EACTS European Association For Cardio-Thoracic Surgery

Daily News

The official newspaper of the 32nd EACTS Annual Meeting 2018

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In this issue

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 Bond of Queen Elizabeth Hospital Birmingham, UK, beat Jaime-Jürgen Eulert-Grehn and Timo Nazari-Shafti 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[1], 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 multi-vessel 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

Continued on page 2

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 multi vessel 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 it, see the patient at one month, fill out some forms and then the central organisation will do the rest of the follow-up and you get $2,000.

"This can actually be productive for the finances of your research organisations. We are expecting and hoping that each centre will enrol one patient a week. This is what we would like to see, but we haven't achieved that yet."

He continued: "We are not actually asking the surgeons to go to the clinic and send some of these patients to the catheter lab or the operating theatre. We are doing the opposite. We are asking you to go to the cath lab, partner with a cardiologist, identify which patients are eligible and randomise them."

"This can actually be productive for the finances of your research organisations. We are expecting and hoping that each centre will enrol one patient a week."

John Puskas

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."

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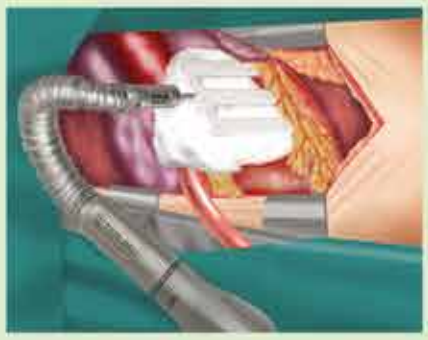
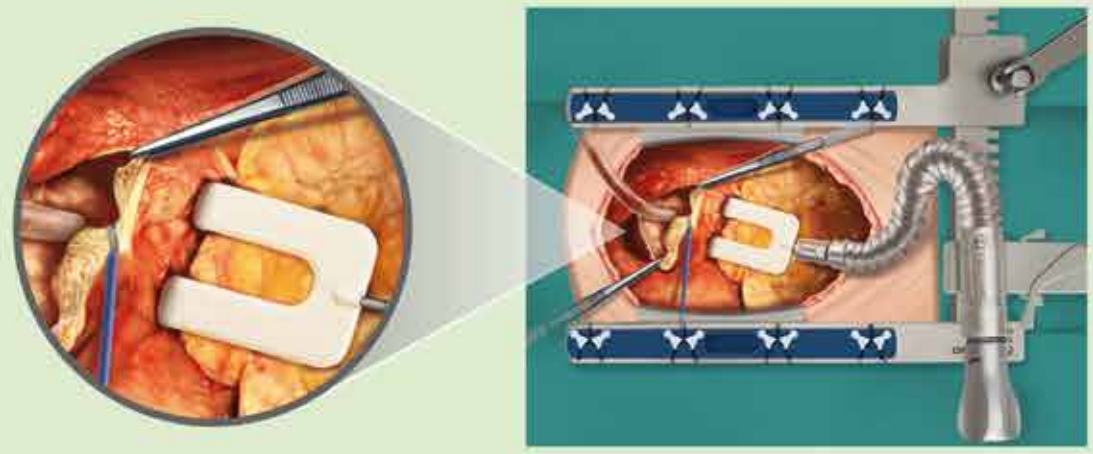


Retraction during On-Pump CABG

Used for retraction during on-pump or off-pump LAA procedures



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General | Focus Session | Enhanced recovery after surgery (ERAS)

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.[1] 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 Marjan Jahangiri, (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 Milan. 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).

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Cardiac | Professional Challenge | Managing patients with multi-vessel disease in the modern era

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).

Dr 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)[1], as well as a metaanalysis on the short- and long-term results and relative benefits of bilateral internal thoracic artery grafting[2]. 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 investigators)[3], and a review of mechanisms and consequences of coronary graft failure as part of the ATLANTIC (Arterial Grafting International Consortium) Alliance[4].

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 reasoned 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 makes 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[1].

"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."

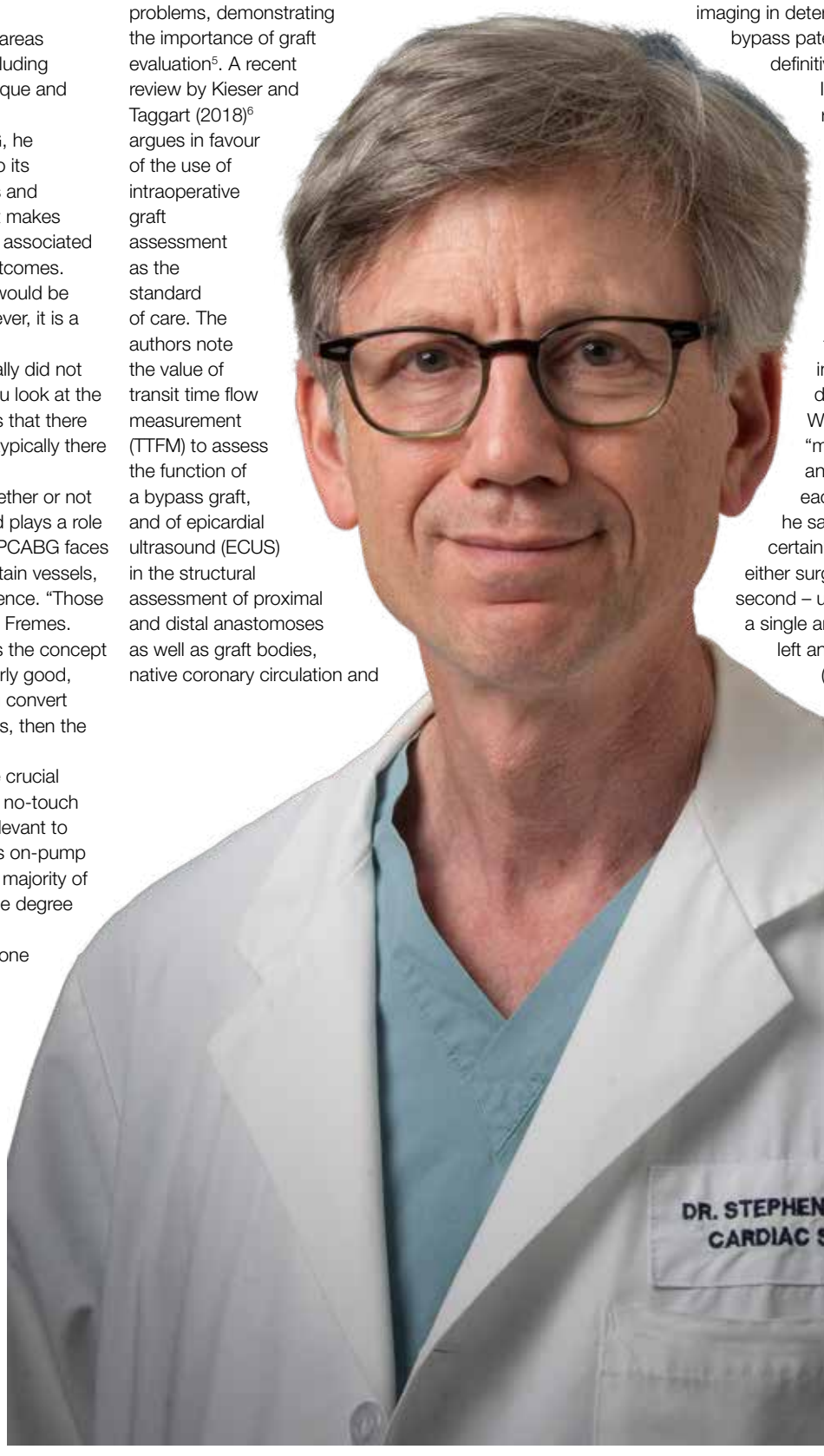
Casting a wider net in coronary revascularisation to include percutaneous approaches, he continued: "When you look at everything, comparing angioplasty and coronary bypass, a couple of things are very consistent. One is that repeat revascularisation is greater with angioplasty, and stroke is greater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

"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."

Stephen Fremes

"But stroke is a penalty that people pay for having bypass surgery. And as patients get older into 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[5]. A recent review by Kieser and Taggart (2018)[6] 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.[6]



Underscoring 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 lie of the graft, a clip 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 poses more of a stroke risk than calcific plaque. "You can do transoesophageal echo," he said, "Which is standard in many places, but that does not 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 the technology by Stryker (USA) may see its adoption expanding. This technique was recently reviewed, alongside TTFM, by Ohmes et al., who note that despite several promising studies, the use of ICG intraoperative fluorescent imaging in determining coronary bypass patency has not been definitively proven.[5]

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 PCI for the other targets – or the other way around. It is one of the strategies to achieve a no-touch technique.

"This may or may not be through a minimally invasive approach. When you use it with a minimally invasive approach there is a faster recovery, but it doesn't necessarily mean that you have a better revascularisation. Complementary PCI for the remainder of the disease then 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.

"The 'no-touch' aortic technique is one of the associated surgical strategies which is getting more traction lately."

Stephen Fremes

"There is an NIH-funded trial organised through CTSNet that is ongoing, largely 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 incisions has been considered for CABG."

This prospective, multi-centre randomised hybrid coronary revascularisation trial compares the effectiveness of hybrid coronary revascularization against multi-vessel 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.[7]

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.

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Cardiac | Professional Challenge | Managing patients with multi-vessel disease in the modern era

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

Saturday's Professional Challenge session on the management of multivessel disease includes a presentation by Filippo Crea (Department of Cardiovascular and Thoracic Sciences, A. Gemelli Foundation, Catholic University of the Sacred Heart, Rome, Italy), who addresses the role of medical therapy in stable coronary artery disease.

Dr Crea will discuss how medical therapy should be tailored according to patients' risk factors. He also looks at issues faced by patients after revascularisation, with a discussion of the distinction between coronary stenosis and microvasculature angina (the latter a possible underlying cause of persistent angina), as well as the role of medical and secondary prevention strategies.

"We are dealing with an ageing population, and the weight of comorbidities is growing."

Filippo Crea

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 this population in terms of reduction of cardiovascular outcomes, angina relief and or survival[1]. Yet, in a recent review by Al-Lamee et al. (2018), the authors note that in stable CAD, "patients and physicians often choose PCI rather than first attempting to control symptoms with anti-anginal medications as recommended by guidelines."[2]

Clinical decisions depend on patient features however, explained Dr Crea in conversation with *EACTS Daily News* – and whether the patient is high risk, or medium- to low-risk.

First addressing high-risk patients, who typically have three vessel- and left main stem disease, he said: "Although stable, this subset of high-risk patients with severe coronary artery disease benefit from myocardial revascularisation. The issue is whether to go for bypass or PCI."

A recent review and pooled analysis by Head et al. (2018) addresses this question, with the authors looking to overcome the lack of power in existing randomised trials to detect mortality differences between CABG and PCI. The 11 included trials (totalling over 10,000 patients) related to patients with multivessel or left main coronary artery disease who did not present with acute myocardial infarction, who were treated with bypass or PCI with stents (bare-metal or drug-eluting), and had more than one year of follow-up for all-cause mortality. The investigators found that CABG had an overall mortality benefit over PCI. Subset analysis was consistent in confirming the mortality benefit, in particular for diabetic patients.[3]

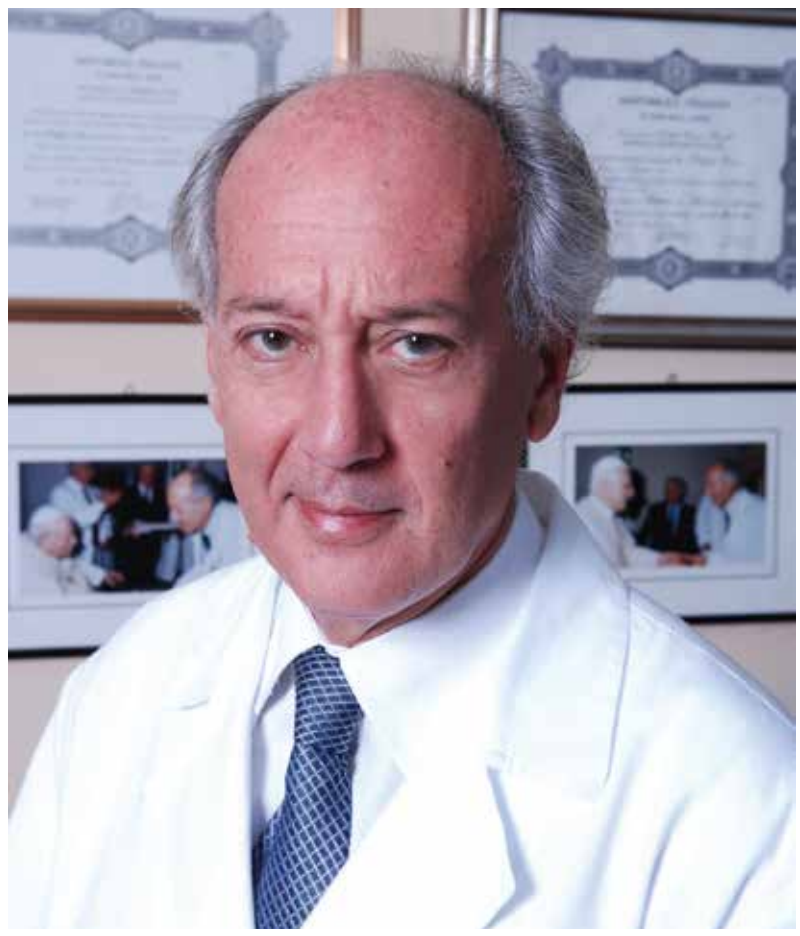
Comorbidities in high-risk patients considering surgery, explained Dr Crea, is a growing issue. "We are dealing with an ageing population," he said. "And the weight of comorbidities is growing. In this setting, what plays a central role in my opinion is the heart team. When the patient has got a complex coronary anatomy but also comorbidities that increase the surgical risk, this type of patient should be carefully discussed by the heart team, balancing the risks and advantages of surgery versus PCI.

