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From knowledge to wisdom

The Presidential Address of the 31st EACTS Annual Meeting in Vienna took place on Monday afternoon, with EACTS President Miguel Sousa Uva stepping up to the podium to deliver a fascinating exploration of the pressing needs and ongoing goals essential to transform 'knowledge into wisdom'.

After a kind introduction by Domenico Pagano and Jose Pomar, Professor Sousa Uva opened his Address by paying tribute to his mentors, his family and his colleagues, underlining their importance in helping him reach his professional goals throughout the years. Diving into his lecture, he began: "Today, cardiothoracic surgery is at a crossroads. The world is changing at an incredible pace."

The core messages of his presentation were two-fold. First, he emphasised the importance of percutaneous techniques, noting how essential it will be for cardiothoracic surgeons to add catheter skills to their armamentarium. Second, he reasoned that we should focus due time and effort into effective decision-making.

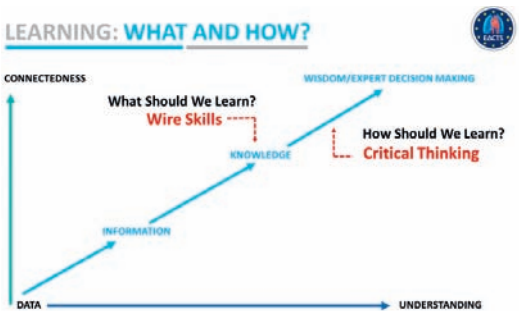

Figure 1

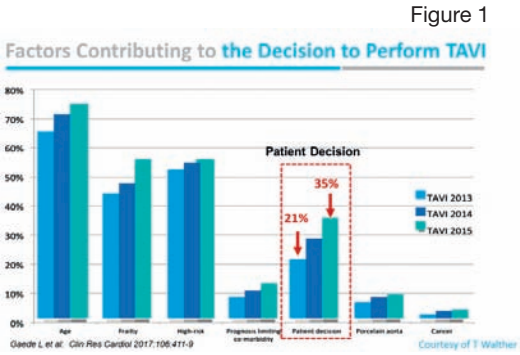

Figure 2

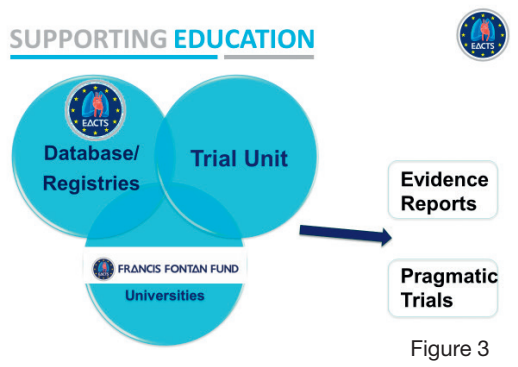

Figure 3

Professor Sousa Uva commented that, faced with increased information, cardiothoracic surgeons need to use reason to select what we should learn, as well as working to better structure information into knowledge. This, as the title of his presentation suggests, is important in integrating experience and knowledge to achieve wisdom or clinical expertise in decision-making (Figure 1)

And this wisdom includes patient preference which, as Professor Sousa Uva put it, can carry a strong message of its own. "Let's face it, patients don't want surgery!" he said. "They come to you with an already very clear idea of how they want their aortic valve stenosis fixed. 'I want Just a small puncture here', they say, pointing to the groin."

As he exemplified (Figure 2), patient decision-led TAVI has increased from 21% to 35% between 2013 and 2015, hammering home the importance for surgeons to acquire the skills that facilitate treatment. This way, they will know both avenues of treatment, and can give advice to the patient from a position of wisdom.

"Decision-making in medicine has become increasingly complex," he continued. "In the future we will certainly need the help of machine-learning and algorithms. However, clinical thinking will remain crucial."

He added: "Medicine is a science of uncertainty, and an art of probability."

Professor Sousa Uva underlined that, since its birth 31-years ago, EACTS has been at the forefront of technical and conceptual knowledge dissemination in Europe and beyond. Initiatives such as those birthed by EACTS are essential in supporting education as we move forward. Whether that is with databases/ registries, trial units, initiatives such as the Francis Fontan Fund or other methods, this can lead to more pragmatic trials, evidence reports and, ultimately, better education as a whole.

"If surgeons wish to remain in control of their own future, the time has become to reflect on the current challenges to our profession, and find firm responses, while keeping the patient in mind," he said, adding: "Surgeons need to continuously adapt, and include in their curricula new training of endovascular skills in order to encourage less-invasive treatments and respond to patients' wishes to avoid operation.

"Secondly, literacy in data analysis, critical thinking, mindfulness of uncertainty, and the development of empathy of patients – and openness to their preferences – are at the heart of decision-making, and should be incorporated into surgical education. Cardiothoracic surgery has great potential, if we adapt, while keeping our eyes wide open, and focus on a patient's best interests. Our community, both individually and collectively, must embrace lifelong learning and allow time for reflection if it wants to achieve the wisdom required to help our patients."

Cardiac | Focus | Three Perfusion session 3: Mechanical circulatory support – state of the art

Mechanical circulatory support – state of the art

Jan Gummert (Clinic for Thoracic and Cardiovascular Surgery, Heart and Diabetes Center NRW, Bad Oeynhausen) presented the state of the art in percutaneous ventricular assist devices (VAD) on Sunday afternoon, during a session focussing on mechanical circulatory support.

VADs have seen increasing use in the face of growing organ shortages, as well as presenting a destination therapy in itself for patients with end-stage heart failure.

Dr Gummert discussed the percutaneous options in mechanical circulatory support. He began with the intraaortic balloon pump, noting that despite recent negative data the device remains an "excellent" option in post-cardiotomy failure.

On the topic of centrifugal pumps such as the Impella devices (Abiomed, Danvers, MA, USA), he continued: "What we want to avoid is hypoperfusion and the necessity to give a lot of vasopressors. Unfortunately those are the patients we will see when we come to a remote centre and they are stabilised with vasopressors. Yes they maintain blood pressure, but this is the result. This is a burden for the therapeutic options: maybe you can save their lives, but usually they lose their lower limbs."

Dr Gummert also spoke of extra-corporeal membrane oxygenation (ECMO). "In the literature as well as in our centre, in post-cardiotomy failure you will get over 25% survival. Of course this depends on the [patient] selection. In our centre, we still would put an 80-year-old patient on ECMO at least for several days to allow them to recover. Of course you can discuss this in terms of economic and other issues. But we have the feeling that, if you can still save 25% of the patients, it may be justified."

Continuing to discuss the advantages of ECMO, Dr Gummert noted its rapid deployment, suitability for for resuscitation, and reliable performance. Its disadvantages lie in the fact that it is not a true VAD, that there is no drainage of the LV as well as increased afterload and (as yet) no standard weaning protocol.

"The questions are: when to say no, the need for definition of non-salvageable patients, and best practice to monitor and wean," he summarised.

"When to say no is a big issue. If you have a 10% chance of survival, would you deny a 20-year-old patient this chance? Probably not, but if it's an 80-year-old patients - we don't know. How you decide depends on your local situation, economic and other issues. But it is difficult."

Presenting an interesting angle on data presentation, he continued: "If you want to have a better outcome, that can mean that you deny patients who have a chance to survive this form of therapy. Of course when you show slides at a meeting like this, with 90% survival after ECMO therapy, if you have proper patient selection that is no issue. But it is not about denying patients proper treatment. You have to keep in mind that you can easily destroy a method like this if the overall outcome is poor; then healthcare politicians say 'we shouldn't do this', because the outcome is so poor. So there is a balance here in how to deal with the situation."

Moving on to stasis of the LV in ECMO, Dr Gummert questioned how best we can deal with issues such as thrombus formation and high risk of stroke, proposing that the only solution be an totally artificial heart, allowing thrombus removal from the ventricle.

"One solution could be the TandemHeart [Cardiac Assist, Inc.], because you drain the left atrium with a cannula introduced through the septum. It is a very complex manoeuvre in the context of resuscitation."

"When to say no is a big issue. If you have a 10% chance of survival, would you deny a 20-year-old patient this chance? Probably not, but if it's an 80-year-old patients - we don't know. How you decide depends on your local situation, economic and other issues. But it is difficult."

Jan Gummert

Offering an alternative solution, he spoke of unloading the LV using an Impella device, while perfusing lower limbs. "So far, we have some good results with this kind of therapy. We start to use it more often, and earlier, so our results are actually getting better. It is always the same issue - you start it only in patients you have more-or-less lost, and now we start to use it more frequently."

On the topic of implantable devices, Dr Gummert quoted the ESC guideline definition of patients suitable for LVADs. These included those dependent on IV inotropic therapy; those with more than three hospitalisations; and those with progress of end-organ dysfunction. "You all know this,@ he added, "And its cut-off is sometimes difficult to decide."

Regarding the use of LVAD as bridge to transplantation, he noted a paradoxical situation that patients may find themselves in if not properly informed: "The trouble is that the bridge to transplant option is not really a reliable option. In countries with organ shortage, you have a 1% chance per year to get a transplant on the elective waiting list. That means if you have a LVAD implanted, and you don't have serious complications justifying high urgency status, this will be forever. You have to be honest with your patients that it is a destination therapy. There is a slim chance to get transplanted, but it is low."

He went on to evaluate long-term outcomes from a number of different trials, summarising that while LVADs have improved over the past ten years, survival remains poor after 5 to 7 years.

Discussing survival data in mechanical circulatory support, he continued: "In the patient group 19-50 years, after five years you have a survival of almost 60%. So it's really getting better, close to transplantation. In the older patients it is not really that good. The reason why our results are like this is that we still try to transplant as many patients as possible. We still do 85 transplants per year. Our strategy is that we would rather keep a patient on inotropes for a month in order to allow them to be transplanted. Of course, you can discuss whether this is justified or not."

Despite continuous progress, the field, he said, remains "a pig", with many difficult complications persisting. He noted that 40% - 60% of patients have an unplanned readmission after 6 months following LVAD implantation. The top challenges, he said, are the blood-pump interface, right heart failure, neurological complications, GI bleeding, infection, device-related complications, quality of life, palliative care. "Right heart failure is an issue. [We can give] temporary support with centrifugal pumps; the disadvantage is that you cannot mobilise those patients."

Other options to address right heart failure, he added, include the Heart Ware and Heart Mate devices. "This is very expensive, and sometimes it is not paid for by insurance companies. The outcome is actually similar to paracorporeal biventricular support in most programmes."

Stroke is a significant issue, he noted, with 25% of the patients having strokes after 2 years. "Those are not all fatal strokes, but this is certainly an issue that needs addressing. And driveline infections are still an issue. We have no solution so far to avoid this nasty complication; the more mobile the patients are, the more often you have this kind of problem.

"GI bleeding is another issue, and in the Momentum trial...with the HeartMate III, there were no confirmed pump thromboses in this cohort. But the stroke rate was not significantly different from the Heart Mate II. So we will have to wait and see."

Summarising the needs in VAD therapy, Dr Gummert concluded: "Implantable, bioventricular support, transcutaneous energy transmission - these would be great - and disruptive technology for the pumping mechanism to reduce the need for anticoagulation. VAD therapy should be standard of care in hypoperfusion syndrome to reduce the risk of end-organ damage, and should be implemented as soon as possible in specialised centres."

