Final round of Jeopardy held today!

Don’t miss the final of the Jeopardy competition, held this morning, where finalists compete for the chance to attend the STS 2019 Annual Meeting in San Diego.

Entrances to the EACTS Cardio-Thoracic Masters Jeopardy competition were tremendous this year. Yesterday, the top four teams from the screening exam stage competed in two rounds. Federica Caldaroni and Andriy Dralov of Sapienza University of Rome, Italy were defeated by Pedro Magro and Paulo Oliveira of Hospital Santa Cruz, Lisbon, Then, Ivan Yim and Chris Blond of Queen Elizabeth Hospital Birmingham, UK, beat Jaime-Jürgen Eulert-Greth and Timo Nazari-Shafi of the Deutsches Herzzentrum Berlin, Germany. Whichever team emerges victorious in today’s final will have a unique opportunity for a fully sponsored trip, including registration, accommodation and economy travel expenses, to the STS 55th Annual Meeting (26–30 January 2019) in San Diego, California, USA. Here, they will compete against the winning North American team for the Cardiothoracic Surgery Resident Jeopardy Competition title.

Come and support your colleagues for what promises to be a thrilling competition, hosted by Pieter Kappetein, at 10:00 in Titian!

Cardiac | Focus Session | Is less more? Hybrid and minimally invasive coronary revascularisation

European surgeons needed for major international randomised controlled trial in hybrid coronary revascularisation

On Friday morning, John Puskas, Chief of Cardiac Surgery at Mount Sinai, New York, USA, gave an update on The Hybrid Coronary Revascularisation Trial, a major international randomised trial comparing hybrid coronary revascularisation (HCR) with percutaneous coronary intervention (PCI). HCR is the planned combination of surgical and percutaneous techniques in two different coronary territories both scheduled and performed within a predetermined time period in patients with multivessel artery disease. The new Hybrid trial, which is jointly led by Professor Puskas, is recruiting 2,534 patients.

“We would like to enrol another 50 [sites] in Europe. Enrolment has progressed, but not fast enough.”

John Puskas

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Cardiac | Focus Session | Is less more? Hybrid and minimally invasive coronary revascularisation

European surgeons needed for major international randomised controlled trial in hybrid coronary revascularisation

Continued from page 1

to investigate the safety and effectiveness of the procedure compared to PCI with drug eluting stents (DES) in patients with multivessel coronary artery disease (CAD) involving the left anterior descending (LAD) and or left main (LM) arteries. The trial is recruiting patients via centres in the US, plus more in Canada, Europe and Israel with the LAD distribution eligible for both HCR and PCI with DES. One group will be treated with PCI only, with stents placed in all blocked coronary arteries, while the second group with receive HCR using CABG and PCI.

Follow-up is every six months out to five years, with a primary endpoint of 5-year MACCE (all-cause mortality, MI, stroke or unplanned revascularisation).

“The trial is powered to detect superiority of HCR over PCI,” said Professor Puskas. “The sample size is large – and this is why this is an important conversation, as we need more sites to meet the enrolment goal. “Most NIH [National Institutes of Health, USA] trials are an act of devotion and love because the NIH doesn’t pay enough to enrol each patient. This trial is different. This trial you can make money on it. We are asking to do what you normally do, bill for the lab, partner with a cardiologist, identify which patients are eligible and randomise them.”

With surgeons from Germany, England, Poland, Italy and Israel already signed up, Professor Puskas stressed that surgeons needed to partner up with cardiologists at their hospital and work together. “[The trial] will need enthusiastic engagement of both cardiology PIs and cardiac surgeon PIs at each site to succeed.”

He went on to present two case reports that exemplify the types of patients that the trial is looking to recruit, and the sort of patients that hybrid therapy is routinely offered to at Mount Sinai. The first was a Jehovah’s Witness with two-vessel disease including proximal LAD stenosis, and as such there was some concern about sternotomy and standard bypass surgery. Professor Puskas underlined such a patient as the most common type of case that is offered hybrid treatment.

The second case was a 57-year-old patient with LM bifurcation and proximal LAD disease, who refused sternotomy. In most centres, said Professor Puskas, such a patient would normally be treated with multi-vessel PCI. The patient had no significant past medical history, but a strong family history of CAD in the distal and proximal LAD. He was back to work within two weeks of having the hybrid treatment.

“In his closing statements, Professor Puskas reiterated the need for more European centres to be involved in the trial:

“Presently we have 32 sites open in the US and Canada and we are working to increase these to four more sites in Canada and 12 in the US. We would like to have another 50 in Europe. Enrolment has progressed, but not fast enough.”

References
1. The Hybrid Coronary Revascularisation Trial. Available at: https://clinicaltrials.gov/ct2/show/NCT03089398
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Enhanced Recovery after Surgery explored in dedicated session on Saturday

Daniel T Engelman
University of Massachusetts-Baystate, Springfield, MA, USA

Enhanced Recovery after Surgery (ERAS®) programmes aim to reduce complications, hospital length of stay and promote an earlier return to normal activities. While ERAS initiatives are associated with a reduction in overall complications and length of stay of up to 50% and are widely utilised in many surgical specialties to reduce complications and costs, such programmes have only recently begun to be implemented in cardiac surgery.

In early 2017, a group of cardiac surgeons, anaesthetists and intensivists first met to start the Enhanced Recovery After Cardiac Surgery Society. Our mission is to optimise the perioperative care of cardiac surgical patients through collaborative discovery, analysis, expert consensus, and dissemination of best practices. Our organisation has since grown, with members joining from all over the globe. We have also been welcomed by the International ERAS Society® as the official representatives for our specialty. ERAS Cardiac Surgery has been granted the distinct privilege of proposing which hospital(s) should be appointed as ERAS® Centers of Excellence in Cardiac Surgery.

We have recently completed the first-ever set of ERAS Consensus Recommendations for cardiac surgery. The consensus was expressed in terms of class of recommendation (COR) and level of evidence (LOE) on 23 subjects and is presented in the review by the enhanced recovery after surgery (ERAS®) Cardiac Society. Based on the evidence available for each element of the perioperative care pathway, we produced a comprehensive consensus review, along with our clinical perspectives and recommendations for cardiac care that can be considered for institutional ERAS pathways in patients undergoing heart surgery. The manuscript is presently being reviewed for publication.

The design and implementation of an enhanced recovery after cardiac surgery programme presents a host of challenges unique to the field. Implementation involves a team with designated champions from cardiothoracic surgery, cardiac anaesthesia, intensive care, pharmacy, physical therapy, respiratory therapy, advanced practice and nursing. Buy-in from the individual care units (outpatient, OR, ICU, and step-down) is essential.

Future areas that will require development include: post-discharge monitoring and management; development of cardiac surgical subspecialty pathways; development and validation of non-traditional metrics and maximisation of the use of database and registry reporting. The cardiac surgical team is under increasing pressure to reduce complications and costs, while providing the best possible patient experience. A well-designed and implemented ERAS cardiac programme can assist in achieving such goals. However, it requires the combined efforts of perioperative, medical-care providers, hospital system administrators, healthcare financial administrators – and most importantly – the patients themselves.

We have presented our consensus work at major international meetings including the AATS in San Diego (USA), The STS in Washington, D.C. (USA), EACTA and ACTACC in the UK, and ERAS International in Stockholm (Sweden). Professor Marian Juhangier (St. George’s Hospital, University of London) the European Director of ERAS® Cardiac and I are delighted to have been invited to lead an ERAS symposium at the EACTS Annual Meeting in Nilan. Our next major symposium will be in Toronto, Canada at the American Association of Thoracic Surgery. The goal is to provide hospitals with better guidance for developing local protocols that are part of a continuous quality improvement (CQI) process for better patient care, as well as a reduction in postoperative complications and costs after cardiothoracic surgery (www.erascardiac.org).

References

Preliminary Experience of Trileaflet Aortic Valve Reconstruction in Children and Adolescents

Adriano Carotti, MD
Department of Pediatric Cardiology and Cardiac Surgery; Bambino Gesù Children’s Hospital and Research Institute, Rome, Italy

Certain number of children in whom successful standard aortic valve repair cannot be achieved or failed, will ultimately need aortic valve replacement. The choice of the type of heart valve is often associated with distinct clinical and technical problems owing to several anatomic, social and prosthesis-related issues. Recently, aortic valve neo-cuspidization (AV-Neo) has been gaining widespread attention: with this innovative technique aortic leaflets replacement becomes possible, regardless of patient age, annular size or previous surgeries.

In our institution, we started utilizing AV-Neo technique in mid-2016 and, to date, 14 pediatric patients (mean age 12.7 ± 3.5 years) have been operated with 0% mortality and excellent results to date. Three patients had previous aortic valve plasty and one previous aortic valve replacement with a bioprosthesis. At the time of operation median aortic annular diameter was 20 mm (range, 16-26 mm).

We believe that AV-Neo not only allows optimal natural motion of the reconstructed aortic valve, but also preserves systolic expansion of interleaflets triangles allowing for a low transvalvular pressure gradient even for small-size aortic annuli. Finally, with the AV-Neo technique, the coaptation height of the cusps is maximized (see attached picture), therefore theoretically allowing for valve competency in the case of annular growth.

We strongly believe that AV-Neo may be a good substitute for the Ross procedure or other complex aortic valve repairs even in pediatric patients and can be performed also following prosthetic valve replacement.
CABG controversies

Saturday’s Professional Challenge session on the management of patients with multi-vessel disease in the modern era sees a discussion of coronary artery bypass grafting (CABG) controversies presented by Stephen Fremes (Division of Cardiac Surgery, Schulich Heart Centre, Sunnybrook Health Sciences Centre, Toronto, Canada).

Fremes has published extensively in this area, most recently a summary of 30 years of data and debate on the use of off-pump CABG (OPCABG), as well as randomized trials on the short- and long-term results and relative benefits of bilateral internal thoracic artery grafting.

Earlier work includes a meta-analysis of six randomised controlled trials (RCTs) evidencing the superiority of radial artery grafts for CABG compared to saphenous vein grafts (with the Radial investigation 01), and a review of mechanisms and consequences of coronary graft failure as part of the ATLANTIC (Arterial Grafting International Consortium) Alliance.

Speaking to EACTS Daily News, Dr Fremes relayed his thoughts on three areas of contemporary debate in CABG, including OPCABG, the “no-touch” aortic technique and graft flow assessment.

The supposed benefits of OPCABG, he explained, were reaoned to be due to its avoidance of cardiopulmonary bypass and minimisation of aortic manipulation. “It makes sense that a less invasive approach is associated with less risk and potentially better outcomes. It is also more intuitive sense that it would be associated with less stroke risk. However, it is a more difficult procedure.

“The initially performed RCTs basically did not show a benefit, or showed harm. If you look at the largest meta-analyses, the message is that there may be some short term benefit, but typically there is long term harm.”

As well as operator experience, whether or not complete revascularisation is achieved plays a role in outcomes, explained Dr Fremes. OPCABG faces the challenge of difficult access to certain vessels, which again relates to surgeon experience. “Those two are tied together,” commented Dr Fremes.

“The other thing that is tied together is the concept of conversion: the outcome can be fairly good, but if the patient is unstable when you convert emergently to cardiopulmonary bypass, then the outcome is worse.”

Dr Fremes then spoke of one of the crucial developments in surgical strategy, the no-touch aortic technique. This is particularly relevant to comparative study of OPCABG versus on-pump CABG (ONCABG), given that the vast majority of CABG procedures have included some degree of aortic manipulation.

“The ‘no-touch’ aortic technique is one of the associated surgical strategies which is getting more traction lately,” noted Dr Fremes. “In OPCABG, you usually put a partial clamp on the aorta to the proximal anastomosis. That is associated with a stroke risk not substantially different from the stroke risk of conventional CABG.

“On the other hand, if you rely on both internal thoracic arteries, and either in addition use a gastroepiploic or another graft as a composite, and do not manipulate the aorta at all, then there is support for this in terms of reducing stroke. This is a message I will emphasise – although I don’t say I do it routinely myself.”

Casting a wider net in coronary revascularisation to include perinontaneous approaches, he continued: “When you look at everything, comparing angioscopy and coronary bypass, a couple of things are very consistent. One is that repeat revascularisation is more frequent with a graft that is greater with angioscopy, and stroke is greater in surgery. In people who have more complex comorbidities, results are better with surgery.

“But stroke is a penalty that people pay for having bypass surgery. And as patients get older in their 70s and 80s, abnormal aortas are much more common now than when I started as a heart surgeon. So avoidance of aortic manipulation is a recognition of aortic disease.”

While long-term graft failure has been associated with intimal hyperplasia and progression of atherosclerosis, short term failure is more commonly associated with technical problems, demonstrating the importance of graft evaluation.

A recent review by Kieser and Taggart [2018] argues in favour of the use of intraoperative graft assessment as the standard of care.

The authors note the value of transit time flow measurement (TTFM) to assess the function of a bypass graft, and of epicardial ultrasound (ECUS) in the structural assessment of proximal and distal anastomoses as well as graft bodies, native coronary circulation and ascending aorta for non-palpable atherosclerosis.

Understanding the importance of intraoperative flow measurement, Dr Fremes said: “There are a certain number of people, maybe 1-5%, who will have a graft that is poorly functioning when they leave the operating room. If you look at them otherwise – with ECG, echo or haemodynamically – this may not be evident. It’s only if you do an angiogram, or one of the other graft assessments, that you will see it. And it may not be the anastomosis itself; it may be the line of the graft, a dip on the graft, or a haematoma.”

A particular issue, he continued, is soft plaque, which may not make itself known either in preoperative CT or in manual palpation – and pose more of a stroke risk than calcific plaque. “You can do transoesophageal echo,” he said, “Which is standardised in many places, but that doesn’t usually visualise the ascending aorta where we manipulate – usually just the root, the arch and the descending. But you can use an imaging probe.”

Alongside TTFM is another non-invasive imaging modality, intraoperative fluorescence coronary angiography, using indocyanine green dye (ICG). Although not commonly used, noted Dr Fremes, recent acquisition of a new technology by Stylar (USA) may see it adopted more in the future.

This technique was recently reviewed, alongside TTFM, by Ohmes et al., who noted that despite several promising studies, the use of ICG intraoperatively in determining coronary bypass patency has not been definitively proven.