"Unfortunately, a daily heart team is not the rule in the majority of hospitals. This is a gap that we should fill. Patient management should increasingly be based in the heart team – a decision made by all the expert subspecialists working around the patient."

Shifting focus to patients at low risk – with an absence of severe three vessel disease, and a reasonable effort tolerance – Dr Crea summarised that here the choice between revascularisation and medical treatment must be made: "All randomised studies and meta-analyses published so far show that there is no evidence of benefit for revascularisation versus optimal medical therapy, when we consider death or myocardial infarction."

Because these two hard endpoints in low- to medium-risk patients are not improved by myocardial revascularisation, optimal medical treatment should be the default treatment, noted Dr Crea. Revascularisation should only become a consideration if symptoms persist despite optimal medical treatment, he added.

Importantly, between 20 and 40% of patients complain of persistent angina following PCI, as summarised in a recent review by Dr Crea and colleagues[4]. 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.[4]



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

Filippo Crea

On the issue of microvascular dysfunction, Dr Crea commented: "This is an issue of growing interest. How do we treat symptoms related to coronary microvascular dysfunction which can only be treated, by definition, by medical treatment? We need more information from trials about what to do in this setting."

The final issue that Dr Crea addressed was post-revascularisation risk factor control. He cited a post-hoc analysis of the SYNTAX trial, published in 2015, which showed that a large proportion of patients receive suboptimal medical treatment and suboptimal risk factor control after revascularisation. Those patients who receive suboptimal medical treatment after revascularisation were shown to experience worse outcomes.[5] "These patients should not miss the opportunity of optimal risk factor control after surgery," he said.

"Risk factor control after revascularisation, for some reason, tends to be suboptimal. This is probably because the patient and doctor feel protected by [the intervention], although we know that this is not the case. Atherosclerosis is a progressive disease, which means that even after optimal revascularisation the patient still needs very organised control of risk factors, including [leading an] optimal lifestyle with optimal medical control of risk factors."

Adherence to lifestyle-modifying schemes is a well known issue[6], and one that continues to be investigated in terms of mode of delivery[7,8] and patients' attitudes[9,10]. "Globally, we have this problem," said Dr Crea. "Physical exercise is an important part of prevention in the field of atherosclerosis.

"I remember two studies – one published about 30 years ago. Patients with stable angina were randomised to beta blockers or physical exercise. Symptoms were better in those randomised to physical exercise. In a more recent study, patients were randomised to PCI (which at that time was before the stenting era) or physical exercise. After one year, exercise tolerance was better in patients randomised to physical training than those randomised to PCI. These were two simple studies that show the importance of physical exercise in angina control but also in the attempt to control the progression of atherosclerosis."

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.

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EACTS course in Minimally Invasive Techniques in Adult Cardiac Surgery (MITACS)

Peyman Sardari Nia Maastricht, The Netherlands, Course founder and Director

The implementation of new developments and the applicvation 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 teamwork 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, MUMC, 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

INSIDE MILAN

Where to go? What to do?

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 Sbagliatos* 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*.

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.

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.

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.

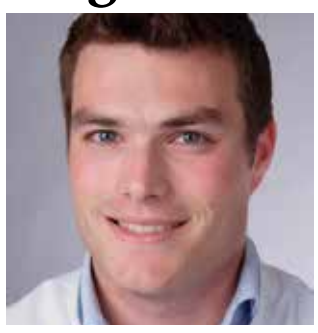
DRY

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 veno-arterial extracorporeal life support (ECLS) might improve survival in patients with severe cardiogenic shock[1]. However, ECLS is associated with a high rate of complications, especially with prolonged therapy[2], an in particular, ECLS leads to an increase in left ventricular (LV) afterload[3].

The Impella 5.0 (Abiomed, USA) – a micro-axial, catheter-based, transaortic left ventricular assist device (LVAD) – seems to be a less invasive alternative with equivalent haemodynamic support, if right ventricular and pulmonary function allow switching from ECLS to LV support only[4].

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[5]. Additionally, durable left ventricular assist device (LVAD) implantation is contraindicated in patients with unclear neurologic status especially after resuscitation according to the ISHLT recommendations[6].

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[7,8]. 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 third of patients survived with good neurologic outcome 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 neurological 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.

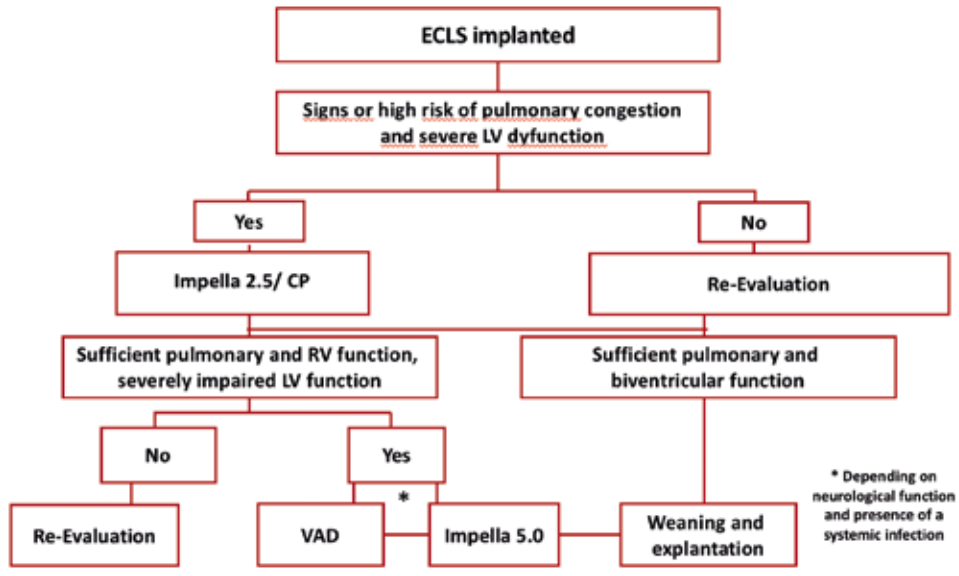


FIGURE 1: Treatment algorithm for patients on extracorporeal life support (ECLS) at the University Heart Center Hamburg, Germany. VAD = ventricular assist device.

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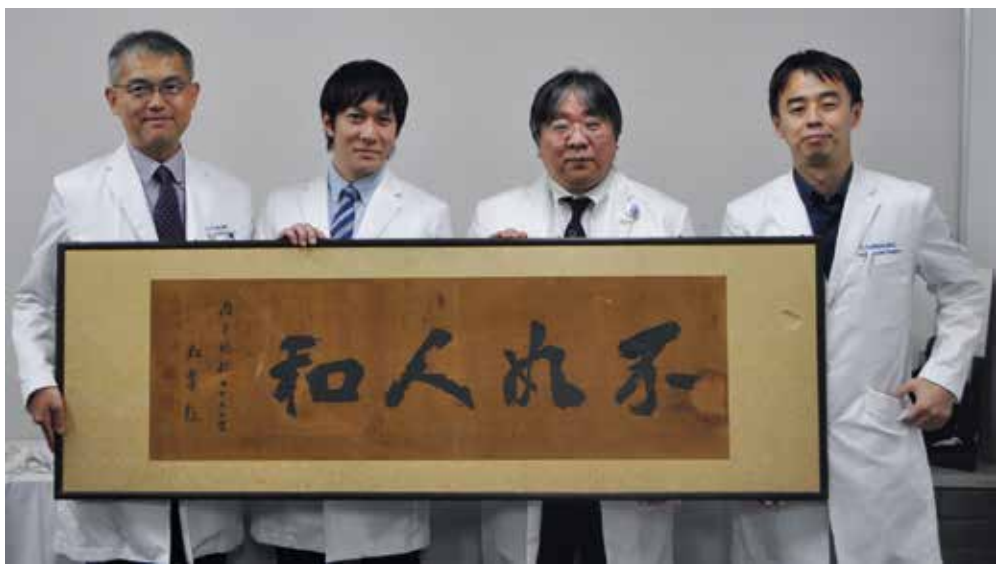
Cardiac | Focus Session | Aortic valve and root infection

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



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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.

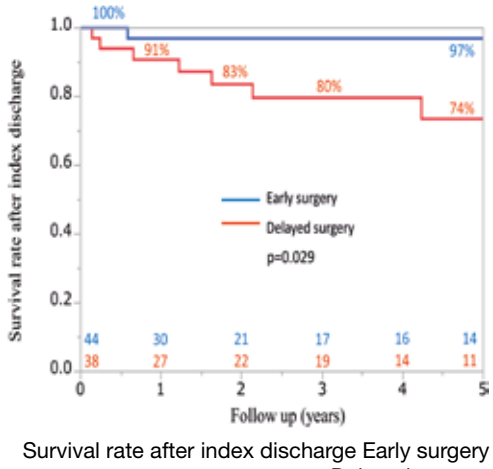
Methods

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.

	Delayed Surgery (n = 45)	Early Surgery (n = 45)	p Value
Operation time (min)	320 (271-391)	308 (247-364)	0.182
Cardiopulmonary bypass time (min)	177 (138-220)	160 (123-209)	0.360
Aortic cross-clump time (min)	129 (99-176)	124 (82-164)	0.476
Postoperative intubation periods	1 (0-2)	1 (1-4)	0.451
Requirement of postoperative CHDF	7 (16%)	7 (16%)	1.000
Hospital death, n(%)	7 (16%)	1 (2%)	0.058
Death from intracranial hemorrhage, n(%)	0 (0%)	1 (100%)	1.000
Death from multi organ failure, n(%)	3 (43%)	0 (0%)	0.242
Death from infection, n(%)	2 (29%)	0 (0%)	0.494
Neurologic deterioration, n (%)	2 (4%)	1 (2%)	1.000
Postoperative intracranial hemorrhage	2 (4%)	2 (4%)	1.000
Postoperative modified Rankin Scale	1.0 ± 1.8	1.1 ± 1.7	0.664

Early Surgery: Valve surgery within 3 days after CI diagnose

Perioperative results in patients with acute CI after propensity score match



Survival rate after index discharge Early surgery vs Delayed surgery

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 postoperative 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 after 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 80% 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.