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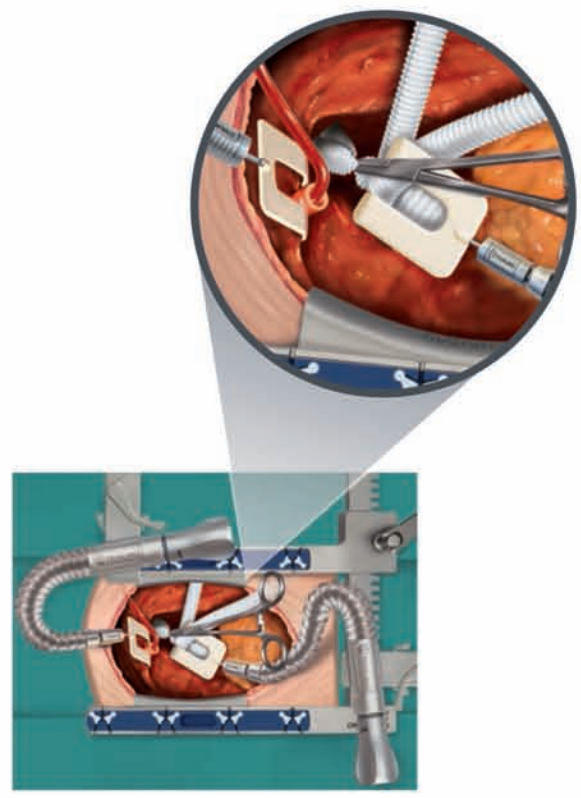
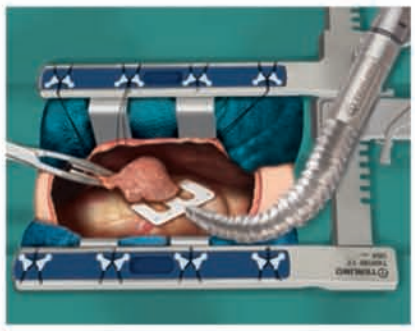


Assistant™ used to expose the carotid artery 2nd Assistant™ retracts the innominate vein to expose the remaining arch vessels



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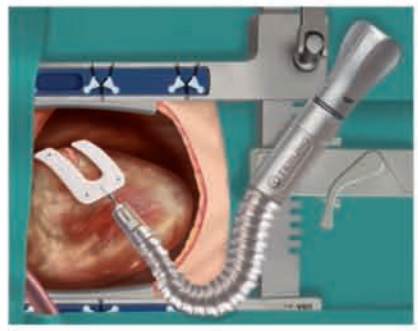

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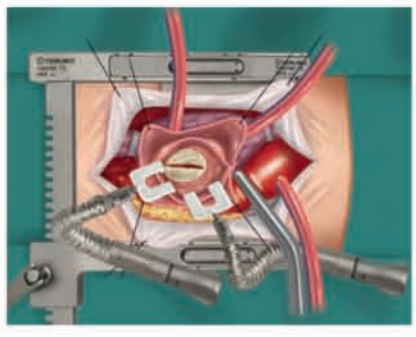

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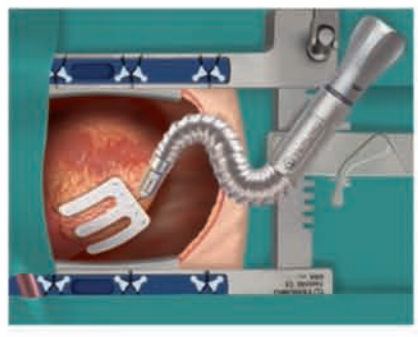

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Cardiac | Focus | VAD therapy – choose the treatment and deal with the complications

Are all pumps the same?

A new retrospective study comparing the HeartMate3 and HeartWare HVAD pumps in advanced heart failure patients has come up with some very unexpected results, reveals Evgenij V. Potapov, a cardiac surgeon from DHZB (German Heart Centre Berlin).

As Dr Potapov described, the Left Ventricular Assist System (LVAS) market is currently dominated by two small, implantable devices – the HeartMate 3 (St Jude Medical, USA) and HeartWare HVAD System (HeartWare, USA).

Prior to the launch of HeartMate 3, and with rates of circulatory pump implantation expanding, there were concerns about pump thrombosis cases associated with both the axial continuous flow pump HeartMate 2, and the HeartWare – a centrifugal continuous flow pump.

The HeartMate 3 system, approved in Europe at the end of 2015, was the first commercially-approved centrifugal flow LVAS using novel, 'fully magnetically levitated' technology, which allows the device's rotor to be suspended by magnetic forces. It has been engineered to avoid pump thrombosis, with enhanced blood flow and no mechanical bearings or friction.

Results from the HeartMate 3 CE mark trial found no pump thrombosis, haemolysis or pump malfunctions or exchanges at 30 and 180 days. Survival at 30 days was 98%, and 92% at six months. Eighty-three percent of patients demonstrated a significant reduction in heart failure symptoms at six months, improving from New York Heart Association (NYHA) Class IIIB or IV, to Class I or II. A more than two-fold improvement in six-minute walking distance compared to baseline were also reported.

"Of the two products, HeartMate 3 has been positioned as the newer and better product, with a much lower risk of pump thrombosis," Dr Potapov told *EACTS Daily News*.

"But it's really important for surgeons – and patients, for that matter – to know for sure if one pump is better in terms of survival, complication rates and quality of life. This is why we carried out a small retrospective comparison of the two devices, comparing complication rates and outcomes over a 12-month period.

"We retrospectively analysed our single-centre experience over one year, looking at outcomes and complication profiles in consecutive patients supported for the first time with HeartMate 3 or HVAD. Both pumps were implanted on – or off-pump, employing standard and minimally invasive techniques. Due to logistical reasons, the two devices were used in an alternating mode, thereby eliminating any systematic bias in pump selection. As, up to now, there has been no proven difference with regards to the survival or complication profile of the two devices, we considered this approach appropriate."

"Our data shows similar complication profiles and mid-term survival in patients supported with the two pumps. These results have come as quite a surprise to us as we were expecting the newer device to have better outcomes."

Evgenij V. Potapov

What the new study found

Between October 2015 and October 2016, 63 patients received 64 HeartMate 3 devices, and 67 patients received 68 HeartWare HVAD pumps. The mean age was 57.3 vs 57.8 years (p = 0.469). The preoperative demographics and haemodynamic profiles were similar in both groups. Specifically, 58.7% of patients were INTERMACS level 1, vs 68.8% at level 2 (p = 0.456). Furthermore, preoperative use of short-term mechanical circulatory support was 22.2 vs 28.8% respectively (p = 0.384), and outcomes were also similar.

"In particular, there were no differences in the need for postoperative RVAD (20.6 vs 15.1% respectively [p = 0.396]," explained Dr Potapov.

"The incidence of pre-and intra-pump thrombosis was 0.08 EPPY [events per patient-year] vs 0.20 EPPY, respectively [p = 0.404], while pump exchange was necessary in one case in each group [p = 1]. The incidence of major cerebrovascular events was 0.08 EPPY vs 0.10 EPPY respectively, p = 1.The incidence of pericardial effusion requiring surgical intervention was 0.38 EPPY vs 0.21 EPPY respectively [p = 0.272]. The 30-day survival was 81%and 80.4% respectively, and 6-month survival was 69.1% and 68.1% [p = 0.688]."

He continued: "Our data shows similar complication profiles and mid-term survival in patients supported with the two pumps. These results have come as quite a surprise to us as we were expecting the newer device to have better outcomes. Although HeartMate 3 does not produce any pump thrombosis at all – the incidence of other complications makes the survival similar. Therefore, the results still make it difficult for surgeons to choose one device over another.

"But having said that, these are only mid-term results. These results are disappointing in one sense: although there are some improvements in the newer device, it is not really a 'breakthrough'."

Perhaps these results are not that surprising, Dr Potapov postulated, given the health of patients receiving the pumps. "These are very sick people, with mortality rates of 10-20% in the first year after implantation. Survival is influenced mainly by their health status," he said.

What is needed next

Dr Potapov stressed that longer follow-up and a larger dataset will be necessary to find statistical differences between the two pumps. "I will be asking surgeons in the auditorium if they would be prepared to take part in a prospective randomised study to compare these two pumps in a larger number of patients," he said.

"In Germany alone, almost a thousand of these pumps are implanted every year. If everyone in Europe agreed to take part in a study now, then we could have some results within two years. Then we may have a definitive answer to this question. I think a randomised prospective study of the two devices is now needed."

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Cardiac | Focus | Personalised External Aortic Root Support

An update on PEARS

Sunday played host to a dedicated session on personalised external aortic root support (PEARS), beginning with an introduction by John Pepper, Professor of cardiothoracic surgery at the National Heart and Lung Institute, Imperial College, London, UK, who gave an overview of research conducted by his group.

The basic concept of PEARS is to create a bespoke personalised polymer sleeve tailored to each patient's individual aortic root morphology. This sleeve is created by using computer-aided design and rapid prototyping. The closeness of the fit allows incorporation of mesh support, stabilisation of the aortic dimensions and maintenance of aortic valve competence. The first man who underwent the procedure, Tal Golesworthy, was also the co-inventor of the technique.

Professor Pepper said that while PEARS research had started off slowly back in 2004, there are now several centres, on several continents, performing the procedure in small numbers. He added that in terms of intention to treat, there were 123 patients operated with intention to implant PEARS, but in fact one had a Florida sleeve, one required a VSSR, and one had a TRR. He added that this was done at a time when the pericardium was open, the aorta was inspected, and the operator felt the tissue was too thin and too fragile to go ahead with the PEARS.

"It was a perfectly reasonable thought, so it wasn't that they were half way through with a PEARS operation and then converted," said Professor Pepper. "There has been a late death – unrelated – at five years. The patient had cardiomyopathy in addition to Marfan which he inherited from his mother, and we think he developed ventricular arrhythmia."

Professor Pepper also noted that they had re-operated on one patient after five years, who developed ventricular arrhythmias early post-operatively. They opened the sleeve completely and the patient recovered, and in fact remained very well for four years after the operation.

"Then between year four and year five there was dilation of the non-coronary sinus so my colleague went back and reoperated," said Professor Pepper. "This was a kind of negative proof of the operation as the non-coronary sinus, which was not protected, did enlarge."

"These patients were followed for 412 patient-years; 11 followed for more than 10 years, 32 for more than five years and we have 120 patients still alive. This is the current status of where we are."

Professor Pepper showed an image of the heart of one patient with Marfan syndrome who sadly died. He said: "It was difficult to fit a finger between the back of the sternum and the front of the vertebrae. So, access is difficult in these patients, although oddly it sometimes makes it easier.

> *"... this is a new twist on an old idea of placing something around the aorta. But the two main differences are firstly, it's personalised, and secondly the material is completely different from the standard Dacron that we use."*
>
> John Pepper

"We initially started using MR scans to analyse the dimensions of the patient and with Warren Thornton's help a computer engineer, we managed to create the former, but it became clear that the resolution of CT scans are better, so we now do CT scans and we follow up the patient with MR to avoid radiation." He said although modern CT scans have less radiation if a patient is having them repetitively, he thought an MR was better.

Professor Pepper showed a slide of the sagittal view of the aorta which showed red tramlines representing the thickness of the former. He explained that sort of image is then reviewed by the individual operating surgeon before work starts to construct the former, which generally takes three to four weeks.

> *"... this is true precision medicine."*
>
> John Pepper

"This is a personally-engineered former and it is sterilised as I have already explained. In case you think it is unnecessary to do this here are the first 20 formers and you can see that they are all very different. So, this is true precision medicine surgery, personalised surgery and you will hear more about this from my colleague, but essentially we need to carefully dissect down beneath both coronaries to the annulus and we do this mainly without coronary bypass but occasionally we may use it."

Professor Pepper then discussed an example of an individual proof of concept study of a woman who was diagnosed with Marfan syndrome in pregnancy. During the last trimester of her pregnancy her aorta diameter increased in size (as seen on Echo) but she was safely delivered by vaginal delivery. "Then we asked to see her and operated on her to put on a sleeve and she had the second successful pregnancy and you can see that complete control of aortic diameter was achieved," he said.

Professor Pepper acknowledged there were concerns about the PEARS procedure, because it was relatively, moving on to discuss frequently asked questions about it. He said: "But of course there are many concerns this is a new twist on an old idea of placing something around the aorta. But the two main differences are firstly, it's personalised and secondly the material is completely different from the standard Dacron that we use: it's a polyester but it's different because it is a macroporous mesh."

> *"There are now several centres, on several continents, performing the procedure in small numbers."*
>
> John Pepper

He argued that it was frequently asked whether the arterial wall would become thinner, but explained that follow up annual MR scans had not found this. He added that incorporation makes migration unlikely and hadn't seen it yet in 10 years of follow-up. "People say 'well it could dissect within the sleeve and anything could happen', but we haven't seen it yet and maybe we won't, but I don't think you can ever say that in medicine. But maybe if you follow 100 patients for 10 years and don't see it we can be a little more confident that it won't happen."

He said dilatation beyond the support could happen, but had not been seen on follow-up imaging and there was less likelihood of it happening than with an interposition graft.

The audience heard that PEARS surgery has been applied to the following disease types: 82 ascending aortic dilations associated with Marfan syndrome (five patients with adjunctive mitral valve repair); six patients with BAV; two with transposition late after ASO; five with

Loeys–Dietz syndrome; one with Fallot's tetralogy; two with Turner syndrome; nine with non-syndromic degeneration; and five unspecified.

He summarised by saying that PEARS has maintained the same device manufacture, positioning and incorporation, and that they had used an identical protocol from 2004 to 2017. In total there had been 120 consecutive intention-to-treat cases, 412 patient-years of follow-up. There was one valve or aortic event, one death and three conversions.