In his concluding remarks, Dr Fremes commented on the growing importance of recent developments in technologies and techniques that seek to bridge therapeutic gaps in coronary artery disease treatment. With the proviso that “minimally invasive” and “hybrid” are each umbrella terms, he said: “Hybrid certainly means doing either surgical first and PCI second – usually involving a single arterial graft to the left anterior descending (LAD) artery and achieves complete revascularisation, which is typically associated with very rapid recovery. On the other hand, it does achieve the no-touch aortic technique, so it should be associated with less stroke risk.

“There is an NIH-funded trial organised through CTSSnet that is ongoing in North America but I understand that European centres will be included. It originally was described as a minimally invasive direct coronary artery bypass (or robotic) type operation followed by multivessel PCI. But because of slower than anticipated recruitment, allowance of more invasive invasions has been considered for CABG.”

This prospective, multi-centre randomised hybrid coronary revascularization trial compares the effectiveness of hybrid coronary revascularization against multivessel PCI with metallic drug-eluting stent in patients with multi-vessel coronary artery disease involving the LAD or left main territories trial. It commenced last year with a planned enrolment of 2354 patients. It is estimated to complete in 2024.”

The session ‘Managing patients with multi-vessel disease in the modern era’ takes place this morning from 8:15 to 11:30 in the Auditorium.

Stephen Fremes

References


Multivessel disease in the modern era: what is the role of medical therapy?

Filippo Crea

The distinction between coronary stenosis and microvascular angina (the latter a possible underlying cause of persistent angina), as well as the role of medical and percutaneous revascularisation. Medical therapy has advanced considerably in recent decades alongside forward leaps in both surgical and percutaneous intervention in CAD. In a recent meta-analysis, Khan et al. (2018) acknowledge the controversy surrounding the question of intervention versus medical therapy in stable CAD, while finding no benefit of intervention in revascularisation and medical treatment. The authors detail structural and functional causes of post-PCI angina, as well as a diagnostic and treatment algorithm. Structural causes are given to include stent-related issues, diffuse atherosclerosis or progression of disease in nearby vessel segments, and the presence of myocardial bridges. Functional causes include epicardial vasospasm, coronary microvascular dysfunction and stent-related mechanical stretching of vessel walls.

“Risk factor control after revascularisation, for some reason, tends to be suboptimal.”

Filippo Crea

References
When CONNECT was launched, many perfusionists hailed it as major technological breakthrough, helping to optimize their clinical efficiency and allowing them more time to concentrate on their patient and circuit. CONNECT also improves workflow, minimizes transcription errors and creates a complete electronic record for each case that can be used for statistical and inventory analysis, the generation of reports and to print complete electronic medical records when needed.

By collecting electronic data from a variety of patient monitors, blood gas devices, ACT meters, cerebral oximetry devices and more, everything the perfusionist need is available on one screen. They could view, in near real-time, data and patient parameters based on their personal preferences, numbers, graphs or charts. It also gave them complete documentation of every case.

Today, a new and powerful option is available for use with CONNECT – HL7. The HL7 upgrade is an integrated, bidirectional communication system between CONNECT and the Electronic Medical Record (EMR) of the hospital. It further simplifies the clinical data workflow and allows the perfusionist to retrieve and share patient information to and from the EMR.

HL7 includes full customization options to fit your hospital’s specific EMR and emergency workflow parameters. It provides a powerful search engine to import patient demographic information, and automatically uploads all of the post-operative PDF patient record into the EMR. It also enables post-operative export of recorded patient data during extracorporeal circulation directly into the graphical user interface of the EMR. This results in a more seamless workflow, improved data integrity, enhanced legibility and a reduction in manual processes...all contributing to improve patient care and safety.
The implementation of new developments and the application of new techniques is challenging in cardiothoracic surgery. This is due to three major factors.

First of all, cardiothoracic surgery is characterised by a long training period tasked with training surgeons to perform the most difficult and sensitive surgical procedures, during which any imperfection of surgical technique is directly associated with serious complications. This implies that successful implementation of new techniques will depend on rigorously setting up training modules that compensate and reduce imperfections present during this learning curve.

Secondly, the success of cardiothoracic surgery is due to the consistency and superiority of conventional techniques that have been the subject of decades of scientific scrutiny, with known long-term results. This has resulted in some sort of rigidity in the cardiothoracic community, with reluctance to abandon the known for the unknown.

Thirdly, there is heterogeneity in cardiothoracic training programmes across Europe; training differs significantly among countries, rather than being a common, solid training programme with pre-set entry and exit criteria. Some programmes are totally separated from general surgery, and some exist as a sub-speciality within general surgery. Most cardiac surgeons, for example, have no basic knowledge or training in thoracoscopic/endoscopic techniques as these techniques belong to the general surgical discipline. This has resulted in genuine anxiety in embracing endoscopic techniques in cardiothoracic surgery due to the lack of basic training.

The accumulation of the above factors has resulted in serious difficulties for centres, surgeons and most importantly for the young surgeons to learn and apply the new developments.

The EACTS recognises the need for structural educational activities in minimally invasive techniques. Therefore, the MITACS course was founded seven years ago and has been one of the most popular courses of the Association. MITACS is a comprehensive compendium of the contemporary minimally invasive techniques in adult cardiac surgery. The focus of the course is on technical aspects of different minimally invasive procedures. MITACS is designed to provide the participants with a platform and a basis for the newest techniques in adult cardiac surgery. The course lasts three days and is composed of seven parts, each dedicated to specific technique. To emphasise the success of the team-work approach, surgeons, cardiologists, perfusionists and anaesthesiologists contribute through presentations and live cases in order to demonstrate the technical aspects of these new procedures.

This year, MITACS was organised at Maastricht University Medical Center, Maastricht, the Netherlands. The theme of this year’s course was a “dedicated team-work approach”, as the success of minimally invasive techniques is very dependent on multidisciplinary teams working together to enhance the quality of care. There were 148 participants from 41 countries, some travelling from distant continents to attend the course. This year we had 10 live cases broadcasted in 2D and 3D.

Very unique for this year’s course was the pre-operative planning of live cases in 3D, with interactive 3D reconstructions. Endoscopic mitral repair cases were planned with 3D printed pathological valves and were simulated live during the cases. In addition, we used the high-fidelity mitral simulator to let a voluntary participant do the same repair in the lecture room.

MITACS 2018 was a great success and we are looking forward to the exciting programme in 2019.

Acknowledgements: The organisation of this Course would have been impossible without the help of many people involved. I would like to thank the organising committee, the EACTS Office, MIMC, MECC, EMTRAC, invited faculty, the participants, the sponsors and the patients operated on during the live procedures for their support, help and participation.

MITACS 2018 Course Directors: Peyman Sardari Nia, Volkmar Falk and Thomas Walther
**APERITIVO**
It would be almost impossible to soak up the delights of Milan without aperitivo time. Locals relish in a delightful custom of loading up a plate of nibbles to enjoy with good conversation and the clinking of glasses.

**BAR BASSO**
If you want to start right at the top, you can't go wrong at Bar Basso: this is the place that first introduced aperitivo to Milan. Inside you'll get a whiff of nostalgia as the smartly-dressed bartenders knock-up Negroni Sbagliato under crystal chandeliers. The drink itself comes highly recommended, not only for its care and attention (expect hand-cut ice), but because it has its own, huge goblet known as Colossus.

**STRAF BAR**
Situated right next to the Duomo, Straf Bar looks like a tiny art gallery filled with a fashion-savvy, young and hip crowd. But in truth the place is casual and inviting, so grab a plate and enjoy some delicious aperitivo on the cosy red sofas.

**MAG CAFÉ**
Down in the trendy Navigli canal district you'll find this quirky cocktail bar dressed like Midnight in Paris. Get there early and grab a seat on the terrace for the best views, before tucking in to 1920s-style cocktails and tasty plates.

**ALTERNATIVELY**

**DEUS CAFÉ**
Want to drink like a biker? Head here and you will be greeted with a world of motorcycles, bikes and – even more strange – surfboards. A bar, a shop and a workshop, don't worry you can still enjoy a fantastic range of drinks and finger foods in true aperitivo fashion.

**RADETZKY CAFÉ**
Go celebrity spotting at the Radetzky Café – it's not unusual for one or two pop in and take a pew in the inside-outside seating area sprawling onto the street. This place is a statement, so make yours with a choice of punchy aperitivo staples (e.g. Negronis, gin lemons) and salted snacks.

**DRY**
It's been said that the crafted cocktails and pizzas here are so good that they each should have their own dedicated venue, but in reality Dry wants to impress you all under one roof. Try the calzone packed with stewed onions, bakes olives and anchovy butter, or pick up some smaller plates.
### Cardiac | Abstract | Ventricular assist device therapy: Problem or solution

**Impella 5.0 therapy as a bridge-to-decision option for patients with unclear neurological outcome on extracorporeal life support therapy**

**Alexander M. Bernhardt**
Department of Cardiovascular Surgery, University Heart Center Hamburg, Germany

Peripheral vaso-arterial extracorporeal life support (ECLS) might improve survival in patients with severe cardiogenic shock. However, ECLS is associated with a high rate of complications, especially with prolonged therapy, an in particular, ECLS leads to an increase in left ventricular (LV) unloading. Impella 5.0 (Abiomed, USA) – a microaxial, catheter-based, transaortic left ventricular assist device (LVAD) – seems to be a less invasive alternative with equivalent haemodynamic support of right ventricular and pulmonary function allowing switching from ECLS to LV support only.

Importantly, patients with unclear neurologic status on ECLS frequently pose a clinical dilemma. According to ELSO guidelines, ECLS should be discontinued if there is no hope for healthy survival. Additionally, durable left ventricular assist device (LVAD) implantation is contraindicated in patients with unclear neurologic status especially after resuscitation according to the ISHLT recommendations. However, existing between these two recommendations is a grey zone of patients with the potential for healthy survival and neurologic recovery, given appropriate time. Therefore, a bridge-to-decision option is needed which allows for adequate haemodynamic stabilisation while minimising device-related complications.

Impella 5.0 can be implanted in the femoral and axillary artery, although we prefer the axillary access to facilitate mobilisation of patients – a further advantage of the Impella 5.0 over other short-term devices. In our series, the majority of patients were mobilised to a chair, or were even able to walk around on-device. Thirty-day survival was 68.2% and, given the large number of resuscitated patients and high-risk patients with unclear prognoses on ECLS, this survival is remarkable. We included patients in our cohort study that had an unclear neurologic outcome on ECLS without further treatment options. These patients might have been those eligible to start palliative care according to above mentioned guidelines, but by applying this concept almost two thirds of patients survived with good neurologic outcomes measured by functional cerebral performance measurements. By integrating the Impella 5.0 treatment in a dedicated heart failure and mechanical circulatory support programme there is more time for patients to recover cardiac function, and assess their neurologic function, to allow further treatment options.

In conclusion, Impella 5.0 support provides a good bridge-to-decision option for patients with unclear neurologic status following ECLS implantation. Impella 5.0 therapy leads to LV unloading increasing the chance of recovery. In addition, it allows further evaluation of the neurologic situation and therapy options. About two-thirds of patients survived with good neurologic outcome.

**References**


**ECLS implanted**

**Sufficient pulmonary and RV function, severely impaired LV function**

**ECLS discontinued**

**Sufficient pulmonary and biventricular function**

**No**

**Re-Evaluation**

**Yes**

**Impella 5.0/CP**

**VAD**

**Wearing and explanation**

**FIGURE 1**: Treatment algorithm for patients on extracorporeal life support (ECLS) at the University Heart Center Hamburg, Germany. VAD = ventricular assist device.

**Takaaki Samuel, Daisuke Yoshikawa, Koichi Toda, Junyakyooyama, Kota Suzuki, Shigeru Miyagawa, Yasushi Yoshikawa, Hiroki Hata, Hiroshi Takano, Goro Matsumotoa, Osamu Monita, Taichi Sakaguchi, Hirotsugu Fukuda, OSCAR study group, and Yoshiaki Sawate**
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### Cardiac | Focus Session | Aortic valve and root infection

**Emergent valve surgery improves clinical results in patients with infective endocarditis complicated with acute cerebral infarction: Analysis using propensity score matching**

University of Tsukuba, Japan

Background

The optimal timing of valve surgery for patients with infective endocarditis (IE) with acute cerebral infarction (CI) is not known. Although some previous studies have reported that early valve surgery for IE patients within 1 or 2 weeks after CI could be performed safely, the optimal initial strategy is still not identified because of the unmatched cohorts used in these studies. Therefore, this study aimed to assess the feasibility and safety of early surgery within a few days after CI by using propensity score matching.

Methods

Between 2009 and 2017, 585 patients underwent valve surgery for active IE at 14 institutions. Among the patients, 152 had preoperative acute CI. Early surgery was defined as surgery within three days after the diagnosis of CI. Of the 152 patients, 67 underwent early valve surgery (early group), whereas 85 underwent delayed valve surgery (delayed group). Of the patients, 45 in each group were extracted using propensity score matching which adjusted for age, haemodialysis, diabetes mellitus, prosthetic valve infection, presence of symptomatic heart failure, ejection fraction, Staphylococcus aureus infection, disseminated intravascular coagulation, modified Rankin scale (mRS) score, and presence of neurological symptoms. The primary outcome was in-hospital death after valve surgery, and secondary outcomes were neurological. We compared the clinical results of these matched patients.

**Results**

Hospital mortality was lower in the early group (2% vs 16%, p = 0.058). The rate of postoperative intracranial haemorrhage in the early and delayed groups were 4% in both cases, the positive mRS score was not significantly different (early group: 1.1 ± 1.7, delayed group: 1.0 ± 1.8), and neurological deterioration did not differ significantly either. The survival rates at the first discharge at 1, 2, and 3 years after valve operation were 100%, 97%, and 97% in the early group and 91%, 83%, and 60% in the delayed group, respectively (p = 0.029).