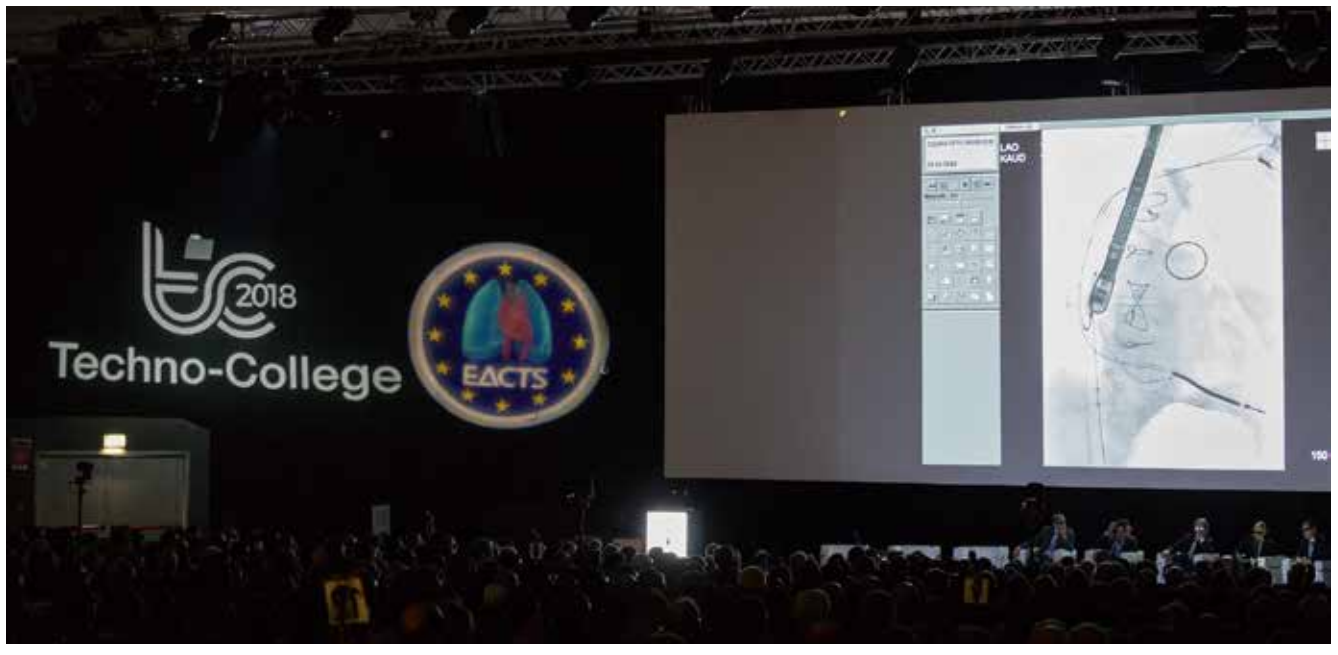
Live mitral valve repair using novel non-ring annuloplasty device

A live case from the team at Hamburg University Hospital, led by operators Lenard Conradi and Yvonne Schneeberger, 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, falling within NYHA functional class III and experiencing syncope with a logistic EuroSCORE I 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. He also suffered persistent atrial fibrillation and, in 2010, a pulmonary embolism.

The case showcased the use of the smart canula (Smartcanula LLC, Switzerland) for stenting of the superior vena cava, right atrium and portion of 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[1].



"The Mitral Bridge has a catheter extension in development, and this is very promising."

Lenard Conradi

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 downsizing 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 flare was corrected 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 Vinayak 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 MitraClip (Abbott Laboratories, USA), Dr Conradi responded: "It is not really rigid. It has a nitinol 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."

"We are working on a generation two [Mitral Bridge], which is a removable bridge."

Valavanur Subramanian

Mitral Bridge founder Valavanur Subramanian (New York, USA) was also present, and commented on some of its key features: "It not only reduces the septolateral 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 septolateral 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 tearing of the Mitral Bridge, given the distribution of the tension via sutures 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 pledgets instead of non-pledgeted simple sutures as for regular mitral valve repair. Mechanistically, 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.

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Cardiac | Rapid Response | Living with a ventricular assist device - living with problems?

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-CE Mark 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 JHLT (Strueber, et al), and a follow-up analysis of long-term outcomes was published in the October 2016 issue of *EJCTS* (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 on 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 designs 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 patients in 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.

Cardiac | Rapid Response | Put your lead vest on: Transcatheter aortic valve implantation under rapid fire

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

Emiliano Navarra and Parla Astarci Cliniques universitaires Saint-Luc, Brussels, Belgium

Figure 1: Prototype of the AVATAR device suitable for conventional AVR

Figure 2: Circular orifice obtained after the resection

Figure 3: Tip of the device

The calcifications of the aortic valve are responsible for most of the problems during catheter-based valve implantations (TAVI). Several complications are described: deformation of the stent and paravalvular leaks, occlusion of coronary ostia, and embolisation of debris. The AVATAR consortium is developing a new device to resect the aortic valve during TAVI.

Our report presents the initial experience in-human 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 candidates 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 than is pushed to the counter-cone to stabilise the calcified leaflets. Once the valve is isolated, 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 resection 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.

Congenital | Abstract | Surgery in adults presenting with congenital heart disease

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. Marathe[1,2], Douglas Bell[2,3], Kim Betts[4], Sajid Sayed[5], Benjamin Dunne[5], Cameron Ward[1,2], Chris Whight[3], Homayoun Jalali[3], Prem Venugopal[1,2], David Andrews[5], Nelson Alphonso[1,2] 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

Reconstruction of the right ventricular outflow tract (RVOT) along with implantation or replacement of the pulmonary valve using a right ventricle (RV) to pulmonary artery (PA) valved 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 valves. Each of these options have unique advantages and disadvantages which influence 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.

Supreet Marathe

Methods

All patients up to 20 years of age years at the time of pulmonary valve replacement between 2000 and 2017 were identified 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 trans-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%, 89% and 31% at 5,10 and 15 years respectively for the Freestyle™ valves (n = 52). Freedom from structural valve degeneration (SVD) was 92%, 87% and 77% at 5,10 and 15 years respectively with homografts and 96%, 80% and 14% at 5,10 and 15 years respectively with Freestyle™ valves.

In the first 10 years there was no difference in outcomes [reintervention HR = 0.69 (0.20, 2.42), p = 0.563; SVD HR = 0.92 (0.34, 2.51), p = 0.869].

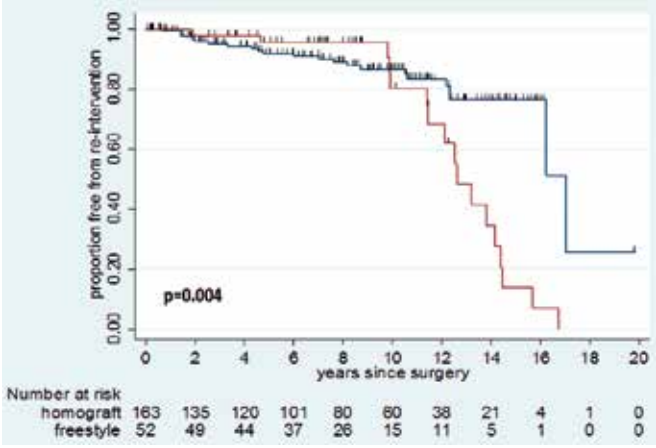
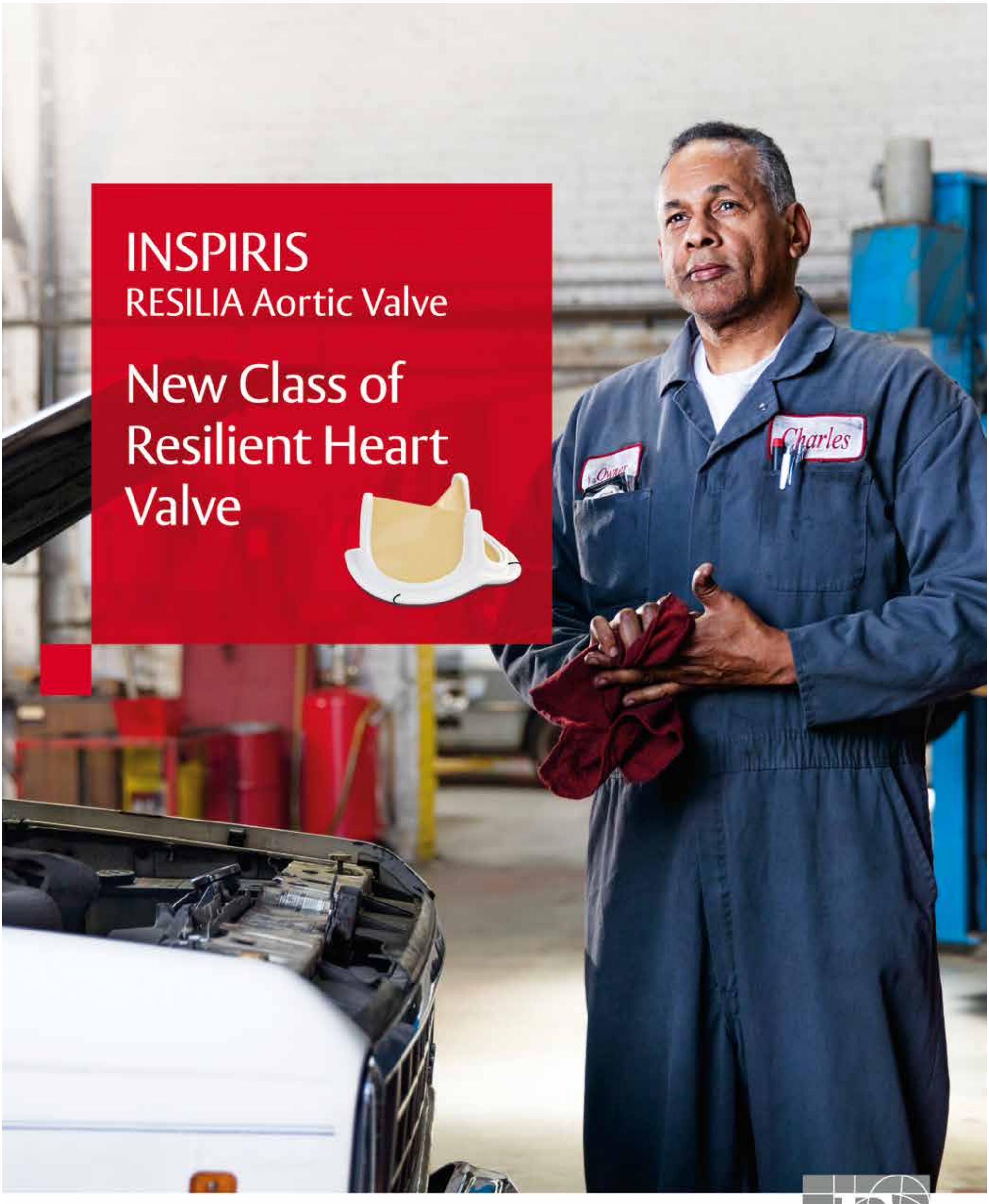


Figure. Kaplan-Meier curves depicting freedom from reintervention for pulmonary homografts (blue) with Freestyle™ valves (red). Black ticks indicate censor marks.

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 pulmonary 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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Edwards

Cardiac | Focus Session | Myocarditis, acute myocardial infarction and hypertrophic obstructive cardiomyopathy remodelling

Acute myocardial disease is a systemic disease:
The interconnection between the heart and the brain

James T Thackeray
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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.

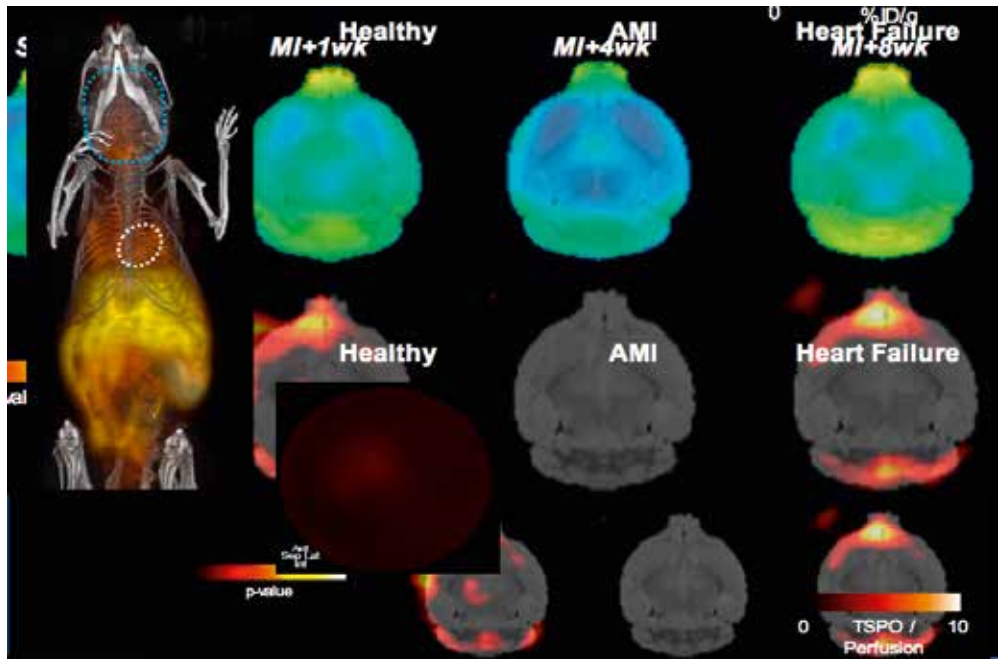

Figure. Whole body PET imaging (left) demonstrates upregulation of TSPO in the anterolateral infarct territory of the left ventricle polar maps (lower panel) with parallel neuroinflammation in acute myocardial infarction (AMI). Chronic heart failure results in increased TSPO signal in the remote myocardium and recurrent signal in the brain. These whole-body PET images demonstrate the systemic consequences of acute ischaemia in the heart-brain axis. Assembled using data from Thackeray et al. J Am Coll Cardiol. 2018;71:263-75.