Cardiac | Rapid Response | New aspects in mitral valve surgery

Left ventricular reverse remodelling after mitral valve repair for degenerative posterior leaflet prolapse: does it affect durability of chordal implantation repair?

Benedetto Del Forno, Michele De Bonis, Elisabetta Lapenna, Ilaria Giambuzzi, Fabrizio Monaco, Ottavio Alfieri
Cardiac Surgery Unit, San Raffaele Hospital – Scientific Institute, Milan, Italy

Reverse remodelling of the left ventricle is typical after surgical repair of severe degenerative mitral regurgitation and becomes more significant in patients with pre-operative left ventricular dilatation.

Since 1964, when Frater proposed the concept of repairing the mitral valve using a physiological approach, chordal implantation has become an interesting option, showing the same safety and effectiveness of the classic quadrangular resection. In addition, this technique has proven, excellent long-term results.

Key to this technique is an accurate measurement of the proper length of the PTFE chordae needed to correct the leaflet prolapse and achieve a competent valve. However, in the scientific community there are several concerns regarding the impact of significant reverse remodelling on implanted chordal length, assuming that it could lead to recurrence of leaflet prolapse once the ventricle become smaller. Given this possibility, many surgeons avoid this technique in patients with dilated left ventricles.

Considering this issue, we designed a study to evaluate the efficacy of chordal implantation repair to treat posterior leaflet prolapse in patients with enlarged left ventricle as compared with classic quadrangular resection. Moreover, the impact of these techniques on reverse remodelling and on the durability of mitral valve repair will be evaluated.

From January 2011 to March 2016, 679 patients with enlarged left ventricle (left ventricle end-diastolic diameter [LVEDD] ≥59 mm in males, and ≥54 mm in females) and severe mitral regurgitation due to degenerative prolapse of posterior leaflet underwent mitral valve repair in our Institute. For the purpose of our study, we excluded patients that received coronary artery bypass grafting, or any procedure involving aortic valve or ascending aorta.

Thirty patients underwent mitral valve repair using chordal implantation (the study group). Then we selected 30 consecutive patients treated by classic quadrangular resection as a control group.

Preoperative variables were comparable between the two groups, except for female sex.

At four years' follow-up, we observed excellent results in terms of survival (chordae group: 100%; resection group: 97±3.3%; p = 0.3), freedom from reoperation (100% in both groups) and freedom from MR ≥3 (Figure 1).

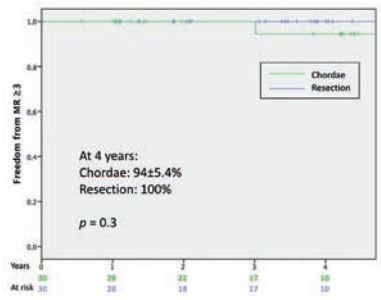


Figure 1. Kaplan-Meyer curve showing freedom from recurrence of mitral regurgitation ≥ 3+ at 4 years' follow-up.

Reverse remodelling occurred in both groups but to different degrees. The chordae group showed a greater reverse remodelling compared to the resection group both at discharge (p<0.05) and at 4 years' follow-up (p<0.0001; Figure 2). Moreover, seven patients of the entire cohort (one of the chordae group and five of the control group) did not show any degree of reverse remodelling at follow-up.

At Cox regression analysis, an increased LVEDD at discharge served as a predictor of no reverse remodelling (p<0.05 OR 1.18 CI 1.02 – 1.35), whereas chordal implantation resulted as a protective factor with respect to this unfavourable event (p<0.05 OR 0.1 CI 0.02 – 0.8).

In conclusion, the mid-term results of chordal repair in patient with enlarged left ventricle are excellent. Moreover, chordal repair provides a higher degree of reverse remodelling as compared to classic quadrangular resection. In our experience, reverse remodelling after chordal implantation repair does not lead in a recurrence of posterior leaflet prolapse and mitral regurgitation.

Table 1. Comparison of left ventricle end-diastolic diameter between the two groups before surgery, immediately after surgery and at four years' follow-up.

	Pre-operative LVEDD	Discharge LVEDD	Latest follow-up LVEDD	*p* Value (Pre vs Post)	*p* Value (Post vs F-U)
Chodae (n-=30)	61.6±3	49.1±3	47.9±4	<0.0001	<0.05
Resection (n=30)	62.7±4	52.5±6	52.6±4	<0.0001	0.8
***p* Value (Chordae vs Resection)**	0.2	<0.05	<0.0001		

Cardiac | Rapid Response | Current developments in transcatheter aortic valve implantation

Results of transapical aortic valve implantation – single center experience in 930 cases

S. Leontyev[1], J Kovalova[1], N Mangner[2], P Kiefer[1], A Linke[2], D Holzhey[1] 1. Department of Cardiac Surgery, Heart Center, University of Leipzig, Leipzig, Germany; 2. Department of Cardiology, Heart Center, University of Leipzig, Leipzig, Germany

Transcatheter aortic valve implantation (TAVI) has rapidly spread during the last few years and has become the standard of care for treatment of high-risk patients who are considered not suitable for conventional aortic valve replacement. The valve can be implanted transfemorally, transaortically or transapically. The transfemoral AVI is currently the most frequently chosen method. However, problems with vascular access or anatomical variants (e.g. kinking of the femoral arteries) still limit application in all patients. In this case the next best option for implantation is the transapical access.

The aim of this study was to evaluate preoperative predictors of in-hospital mortality, 30-day mortality and freedom from re-operation among patients undergoing transapical transcatheter aortic valve implantation (TA-AVI) with severe aortic valve stenosis.

Nine-hundred and thirty consecutive patients with severe aortic stenosis (AS) received TA-AVI at our institution between February 2006 and November 2016. Mean age was 80.47 ± 6.4 years, and 55.2 % were female. The mean STS Score and EuroScore II logistic were 9.06±7.3% and 7.79 ± 10.67% respectively. Most patients (80.3%, n=749) preoperatively presented with NYHA class III/IV. The most common comorbidities were arterial hypertension (92.9%, n=868), chronic obstructive pulmonary disease (26.5%, n=246) and peripheral vascular disease (23.3%, n=217). Chronic renal failure with dialysis was known in 4.8% (n=45) of patients.

12.5% (n=117) of patient were operated as urgent or emergent cases.

The most common complication were acute renal failure which occurred in 16.9% of patients. Further complications included AV Block follwed by pacemaker implantation (13.9%), low cardiac output (4.9%), bleeding (4.3%), sepsis (4.0%) and stroke (3.7%). In-hospital mortality was as high as 10.3% (n=97).

Independent predictor of in-hospital mortality is urgent or emergent indication for operation (OR: 2.5, 95% CI: 1.4–4.2, p=0.001). The 1-, 3-, 5-, and 8-year survival was 72.6±1%, 60.7±1%, 44.5±2%, and 38.5±2%, respectively. Cox regression analysis identified the following independent risk factors: Urgent or emergent indication for surgery (HR: 2.2, 95% CI: 1.5–3.4, p<0.000), serum creatinine of more than 200 mmol/l (HR 2.9, 95% CI 1.5–5.6, p=0.002), diabetes (HR: 1.4, 95% CI: 1.1–1.8, p<0.011), preoperative dialysis depend chronic renal failure (HR: 3.0, 95% CI: 1.5–6.0, p=0.002) and cardiogenic schock (HR: 1.8, 95% CI: 1.2–3.0, p=0.007).

The TA-AVI procedure is suitable for high-risk patients with sever aortic stenosis and is has acceptable in-hospital mortality. The mid-term outcome is associated with good survival and is negatively influenced by renal insufficiency and critical preoperative state. As shown in our study the highest risk factors for in-hospital mortality is urgent or emergent indication for operation and the highest risk factors for long term mortality were urgent or emergent indication for surgery, serum creatinine more than 200 mmol/l and preoperative dialysis.

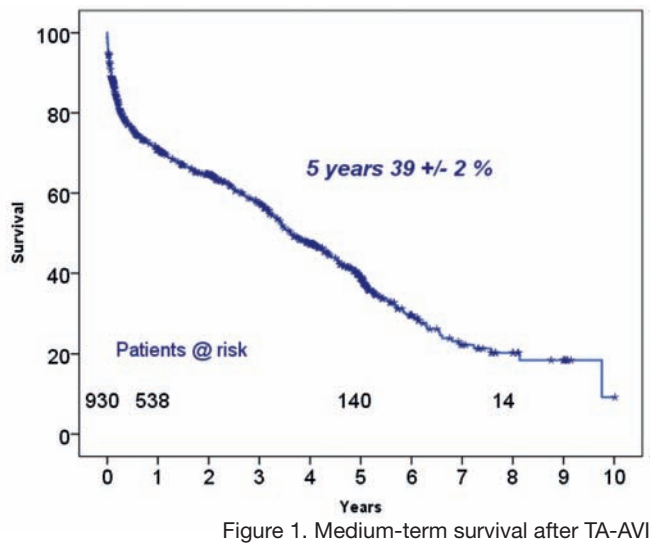


Figure 1. Medium-term survival after TA-AVI

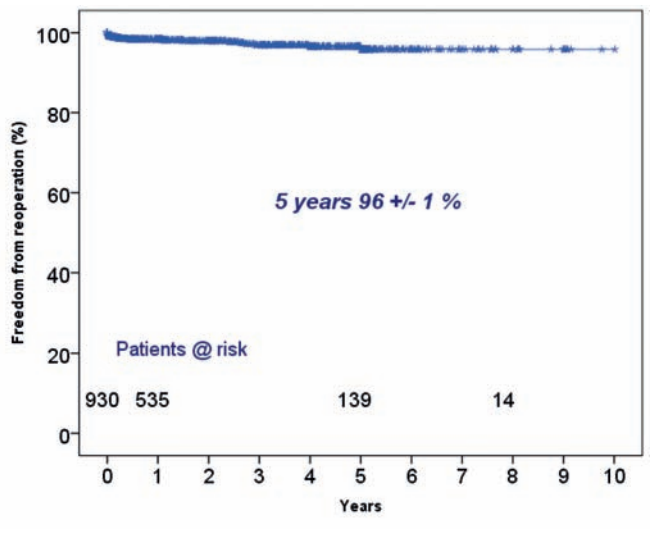


Figure 2. Freedom from all aortic valve-related reoperations

Conflicts of interest / Sources of funding: None

INSIDE VIENNA

Where to go? What to do?

TRADITIONAL EATING

STEIREREck
Pricey but with an excellent reputation, this is a famed gourmet dining paradise.

ULRICH
Breakfast and brunch pull in the punters at this Austrian eatery with a "lighter touch".

MELKER STIFTSKELLER
"The best pork knuckle in town" can be found at this underground restaurant. Think exposed brick walls, dark ambience and great food.

ALTERNATIVELY...

LOLA SPANISCHES
This Spanish tapas restaurant is highly-rated on the Vienna foody scene. Grab some croquetas and dig in.

TIAN
Sophisticated vegetarian and vegan food can be found at this central hotspot. The menu uses seasonal produce to craft its artistic dishes.

TO DRINK

IF DOGS RUN FREE
are at the forefront of Vienna's cocktail scene. Go for the cool vibes, but stay for the delicious concoctions on offer.

LE LOFT
Atop the Sofitel Vienna Stephansdom, this bar combines stunning views of Vienna and a beautiful painted mural ceiling

SCHÖNBICHLER
is a world of tea, stocked with a wide-ranging and high-quality selection from all over the world. Ask the experts behind the counter for something to match your tastebuds.

Vascular | Abstract | The challenges of endovascular approach in thoracic aorta

Thoracic endovascular aortic repair: Evolution and results in an 18-year experience

Nimesh D Desai, Wilson Y Szeto, Benjamin Jackson, Prashanth Vallabhajosyula, Grace Wang, Ronald Fairman, Joseph E Bavaria Hospital of the University of Pennsylvania, Philadelphia, PA, USA

In 1999, we started the thoracic endovascular aortic repair (TEVAR) program at the University of Pennsylvania. During the first six years, patients were enrolled in pivotal TEVAR trials, the majority of whom had descending thoracic aortic aneurysms. However, after TEVAR was approval by the FDA in 2005, indications expanded significantly to include patients with aortic transections, acute and chronic type B dissections, and hybrid arch replacement. While TEVAR began as an experimental procedure, it is now our predominate technique to treat pathology of the descending thoracic aorta. In April 2017, during the 18th year of our TEVAR program, we completed our 1,000th procedure.