**Conclusion**

Early valve surgery for IE within three days after CI improved clinical results without increasing the incidence of postoperative neurological complications.
Live mitral valve repair using novel non-ring annuloplasty device

A live case from the team at Hamburg University Hospital, led by operators Lenard Conradi and Yvonne Schoenberger, demonstrated a minimally invasive repair of mitral valve prolapse using a novel, non-ring annuloplasty device and novel venous drainage canula with concomitant cryoablation and left atrial appendage closure. The patient was male, 86 years of age, of normal build (BMI 22.8 kg/m2) but highly symptomatic, taling within NYHA functional class III and experiencing syncope with a logistic EuroSCORE II of 8.5% and STS PROM score of 6.8%. He presented with severe eccentric mitral regurgitation with flail of the posterior mitral leaflet (P2) along with two ruptured chordae. Left ventricular ejection fraction was preserved at 59%. Three-vessel disease, treated by PCI of the left main, left anterior descending and coronary arteries in September 2018 was preceded by PCI of the right coronary artery in May 2018. The case showed a catheter extendable silicone-nitinol bridge, designed by Heart Repair Technologies, USA) annuloplasty device, a dynamic curved silicone-nitinol bridge, designed and customised by AtriCure, USA) for left atrial appendage closure.

The case showcased the use of the smart canula (Smartcanula LLC, Switzerland) for stenting the inferior vena cava, as well as the AtriClip PRO (AtriCure, USA) for left atrial appendage closure.

Central to the procedure was the Mitral Bridge (Heart Repair Technologies, USA) annuloplasty device, a dynamic curved silicone-nitinol bridge, designed to reduce or eliminate mitral regurgitation while preserving leaflet function and architecture. The bridge includes a suturing pad, sutured between A2 and P2 at the annular level. It is designed to reduce septo-lateral diameter and to maintain leaflet coaptation without rigidification of the complete annulus. The device received CE mark in 2017, and is currently enrolling for post-market study in five European centres. The procedure was accompanied by discussion including panel members and audience. Responding to a question by moderator Joerg Kempfert (Berlin, Germany) as to what advantages the Mitral Bridge held over a standard ring, Dr Conradi responded: “The standard ring would absolutely be the alternative here. The main reason for [the Mitral Bridge] is that this patient has a severe aggressive lung adhesion which I had to free up very carefully. Of course, the Physio ring (Edwards Lifesciences, CA) would be standard of care with prolapse correction, but since we are enrolling in this study and he was eligible we included him. We wanted to show the technique. It is probably at least equivalent, and there are a couple of theoretical advantages. It does not rigidify the annulus, especially in functional mitral regurgitation. But this is an academic question. The device has a catheter extension in development, and this is very promising. The Mitral Bridge is at present ideal for a heavy patient who has severe restrictions and you would need to put in a 28 IMR [ring], and there is a certain chance of ending up with a gradient. That is something that, I think, could be avoided using the bridge technique because you are not really stenosing the annulus so much. We were looking for such a case, but the concept can still be demonstrated nicely in a case like this.”

He continued: “You also reduce the number of sutures a little bit. It is very easy to measure and to put it in – there is no big secret to it. If it really does the job the same as an annuloplasty then it may even save you a bit of time in degenerative MR cases.”

Valve flaps were connected by insertion of 12 mm neochordal loops and subsequently the Mitral Bridge was inserted. “I think what Lenard has done is good, putting in the Gore-Tex cords,” commented panel member Vineyak Bapat. “We don’t want the leaflet to smash against this bridge – that would have its own issues.”

“Discussion continued with another query from Dr Bapat: “For any mitral repair technique there is always some failure rate. What would be the plan down the line with this?”

Dr Conradi responded: “That is a good question. If it’s in there and you don’t have any bailouts...not many, at least that I can think of. That is one issue.”

Asked by a member of the audience whether systolic anterior motion would be a post-procedural risk, in comparison with the MiraClip (Abbott Laboratories, USA), Dr Conradi responded: “It is not really rigid. It has a mitral stabiliser, but it is silicone. It always depends on the leaflet pathology. Here, the IMR was not overly large, there was a large LVOT diameter. For this pathology, I would not be afraid.”

Mitral Bridge founder Valavan Subramanian (New York, USA) was also present, and commented on some of its key features: “It not only reduces the septal diameter, but because it is nitinol it moves a little bit after it is implanted. It closes the leaflets very early, just like a normal mitral valve. The intra-annular curvature does not allow the leaflet after it has closed to go to the outflow tract, so there is no LV-outflow tract as such. In degenerative mitral repair, there are two functionalities we have to correct: one is the prolapse height, and also the septal diameter.

“As far as whether the bridge can be removed, we are working on a generation two, which is a removable bridge.”

Another audience question on the thrombogenicity of the bridge was addressed by Dr Conradi, who responded noting that the CE-mark study did not demonstrate any increase. “I don’t think there was a single case, thinking about the trial data. These patients are put on coumadin for three months like after any mitral valve repair. I really don’t think there is a difference.”

Concerns were also raised regarding teaching of the Mitral Bridge, given the distribution of the Mitral Bridge across A2 and P2 segments alone, rather than the entire annulus. Asked whether he had considered this risk, Dr Conradi replied: “Yes, and that is why we put in pledges instead of non-pledged simple sutures as for regular mitral valve repair. Mechanically, you are right – you are distributing the force over two focal points only, so it could happen.”

Testing of the valve demonstrated good coaptation with no leakage, and the team concluded the procedure with exclusion of the left atrial appendage using the AtriClip device.

References
Long-term support of patients receiving a left ventricular assist system for advanced heart failure

Daniel Zimpfer
Medical College of Vienna, Austria

The HeartWare® centrifugal flow ventricular assist device system (HVAD) was first approved for treatment of advanced heart failure in 2009. The Registry to Evaluate the HeartWare Left Ventricular Assist System (ReVOLVE) was an investigator-initiated, multicentre, real-world commercial registry that collected post-CES clinical data on 254 patients implanted with the HVAD System as a bridge to transplant in the European Union and Australia. The results of the ReVOLVE study were first published in the June 2014 issue of EJCTS (Schmitto, et al.), and a follow-up analysis of long-term outcomes was published in the October 2016 issue of EACTS (Schmitto, et al.). With an increasing population of patients now on HVAD support for longer periods due to both the paucity of hearts available for transplant, as well as the increasing use of left ventricular assist devices in patients ineligible for heart transplant (destination therapy), we sought to gather extended follow-up data on those ReVOLVE patients still in support in an effort to increase the understanding of outcomes of these devices over extended periods of ventricular support. Clinical trials typically report extended survival out to two and three years, but with increasing improvements in device design and patient management, the expectation of what constitutes “long-term” support is exceeding that typical reporting timeframe. Patients in the ReVOLVE Registry were implanted with an HVAD System between February 2009 and November 2012. We collected follow-up data on survival, major adverse events, and support status through July/August 2018. Data was available on almost 70% of patients that were still on support at the time of the last analysis of data collected through early 2015. In this extended analysis, the mean time on support was just over 2.5 years, the longest of which has now exceeded nine years of support. Kaplan-Meier survival analysis revealed 51% survival through seven years of HVAD support. Twenty-one patients have exceeded seven years of support, with 18 of those still alive on support, 13 on their original HVAD pump.

In summary, this extended follow-up analysis of the ReVOLVE real-world registry demonstrates that reliable, long-term support of patients with advanced heart failure on an HVAD System is possible, with 50% survival now exceeding seven years.

Native aortic valve resection before valve replacement using a novel device: the AVATAR project

Emiliano Navarre and Parla Astari
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The calculations of the aortic valve are responsible for most of the problems during coronary valve implantations (TAVI). Several complications are described: deformation of the stent and paravalvular leaks, occlusion of coronary ostia, and embolisation of debris. The AVIARAH consortium is developing a new device to resect the aortic valve during TAVI. Our report presents the initial experience in humans with a prototype designed for a minimally invasive approach, and focuses on the feasibility and safety of the resection. The objectives were: 1) to evaluate quality of resection and quantity of resected tissues; 2) to evaluate the collateral damages on surrounding structures; 3) to evaluate the efficacy of the collection chambers. Data were prospectively collected and analysed. A single size instrument was used, with an external diameter of 22 mm, and patients were selected on the basis of their aortic diameters at the level of the sinotubular junction and the aorto-ventricular junction. From October 2015 to June 2016, 10 patients who were candidate for surgical AVR were selected to undergo to native aortic valve resection using the AVATAR device. The procedures were performed through complete or partial sternotomy. The distal part of the device includes two cones (the holding cone and the counter-cone) to hold the aortic valve during the resection and a third one (the Nitinol blade) to resect the native calcified valve (the resection cone) as shown in Figure 1. Once the aortic valve is well presented (Figure 2), the distal cone (counter-cone) is introduced through the diseased aortic valve in the LVOT. The holding cone is released, the resection is performed, and the resection cone is pushed and counter-rotated into the counter-cone. In conclusion, this new device is safe and effective when used during surgical AVR. Quality and quantity of the resected tissue are good and could reduce the complication related to the native diseased valve. Currently we are working to develop an endovascular device suitable to resect the aortic valve during TAVI.

Homografts or stentless bioprosthetic (Medtronic Freestyle™) valves in the pulmonary position: A multicentre propensity-matched long-term comparison in patients younger than 20 years of age with congenital heart disease

Supreet P. Marathe1,2, Douglas Bell3, Kim Betts,1, Sajid Sayed5, Benjamin Dunne5, Cameron Ward1,2, Chris Whight,2 Homogayu Jaljali1, Prem Venugopali1,4, David Andrews,1 Nelson Alphonso3,1
1. Queensland Paediatric Cardiac Services, Lady Cilento Children’s Hospital, Brisbane, Australia; 2. University of Queensland School of Medicine, University of Queensland, Brisbane, Australia; 3. The Prince Charles Hospital, Brisbane, Australia; 4. Department of Epidemiology, Institute for Social Science Research, University of Queensland, Brisbane, Australia; 5. Department of Cardiothoracic Surgery, Child and Adolescent Health Service, Princess Margaret Hospital, Perth, Australia

Introduction

The construction of the right ventricular outflow tract (RVOT) along with implantation or replacement of the pulmonary valve using a right ventricular (RV) pulmonary valve conduit is an important component of surgery for congenital heart disease. Though the ideal valved conduit remains elusive, a variety of options are available. The most commonly used conduits are homografts (aortic or pulmonary), bioprosthetic valves, bovine jugular vein conduits and mechanical devices. Each of these options have unique advantages and disadvantages which influences their selection.

Aims

The aim of our study was to compare the long-term performance of pulmonary homografts and Freestyle™ valves in the pulmonary position in patients younger than 20 years of age with congenital heart disease.

Methods

All patients up to 20 years of age years at the time of pulmonary valve replacement between 2000 and 2017 were included retrospectively from hospital databases in three congenital heart centres in Australia. Study patients had either a cryopreserved pulmonary homograft or a Freestyle™ valve inserted in the pulmonary position. Valve performance was evaluated using previously published criteria. The primary endpoints were freedom from reintervention (surgical or catheter-based) and structural valve degeneration (SVD; peak-pulmonary gradient ≥ 50 mmHg and/or more than moderate pulmonary regurgitation). Propensity score matching was used to balance the two treatment groups.

Results

Freedom from reintervention was 96%, 88%, and 81% at 5, 10, and 15 years respectively in the homograft cohort (n = 163) and 98%, 90%, and 81% at 5, 10, and 15 years respectively for the Freestyle™ valves (n = 52). Freedom from structural valve degeneration (SVD) was 95%, 87%, and 77% at 5, 10, and 15 years respectively for the homograft cohort and 96%, 86%, and 79% at 5, 10, and 15 years respectively for Freestyle™ valves. In the first 10 years there was no difference in outcomes (reintervention HR = 0.69 (0.20, 2.42), p = 0.562; SVD HR = 0.39 (0.34, 2.15), p = 0.869). After 10 years, Freestyle™ valves were at a higher risk of both outcomes [reintervention HR = 7.89 (2.79, 22.34), p < 0.001; SVD HR = 7.41 (2.77, 19.84), p < 0.001]. The findings were similar when analysed by implantation in the orthotopic position and in the propensity-matched groups.

Conclusion

In the propensity position in patients younger than 20 years of age with CHD, the Freestyle™ valve is a comparable alternative to pulmonary homografts up to 10 years after implantation. Beyond 10 years, the Freestyle™ valve has a higher probability of reintervention and SVD.
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Acute myocardial disease is a systemic disease: The interconnection between the heart and the brain

James T Thackeray
Hannover Medical School, Germany

Acute myocardial infarction (MI) is conventionally viewed as a disease of the cardiovascular system, as the principal damage is incurred by cardiomyocytes after ischaemia. It is increasingly evident that organ systems do not operate independently, ergo damage to one organ may have grave consequences for other disparate organs. Revascularisation of the myocardium has been highly successful to improve cardiac outcomes after MI, but enhanced acute survival has led to increased incidence of chronic heart failure and other comorbidities. Indeed, growing evidence implicates cardiovascular disease as a risk factor for cognitive impairment with a direct association between acute MI and chronic dementia.

Local inflammation and systemic immune activation can be identified early using whole body molecular imaging, which may identify risk of subsequent heart failure and progressive dementia.

To study the influence of cardiac ischaemic damage on the brain, we induced MI by coronary artery occlusion in mice, and serially assessed cardiac and neuroinflammation using non-invasive positron emission tomography (PET) of mitochondrial translocator protein (TSPO) as a marker of activated peripheral macrophages and central microglia. At one week after MI, mice exhibited increased TSPO signal in the infarct territory as defined by perfusion imaging (Figure). Immunostaining confirmed the infiltration of CD68 positive macrophages expressing TSPO in the infarct and border zone. While the PET signal was comparable to sham operated animals at four weeks after MI, TSPO upregulation in remote myocardium was evident at eight weeks, proportional to the decline of contractile function and possibly reflecting mitochondrial dysfunction in failing cardiomyocytes. Cardiac inflammation at one week post MI predicted left ventricle ejection fraction at eight weeks, reflecting the involvement of macrophages in infarct expansion and progression of heart failure.

In addition to cardiac inflammation, diffuse global neuroinflammation was identified in the same biphasic pattern: elevated at one week, returning to baseline levels at four weeks, and elevated again at eight weeks after MI (Figure). Immunohistology demonstrated the co-localisation of TSPO to CD68 positive microglia in the cerebrum. A similar biphasic pattern has been reported in the development of Alzheimer’s disease. The late neuroinflammation was inversely correlated to late ventricular ejection fraction, suggesting an interaction between cardiac function and microglial activity. This concomitant neuroinflammation was specific to myocardial damage, as when local inflammation was induced in the quadriceps muscle, brain TSPO signal did not deviate from sham levels.

