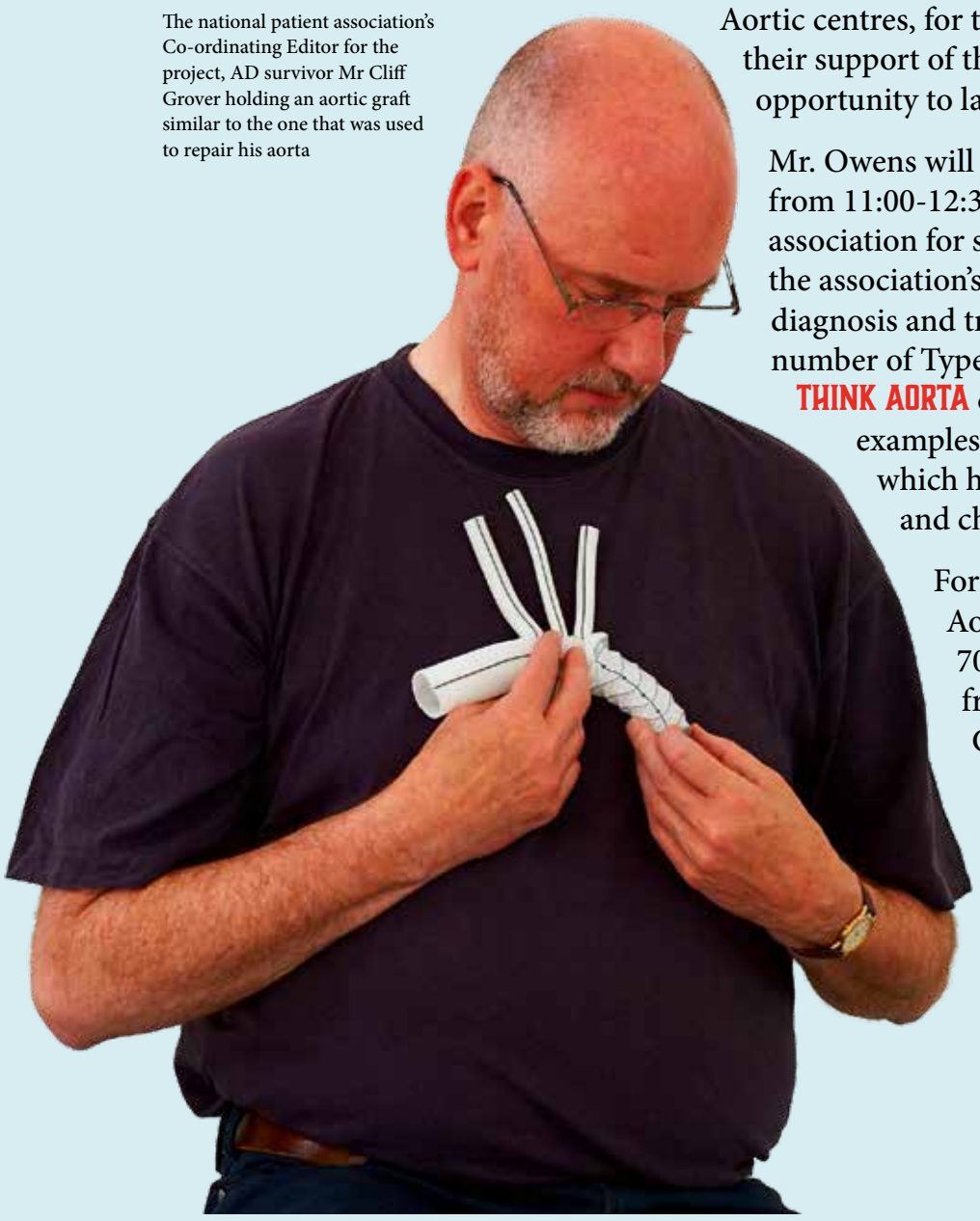


For the last five years, SCTS has partnered with national patient association Aortic Dissection Awareness UK and Ireland in their work to raise awareness of Aortic Dissection and to improve Aortic services for patients. As more and more patients survive acute Aortic Dissection, one of their concerns is how little information about the condition they are given on discharge, to help them manage their recovery and the life-long implications of being an Aortic Dissection survivor. To help address this issue, the national patient association is launching a new book, ***Aortic Dissection: The Patient Guide***, at the 2022 SCTS Annual Meeting.

The national patient association's project lead Mr. Cliff Grover, a Type A Aortic Dissection survivor himself, explains: "***Aortic Dissection: The Patient Guide*** is written by patients, for patients. It's a 96-page, A5 book containing all the information that we wish we had been given after our Aortic Dissection. Over the last 18 months, a team of almost twenty patients and relatives wrote the Guide and a multidisciplinary team of seven expert clinicians reviewed the content. We are delighted that both SCTS and The Vascular Society have decided to endorse the final product with their logos on the front cover. We now have funding in place, with distribution arrangements (through our partner Terumo Aortic), so that we can provide free copies of the Guide to every UK Aortic centre, starting today. Our aim, in partnership with SCTS and The Vascular Society, is that by the end of 2022, every Aortic Dissection patient will be given a copy before they leave hospital."

SCTS members who treat Aortic Dissection patients are invited to visit the national patient association on stand 22 and order a free stock of ***Aortic Dissection: The Patient Guide*** to be delivered to their Aortic centre after the meeting. In addition, they will each be given a complimentary personal copy of the Guide, signed by an Aortic Dissection survivor.

Mr. Gareth Owens, Chair of AD Awareness UK & Ireland, says "I wish I had been given something like this when I left hospital. It's such an obvious thing to do. ***Aortic Dissection: The Patient Guide*** is a fantastic resource which we are making available free to UK Aortic centres, for the benefit of their patients. We're very grateful to SCTS for their support of this initiative and to the President, Mr. Simon Kendall, for the opportunity to launch the Guide at the SCTS Annual Meeting."



The national patient association's Co-ordinating Editor for the project, AD survivor Mr Cliff Grover holding an aortic graft similar to the one that was used to repair his aorta

Mr. Owens will be speaking in the Aortic Dissection session in Hall 2B from 11:00-12:30 on Tuesday, about the benefits of having a national patient association for service provision in acute Aortic Dissection. He will cover how the association's highly-successful **THINK AORTA** campaign is improving the diagnosis and transfer of acute Aortic Dissection patients and increasing the number of Type A dissection surgical cases, creating more AD survivors. The **THINK AORTA** campaign and ***Aortic Dissection: The Patient Guide*** are just two examples of what Mr. Owens terms "the power of patient partnership", which he says is delivering benefits to SCTS members and their patients and changing the UK Aortic Dissection landscape for the better.

Formed by a small group of Aortic Dissection survivors in 2015, Aortic Dissection Awareness UK & Ireland now has more than 700 members across the UK & Ireland, including patients from every UK Aortic centre. On 13th April 2022, the Charity Commissioners granted the organisation registered charity status. The first charitable act of the national patient charity for Aortic Dissection is this commitment, announced at the SCTS Annual Meeting, to provide a free copy of ***Aortic Dissection: The Patient Guide*** to every UK patient who needs one, in perpetuity.

Aortic Dissection Awareness

Aortic Dissection Awareness UK & Ireland is a charity registered in England & Wales

Registered Charity number: 1198617

Heart Research UK Session Meeting Room 3B **Tuesday** 13:30 - 15:00

Regional variation in material properties of ascending thoracic aortic aneurysms: an in-vitro biomechanical analysis

M Yousuf Salmasi, Ulrich Stock, Thanos Athanasiou, James Moore Jr Imperial College London, and the London Aortic Mechanobiology Group

The pathophysiology of ATAA involves degeneration of the aortic media and increased wall stiffness, predisposing the aorta to acute TAAD. Determining these local variations in aortic wall mechanics, although not currently possible using non-invasive/imaging techniques, may aid in achieving patient-specific characterisation of ATAA and more accurate prognostication. In-vitro testing of explanted tissue has unlocked the potential for such characterisation, although few studies have searched for regional variation with aneurysms. These efforts have been limited by specimen numbers, optimisation of regional sampling, absence of thickness data and/or the absence of linked tensile and delamination testing.

Our research

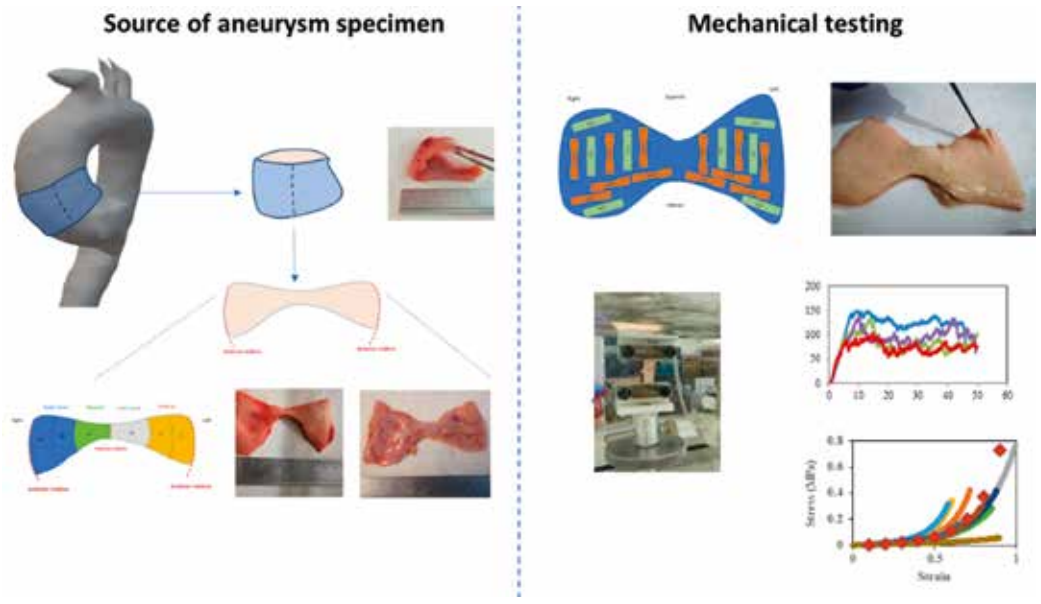
The presented study aimed to characterise the biomechanical properties of diseased human tissues. Thirty-four aneurysm specimens (proximal thoracic aorta) were harvested en-bloc from patients undergoing surgery for aneurysm replacement. Specimens were processed into regional samples of similar shapes covering the whole aneurysm isosurface, according to a structured protocol, in both orientations (longitudinal and circumferential). Thickness mapping, uniaxial tensile and peel tests were conducted, enabling calculation of the following parameters: true stress/strain, tangential modulus, tensile strength peeling force and dissection energy function. Two constitutive material models were used (hyperelastic models of Delfino and Ogden) to fit the data. A circumferential strip of tissue was also obtained for computational histology (regional quantification of i) elastin, ii) collagen, iii) smooth muscle cells).

The key finding from the work was heterogeneity in material properties: compared to the inner aortic curve, the outer curve was thinner and exhibited reduced delamination peeling force. The tissue at the outer curve also exhibited a higher overall tensile strength. These properties were augmented in advanced age.

Clinical implications

Heterogeneity in aneurysm wall material properties may be a crucial feature of disease severity. Our results suggest that the outer aortic curve is more prone to dissection propagation and perhaps less prone to rupturing than the inner aortic curve. These results strengthen the notion of disease heterogeneity in ascending thoracic aortic aneurysms and has implications for the pathogenesis of aortic dissection.

Compared to the inner aortic curve, the outer curve is thinner and exhibits reduced delamination peeling force. The tissue at the outer curve also exhibits a higher overall tensile strength. These properties are augmented in advanced age. The



main failure mode of ATAA is separation of its medial layers, which are already degenerated in chronic aneurysmal disease. Our data show for the first time the large variations in peeling force and dissection energy between adjacent areas in the TAA wall (outer vs inner curve p=0.0093).

The spirit of studying aortic biomechanics is to shift the paradigm of clinicians towards the patient-specific underlying mechanisms of disease, moving beyond a surrogate measure of aortic diameter. However, modelling the interaction between blood flow and the arterial wall represents one of the major challenges in the field of patient-specific computational modelling. A subgroup analysis of our patients is presented in a separate article, were pre-operative computational flow analysis identified that high wall shear stress correlated strongly with areas of aortic thinning, elastin loss and altered aortic wall strength.

British Heart Valve Society Session: Aortic Valve Interventions Hall 2A **Tuesday** 13:30 - 15:00

Rapid deployment valves: the largest data synthesis study to compare against conventional AVR

M Yousuf Salmasi, Sruthi Ramaraju, Iqraa Haq, Faruk Oezalp, George Asimakopoulos, Shahzad Raja Imperial College London

The introduction of rapid deployment AVR prostheses (RDAVR), particularly sutureless valves, in the last two decades has offered an alternative technique for implantation during surgical AVR. Benefits of RDAVR in comparison to conventional sutured AVR (cAVR) include reduced operation time with reduced cross-clamp and cardiopulmonary bypass times, as well as favourable effective orifice area (EOA) and haemodynamic outcomes. Despite this, Current guidelines do not make specific recommendations for the use of RDAVR, perhaps due to the paucity of comparative data between the two bioprosthetic classes for the surgical management of aortic stenosis.

Our meta-analysis

Our research group made a concerted effort to conduct a large up-to-date data-synthesis study comparing RDAVR with the accepted standard.

The problem with recent meta-analyses of this kind is the lack of robust subgrouping of patient cohorts accounting for several different study designs and prosthesis heterogeneity. In the present study, the following were accounted for:

1. Study design
2. RDAVR prosthesis (Perceval, Intuity, 3F Enable, Mixture)
3. cAVR prosthesis
4. Surgical approach (Sternotomy, mini-sternotomy, thoracotomy, Mixture)

Out of 1,773 titles identified through a systematic literature search, 35 papers comparing RDAVR with cAVR were used in the final analysis, including one randomised study, one registry study, 6 propensity matched studies and 28 observational studies, incorporating a total of 10,381 participants (RDAVR n=3,686; cAVR n=6,310).

Using random-effects meta-analysis with subgrouping, a number of key advantages of RDAVR were identified:

- reduced cardiopulmonary bypass (SMD -1.28, 95% CI [-1.35, -1.20], p<0.001) and cross-clamp times (SMD -1.05, 95% CI [-1.12, -0.98], p<0.001).
- shorter length of stay in the intensive care unit (SMD -0.385, 95% CI [-0.679, -0.092], p=0.010).
- more favourable effective orifice area and transvalvular gradients (p<0.05)

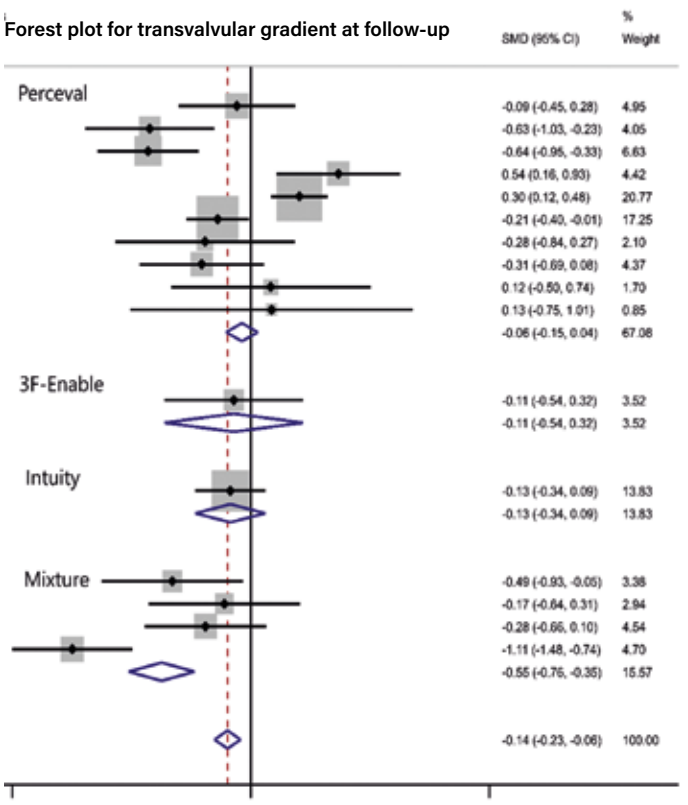
Conversely, the two main limitations of RDAVR were still found to be significant:

- higher rate of pacemaker insertion (OR 2.41, 95% CI [1.92, 3.01], p<0.001)
- higher paravalvular leak (PVL) at mid-term follow-up (OR 2.52, 95% CI [1.32, 4.79], p = 0.005).

Clinical implications

With the emerging evidence of the use of TAVI, guidelines are increasingly recognizing the use of RDAVR as a non-inferior alternative for high-risk patients and patients over the age of 65 with TAVI as a preferred option in some cases. However, the risk of pacemaker insertion in the short-term, and paravalvular leak in the long-term, remains a cause for concern.

As our institutions implant growing numbers of RDAVR prostheses, an improved consensus on training, implementation and management of complications effectively is vital.



Location Poster Hall

Cardiac Surgery in the Over in the Over 85 Population: A Single Centre Retrospective Cohort Analysis

Abdul Badran University Hospital Southampton NHS Foundation Trust, Southampton

Cardiac surgery in the advanced age is associated with significant operative risk. The greatest mortality is reported in >75 year olds and has been attributed to the prevalence of comorbidities including hypertension, diabetes mellitus and chronic kidney disease.

The older population is an increasing one but still remains undertreated, underdiagnosed, and under-represented in clinical trials.

This population requires special attention due to the higher risk of both conservative as well as operative management. Additionally the complexity of often atypical presentations can lead to treatment delays.

Methods

We retrospectively reviewed all cardiac surgery in our very advanced aged population with age above 85 years, over an 18 year period. 555 patients underwent cardiac surgery, 323 males and 232 females. The vast majority underwent a valve operation (n=454), 303 patients underwent CABG, 23 had an aortic operation and 43 had arrhythmia surgery.

Results

Female patients had a significantly better survival than males (P=0.007). 30 day mortality in this high risk group was 7%. Significant long term mortality associations were found with a history of preoperative atrial fibrillation (Hazard ratio 7.8, p=0.01). Mortality at 1 year was found to be significantly associated with a history of hypertension (Odds ratio=4.95 p=0.001). Patients who underwent aortic valve replacement had better 1 year survival (p=0.03).