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 colocalisation 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.

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Cardiac | Rapid Response | Optimisation of cardiac function and underlying mechanisms in cardiac surgery

Is there a renoprotective value to leukodepletion during heart valve surgery? an external feasibility randomised controlled trial

Espeed Khoshbin 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 394 potentially eligible patients, 64 consecutive adult participants were randomised. Thirty-three patients received leukodepleting filters (LG-6) versuas 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 blinding 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, less 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%(6) and 12%(3) 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)

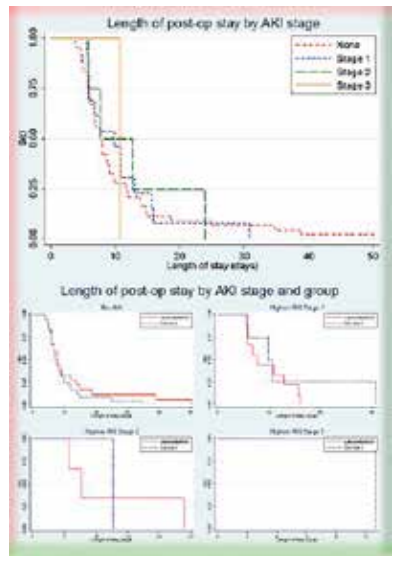

Figure 1. Relationship between development of AKI and length of hospital stay

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% (219/8550) 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 unlikely 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.

Congenital | Rapid Response | Rapid fire - Congenital 3

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 if not definitive solution for aortic pathology. The percentage of reoperations after the Ross procedure is not negligible, and the complexity of the surgical procedure requires a good level of surgical experience. Choosing to do the Ross operation is not always easy; it requires a delicate interview with the patient to explain what may happen in the future.

We wanted to see the outcomes and quality of life in this group of patients, therefore we asked a subgroup of patients – all of whom had undergone the Ross procedure despite an aortic ring of adequate size to facilitate aortic valve replacement with mechanical prosthesis – if, with hindsight, they would make the same choice again.

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), 55 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 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

8:15	Degenerative mitral regurgitation: Bespoke management	Amber 1&2	Adult Cardiac
8:15	Conflicting evidence on patient-prosthesis-mismatch	Amber 3	Adult Cardiac
8:15	Modern antithrombotic therapy after cardiac surgery	Amber 5	Adult Cardiac
8:15	Innovations in thoracic surgery	Amber 6	Thoracic
8:15	Flow analysis and annulus modification after valve sparing surgery	Amber 7	Vascular
8:15	Heart failure and mechanical circulation	Botticelli	Congenital
8:15	The Ross procedure solves all problems!	Brown 2	Adult Cardiac
8:15	Minimising neurological risk in coronary surgery	Brown 3	Adult Cardiac
8:15	Circuit of life	Michelangelo	Adult Cardiac
8:15	MMCTS Video cases – Vascular bailouts	Raphael	Vascular
8:15	Rapid Response 1 – Thoracic	Titian	Thoracic
	Break		
9:30	Tetralogy of Fallot and pulmonary atresion / ventricular septal defect : Part 1	Botticelli	Congenital
9:30	Relevant factor determining outcome after cardiac surgery	Michelangelo	Adult Cardiac
9:30	EACTS-STS – Treatment of type B aortic dissection in the era of stent-grafting – Acute dissection	Raphael	Vascular
9:30	Expert experiences with drafting your manuscript	Suite 5	General
9:30	Oncology 1	Titian	Thoracic
9:30	Trachea/airway	Amber 6	Thoracic
9:30	New technology meets common practice – How to enhance your surgical portfolio	Auditorium	Adult Cardiac
11:00	Thoracic Mixed	Amber 4	Thoracic
11:00	Tetralogy of Fallot & pulmonary atresion / ventricular septal defect. Part II	Botticelli	Congenital
11:00	Pulmonary thrombosis and hypertension and ventricular complications of myocardial infarction	Michelangelo	Adult Cardiac
11:00	EACTS-STS – Treatment of type B aortic dissection in the era of stent-grafting – Chronic dissection	Raphael	Vascular
11:00	Insights into clinical trials	Suite 5	General
11:00	Time-pressured reactions to avoid casualties in type A dissections	Titian	Vascular
	Lunch		
12:45	Transcatheter aortic valve implantation training	Amber 7	Adult Cardiac
14:15	Transcatheter valve-in-valve implantation 2018	Amber 1&2	Adult Cardiac
14:15	Think Tank on European Cardio-Thoracic Surgery Training: Next Steps?	Amber 3	General
14:15	Oncology 2	Amber 4	Thoracic
14:15	Coronary Artery Disease, Experimental Myocardial infarction and Heart Regeneration	Amber 5	Adult Cardiac
14:15	HOCM	Amber 6	Adult Cardiac
14:15	The tricuspid valve dilemma: between confirmations and denials	Botticelli	Adult Cardiac
14:15	Nightmares in end stage heart failure	Brown 1	Adult Cardiac
14:15	Classics and novelties in the technical aspects of coronary artery bypass grafting	Brown 2	Adult Cardiac
14:15	Functional mitral valve disease	Brown 3	Adult Cardiac
14:15	Atrial fibrillation surgery: room for improvement	Michelangelo	Adult Cardiac
14:15	Working from inside the aorta with surgical input	Raphael	Vascular
14:15	Analyzing survival and events during follow-up	Suite 5	General
14:15	Rapid Response – Congenital	Titian	Congenital
14:15	Hands-on Training Atrial Fibrillation	EACTS Training Village	Adult Cardiac
14:15	A practical approach to aortic valve repair	Auditorium	Adult Cardiac
	Break		
16:00	Prediction and avoidance of complications in transcatheter procedures	Amber 1&2	Adult Cardiac
16:00	Nightmares in cardio-thoracic surgery (Residents)	Amber 3	Adult Cardiac
16:00	Beyond conventional risk scores: Predicting mortality and serious morbidity	Amber 4	Adult Cardiac
16:00	Controversies & catastrophes in adult cardiac surgery	Amber 5	Adult Cardiac
16:00	Update on molecular biology in lung cancer – for surgeons	Amber 6	Thoracic
16:00	The host beyond valve surgery	Amber 7	Adult Cardiac
16:00	Surgical videos	Botticelli	Congenital
16:00	How do I start my coronary practice: The devil is in the details	Brown 1	Adult Cardiac
16:00	Minimally invasive mitral valve surgery – start up tool box	Brown 3	Adult Cardiac
16:00	Optimising perioperative care in cardiac transplantation	Michelangelo	Adult Cardiac
16:00	Strategies to minimize end-organ damage in aortic surgery	Raphael	Vascular
16:00	EACTS/PASCaTS Joint Session	Suite 5	Adult Cardiac

Friday 19 October

8:15	How to do it (video)	Amber 3	Adult Cardiac
8:15	Repeat before you treat	Amber 4	Adult Cardiac
8:15	Heart transplantation	Amber 5	Adult Cardiac
8:15	Oligometastatic disease	Amber 6	Thoracic
8:15	Mechanical assist devices, extracorporeal support and left ventricular remodelling matrices	Amber 7	Adult Cardiac
8:15	Ventricular assist device therapy: Problem or solution	Amber 8	Adult Cardiac
8:15	New developments in left main disease	Auditorium	Adult Cardiac
8:15	Congenital miscellaneous	Botticelli	Congenital
8:15	Surgical aortic valve replacement from bench to bedside	Brown 2	Adult Cardiac
8:15	Standard of care for P2 prolapse?	Brown 3	Adult Cardiac
8:15	A Journey in coronary artery bypass surgery	Michelangelo	Adult Cardiac
8:15	“Gut feeling”: management for type A dissection while awaiting evidence. PART 1	Raphael	Vascular
8:15	Expert experiences with science: starting a new project	Suite 5	General
8:15	Non-oncology	Titian	Thoracic
8:15	Introduction to mitral valve repair: Wetlab	EACTS Training Village	Adult Cardiac
8:15	How to become a hybrid surgeon	Brown 1	Adult Cardiac
	Break		
10:00	Surgery for functional mitral regurgitation: potential for improvements!	Amber 1&2	Adult Cardiac
10:00	Is less more? Hybrid and minimally invasive coronary revascularisation	Amber 3	Adult Cardiac
10:00	New strategies to reduce bleeding beyond prolene	Amber 4	Adult Cardiac
10:00	The new kid in town	Amber 5	Adult Cardiac
10:00	Rare thoracic cancers (EUROCAN)	Amber 6	Thoracic
10:00	Work in progress	Amber 7	General
10:00	New data in atrial fibrillation ablation	Amber 8	Adult Cardiac
10:00	Trial update – ART, IMPAG and MITRA FR & COAPT	Auditorium	Adult Cardiac
10:00	Long-term outcome after surgical repair in congenital heart disease	Botticelli	Congenital
10:00	Mechanical Circulatory Support (ventricular assist device)	Brown 2	Adult Cardiac
10:00	Choosing the best valve sparing technique and how they compare with Bentalls	Brown 3	Adult Cardiac
10:00	Infections and malignancy in cardiac surgery	Michelangelo	Adult Cardiac
10:00	“Gut feeling”: management of type A dissection while awaiting evidence. Part 2	Raphael	Vascular
	Break		

Abstract | Focus session | Rapid response | Techno College | Professional challenge | Hands-on training | Plenary

11:45	The importance of simulation training for CT surgeons	Amber 1&2	Adult Cardiac
11:45	Work life balance/ Diversity in cardio-thoracic surgery	Amber 3	Adult Cardiac
11:45	Optimizing outcomes of extracorporeal life support therapy	Amber 4	Adult Cardiac
11:45	TAVI registries: Outcomes, impact and access in different countries	Amber 5	Adult Cardiac
11:45	2018 ESC/EACTS Guidelines on myocardial revascularisation	Auditorium	Adult Cardiac
11:45	Regenerative medicine hypoxia preconditioning and inflammation translation from bench to clinical practice	Brown 1	Adult Cardiac
11:45	Tips and tricks to optimise your endocarditis practice	Brown 2	Adult Cardiac
11:45	Settling the on vs off pump debate	Brown 3	Adult Cardiac
11:45	PCI: Friend and foe	Michelangelo	Adult Cardiac
11:45	Let the pachyderm proboscis freeze: FET experience is increasing	Raphael	Vascular
11:45	Flying over the arch with a parachute on board	Titian	Vascular
11:45	Quality Improvement Using Data: International Experience	Amber 8	Adult Cardiac
11:45	Thoracic – Featured abstracts	Amber 6	Thoracic
	Lunch		
13:00	How to set up and run a ventricular assist device programme	Amber 3	Adult Cardiac
13:00	Oesophagus	Amber 7	Thoracic
13:00	Nightmare cases & unsolved clinical problems	Botticelli	Congenital
13:00	ECMO/ECLS	Brown 2	Adult Cardiac
13:00	Dusk or dawn for SAVR?	Michelangelo	Adult Cardiac
13:00	Endovascular fix of open failure	Raphael	Vascular
13:00	Meta-analyses: breaking down different methods	Suite 5	General
13:00	Interventional Therapies	Auditorium	Adult Cardiac
13:00	Jeopardy	Titan	General
	Break		
14:15	Teaching root repair techniques by experts	EACTS Training Village	Adult Cardiac
14:45	LVAD Outpatient Management	Amber 3	Adult Cardiac
14:45	Rapid Fire – Congenital 2	Amber 4	Congenital
14:45	Open access – who is paying the bill: the reader or the writer?	Amber 6	Thoracic
14:45	Second conduit: choices beside RITA	Amber 7	Adult Cardiac
14:45	Optimised perfusion	Brown 2	Adult Cardiac
14:45	New solutions in mitral repair: come and see!	Michelangelo	Adult Cardiac
14:45	The bigger picture – from aortic surgery towards comprehensive aortic medicine	Raphael	Vascular
14:45	The propensity score: opening a black box	Suite 5	General
14:45	Chest Wall	Titian	Thoracic
	Break		
16:30	Key technical points in coronary surgery	Amber 1&2	Adult Cardiac
16:30	Ventricular Assist Devices	Amber 3	Adult Cardiac
16:30	Thymic surgery	Amber 4	Thoracic
16:30	The role of the cardiac surgeon during lead extraction	Amber 5	Adult Cardiac
16:30	Enhanced recovery in thoracic surgery	Amber 6	Thoracic
16:30	“Cold” Topics in Heart Transplantation	Amber 7	Adult Cardiac
16:30	Endocarditis: a battle in different directions	Amber 8	Adult Cardiac
16:30	Progress in TEVAR/EVAR	Auditorium	Adult Cardiac
16:30	Surgical videos 2	Botticelli	Congenital
16:30	Aortic valve and root infection	Brown 1	Adult Cardiac
16:30	Tough clinical decisions for improved sAVR therapies	Brown 2	Adult Cardiac
16:30	From basics to challenges in mitral valve surgery	Brown 3	Adult Cardiac
16:30	Outside the box (Residents)	Michelangelo	General
16:30	Breaking old concepts on acute aortic dissections	Raphael	Vascular
16:30	EACTS Aviation task force and NATO Research Task Group – safe surgery for safe flights	Suite 5	Adult Cardiac
16:30	Challenges in mitral surgery	Titian	Adult Cardiac