The increased acute signal was also observed in the spleen and bone marrow, indicating the activation and mobilisation of peripheral leukocytes in response to cardiac ischaemia. Accordingly, myocardial ischaemia influences not only local recruitment of inflammatory and reparative cells, but also affects the activation of resident immune cells in other organs. These data show that the brain is susceptible to acute myocardial ischaemia and subsequent heart failure, and provide a foundation for therapeutic strategies to improve heart and brain outcomes following MI.

Whole body molecular imaging can provide critical insights into interactive inflammatory networks, employing systems-based multi-organ strategies to develop targeted anti-inflammatory therapies can improve cardiac and cognitive function after acute ischaemic damage.
Is there a renoprotective value to leukodepletion during heart valve surgery? An external feasibility randomised controlled trial

Espehd Khoshibin
Manchester University NHS Foundation Trust, Manchester, UK

Heart valve surgery is an independent risk factor for the development of postoperative acute kidney injury (AKI). A major mediator of inflammatory response leading to AKI following cardiac surgery is the activation of leukocytes. We evaluate the feasibility of using a leukocyte depleting filter throughout cardiopulmonary bypass (CPB) to protect against post-operative AKI.

We conducted a single-centre, double-blind, feasibility trial. This pilot study was as part of research for patient benefit funded by NIHR. Participants received either a leukodepleting filter or standard arterial filter. Patients were eligible if they underwent non-emergency single or multiple heart valve surgery, with or without a concomitant procedure. Out of 294 potentially eligible patients, 64 consecutive adult participants were randomised. Thirty-three patients received leukodepleting filters (LG-6) versus 31 standard arterial filters. The primary clinical outcome was the development of AKI within six weeks using the KDIGO criteria. Serial measures of five biomarkers of AKI were assessed. Other outcomes included length of stay (ICU/Hospital) and quality of life. We assessed recruitment rate, acceptability to patients, participation in follow-up, ease of blinded and collection of clinical outcomes, resource used data and recording of adverse events.

This ROLO trial recruited and randomised 65 participants in 15.6 months, more than half the number anticipated. However, the recruitment rate was higher than anticipated (57% achieved, 40% anticipated) indicating that the trial was acceptable to patients. Of the patients with AKI, 64%/16%, 24%/8% and 12%/5% had stage 1, 2 and 3 renal impairment, respectively. The incidence of AKI was higher in the leukodepletion filter group (44% versus 23%, risk difference 21%; 95% CI -2% to 44%). No clear association between the incidence and severity of AKI and length of stay was observed between the two groups (Figure 1).

Urinary NGAL and Alb:Cr ratio were, on average, lower in the leukodepletion group (geometric mean ratio (GMR) 0.80, 95% CI 0.54–1.18, p = 0.29 and 0.84, 95% CI 0.51–1.39, p = 0.53). Urinary RBP:Cr and KIM-1:Cr ratios were 16% higher in the leukodepletion group (GMR 1.16, 95% CI 0.80–1.69, p = 0.45 and 1.15, 95% CI 0.87–1.52, p = 0.35). Serum cystatin C varied with time but suggested a higher average value in the leukodepletion group only at 48 hours (p = 0.011). Comprehensive resource use data were collected, and <3% (219/9500) were missing. On average, health-related quality of life returned to pre-operative levels by three months.

Although this pilot study was not large enough to be definitive, it is highly likely that leukocyte depletion would reduce the incidence of acute kidney injury after heart valve surgery; in fact the opposite is more likely. The studies of biomarkers largely support this finding as there is a tendency toward tubular kidney injury and a significant glomerular insult. These findings do not support further research in the use of the LG 6 filter in this setting. Trials of similar interventions are however feasible in terms of blinding of clinical team and acceptability to the patients. Economic evaluation as part of a similar trial should not raise any concerns.

Outcomes and quality of life in Ross reoperations: would you make the same choice again?

Alessandro Varrica
Congenital Cardiac Surgery Unit, IRCCS Policlinico San Donato, Milan, Italy

Frequently a cardiac surgeon reflects, even after some time, if the choice he made during the operation is correct. Sometimes if he could, he would go back and change the decision, and the same can be true of the patient.

The Ross procedure was introduced as a long-term definitive solution for aortic pathology. Even after some time, if the choice he reflects, frequently a cardiac surgeon reflects, even after some time, if the choice he made during the operation is correct. Sometimes if he could, he would go back and change the decision, and the same can be true of the patient. Usually a cardiac surgeon reflects, and sometimes if he could, he would go back and change the decision, and the same can be true of the patient. Usually a cardiac surgeon reflects, and sometimes if he could, he would go back and change the decision, and the same can be true of the patient. Usually a cardiac surgeon reflects, and sometimes if he could, he would go back and change the decision, and the same can be true of the patient. Usually a cardiac surgeon reflects, and sometimes if he could, he would go back and change the decision, and the same can be true of the patient. Usually a cardiac surgeon reflects, and sometimes if he could, he would go back and change the decision, and the same can be true of the patient. Usually a cardiac surgeon reflects, and sometimes if he could, he would go back and change the decision, and the same can be true of the patient.

Between February 2005 and December 2016, 64 consecutive patients who had undergone a Ross intervention were referred for reoperation in our centre. Median age was 31 years (range: 2 to 52 years), 56 were male and 9 female, and median time to reoperation was 115 months (range: 5 to 271 months). SF-36 questionnaires were mailed to the patients at least six months after surgery, and the mean follow-up was 77 months (range: 6 to 164 months).

In our patient group a total of 96 procedures were performed. The autograft required reoperation in 49 patients, there were 13 aortic valve replacements, 30 aortic root replacements, 4 Wheat procedures and 2 David reimplantations. Twenty-five patients received a surgical procedure of the right outflow tract, 14 with pulmonary conduits and 11 with biological prostheses.

The mean duration of cardiopulmonary bypass and cross clamp was 142 min and 97 min respectively, and there was a mean hospitalisation time of 12 days. There was no early mortality, but one death in the long-term follow-up. One patient developed acute renal insufficiency, one left cerebellar ischaemia, one endocarditis that was medically resolved, and there were no major cerebrovascular events. The SF-36 questionnaire detected good physical parameters and high scores in 95% of patients.

Fifty-two patients undergoing the Ross operation had suitable aortic annulus dimensions adequate for a prosthetic valve. The mean age in this subgroup of patients was 21 years (range: 14–51 years); the mean time between Ross procedure and reoperation was 135 months (range: 57–271 months). We asked if, in hindsight, they would make the same choice again, and only 31% replied that they would.

In conclusion, the Ross reoperation is a safe and effective procedure with low mortality and morbidity if performed in high-quality surgical centres, and the results from long-term follow-up are good. The quality of life after reoperation remains high, but it is our duty to better explain to patients choosing the Ross procedure just what kind of disappointments they could have in the future.
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### EACTS 2018 Agenda

#### Thursday 18 October

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#### Thursday 18 October - Break

- **9:30** Teleradiology of Fallot and pulmonary atresia / ventricular septal defect: Part 1
- **9:30** Relevant factor determining outcome after cardiac surgery
- **9:30** EACTS-STS – Treatment of type B aortic dissection in the era of stent-grafting – Acute dissection
- **9:30** Expert experiences with drafting your manuscript
- **9:30** Oncology 1
- **9:30** Trachea/airway
- **9:30** New technology meets common practice – How to enhance your surgical portfolio
- **11:00** Thoracic Mixed
- **11:00** Teleradiology of Fallot & pulmonary atresia / ventricular septal defect: Part II
- **11:00** Pulmonary thrombosis and hypertension and venous complications of myocardiopathies
- **11:00** EACTS-STS – Treatment of type B aortic dissection in the era of stent-grafting – Chronic dissection
- **11:00** Insights into clinical trials
- **11:00** Time-pressured reactions to avoid casualties in type A dissections

**Lunch**

#### Thursday 18 October - Session

- **10:00** Non-oncology
- **10:00** Introduction to mitral valve repair: Wetlab
- **10:00** How to become a hybrid surgeon

**Break**

#### Thursday 18 October - Abstract

- **12:45** Transcatheter aortic valve implantation training
- **14:15** Transcatheter valve-in-valve implantation 2018
- **14:15** Think Tank on European Cardio-Thoracic Surgery Training: Next Steps?
- **14:15** Oncology 2
- **14:15** Coronary Artery Disease, Experimental Myocardial Infarction and Heart Regeneration
- **14:15** HOCEM
- **14:15** The tricuspid valve dilemma: between confluence and denuis
- **14:15** Nightmames in end stage heart failure
- **14:15** Classics and novelties in the technical aspects of coronary artery bypass grafting
- **14:15** Functional mitral valve disease
- **14:15** Atrial fibrillation surgery: room for improvement
- **14:15** Working from inside the aorta with surgical input
- **14:15** Analyzing survival and events during follow-up
- **14:15** Rapid Response – Congenital
- **14:15** Hands-on Training Atrial Fibrillation
- **14:15** A practical approach to aortic valve repair

**Break**

- **14:00** Prediction and avoidance of complications in transcather procedures
- **14:00** Nightmames in cardio-thoracic surgery (Residents)
- **14:00** Beyond conventional risk scores: Predicting mortality and serious morbidity
- **14:00** Controversies & catastrophes in adult cardiac surgery
- **14:00** Update on molecular biology in lung cancer – for surgeons
- **14:00** The host beyond valve surgery
- **14:00** Surgical videos
- **14:00** How do I start my coronary dissection? The devil is in the details
- **14:00** Minimally invasive mitral valve surgery – start up tool box
- **14:00** Optimising perioperative care in cardiac transplantation
- **14:00** Strategies to minimize end-organ damage in aortic surgery
- **14:00** EACTS/PASCaTS Joint Session

**Lunch**

#### Friday 19 October

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<td>Raphael</td>
<td>Vascular</td>
</tr>
<tr>
<td>8:15-9:30</td>
<td>Export experiences with science: starting a new project</td>
<td>Suite 5</td>
<td>General</td>
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<tr>
<td>8:15-9:30</td>
<td>Non-oncology</td>
<td>Titan</td>
<td>Thoracic</td>
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<tr>
<td>8:15-9:30</td>
<td>Introduction to mitral valve repair: Wetlab</td>
<td>EACTS Training Village</td>
<td>Adult Thoracic</td>
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<tr>
<td>8:15-9:30</td>
<td>How to become a hybrid surgeon</td>
<td>Brown 1</td>
<td>Adult</td>
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</table>

**Break**

- **10:00** Surgery for functional mitral regurgitation: potential for improvements
- **10:00** Is less more? Hybrid and minimally invasive coronary revascularisation
- **10:00** New strategies to reduce bleeding beyond probe
- **10:00** The new kid in town
- **10:00** Rare thoracic cancers (EUROCAN)
- **10:00** Work in progress
- **10:00** New data in atrial fibrillation ablation
- **10:00** Trial update – ART, IMPACT and MITRA FF & COAPT
- **10:00** Long-term outcome after surgical repair in congenital heart disease
- **10:00** Mechanical Circulatory Support (ventricular assist device)
- **10:00** Choosing the best valve sparing technique and how they compare with Bentall
- **10:00** Infections and malignancy in cardiac surgery
- **10:00** "Gut feeling": management of type A dissection while awaiting evidence. Part 2

**Break**
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Location</th>
<th>Room</th>
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<tbody>
<tr>
<td>11:45</td>
<td>The importance of simulation training for CT surgeons</td>
<td>Amber 1&amp;2 Adult</td>
<td>Cardiac</td>
</tr>
<tr>
<td>11:45</td>
<td>Work life balance/ Diversity in cardio-thoracic surgery</td>
<td>Amber 3 Adult</td>
<td>Cardiac</td>
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<tr>
<td>11:45</td>
<td>Optimizing outcomes of extracorporeal life support therapy</td>
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<td>11:45</td>
<td>TAVI registries: Outcomes, impact and access in different countries</td>
<td>Amber 5 Adult</td>
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<td>11:45</td>
<td>2018 ESC/EACTS Guidelines on myocardial revascularisation</td>
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<td>11:45</td>
<td>Regenerative medicine hypoxtia preconditioning and inflammation</td>
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<td>11:45</td>
<td>Tips and tricks to optimise your endocarditis practice</td>
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<td>Settling the on vs off pump debate</td>
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<tr>
<td>11:45</td>
<td>POC: Friend or foe</td>
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<td>11:45</td>
<td>Let the pachyderm proboscis freeze: FET experience is increasing</td>
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<tr>
<td>11:45</td>
<td>Flying over the arch with a parachute on board</td>
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<tr>
<td>11:45</td>
<td>Quality Improvement Using Data: International Experience</td>
<td>Amber 8 Adult</td>
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<tr>
<td>11:45</td>
<td>Thoracic – Featured abstracts</td>
<td>Amber 6 Thoracic</td>
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<td><strong>Lunch</strong></td>
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<tr>
<td>13:00</td>
<td>How to set up and run a ventricular assist device programme</td>
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<tr>
<td>13:00</td>
<td>Oesophagus</td>
<td>Amber 7 Thoracic</td>
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<tr>
<td>13:00</td>
<td>Nightmare cases &amp; unshiled clinical problems</td>
<td>Botticelli Congenital</td>
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<tr>
<td>13:00</td>
<td>ECMO/ECLS</td>
<td>Brown 2 Adult</td>
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<tr>
<td>13:00</td>
<td>Dusk or dawn for SAVR?</td>
<td>Michelangelo Adult</td>
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<td>13:00</td>
<td>Endovascular fix of open failure</td>
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<tr>
<td>13:00</td>
<td>Meta-analyses: breaking down Different methods</td>
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<td>13:00</td>
<td>Interventional Therapies</td>
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<tr>
<td>12:00</td>
<td>Jeopardy</td>
<td>Titan General</td>
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<td></td>
<td><strong>Rapid</strong></td>
<td></td>
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<tr>
<td>14:15</td>
<td>Teaching root repair techniques by experts</td>
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<td>14:45</td>
<td>LVAD Outpatient Management</td>
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<td>14:45</td>
<td>Rapid Fire – Congenital 2</td>
<td>Amber 4 Congenital</td>
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<td>Open access – who is paying the bill, the reader or the writer?</td>
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<tr>
<td>14:45</td>
<td>Second conduit: choices beside PITA</td>
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<tr>
<td>14:45</td>
<td>Optimised perfusion</td>
<td>Brown 2 Adult</td>
<td>Cardiac</td>
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<tr>
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<td>New solutions in mitral repair come and see</td>
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<td>14:45</td>
<td>The bigger picture – from aortic surgery towards comprehensive aortic medicine</td>
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<td>14:45</td>
<td>The propensity score: opening a black box</td>
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<tr>
<td>14:45</td>
<td>Chest Wall</td>
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<tr>
<td></td>
<td><strong>Break</strong></td>
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<tr>
<td>14:45</td>
<td>Key technical points in coronary surgery</td>
<td>Amber 1&amp;2 Adult</td>
<td>Cardiac</td>
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<td>14:30</td>
<td>Ventricular Assist Devices</td>
<td>Amber 3 Adult</td>
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<tr>
<td>14:30</td>
<td>Thymic surgery</td>
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<td>14:30</td>
<td>The role of the cardiac surgeon during lead extraction</td>
<td>Amber 5 Adult</td>
<td>Cardiac</td>
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<tr>
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<td>Enhanced recovery in thoracic surgery</td>
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<tr>
<td>14:30</td>
<td>“Cold” Topics in Heart Transplantation</td>
<td>Amber 7 Adult</td>
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<tr>
<td>14:30</td>
<td>Endocarditis: a battle in different directions</td>
<td>Amber 8 Adult</td>
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<td>Progress in TEVAR/TEVAR</td>
<td>Auditorium Adult</td>
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<tr>
<td>14:30</td>
<td>Surgical videos 2</td>
<td>Botticelli Congenital</td>
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<tr>
<td>14:30</td>
<td>Aortic valve and root infection surgery</td>
<td>Brown 1 Adult</td>
<td>Cardiac</td>
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<tr>
<td>14:30</td>
<td>Tough clinical decisions for improved sAVR therapies</td>
<td>Brown 2 Adult</td>
<td>Cardiac</td>
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<td>14:30</td>
<td>From basics to challenges in mitral valve surgery</td>
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<td>Cardiac</td>
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<td>Outside the box (Residents)</td>
<td>Michelangelo General</td>
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<td>Breaking old concepts on acute aortic dissections</td>
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<td>EACTS Aviation task force and safe surgery for safe fights</td>
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<td>14:30</td>
<td>Challenges in mitral surgery</td>
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**Saturday 20 October**