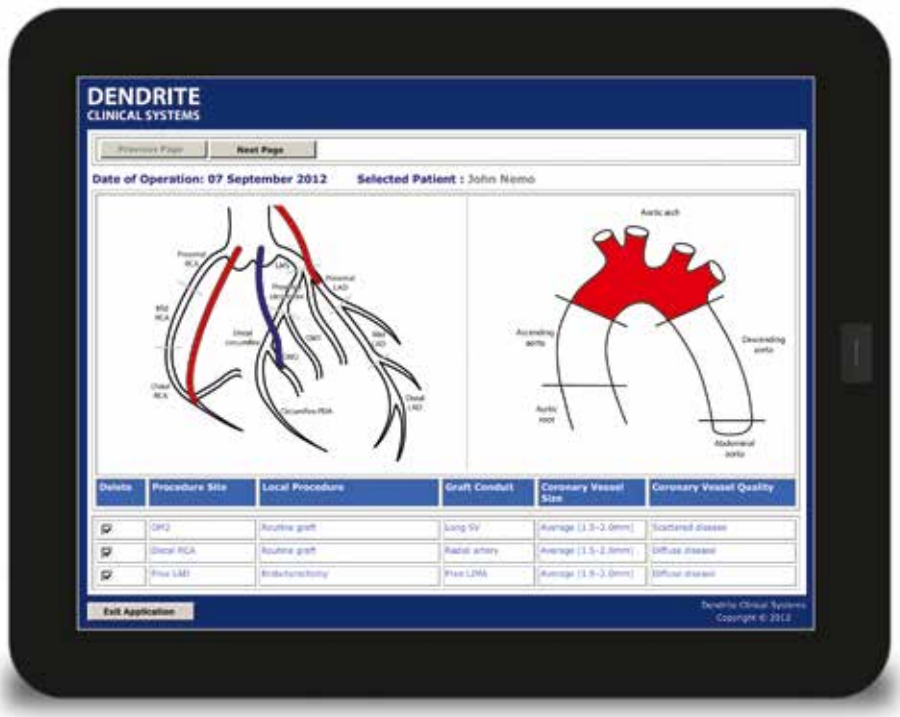
Discussion

Cardiac surgery in the very elderly is feasible but high risk. Atrial fibrillation was observed as a significant association with mortality. This could be attributed to the haemodynamic effects in a cohort with reduced physiological reserve as well as the risk factors attributed to stroke and anticoagulation therapy. The short term mortality in patients with a history of hypertension confirms this as a significant comorbidity in cardiac surgery even in this advanced age. Survival advantages in aortic valve replacement can be demonstrated in the first year after surgery.

Further research into this expanding population of patients is needed to aid future decision making and rationing of resources. Quality of life markers are particularly important in this cohort of patients which is a limitation we could not capture in our study.

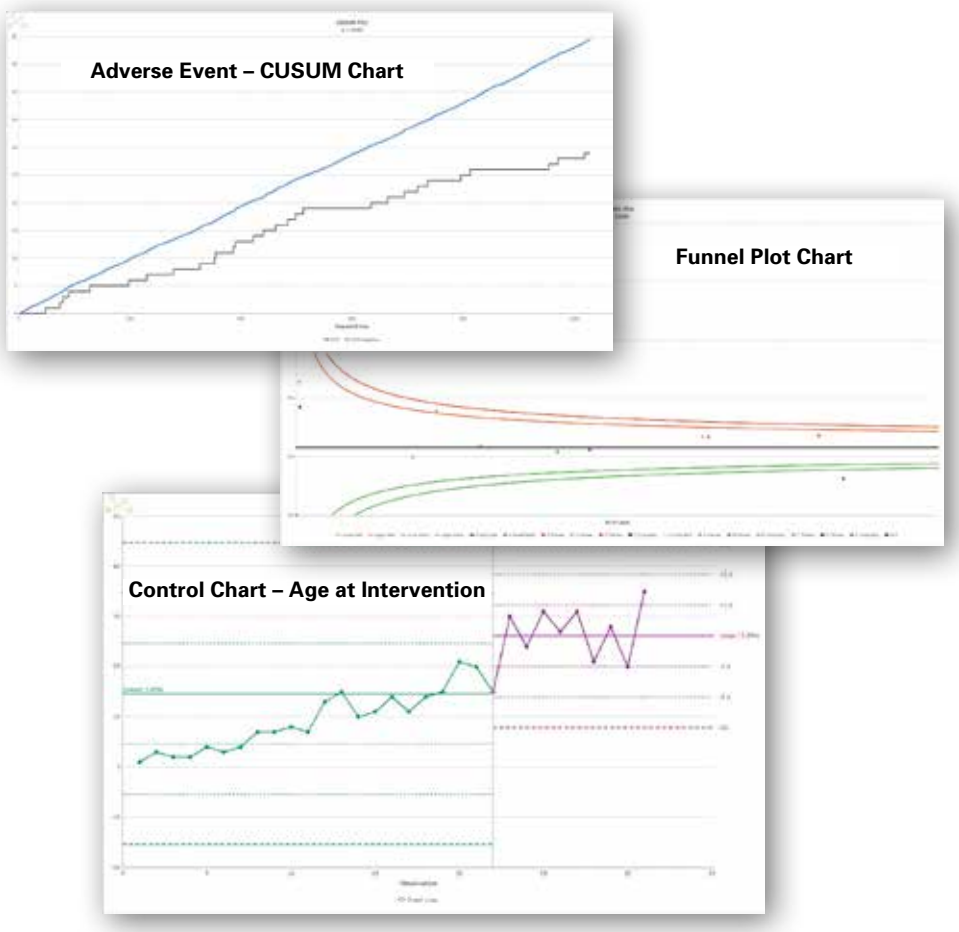
Number of patients	555
Age mean (range)	88 (86-94)
Male:Female	323:232
Preop AF	94 (17%)
Preop CVA/TIA	46 (8.3%)
Preop CKD	73 (13%)
Preop COPD	46 (8.3%)
Preop Diabetes	49 (8.8%)
Preop HTN	244 (44%)
Postop CVA/TIA	16 (2.9%)
Mean Euroscore II	7%
Postop AF	207 (37%)
Postop LRTI	110 (20%)
Deep sternal infection	2 (0.3%)
Postop AKI	30 (5.4%)
Postop (re-exploration)	38 (6.8%)
30 day mortality	7%
1 year mortality Alive: Dead (%)	483:72 (16%)

CARDIAC SURGERY DATABASE SOFTWARE WITH PROMS AND DATA BENCHMARKING



Covers all cardiac surgery procedures

PROMs function is designed to collect follow-up data directly from patients



Includes comprehensive risk modelling and outcomes benchmarking tools

The system:

- Can be used for hospitals and national registries
- Integrates with other clinical information systems
- Includes export to national registries

To request a demonstration or additional information please contact

Dr Alexey Brovko
Senior Medical Advisor
Dendrite Clinical Systems
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Location Poster Hall

Predictors of outcome after CABG in the South-Asian community: a propensity matched analysis

M Yousuf Salmasi, Ramanish Ravishankar, Philip Hartley, Thanos Athanasiou, Prakash Punjabi Imperial College London

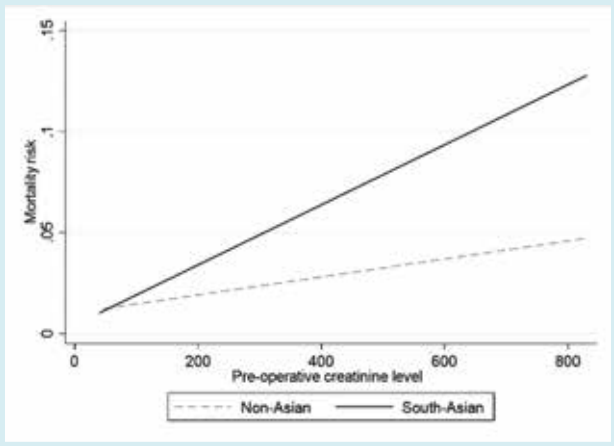
Ethnicity has been shown to influence hospital mortality following coronary artery bypass grafting (CABG), with a trend towards increased mortality in Asian patients compared with Caucasian patients. One school of thought is that the reduced number of referrals in ethnic minorities for coronary revascularisation leads these patients to present at more advanced stages of disease and have a greater operative risk than Caucasian patients. In addition, the prevalence of hypertension, diabetes and hypercholesterolemia are increased in the Asian population, which can contribute to cardiovascular disease burden, coronary targets and fitness for recovery, thus affecting the risk of surgery as a whole.

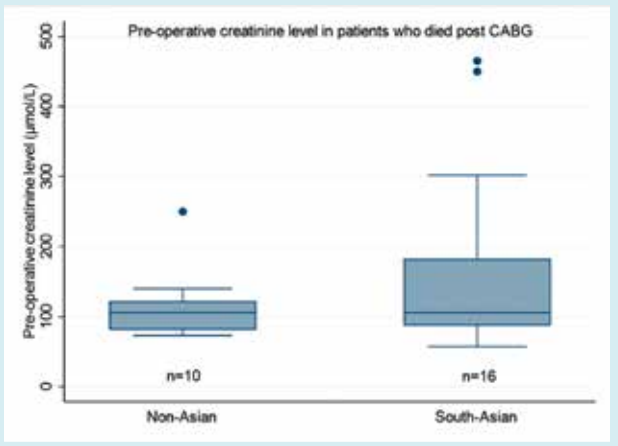
Despite its effect on procedural mortality, there is no clear consensus on the influence of South Asian ethnicity on multiple outcomes following CABG. As such, ethnicity is not currently incorporated into standardized pre-operative risk-stratification tools.

Our research

The aim of this study was to explore the outcomes in a large cohort of patients undergoing CABG surgery, comparing groups of South-Asian and Non-Asian patients using propensity matched analysis. Perioperative data was retrospectively analysed from a prospectively collated database at a single cardiothoracic institution between 2011 and 2019. In total, 1,957 patients underwent CABG surgery (799 South-Asian, 40.8%). The patient groups were propensity matched according to 10 relevant pre-operative covariates (Age, gender, BMI, COPD, renal failure, smoking, diabetes, LVEF, peripheral vascular disease, operating surgeon): 675 non-Asian patients were matched against 675 South-Asian patients.

Operative mortality was 1.77% and similar between the two groups (p=0.447). Multivariate regression analysis found predictors of operative mortality to be pre-operative serum creatinine, age, left ventricular (LV) impairment and extent of coronary disease. The effect of creatinine on mortality was selective for South-Asian patients (p=0.015). LV impairment was a predictor of mortality in non-Asian patients, however this effect did not exist in South-Asian patients. Predictors of short-term complications (composite of death, stroke, reoperation, hemofiltration and pneumonia) were age and creatinine (coef 0.002, 95% CI 0.0004 – 0.004, p=0.019) in the overall cohort. Subgroup analysis found age to remain a selective negative predictor of complications in South-Asian patients. Cox regression analysis found creatinine, age and LVEF to influence 10-year survival, whilst ethnicity was not a predictor.





Clinical implications

This study highlights the cumulative risk associated with ethnicity and renal disease in predicting short-term outcomes following CABG. Renal function is a well-known independent risk factor in patients undergoing CABG and its measure can indicate the likelihood of all-cause mortality and complications.

Variations in metabolic signature between different population subgroups have long been the subject of interest amongst clinicians in appropriating correct therapy for cardiovascular disease, including heart failure, atherosclerosis and hypertension. There is evidence for wide variations in enzyme isoforms and cellular receptors lead to ethnic diversity in drug response and pharmacokinetics, with indicating a strong underlying genetic component to the observed biodiversity.

Location Exhibition Hall **Moderated Poster Session 1**

High wall shear stress can predict wall degradation in ascending aortic aneurysms: is it time to go with the flow?

M Yousuf Salmasi, Omar Jarral, Selene Pirola, Yun Xu, James Moore Jr, Thanos Athanasiou Imperial College London, and the London Aortic Mechanobiology Group

Yousuf Salmasi

Omar Jarral

The primary mechanism of thoracic aortic dissection (TAAD), and its resulting acute pathophysiology and sequelae, is mechanical material failure. More specifically, acute aortic dissection occurs where the stress created by the haemodynamic flow supersedes the strength of the aortic wall at an instantaneous time point.

Current guidelines are inadequate to accurately predict TAAD: as a risk-prediction tool, size criteria is speculative at best. The more we learn about thoracic aortic biomechanics, the more we realise that aortic diameter is grossly inadequate as a predictor of prospective aortic dissection or rupture. Increasing aortic size is only one of the manifestations of aortopathy: aneurysm size is a consequence of negative aortic remodelling but not its cause. Although there is truth that overall aortic wall tension increases with diameter (vis-à-vis: Law of Laplace), it does not account for heterogenous wall thickness and stress distribution throughout the aortic segment of interest2.

The application of fluid mechanics to cardiovascular physiology has been made possible through the emergence of two main technologies: i) 4D flow-sensitive magnetic resonance imaging (4D flow MRI); and ii) computational fluid dynamics (CFD). Whilst numerous aortic flow patterns can be analysed, the literature focuses mainly on wall shear stress (WSS): the stress impacted on the aortic wall from blood flowing parallel to its course.

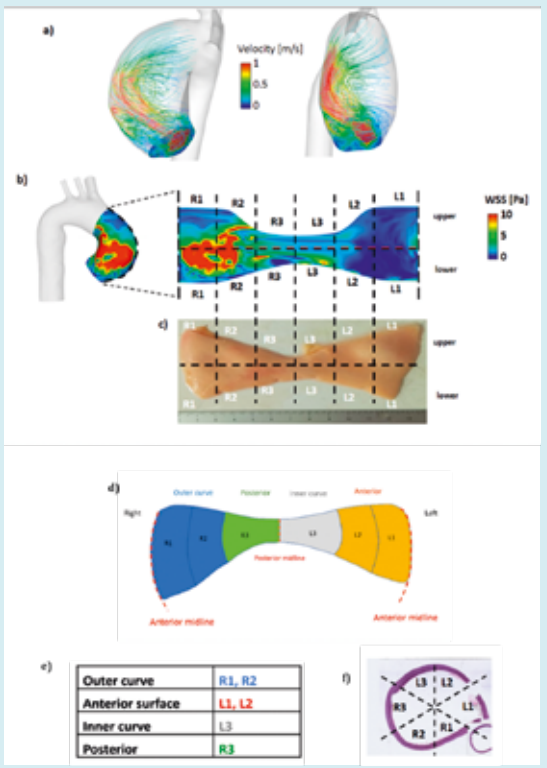
Our research

Wall shear stress mapping can be a powerful tool to identify hotspots of disease in ascending thoracic aortic aneurysms, impacting both mechanical and microstructural features. In this cohort study, ten patients undergoing surgery for root or ascending ATAA were recruited. Exclusions: bicuspid aortopathy, connective tissue disease. All patients had pre-operative 4-dimensional flow magnetic resonance imaging (4D-MRI), allowing for patient-specific computational fluid dynamics (CFD) analysis and anatomically precise time-averaged WSS mapping of ATAA regions (12 segments per patient). Aneurysmal aortic samples were obtained from surgery and subjected to region specific tensile failure and peel testing (matched to WSS segments). Computational pathology was used to characterise elastin/collagen abundance and smooth muscle cell (SMC) count.

High wall shear stress predicts areas of reduced peel force, increased stiffness, wall thinning, reduced elastin and smooth muscle cell count. These features are consistent with aortic wall degradation, thus implying the strong predictive potential for TAAD.

Implications

Computational modelling of thoracic aortic disease has expanded the repertoire of aneurysm diagnostics in recent years. Whilst research into aortic flow dynamics and wall mechanics is gaining momentum, it is yet to penetrate recommended guidelines or routine clinical practice. Much of this is due to the need for resource-heavy computational methods, or the lack of patient-specific data, or a combination of both. Nevertheless, the linkage of thoracic aortic flow with wall mechanical properties will be the key to understanding both aneurysmal growth and acute wall failure (i.e. dissection/rupture) and is certain to influence future guidelines for intervention.



Location Exhibition Hall **Moderated Poster Session 1**

Genetic and histological signatures in proximal thoracic aortopathy

London Aortic Working Group
centre of mechanobiology research

M Yousuf Salmasi, Deborah Morris Rosendahl, Ulrich Rosendahl, George Asimakopoulos, Aung Oo, Thanos Athanasiou Imperial College London, and the London Aortic Mechanobiology Group

Despite the rapid developments in our understanding of the genetic basis of thoracic aortic aneurysms (TAA) and dissection (TAAD), routine use of genetic analysis for risk stratifying patients is limited. More than 80% of patients with TAA have sporadic forms of the disease with no underlying pathogenic mutation and the resulting burden of variants of unknown significance can be quite high. Although clinical guidelines have relaxed cut-off sizes for many syndromic causes of TAA, the relevance of guidelines for other types of genetic variants and familial forms of the disease are still not inclusive.

Our research

The study we present here displays the strong potential of prospective cohort studies that link genetic analysis with microstructural quantification of explanted aneurysms. Fifty-four patients undergoing surgery for proximal TAA were recruited. Exclusions: connective tissue disease, bicuspid aortic valves, redo surgery. All patients underwent next generation sequencing (NGS) using a custom gene panel containing 63 genes previously associated with TAA on Illumina MiSeqor NextSeq550 platforms.

Explanted TAA tissue was obtained en-bloc from 34/54 patients, and complete circumferential strips of TAA tissue processed into whole slides which were subsequently digitalised. Computational pathology methods were employed to quantify elastin, cellularity and collagen in six equally divided regions across the whole aneurysm circumference.

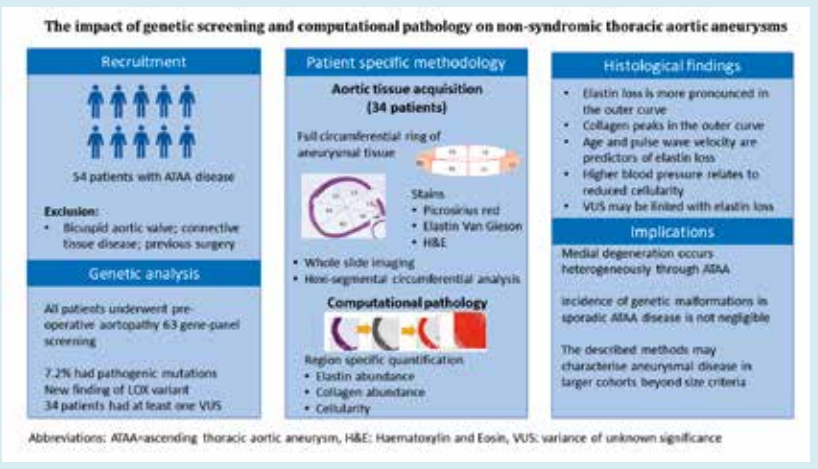
Main findings

Of 54 patients, clearly pathogenic or potentially pathogenic variants were found in 7.4%: namely LOX, PRKG1, TGFBR1 and SMAD3 genes. 55% had at least one variant of unknown significance (VUS) and seven of the VUSs were in genes with a strong disease association (category A) genes, whilst 15 were from moderate risk (category B) genes.