Saturday 20 October

8:15	Aortic valve surgery made cosmetic	Amber 1&2	Adult Cardiac
8:15	Rare and uncommon diseases	Amber 3	Adult Cardiac
8:15	EUROMACS	Amber 4	Adult Cardiac
8:15	S.O.S. – Save our surgeon! critical situations in cardio-thoracic surgery	Amber 5	Adult Cardiac
8:15	Enhanced recovery after surgery (ERAS)	Amber 7	General
8:15	Single ventricle 1: Can we avoid univentricular palliation	Botticelli	Congenital
8:15	Heart team perspective in atrial fibrillation	Brown 1	Adult Cardiac
8:15	Challenges and solutions in proximal aortic diseases	Brown 2	Vascular
8:15	Evidence based decision making in transcatheter aortic valve implantation	Brown 3	Adult Cardiac
8:15	Living with a ventricular assist device – living with problems?	Michelangelo	Adult Cardiac
8:15	Myocarditis, acute myocardial infarction and hypertrophic obstructive cardiomyopathy remodelling	Suite 5	Adult Cardiac
8:15	Put your lead vest on: Transcatheter aortic valve implantation under rapid fire	Titian	Adult Cardiac
8:15	Coronary	EACTS Training Village	Adult Cardiac
8:15	Anatomical segmentectomies	Amber 6	Thoracic
8:15	Managing patients with multi-vessel disease in the modern era	Auditorium	Adult Cardiac
	Break		
10:00	Bicuspid aortic valve repair: I do the best technique for my patient	Amber 1&2	Adult Cardiac
10:00	The right solution for the right ventricle	Amber 3	Adult Cardiac
10:00	How to train the next generation of cardiovascular surgeons – Joint EACTS/ BSCVS	Amber 4	Adult Cardiac
10:00	The cardiac surgeon and the anesthesiologist tell each other what is important to make a decision for their patient Joint Session EACTS – EACTA	Amber 5	Adult Cardiac
10:00	Zooming in topics	Amber 7	General
10:00	Single ventricle 2: Can we optimise univentricular palliation?	Botticelli	Congenital
10:00	Left atrial appendage management in the direct oral anticoagulants era	Brown 1	Adult Cardiac
10:00	Challenging the guidelines in thoracic aortic surgery	Brown 2	Vascular
10:00	From tricuspid valve repair to transcatheter replacement options	Brown 3	Adult Cardiac
10:00	Emerging trends in tricuspid valve repair surgery	Michelangelo	Adult Cardiac
10:00	Career development	Suite 5	General
10:00	Jeopardy Final	Titan	General
11:45	Presidential Address & Awards	Auditorium	General
	Lunch		
12:45	Allied Health – Abstracts	Amber 7	General
12:45	Residents lunch	Panorama Lounge	General
14:15	Surgery for ground glass opacities – a waste of time?	Amber 6	Thoracic
14:15	Allied Health – Workshop	Amber 7	General
14:15	Surgery in adults presenting with congenital heart disease	Botticelli	Congenital
14:15	Aortic arch repair – The brain in focus	Brown 2	Vascular
14:15	Optimisation of cardiac function and underlying mechanisms in cardiac surgery	Michelangelo	Adult Cardiac
14:15	The Lion’s den and emerging technologies	Auditorium	Adult Cardiac
14:30	Ross procedure (Reinforced Ross, Root or subcoronary Ross)	EACTS Training Village	Congenital
	Break		
16:00	Film – Thoracic	Amber 6	Thoracic
16:00	Thoracoabdominal aorta surgery – standards and perspectives	Brown 2	Vascular
16:00	Rapid fire – Congenital 3	Titian	Congenital

Cardiac | Rapid Response | Emerging trends in tricuspid valve repair surgery

Early outcomes of transcatheter tricuspid valve-in-valve implantation: a case series

Guilherme Viotto, 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

Within 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.

A total of seven patients underwent transcatheter tricuspid ViV implantation at our institution from November 2015 to December 2017. The baseline diagnoses were: 3 Ebstein's Anomaly; 1 Tetralogy of Fallot; 1 neonatal endocarditis; 1 ventricular septal defect with double tricuspid lesion; and 1 rheumatic mitral and tricuspid valve, the patient of which underwent a combined transapical mitral and transjugular tricuspid valve-in-valve implantation. The mean age was 33 ± 10,8 years and 57.1% of patients were male. Mean previous thoracotomies was 3 ± 2 (range 1–5) and the mean follow-up was 1.24 years (Table 1).

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.

Case	Age (y)	Gender	NYHA class	Native TV pathology	No. Prior surgeries	RV dysfunction Pre-op	EuroSCORE II	Years since last surgery	Bioprosthetic TV size (mm)
1	32,4	M	II	EBSTEIN	3	Moderate	2,07	14,73	29
2	21,8	M	II	ENDOCARDITIS	5	None	1,52	11,63	27
3	42,5	F	IV	EBSTEIN	2	Severe	2,52	35,24	Unknow
4	16,3	M	III	T4F	5	Moderate	1,52	4,61	29
5	34,4	F	II	VSD+ DTL	4	None	2,81	13,68	Unknow
6	36,8	M	IV	RHEUMATIC MITRAL AND TRICUSPID	4	Moderate	2,86	19,49	Unknow
7	46,9	F	II	EBSTEIN	1	Moderate	2,09	14,26	35

Legend: Y: Years; NYHA: New York Heart Association; TV: Tricuspid Valve; No: number of; RV: Right ventricle; Pre-op: Preoperative; T4F: Tetralogy of Fallot; VSD: Ventricular Septal Defect; DTL: Double Tricuspid Lesion; M: Male; F: Female.

Table 2 - Procedure technical and data.

Case	Indication	Mean gradient Pre-op (mmHg)	Mean gradient Post-op (mmHg)	Regurgitation Pre-op	Regurgitation Post-op	RV dysfunction Post-op	TV size (mm)
1	TR+TS	11	7	Severe	Mild	Moderate	26
2	TR+TS	12	5	Moderate	None	None	24
3	TR+TS	9	7	Severe	None	Moderate	28
4	TR+TS+MS	19	7	Moderate	Mild	Moderate	28
5	TR+TS	12	6	Moderate	None	None	30
6	TR+TS	9	4	Moderate	None	None	30
7	TR+TS	13	5	Moderate	None	Moderate	30

Legends: TR: Tricuspid Regurgitation; TS: Tricuspid Stenosis; MS: Mitral Stenosis; RV: Right Ventricular; mmHg: millimetres of mercury; Pre-op: Preoperative; Post-op: Postoperative; TV: Transcatheter Valvular; 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

TERUMO Aortic | Powered by Bolton & Vascutek

Thoracic | Rapid Response | Rapid Response 1 - Thoracic

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

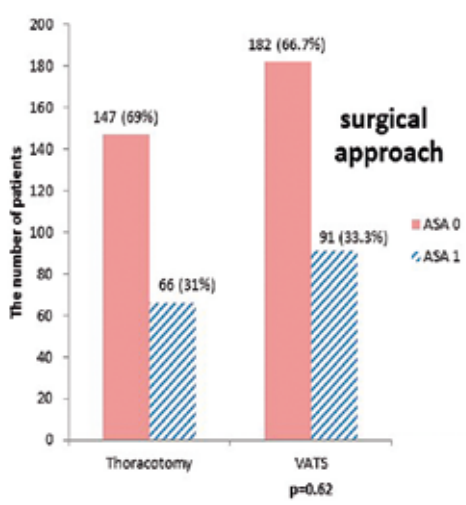
Davor Stamenovic, Thomas Schneider and Antje Messerschmidt
ViDia Christian Clinics
Karlsruhe, Germany

Acetylsalicylic acid (ASA) is a medication widely used for primary and secondary prevention of cardiovascular diseases – the leading cause of morbidity and mortality worldwide. However, in the thoracic surgical setting in particular it still remains controversial whether to continue or pause ASA in the perioperative period.

Our study is a single-centre retrospective study of 489 patients undergoing anatomical lung resection in our clinic from January 2013 to December 2016, in which 329 patients did not use ASA (ASA-0 group) and 157 patients (ASA-1 group) continued taking aspirin (100mg).

Major outcome measures were blood loss during the operation and in the first five days postoperatively, as well as the amount and proportion of blood transfusions according to the Mercuriali formula. We also documented the need for reoperation due to haemothorax and/or bleeding. Moreover, the groups were compared with regards to their morbidity and mortality rate.

We found out there was no significant difference between the two groups in terms of intra-operative bleeding (p = 0.58) or total blood loss (p = 0.95),



nor was there was a difference according to the number of transfusions received up to the fifth postoperative day between groups (p = 0.66). Even the indication for reoperation due to bleeding was similar between the groups (p = 0.69).

What one could say is that there was a trend towards higher rates of postoperative complications in the ASA-1 group (p = 0.055), whereas neither cardiovascular complications nor death were more frequent in any of the groups (p = 0.73).

In summary, patients receiving aspirin therapy undergoing anatomical lung resection seem not to be at any disadvantage regarding bleeding. However, they do show a trend towards higher rate of postoperative complications due to their comorbidities.

Vascular | Focus Session | Aortic arch repair – The brain in focus

Effectiveness of embolic protection filter devices for cerebral protection in endovascular aortic arch repair in significant aortic atheroma patients

Kazuo Shimamura[1], Toru Kuratani[2], Keiwa Kin[1], Takayuki Shijo[2], Kenta Masada[1], Yoshiki Sawa[1]
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 atheroma was a significant risk factor, with a stroke rate of 16.7–37.0% in high grade atheroma patients. Filter devices have been used as a distal embolic protection method in several endovascular procedures, however their usefulness for brain protection in TEVAR have not been investigated thoroughly enough. Therefore, the present study was conducted to evaluate the effectiveness of filter devices as a technique to prevent embolic stroke in TEVAR, focusing on arch repair for high-risk patients with significant aortic atheroma.

In the present study, 22 patients (20 male, mean age, 79.0 years old, mean Logistic EuroSCORE 23.9%) with aortic arch/proximal descending aortic pathologies with significant aortic atheroma (atheroma grade ≥ II or more) and who were deemed unfit for conventional open surgery 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/DW-MRI study in case with neurological deficit. The atheroma grade of the aortic arch were II,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(18.1%) and 1 (4.5%) patients, respectively.