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<thead>
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<th>Time</th>
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<tr>
<td>8:15</td>
<td>Coronary</td>
<td>EACTS Training Village</td>
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<tr>
<td>8:15</td>
<td>Anatomical segmentation for myocardial infarction</td>
<td>Amber 6 Thoracic</td>
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<td>8:15</td>
<td>Managing patients with multi-vessel disease in the modern era</td>
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<tr>
<td>10:00</td>
<td>Bicuspid aortic valve repair: I do the best technique for my patient</td>
<td>Amber 1&amp;2 Adult</td>
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<tr>
<td>10:00</td>
<td>The right solution for the right ventricle</td>
<td>Amber 3 Adult</td>
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<tr>
<td>10:00</td>
<td>How to train the next generation of cardiovascular surgeons – Joint EACTS/ BSCVS</td>
<td>Amber 4 Adult</td>
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<tr>
<td>10:00</td>
<td>The cardiac surgeon and the anesthesiologist tell each other what is important to make a decision for their patient Joint Session EACTS – EACTA</td>
<td>Amber 5 Adult</td>
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<tr>
<td>10:00</td>
<td>Zooming in topics</td>
<td>Amber 7 General</td>
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<td>10:00</td>
<td>Single ventricle 2: Can we optimise univentricular palliation?</td>
<td>Botticelli Congenital</td>
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<td>10:00</td>
<td>Left atrial appendage management in the direct oral anticoagulants era</td>
<td>Brown 1 Adult</td>
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<td>10:00</td>
<td>Challenging the guidelines in thoracic aortic surgery</td>
<td>Brown 2 Vascular</td>
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<td>10:00</td>
<td>From tricuspid valve repair to transcatheter replacement options</td>
<td>Brown 3 Adult</td>
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<td>10:00</td>
<td>Emerging trends in tricuspid valve repair surgery</td>
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<tr>
<td>10:00</td>
<td>Career development</td>
<td>Suite 5 General</td>
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<tr>
<td>10:00</td>
<td>Jeopardy Final</td>
<td>Titan General</td>
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<tr>
<td>11:45</td>
<td>Presidential Address &amp; Awards</td>
<td>Auditorium General</td>
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<tr>
<td>12:45</td>
<td>Allied Health – Abstracts</td>
<td>Amber 7 General</td>
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<tr>
<td>12:45</td>
<td>Residents lunch</td>
<td>Panorama Lounge</td>
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<td>14:15</td>
<td>Surgery for ground glass opacities – a waste of time?</td>
<td>Amber 6 Thoracic</td>
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<tr>
<td>14:15</td>
<td>Allied Health – Workshop</td>
<td>Amber 7 General</td>
<td></td>
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<tr>
<td>14:15</td>
<td>Surgery in adults presenting with congenital heart disease</td>
<td>Botticelli Congenital</td>
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<td>14:15</td>
<td>Aortic arch repair - The brain in focus</td>
<td>Brown 2 Vascular</td>
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<tr>
<td>14:15</td>
<td>Optimisation of cardiac function and underlying mechanisms in cardiac surgery</td>
<td>Michelangelo Adult</td>
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<tr>
<td>14:15</td>
<td>The Lion’s den and emerging technologies in cardiac surgery</td>
<td>Auditorium Adult</td>
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<tr>
<td>14:00</td>
<td>Ross procedures (Reinforced Ross, Root or subcoronary Ross)</td>
<td>EACTS Training Village</td>
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<td>16:00</td>
<td>Film – Thoracic</td>
<td>Amber 6 Thoracic</td>
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<td>16:00</td>
<td>Thoracoscopic aorta surgery – standards and perspectives</td>
<td>Brown 2 Vascular</td>
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<tr>
<td>16:00</td>
<td>Rapid fire – Congenital 3</td>
<td>Titan Congenital</td>
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</table>
Early outcomes of transcatheter tricuspid valve-in-valve implantation: a case series

Guilherme Vietto, Leonardo Paim, Renato Souza, Joaquim Aprígio, Lucas Lacerda, Raul Arrieta, Pablo Pomerantzeff, Marcelo B. Jatene, José Honório Palma and Fabio B. Jatene Cardiovascular Surgery, Heart Institute, University of São Paulo Clinic’s Hospital, Brazil

With the remit of cardiac surgeries, isolated reoperative tricuspid valve (TV) replacement is one of the operations which carries the highest risk. In patients with structural bioprosthetic valve degeneration in the tricuspid position, valve replacement remains a major surgical intervention with considerable reported risk of morbidity and mortality. These patients usually present with complex acquired or congenital valve diseases and, often, in association with other valve disorders.

Transcatheter valve implantation has become an attractive management option for patients at prohibitive surgical risk, and is an increasingly-used technique in the treatment of failed bioprosthetic valves. We sought to evaluate our single centre’s early outcomes for transcatheter valve-in-valve (ViV) implantation in patients with degenerated bioprostheses in the tricuspid position.

We carried out a prospective study which included patients with degenerated bioprostheses in the tricuspid position, considered as high risk by our heart team, who went on to receive valve-in-valve implantation. The procedures were performed via a transjugular venous access under general anaesthesia with transoesophageal echocardiographic- and fluoroscopic guidance.

There was successful implantation in all cases, and there was no need for conversion to open surgery. There were no deaths during the study period, and all patients are currently functional class I/II (New York Heart Association). The mean transvalvular gradient decreased from 12.1 ± 4.4 mmHg to 5.7 ± 1.2 mmHg (p < 0.001) and regurgitation decreased from moderate/severe to none/mild in all patients (Table 2). Peri-procedural complications included one case of cervical haematoma and one case of severe thrombocytopenia without major bleeding.

Tricuspid valve disease is an important clinical problem. Nevertheless, it has received considerably less attention in surgical practice. Conventional surgery still remains the preferred approach for treatment of TV disease, however, this procedure carries increased morbidity and mortality. Transcatheter procedures appear to be an attractive, feasible and safe alternative to conventional surgery for high-risk/inoperable patients with TV disease. In our case series of seven consecutive patients, tricuspid ViV intervention proved to be an attractive alternative to redo conventional surgery, with clinical and haemodynamic improvement and no major complications. Further studies are now necessary to improve the level of evidence and the quality of results for tricuspid ViV implantation.

Table 1 – Patients’ baseline demographics.

<table>
<thead>
<tr>
<th>Case</th>
<th>Age (y)</th>
<th>Gender</th>
<th>NYHA class</th>
<th>Native TV pathology</th>
<th>No. Prior surgeries</th>
<th>RV dysfunction</th>
<th>EuroSCORE</th>
<th>Years since last surgery</th>
<th>Bioprosthetic TV size (mm)</th>
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<tbody>
<tr>
<td>1</td>
<td>32,4</td>
<td>M</td>
<td>II</td>
<td>EBBSTEIN</td>
<td>3</td>
<td>Moderate</td>
<td>2.07</td>
<td>14,73</td>
<td>29</td>
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<tr>
<td>2</td>
<td>21,8</td>
<td>M</td>
<td>II</td>
<td>ENDOCARDITIS</td>
<td>5</td>
<td>None</td>
<td>1.52</td>
<td>11,63</td>
<td>27</td>
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<tr>
<td>3</td>
<td>42,5</td>
<td>F</td>
<td>IV</td>
<td>EBBSTEIN</td>
<td>2</td>
<td>Severe</td>
<td>2.52</td>
<td>35,24</td>
<td>Unknown</td>
</tr>
<tr>
<td>4</td>
<td>16,3</td>
<td>M</td>
<td>III</td>
<td>T4F</td>
<td>4</td>
<td>Moderate</td>
<td>1.52</td>
<td>4,61</td>
<td>29</td>
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<tr>
<td>5</td>
<td>34,4</td>
<td>F</td>
<td>II</td>
<td>VSD+ DTL</td>
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<td>2.81</td>
<td>13,66</td>
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<tr>
<td>6</td>
<td>36,8</td>
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<td>IV</td>
<td>RHEUMATIC MITRAL AND TRICUSPID</td>
<td>4</td>
<td>Moderate</td>
<td>2,66</td>
<td>19,49</td>
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<tr>
<td>7</td>
<td>46,9</td>
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<td>14,26</td>
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Table 2 – Procedure technical and data.

<table>
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<tr>
<th>Case</th>
<th>Indication</th>
<th>Mean gradient Pre-op (mmHg)</th>
<th>Mean gradient Post-op (mmHg)</th>
<th>Regurgitation Pre-op</th>
<th>Regurgitation Post-op</th>
<th>RV dysfunction Pre-op</th>
<th>RV dysfunction Post-op</th>
<th>TV size (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>T1+T5</td>
<td>11</td>
<td>7</td>
<td>Severe</td>
<td>Mild</td>
<td>Moderate</td>
<td>None</td>
<td>26</td>
</tr>
<tr>
<td>2</td>
<td>T1+T5</td>
<td>12</td>
<td>5</td>
<td>Moderate</td>
<td>None</td>
<td>None</td>
<td>24</td>
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<tr>
<td>3</td>
<td>T1+T5</td>
<td>9</td>
<td>7</td>
<td>Severe</td>
<td>Mild</td>
<td>None</td>
<td>None</td>
<td>28</td>
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<tr>
<td>4</td>
<td>T1+T5+M5</td>
<td>19</td>
<td>7</td>
<td>Moderate</td>
<td>Mild</td>
<td>None</td>
<td>None</td>
<td>28</td>
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<tr>
<td>5</td>
<td>T1+T5</td>
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<td>Moderate</td>
<td>None</td>
<td>None</td>
<td>None</td>
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Legends: TR: Tricuspid Regurgitation; TS: Tricuspid Stenosis; MS: Mitral Stenosis; RV: Right Ventricle; mmHg: millimetres of mercury; Pre-op: Preoperative; Post-op: Postoperative; TV: Transcatheter Valve; mm: millimeters.
Terumo Aortic Symposium
The future of aortic surgery
Where is it going and who can we treat?

Saturday, 20 October • 12:45 – 14:00 • Amber Room 1&2

Chairman:  Joseph Bavaria (USA)
Speakers:  Martin Czerny (Germany), Ourania Preventza (USA), Ruggero de Paulis (Italy), Malakh Shrestha (Germany)
Panel Member:  Roberto Di Bartolomeo (Italy)

Martin Czerny:  Expanding treatment options across all zones of the aorta with the Relay® Thoracic Stent Graft: Introduction of the new low profile Relay® Pro and an update on the Relay® Branch experience

Ourania Preventza:  Thoraflex™ Hybrid: early results, 30-day data from the US IDE trial

Ruggero de Paulis:  Long term outcomes for Gelweave™ Valsalva: 15-year follow-up

Malakh Shrestha:  Patient case studies: Thoraflex™ Hybrid device sizing
Aspirin in patients undergoing major lung resections – hazardous or harmless?

Davor Stamenovic, Thomas Schneider and Antje Messerschmidt
ViDia Christian Clinics Karlsruhe, Germany

Aspirin in patients undergoing major lung resections – hazardous or harmless?

Kazuo Shimamura1, Toru Kuratani2, Keiwa Kin1, Takayuki Shijo1, Kenta Masada1, Yoshiki Sawa1
1. Department of Cardiovascular Surgery, Osaka University Graduate School of Medicine, Osaka, Japan; 2. Department of Minimally Invasive Cardiovascular Medicine, Osaka University Graduate School of Medicine, Osaka, Japan

Thoracic endovascular aortic repair (TEVAR) has emerged as an attractive, less invasive treatment option to treat aortic pathologies, however embolic stroke is an important postoperative complication. Previous reports demonstrated aortic arch atheroma was a significant risk factor, with a stroke rate of 16.7–37.0% in patients with significant aortic arch atheroma.

The present study was conducted to evaluate the effectiveness of filter devices as a technique to prevent embolic stroke in TEVAR, focusing on endovascular aortic arch repair in significant aortic arch atheroma patients.