Of the 1,000 patients that underwent TEVAR from 1999 to 2017, the average age was 68.4 years with 53% of patients older than age 70 years. Approximately 59% (585) were female and 10% (104) had chronic renal failure. Urgent or emergent procedures were completed in 48% (481) of cases. Atherosclerotic aneurysms were the most common indication for TEVAR in 62% (623) with type B dissections a distant second in 15% (153) of patients.

Overall unadjusted survival was 47% at 10 years with a median follow up of 4.2 years. Furthermore, we found that survival was significantly dependent on the primary indication for TEVAR. While patients with traumatic transection experienced early perioperative death, this group had the greatest long-term survival at 83% at 10 years. Patients with chronic and acute type B dissections had similar long-term survival to each other, with the exception that the acute type B patients had a worse perioperative mortality. Lastly, patients that underwent TEVAR for aneurysmal degeneration had the worse long-term survival of 39% at 10 years.

Stroke or TIA occurred in 6% (60) and permanent paraplegia was found in 24% (240) of patients during the perioperative period. Early mortality occurred in 10% (100) of patients. Predictors of early death were age (OR: 1.05, p=0.01), chronic renal failure (OR: 2.67, p=0.004), and emergent/urgent cases (OR: 2.79, p=0.001). Endoleaks were present in 143 (14.3%) patients, of which 91 (63.6%) resolved after additional ballooning or placement of another stent graft at the index procedure.

In conclusion, the TEVAR outcomes are variable and based on the initial indication of the patients' aortic pathology. In our series spanning 18 years, patients with traumatic transection and type B dissections (acute and chronic) had significantly improved long-term survival as compared to patients that underwent TEVAR for descending thoracic aneurysms. Most importantly, these patients can undergo this minimally invasive approach with acceptable risk for stroke and paraplegia.

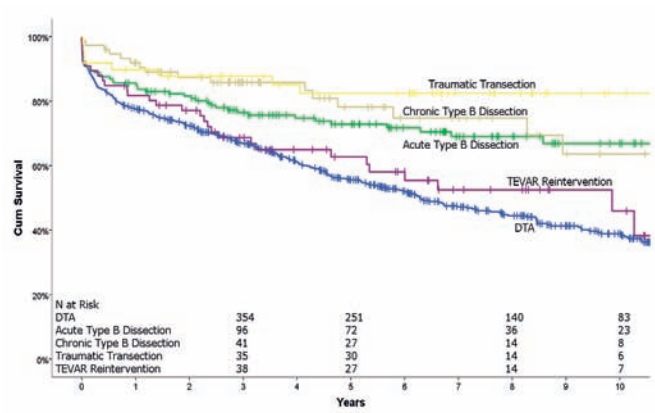


Figure 1. Overall unadjusted survival for TEVAR patients based on indication for surgery. (DTA: descending thoracic aneurysm)

Thoracic | Abstract | Thoracic case session 2

Simultaneous uniportal VATS right upper lobectomy with Nuss procedure for pectus excavatum repair; First reported uniportal combined lobectomy and Nuss operation

Hussein El-khayat[1], Emad Zarief[2], Mahmoud Sallam[1], Elhussein Mohamed[1], Ahmed El-minshawy[1]. 1. Cardiothoracic Surgery Department, Faculty of Medicine, Assiut University, Assiut, Egypt.; 2. Anesthesia and Intensive Care Department, Faculty of Medicine, Assiut University, Assiut, Egypt.

We report a case of an eight-year-old male child with bronchiectasis and pectus excavatum (Figure 1). Although feasibility and safety of VATS became well-established in the treatment of benign pathologies,[1] many surgeons would argue that two benign lesions in a small child should be approached through an open approach, especially given that bronchiectasis usually has thick adhesions due to repeated infections, and a small chest cavity may not allow a full range of movement of staplers.

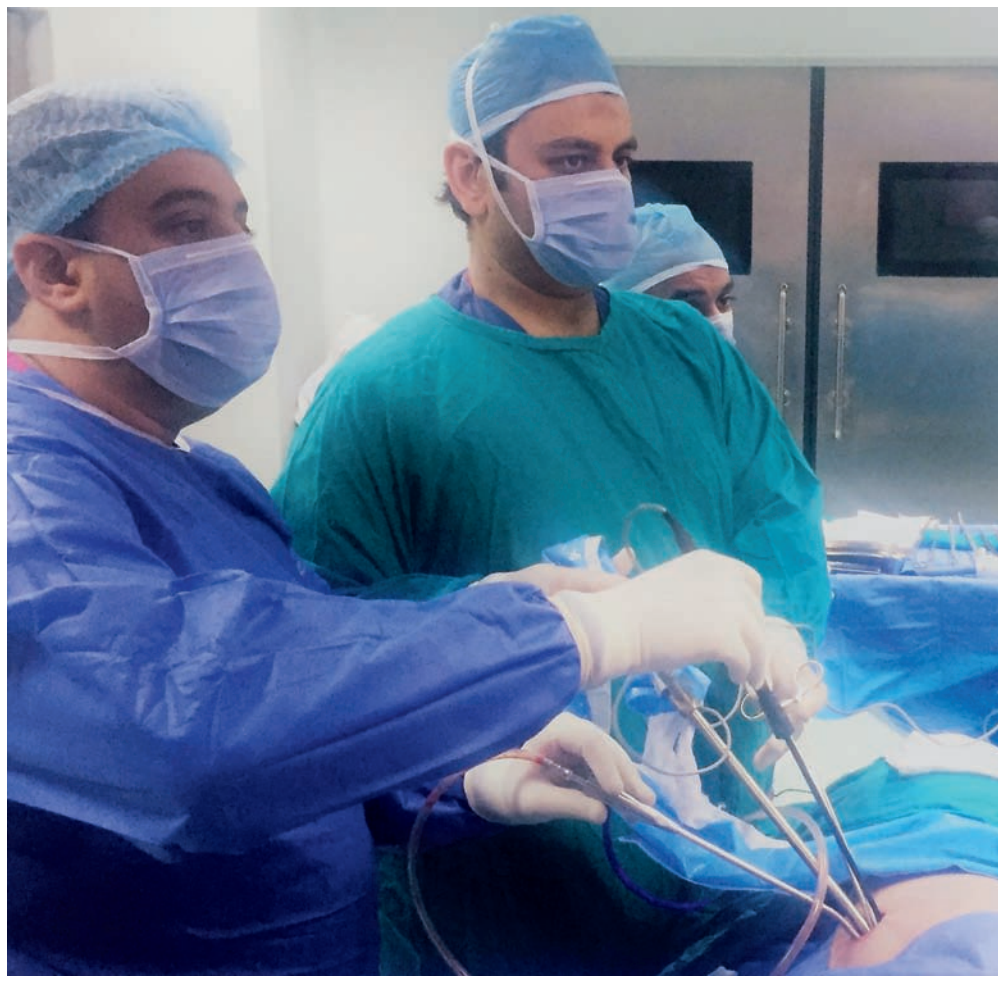
However, several factors should be considered: patient are young, fearing from postoperative pain and more over like to have a good cosmetic result for his chest wall deformity.

Pectus excavatum is the most common congenital chest wall deformity, and the minimally invasive repair of the pectus excavatum (MIRPE) has become the treatment of choice in the last decade, performed with a high degree of success.[2] As a minimally invasive repair technique by Nuss, it involved remodelling of the anterior chest wall by employing a retrosternal metal bar without any cartilage resection.

Bronchiectasis is an airway chronic disease that is characterised by recurrent respiratory infectious exacerbations with obstructive lung disease in children and adults.[3] Thoracoscopic surgery for localised bronchiectasis is gaining more acceptance every day.[3,4]

Simultaneous open cardiothoracic operations and pectus repair are being used[5], but still lack satisfactory cosmetic results and are outside 'minimally invasive'. Few publications report simultaneous multiport VATS and MIRPE[6,7]. Our case is the first reported example of such combined procedures via a uniportal VATS approach, reported in an eight-year-old child.

We believe that utilising the uniportal VATS approach simultaneously with MIRPE should be offered rather than a staged operation or multiport VATS, thus maximising the potential effects of minimally invasive surgery.



Dr Hussein Elkhayat (left) and Dr Mahmoud Sallam

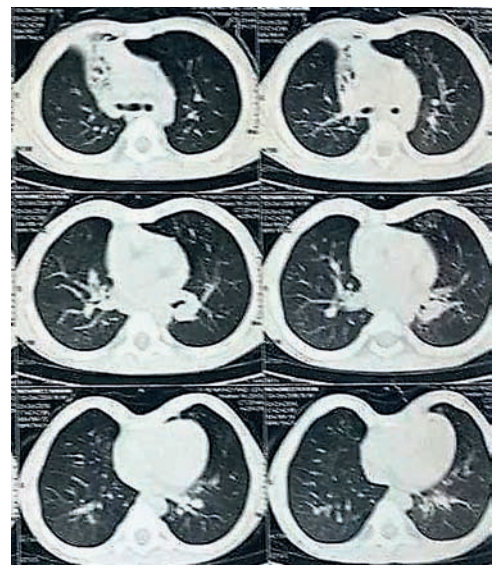


Figure 1. CT scan chest of the patient showing right upper lobe bronchiectasis and pectus excavatum.

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Thoracic | Abstract | Airway

Scaffold-free trachea regeneration by tissue engineering with bio-three-dimensional printing

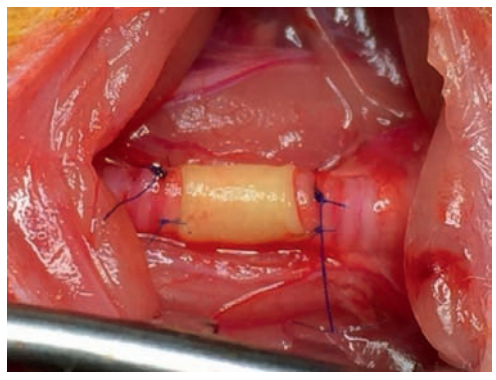

Figure 1. Photograph of the surgical field after transplantation of the scaffold-free graft made by bio-3D-printing technology.

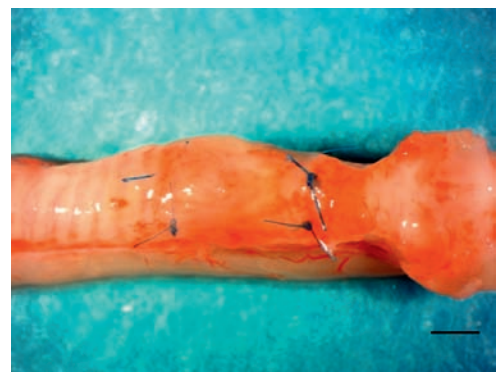

Figure 2. Day 7 post operation. Some amount of connective tissue with microvessels surrounding the tracheal graft was observed. Scale bar = 2 mm.

Daisuke Taniguchi[1,2], Keitaro Matsumoto[1,2], Takeshi Nagayasu[1,2] 1. Department of Surgical Oncology, Nagasaki University Graduate School of Biomedical Science, Japan; 2. Medical-engineering Hybrid Professional Development Program, Nagasaki University, Japan

There are general limits for safe tracheal resection, i.e. half of the tracheal length in adults and one-third in small children. Thus, safe and dependable techniques for tracheal replacement are being developed. There are many approaches for reconstructing the trachea, including regeneration with tissue engineering; however, no standard procedures for tracheal transplantation/regeneration, particularly circumferential replacement, have been developed. In the current situation, most artificial airway organs still require scaffolds to maintain the strength and stiffness of the airways. However, scaffolds for artificial organs have some issues, such as risk of infection, irritation, lower biocompatibility, and time-dependent degradation. Here, we aimed to assess circumferential tracheal replacement strategies using scaffold-free trachea-like grafts made by bio-three-dimensional (bio-3D) printing technology with the isolated cells in an inbred animal model.

Chondrocytes and mesenchymal stem cells were isolated from three-week-old F344 male rats. Rat lung microvessel endothelial cells (RLMVECs) were purchased and used as a cell source. After the preparation of multicellular spheroids, trachea-like tube structures were prepared by bio-3D-printing. The structure was matured in a bioreactor and transplanted into eight-week-old F344 male rat as tracheal grafts under general anaesthesia.