For elastin abundance (analysed on EVG-stained slides), patients demonstrated variations across the circumferential aortic regions of up to 40%: regional variation was found to be statistically significant through ANOVA analysis (p=0.004). Elastin and collagen abundance displayed high regional variation throughout the aneurysm circumference. In patients with <60% total elastin, the loss of elastin was more significant on the outer curve (38.0% vs 47.4%, p=0.0094). Further regression analysis found the outer curve to be the only region with a significant effect on elastin abundance (coef -9.745, 95% CI [-9.745, -1.705], p=0.018).

Implications

This study has demonstrated the clinical utility and importance of two investigative methods in TAA patients: targeted genetic sequencing and computational pathology.



The histological methods have especially demonstrated region-specific variation across the aneurysm affecting elastin, collagen and SMCs, with evidence of more medial degradation in the outer curvature. The collection of data from larger cohorts, through further multi-centre collaboratives, using similar methods is warranted, which will lead on to more refined and personalised disease models. The exact quantification of genetic variants, the various microstructural components of the aortic wall and the resulting physiological phenotype of the aorta and patient as a whole, has the potential to both reclassify the disease process and revolutionise treatment options.

Location Poster Hall

Redo intervention on the aortic valve: indications, outcomes and factors predicting mortality

Tunde Oyebanji, Firas Aljanadi, Mark Jones Cardiothoracic Unit, Royal Victoria Hospital, Belfast, Northern Ireland, UK

Objective

Transcatheter procedures may be contraindicated in some patients requiring reintervention on the aortic valve. In such patients, surgery is carried out at an elevated risk. Therefore, we evaluated the indications and early and long-term outcomes of redo surgical aortic valve replacement (rSAVR).

Methods

The study was carried out retrospectively over ten years (2010-2020). Our eligibility criteria included patients requiring isolated redo-AVR, redo-AVR plus CABG, complex aortic surgery involving aortic valve replacement, and concurrent mitral valve procedures. The primary outcome was mortality at 30-days, 1, 5 and 10 years. Secondary outcomes were 30-day incidences of stroke, acute kidney injury, myocardial infarction (MI), permanent pacemaker (PPM) requirement, and length of hospital stay (LOHS).

Results

Only 83 patients had rSAVR during the study period. In comparison, 38 patients had valve-in-valve TAVI during the same duration. Of the explanted valves, 52 (62.65%) were biological and 31 (37.35%) mechanical. The haemodynamic pathology was prosthetic valve regurgitation [PVR] – 41 (49.4%), prosthetic valve stenosis [PVS] – 21 (25.3%) and mixed – 21 (21.3%). Thirty (36.6%) patients required rSAVR because of endocarditis (mechanical – 11 [13.2%], biological – 19 [23.4%]; p=0.92) and 31 (37.8%) for bioprosthetic valve degeneration. The mean duration before rSAVR was 122 ± 90 months, and this was not statistically different between biological and mechanical valves. More than 60% of our patients were in NYHA class III-IV, and surgeries were urgent or emergent in approximately 67% of cases. Thirty (36.6%) patients required concomitant procedures including CABG, aortic root enlargement to facilitate valve implantation, aortic root replacement and mitral valve surgeries. All-cause mortality at 30-days, 1, 5 and 10 years was 14 (16.87%), 16 (19.28%), 19 (22.89%) and 22 (26.51%) respectively. Cox regression analysis showed the following predictors of mortality: increasing age (HR 1.08, 95% CI 1.03 to 1.14, p=0.001), long cardiopulmonary bypass time (HR 1.02, 95% CI 1.01 to 1.02, p< 0.001), endocarditis (HR 8.93, 95% CI 2.56 to 31.2, p<0.001), peripheral vascular disease (HR 4.44, 95% CI 1.35 to 14.61, p=0.01), valve and CABG (HR 21.34, 95% CI 1.55 to 294.62, p=0.02), and moderate ejection fraction (HR 9.73, 95% CI 2.87 to 32.98, p<0.001). Of patients that died within 30-days of surgery, 9 (64.2%) had endocarditis.

The incidence of stroke, MI, AKI, and new PPM were 2.44%, 3.87%, 15.86% and 15.86%, respectively.

Tunde Oyebanji

Mark Jones

Figure 1: Kaplan Meier analysis of Biological vs Mechanical Valve Prostheses

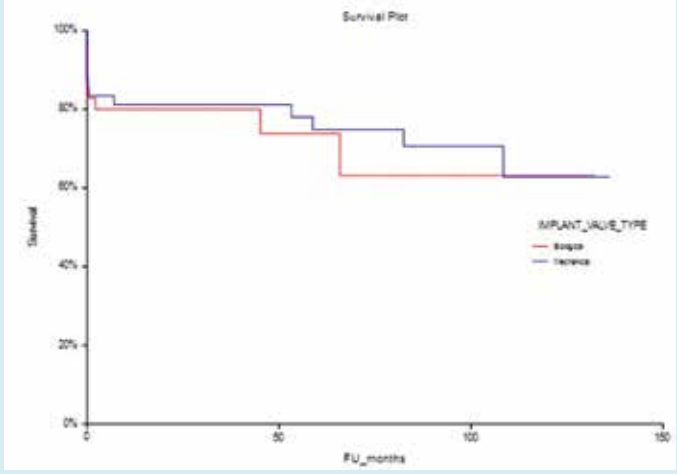


Table 1: Postoperative outcomes after rSAVR

OUTCOME	COHORT	MECHANICAL	BIOLOGICAL	P-VALUE
AGE (YEARS)	62.14±15.82	56.5±15.44	70±13.11	<0.05*
GENDER	83	48 (57.83)	35 (42.17%)	0.97¥
• MALE	50 (60.24%)	29 (34.94%)	21 (25.3%)	
• FEMALE	33 (39.76%)	19 (22.89%)	14 (16.87%)	
LOGISTIC EuroSCORE	26.22±21.9	21.77±19.7	32.33±23.55	0.03*
SURGERY TYPE				0.59¥
• VALVE ONLY	62 (74.7%)	36 (43.37%)	26 (31.33%)	
• VALVE+CABG	9 (10.84%)	4 (4.82%)	5 (6.02%)	
• COMPLEX AORTIC	12 (14.46%)	8 (9.64%)	4 (4.82%)	
ALL-CAUSE MORTALITY				
• 30-DAYS	14 (16.87%)	8 (9.64%)	6 (7.23%)	0.95¥
• 1-YEAR	16 (19.28%)	9 (10.84%)	7 (8.43%)	
• 5-YEARS	19 (22.89%)	11 (13.25%)	8 (9.64%)	
• 10-YEARS	22 (26.51%)	13 (15.66%)	9 (10.84%)	0.89¥
MEAN SURVIVAL(M)	99.8	98.6	93.4	0.79*
LOHS (D)	26.89	27.35 (18.5)	26.23 (19.5)	0.82£
MI	3 (3.85%)	0	3 (3.85%)	0.04¥
STROKE	2 (2.44%)	0	2 (2.44%)	0.097¥
AKI	13 (15.86%)	6 (7.32%)	7 (8.54%)	0.37¥
PPM	13 (15.86%)	6 (7.32%)	7 (8.54%)	0.4¥

¥ - Chi-square test * Two-sample t-test £ - Logrank test

Table 1

The mean LOHS was 26.9 ± 22.3 days (Median = 19.5 days). The mean survival time was 99.8 months. One, five, and ten-year survival were 80%, 74% and 64%, respectively. (see table 1).

Conclusion

Our study provides clinically relevant data about the long-term prognosis of patients undergoing rSAVR. Patients having rSAVR achieve good mid and long-term outcomes, but there is significant postoperative morbidity and mortality. In addition, many patients require concomitant procedures. Endocarditis is a common indication and strongly affects outcomes.

Location Poster Hall

Acute type A aortic dissection - a Welsh national audit

Harry Smith Morriston Hospital, Swansea , UK

During my time working as an F2 in ED, I along with one of the cardiothoracic surgical trainees, researched the relationship between patients who were diagnosed with type A aortic dissection (TAAD) and the time it took them to receive this diagnosis. TAAD is a time critical, cardiac surgical emergency with studies showing a mortality of 50% within the first 48 hours if not operated on1. We researched the period between 2007 and 2019, so this represents a pre-covid study of the presentation of TAAD and includes 119 patients. Of the 119 patients 16 data sets were inadequate.

The main aim of the project was to identify how long it took patients to receive their diagnosis and to identify any factors that effected the time it took for diagnosis. We used two digital patient record systems to gather data – the Patient Administrative and Tracking System (PATS) and Welsh Clinical Portal (WCP). PATs was used to gather cardiac surgical data from north Wales and south Wales and WCP was used to collect ED notes, CT reports and survival rates of each patient identified with a TAAD. We then analysed the data, calculating the average time to CT for each centre and we investigated the differential diagnosis of each centre, whether the initial management of the patient involved ACS treatment and we also investigated patient mortality.

The commonest presenting complaint was chest pain 63%, followed by SOB 11% and Collapse 10%. The average time from presentation to CT scan was 1092 minutes, with a minimum time of 34 minutes and a maximum time of 40389 minutes. Our data has shown that the commonest differential diagnosis for TAAD is myocardial infarction 30%, with 25% of the total number of patients receiving ACS treatment. Other common differentials include PE, CVA and ischaemic limb.

There is a delay in diagnosis of TAAD in wales and there are a myriad of reasons for this delay. Firstly, the rarity of TAAD make it a diagnosis not to be missed but not something that is immediately considered when a patient presents with chest pain or SOB. Secondly, the varying of haemodynamic stability of the patient make it a difficult diagnosis as a patient may have a small dissection and another explanation for their symptoms. Finally, the diversity of symptoms can present a potential challenge to ED physicians2.

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Location Exhibition Hall **Poster Session #3 [ePosters]**

Effects of dietary iron deficiency on cellular and global iron metabolism and mitochondrial function in murine cardiac tissue and plasma

Kristina Tomkova
University of Leicester

Complex clinical syndromes, including post-surgery organ injury or frailty, are often well described on phenotypical level but the knowledge of their underlaying molecular causes often lacks depth. Our research group focuses on reducing the risks of organ injury and poor outcomes after cardiac surgery by identifying and understanding the biological mechanisms that drive these complications. Both iron metabolism and mitochondrial function have been previously associated with the frailty syndrome and poor outcomes after cardiac surgery. Iron metabolism and mitochondrial function are highly correlated pathways, whereby dysregulation in one can lead to dysregulation in the other. This is because iron is an essential component of mitochondrial respiratory complexes as well as several other proteins required for correct mitochondrial function. However, the relationships between global iron deficiency, cellular iron metabolism, and mitochondrial function, as well as the underlying molecular patterns of this interaction are poorly defined. Therefore, we decided to investigate the effect of dietary iron restriction on mitochondrial function in the heart and the bloodstream and to determine the potential therapeutic use of intravenous iron supplementation as a method of improving mitochondrial function.

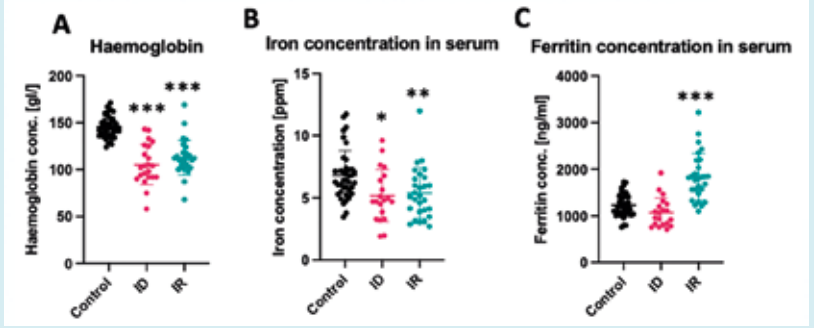

Figure 1: Iron metabolism in serum

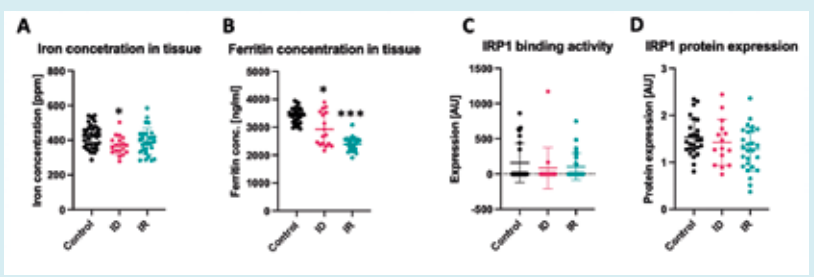

Figure 2: Iron metabolism in heart tissue

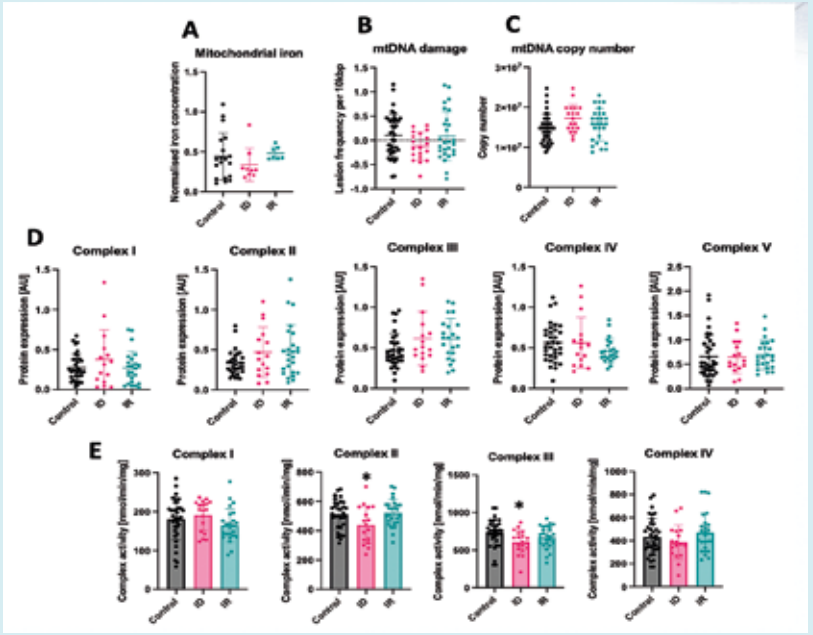

Figure 3: Mitochondrial function in heart tissue

To illuminate the relationship between iron deficiency, mitochondrial function, and iron repletion, we designed a murine model of dietary iron restriction. We compared three groups of mice: mice fed control diet (n=39), mice fed iron deficient (ID) diet (n=20) and mice fed iron-deficient diet and administered intravenous iron repletion (IR) treatment 24-72 hours before sacrifice (n=28). In these mice we have systematically examined the iron metabolism pathway and mitochondrial health and function by measuring the levels of iron, haemoglobin, and ferritin. We examined the protein expression and enzymatic activities of iron regulatory protein 1 (IRP1) and all mitochondrial complexes; and we investigated the mitochondrial DNA (mtDNA) damage and copy number.

From our results, we have concluded that dietary iron restriction results in disruption of iron metabolism as evidenced in lowered levels of iron, ferritin, and haemoglobin in ID mice (Fig. 1A-C and Fig. 2A-B). However, this disruption was not sufficient to trigger the expected increase in IRP1 mRNA binding; did not induce changes in mtDNA; and did not lower the total mitochondrial iron levels in the heart tissue (Fig. 2C-D and. Fig. 3A-D). However, mitochondrial function was affected, as both respiratory complex II and complex III had decreased enzymatic activities in the ID mice. Iron repletion was able to correct this dysfunction and return the enzymatic activity back to normal levels (Fig. 3E). Therefore, we hypothesise that iron deficiency affects the mitochondrial respiratory chain and can results in inefficient energy production which can lead to numerous complications in recovery after cardiac surgery. In our future work, we plan to measure these variables in human clinical trials to study this phenomenon more closely. We believe this link between iron metabolism disruption and mitochondrial dysfunction provides insights into potential molecular mechanisms regarding the clinical phenotypes associated with iron deficiency, anaemia, and the frailty status of patients.

Location Exhibition Hall **Moderated Poster Session #4 [ePosters]**

An assessment of risk scores on the survival of post-cardiotomy Extra-Corporeal Life Support (ECLS) patients

Sara Volpi, Oluwatobiloba Oyebanji, Nicole Makariou, Umar Hamid, Wael I Awad St Bartholomew's Hospital, London, UK

Extra Corporeal Life Support in recent years, has become an essential supportive therapy in treating adults with impaired cardiac and/or pulmonary function unmanageable conventionally. It acts as a bridge to recovery or further surgical or medical intervention. The use of ECLS has increased worldwide due to an improvement in technology, ease of management, growing familiarity with its capability and decreased cost. Despite ECLS being more accessible to centres, survival rates remain low. The decision to initiate ECLS is often made on a case-by-case basis by a multidisciplinary team, often relying on clinical judgement to ascertain the likelihood of patient survival, whilst balancing costs and hospital resources.

Post-cardiotomy cardiogenic shock (PCCS) is associated with the worse outcomes after ECLS. Several multivariable risk models have been developed to predict mortality following ECLS, but the relative utility of these models in PCCS is unknown. Due to the high morbidity and mortality associated with ECLS, there is a great need for a predictive score that can aid in the selection of patients with PCCS for ECLS. This study assesses the predictive value of four risk scores on mortality following PCCS.

This study examined patients receiving post-cardiotomy ECLS at our centre between January 2015 and April 2021. The cohort was retrospectively risk-stratified using four commonly used scoring systems: SAVE-score, ACEF-II, EuroSCORE II and PC-ECMO. The area under the receiver-operating curve (AUROC) was calculated for each risk model.

During this 6-year period, 112 patients underwent ECLS, of whom 46 (41.1%) were for PCCS. The median age of the PCCS cohort was 55 (19 – 79) years, 28/46 (60.9%) were male; 26/46 (56%) had pre-operative left ventricular impairment; 52% were following elective cardiac procedures. The overall in-hospital mortality was 34/46 (74%). AUROC for SAVE-score was 0.7% (95% CI 0.511-0.889), predicted mortality was 63%, ACEF-II was 0.62 (95% CI 0.41-0.82), predicted mortality was 7.5%, the EuroSCORE II was 0.53 (95% CI 0.313-0.745), predicted mortality was 16.7%, and PC-ECMO was 0.51 (95% CI 0.315-0.710), predicted mortality was 71%.