In the present study, 22 patients (20 male, mean age, 79.0 years old, mean age, 79.0 years old, mean age, 79.0 years old) underwent endovascular aortic arch repair with protection of the supra-arch vessels using balloon catheter and filter devices. Filter devices were placed intraoperatively in selected vessels to prevent critical stroke (Figure 1). Effectiveness of stroke prevention was evaluated by a postoperative neurological examination protocol and followed by neuroimaging with CT/DWI-MRI study in case with neurological deficit. The atheroma grade of the aortic arch were III and IV in 36%, 14% and 50% of the patients, respectively, and the proximal landing zone of the stent grafts was Zone 0, 1, 2 and 3 in 12 (54.5%), 5 (22.7%), 4 (18.2%) and 1 (4.5%) patients, respectively.

In total, 37 filter devices were placed in the supra aortic vessels (5 brachiocephalic arteries, 23 carotid arteries, 5 subclavian arteries and 4 vertebral arteries). Balloon protection was used as adjunct protection in 16 vessels (16 in the left subclavian artery and 2 in the vertebral artery). Technical success was achieved in all patients, and 30-day mortality was 4.5% (1/22 cases). After extraction from the delivery sheath, the filter device and aspirated blood from the side tube of the delivery sheath from the retrieval maneuver was examined macroscopically. Large debris (> 2 mm) were captured in 7 (31.8%) of 22 cases and small or fine debris were observed in the filter or aspirated blood in 20 (90.9%) of the 22 cases. Two (9.1%) cases showed symptomatic stroke postoperatively. To the best of our knowledge, this study is the first to investigate the efficacy of filter protection in arch TEVAR for aortic arch pathologies. We concluded that hybrid endovascular aortic arch repair with an embolic protection filter device showed satisfactory early results in high-risk patients with significant aortic arch atheroma.

Fig. 1: Effectiveness of the filter device in preventing critical stroke.
Long-standing severe pulmonary regurgitation is a common cause of progressive right ventricle (RV) dilation and dysfunction after tetralogy of Fallot (TOF) repair. Pulmonary valve implantation (PVI) has been performed to improve right ventricular function and exercise capacity, prevent tachyarrhythmia and sudden cardiac death. In addition, left ventricle (LV) dysfunction is emerging as a highly important predictor of outcomes, both late after repair and after PVI.

As seen in the late follow-up of congenital heart disease patients, they may develop adaptive mechanisms that keep them “asymptomatic” despite their cardiac malfunction. Many who have had corrective surgery, even those with a highly complex disease, consider themselves “cured.” The misperception of a cure in both young adult patients with biventricular or univentricular physiology corroborates with their feeling of a few or no symptoms referred during the clinical interview. Otherwise, when submitted to a functional test, they show a lower physical capacity compared to their healthy peers. This study aimed to evaluate and compare the functional capacity and quality of life (QoL) in adolescents and adult patients with previous TOF repair and severe pulmonary valve insufficiency that underwent pulmonary valve implantation (TOF+PVI), compared to a group of Fontan patients (FG) and healthy controls (HC), and to analyse the function and volumes of both ventricles in the TOF+PVI group before and after PVI.

The cross-sectional and controlled study included 95 subjects: 31 repaired TOF patients with severe pulmonary valve regurgitation submitted to a PVI, 35 Fontan patients followed at the Pediatric and Adult Congenital Heart Disease Division, Heart Institute of the University of Sao Paulo Medical School, and 29 healthy subjects. Ventricular ejection fraction and indexed end-systolic and end-diastolic volumes were evaluated by cardiovascular magnetic resonance (CMR), the functional capacity was evaluated by cardiopulmonary exercise test on a treadmill using a ramp protocol, and the quality was assessed using the Short Form 36 questionnaire (SF-36).

We demonstrated in this study that asymptomatic patients with previous TOF repair and severe pulmonary valve insufficiency submitted to PVI have a reduced functional capacity compared to healthy subjects, and similar to patients submitted for a Fontan procedure, although with remodelling of sub-pulmonary and systemic ventricles in the mid-term after PVI (Figure 1). Besides this, good quality of life was observed among the groups in most of the domains and very similar to healthy subjects, except in physical functioning and general health. However, patients with repaired TOF submitted to PVI showed worse general health when compared to Fontan patients and the HC cohort (Figure 2).

We can infer that these differences were due to the persistent right ventricular dysfunction, despite valve implantation. Our findings suggest that the indication of pulmonary valve implantation during the follow-up of repaired TOF patients with severe pulmonary regurgitation needs revision, and there should be due consideration of the importance of preserving right ventricle function. We await data indicating early surgery can preserve RV function, as well as LV function, improving outcomes and survival.
Improving early outcomes after CABG

Thomas A. Schwann
University of Massachusetts-Baystate, Springfield, MA, USA

Improving quality in healthcare has been an aspiration of all since the time of Hippocrates, and was the impetus for the development of the Society of Thoracic Surgeons (STS) Database. Today, the database accounts for a majority of a typical cardiac surgeon’s professional activities, and comprised approximately 54% of all cardiac surgical procedures included in the 2016 STS Database. The risk-adjusted mortality for CABG has remained relatively fixed at 2% over the past decade.

CABG is a resource-intensive procedure with a price tag of $73,420, alongside substantial additional costs associated with peri-operative complications. Despite the increasing complexity of the CABG surgical repertoire available today (minimally invasive techniques, hybrid revascularisation, robotic techniques and multi-arterial bypass grafting [MAGB]), and the increasing acuity of the typical CABG patient, CABG is still regarded as a “generic” procedure that can be effectively and efficiently performed by any cardiac surgeon, rather than a surgeon specifically trained in CABG.

The mortality risk of CABG – and healthcare in general – remains several orders of magnitude higher than what has been accomplished in other high risk, high complexity fields such as commercial aviation or the nuclear power industry. Indeed, CABG carries a comparable risk to bungee jumping and alpine mountaineering.

Peter Pronovost writing in the Harvard Business Review (1) describes three Waves of Innovation important for improving patient safety, which all have clear applications to CABG surgery.

1. The first Wave of Innovation entails focused efforts in improving the technical aspects of CABG. Although cardiac surgeons have demonstrated their commitment to this endeavour via prodigious research and a robust number of publications on this subject, the mortality risk of CABG has remained unchanged. Although the relationship between surgeon CABG case volume and outcomes is complex, it has been suggested that a cardiac surgeon with a specific interest and focused training in all the emerging technical aspects of CABG may improve outcomes.

2. In two recent analyses (2,3) of multi-arterial grafting and multi-arterial bypass grafting, short- and long-term outcomes improved with increasing experience in these techniques. Improved outcomes were also reported by the University of Maryland group following the implementation of a CABG-focused surgical unit directed by a CABG specialist (4).

2. The second Wave of Innovation in patient safety relates to intra-institutional standardisation of patient care processes. In general, there is an under appreciation of the role that standardisation of care has in quality improvement efforts. This reflects the existing paradigm in cardiac surgery; i.e. that clinical success depends on a mano a mano struggle against cardiovascular pathology that is provider specific rather than institution specific. Robust, continuous quality improvement is only possible when clinicians agree to agree on institution-specific approaches to common peri-operative challenges such as post-operative myocardial ischaemia, blood conservation or management of peri-operative atrial fibrillation and cardiac arrest with the full engagement of all pertinent stakeholders that participate directly or indirectly in patient care. This facilitates engagement of staff at all levels of the organisation and permits an assessment of a specific process on clinical endpoints via measurements and their dissemination throughout an organisation of key process indicators.

3. The third Wave of Innovation in patient safety is the formation of high reliability organisations (HROs) focused on alignment between institutional administrative and clinical leadership, deriving appropriate resources to meet agreed clinical goals. Clinicians traditionally have had the least experience in this critically needed endeavour. The importance of HROs in enhancing outcomes and performance was recognised by W. Edwards Deming, an American efficiency expert, when he wrote “Eighty-five percent of the reasons for failure are deficiencies in the systems and processes rather than the employee. The role of management is to change the process rather than badgering individuals to do better.” HROs are characterised by a well-articulated mission statement throughout the organisation, a culture of safety with avoidance of harm wherever possible, and a transparent blame-free environment permitting institutional learning when harm was unavoidable, alignment and engagement of all stakeholders toward a common goal and a committed leadership to allocate appropriate resources to the clinical enterprise. HROs also recognise the emerging neuro cognitive research which finds -based on the intrinsic properties of our nervous systems – that individuals have certain cognitive biases that lead to errors and poor decision making, especially in the face of ambiguity. Baked into the very operation of HROs are tools that mitigate cognitive biases. Specific to CABG, a well-functioning Heart Team to drive optimal therapeutic decision making, the implementation of checklists into routine clinical care and the incorporation of quantitative rather than qualitative tools in optimal shared therapeutic decision making (EuroScore or the Society of Thoracic Surgeons Peri-operative Risk Models and one of the SYNTAX Scores) should be useful adjuncts in mitigating cognitive biases. In the words of W. Edwards Deming, to improve outcomes, “It is not enough to do your best; you must know what to do, and then do your best.”

Endoscopic port-access mitral valve repair drylab training using high-fidelity simulators

Peyman Sardari Nia
Maastricht University Medical Center, Maastricht, the Netherlands

Mitral valve repair is one of the most complex and difficult procedures in cardiac surgery, because of the complexity of the mitral valve and the diversity of its pathology. Performing mitral valve repair via a minimally invasive approach, whether endoscopically, through direct vision or with robotic-assistance is even more difficult.

Minimally invasive mitral valve repair (MMVR) has been shown to be effective and beneficial for patients. Application of this technique has been concentrated in high-volume centres and in the hands of a limited number of surgeons. For one, dexterity in open surgery of CABG case volume and outcomes is complex, it has been suggested that a cardiac surgeon with a specific interest and focused training in all the emerging technical aspects of CABG may improve outcomes.

The next course will be held 13–15 December 2018 in Maastricht, the Netherlands.

Organiser
EACTS

Course director
Peyman Sardari Nia, MD, PhD

Venue:
Maastricht University Medical Center (MUMC), the Netherlands

Emtrac, Maastricht, the Netherlands

Endoscopic Port-Access Mitral Valve Repair Drylab Training

The course duration is two days and the concept is akin to airline-pilot training. The participants undergo a theoretical pre-assessment and technical pre-assessment on the simulator, then relevant subjects are learned by deconstructing the operation into multiple steps, with videos and presentations in an interactive manner. Parallel to the theoretical teaching, hands-on experience is gained on high-fidelity simulators in a step-by-step manner, leading up the final stage: a full repair on a 3D-printed pathological silicone replica.

The next course will be held 13–15 December 2018 in Maastricht, the Netherlands.

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Comparison of early patency rate and long-term outcomes of various techniques for reconstruction of segmental arteries during thoracoabdominal aortic aneurysm repair

Soichiro Henmi, Yuko Ikono, Koki Yokawa, Yasuko Gotoke, Hidekazu Nakai, Katsuhito Yamanaka, Takeshi Inoue, Hiroshi Tanaka and Yutaka Okita
Division of Cardiovascular Surgery, Department of Surgery, Kobe University Graduate School of Medicine, Kobe, Japan

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pineal cord injury remains one of the most serious complications of thoracoabdominal aortic aneurysm repair. Reattachment of the responsible intercostal arteries is considered one of the most necessary adjuncts to avoid spinal cord injury. This study aimed to analyse the early patency rate and long-term outcomes of reattached segmental intercostal arteries using graft interposition, single-cuff anastomosis, or island reconstruction. We selected 112 consecutive patients who underwent open surgery for the thoracoabdominal aorta with reattachment of segmental arteries between October 1999 and March 2018 at our institution in Kobe. The early patency of segmental arteries was analysed using enhanced computed tomography. Segmental arteries were reconstructed using graft interposition (n = 111), single-cuff anastomoses (n = 38), or island reconstruction (n = 23). The hospital mortality was 5.7%. Twenty patients developed spinal cord ischaemic injury (permanent, n = 12; transient, n = 8). Spinal cord injury was found in 16, 3, and 1 patient in the graft interposition, single-cuff anastomosis, and island reconstruction groups, respectively. Overall, 477 segmental arteries were reattached (mean number per patient, 2.8 ± 1.3). The overall early patency rate was 64.8%. The patency rates in island reconstruction (92.0%) and single-cuff anastomosis (76.8%) were significantly better than that in graft interposition (53.8%; p < 0.01). However, six patients with island reconstruction of segmental arteries had aneurysm formation at the ICA reconstruction site, of whom four underwent reoperation during follow-up. None of the patients with graft interposition or single-cuff reattachment had a patch aneurysm in segmental arteries. From these results, island reconstruction and single-cuff anastomoses might offer better patency rates and prevent spinal cord ischaemic injury compared to graft interposition. Because some patients with island reconstruction – especially in Marfan syndrome – required resorption for patch aneurysms in segmental arteries, a single-cuff anastomosis is preferable in terms of early- and long-term outcomes.

Cardiac | Abstract | New data in atrial fibrillation ablation

Hybrid versus catheter ablation in patients with persistent and longstanding persistent atrial fibrillation: a systematic review and meta-analysis

Claudia A.J. van der Heijden1, Mindy Vroomen2, Rein Vos3, Mark La Meir4, Laurent Pison2, Bart Maesen1
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s the underlying mechanisms of persistent and longstanding persistent atrial fibrillation (AF) are incompletely understood, current treatment options are still limited in obtaining an effective rhythm control while avoiding complications. Although catheter ablation of longstanding persistent AF has been explored via a plethora of strategies – and is still the most applied invasive therapy worldwide – the success rate of this technique is rather disappointing in such patients. Over the past years, hybrid ablation has gained more attention since it combines the strengths of endocardial catheter and epidural surgical ablation. Recently, three-year outcomes following hybrid ablation have been reported, with 79% of patients being in sinus rhythm without the use of anti-arrhythmic drugs (AAD). Although the results of hybrid and catheter ablation have been well reported separately, data comparing the outcome of both procedures are lacking. In this review and meta-analysis, we provided an overview of studies with results of catheter ablation and hybrid ablation in order to compare the effectiveness of both techniques in patients with longstanding persistent AF. Also, the rate of complications in both procedures was analysed. The primary outcome, which was the number of patients in normal sinus rhythm after at least 12 months of follow-up without the use of AADs, was compared between hybrid and catheter ablation.