Trachea transplantation was performed using the silicone stent and followed up for 11 postoperative days (POD). The generated scaffold-free trachea-like structures showed around two-thirds the tensile strength of native adult trachea. The bio-3D printed structures were easy to handle with surgical forceps and had sufficient strength to transplant into tracheas using silicon stents (Figure 1). After sacrifice and resection of the transplanted trachea, all tracheal grafts maintained shape and stiffness (Figure 2). Some connective tissue with microvessels surrounding the tracheal grafts was observed. Histologically, glycosaminoglycan (GAG) production was assessed by Alcian blue staining, and GAG deposits were found in the bio-3D-printed structures after the maturation period; GAGs persisted until 11 POD. Immunohistochemistry showed that collagen II was observed in structures after maturation and maintained after tracheal transplantation. Our findings showed that cartilaginous tissue was formed during the maturation period after the bio-3D printing and maintained after transplantation. Some small capillary-like tube formations consisting of CD31-positive cells were observed in the structures, and the number of these structures increased over time. These results showed that appropriate vasculogenesis could be obtained in scaffold-free trachea transplantation with our bio-3D printing technique.

This work demonstrated our initial experience of tracheal tissue engineering with bio-3D printing technology using a scaffold-free approach. The artificial trachea fitted and matured in situ after transplantation. The structures produced by the bio-3D printer with isolated rat cells could be transplanted via allogenic trachea transplantation in an inbred animal model. This technology could give the opportunities for the patients with tracheal tumour, tracheomalacia or tracheal stenosis to have another option for better quality of life.

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Adult cardiac | Rapid Response | Risk scores; indications, contraindications and side effects

Open heart surgery in late octogenarians and nonagenarians: Risk stratification models overestimate mortality in this cohort

Kazuyoshi Takagi, Tohru Takaseya, Koichi Arinaga, Takahiro Shojima, Satoshi Kikusaki, Kosuke Saku, Tomofumi Fukuda and Hiroyuki Tanaka Department of Surgery, Kurume University, Kurume, Japan

In recent years, surgical indications for super elderly patients have been expanded due to results of advances in anaesthetic techniques, surgical techniques, postoperative care, and the expanding technology of catheter-based heart valve interventions. We face the necessity to consider surgical risks and patient's benefits carefully in an aging society. Established risk stratification models such as the Euro II score, the Japan score and the STS score are very useful to predict surgical outcomes and decide surgical indications in open heart surgery. However, these scoring models are not specifically designed for late octogenarians and nonagenarians. The accuracy of these models to predict the surgical outcome in this cohort is still unclear. This study aimed: (1) to investigate the surgical outcome in late octogenarians and nonagenarians undergoing open heart surgery and (2) to assess the accuracy of these established risk stratification models in this cohort.

From 2001 to 2016, 96 patients aged between 85 and 94 years old received open heart surgery. Mean age was 86.7 years, and the percentage of men was 27%. There were 37 patients with heart valve surgery, 26 patients with aortic surgery, 15 patients with coronary bypass, 13 patients with combined heart valve surgery and coronary surgery, and five patients with other single procedure. The percentage of emergent surgery was 36%. We evaluated preoperative patient demographics, intraoperative details, postoperative courses including ventilation time, the length of ICU stay, major complications and 30-day mortality. The Euro II score, the Japan score and the STS score were evaluated for each patient. The accuracy of these models to predict 30-days mortality was evaluated using area under the curve (AUC) on the receiver operating characteristic curve.

Mean postoperative ventilation time was 5.7 ± 9.9 days. Mean length of ICU stay was 7.1 ± 11.0 days. The rate of major complications including stroke, renal failure, deep wound infection and ventilation time over three days was 38%. Thirty-day mortality was 5%. The mortality was lower in elective versus emergent surgery (3.3% vs 8.5%; p< 0.05). Estimated 30-days mortalities in elective versus emergency surgery were 6.0 ± 6.8% versus 15.5 ± 13.9% by the Euro II score, 7.7 ± 6.9 % versus 20.3 ± 12.6% by the Japan score, and 8.0 ± 4.2% versus 16.2 ± 13.9% by the STS score. Predictive 30-day mortality using risk stratification models was estimated higher than outcome in real world (Table 1). The Euro II score was the most accurate model to predict 30-day mortality (AUC:0.8988).

Estimated mortalities and Surgical outcome in real world

	Mortality (Elective)	Mortality (Emergent)	AUC
Euro II score	6.0 ± 6.8%	15.5 ± 13.9%	0.89880
Japan score	7.7 ± 6.9%	20.3 ± 12.6%	0.77590
STS score	8.0 ± 4.2%	16.2 ± 13.9%	0.66747
in this study	3.3%	8.5%	-

Table 1. 30-day mortality rates in patients undergoing elective and emergent open heart surgery using predictive risk stratification models (Euro II score, Japan score, and STS score), compared with real-world surgical outcome.

We conclude that open heart surgery can be performed in late octogenarians and nonagenarians with a satisfactory outcome. Risk stratification models overestimate mortality in this cohort. These results suggest that age itself shouldn't be an automatic exclusion to undergo open heart surgery. We have to consider surgical indication carefully, based on not only risk stratification models, but also our own experiences and outcomes in late octogenarians and nonagenarians. The Euro II score helps us to consider surgical risks in this cohort.

Cardiac | Abstract | Improving transcatheter aortic valve implantation

Balloon expandable transapical transcatheter aortic valve implantation without pre-dilation of the aortic valve – results of the multicentre EASE-IT TA registry

Daniel Wendt and Justus Strauch
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A frequently performed step prior to the deployment of the transcatheter heart valve in patients undergoing TAVI is the dilation of the aortic valve using an expandable balloon (balloon aortic valvuloplasty; BAV)[1]. BAV, however, can cause serious complications including cardiovascular events, bleeding complications, arrhythmia and cerebral embolism.[2] Thus, physicians today tend to omit BAV wherever possible.[3-5]

The EASE-IT TA registry aimed to evaluate clinical decision making in patients undergoing TAVI with or without BAV using an Edwards SAPIEN 3 valve and Ascendra Balloon Catheter. EASE-IT-TA itself is a prospective, two-armed, multicentre registry, collecting essential data of procedural success rates, adverse events, and mortality in a large cohort of patients undergoing transapical (TA)-TAVI with the aforementioned prosthesis. The data set of this analysis consisted of 198 patients from 10 experienced German TAVI centres, of which 61 patients underwent TA-TAVI with BAV and 137 TA-TAVI without BAV. Outcomes were assessed before and after the TAVI procedure after three and six months.

The study demonstrated no clinical benefit for the performance of BAV based on its primary composite endpoint consisting of all-cause mortality, non-fatal stroke, non-fatal myocardial infarction, acute kidney injury, and pacemaker implantation within 30 days (OR 0.71; 95% CI 0.34-1.82) and six months (OR 0.74; 95% CI 0.37-1.47) after TAVI (with multivariable adjustment). On the contrary, there was even a trend for a net clinical benefit for the omission of BAV prior to TAVI. Both approaches reduced the proportion of patients in NYHA class III/IV at 30 days. In the group that underwent BAV it was reduced from 85.2% to 1.7%, and 85.4% to 2.3% in the group without BAV.

Further to this, the omission of BAV reduced the requirement for procedural catecholamine use (17.5% vs. 32.8%; P = 0.017). This might contribute to a better safety profile because it is considered that the use of such agents in cardiac surgery is associated with complications such as tachycardia, arrhythmias, and myocardial, intestinal, and renal ischemia.[6] Several investigations into the omission of BAV in patients undergoing transfemoral TAVI reported that the omission was associated with a significantly shorter procedural duration[4,7,8], but here the analyses were not able to confirm such reports. In EASE-IT TA, the average procedural duration in the absence of BAV was found to be only 4.9 minutes shorter, whereas a significant reduction in fluoroscopy duration was observed (difference 3.2 min; p = 0.039).

These data suggest that there is little justification for maintaining BAV in TA-TAVI for the majority of patients.

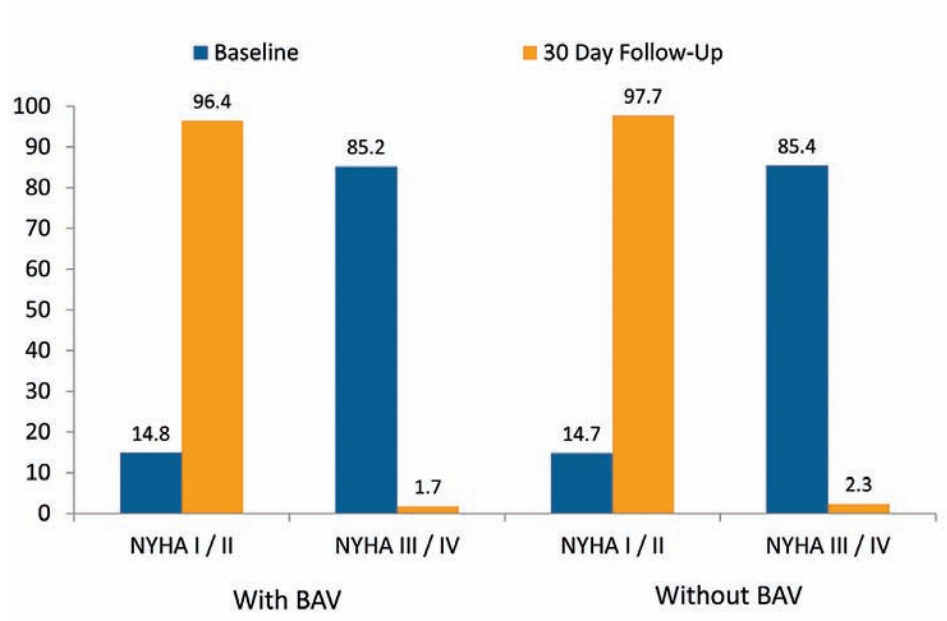

Figure 1. Comparison of changes in New York Heart Association (NYHA) class at 30-day follow-up relative to baseline show no significant difference between TAVI with and without balloon aortic valvuloplasty (BAV).

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Adult Cardiac | Abstract | Nightmares in cardiac surgery

ECMO and mechanical valves. An unfriendly relationship

Elena Sandoval, María Ascaso, Daniel Pereda, Guillermo Ventosa-Fernández, and Eduard Quintana Cardiovascular Surgery Department, ICCV. Hospital Clínic. Barcelona, Spain.

From left to right M Ascaso, E Quintana and E Sandoval

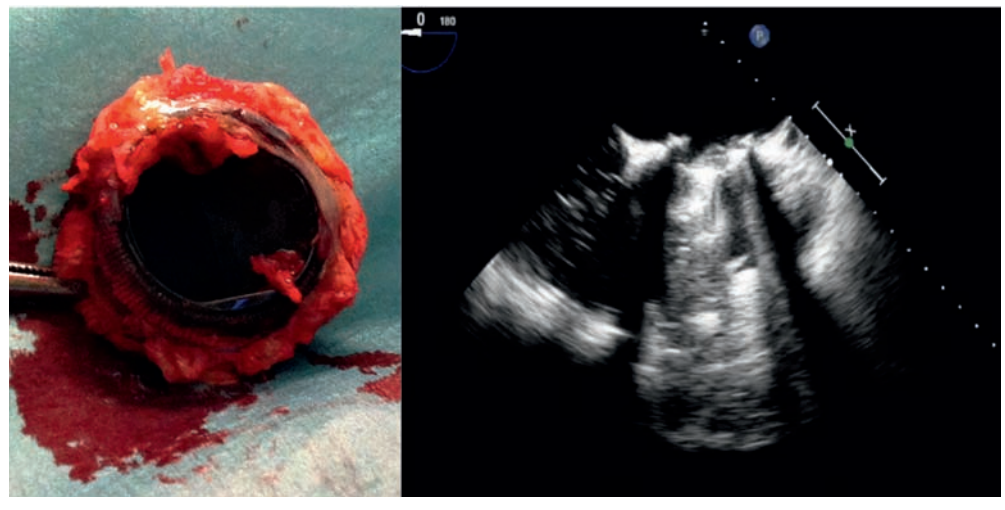


Figure 1

A 24-year-old female with Marfan syndrome was admitted to our hospital due to palpitations. As relevant previous medical history she had a mitral valve replacement at the age of 14 and an aortic valve and root replacement at the age of 22. In both cases, mechanical valves were used.

Echocardiography showed severely dilated left ventricle (84/78 mm) and EF of 10%. The right heart catheterisation contradicted pulmonary hypertension.

Despite initial stabilisation, the patient developed symptoms attributable to low cardiac output, and an intra-aortic balloon pump was implanted. The patient's clinical status worsened again, and femoral v-a ECMO support was started using a 21 F venous cannula and a 6-mm dacron side-graft to the femoral artery. Appropriate support was rapidly achieved and the patient's perfusion was restored. Four days later, the patient developed pulmonary oedema. Anatomically she was not a candidate for currently available total artificial heart therapies. Mitral prosthesis thrombosis was suspected and the patient was taken to the OR. The ECMO circuit was switched to CPB. The aorta was clamped and antegrade cardioplegia administered. The aortic prosthesis was closed with a pericardial patch sutured to the prosthetic annulus. The right atrium was then incised and the fossa ovalis was widely opened. The mitral prosthesis was removed and the annular margins were oversewn to avoid further emboli from raw-debrided edges. A new 40 F single venous cannula was placed halfway across the septostomy in the left atrium through the right atrial appendage.