In this single centre study, the SAVE-score appears to be the better risk model in predicting mortality in PCCS patients receiving ECLS. Further larger studies are needed to validate these findings and provide valuable insight in patient selection for this high-risk intervention.

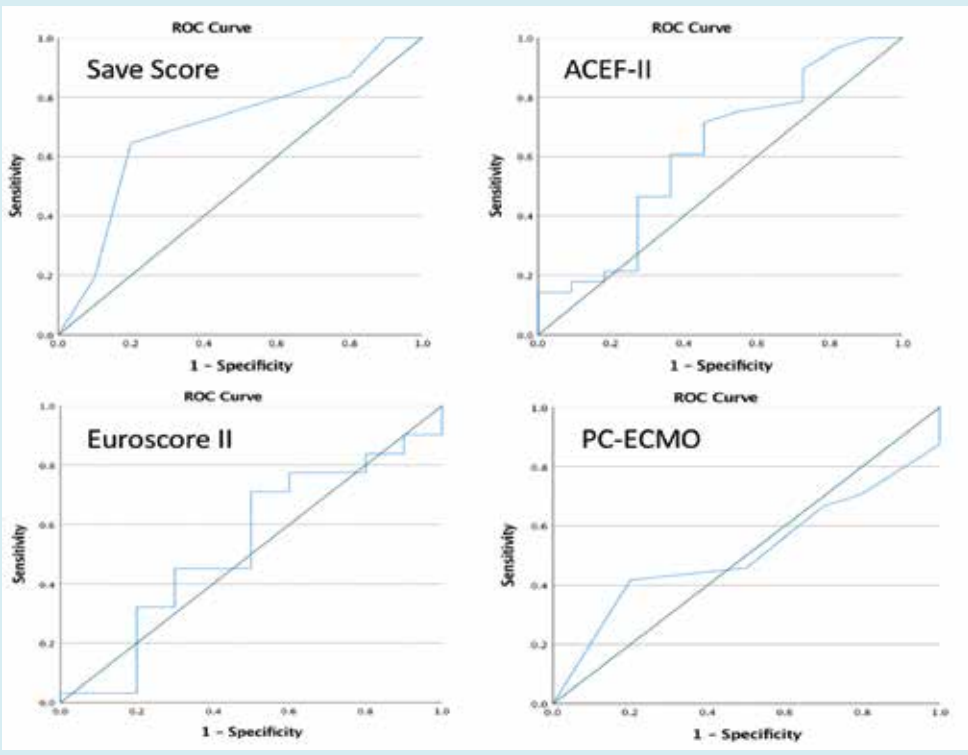

Figure 1: ROC for risk models used to calculate predicted mortality post ECLS

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Location Moderated Poster Session #3 [ePosters] **Exhibition Hall**

Review of patients discharged post thoracic surgery with chest drain in situ and drain follow up clinic

Firas Aljanadi, Jonathan Strickland, Liana Montgomery, Mark Jones
The Royal Victoria Hospital, Belfast, UK

Firas Aljanadi

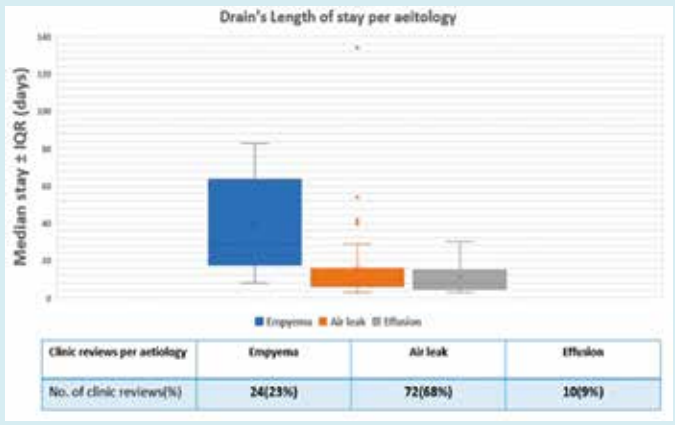
Mark Jones

Persistent air leak and prolonged drainage are well-recognised complications of thoracic surgery. These complications increase the hospital stay and costs of care. Patients can be discharged with a chest tube in situ and followed up in a ward-based nurse led clinic. We reviewed such patients and the rate of readmission after discharge with a chest drain to assess the effectiveness of the drain follow up clinic.

This is a retrospective review of our prospective database for 22 months (March 2019 to January 2021). We identified 62 patients who were discharged from the thoracic surgery ward with a chest drain and attached bag with one-way valve. Analysis focussed on indication and duration of chest drainage, complications, and readmission for any reason.

Sixty-two patients were discharged with a chest drain in situ representing 5% of all the patients who had thoracic surgery within the study period. Median age was 67 years (range 22-85 years) with 24 females and 38 males. Fifty-two percent of the patients underwent a video-assisted thoracoscopic approach, 27% of them a thoracotomy and 21% had an isolated bedside chest drain insertion. Following hospital discharge, median duration of chest drainage was 11 days [interquartile range (IQR) 7-18.75 days]. Patients had 106 review episodes in the ward-based nurse-led clinic. Indication was prolonged air leak (71 %; 72 clinic reviews), persistent fluid drainage following evacuation of empyema (16%; 24 clinic reviews) and persistent fluid drainage for simple effusion (13%; 10 clinic reviews). Median length of drain stay was 30 days (IQR 19.75-54 days) for empyema, 10 days (IQR 6-16 days) for air leak and 8 days (IQR 6.5-12 days) days for simple effusion. Nine patients required readmission (14.5%) and empyema had developed in three patients (4.8%).

We concluded that patients discharged with a chest drain in place can be followed up in a dedicated ward-based nurse-led monitoring clinic for optimal quality of care. A dedicated chest drain clinic staffed by specialist nurses helps to conserve resources by shortening hospital admission but also aids patient recovery.



Clinic reviews per aetiology	Empyema	Air leak	Effusion
No. of clinic reviews(%)	24(23%)	72(68%)	10(9%)

Location Poster Hall

Exogenous formaldehyde in the exacerbation of coronary artery disease. An observational study with meta-analysis

India Premjithlal Bhaskaran
Kew House School, Imperial College, London, UK

This is to establish the personal awareness in reducing usage of atmospheric formaldehyde level that causes coronary artery disease (CAD) and other diseases and how to manage the reduction of the atmospheric formaldehyde level. Formaldehyde is a toxin that is found in abundance in anatomy dissecting rooms, funeral homes and produced by automobiles, incinerators, power plants and refineries. It's also one of the cigarette smoke by-products. Inhalation, ingestion, and cutaneous absorption are all ways to be exposed to formaldehyde.

Formaldehyde levels in human cells range from 0.2 to 0.5 mM, while the concentration in healthy people's blood is between 0.05 and 0.1 mM. As a result, physiological or metabolic systems can maintain a low amount of formaldehyde in the blood and tissues. The negative consequences of formaldehyde exposure grow more severe as the concentration level rises.

CAD is caused by formaldehyde exposure, which causes atherosclerosis, arrhythmia, tachycardia, ventricular or atrial fibrillation, stroke, and is associated to oxidative stress or inflammation. Formaldehyde exposure at higher levels can create negative inotropic strength in the heart, as well as sinoatrial malfunction, which can lead to bradycardia or death.

This study comprises meta-analysis from literature as well as an observational investigation based on multiple formaldehyde measurements in the atmosphere at two different time periods. Using a combination of pertinent Medical Subject Heading (MeSH) phrases and the key words formaldehyde and coronary artery disease, the databases in PubMed, EMBASE and ProQuest were searched. The studies were published between January 2005 and July 2021. A total of 204 citations, titles, and abstracts were found, with the entire manuscripts of 91 papers being obtained. 86 were eliminated and five were included in the meta-analysis. Two cross-over studies and three time series designs are included

(Figure 1). For the meta-analysis, the Mantel-Haenszel Risk Ratio was used. Heterogeneity was assessed using the Chi-square and I2 statistics. Data was analysed using Review Manager Software (Rev Man 5, Cochrane Collaboration, Oxford, England). The risk ratio was 2.31 (95% C.I = 1.19 to 4.09) and hence for every unit (.g/m3) increment in the formaldehyde concentration, there was a higher risk for CAD (Figure 2).

In observational study, the formaldehyde levels, measured using a formaldehyde detector, were obtained from a west London school and six different public places (Figure 3&4). In 2018 and 2020, measurements were taken at 08:00 and 17:00. Across the trials, the average daily exposure of formaldehyde concentration ranged from 0.37 mg/m³ to 5.4 mg/m³. The formaldehyde levels were unstable across the two timepoints and it was reduced in 2020. In 2018, the levels were higher than normal. (Figure 3-5). Due to constraints that resulted in lower formaldehyde formation, low atmospheric levels of were observed throughout the pandemic period of 2020. This demonstrated that by improving and modifying our lifestyles, we could regulate hazardous amounts of formaldehyde and other toxic chemicals.

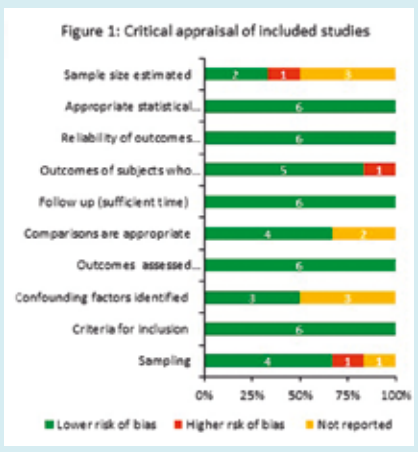


Figure 1

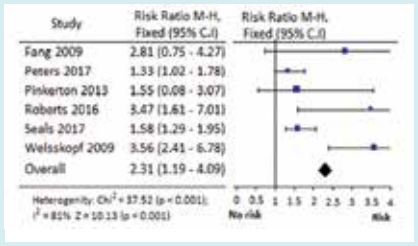
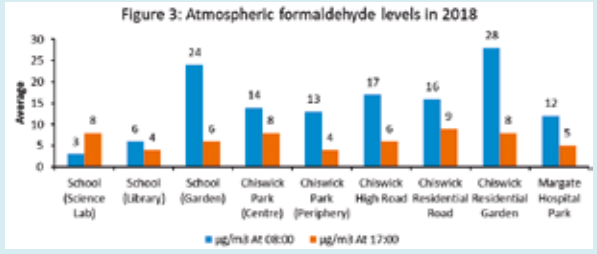
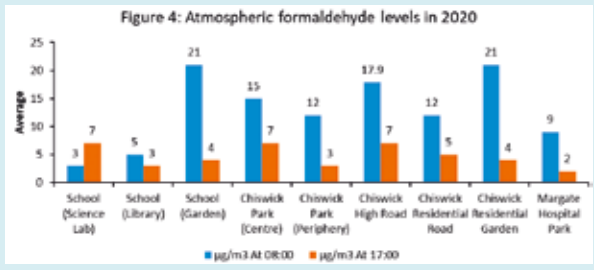
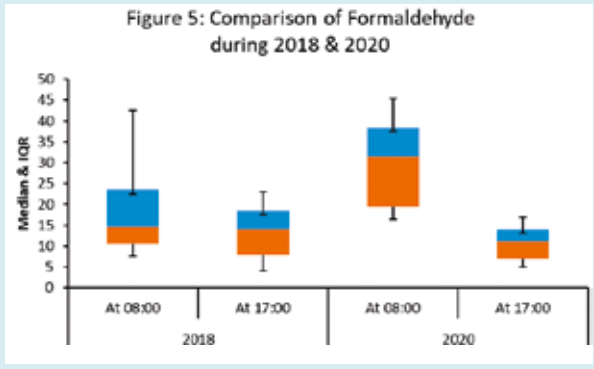


Figure 2: Risk of CAD due to formaldehyde exposure







Location Poster Hall

Transcatheter versus surgical closure of atrial septal defects: A systematic review and meta-analysis of clinical outcomes

Louise J Brown[1], Sophie L Mellor[2], Aimee-Louise Chambault[3], Kathryn Olsen[2], Nilofer Sorathia[4,5], Arthur E Thomas[6], Neel Kothari[7] and Amer Harky[8] 1 North Cumbria Integrated Care NHS Foundation Trust, Cumberland Infirmary, Carlisle, UK; 2 University Hospitals Birmingham NHS Foundation Trust, Birmingham, UK; 3 Medical School, College of Medical and Dental Sciences, University of Birmingham, Birmingham, UK; 4 St Georges, University of London; 5 University College London; 6 Peninsula College of Medicine and Dentistry, Plymouth, UK; 7 Sandwell & West Birmingham NHS Trust, Sandwell General Hospital, West Bromwich, UK; 8 Department of Cardiothoracic Surgery, Liverpool Heart and Chest, Liverpool, UK

Louise Brown

Sophie Mellor

Atrial septal defects (ASD) are the second most common type of congenital heart disease (CHD) with a prevalence of around 1.4 per 1,000 and this rate is rising due to improving detection rates. Closure is often required to control the physiological consequences of the shunt produced by the ASD. The two principal methods for closure are either surgical closure or transcatheter closure with device implantation, the latter being the treatment technique most commonly used in the UK.

This research aimed to comprehensively examine current literature comparing clinical outcomes of transcatheter and surgical closure for ASD and perform a meta-analysis of results, which will be subdivided into cohorts of either adult or paediatric patients.

A comprehensive electronic literature search was conducted. Primary studies were considered if they compared both closure techniques. A total of 33 studies were included in meta-analysis, all were observational, of which 22 were retrospective, 7 prospective and 4 used retrospective and prospective methods. Primary outcomes included procedural success, mortality and reintervention rate. Secondary outcomes included residual ASD and mean hospital stay.

Results showed a mean total hospital stay was significantly shorter in the transcatheter cohort across both the adult (95% CI, MD -4.05 (-4.78, -3.32) p<0.00001) and paediatric populations (95% CI, MD -4.78 (-5.97, -3.60) p<0.00001), please see figure 1. In adults, procedure success favoured surgery; OR 4.40 (95% CI, 1.99-9.72) p=0.0003. The mean procedure success in the paediatric cohort favoured neither intervention method; OR 0.96 (95% CI 0.37-2.48) p= 0.94, please see figure 2.

No significant difference was found in re-intervention rate across the adult (OR 0.42, 95% CI, [0.09, 1.96], p=0.27) or paediatric cohorts (OR 1.15, 95% CI, [0.28, 4.82], p=0.85), nor in overall mortality between both techniques in the adult (OR 0.76, 95% CI, [0.40, 1.45], p=0.41), or paediatric cohorts (OR 0.62, 95% CI, [0.21, 1.83], p=0.39), nor in the number of arrhythmias reported between both techniques in the adult cohort (OR 0.84, 95% CI, [0.44, 1.59], p<0.58) and paediatric cohort (OR 0.80, 95% CI, [0.43, 1.50], p=0.49).

This research isn't without limitations; the majority of the evidence appraised consisted of cohort studies, of which a significant proportion were carried out retrospectively. This lends to all the usual limitations associated with retrospective cohort studies, particularly susceptibility to confounding variables, bias in the selection and allocation process to each arm of the studies, and loss to follow-up. A further limitation includes the period in which some of the research was carried out. For example, technical advances for the interventional ASD repair had not yet been developed during this time period.

We concluded that both transcatheter and surgical approaches are safe and effective techniques for ASD closure. Our study has demonstrated the benefits of transcatheter closure in terms of lower complication rates and mean hospital stay. However, surgery still has a place for more complex ASD closure and, as we have demonstrated, shows no difference in mortality.

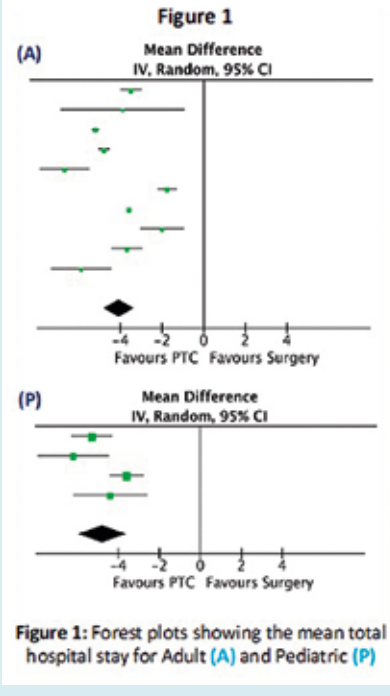


Figure 1: Forest plots showing the mean total hospital stay for Adult (A) and Pediatric (P)

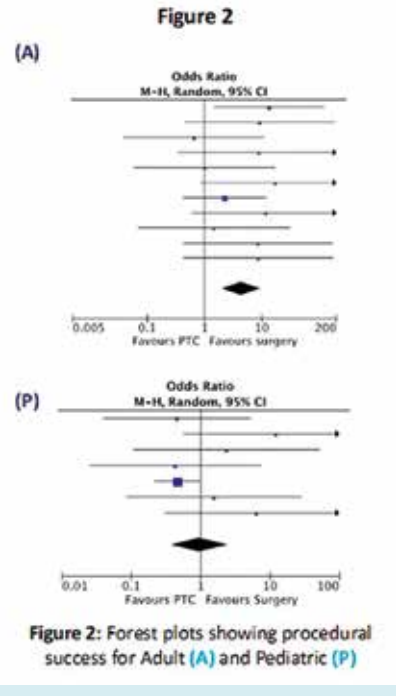
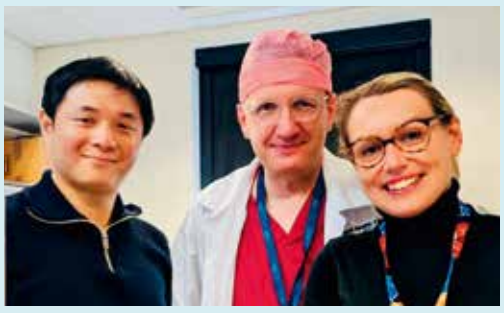


Figure 2: Forest plots showing procedural success for Adult (A) and Pediatric (P)

Location Poster Hall

A novel biomechanical testing for aortic glue used in type A dissection repair

Alicja Zientara Royal Brompton Hospital, London, UK



From left to right: Dr Yuan-Tsan Tseng, Prof Dr Ulrich Stock and Dr Alicja Zientara

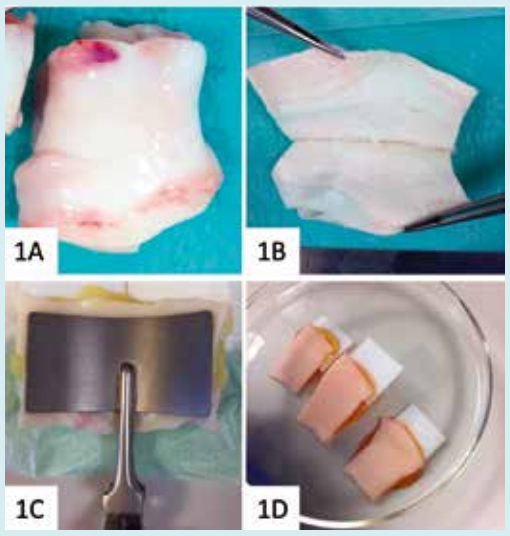


Figure 1

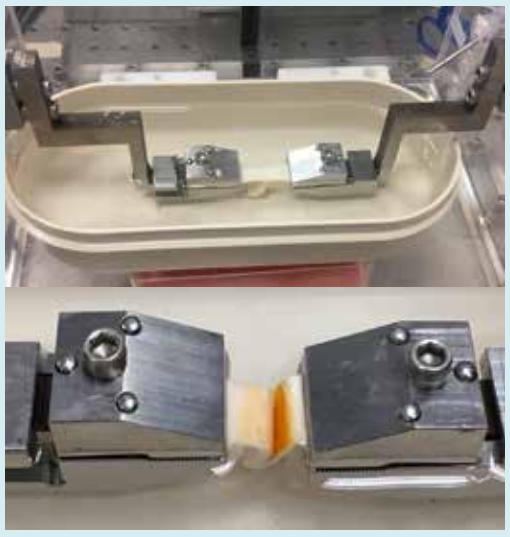


Figure 2

Why test adhesive strength of tissue glue?