Based on the results of the included studies in this review, hybrid ablation results in significantly higher success rates compared to catheter ablation (74.7% vs 45.5%; p < 0.001). This difference in success rate can be explained by differences in the techniques used. The use of a bipolar radiofrequency clamp to isolate the pulmonary veins results in long-lasting transmural lesions. Furthermore, hybrid ablation offers the opportunity for endocardial touch-up of conduction gaps that could not be identified and/or treated by epicardial ablation. Additionally, a funnel plot was made confirming that no publication bias occurred in this review (Figure 1).

Of second importance included perioperative complications. The incidence of major complications, including bleeds requiring transfusion or reoperation, conversion to sternotomy, phrenic nerve injury and tamponade, were significantly higher in hybrid versus catheter studies (p < 0.05). However, the overall rate of these complications was low, and there was no difference in hospital mortality. In conclusion, hybrid ablation is more effective than catheter ablation in maintaining sinus rhythm in patients with longstanding persistent AF, but comes with a slightly higher complication rate. However, data directly comparing both techniques are lacking and small, heterogeneous, single-arm studies in a random effect model hinder drawing definitive conclusions. Therefore, larger randomised controlled trials are needed in order to demonstrate the benefit of hybrid ablation over catheter ablation in patients with persistent and longstanding persistent AF.

References
The EACTS Quality Improvement Programme: Adult Cardiac Database

Improving quality through international outcome benchmarking

Stephanie Hawksworth, Theo de By and Örjan Friberg on behalf of the EACTS Adult Cardiac Database

The EACTS Adult Cardiac Database (ACD) includes contributions from more than 80 European hospitals and cardiothoracic units, corresponding to more than 120,000 surgical interventions. This expansive collection of data has strengthened the ACD’s benchmarking capabilities, providing a sophisticated tool which individual hospitals can use to compare their outcomes with the anonymised data of other hospitals in the database.

The unique characteristics of the ACD benchmarking tool allow a user to:
- Access the ACD dashboard and select which hospitals to compare
- Select hospitals with a volume-range of interventions, comparable to their own
- Use many filters, e.g. for patient age, procedures, urgency, logistic EuroSCORE etc.
- Download their hospital’s bespoke report, which is automatically updated on a monthly basis, and look for hospital compared to all others
- Monitor results with control charts, offering performance statistics over time

As part of the EACTS Quality Improvement Programme (QUIP), the ACD and its benchmarking possibilities have proven to be a powerful instrument for quality assessment. Firstly, the volumes of various kinds of interventions can be compared, e.g. the number of patients with multiple CABGs, mitral valve operations, etc. What’s more, it can reveal on-pump/off-pump statistics, the distribution of patients by urgency and it can confirm areas of professional excellence which are present in every unit. Finally, in some areas, it is able to pinpoint areas of relative weakness, and how they can be improved.

The Quality of outcomes support team

The Quality of Outcomes and Research Unit (QuORU) of the University Hospital in Birmingham collaborates with EACTS to provide support and offers statistical and data analyses services on the highest level.

Importantly, their experienced software developers are able to tease out what kinds of comparisons users are undertaking with the benchmarking tool, helping to better gauge what searches are common, as well as the ultimate quality of those comparative outcomes.

Bespoke Reports

Participating centres can download their bespoke reports when they log into the Adult Cardiac Database. This report provides a comprehensive overview of the centre’s cardiac data and contribution to the Adult Cardiac Database, showing statistical analysis and the comparisons of the following data:
- Completeness of data
- Volume of procedures
- In-hospital mortality rate
- Re-op for bleeding rate
- Average post-op LOS

To find out more about what the ACD Centre Reports can offer you, please go to www.eacts.org/quip or contact quip@eacts.co.uk

“Since 2017 I had the privilege of being Chair of the ACD Task Force. The ACD is growing rapidly in terms of numbers of procedures, participating centres and countries. This is gratifying but also increases the demands for clear and universally adopted data definitions and defined processes of data validation.

“During the last year the Task Force have focused most of our work on the very fundamentals of a database; a thorough revision and update of all included variables with definitions, as well as analysing and trying to define the different steps and means of data validation required for achieving as high validity as possible of the data in the registry.

“A new ‘data-dictionary’ with the updated list of variables was just finalised and will be publicly available in the coming months. We also hope to soon publish the first Annual Report in 2018, which will reflect the growth of the database, the trends in adult cardiac data and the future developments.”

Örjan Friberg
Database Task Force Chair

Volume of procedures in Adult Cardiac Database 2018
Cardiac | Rapid Response | A Journey in coronary artery bypass surgery

**STS, EuroSCORE II or SYNTAX II: Which is the best score to assess mortality risk for complex coronary artery disease after CABG?**

**Bianca Maria Maglia Orlandi**
REPLICCAR Group, The Heart Institute, University of São Paulo (INCOR-HCFMUSP), Brazil

**Introduction**
Complex coronary artery disease (CAD) still represents a challenge in clinical management. Coronary artery bypass graft (CABG) surgery has been established as the standard of treatment for complex CAD. Prognostic models have been adopted in medical guidelines and are now widely used to assess risk and guide therapy. However, a direct comparison among STS, EuroSCORE II (ESII) and SYNTAX Score II (SSII) has never been performed.

**Purpose**
The aim of the present study was to compare the predictive performance of STS, ESII and SSII for short- and long-term all-cause mortality in patients undergoing isolated CABGB for complex CAD.

**Methods**
All patients with three-vessel and/or left main CAD of the Multicenter São Paulo’s Cardiovascular Surgery Registry (REPLICCAR-1) that underwent isolated CABGB were included. STS, ESII and SSII were calculated, and their performance to predict short- (30 days) and long-term (4 years) mortality was assessed.

**Results**
Between 2013 and 2016, a total of 2,961 patients were included. The median age was 63.34 years (interquartile range [IQR]: 56.3–69.3 years), 72.6% were men, 46.8% had previous myocardial infarction, the median left ventricular ejection fraction was 60% (IQR: 50–64 %) and 16.9% were receiving insulin therapy for diabetes. The median STS was 0.6% (IQR: 0.41 to 1.29%), the median ESII was 1.4% (IQR 0.85 to 2.09%) and the median SSII was 25.15% (IQR: 18.6 to 32.3%).

The all-cause mortality at 30 days was 3.4%. All scores demonstrated good performance for short-term mortality. However, both STS and ESII had better accuracy at this timepoint (p < 0.05). The mortality at four-year follow-up was 5.3%. The SSII had the best discriminative ability to separate low-, medium- and high-risk groups (SSII: 54%, 27% and 17% vs STS 99.3%, 0.7% and 0% vs ESII 93%, 4.5% and 1.5%). Additionally, SSII was the most precise in predicting long-term mortality [Calibration-in-the-large (CL) = 0.01].

**Conclusions**
All scores were validated for short-term mortality, with better performance being seen for STS and ESII. However, SSII was the only score able to stratify patients more precisely in the long term.

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**Magnetic resonance imaging for cerebral embolisations during right mini-thoracotomy mitral valve surgery: a prospective randomized clinical study**

**Cristina Barbero**
University of Turin, Italy

**Background**
Neurological injuries after cardiac surgery are impressive complications for both short and long-term quality of life and health costs. The role of perfusion strategies and aortic clamping techniques on the occurrence of this complication is one of the most debated issues in minimally invasive mitral valve surgery (MVS).

It is well known that neurological injuries can also occur as silent embolisations, which are subclinical events theoretically capable of determining long-term deficits of cognitive and intellectual functions and alterations of the neuropsychological profile of the patients. The aims of this study are to determine the overall rate of cerebral embolisations with magnetic resonance imaging (MRI) in patients undergoing minimally invasive MVS, and to compare endoaortic clamping (EAC) versus transthoracic clamping (TTC).

**Methods**
Patients undergoing minimally invasive MVS from June 2014 to June 2016 were screened for enrolment in a prospective randomised clinical study.

**Results**
During the study period, 274 patients underwent right mini-thoracotomy MVS at our department. Fifty-one patients were included and randomised; 43 out of 51 patients underwent post-operative and follow-up MRI. Stroke was reported in one patient out of 43 (EAC group). No minor neurological events were reported. Twelve out of 43 patients reported new ischaemic lesions at the control MRI (27.9%).

**Conclusion**
Preliminary outcomes of the present study show comparable results in terms of neurological events between the EAC and the TTC technique.
“Keep your Move in the Tube” after heart surgery: evidence, translation and implementation of a paradigm shift towards physical activity for enhanced recovery

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Cardiac surgery via a median sternotomy has been performed since 1925 and is to date the most commonly performed procedure in patients requiring coronary revascularisation and valve procedures worldwide. Median sternotomy is associated with excellent outcomes, however, sternal complications exist in a small but significant number of patients (1% to 8%). As such, sternal precautions in the form of postoperative restricted upper limb and trunk activity are routinely applied following surgery to prevent sternal complications. On the other hand, these restrictions on upper limb movements are derived from limited cadaver and bone replica models, thus setting restrictions on upper limb movements and trunk tasks in the form of sternal precautions which may exacerbate loss of independence and instil anxiety and a “fear” of participation.

More recently, Katijjahbe et al. (2018) conducted a randomised controlled study at the Department of Surgery in Melbourne, Australia, exploring a programme of active upper limb participation, reporting no adverse events, and reinforcing the safety and feasibility of upper limb exercise.1

This research, coupled to literature that validates the safety and feasibility of moderate intensity exercise after heart surgery, has prompted a shift in the paradigm in clinical practice and rehabilitation after cardiac surgery towards active participation in exercise and physical activity.2

We will be presenting two research papers and a focused symposia workshop within the Allied Health programme that describes the journey from evidence to translation of a new paradigm shift from over restrictive sternal precautions to one that promotes physical activity and upper limb exercise: ‘Keep Your Move in the Tube’ for optimal patient care.”

Doa El-Ansary

Additionally, they have been documented to delay discharge from hospital, and the recovery of patients with functional limitations prevent patients from returning home directly after hospital discharge. Following median sternotomy, typical guidelines involve limiting arm movement during loaded lifting, pushing and pulling for 6–8 weeks – even up to 3 months in some institutions. Ironically, upper limb exercises reduce sternal pain – and can promote recovery and return of function – but the prescription of such exercises alongside sternal precautions poses a clinical dilemma as they both contravene one another. Furthermore, physical activity including upper body exercises may be imperative to promote timely physical, emotional, functional, and cognitive recovery, to facilitate bone healing and remodelling in response to loading, and to set a culture of active participation which transitions to long-term secondary prevention and wellness behaviour. There is a strong body of evidence to support early, moderate-intensity exercise that is inclusive of graduated upper limb and trunk exercises to facilitate recovery, reduce pain, and improve function.

Presenting the evidence

Our research group has conducted several observational studies in the cardiac surgery population, elucidating that there is minimal change in sternal separation and micromotion (< 2 mm) during upper limb movement and functional tasks, as measured by real-time ultrasound in a cohort of patients with sternal instability and without sternal complications following cardiac surgery via a median sternotomy (Figure 1). Adams et al. (2014) also reported that in over 32 activities of daily living commonly performed by individuals after cardiac surgery (e.g. opening a door, lifting a box) the forces required for exceeded those produced by upper limb exercise, again highlighting the contradictory nature of “sternal precautions.”

Figure 1. Real-time ultrasound image of the sternum following stenotomy during upper limb elevation (bilateral). Separation of the sternal edges in the coronal plane (lateral direction) is 0.1 mm and in the sagittal plane (antero-posterior direction) is 0.2 mm. White Squares = demark sternal edges.

The guiding principles of Keep Your Move in the TubeTM are to move away from load and time restrictions imposed by traditional sternal precautions, and rather to reduce force across the sternum by focusing on movements with reduced lever arms that are close to the body. This concept was translated into the Keep Your Move in the Tube framework using simple graphics depicting movements in a green tube and out of a red tube (Figure 2). By moving within such tubes, no particular precautions or restrictions need to be imposed on patients following a median sternotomy. Furthermore, patients can perform unlimited movement of their arms when unloaded.

Utilisation of Keep Your Move in the Tube has the potential to replace traditional, inconsistent sternal precautions with an approach that is easy for patients and health professionals to understand and follow. More importantly, having a standardised approach that is informed by evidence will assist health professionals, caregivers, and patients in implementing best practice, and ensure compliance. This may also facilitate optimal postoperative recovery due to its focus on early resumption of activities of daily living and active participation in physical activity. Implementation of Keep Your Move in the Tube Translation and implementation into clinical practice has commenced in several facilities worldwide including the Memorial Regional Hospital in Hollywood, FL, USA, who used a pragmatic approach informed by evidence to implement the training program of staff and patients. Data is currently being collected to examine the impact of implementing Keep Your Move in the Tube, evaluating discharge disposition (i.e. home vs inpatient rehabilitation or skilled nursing facility), functional performance, quality of life and cost of care.

Our research group represents an international collaboration between researchers and clinicians in physiotherapy, surgery, exercise physiology, nursing and anaesthesia. We will be presenting two research papers and a focused symposia workshop within the Allied Health programme that describes the journey from evidence to translation of a new paradigm shift of Keep Your Move in the Tube for optimal patient care.

References
LivaNova is proud to announce the delivery of the 6,000th S5 Heart-Lung Machine in October 2018. Launched in 2005, S5 now commands a global market share of more than 70% and more than 5 million patients treated, making it the most successful Heart-Lung Machine ever made.

S5’s modular concept allows the machine to be configured to face every challenge in cardio-pulmonary perfusion and is “future-ready” to accommodate new innovations for improving perfusion quality and patient outcomes.

The system’s quality, technology and safety record are legendary. The S5 permits closer positioning of the HLM to the patient, which shortens the extracorporeal circuit and reduces priming volume. This protects the patient against hemodilution and potential neurological damage.

“I am using the S5 in various configurations according to the different weight of my patients. This helps me to achieve an optimum relation between the priming and blood volume of the patient. The flexible mast mounted pumps allow a very close positioning of the whole system to the patient”, says Frank Munch, chief perfusionist at University hospital Erlangen, Germany.

With its comprehensive portfolio and focus on innovation, LivaNova is the global market leader in cardiopulmonary solutions. The company’s systems, equipments and devices are found in the vast majority of the world’s leading cardiac hospitals.
The EACTS EUROMACS Registry: a source for scientific data

Theo de By
The Hague, the Netherlands

Ever since its conception, the focus of the EUROMACS Registry has been on the promotion of scientific research with respect to the care of patients with end-stage heart failure, and who have received mechanical circulatory support (MCS). The availability of clinical data and long-term follow-up facilitates scientific studies, as anonymous EUROMACS Registry can be harnessed by research groups.