CPB support was switched to full v-a ECMO using the new venous cannula and the previous arterial one. Pulmonary oedema resolved, and the patient was successfully transplanted two days later. She recovered uneventfully.

Patients with mechanical prosthesis receiving bridging ECMO therapies may need further aggressive interventions to solve or prevent thromboembolic complications.

Adult cardiac | Abstract | Outcome of mitral valve surgery

Durability at 20 years of quadrangular resection with annular plication for mitral regurgitation due to posterior leaflet prolapse: the paradox of being a benchmark out of fashion

Elisabetta Lapenna, Michele De Bonis and Ottavio Alfieri Department of Cardiac Surgery, Vita-Salute San Raffaele University, IRCCS San Raffaele Hospital, Milan, Italy

Left to right: De Bonis, Alfieri and Lapenna

Degenerative mitral regurgitation (MR) due to prolapse of the posterior leaflet is the most common dysfunction of the mitral valve in the western world and is nowadays treated with a variety of surgical techniques. Quadrangular resection combined with annular plication and annuloplasty, as originally described by Carpentier, has been for many years the standard approach, before sliding/folding plasty and artificial chordae gained larger popularity in order to overcome some drawbacks correlated to this technique (kinking of the circumflex artery, leaflet restriction and systolic anterior motion). Nevertheless, the very long-term results (≥20 years) of quadrangular resection and annular plication are relatively unknown because the published series include all kinds of resection techniques (triangular resection, quadrangular resection with annular plication/sliding/folding plasty, butterfly technique, etc.) without a clear distinction among them, often reporting only freedom from reoperation rather than from recurrent mitral regurgitation. We were rather intrigued by the fact that it is almost impossible to derive from the available literature the very long-term outcomes of one of the first methods of repair described to treat P2 prolapse, namely quadrangular resection with annular plication alone. Of course it does apply to a selected group of patients with segmental prolapse of P2.

The aim, then, of this study was to evaluate the very long-term (20 years) clinical and echocardiographic results of this approach, which was used for many years at the beginning of our mitral repair programme. The study population includes the first 145 consecutive patients with severe degenerative MR due to isolated posterior leaflet prolapse/flail who underwent quadrangular resection of the posterior leaflet combined with annular plication between 1997 and 1998. Intentionally, we selected patients from our initial experience in order to look for long-term results. We identified no in-hospital mortality, with 92% of patients discharged from the hospital without any major complications. Only one patient went home with mild-to-moderate residual MR. Follow-up was 97% complete (median 19 years). At 20 years the overall survival was 74±3.7%, and the cumulative incidence function of cardiac death with non-cardiac death as competing risk was 9.9±2.5%. Age was the only significant predictor of cardiac death (HR 1.1, CI 1.0;1.1, p = 0.01) at multivariate analysis. Only 6 patients (4%) were re-operated upon for recurrent severe mitral insufficiency. At 20 years, the cumulative incidence function of reoperation and recurrence of MR≥3+ with death as competing risk was 4.3±1.7% and 8.8±2.8%, respectively. Indeed, only 11 patients (8%) had recurrent MR≥3+. Fine and Gray models failed to identify significant predictors of recurrence of MR≥3+. At the last follow-up, moderate MR (2+/4+) was detected in 14 patients (10%).

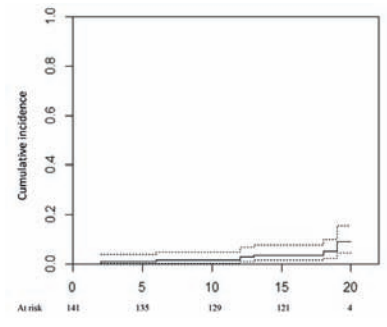
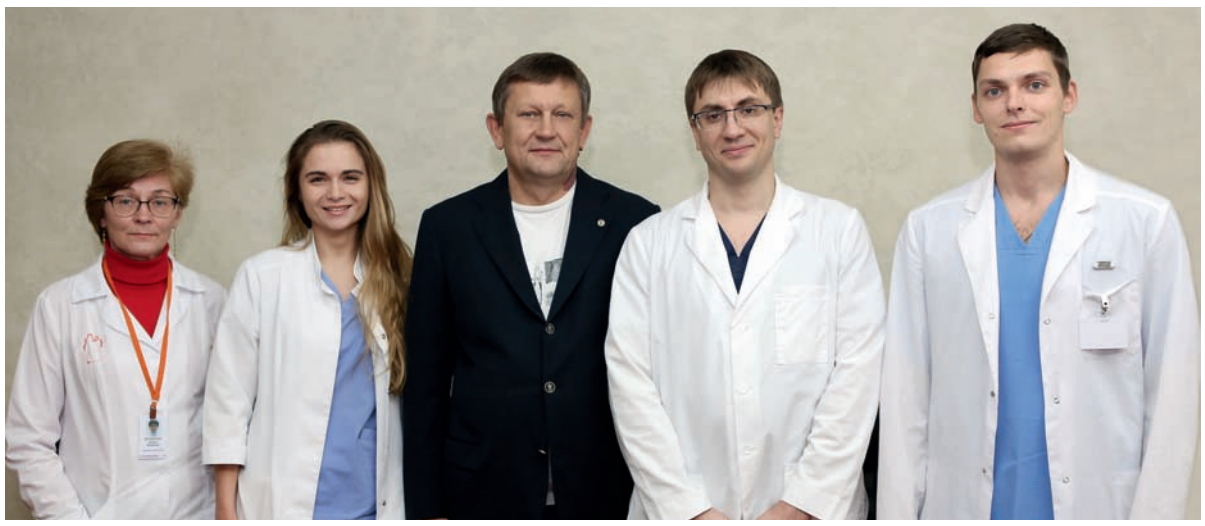


Figure 1. CIF of MR≥3+ with death as competing risk.

In conclusion, the substantial absence of residual mitral regurgitation and the superb stability of the repair reflected in the low rate of MR recurrence and reoperation for up to two decades after surgery, suggest that this technique achieves excellent early and very long term results in a selected subset of patients and in a high-volume centre. Although surgical mitral repair techniques have evolved over the past two decades, our findings show that quadrangular resection with annular plication remains an important contemporary benchmark against which any new emerging surgical or transcatheter mitral valve repair solution should be compared.

Congenital | Abstract | Tetralogy of Fallot / Pulmonary atresia

What is the best biomaterial for a paediatric conduit? Analysis of clinical data and experimental study



(From left) Irina Zhuravleva, Nataliya Nichay, Alexander Karaskov, Alexander Bogachev, Yuriy Kulyabin

Nataliya Nichay, Irina Zhuravleva, Yuriy Kulyabin, Alexander Bogachev-Prokophiev and Alexander Karaskov
E.Meshalkin National Medical Research Center, Novosibirsk, Russian Federation

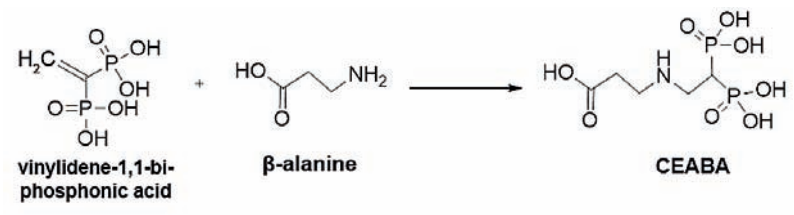


Figure 1. Freedom from reintervention caused by xenograft calcification.

Conduit implantation for right ventricular outflow tract reconstruction (RVOT) is an essential option in the repair of various complex congenital heart diseases. Although the pulmonary homograft is considered as the most appropriate conduit, the small diameter for children is strongly limited; therefore valved xenografts are widely used for RVOT reconstruction. However, xenografts predictably tend to fail, and conduit replacement should be required, this is an especially relevant issue for young children. Young patients are exposed to a high rate of reintervention and conduit replacement due to active growth, which leads to conduit-patient mismatch. Furthermore active metabolic processes in children result in early calcification of the conduit. The search of biomaterial resistant to the calcification is still in progress.

We aimed to reveal the best choice of biomaterial for paediatric conduit according to the rate and degree of calcification depending on the treating method. Our study consisted of both clinical data analysis and experimental study.

The clinical part aimed to determine the incidence of reintervention and calcification of xenografts in children. A total of 301 patients aged from 0 to 18 years who underwent RVOT reconstruction with xenograft from 2000 to 2016 were retrospectively analysed. The placement of 337 xenografts were performed, including glutaraldehyde-treated bovine jugular vein (GA-BJV) (n=171, 51%), glutaraldehyde-treated bovine pericardial valved conduit (GA-PVC) (n=75, 22%), diepoxy-treated porcine aortic root conduit (DE-PAC) (n=58, 17%), diepoxy-treated bovine pericardial valve conduit (DE-PVC) (n=33, 10%). The median follow-up was 4.2 years, equating to 1,279 patient-years. Calcification was the main cause of conduit dysfunction in 71% of cases. In the DE-PAC group, at reintervention, 94% of xenograft were calcified. In the GA-BJV group, xenograft calcification occurred in only 9% of cases. No significant difference in calcification rate were found in the GA-PVC and the DE-PVC groups (35% and 26%, accordingly). The lowest freedom from calcific dysfunction was in the DE-PAC group (Figure 1).

The experimental part aimed to compare the calcification of porcine aortic wall, bovine pericardium and jugular vein (BJV) wall cross-linked with glutaraldehyde (GA) and diepoxide (DE) in subcutaneous rat model. We also intended to weigh the anti-calcification efficacy of DE-preserved-tissue modification with 2-(2carboxyethyl)-amino ethylidene bisphosphonic acid (CEABA). CEABA is a novel bisphosphonate synthesized in Novosibirsk Institute of Organic Chemistry (Novosibirsk, RF) (Figure 2). Three groups of each biomaterial were evaluated: GA-, DE – and (DE+CEABA)-treated. According to our results all the GA-treated biomaterials had a high calcium-binding capacity. DE-preservation decreased the calcium content in the BJV and in the pericardium, but not in the aortic wall (Figure 3). CEABA effectively reduced mineralization in the DE-aortic wall and in the DE-pericardium, but it produced no effect in the DE-vein wall. Mineralization in the GA – and DE-treated aortic and BJV walls is predominantly associated with elastin.

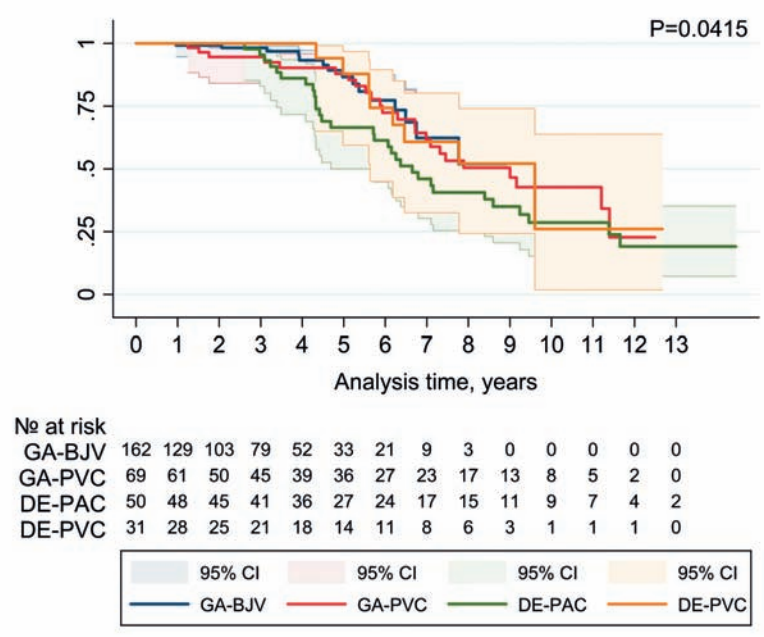


Figure 2. Synthesis of 2-(2'-carboxyethylamino)ethylidene-1,1-bisphosphonic acid (CEABA)

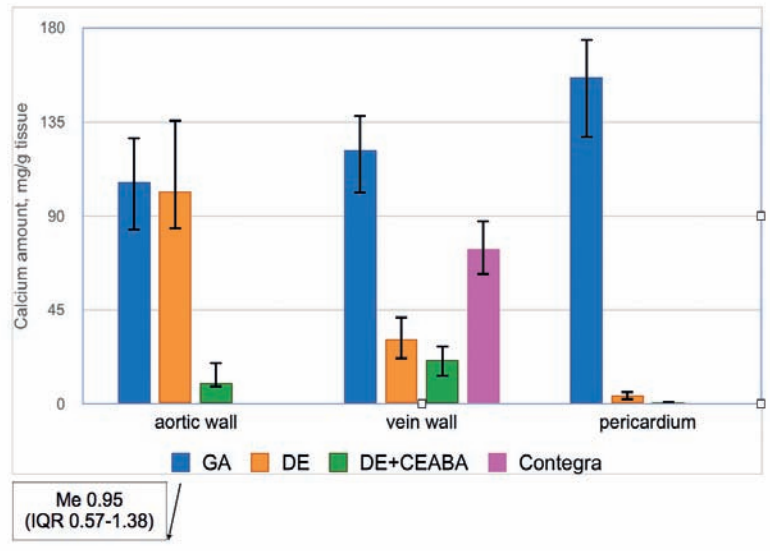


Figure 3. Calcification of the biomaterials of different treatment after 60 days of subcutaneous implantation in rats.