Since decades treatment for type A dissections include reattachment of the dissected membranes using tissue glue inside the false lumen. Seen initially rather as a bail-out strategy, the successful reattachment developed towards a life-saving operation which also avoids a full root replacement decreasing crucial cross clamp time during an emergency operation.

Tissue glues have significant limitations such as cytotoxic effects to adjacent tissues, induced inflammation, tissue oedema and necrosis. This can result in late complications include re-dissection and pseudoaneurysm formation with resulting need of repeat surgery. The widely used Bioglue (Cryolife..). represents the gold standard component in the repair of type A dissections. Interestingly, despite broad acceptance the adhesive strength of the glued aortic layers has not been tested and quantified so far. The aim was to design an experiment that can quantify the adhesive strength, namely peel force, of an aortic wall, which has been glued back together after a type A dissection. In addition, historical adjuvant devices (Borst-clamps) were tested to improve the adhesive strength of the glued aortic layers.

Sample preparation and testing

An artificial aortic dissection was introduced on an ascending porcine aorta using a scalpel and a tweezer to create a central cut in the vascular media and peel the aorta apart. In each aorta, one 1cm width strip was cut as an "unpeeled" control. The peeled aorta was glued back into position simulating the surgeon's manoeuvre during a root repair in type A dissections (Fig.1A-D).

For sample testing, we adapted the principle of the adhesive T-peel test (EN ISO 11339:2010) for the determination of the peel strength of adhesives by measuring the peeling force of a T-shaped bonded assembly of two flexible tissues. The measurements were performed using a Bose Electro Force Planar Biaxial Test Bench Instrument···under uniaxial mode (Fig.2). Samples were peeled in T-Peel configuration with a linear displacement rate at 0.33mm/s up to total displacement of 20mm. The load as a function of displacement was recorded. The average T-Peel strength was calculated by dividing the average load in Newtons by the width of the specimen in millimetres.

Four conditions of differently prepared samples depending on the applied pressure on the glued aorta were tested: zero pressure according to the manufacturer's recommendation, slight pressure (0.5KPa), moderate pressure (1.7KPa) and pressure applied by a Borst clamp (Fig.1D) (1.7KPa).

Conclusions and future perspective

The novel T-peel test offers an attractive method to test tissue glues in a defined in-vitro environment simulating an aortic dissection. The performance of Bioglue demonstrated increased peel force after applying a moderate pressure at 17KPa (via weight or Borst clamp) on the aortic sample in contrast to slight or no pressure as per the manufacturer's recommendation, which translated into clinical practice may give the surgeon a hint how to apply the glue most effectively.

This newly established principle can be adapted for further testing of alternative glues containing less cytotoxic ingredients (i.e., glutaraldehyde).

Modifications of the setup will allow identification of the optimal adhesive strength for tissue glues in general, for example using glue at different temperatures, under different pressures or with adjuvant devices (Borst-clamps).

Moderated Poster Session 1 Exhibition Hall **11:00 - 12:30**

Endovascular Treatment of Ascending Aortic Pathology- A Meta-Analysis

Shehani Alwis1, David Mozalbat2, Shabnam Cyclewala1, M Yousuf Salmasi3, Christoph A. Nienaber1 1. Department of Cardiac Surgery, Royal Brompton and Harefield NHS Trust, London; 2. Department of Cardiac Surgery, St George's Hospital, London; 3. Department of Surgery, Imperial College London

Objectives

Open surgical repair is the established gold standard treatment for pathology of the ascending aorta (AA). However, the mortality of open surgical repair is reported in literature to be ranging from 2% to 50%. This reflects the heterogeneity in both patient population and surgical strategy. In recent years, endovascular stenting (TEVAR) of the AA has been attempted, but only in expert centres with a limited understanding of outcomes. This study aimed to systematically review the literature to determine the safety and outcomes of stenting in the ascending aorta.

Methods

A systematic literature search was conducted in five online databases, incorporating cohort studies and case series of patients undergoing TEVAR for pathology in the AA region. Case reports were excluded. Search terms incorporated "ascending aorta" OR "ascending thoracic aorta") OR ("aorta" AND "zone 0") AND ("stent" OR "endovascular"), which were used as keywords. The relevant screened articles were systematically assessed and data was analysed using inclusion and exclusion criteria. The extracted data included the authors name, study year, number of patients, gender, comorbidities, history of prior surgery and indication for treatment. Analysis also included primary end points which were overall survival and secondary endpoints such as freedom from endoleaks, freedom from reintervention, neurological damage/stroke, transient neurological deficit, in hospital mortality and length of hospital stay. Qualitative analysis of patient covariates and outcomes were measured using pooled meta-analysis. Meta-regression was used to assess the influence of covariates on complication rates.

Results

Literature search generated 875 titles of which case reports, editorials and review articles were excluded and as well as publications not in English. After applying the inclusion-exclusion criteria, 25 full-text articles were included in the final analysis. These were either retrospective or prospective studies published from 2011 to 2020. The publications used encompassed, 16 single centre studies and 8 multi centre studies with a total of 572 endovascular procedures, the majority of which were elective aneurysm repairs (89%), and 11% acute aortic dissection. Pooled analysis revealed a procedural mortality as 4.19%. The incidence of endoleaks was17.6% and at long-term follow-up 17.1% (98 cases) required reintervention. Neurological complications occurred at a rate of 6.8% which was a combination of major strokes, minor strokes and spinal cord ischaemia.

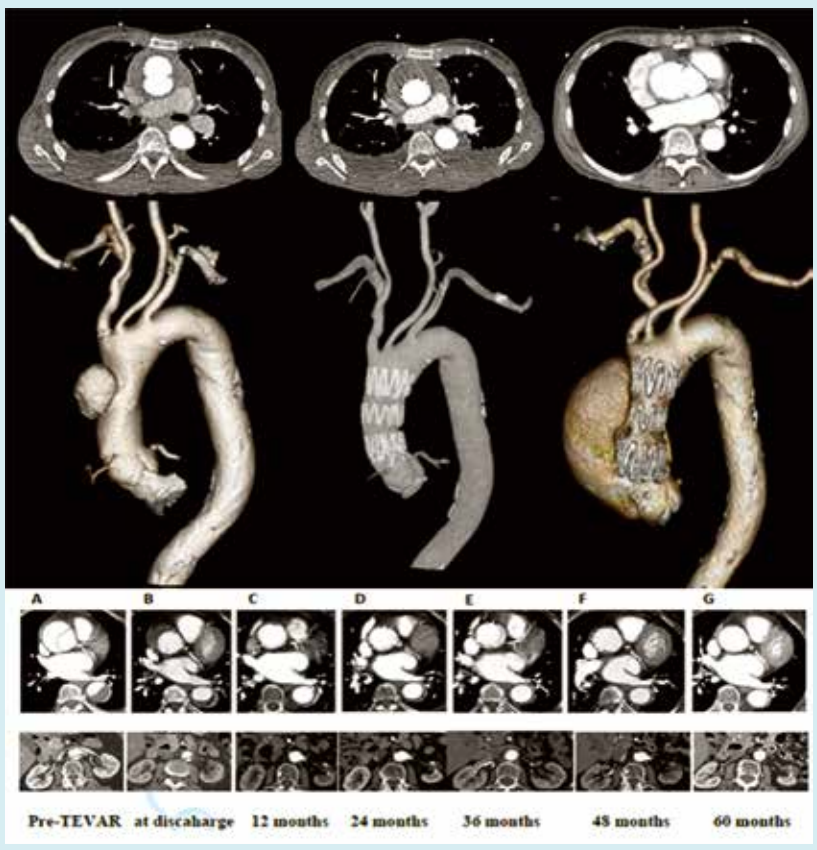


Image 1: CT scan demonstrating ascending aorta stenting; and axial follow-up CT scan images after ascending aorta stent management

A meta-regression analysis revealed congestive heart failure as a predictor for post-operative endoleak (coef 27.47, 95% CI [6.53, 48.42], p= 0.017). No other variables (age, gender diabetes, PVD, COPD) were shown to be predictive of endoleaks post-operatively. The presence of diabetes as a covariate was found to be a predictor of lower rates of re-intervention (coef -17.66, 95% CI [-28.2, -7.14], p=0.004).

Conclusions

Endovascular repair of ascending aortic aneurysms is a safe alternative to surgery in high-risk patients, although the risks of endoleaks and re-intervention are not negligible. This analysis indicates careful patient selection is needed, especially to ensure a good short-term outcome.

Location Exhibition Hall **Moderated Poster Session 4**

Management of bronchial stenosis post pulmonary lung transplantation – initial evaluation of biodegradeable stents

Shabnam Cyclewala, Nizar Asadi
Department of Thoracic Surgery, Royal Brompton and Harefield NHS Trust, London

Shabnam Cyclewala

Introduction

Bronchial stenosis is one of the most common airway complications post lung transplantation. Incidence varies from 5 to 20%, commonly seen in the first 2 to 9 months post transplantation.

Objective

To study the incidence of bronchial stenosis in patients who have undergone lung transplantation and the outcomes of the different management strategies used and study the complications. To explore the options of using absorbable stents and measure their efficacy compared to other management options.

Methods

Retrospective analysis of prospectively collected data from 524 patients who have undergone lung transplantation at the institute over the last 10 years. Patient surviellence: Bronchial stenosis post operatively which was identified on surviellence/ diagnostic bronchoscopy. Data gathered with regards to the type of inrterventions used to treat bronchial stenosis. Outcomes were then explored and efficiacy of of absorbable stents were seen.

Results

A total of 524 lung transplantations were performed: bilateral, single, heart lung transplantations. 44 Patients developed bronchial stenosis out of which 32 (72%) patients required interventions. The most common site for non anastomotic stenosi was found to be bronchus intermedius (28 patients - 63%) followed by 9 with left main bronchus (20%), 5 with right main bronchus (11%) and left upper lobe bronchus (2%) .These patients were treated in a stepwise approach – initially 32 with balloon dilatation- (72%), which was later treated with cryotherapy (15 patients – 34%) and ultimately- 8 patients were treated with endobronchial stents (18%). Current patients in the study 3 patients who have undergone biodegradeable stent placements (37.5%) show better short term outcomes as compared to metallic stents (5 patients – 62.5%)With metallic stents, 3 patients had an incidence of bronchomalacia(60%), 1 required re-stenting (20%), and 2 had persistent stenosis post removal(40%) .Biodegradable stents has so far no reports of bronchomalacia and decreases the need for an intervention to remove the stent. Strict follow up is being undertaken to study the long term outcomes of biodegradeable stents.

Conclusions

Conventional stents have been used previously which carry a risk of complications such as restenosis, bronchomalacia, erosion, fracture and granuloma formation etc. Biodegradable stents have been newly introduced which hold strength initially and degrade over months. It bypasses the issue of stent removal. Literature also states that biodegradeable stents improve dyspnoea and FEV1 post bronchial stenosis. Overall biodegradeable stents show a promising outcome, although long term follow up and prospective studies need to be undertaken to adequately compare benefits and subsequent complications as compared to conventional methods.

Location Poster Hall

Establishing a video education library for mitral valve repair: what do trainees think?

Anna Casey Brighton and Sussex Medical School, Brighton, UK

My name is Anna Casey, and I will be presenting my findings from an Independent Research Project I did in my fourth year of medical school at Brighton and Sussex Medical School. I worked with Mr Ishtiaq Ahmed, a consultant cardiothoracic surgeon at the Royal Sussex County Hospital to find out what Cardiothoracic surgical trainees (CTS Trainees) wanted from a potential new E-learning resource. I would like to thank him for his support and insight into CTS training throughout the project.

During Covid-19 we have all adjusted to new online ways of teaching and learning, and whilst there are several excellent online resources for CTS teaching, we wanted to see if trainees would benefit from something different. The potential resource would be a video library of CTS procedures, from videos taken during surgery, accompanied by commentary and annotations. This would allow trainees to refresh their practical skills and aid their learning.

There is a potential gap in the market for something like this, as there is not, to our knowledge, an E-learning resource specifically targeted at UK CTS trainees. The resources that are out there are quite general and tend towards the USA in terms of their focus, and whilst pathology is pathology, the approaches and training needs are different depending on context.

To understand what CTS trainees in the UK wanted from such a resource, I distributed questionnaires and followed these up with interviews from CTS trainees across my local region (London deanery). I asked questions about their use of E-learning materials prior to and during the pandemic, as well as the sort of things they look for in E-learning resources (for example videos, quizzes).

The trainees felt positively about the development of a new E-learning library designed for UK trainees. Their use of E-learning resources has been increasing in recent years and has been accelerated by the pandemic, however, they felt that this demand has not been matched by UK-specific resources. I asked about several features of E-learning resources, and trainees overall valued offline mobile access, explicit linkage to UK training outcomes, and self-testing ability. Mitral valve repair was a key procedure which trainees felt would be ideal for the video library format.

Limitations of our approach include the inclusion of only those trainees within the London deanery, and the resulting small participant numbers.

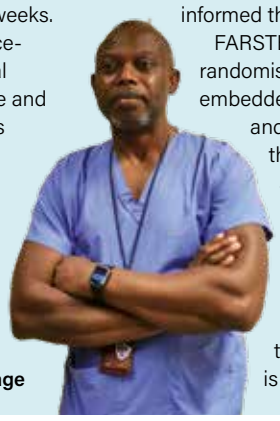
Overall, this project showed that there is the potential for a relevant and targeted E-learning resource to be created for the benefit of UK CTS trainees, in particular focussing on mitral valve repair and allowing trainees to assess themselves. The methods used could be used to assess other groups, for example CTS trainees in other areas of the UK or the world when developing new E-learning resources.

Location Exhibition Hall **Moderated Poster Session #3 [ePosters]**

Feasibility study of early outpatient review and early cardiac rehabilitation after cardiac surgery: mixed methods research design (FARSTER).

Mr Dumbor Ngaage on behalf of FARSTER investigators.

Our current practice of care for patients who have undergone cardiac surgery is to undertake the first planned outpatient review 6 weeks after hospital discharge and commence cardiac rehabilitation (CR) from 8 weeks. This practice is not evidence-based, and the long interval between hospital discharge and outpatient review increases the period of inactivity and vulnerability to surgery-related complications. Also, CR which has significant short and long-term benefits, is delayed and this may mitigate the expected benefits. We therefore conducted a preliminary prospective observational study to determine the optimal timing of the first planned outpatient review after cardiac surgery (FORCAST6), which was presented at the SCTS conference in Belfast in 2018. The findings of this study and a strong patient group involvement, informed the design FARSTER.



Dumbor Ngaage

FARSTER is small multi-centre randomised controlled trial with embedded health economic evaluation and qualitative interviews, with the main aim of establishing the acceptability and feasibility of delivering outpatient review 3 weeks following cardiac surgery and CR from 4 weeks, in order to determine whether a future large-scale trial examining effectiveness is achievable.

We recruited 50 participants between June and December 2019 at two UK Cardiac Centres (Castle Hill Hospital, Kingston-Upon-Hull and James Cook Hospital, Middlesbrough), and randomised 1:1 to Conventional pathway and Early pathway respectively.

At outpatient review post discharge, one participant was not fit for CR and another required two outpatient appointments before being declared fit for CR, both in the Conventional pathway group. All Early pathway patients were fit for CR. Those declared fit in each study group undertook supervised CR, which included individually prescribed exercises, performed at study centres once or twice a week. Incremental Shuttle Walk Test (ISWT) was performed, and EQ-5D-5L with health resource-use questionnaires were completed at the start and end of CR, and 26 weeks post-randomisation.

There were no intervention-related adverse events. The ISWT distance walked increased for both study groups. At each time point, the average distance walked was further in the Early Pathway than the Conventional group.

The mean EQ-5D-5L utility scores increased from baseline by 0.202 for Early pathway group versus 0.188 for conventional. Total costs were £1,519 for Early pathway, £2,043 for Conventional group.

A strong qualitative component including; Patient and staff interviews, patient and CR centre diaries were analysed. Many Conventional group participants felt their outpatient review and CR could have happened sooner, while Early pathway group felt the timing was right.

Even though the COVID-19 pandemic led to some alteration of the planned trial processes to facilitate the collection of outcome data (consistent with guidance published by the Society for Cardiothoracic Surgery at that time), participant retention rate at the end-of-study follow-up was 74%.

Overall, the recruitment and retention rates, and acceptability to participants and professionals of the new postoperative pathway show that a large full-scale RCT is feasible. This is now being planned and all interested surgeons and centres are invited to contact the Chief Investigator at dumbor.ngaage@nhs.net.

Funding: This study was funded by the National Institute for Health and Care Research (NIHR) under its Research for Patient Benefit (RfPB) Programme [Grant Reference Number PB-PG-0317-20047]. The views expressed are those of the author(s) and not necessarily those of the NIHR or the Department of Health and Social Care.

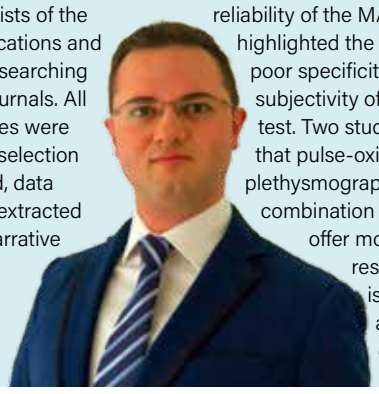
Location Poster Hall

What is the best method for radial artery assessment in patients undergoing surgical coronary revascularisation?