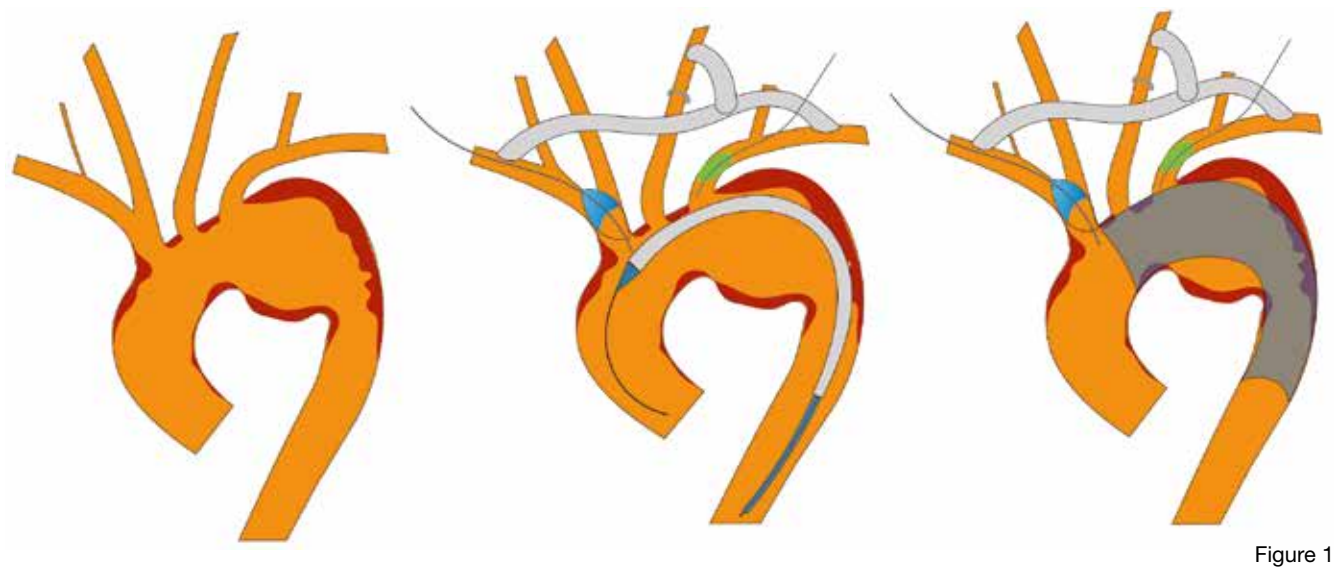


Figure 1

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 18 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. Although it is associated with technical complexity using current protection methods, filter protection could be an attractive adjunct maneuver to prevent critical stroke in endovascular arch repair.

Kazuo Shimamura

Toru Kuratani[2]

Congenital | Abstract | Surgery in adults presenting with congenital heart disease

Evaluation of functional capacity and quality of life in adolescents and adults with Tetralogy of Fallot after pulmonary valve implantation: the importance of preserving right ventricular function

Luiz F. Caneo[1], Luciana P. Amato[1], Aida L. R. Turquetto[1], Daniela R. Agostinho[1], Rodolfo A. Neirotti[2], Walter Ishikawa[1], Gabriela Liberato[1], Fabiana P. Hodas[1], Patricia A. de Oliveira[1], Milena S. R. Barnabe[1], Rilvani C. Gonçalves[1], Marcelo B. Jatene[1], Fábio B. Jatene[1] 1. Heart Institute, University of Sao Paulo Medical School, Sao Paulo, Brazil; 2. Michigan State University, Michigan, United States of America

Long-standing severe pulmonary regurgitation is a common cause of progressive right ventricle (RV) dilatation 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 of 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.

Luciana Amato and Luiz Caneo

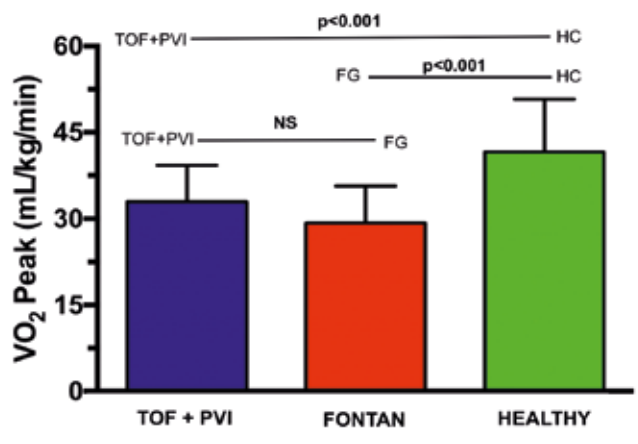


Figure 1.

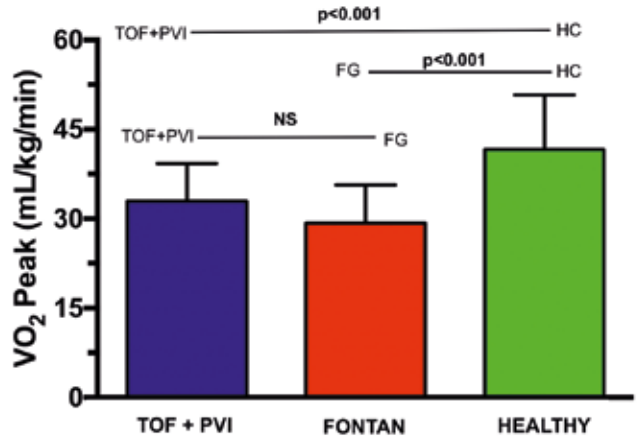


Figure 2.

FG: Fontan group; HC: healthy control; PVI: pulmonary valve implantation; TOF: tetralogy of Fallot

Cardiac | Focus Session | Key technical points in coronary surgery

Improving early outcomes after CABG

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

Improving quality in healthcare has been an aspirational goal since the time of Hippocrates, and was the impetus for the development of the Society of Thoracic Surgeons (STS) Database. Today, CABG accounts for the 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 [MABG]) 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 cord 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.
In two recent analyses (2,3) of multi-arterial 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 e 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, ensuring adequate 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 unavoidably encountered, 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."

EACTS | Endoscopic Port-Access Mitral Valve Repair Drylab Training

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 (MIMVR) thas 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 numbers of surgeons. For one, dexterity in open surgery is insufficient for starting a journey in MIMVR; new dexterity should be developed in endoscopy, the use of long-shafted instruments and in the placement of sutures on the mitral valve annulus. Therefore, the learning curve of MIMVS is steep.

I have developed and designed a minimally invasive mitral valve simulator at Maastricht University Medical Center (MUMC), the Netherlands. This simulator – which was awarded the Techno-College award in 2014 – enables residents, fellows and surgeons to develop skills in MIMVR and practice those skills endlessly.

During the past four years we have organised over 13 courses and trained over 150 surgeons from all over the globe during the EACTS Port-Access Mitral Valve Repair Drylab Training in Maastricht. 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 pathologic silicone replica.

Organiser
EACTS

Course director
Peyman Sardari Nia, MD, PhD

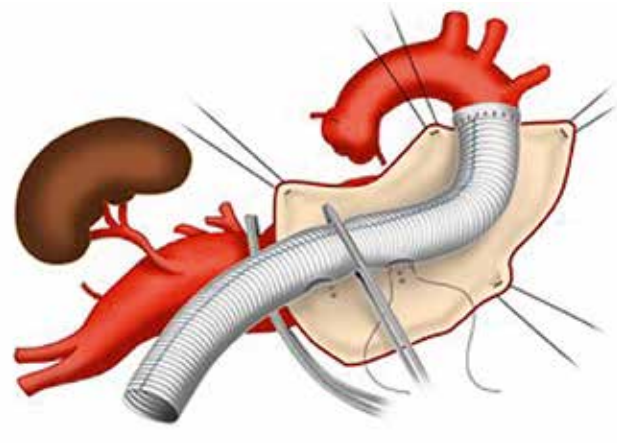
Venue:
Maastricht University Medical Center (MUMC), the Netherlands
Emtrac, Maastricht, the Netherlands

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

Vascular | Focus Session | Thoracoabdominal aorta surgery – standards and perspectives

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

Soichiro Henmi, Yuki Ikeno, Koki Yokawa, Yasuko Gotake, Hidekazu Nakai, Katsuhiro Yamanaka, Takeshi Inoue, Hiroshi Tanaka and Yutaka Okita Division of Cardiovascular Surgery, Department of Surgery, Kobe University Graduate School of Medicine, Kobe, Japan



Spinal 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 172 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 anastomosis (n = 38), or island reconstruction (n = 23). The hospital mortality was 5.7%. Twenty patients developed spinal cord ischaemic injury (permanent, n = 12 or 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 aneurysms 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 reoperation 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 Heijden[1], Mindy Vroomen[2], Rein Vos[3], Mark La Meir[4], Laurent Pison[2], Bart Maesen[1] 1. Department of Cardiothoracic Surgery, Maastricht University Medical Centre, Maastricht, the Netherlands; 2. Department of Cardiology Surgery, Maastricht University Medical Centre, Maastricht, the Netherlands; 3. Department of Methodology and Statistics, Maastricht University, Maastricht, the Netherlands; 4. Department of Cardiac Surgery, Vrije Universiteit Brussel, Universitair Ziekenhuis Brussel, Brussels, Belgium

As 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 epicardial 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).1 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 technique 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).

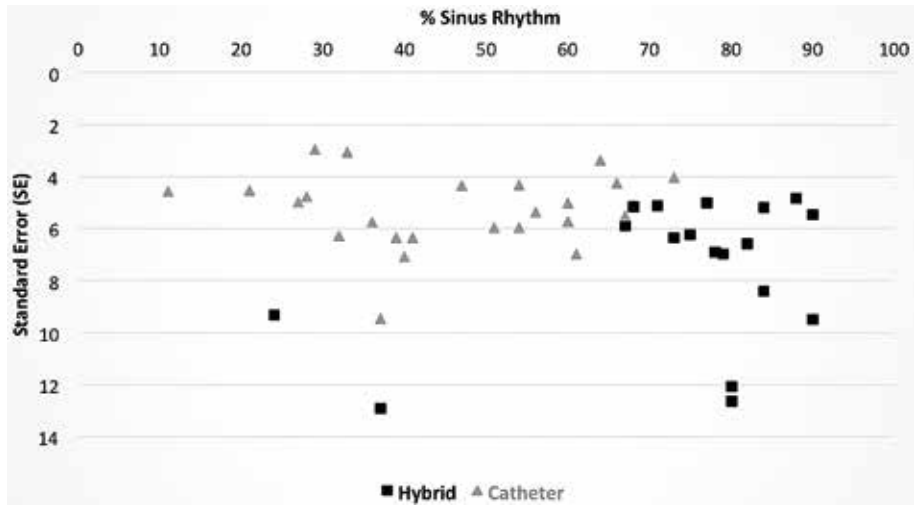


Figure 1: Funnel plot showing symmetrical distribution of studies indicating absence of publication bias. The percentage in sinus rhythm at the end of follow-up was plotted against the Standard Error (SE) of each included hybrid and catheter study in this review.

Our secondary outcome 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, heterogenic, 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

1. Bart Maesen, Laurent Pison, Mindy Vroomen, Justin G Luermans, Kevin Vernooy, Jos G Maessen, et al. Three-year follow-up of hybrid ablation for atrial fibrillation. Eur J Cardiothorac Surg 2018;53(suppl_1):i26-i32.

EACTS | Adult Cardiac Database / Quality Improvement Programme (QUIP)

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:

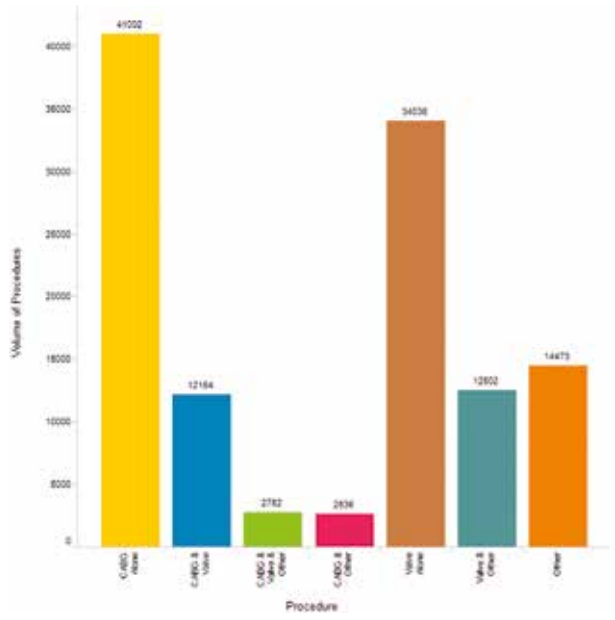
- Access the ACD dashboard and select which hospitals to compare
- Select hospitals with a volume-range of interventions, comparable to their own
- Use many filters, e.g. for patient age, procedures, urgency, logistic EuroSCORE etc.
- Download their hospital's bespoke report, which is automatically updated 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.



Volume of procedures in Adult Cardiac Database 2018

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

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 CAGB for complex CAD.