Our study demonstrated that GA-treated BJV conduit has shown the lowest rate of calcification. However, calcification of the BJV could be partially reduced by virtue of substitution of GA for DE compound. The strategy of cross-linking with DE and additional modification with CEABA is the most effective for the bovine pericardium and can be employed to further develop the paediatric conduit. Porcine aortic root conduits have demonstrated suboptimal results in terms of calcification at the clinical follow-up and underwent calcification that cannot be blocked with CEABA modification in experiment.

Cardiac | Abstract | Surgical management of effective endocarditis: analysis of early and late outcomes 1

Is mitral valve repair superior to mitral valve replacement in patients with native mitral valve endocarditis? A systematic review and meta-analysis of 8,978 patients

Amer Harky, Mohamad Bashir, Rakesh Uppal Department of Cardiac Surgery, Barts Heart Centre, St. Bartholomew's Hospital, London, UK

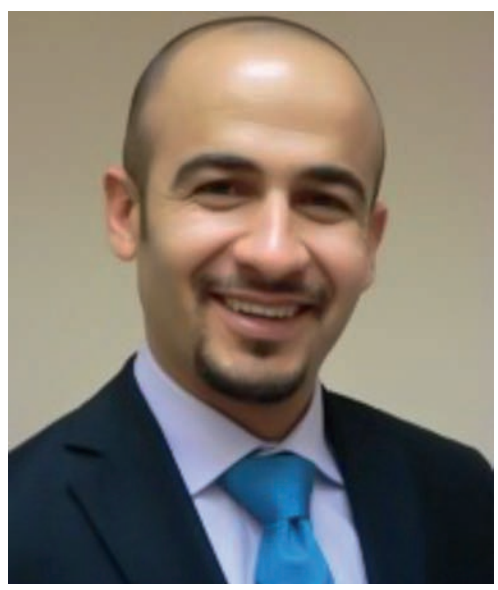
In the western world, infective endocarditis (IE) represents a health burden on the cogwheel of healthcare with an incidence of 10-15 per 100,000. The historical risk factors have evolved dramatically, and as such rheumatic fever has become quite rare. Having said that, the surge of IE amongst intravenous drug abuse, nosocomial infections or immunosuppression patients plays a greater role, with lack of robust epidemiological data representing this. However, the most common native valve affected remains to be the mitral valve with a prevalence of 41% of all cases diagnosed with IE.

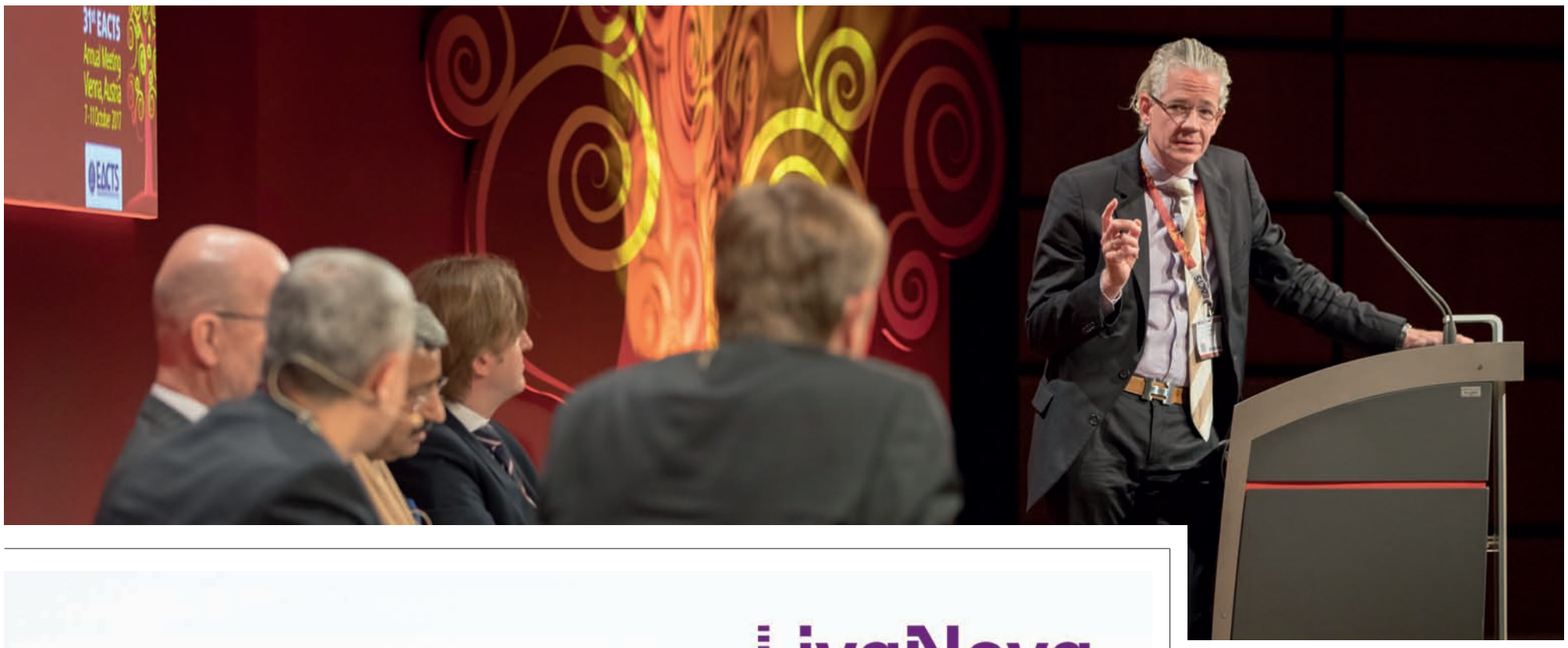
The guidelines and evidence extracted from a series of large cohorts highlight two main streams to managing IE, albeit through complex antibiotic regimen which remain the primary medical modality amongst patients without significant heart failure or structural valve destructions. The alternative managing pathway is a combination of surgical and medical interventions through intravenous antibiotics, as aforementioned, and either repair or replacement of the mitral valve.

Surgical repair of the mitral valve (MVr) in patients with native valve IE has attained surgical superiority over mitral valve replacement (MVR). However, to date there is no collective evidence that compares the outcomes between patients who underwent MVr versus MVR for native valve IE. As such, we set out to investigate this through a systematic review of the current literature employing varied statistical methods to deduce a meta-analysis of the outcomes between MVr versus MVR.

The results analysed a total of 8,978 patients, and 14 articles were included in the synthesis of the meta-analysis. Cardiopulmonary bypass time was lower in the MVr group compared to the MVR group (P = 0.05). There was no significant difference observed in the aortic cross clamp time between the two groups (P = 0.2). Post-operative outcomes (<30 days / in hospital events) such as bleeding (P = 0.005) and recurrence of infective endocarditis (P = 0.004) were significantly lower in the MVr group. Beyond 30 days, outcomes were similar for recurrence of IE (P<0.0001) in both groups. Additionally, there are significantly less reoperation rates in the MVr group (P = 0.0021). MVr group seems to have a significantly better mortality profile at 1 year post-operatively (P = 0.03).

The present meta-analysis shows that mitral valve repair has good clinical outcomes both while in-hospital and at one and five years of follow up, and is superior to mitral valve replacement in patients that undergo mitral valve surgery for native mitral valve endocarditis.





LivaNova
Health innovation that matters

LivaNova Boosts Investment in Cannulae Technology, Expands Portfolio

During the past five years, LivaNova has been intently focused on and committed to acquiring and developing cardiac surgery cannulae. We remain one of the few companies continuing to invest the most in cannulae technology as we enlarge our product portfolio.

Our comprehensive cardiac surgery cannulae portfolio includes adult, pediatric and minimally invasive cannulae. Our adult cannulae feature both curved and straight-tip aortic arch designs for maximum clinical flexibility; our pediatric cannulae offer choices for the smallest of vessels, from children to small adults; and our minimally invasive MICS cannulae are designed to ensure excellent hemodynamics while providing easy insertion and minimal intrusion into the surgical field, thus improving patient outcomes.

Further demonstrating our investment in supporting cardiac surgeons and clinician partners, LivaNova launched the Cannulae Digital Hub, the only online cannulae hub for clinicians. At cannulae.livanova.com, clinicians will find a one-stop, comprehensive portal with news, resources, product highlights and information on our entire portfolio, including conventional adult cannulae, MICS and femoral cannulae and conventional pediatric cannulae.

Built on a 30-plus-year foundation of innovation, LivaNova offers a complete cannulae portfolio to the global cardiac surgery market. We look forward to meeting the needs of cardiac surgeons in the years ahead through our commitment to continual improvement of cardiac surgery cannulae technology.

EACTS Academy

Minimally Invasive Techniques in Adult Cardiac Surgery

The European Association for Cardio-Thoracic Surgery's course on Minimally Invasive Techniques in Adult Cardiac Surgery (MITACS) ran from 20-22 June, 2017 at the Central Clinical Hospital of the Ministry of Interior and Administration in Warsaw, Poland. With a record attendance of over 200 cardiothoracic surgeons, cardiologists, cardiac anaesthetists, perfusionists, residents and fellows, the course served as a vibrant and engaging forum focusing on key topics in the minimally invasive field.

MITACS is designed to provide the participants with a platform and a basis for starting the same programme at their own institute. To emphasise the success of the teamwork approach, invited experts share their expertise over three days of keynote presentations, live-in-a-box videos and live surgical case transmissions in order to demonstrate the technical aspects of the new procedures.

Ten live cases took centre stage, with enthralling explorations held primarily in 3D, thus providing a more immersive experience for the audience. What's more, the MITACS course also emphasised hands-on experience, with a dedicated 'SimCity' session that provided an opportunity to practice minimally invasive techniques and skills using a wide range of technologies and equipment under the expert guidance of our faculty and industry partners.

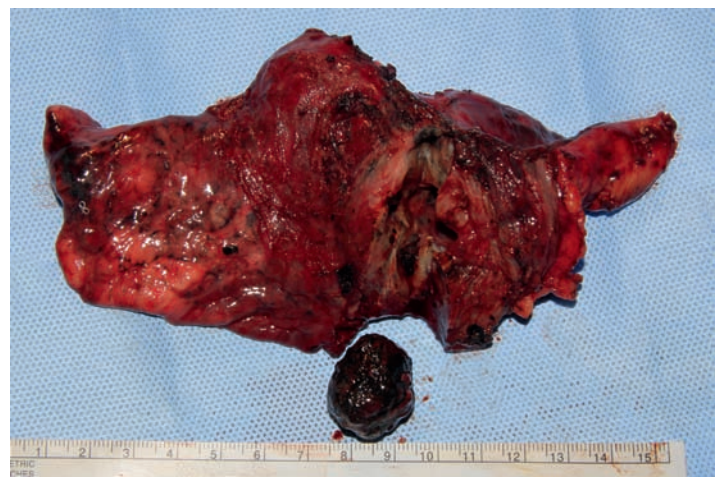
MITACS forms part of EACTS' ongoing Academy programme, providing training courses of the highest quality which are attended by delegates from all over the world.

Highlights from this year's MITACS course can be found in the accompanying Course Report (pictured) available for download from the EACTS website.

The next MITACS course will be held on 26-28 June, 2018 in Maastricht, the Netherlands. We encourage you to head to www.eacts.org to register your interest for this, and other upcoming Academy courses.