Vincenzo De Franco, BN(Hons), MSc Postgraduate Researcher, Surgical Care Practitioner, Royal Papworth Hospital

Accuracy and consistency of screening tests implemented for the pre-operative assessment of radial artery (RA) graft, prior to surgical coronary revascularisation, has been at the heart of debate for many years. Correct RA assessment is crucial prior to their surgical harvesting to avoid post-operative ischaemic complications. However, the absence of a universally agreed approach emphasises the lack of evidence-based practice. A systematic review was conducted with the aim of evaluating and comparing the validity and reliability of the most commonly adopted RA assessment techniques, including: modified Allen test (MAT), pulse-oximetry, plethysmography and ultrasonography. The objective of this research was identified as the need to establish the most superior RA screening test within cardiac institutions. However, this also has application to patients undergoing instrumentation of the RA for other reasons.

A systematic search was undertaken, appraising relevant primary research studies published in English language between 2010 and 2020. Five electronic databases were consulted (viz. MEDLINE, PubMed, CINHAL, Scopus and EMBASE) to access studies relating to the assessment of RAs during coronary artery bypass grafting. Additional records were identified by screening the reference lists of the selected publications and through hand searching of specialist journals. All included articles were reviewed and selection criteria applied, data findings were extracted for analysis, narrative synthesis and conclusions drawn. Critical appraisal of the included studies was performed using the modified Downs and Black checklist.



Nine studies addressing the research question were included in the review. Seven studies identified the reduced validity and/or reliability of the MAT, four of which highlighted the poor sensitivity, poor specificity and the subjectivity of the screening test. Two studies established that pulse-oximetry and plethysmography, used in combination with the MAT, offer more objective results than an isolated MAT, also impacting on sensitivity and specificity. Although results from these combination strategies are promising, further research is required to support these findings, due to the significant confounding variables identified. Ultrasonography provides important insight into the morphological and pathological characteristics (e.g. atherosclerosis and calcification) of RAs, providing an accurate and reliable anatomical RA assessment with objective and consistent results.

The systematic review suggests that ultrasonography screening is superior in RA assessment, enabling selection of RA segments with favourable morphological features, hence optimising post-operative surgical outcomes. Based on the evidence currently available, the MAT should no longer be used as a sole discriminatory test prior to harvesting, as the consensus found in this review is that an isolated MAT is insufficiently reliable for safe practice.

Further research is required to support the findings of this review. The need to create a standardised protocol which informs harvesting clinical decision is addressed. As a surgical care practitioner-researcher undertaking a doctoral academic program I am aiming to develop an evidence-based approach into the RA screening, contributing to enhance standards of care and professional role.

Location Poster Hall

Retrograde arterial perfusion is safe for Endoscopic heart valve surgery in both young and elderly patients

Hind Elhassan
Blackpool Teaching Hospital, Blackpool, UK

Minimal invasive cardiac surgery using right anterolateral thoracotomy has been widely accepted over the past decades for intracardiac procedures. It has been associated with lesser complications in terms of post-operative pain, reduced bleeding and need for transfusions, atrial fibrillation (AF), chest tube drainage, duration of ventilation, intensive care unit (ICU) stay and duration of hospitalization as well as return to normal activity. However, retrograde arterial perfusion through the femoral vessels cannulation used in minimally invasive surgery has been debatable. There have been few studies that associate the use of retrograde arterial perfusion with an increased risk of embolic stroke especially in elderly patients. These findings in the literature have motivated us in Lancashire cardiac centre to put our own experience under the microscope. A minimally invasive approach using retrograde perfusion has been introduced to Lancashire cardiac centre since 2007. We compared all patients undergone intracardiac operation using retrograde arterial perfusion from 2007-to 2021 dividing them into two groups based on their age (<70 years old and ≥70 years old). 112 patients were matched in each group according to their gender, comorbidities, the NYHA class and Logistic EuroScore. We compared the postoperative outcomes and long-term survival up to five years after the initial operation. There was no difference between the two groups in terms of postoperative outcomes. Patients ≥ 70 years old have no increased risk for neurological complications compared with those below 70 years old. Moreover, there is no difference in all postoperative complications between the two groups.

The mortality rate was also not significant between the two groups) as well as the crude survival rates for up to 3 years, but is almost significant by 5 years, where elderly patients have a mean survival of 0.29 years (around 3.5 months) lower than adult patients. Comparison beyond 5 years is unreasonable to be linked to retrograde arterial perfusion as octogenarian patients by nature has more comorbidities and are more likely to die within 10 years compared to younger adult patients.

We screen all patients for peripheral vascular disease and aortic disease through CT TAP and TOE. Where there is an occlusive disease or irregular plaques within the femoral or iliac tree is contraindication from peripheral cannulation as well as grade IV/V aortic atheroma detected by transoesophageal echocardiogram intraoperatively. While extensive calcification of the arterial tree is not a contraindication to retrograde perfusion but any occlusive disease or the presence of irregular plaques within the femoral or iliac tree are reasons to avoid peripheral cannulation. We routinely use CO2 insufflation in the surgical field during the procedure, which provides no increased risk in cerebral micro-emboli compared to conventional sternotomy

We have concluded that the use of retrograde femoral arterial perfusion in elderly patients is not associated with increased risk compared to the younger patients population for most primary cardiac valve procedures. Hence, minimally invasive approaches could be offered to elderly patients who might benefit from it.

Location Exhibition Hall **Moderated Poster Session #3 [ePosters]**

Results of surgical closure of bronchopleural fistula with vascularized tissues

Walid Hammad
MD, MRCS, MEBCTS, FRCS (c-th)

Chronic bronchopleural fistula (BPF) is a serious complication as it carries a high morbidity and mortality and is associated with prolonged hospital stay and thus high resource consumption. BPF remain a major complication after thoracic surgery. Despite the advances in technology, management guidelines being not clear, it varies between surgical correction and endobronchial interventions with varying degrees of success. Obviously, successful treatment of chronic BPF requires aggressive control of infection, adequate drainage of the chest cavity, closure of the fistula, and obliteration of the residual space. This study was carried out to assess the efficacy of surgical closure of the chronic BPF using vascularized tissue transfer into the pleural cavity. A case series of 28 patients were operated upon primarily due to chronic BPF with or without empyema. The duration of persistent air leak before surgical intervention varied significantly among our patients with a mean period of 5 ..2.12 months. The longest period of air leak in our series was 5 months continuous chest tube drainage. All patients were selected and subjected to surgical intervention using vascularized tissue transfer into the pleural cavity. Ten patients had primary pleuropulmonary disease, 17 patients had postoperative BPF, and one patient had post-traumatic air leak. The vascularized tissues had been used were: Intercostal muscle flap, Latissimus dorsi muscle, Omental flap, and Pericardial pad of fat. In patients with apico-lateral residual air space as a postoperative complication of bullectomy operation, Latissimus dorsi muscle transposition was effective. Omental flap was used to close fistulas associated with empyema and residual basal pleural space. Due to its wide availability, a vast majority of our patients, 17 patients, treated with intercostal muscle flap after sub-periosteal resection of the corresponding upper rib and cutting through the upper border of the lower rib. The difficult manipulation of the pericardial pad of fat limited it use to clean central fistulas. There was immediate or early stoppage of air leak after the intervention in most patients. One patient required negative suction for 2 days to help stoppage of the leak. No patient required instillation of sealants through the tubes. The mean hospital stay postoperatively was 4 ± 1 day. We concluded, Once the BPF has developed, early recognition, drainage of the pleural space and control of the inflammatory process are critical. In addition, surgical closure of BPFs with proper vascularized tissues is an effective technique associated with low cost and lower hospital stay.

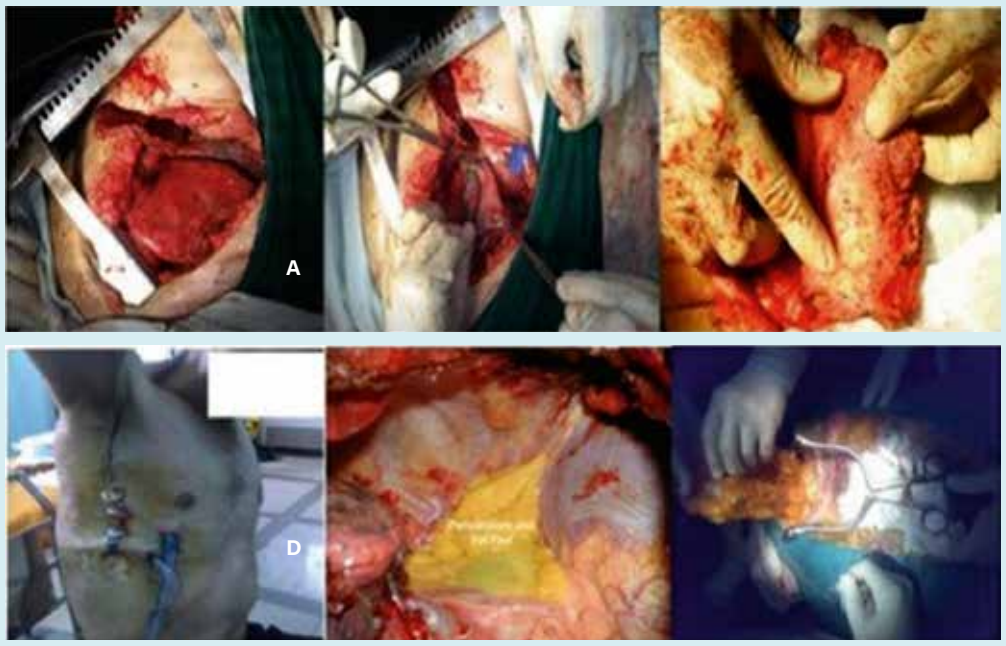


Fig. 3. (A) Pedicled intercostal muscle flap, IMF (B) ruptured pulmonary sarcoidosis cyst before closure with IMF (C) completely dissected and isolated right sided latissimus dorsi muscle, LDM, with preservation of its vascular pedicle (D) longitudinal skin incision along the anterior border of LDM (E) operative view for the anatomy of pericardial pad of fat (F) omental flap passed through the foramen of Morgagni to be directed toward the pleural cavity.

Location Poster Hall

Utilisation of National Early Warning Score and assessment of patient outcomes following cardiac surgery

Abiah Jacob
St Bartholomew's Hospital, London, UK

The National Early Warning Score (NEWS) was initially launched in 2012 by the Royal College of Physicians to detect and ensure a rapid clinical response to the deteriorating patient and to standardise triaging of patients with acute illness. The NEWS has also been endorsed as the recommended early warning system to detect acute clinical illness/deterioration due to sepsis in patients with an infection or at risk of infection, with a NEWS >5 being the recommended trigger level for an urgent clinical response, initiating Critical Care Outreach Team (CCOT) engagement. We investigated involvement of CCOT at our centre based on NEWS following cardiac surgery and subsequent patient outcomes.

1,588 patients undergoing cardiac surgery between October 2020 and October 2021 were studied. Patient characteristics and operative factors triggering CCOT review were analysed and outcomes following CCOT review and surgical team involvement were evaluated. We found that 72 of 1588 (4.53%) patients (mean age 64.9 ± 2.5 years, EuroSCORE 7.13) initiated 91 calls to CCOT following surgery. The mean NEWS score on CCOT activation was 5.78 (95% CI: 5.29-6.26), with 21/91 (23.1%) activations from patients with NEWS <5. The most common NEWS parameters contributing to activations were oxygen therapy (mean:1.76) and systolic blood pressure (mean: 1.20). 4/72 (5.56% patients suffered cardiac arrest; 4/72 (5.56%) had emergency resternotomy; the mean length of post- operative stay in our patients was 18.3 ; in-hospital mortality was 6.94% (5/72 patients) versus an in-hospital mortality of 3.89% (59/1516) among the remaining patients in whom there were no calls for CCOT review(p=0.198). CCOT activations led to 12 transfers to ITU and 18 to HDU.

We conclude that NEWS is a useful way of initiating CCOT involvement for patients with acute clinical deterioration. The early involvement of CCOT and standardised recommendations on patient management thereafter, may lead to improved patient outcomes.

Location Exhibition Hall **Moderated Poster Session #1**

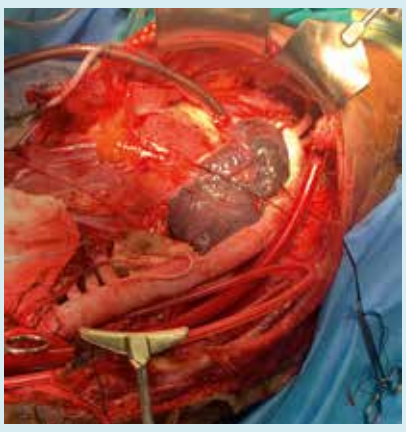
Perfusion strategies for Thoraco Abdominal Aortic Aneurysms - Our Institutional Experience

Sam Selvaraj Narayana Health, Bangalore, India

Thoraco Abdominal Aortic Aneurysm (TAAA) is rare, occurring in approximately 6-10 per every 100,000 people. But surgical correction of this pathology possesses serious complications like paraplegia and spinal cord problems. The overall 30 day mortality and paraplegia results are 8.5% and 4.2% respectively. Between Jan 2019 & Sept 2021 we have performed about 12 Hemi Arch & Thoraco Abdominal Aortic Aneurysm cases and our perfusion techniques for this type of surgery provides good clinical practice and prevents the neuro, spinal cord, gut and renal related complications. All the 12 cases are retrospectively analysed in detail for perfusion techniques, neurological outcome, renal function and the post operative outcome.

CPB established with cannulation on PA, RA and Descending Aorta or Femoral venous and Descending Aorta. The surgery was performed at 26°C and Systemic Potassium was administered into the venous reservoir to arrest the heart. Retrograde cerebral perfusion was performed through the Long Femoral venous cannula. Once the Proximal anastomosis is done under RCP, the upper body flow is established by the side arm of the anteflo graft. The abdominal vessels are perfused by Silicon catheter. The abdominal vessels and renal arteries are anastomosed one after another to the arms of coselli graft. We perfused the renal arteries with renoplegia every 10 minutes in each renal artery. Once the descending aorta is anastomosed the clamp is removed and rewarmed to 36°C. Hemostasis secured and came off CPB uneventfully.

There was no incidence of any neurological deficit in the post- operative period for all the 12 Patients. Two patients required tracheostomy in the post-operative phase. The Sr. Creatinine was in the desirable range and there was no gut ischemia in the post-operative period. Our strategic planning of perfusion techniques for the Thoraco Abdominal Aortic Aneurysm cases resulted in yielding favorable outcome.



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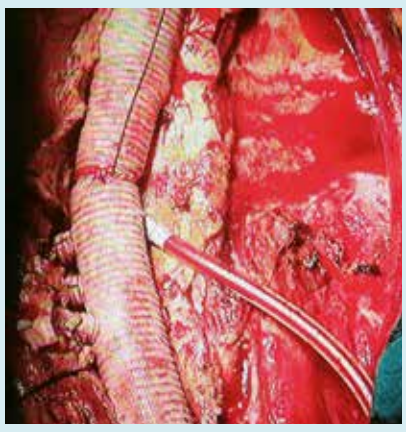

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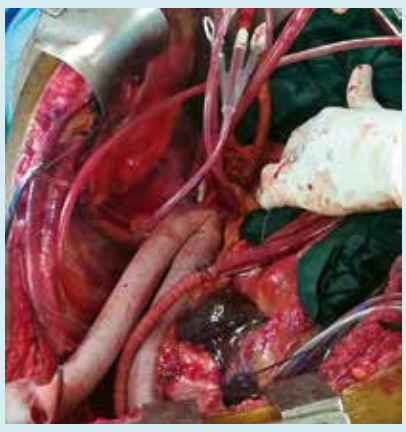

Renal Perfusion at TAAA

Location Poster Hall

Post-transplant outcomes after bridge to candidacy and heart transplantation with the Centrimag™ short-term ventricular assist device

Sef, Davorin PhD[1]; Verzelloni Sef, Alessandra[1]; Jothidasan, Anand[1]; Mohite, Prashant[2]; Raj, Binu[1]; De Robertis, Fabio PhD[1]; Stock, Ulrich PhD[1] 1 Harefield Hospital, Royal Brompton and Harefield Hospitals, Harefield, UK; 2 The Golden Jubilee National Hospital, Glasgow, UK

Heart transplantation (HTx) remains the gold standard treatment for end-stage heart failure refractory to medical treatment, but other strategies are still required due to a limited donor organ supply. A short-term mechanical circulatory support (MCS) can provide hemodynamic stabilization and potential end-organ function recovery. The role of short-term MCS as a bridge to transplant (BTT) or candidacy (BTC) remains unestablished. The CentriMag..(Levitronix LLC, Waltham, MA) ventricular assist device was used because of its ease of implantation and a considerably longer duration of support demonstrated by our group earlier (CE marked for 30-day use). The CentriMag..short-term ventricular assist device can be used as either BTT or BTC in patients with decompensated end-stage heart failure when there is a contraindication for the use of a long-term device or urgent HTx.

In this study, we analysed outcomes of patients that were bridged to either transplant or candidacy with the CentriMag..device. We described our 15-year single-centre experience of all patients successfully bridged to candidacy or HTx with the CentriMag… device due to decompensated end-stage heart failure.

A total of 29 patients (37.2±13.8 years) underwent implantation of the CentriMag™ device as a BTT (18 patients, 62%) or BTC (11 patients, 38%). The device was used for the left ventricular in 9 (31%), right ventricular in 6 (21%) and biventricular support in 14 patients (48%). Preoperatively, 4 patients (17%) were mechanically ventilated, 4 (14%) had uncertain neurological status, 9 (31%) had intra-aortic balloon pump, 26 (90%) had moderate/severe right ventricular failure, 14 (48%) had renal failure, 5 (17%) had multi-organ failure, and 6 (21%) had previous sternotomy at the time of the device implantation. 30-day mortality after implantation of the CentriMag was 7%. Mean duration of support was 38..44 days. We had no device failure One of the major findings in this study was that 30-day survival after the CentriMag..implantation was 93%, while 30-day and 1-year posttransplant survival were 90% and 83% respectively, showing that the device was effective in the resuscitation of these critically ill patients and in bridging them to either transplant or candidacy.

In conclusion, we believe that the CentriMag… device can be effective in rescuing critically ill patients who are considered unsuitable for long-term ventricular assist device or HTx. Furthermore, it can be used as either BTT or BTC with satisfactory posttransplant outcomes.