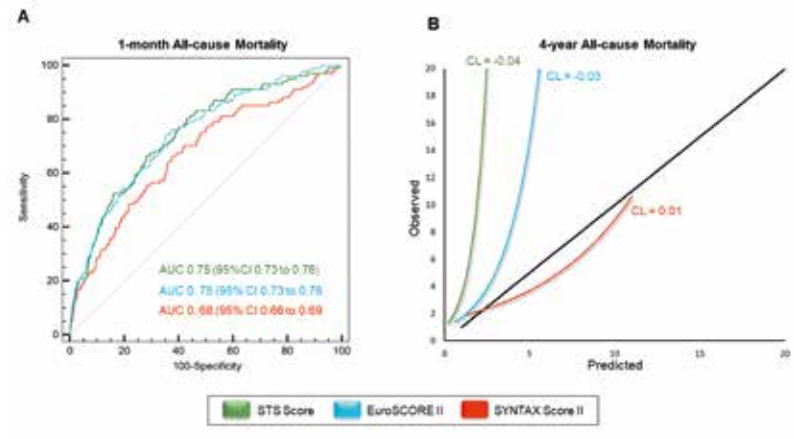
Methods

All patients with three-vessel and/or left main CAD of the Multicenter São Paulo's Cardiovascular Surgery Registry (REPLICCAR-1) that underwent isolated CABG 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 SS II 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.

Cardiac | Rapid Response | New solutions in mitral repair: come and see!

Magnetic resonance imaging for cerebral embolisations during right minithoracotomy 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%). Subgroup analysis showed no differences between the two clamping techniques (23.8% in the EAC group versus 31.8% in the TTC group, $p = 0.58$).

Conclusion

Preliminary outcomes of the present study show comparable results in terms of neurological events between the EAC and the TTC technique.

General | Focus Session | Allied Health – Workshop

"Keep your Move in the Tube" after heart surgery: evidence, translation and implementation of a paradigm shift towards physical activity for enhanced recovery

Doa El-Ansary[1], Jenny Adams[2], Richard Gach[3], Susan Triano[3] and Katijjahbe Mohd[4] 1. Swinburne University of Technology and Department of Surgery, Royal Melbourne Hospital, Melbourne, Australia; 2. Baylor Health, Texas, USA; 3. Memorial Regional Hospital, Department of Physical Therapy, Hollywood, Florida, USA; 4. Hospital Canselor Tuanku Muhriz, UKM Medical Centre, KL, Malaysia

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.

"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 and trunk 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.

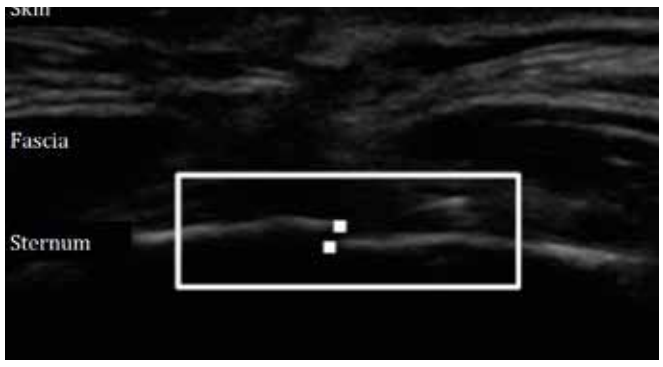


Figure 1. Real-time ultrasound image of the sternum following sternotomy during upper limb elevation (bilateral). Separation of the sternal edges in the coronal plane (lateral direction) is 0.1 mm and in the sagittal plane (antero-posterior direction) is 0.2 mm. White Squares = demark sternal edges.

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).[1,2] 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 far exceeded those produced by upper limb exercise, again highlighting the contradictory nature of "sternal precautions".[3]

More recently, Katijjahbe et al. (2018) conducted a randomised controlled study at the Department of Surgery in Melbourne, Australia, exploring a programme of standard sternal precautions compared to a programme of active upper limb participation, reporting no adverse events, and reinforcing the safety and feasibility of upper limb exercise.[4]

This research, coupled to literature that validates the safety and feasibility of moderate intensity excise 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.[5]

"Keep Your Move in the Tube"

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

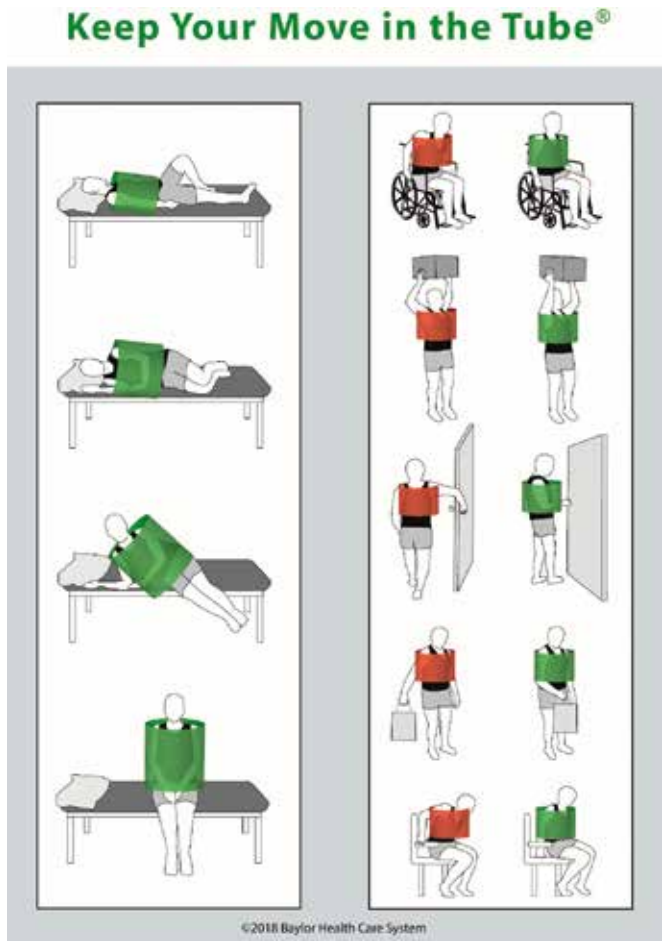


Figure 2: Keep Your Move in the Tube®

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."

Doa El-Ansary

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 You Move in the Tube for optimal patient care.

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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.

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EACTS | EUROMACS

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 pertinent?
- 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?

Twenty-eight proposals were registered between 1 January 2016 and 1 October 2018. Of these 28 proposals:

- Five were rejected
- Two studies are pending
- 10 studies are ongoing
- Four projects are in their last stage (writing before submission to a journal)
- 1 study has been submitted to the *EJCTS* and is presently under review
- Seven studies with EUROMACS data have been published in the past two years
- Contributions 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**

Expected developments

Presently, each participating centre can download its data from the EUROMACS Registry on a daily basis. The aim of EACTS is to offer its members a software tool with which they can administrate and analyse the clinical data of their own patients and compare their data with the entire registry. For this reason, a tool has been developed through which local data can be benchmarked on an international level. By using filters and selections of patient categories, more precise comparisons can be made. While the EUROMACS team is working on a possible migration of software, the benchmarking tool can be installed once the software migration has taken place.

Come join us at the EUROMACS Focus Session this morning, 08.15–09.45!

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 in Hamburg, Germany. *EACTS Daily News* caught up with Dr Bernhardt to talk about his perspectives on EUROMACS, past, present and future.

Dr Bernhardt, you're one of the surgeons who has participated in EUROMACS since the beginning of the Registry. What motivates you to keep on providing data for so many years?

My colleagues and I enter data from our patients on mechanical circulatory support into the EUROMACS Registry on a structural basis. There are two main reasons to do so: First, we contribute consistently to a database that serves our own purpose, to administrate all relevant clinical data for these patients; secondly, by contributing to EUROMACS, we are able to obtain anonymised data from all participants for scientific study projects.

The leading principle is that you can't manage it when you can't measure it; that keeps us motivated to register relevant therapeutic data.

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.

Do your patients object to sharing their de-personified data internationally?

No, very few patients object. I think the reason is that we have shown that these data are used for increasing the insights into the strengths and weaknesses of mechanical circulatory support therapy. Moreover, the EUROMACS Registry is owned by the EACTS, which is a non-profit charity and impartial.

Which insights have you gained from EUROMACS?

First of all, I must say that you can always ask any questions from EUROMACS and you 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.

Can you be more specific on that?

We've been following several publications with EUROMACS data over the years. At our Hamburg University Heart Center, we've been able to obtain data from EUROMACS that has made it possible to do analyses on factors such as gender differences and the outcomes of isolated RVAD implantations 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.

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

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. Additionally, I have learned that the EACTS has contracted a university-based processor that can offer us state-of-the-art software with which we can benchmark our data on a daily basis. The availability of such a tool will enable all participants to identify areas for improvement. The greatest benefit of gained insight is for our patients, because at the end of the day, [improvement in their care] is the aim we all strive for.

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 (VAD) 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 *EJCTS*.[1]

Theo de By The Hague, the Netherlands
Martin Schweiger Zurich, Switzerland
Oliver Miera Berlin, Germany

Statistical support

Statistical support was provided by the Quality and Outcomes Research Unit (QuORU) of the University Hospital Birmingham (UK). 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.

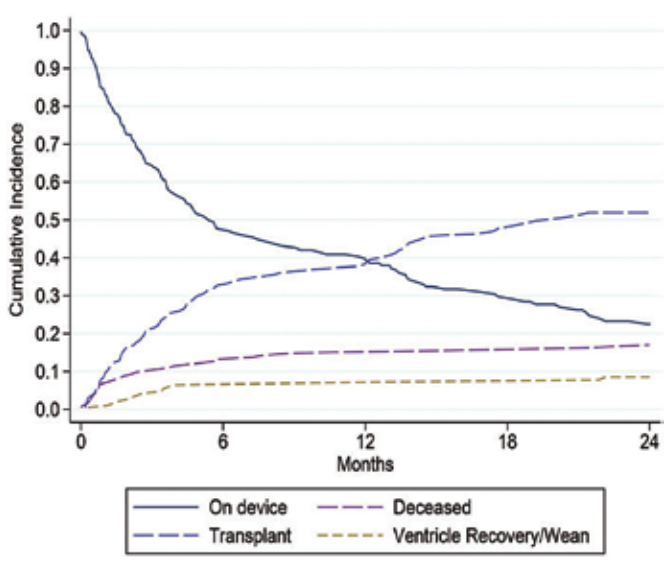

Figure 1.

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 additional 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 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 pulsatory 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[2]). 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.

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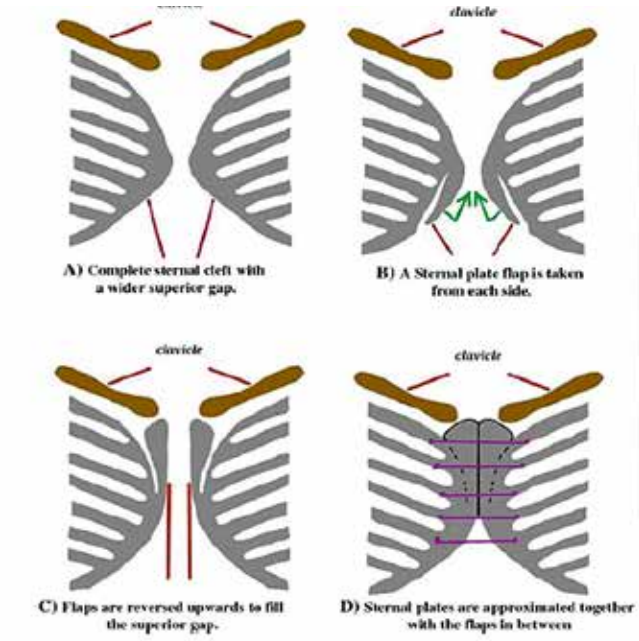
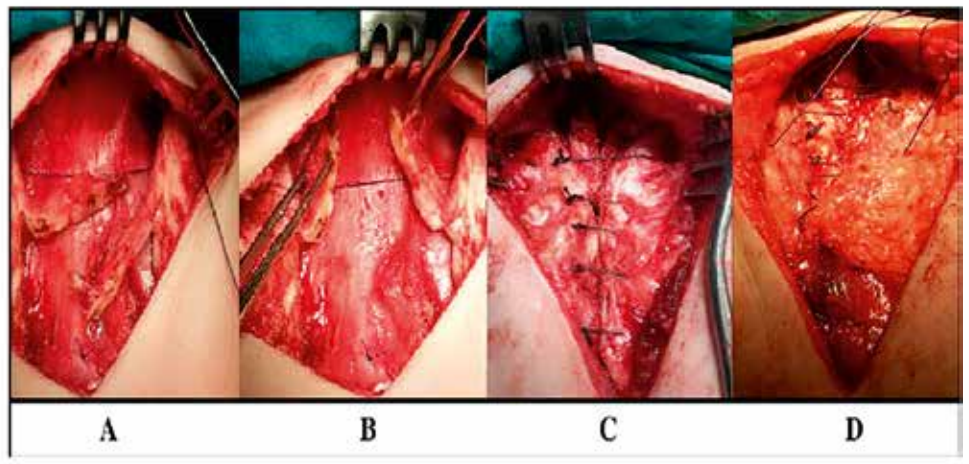
Thoracic | Rapid Response | Chest Wall

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.