How can participating centres obtain data?

Any contributor of data can approach the EUROMACS Director who will send a standard form. The form should summarise the data that is necessary from the EUROMACS Registry, as well as the strategy of the publication. Evaluation of the proposal will then take place by a EUROMACS sub-committee using criteria such as:

- Is it a good research question; is it original?
- Is the research design appropriate?
- Are the methods rigorous and feasible?
- Are the specific objectives clear?
- Is the background and significance scholarly and partner?
- Are the methods appropriate for the research study?
- Is the proposal clear, concise and well organised?

A proposal can be rejected based on one or more of the following arguments:

- If the researcher’s hospital doesn’t contribute data to the EUROMACS Registry
- If the subject is already “taken”, i.e. another researcher has received approval and data from EUROMACS to work on the same or very similar hypotheses.

How many study proposals were received, and what is their status?

Two studies with EUROMACS data have been published in the past two years.

Contributors to two IMACS reports have been provided.

Two proposals have recently been submitted and are in the process of approval by the sub-committee.

Publications are made available on the EUROMACS website: www.euromacs.org/downloads/scientific-articles

Availability of research data in EUROMACS contributes to quality improvement

Alexander Bernhardt is responsible for the heart transplant and the mechanical circulatory support programmes at the University Heart Centre Hamburg, Germany.

The EACTS EUROMACS Registry has been on the radar since its conception, and has been provided by the EACTS, an independent body. The registry has been developed by a group of researchers from across Europe and the United States.

The EUROMACS Registry has quite a lot of data fields – does that discourage you and your data manager? Treating patients who are on a VAD requires the observation of many factors that play a role in their wellbeing. Given the fact that most centres are relatively small, it’s only natural that we accumulate data on an international level so that large quantities of variables become available for analyses.

If you look at the possibilities for EUROMACS, what do you envisage? It’s good to hear that more centres are in the process of joining. A further increase of data will strengthen the base for future analyses.

Finally, the EUROMACS data are shared with the IMACS registry in an anonymous way, and we find it important to know that our data are included in an endeavour to aggregate insights on a global level.

Can you be more specific on that? We’ve been following several publications with EUROMACS data over the years. At our Hamburg University Heart Centre, we’ve been able to obtain data from EACTS that has made it possible to do analyses on factors such as gender differences and the outcomes of isolated RVAD implants in patients with right heart failure. These data have been published in peer reviewed journals. Currently, we’re working on a comparative study between European and US data.

Which insights have you gained from EUROMACS?

First of all, I must say that you can always ask any questions from EUROMACS and you will promptly get the answers. Over the years, this service has been very helpful. Secondly, and most important are the possibilities to obtain data for scientific projects. The results of these projects have given us insights into the consequences of therapeutic treatments as we practise them.

EACTS enables first EUROMACS Paediatric Report

Structural support for statistics and informatics has been consolidated

Martin Schweiger, Theo de By and Oliver Miera

There are substantial differences between adults supported with ventricular assist devices (VADs) and children, especially the very young. Thanks to the structural support provided by the EACTS, an increasing number of hospitals have contributed data from their patients on mechanical circulatory support (MCS) to the EUROMACS Registry. This has made it possible to accumulate clinical data to such an extent that a first EUROMACS Paediatric Report has now been published in the EACT.

Statistical support

The aims of QuORU are to provide the specification for, and oversee, the development and implementation of appropriate quality outcome metrics. Recently, the EACTS has entered into an agreement with the UHB to provide expertise in the areas of clinical research, statistics and informatics.

Highlights of the report

Data from 237 durable device implantations in 210 patients (81 female), originating from 25 European centres in 14 countries could be analysed. In a unique collaboration throughout the analytic process, all contributing clinicians were willing to provide data, supply missing data and corrections whenever needed.

A summary of the data shows that:

- Mean support time was 11.6 months (+ 16.5 SD).
- 51% (n = 107) received a transplant at two years post VAD implantation.
- 82.4% (n = 3) of the children survived beyond 24 months.

Figure 1.
survived to transplant, recovery, or are at ongoing treatment until the last follow-up. 17.6% (n = 37) died at two years. Cerebro-vascular accidents were the main cause of death (24.3% of the deceased)

Competing outcomes
In the analysis, a patient is considered at risk until explantation due to transplant, weaning from the device, has died or is alive. To determine these values, cumulative incidences were calculated using competing outcomes methods. To avoid any censored individuals, only patients with a follow-up period of two years were considered for the competing outcome analysis. Figure 1 shows those competing outcomes.

Devices
In this first Paediatric Report, the relation between pulsatile and rotary/centrifugal devices was 46.8% versus 53.2%, respectively. Not surprisingly, this differed significantly from the adult cohort where only 3% of patients had a pulsatory durable VAD.

Conclusions
The one-year survival rate seems to be satisfactory in this first EUROMACS Paediatric Report. Device malfunctions, including pump-chamber changes due to thrombosis, were the most frequent adverse event. A comparison between registries shows that outcome data differ with, for example, the Pedimacs report (North America data). One of the most striking differences is the waiting time for a heart transplant. Whereas permanent support has long become a reality for adults, bridge to transplantation or transplantability still remains the highest percentage in intention-to-treat patients within the paediatric population. Whereas almost 50% of the paediatric patients in North America had a transplant within the first six months after a VAD implant, in Europe, only 33% at six months and 38% patients at 12 months had a transplant. These numbers reflect the lack of suitable donor organs in Europe, which leads to significantly longer support times.

Continued interest and increase of data
Many questions remain to be addressed, e.g. discharge, additional specifics in anticoagulation management, a focus on congenital heart disease and much more, all of which were beyond the scope of this first EUROMACS Paediatric Report. The publication of the EUROMACS Paediatric report has led to renewed interest from colleagues who hadn’t joined EUROMACS yet. With an increasing number of contributors, we are reaching pan-European coverage step by step.

As many questions remain to be addressed, the additional data will hopefully enable stronger analyses and improved insight. Further focused EUROMACS paediatric reports are planned.

Acknowledgements
On behalf of all co-authors we acknowledge all contributors of data, and Hina Waheed, Statistical Intelligence Analyst from QuORU, for her contribution to the success of this EUROMACS Paediatric Report.

References
Autologous reversed sternal plate flaps for treatment of sternal clefts: a long-term follow-up study

Hany Elsayed Cairo, Egypt

Sternal clefts are very rare congenital defects of the sternum. They can be diagnosed since day one of life. They are divided into complete and incomplete according to the extension of the defect along the whole sternum, and are usually isolated, but may be associated with other anomalies. Challenges exist as wide defects can render primary closure difficult and the use of any artificial material in this young age necessitates the need of repeated procedures as the child will outgrow any artificial material. Many surgical techniques have been suggested to correct the defect. We advocated an innovative technique since 2014 to repair this rare defect and in this study, we present our longer-term follow up of our series of patients.

The technique depends on the idea of reversing a flap from the child’s own sternum at its lower ends and reversing it on its axis to fill the gap at the upper end of the sternum – the most challenging step in repairing sternal clefts. The technique avoids the use of any artificial material and hence the child does not require any repeated procedures and avoids the need to resect any cartilage to release the sternum. This is a virtue as rare reports have stated that this may be associated with an arrest of growth of the chest wall during successive years of life; a potentially lethal condition named acquired Jeune’s syndrome.

From August 2013 to February 2018 six patients (five females) had the procedure performed by a single surgeon in a tertiary thoracic centre. Median age was 1.7 years (3 months – 12 years old). Median hospital stay was 4 days (3–6 days). All procedures were isolated apart from one which was associated with a wrap around a congenital ascending aortic aneurysm in a 2-year-old boy. No morbidity or mortality in our series. At a median follow up of 42 months patients have a stable sternum, well healed wound and no need for any further intervention.

We concluded from this study that our medium-term follow up results for reversed autologous sternal plate flaps for treatment of sternal clefts shows excellent results without the need for any further intervention. The avoidance of any cartilage disturbance is an additional virtue of this technique. Although the numbers are small, but we think it can be one of the golden standards of surgical correction methods in sternal cleft anomalies.
Having now been used on more than one million patient procedures, LivaNova’s Inspire family of adult oxygenators has delivered on its promise of minimizing the impact of cardiopulmonary bypass surgery—by helping to reduce hemodilution, improve neurological protection and decrease inflammatory response.

Since its launch in 2013 at the EACTS meeting in Vienna, Inspire has achieved record adoption and market penetration across the five continents. It was designed after years of research, laboratory testing and the support of a global team of clinical experts. The oxygenator’s widespread appeal is due, in part, to the significant reduction in priming volume it achieves during extracorporeal circulation, which in turn may help reduce hemodilution and the need for blood transfusions by 33% 1,2.

The one millionth cardiac patient to benefit from an Inspire oxygenator was treated at Royal Sussex Hospital in Brighton, England. According to lead clinical perfusionist Jonathan P. Sheppard, “We have used the Inspire oxygenator in our daily practice since it was released to optimize perfusion by reducing hemodilution and the need for blood transfusions. Inspire may also improve patient outcomes by reducing multiple sources of cellular inflammation and decreasing patient inflammatory response.”

Inspire’s success is a testament of LivaNova’s commitment to deliver the highest quality cardiac surgery products to support clinicians in their daily practice. Available in both open and closed circuit versions, Inspire high performance oxygenators offer a wide array of choices to suit your clinical practice, as well as the individual patient’s perfusion needs.

1. Initial results of an optimized perfusion system – Perfusion 2013 28(4) 292–297 – CT Starck, et al
2. Effects of priming volume reduction on allogeneic red blood cell transfusions and renal Outcome after heart surgery – Perfusion 2014 10(1-2) – Milhaud, et al
Central vs. Peripheral cannulation approach for postcardiotomy VA-ECMO; does the cannulation technique influence the outcome?

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Cardiac | Rapid Response | Optimizing outcomes of extracorporeal life support therapy

Postcardiotomy cardiogenic shock is a devastating complication after cardiac surgical procedures and is associated with a high mortality rate. When medical therapy fails, VA-ECMO is the ultimate option for patients with refractory postcardiotomy cardiogenic shock. Patients may be supported with VA-ECMO using either central cannulation technique (cannulation of aorta) or peripheral cannulation technique (cannulation of femoral or axillary artery). The ideal cannulation approach (central vs. peripheral) for postcardiotomy cardiogenic shock is still unknown. The aim of this study was to compare the outcome of patients with postcardiotomy cardiogenic shock who were supported with central vs. peripheral cannulation technique.

This is a single center retrospective data analysis. After receiving approval from ethics committee, data of patients receiving VA-ECMO for postcardiotomy cardiogenic shock either intraperositively or after the surgery in the intensive care unit from January 2011 to December 2017 were collected and analysed. Data collection included baseline demographics, implant data, adverse events and survival. The central and peripheral approaches were compared in terms of baseline characteristics, intensive care unit stay, hospitalisation length, adverse event rates and overall survival.

A total of 86 patients met the inclusion criteria. The mean age was 68 ± 10 years. Sixty-four (73%) of the patients were male. The average EuroScore II was 14 ± 12%. Urgent/emergent cardiac surgery procedures were performed in 55 patients (64%). Forty-three patients (50%) received VA-ECMO in operating room and 43 patients (50%) received VA-ECMO on the intensive care unit. Twenty-eight patients (33%) were supported using central VA-ECMO approach and 58 patients (67%) were supported using peripheral VA-ECMO approach. Table 1 shows patients characteristics. The two groups (central vs. peripheral) were comparable except for longer cardiopulmonary bypass time and cross clamp time, higher Euro Score and higher rate of chest being left open at the primary surgery in the central VA-ECMO group. Furthermore, a higher number of other procedures (which included complicated multiple valve procedures or surgeries for type A dissection) were included in central ECMO group. Bleeding complications, transfusion requirements, and postoperative neurological injury were comparable between the two groups. However, more patients in the peripheral VA-ECMO group were weaned from VA-ECMO (p = 0.063). Further, a higher in hospital mortality was observed in the central ECMO group (p = 0.020).

To better match the two groups, propensity score analysis was performed for EuroScore, gender and type of cardiac procedures. Following propensity score analysis, twenty patients remained in each group and were compared again. After matching, no statistically significant differences in the baseline characteristics between the two groups were observed except for higher rate of open chests in the central ECMO group (p = 0.020). However, outcomes and complication rates remains similar between the two groups (Table 2).

In conclusion, in postcardiotomy patients requiring VA-ECMO support, similar complication rate and outcome is observed regardless of the cannulation strategy.

References

Table 1: Patients baseline characteristics

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Body mass index</th>
<th>Sex (male, %)</th>
<th>EuroScore II</th>
<th>Cardiac surgery type</th>
<th>ECMO in OR</th>
<th>ECMO in ICU</th>
<th>Carotid endarterectomy</th>
<th>Heart valve surgery</th>
<th>Other procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>67 ± 13</td>
<td>37 ± 9.7</td>
<td>37 (51)</td>
<td>39 ± 14</td>
<td>117 ± 48</td>
<td>11 (14)</td>
<td>11 (14)</td>
<td>4 (5)</td>
<td>11 (14)</td>
<td>4 (5)</td>
</tr>
</tbody>
</table>

Table 2: Outcome and complication rate in both groups after propensity score matching

<table>
<thead>
<tr>
<th>VA-ECMO</th>
<th>Central (n=28)</th>
<th>Peripheral (n=58)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcome</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall survival</td>
<td>0.020</td>
<td>0.063</td>
<td>0.020</td>
</tr>
<tr>
<td>Complication rate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bleeding complications</td>
<td>0.49</td>
<td>0.45</td>
<td>0.87</td>
</tr>
<tr>
<td>transfusion requirements</td>
<td>0.49</td>
<td>0.45</td>
<td>0.87</td>
</tr>
<tr>
<td>postoperative neurological injury</td>
<td>0.49</td>
<td>0.45</td>
<td>0.87</td>
</tr>
</tbody>
</table>
**EACTS 2018 Floor Plan**

**Exhibition opening times:**
- **Thursday 18 October** 14:00–19:00
- **Friday 19 October** 09:00–17:00
- **Saturday 20 October** 09:00–17:00
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