Location Exhibition Hall

Trifecta aortic valve bioprosthesis - excellent early and long-term outcomes

Mukesh Karuppannan, David Rose, Antony Walker, Amal Bose Lancashire Cardiac Centre , Blackpool Victoria Hospital, UK

The Trifecta bio-prosthesis is a bovine pericardial valve externally mounted on a titanium stent. Reports of early valve degeneration led to an evaluation of our experience with this valve and its long term outcomes.

This was a retrospective analysis of patients undergoing aortic valve replacement with the Trifecta valve between May 2011 and December 2019 at a single centre. The primary outcome was overall survival. Secondary outcomes included operative mortality and morbidity, aortic valve re-operations, and re-operation for structural valve deterioration. Echocardiographic outcomes were evaluated.

The study included 419 Trifecta valve implants (203 - first generation, 216 - GT series) . Operations included isolated AVR in 211 (50.35%) , AVR plus coronary artery bypass grafting in 165 (39.37%) , and AVR plus mitral valve operation in 43 (10.26%) . AVR by minimal access technique was employed in 53 patients (12.64%). Early mortality rate was 3.81% (n=16).Overall survival at 1 year, 5 years and 10 years were 89.03%, 77.08% and 73.51% respectively . Overall freedom from aortic valve re-operation was 98.33% and 98.1% at 5 years and 10 years respectively. There were a total of 8 re-operations (median 3.4 years,IQR 3.46) with 2 re-operations in <1 year and 6 late re-operations , giving a total 10 year re-operation rate of 1.90%. Of these, 4 were for infective endocarditis, 1 was for paravavular leak and 3 were for structural valve degeneration (mean 4.52 years).Overall mean gradients were 6.9 ± 5.2 mm Hg postoperatively and remained low at 10.5 ± 6.4 mm Hg at 1 year.

Our 10 year experience demonstrate good short and long term outcomes of the Trifecta valve prosthesis. Enhanced surveillance with annual echocardiogram will help in identification of early structural valve degeneration. Comparative studies with other tissue valves will further aid in determining the durability of Trifecta valve prosthesis

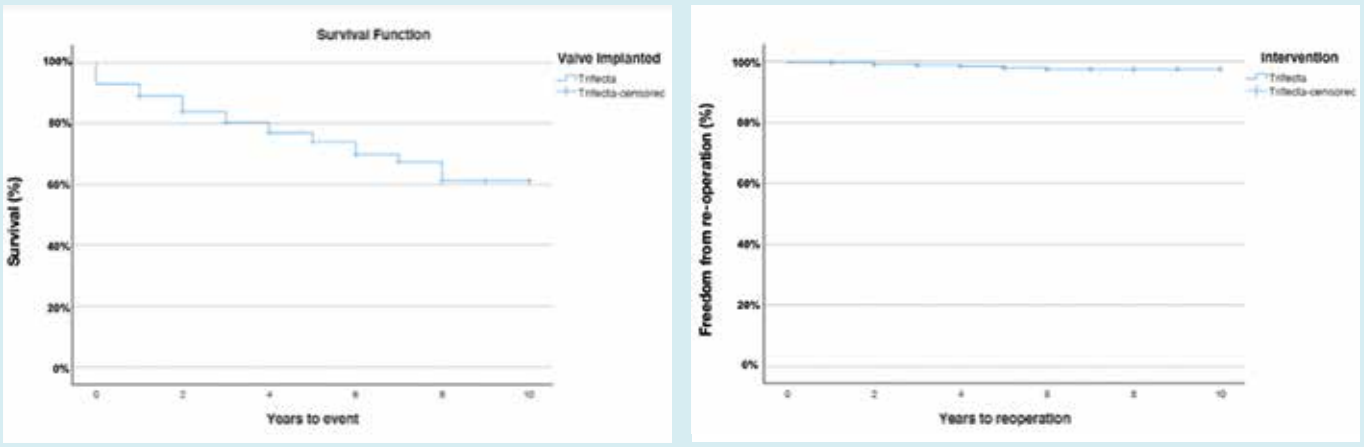

Figure 1 : Graphs showing ten year survival and reoperatio n rates in 419 patients implanted with Trifecta Aortic Bioprosthesis

Location Poster Hall

Predictors of Permanent pacemaker implantation following coronary artery bypass graft surgery, a 20 year experience of a single UK centre

Francesca Leone, Ghazi Elshafie, Mahmoud Loubani Castle Hill Hospital, Cottingham, UK

Introduction

Permanent pacemaker implantation (PPMI) is a potential complication after cardiac surgery. While coronary artery bypass graft surgery (CABG) admittedly has a lower reported incidence than valve surgery, approximately 1% of patients who undergo this operation may require PPMI[1]. Previous studies have investigated risk factors for PPMI but we wished to investigate how this translated to our centre.

Methods:

We undertook a retrospective review of all patients who underwent isolated CABG between 1999 and 2020 in the cardiothoracic surgical department of Castle Hill Hospital, Hull, United Kingdom. This is a tertiary referral centre which provides services to North Lincolnshire and Goole, East Riding of Yorkshire, York and North Yorkshire. We excluded patients with preoperative complete heart block or pacemaker in situ and identified those who had PPMI in hospital postoperatively. The data was taken from a large hospital registry. We analysed the data using IBM SPSS Statistics Version 27.

		No PPMI	PPMI	P value
Number of Patients		7881	67	
Age (mean, SD)		66 (9.1)	69 (8.7)	0.002
Male Sex		80.7%	91.0%	0.034
Extent of coronary artery disease	1x vessels >50% stenosis	3.3%	0%	0.025
	2x vessels >50% stenosis	24.4%	13.4%	
	3x vessels >50% stenosis	72.3%	86.6%	
Number of Previous MI	0	50.5%	31.3%	0.001
	1	38.4%	46.3%	
	≥2	11.1%	24.6%	
Pre-operative Heart Rhythm	Sinus Rhythm	93.0%	52.2%	<0.001
	AF/Flutter	6.3%	16.4%	
	VT/VF	0.7%	22.4%	
	Other*	0.07%	9.0%	
Unstable Angina within 30 days		25.9%	62.7%	<0.001
Post-operative MI		1.1%	10.6%	<0.001

Table 1. Patient Characteristics. VT/VF = ventricular tachycardia / fibrillation, AF = atrial fibrillation, MI = myocardial infarction

Results:

Of the total 8073 patients who underwent isolated CABG surgery during this period (Table 1), 7881 did not require PPMI after surgery. 115 were excluded due to having a pacemaker in situ before the operation and 10 due to pre-operative heart block. 67 patients (0.85%) required PPMI after surgery. Predictors for PPMI post CABG were preoperative arrythmia (p<0.001), number of previous myocardial infarction (MI) (p<0.001), post-operative MI (p<0.001), unstable angina within 30 days (p<0.001) and the extent of coronary artery disease (p=0.025).

Discussion:

Our findings demonstrate that the risk of PPMI can be predicted by several indicators of cardiac disease pre-operatively. Patient who are at high risk of PPMI post CABG are patients with preoperative arrythmia, previous MI, post-operative MI, preoperative unstable angina, and patients who present with complex coronary artery disease. We recommend that this risk should be addressed in the preoperative assessment in order to tailor the consenting process to the patient. We feel this has a potential role in developing a more patient centred approach to the consenting process and could lead to a better understanding of post-surgical risk for both clinician and patient.

The literature to date disagrees concerning whether women are at an increased risk of PPMI after CABG in comparison to males[2,3]. Of the women who underwent isolated CABG, six required PPMI (0.4%), a much lower rate in comparison to the 0.96% of the male contingent. Of the risk factors identified for PPMI there was significant difference between the male and female cohorts except in the number of previous MI. This reveals the need for further work examining the factors which govern increased risk of PPMI in women in a larger sample.

Furthermore, to date little is known about how the anatomy of the coronary arteries impacts whether a PPMI is required after CABG[4]. The impact of aberrant anatomy is a potential avenue that should be explored in future research.

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Location Exhibition Hall **Moderated Poster Session #2 [ePosters]**

The role of blood patch pleurodesis in the Covid-19 era: Lessons learned

Muslim Mustaev Guy's & St Thomas' NHS Foundation Trust, London, UK

Autologous blood patch pleurodesis (BPP) is a procedure involving a total of 50-150ml of peripheral blood injected into the chest drain. The aim of the procedure is to resolve a prolonged air leak which is defined as an air leak that lasts for more than seven days. Prolonged air leak is a recognised complication of thoracic surgery, and it has a significant impact on the patient's duration of stay at hospital. During the Covid-19 pandemic, our thoracic surgery department made a significant effort in reducing post-operative complications to reduce the hospital stay of patients. Autologous blood patch pleurodesis was one of the methods utilised to limit such complications.

In our project, we have performed a retrospective review from January through October 2021 involving 10 patients. The mean age of our patients was 66.3+/-12.3 years, six of which were males and four were females. We have taken into account numerous different factors such as air leak at the time of index operation and the date when the chest drain was removed. We have also divided our findings according to the initial indications, including pneumothorax, empyema, mediastinal lymph node dissection, lung cancer etc., and surgical approach, for example, thoracotomy, video-assisted or robotically-assisted thoracic surgery.

All analysed patients developed a prolonged air leak in the post-operative period. BPP was performed on all the patients using 50-60mL of autologous venous blood. This was performed as a once-only procedure for each patient. Our findings showed that the mean duration of the prolonged air leak was 13.6 +/- 12.3 days, ranging from 2 to 45 days. The mean period after BPP until drain removal was 5.8 +/- 5.1 days. Out of the ten patients studied, nine were discharged home uneventfully and one patient required a portable Heimlich valved drain which was removed 19 days after discharge. Our patients did not show any signs of empyema or sepsis after BPP.

We have successfully applied this method to reduce the rate of the known post-operative complication of thoracic surgery. This was particularly important during the Covid-19 pandemic as remaining in hospital for longer than average and being discharged home with an ongoing air leak comes with a risk of spreading the Covid-19 virus to healthcare workers and the community. Blood patch pleurodesis may serve as an adjunct or a valid alternative to Heimlich valve and chemical pleurodesis.

Authors of the project (left to right): Dr Patrick Hurley, Mrs Karen Harrison-Phipps, Dr Muslim Mustaev

Location Poster Hall

Audit and quality improvement project of the management of hyponatraemia in post-cardiopulmonary bypass surgical patients

Dulan Samaraweera
Royal Papworth Hospital NHS Foundation Trust, Cambridge, UK

It is common to come across patients with low serum sodium concentration, or hyponatraemia as commonly known, during routine cardiac ward rounds. Commonly, such irregularities would self-correct by the time patients are fit to be discharged, but some would continue to progress towards more pronounced hyponatraemia, with or without symptoms, making them prone to develop complications, increased hospital stays or even death.

Evidence suggests that hyponatraemia is the commonest electrolyte abnormality encountered in clinical practice. With an incidence of15-30% across all hospitalised patients, it is also a risk factor for increased length of stay and mortality in patients admitted for intensive care. Patients who have undergone cardiac surgeries are particularly prone to develop this issue due to fluid shifts associated with cardiopulmonary bypass (CPB), frequent use of diuretics and/or heart failure. Despite being a significant concern, it is commonly overlooked in a busy ward round and only comes to attention when patients develop symptoms like nausea and vomiting or more prominent ones, such as confusion and seizures.

After coming across few instances where patients with hyponatraemia were not optimally managed, we set out to find the impact of hyponatraemia (defined as serum sodium level of less than 135mmol/L) on patients undergoing cardiac surgery in Royal Papworth Hospital. We also wanted to see whether a set of interventions aiming to increase staff awareness could prevent patients from becoming adversely affected by this. In the first phase, we included all patients undergoing cardiac surgery with the use of CPB, in a single calendar month (146patients) and followed them up for 30 days. Interventions targeting the junior medical staff and nurse practitioners were carried out afterwards. They included teaching sessions and the introduction of a simplified flow chart for early recognition and management of hyponatraemia based on European endocrine society guidelines. The effectiveness of such interventions was reassessed in the second stage to complete the audit cycle, this included 123 patients.

Patients in both groups had similar characteristics with regards to risk factors and the type of surgeries they underwent.

Not surprisingly, almost 40% of the patients would develop hyponatraemia after surgery and this was common to both pre- and post-intervention groups. However, the number developing severe hyponatraemia (serum sodium level <125mmol/L) was lower for the post-intervention group, eight (5.5%) compared to one (0.8%). Symptomatic hyponatraemia was witnessed in seven (4.5%) and three (2.4%) patients in each group while complications attributable to hyponatraemia were noted in three (2.0%) and one (0.8%) patient. It was commonplace for patients to develop hyponatraemia on the third postoperative day and those with this issue would stay an extra day in the hospital (11 days vs 10 days) compared to those who would not. Female sex, advanced patient age, pre-existing renal failure and hypothyroidism also increase the risk for patients developing hyponatraemia.

With our audit, we demonstrated that hyponatraemia is a widespread observation amongst post-cardiac surgical patients. While it might not be possible to keep patients away from developing this electrolyte abnormality, increased staff awareness and timely interventions may preclude them from developing more grave consequences of hyponatraemia.

Location Poster Hall

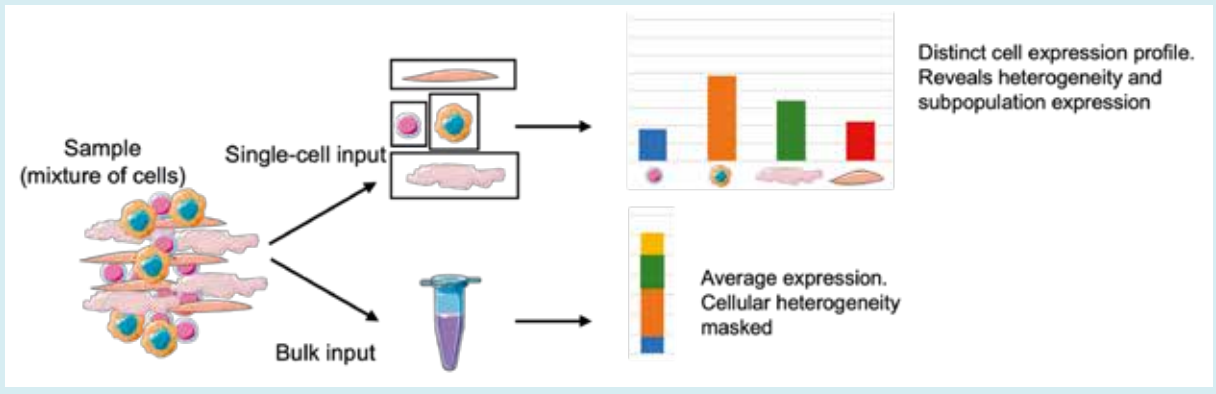
Single-cell sequencing to investigate metabolic stress in the pathology of organ injury following cardiac surgery

Sophia Sheikh
University of Leicester, UK

Organ injury and dysfunction of the heart, lungs, or kidneys are common and often life-threatening complications of cardiac surgery. Examples of how this injury can manifest include acute kidney injury (AKI), pulmonary dysfunction, and low cardiac output. Furthermore, this places great pressure on healthcare services in supporting patient recovery following cardiac surgery. Despite decades of research, effective prevention strategies for post cardiac surgery organ injury remain elusive. Annually, cardiac surgery is performed in over 35,000 UK patients and an estimated 1 million patients worldwide, with the proportion of patients at increased risk of post-surgery organ injury increasing year on year. Reducing perioperative organ injury therefore presents an ever-increasing challenge for clinicians and health services and is a clinical research priority.

Our current research is exploring the overarching hypothesis that patient's baseline status is the principal contributor to organ injury and dysfunction following surgery. Performing bulk transcriptomics and metabolomics using atrial biopsies collected from patients recruited to the Ob-CARD trial (NCT02908009) identified a potential role for cell senescence, immunosenescence, and the presence of other long-term conditions in patient susceptibility to post-surgery organ injury. Now, to explore this further, we aim to characterise transcriptomic and epigenetic profiles, but at the single-cell level using single-cell RNA sequencing (scRNA-seq) and single-nuclei ATAC sequencing (snATAC-seq) approaches, to provide us data but this time at a higher resolution. To do this, we want to explore single-cell profiles in both patient circulating leucocytes and atrial tissue, to identify any relationships between immune cell- and tissue-specific changes across our patient cohorts.

Bulk sequencing approaches are commonly used to provide an average measurement of expression across the whole sample. However, this is inadequate for inferring potential heterogeneity between individual cells or cell types within a sample and could mask the role of genes and/or cell types implicated in disease state or progression. Single-cell sequencing overcomes these limitations by providing a genomic, transcriptomic or epigenomic profile of each individual cell within a sample. In clinical samples such as atrial tissue or circulating leucocytes, where there exists a multitude of different cell types, single-cell sequencing can uncover heterogeneity between these cells and can also identify previously undetectable subpopulations of cell types which may also be associated with disease pathology.



Schematic diagram showing a summary of the data output achieved with single-cell sequencing and bulk sequencing approaches.

Our scRNA-seq and snATAC-seq data combined will identify differentially expressed genes which are epigenetically regulated. We plan to validate our findings using chromatin immunoprecipitation (ChIP) qPCR, to confirm whether our genes of interest are associated with specific histone modifications. Together, this will identify a select panel of genes that are epigenetically regulated and are potential determinants of patient outcomes following cardiac surgery. In the long-term, this work could see the development of targeted therapeutics (perhaps targeted towards epigenetic modifications) to treat or prevent the manifestation of post-surgery organ injury, and/or provide a method to better stratify patients receiving cardiac surgery.

Location Poster Hall

Modelling long-term outcomes in patients with heart failure revascularized with CABG or PCI using hospital episode statistics.

Suraj Pathak, Florence Lai, Joanne Miksza, Mark Petrie, Gavin Murphy Glenfield Hospital, Leicester, UK

Introduction

In this observational study we aimed to evaluate the optimal revascularisation strategy (CABG vs PCI) in heart failure (HF) patients with coronary artery disease (CAD). When considering revascularisation for HF patients, there is no evidence to guide the heart team as to whether coronary artery bypass grafting (CABG) or percutaneous coronary intervention (PCI) should be recommended. Most trials of PCI versus CABG have excluded patients with HF or markedly reduced LVEF (or included these patients in very small numbers). For example, the CASS trial excluded those with LVEF≤35% and included very few patients with LVEFs between 35-50%.[1] In the more contemporary SYTNAX trial, only 2% of patients had HF.[2] The primary aim of the analysis was to model the long term outcomes and evaluate treatment effects for the two interventions using Hospital Episode Statistics (HES) Admitted Patient Care (APC) data.