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

Central vs. Peripheral cannulation approach for postcardiotomy VA-ECMO; does the cannulation technique influence the outcome?

Diyar Saeed University Hospital of Düsseldorf, Heinrich-Heine University, Düsseldorf, Germany

Postcardiotomy cardiogenic shock is a devastating complication after cardiac surgical procedures and is associated with a high mortality rate[1]. 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 (cannulation of femoral or axillary artery). The ideal cannulation approach (central vs. peripheral) for postcardiotomy cardiogenic shock is still unknown[2] 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 intraoperatively 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%) prior to VA-ECMO implantation.

	Central (N=28) (n, %) Mean ± SD	Peripheral (N=58) (n, %) Mean ± SD	P value
Age (years)	67 ± 11	69 ± 10	0,540
Body Mass Index	27 ± 7	27 ± 5	0.606
Sex (male n, %)	17 (61)	46 (79)	0,076
Euro II score (%)	19 ± 14	11 ± 10	0,007
X-Clamp time (min)	115 ± 48	88 ± 48	0,054
CPB time (min)	229 ± 57	180 ± 94	0,010
VA-ECMO Duration (days)	7 ± 7	7 ± 5	0,926
LVEF <30%	13 (46)	17 (29)	0,150
DM	10 (36)	25 (43)	0,641
AF	9 (32)	18 (31)	1,000
Elective procedure	10 (36)	21 (36)	1,000
Immediate intraoperative VA-ECMO	16 (57)	27 (47)	0,490
Chest left open after surgery	11 (39)	3 (5)	<0,001
IABP	11 (39)	28 (48)	0,493
LV Venting	3 (11)	4 (7)	0,678
Primary surgery			
CABG	12 (43)	33 (57)	0,255
CABG + AKR	4 (14)	5 (9)	0,465
CABG + MKR ± TKR	5 (18)	11 (19)	1,000
AKR	0 (0)	6 (10)	0,171
Other procedures	7 (25)	3 (5)	0,012

Table 1: Patients baseline characteristics

The majority of the patients underwent coronary artery bypass surgery (52%). 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 charachterstics. 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).

	Central (N=20) (n, %) Mean ± SD	Peripheral (N=20) (n, %) Mean ± SD	P value
Chest tube outcome in first 24 hours	1219 ± 651	1143 ± 1317	0,824
RBC Units transfused during the stay	48 ± 29	45 ± 31	0,755
Resternotomy for bleeding	9 (45)	9 (45)	1,000
Postoperative new onset dialysis	14 (70)	15 (75)	1,000
Postoperative liver failure	6 (30)	8 (40)	0,741
Postoperative neurological injury	3 (15)	2 (10)	0,605
Postoperative GI complications	2 (11)	1 (5)	0,712
Weaning from VA-ECMO	5 (25)	9 (45)	0,320
ICU stay (days)	16 ± 14	18 ± 19	0,638
In hospital mortality	15 (75)	11 (55)	0,320
Peripheral vascular complications	3 (16)	5 (25)	0,695

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

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 2 groups were observed except for higher rate of open chests in the central ECMO group (p = 0.020). However, outcome and complication rates remians similar between the 2 groups (Table 2).

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

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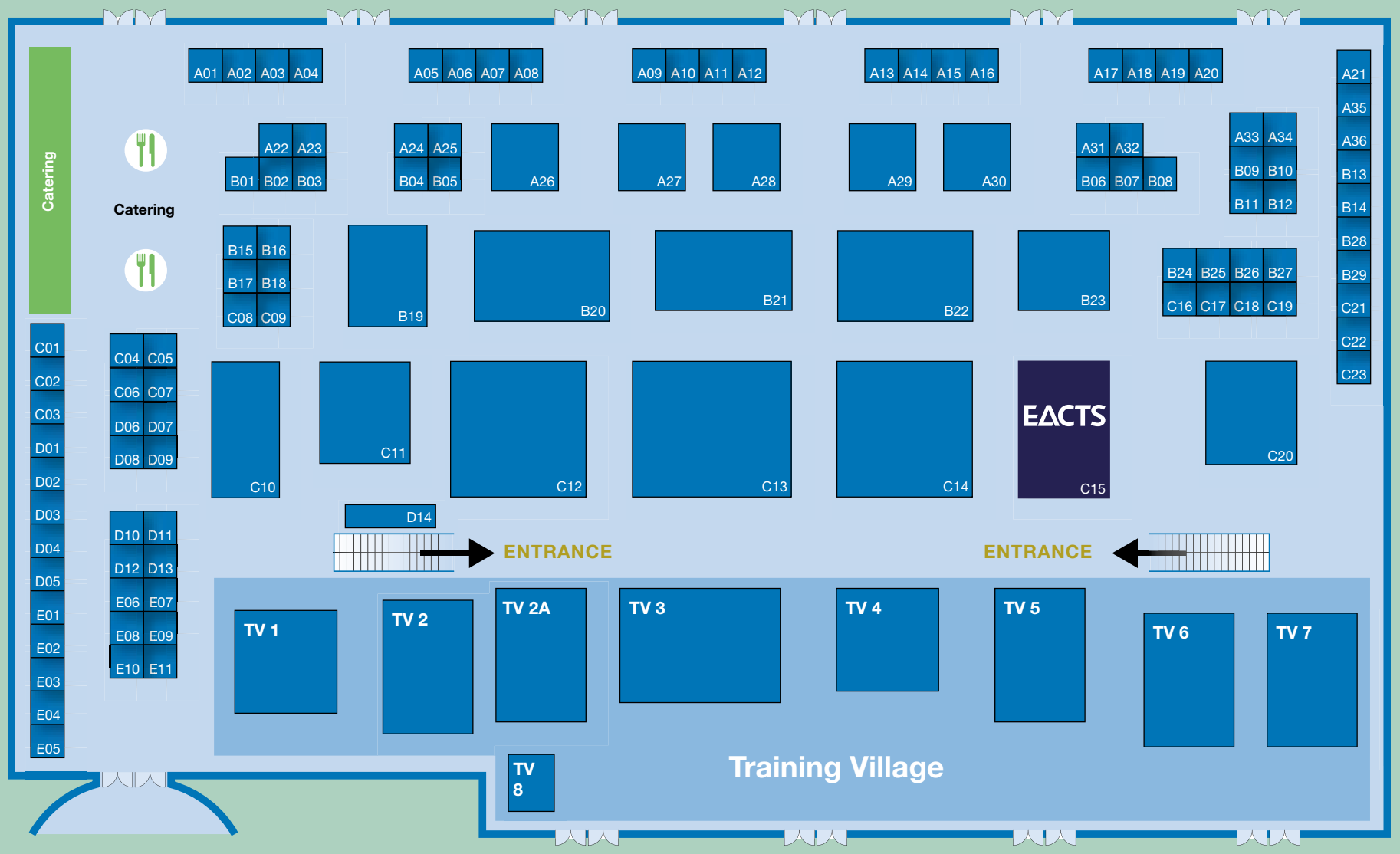
EACTS 2018 **Floor Plan**

Exhibition opening times:

Thursday 18 October	14:00–19:00
Friday 19 October	09:00–17:00
Saturday 20 October	09:00–17:00



A09	3-D Matrix Ltd
A15, A16	A&E Medical Corporation
B28	AATS-American Association for Thoracic Surgery
C10	Abbott
TV Unit 1	Abbott
E10	ABIOMED Europe GmbH
D01	Admedus
A05	Advancis Surgical
B24	Andocor NV
D08	AngioDynamics
E09	Ansabere Surgical, S.L.
E02	Argentum Medical LLc
B07	Asanus Medizintechnik GmbH
C20	AtriCure BV
E01	Aziyo Biologics/Biomatic International, Inc.
C11	B Braun Aesculap
A29	Berlin Heart GmbH
B01	BioCer Entwicklungs-GmbH
A14	Biointegral Surgical, Inc
D03	Biometrix, s.r.o.
A13	BioStable Science & Engineering, Inc
C01	Cardia Innovation AB
B15, B17	CardiaMed B.V.
C08	Cardio Medical GmbH
B25	Changzhou Waston Medical Appliance Co., Ltd
A07	CORONEO Inc
B23	Cryolife Inc./JOTEC GmbH
TV Unit 5	Cryolife Inc./JOTEC GmbH
C21	CTSNet
C04, C06, D06	CytoSorbents Europe GmbH
D10	De Soutter Medical Limited
C22, C23	Delacroix-Chevalier
B08	Dendrite Clinical Systems Ltd
A18, A19	Dr. Franz Koehler Chemie GmbH

C15	EACTS – The European Association For Cardio-Thoracic Surgery
TV Unit 7	EACTS – The European Association For Cardio-Thoracic Surgery
TV Unit 4	Edwards Lifesciences
C14	Edwards Lifesciences
A20	Ethicon, Johnson & Johnson Medical Devices Companies
TV Unit 6	Ethicon, Johnson & Johnson Medical Devices Companies
TV Unit 8	Eurosets s.r.l.
B19	Eurosets s.r.l.
B16	Evaheart GmbH
B03	Exstent Limited
C18, C19	Fehling Instruments GmbH & Co KG
B27	Fuji Systems
A28	GEISTER Medizintechnik GmbH
A04	Genesee BioMedical Inc
C12	Getinge
C03	Heart and Health Foundation of Turkey
B02	Heart Hugger / General Cardiac Technology
A36	Heart Valve Society
A17	HMT Medizintechnik GmbH
B13	ISMICS-International Society for Minimally Invasive Cardiothoracic Surgery
D11, D13	Japan Lifeline Co., Ltd.
A01	Jarvik Heart Inc
B10	JOMDD Inc
C16, C17	KLS Martin Group - Gebrueder Martin GmbH, Co KG
TV Unit 2A	LivaNova
B20	LivaNova
E03, E04, E05	LSI Solutions
TV Unit 2	LSI Solutions
A25	Medela AG
A26	Medistim ASA
TV Unit 3	Medtronic International Trading SÁRL

C13	Medtronic International Trading SÁRL
A06	Nordic Pharma
A21	OmniGuide Surgical
A31, A32	OpInstruments GmbH
B14	Oxford University Press
E08	Paragonix Technologies, Inc.
B04, B05	Peters Surgical
D12	Philips
B06	Posthorax s.r.o
B11, B12	Qualiteam s.r.l. & SyGan Medical GmbH
A33, B09	Redax S.p.A.
A34	Rumex International Corp.
C05, C07, D07, D09	Scanlan International Inc
A27	Siemens Healthcare GmbH
E07	Somahlution
B21	Spectrum Medical
B29	STS-The Society Of Thoracic Surgeons
E11	Sunoptic Technologies
A24	SynCardia Systems Inc
E06	Tecnohealth srl & 4Medika
B22	Terumo Europe NV + Terumo Aortic
A22	Thompson Surgical Instruments, Inc.
A23	Tianjin Plastics Research Institute Co Ltd (TPRI)
A02	Tianjin Welcome Medical Equipment Co., Ltd.
B26	Transonic Europe
B18, C09	Vascular Graft Solutions
D02	Vygon
A10, A11, A12	Wexler Surgical, Inc. & TeDan Surgical Innovations & Designs for Vision
D14	Wisepress Online Bookshop
C02	WL Gore & Associates GmbH
A30	Xenios AG
A08	Xenosys Co Ltd
A03	Zeon Medical Inc
D04, D05	Zimmer Biomet

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INNOVATION

The first thing we do as collaborators is listen. You have shared your experience and expertise, and together, we develop meaningful and comprehensive options for your patients.

autoLog IQ™
Autotransfusion System

Spectrum Medical
Quantum
Perfusion Technologies

Bio-Medicus™ NextGen
Multi-Stage Cannulae

Soft-Flow™
Arterial Cannulae

Medtronic
Further, Together