Data source

This study was conducted using the HES-APC dataset which captures all admissions at NHS hospitals in England. The dataset includes information on patients' demographics as well as admission and discharge information. Diagnoses are recorded using International Classification of Diseases version 10 (ICD-10) codes. Procedures are recorded using Population, Census and Surveys classification (OPCS)-4 codes. The HES-APC was linked up the national death registry which captures all deaths registered in the country.

Study Population

We included heart failure (HF) patients who underwent revascularisation (CABG was defined by OPC4 K40-K46. High Risk PCI was defined as either (1) any patient undergoing more than one PCI intervention within 90 days (OPCS4 - K49X, K50X, K75X) or (2) a patient undergoing a single high risk PCI procedure (OPCS4 - K492, K752, K754)). Heart failure was defined by a diagnosis of ICD-10 I50 within 2 years prior to the index revascularization. Trial populations can be different from study populations due to the voluntary basis of participation. To accurately emulate an actual trial population, we matched our HES derived patient cohort to the STICH trial, which targeted the same high-risk population.[3]

Outcomes and Follow-up

The primary outcome for this study was a composite of 5-year cardiovascular hospitalisation or all-cause-mortality.

Analysis

Kaplan Meier methods were used to estimate cumulative event rates. Instrumental variable analysis was used to estimate treatment effects. Sensitivity analysis using regression adjustment, propensity score matching, and meta-learners, was conducted to ensure consistency of estimated treatment effects. All methods were applied to both unmatched and matched cohorts.

Results

We identified 22,001 patients with heart failure, undergoing revascularisation with either CABG or high-risk PCI during 01/04/2009 and 01/04/2015 (Figure 1). After applying our exclusion criteria, our unmatched cohort had 13,522 patients (CABG(n) = 10,671 and PCI(n) = 2851). After matching the HES cohort to the STICH Trial patients, our final matched cohort consisted of 2,046 patients (CABG(n) = 1,174 and PCI(n) = 872) (Figure 1). This matched cohort had patient characteristics very similar to the STICH Trial (Table 1).

The primary endpoint was 5-year composite of all-cause mortality or cardiovascular hospitalisation. Analysis of 2046 patients undergoing revascularisation, demonstrated that CABG compared with PCI was associated with a low risk of the primary outcome (HR 0.74, 95%CI 0.67 to 0.82) (Figure 3). After adjusting for confounding using instrumental variable analysis, CABG remained associated with a low risk of the primary outcome (Risk difference -0.089, 95%CI: -0.109 to -0.068) (Figure 2). Other modelling methods consistently demonstrated a reduction in the risk of the primary composite outcome in patients undergoing CABG when compared to PCI, at 5yrs of follow up (Figure 2).

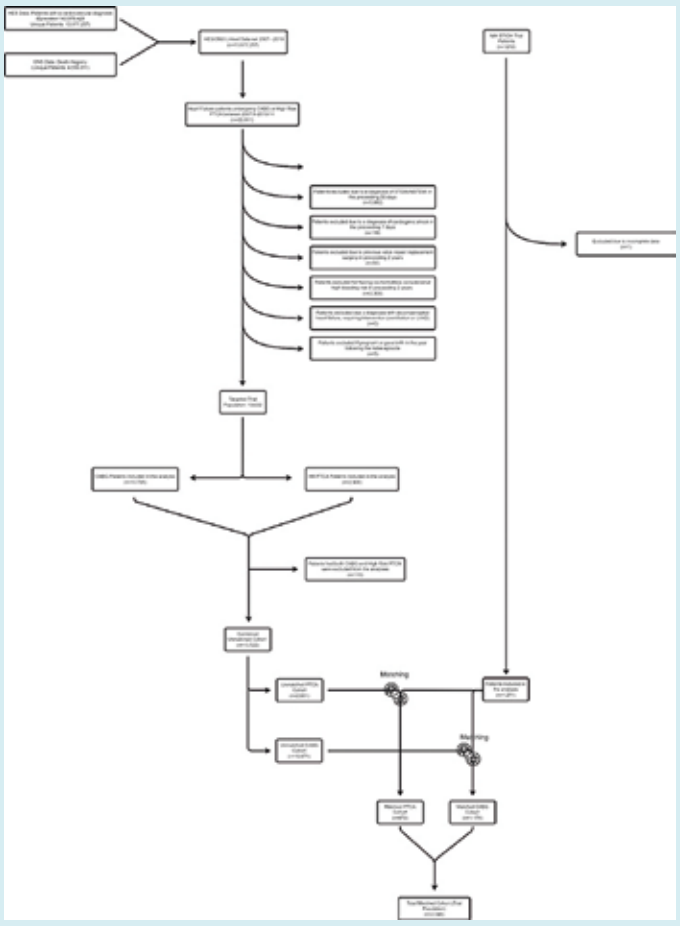


Figure 1

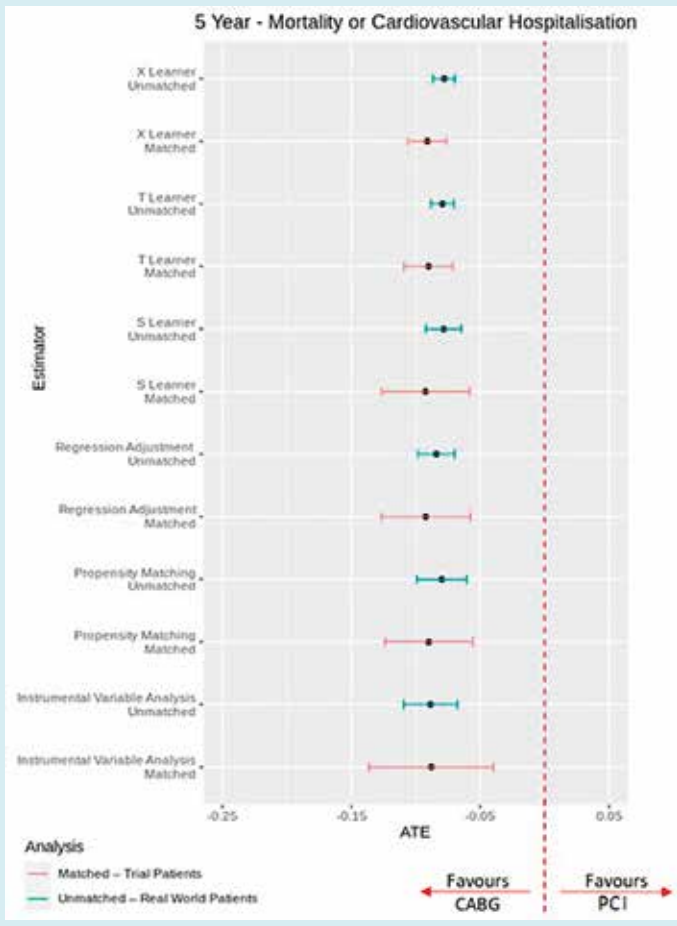


Figure 2

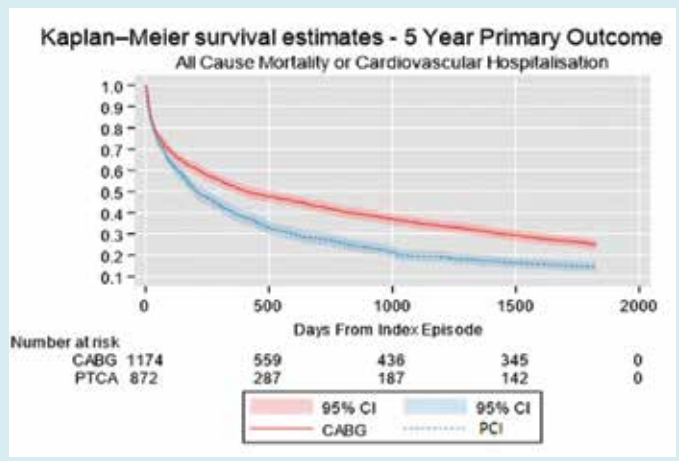


Figure 3

Table 1

	NIH STICH*	Matched HES	Unmatched HES
N	1211	2046	13522
Age, median (IQR)	60.0 (54.0, 67.0)	61.0 (54.0, 69.0)	71.0 (63.0, 77.0)
Sex, F	148 (12.2%)	292 (14.3%)	3300 (24.4%)
Diabetes	477 (39.4%)	859 (42.0%)	5072 (37.5%)
Hypertension	728 (60.1%)	1371 (67.0%)	10665 (78.9%)
Lipidaemia	729 (60.3%)	1241 (60.7%)	8314 (61.5%)
Chronic Kidney Disease	94 (7.8%)	168 (8.2%)	2844 (21.0%)
Stroke	92 (7.6%)	22 (1.1%)	289 (2.1%)
Myocardial Infarction	933 (77.0%)	1465 (71.6%)	4228 (31.3%)
Peripheral Vascular Disease	184 (15.2%)	280 (13.7%)	1559 (11.5%)

Our analyses also uniquely identified a trend in greater treatment effects being observed in the matched trial cohort, in comparison to the unmatched targeted patient cohort (Figure 2). This suggests that a future clinical trial using the same composite outcome may over-estimate treatment effects when compared to the actual treatment benefit observed in clinical practice.

The validity of our estimates are supported by the consistency of the primary analysis with the findings from 5 independent estimators (Figure 2) that were used to model the treatment effects for all primary and secondary outcomes (regression adjustment, propensity score matching, S-Learner, T-Learner and X-learner).

Conclusions

Our analyses demonstrated that CABG is associated with a greater long-term benefit in patients with coronary artery disease and ischaemic heart failure. This is consistent with previously published studies and concurs with current treatment recommendations for patients with ischemic heart failure[4-8]

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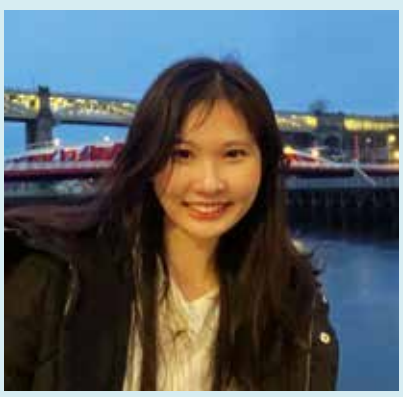
Location Poster Hall

Heart and lung transplant recipients with pre-formed antibodies to the donor can safely undergo transplant - a 10-year experience

Grace, Tsin Yan Newcastle University Medical School, Newcastle, UK



Donor-specific antibodies (DSAs) are antibodies in the transplant recipient against antigens on donor grafts. Patients usually develop DSA after sensitizing events such as pregnancy, previous blood transfusion or transplantation, The binding of DSAs to the donor antigen activates the immune response, resulting in inflammation and cell injury. Accumulation of cell damage ultimately manifests as allograft dysfunction.

DSAs present before transplantation are termed pre-formed DSAs. Historically, transplantation across existing pre-formed DSA often resulted in "hyperacute rejection" and early graft failure. Hyperacute rejection occurs in the first few minutes following transplantation, characterized by intravascular thrombosis and graft loss. Due to these poor outcomes in the presence of DSA, transplants with an organ containing antigens to which there were pre-formed DSAs were contraindicated. Patients with pre-formed DSA often had long waiting times on the transplant list with higher morbidity and mortality.

The Luminex assay, introduced more than a decade ago, allowed detection of anti-HLA antibodies in higher sensitivity and specificity and included quantification of antibodies. More patients on the transplant list were found to be "sensitized", and it became very important to find a way of safely transplanting these recipients with perhaps low antibody levels. A study, stratifying the strength of pre-formed DSA by using the mean intensity fluorescence (MFI) value reported from Luminex assay, concluded that low to medium-strength pre-formed DSAs did not negatively impact short-term survival post-lung transplantation. This prompted a change of cardiothoracic transplant policy, in 2012, allowing transplantation across low to medium strength pre-formed DSAs.

Our study examined the effects of this policy change on intermediate to long-term post-cardiothoracic outcomes. This retrospective single-center cohort study reviewed first-time adult lung and heart transplantation from 1st January 2012 to 31st May 2021. Transplantation was allowed if the patients had no DSA, only two or fewer low-strength DSAs, or only one medium-strength DSA. We continue to monitor DSA status post-transplantation. Persistent pre-formed DSA is the same pre-formed DSA that remained detected at six-months post-transplantation.

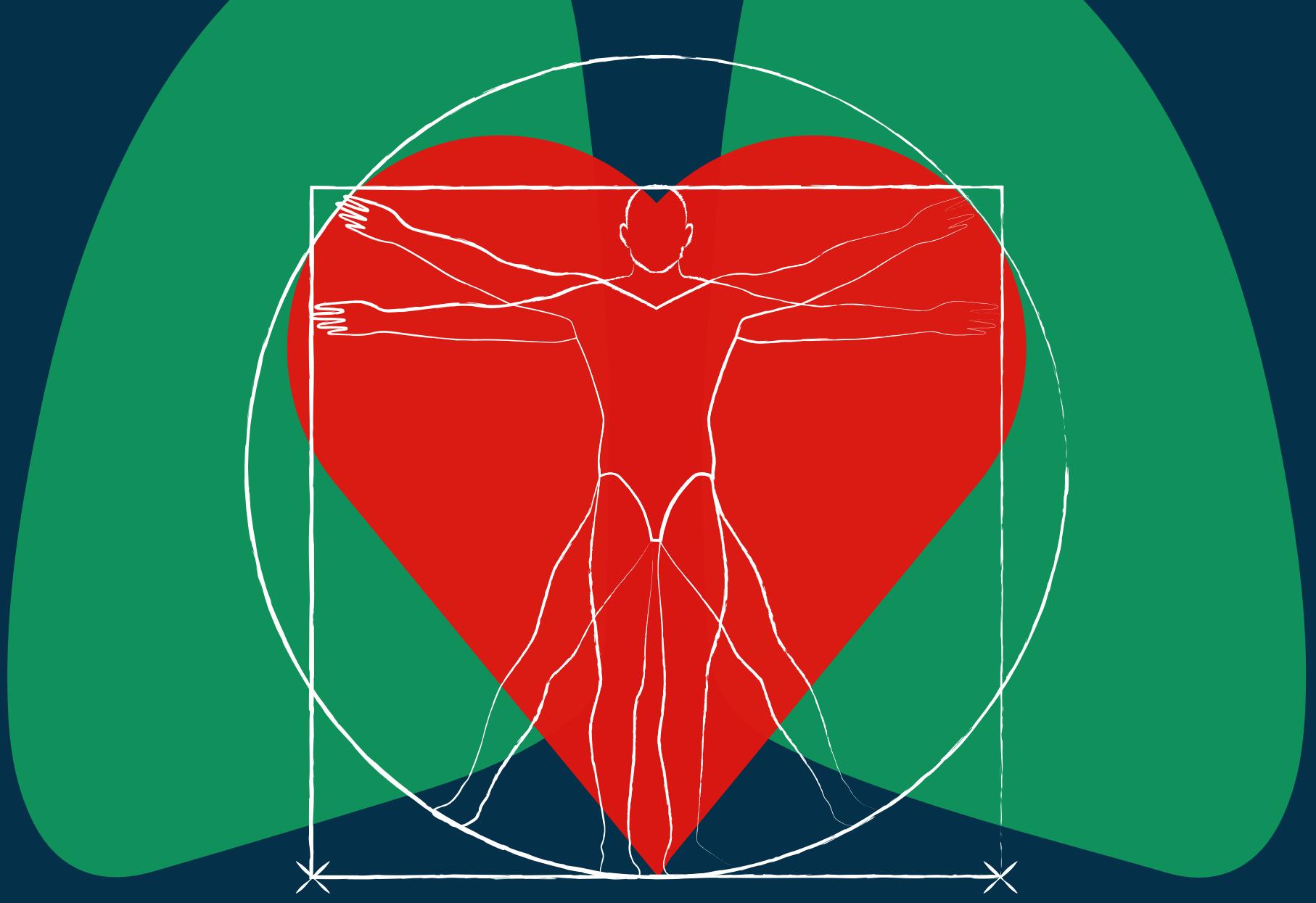
In 361 lung transplant patients, 71 patients had pre-formed DSA (20%) while 290 patients did not (80%). Survival in lung transplant patients with pre-formed DSA was better than those without preformed DSA (p=0.005). Another outcome we assessed was the freedom from bronchiolitis obliterans stage 3 (BOS3). BOS is the predominant cause of long-term mortality post-lung transplantation, resulting from chronic rejection in airways. There was no difference in freedom from BOS 3 in patients with without pre-formed DSA (p=0.554). However, persistent pre-formed DSA was associated with lower survival post-lung transplantation (p=0.003).

Next, in heart transplantation (n=177), 74 patients had pre-formed DSA (n=42%) while 103 patients did not (58%). Both pre-formed and persistent pre-formed DSA did not negatively affect survival post-transplantation (p=0.511, p=0.493).

This study concluded that cardiothoracic transplant across low and medium strength pre-formed DSA is safe and should be encouraged in sensitized patients. But *persistent* pre-formed DSAs are an important predictor of worse survival post-lung transplantation. We suggest that DSAs should be monitored to consider antibody removal treatment.

Floorplan

Company	Stand Number
3D Matrix	**25a**
3m	**25d**
Abbott	**30**
ACTSCP (Association of Cardio-Thoracic Surgical Care Practitioners)	**33**
Acumed UK	**15**
Adtec Healthcare	**18**
Anser Medical Ltd	**9**
Aortic Dissection Awareness UK	**22**
Artivion (Cryolife)	**24a&24b**
Astra Zeneca	**8**
Atricure	**23a&23c**
BD	**9a&9c**
Bowa Medical UK	**16**
British Thoracic Oncology Group (BTOG)	**24C**
BVM Medical	**17**
CalMedical	**10**
HC21 Healthcare	**6&7**
CMR Surgical	**9b&9d**
Cor Cym	**25&26**
Corza Medical	**23**
Dendrite	**23b**
Edwards Lifesciences Ltd	**1**
Emmat	**24d**
Ethicon	**32**
Ethicon Simulation Suite	**Storage**
Getinge	**25c**
Heart Valve Voice	**25b**
Intuitive Surgical	**29**
It's Interventional	**24f**
Lemon Chase	**36**
Lynton Lasers Ltd	**2**
Medela	**23d**
Medistim	**24e**
Medtronic	**31**
Meril Life	**27**
Movies and Chairs	**37, 38, 39, 40**
Pierson Surgical Ltd	**20**
Pharmapal Limited	**43**
Pulmonx	**21**
R&D Surgical	**3&4**
SCTS Podcast	**41**
SERB	**19**
Stryker	**42**
Tekno Surgical&Cardiac Services	**34&35**
Terumo Aortic&Terumo Cardiovascular	**28**
Zimmer Biomet	**5**



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