Thoracic Case Session 1 | Abstract | Thoracic

Intrathoracic gallstone: A rare case report



Sudhir Bhusari, Mohamed Osman, George Doukas, Gyanesh Namjoshi Basildon and Thurrock University Hospital – Essex CTC, UK

Case Report

A 79-year-old male was admitted with acute cholangitis and underwent urgent laparoscopy, drainage of the gallbladder and chelocystectomy. Pre-operative CT demonstrated an enlarged gallbladder and a 2 – 2.5 cm gallstone. The surgical procedure was described as "difficult and long" by his surgeon. However, he made an uncomplicated inpatient recovery and was discharged three days later.

One-month post-operatively, the patient developed a lower respiratory tract infection characterised by a cough, streaky hemoptysis and shortness of breath. Antibiotics were prescribed on four occasions, however symptoms did not resolve.

CT of the chest demonstrated focal consolidation of the subpleural region of the right middle lobe surrounding an ovoid, well circumscribed lesion which showed a laminated pattern of calcification. This lesion is similar to a gall bladder stone identified on prior abdominal CT. The intrathoracic appearances could possibly be due to gallstone migration into the right hemithorax (gallstone ectopia) with an associated inflammatory pseudo tumour/consolidation.

The patient underwent right middle lobectomy. The lung was adherent to the diaphragm and chest wall. There was dense fibrosis on the diaphragm which may indicate the site of entry point to the chest. An enlarged lymph node was found during lobectomy (station R11). The excised middle lobe was opened after excision which showed a 2 cm gallstone inside the lobe, totally surrounded by lung tissue.

Histopathology showed the gallstone close to the bronchus, and the lung tissue showed evidence of chronic inflammation. No evidence of malignancy was seen in both the lung and lymph node.

Post-surgery, our patient made an uncomplicated recovery. Drains were removed on day three, and the patient was discharged for outpatient follow-up.

Cardiac | Rapid Response | Risk scores; indications, contraindications and side effects

The HAS-BLED score is associated to major bleeding in patients after cardiac surgery

Gianluca Santise[1], Emmanuela Tedesco[2], Saverio Nardella[1], Francesco Migliano[1], Dario Buioni[1], Carmelo Dominici[1], Alessandro Test[1], Daniele Maselli[1] 1. Cardiothoracic Surgery Unit, Sant'Anna Hospital, Catanzaro, Italy; 2 Statistic service, Sant'Anna Hospital, Catanzaro, Italy

Bleeding in cardiac surgery is a serious complication, often requiring urgent resternotomy and blood transfusion. The bleeding event is generally classified as perioperative when it occurs within 24-48 hours after the chest closure. It is usually massive, causing hypotension, anaemia and/or tamponade and is, of course, the most investigated kind of bleeding. On the other hand, less intense bleeding can lead to a sneakier progressive increase of pericardial and pleural collections and late cardiac tamponade with consequent need for intervention: this is the so-called 'blood retained syndrome'. This latter type of bleeding has been less-investigated than the classical perioperative one, nevertheless it has an impact on the final outcome of the surgery considering the actual population of patients, who are usually older and fragile. Moreover, the very frequent use of anticoagulants and/or antiplatelet drugs may increase the risk of bleeding in some cases. For this reason, it would be useful to have a risk score to identify patients with higher risk of late bleeding.

Several different risk scores have been previously proposed, but they are focused on perioperative bleeding. Since we were interested in late-onset bleeding specifically, we decided to test the HAS-BLED score, originally developed to predict major bleeding in anticoagulated patients in atrial fibrillation. It considers the frailty of the patients and includes some variables that may influence the development of blood retained syndrome (hypertension, anaemia, renal and hepatic impairment, stroke, previous bleeding, labile INR, elderly, antiplatelet therapy and drug or alcohol concomitancy) therefore it appeared adequate for the purpose.

This retrospective, single-centre study consecutively recruited 1,173 patients undergoing a cardiac procedure. Major bleeding was defined according to BARC (Bleeding Academy Research Consortium) classification: events occurring within the first 48 hours (perioperative) were classified as Type 1 bleeding, while the remainder occurring during the hospital stay and the follow-up were classified as Type 2. Perioperative anticoagulant and antiplatelet therapy was managed according to the recent AHA/ACC and ESC guidelines.

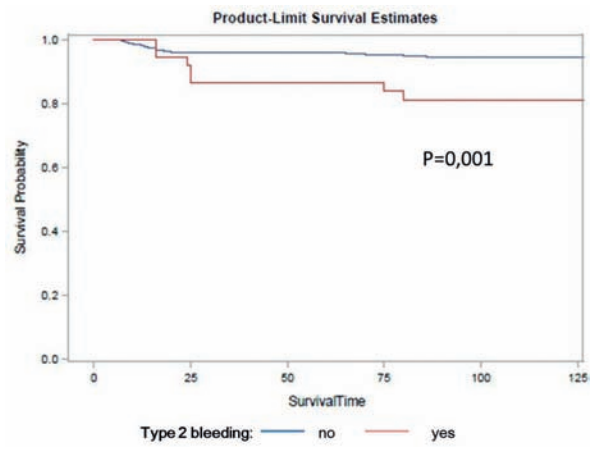


Figure 1: Kaplan-Meier curve for survival in patients with Type 2 bleeding, showing survival of subjects who experienced a Type 2 bleeding versus subjects who did not experience a Type 2 bleed.

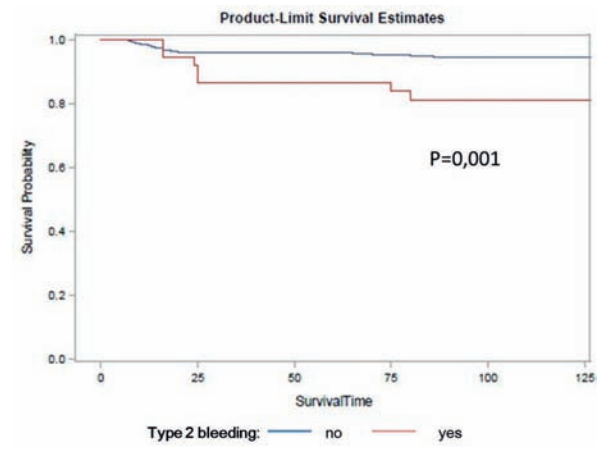


Figure 2: Kaplan-Meier curve for survival in patients with HAS-BLED >4, showing survival of patients with HAS-BLED >4 versus patients with HAS-BLED <4.

The HAS-BLED score was associated to type 2 bleeding, OR: 1.77, (95% CI:1.27 to 2.46, p = 0.0007) reaching an OR of 4.69 (p<0.0001) in patients with an HAS-BLED >4. The association was confirmed at the multiple logistic regression analysis with a C-statistic of 0.763 and an adjusted OR of 1.661 (p = 0.0020), independent of the type of cardiac procedure undertaken. As a collateral result it was found that a higher HAS-BLED score – as well as Type 2 bleeds – had an impact on survival (Figures 1 and 2).

This study confirmed that the HAS-BLED score can be useful to identify the patients with higher risk of retained blood syndrome (Type 2 bleeding). Probably, the risk of thrombosis should be weighted with the risk of bleeding to evaluate a correct balance in the anticoagulation regimen.

EACTS

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 diversity of its pathology. Performing mitral valve repair in a minimal invasive fashion – whether endoscopically, through direct vision or with robotic assistance – is even more difficult.

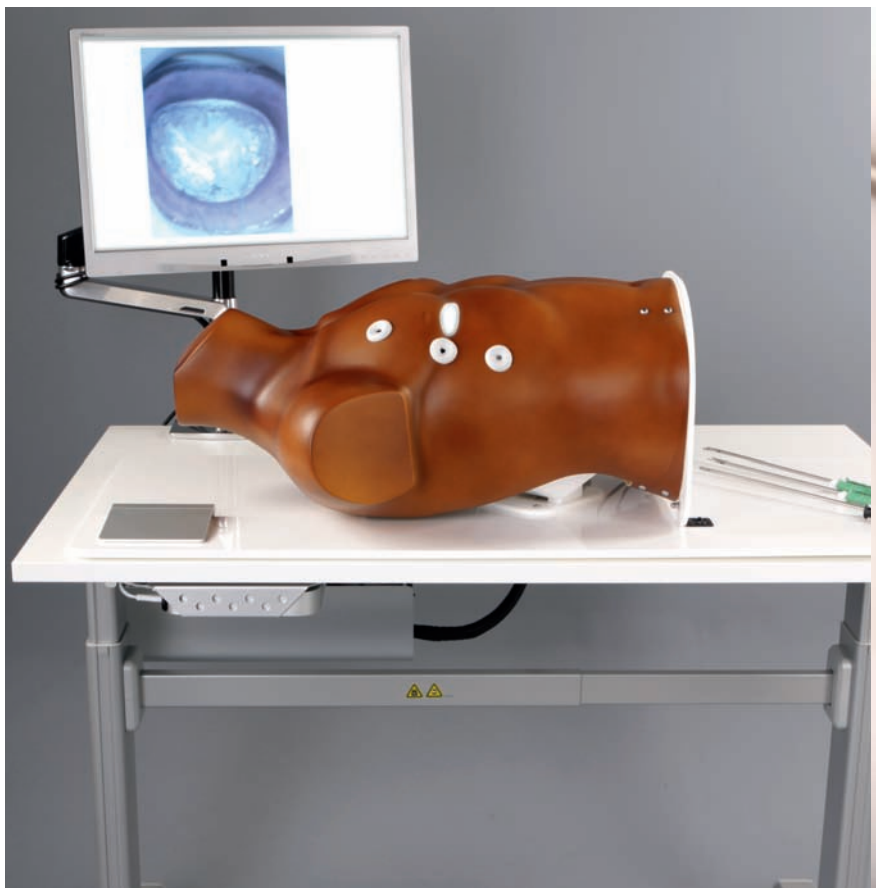
Minimally invasive mitral valve repair (MIMVR) has been shown to be effective and beneficial for patients. Application of this technique has been concentrated in high-volume centres, and in the hands of a limited number of surgeons. Dexterity of open surgery is insufficient for starting a MIMVR, and new dexterity should be developed in endoscopy, and in working with long-shafted instruments.

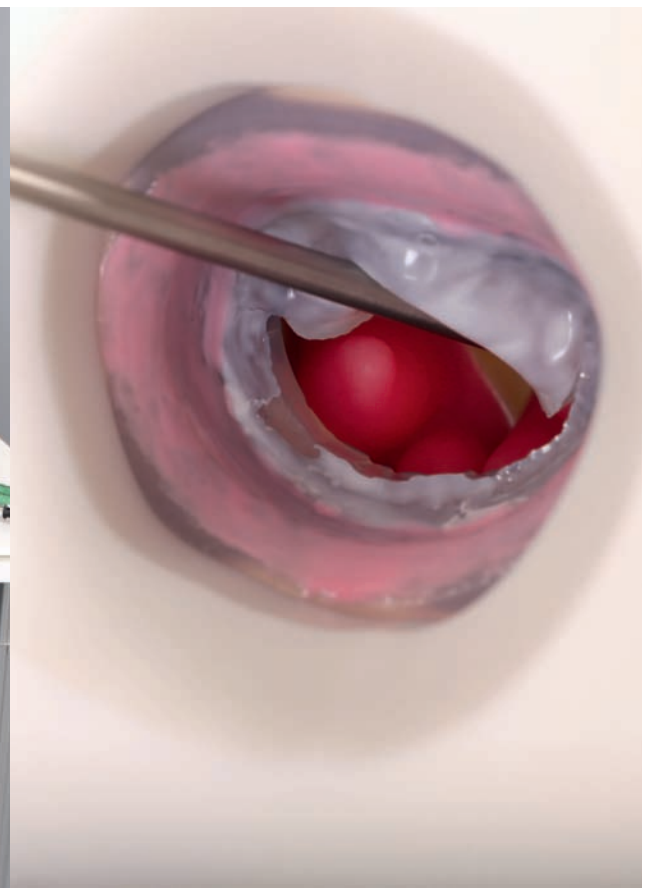
The most critical technical steps are working with long-shafted instruments, endoscopically, as well as placing sutures on the mitral valve annulus. Therefore, the learning curve of MIMVR is steep, and unfortunately still undeveloped in patients.

I have developed and designed a minimally invasive mitral valve simulator with the help of engineering department at Maastricht University Medical Center (MUMC), the Netherlands. This simulator was awarded the Techno-College award in 2015. This simulator will enable residents, fellows and surgeons to develop skills in MIMVR and practice those skills endlessly.

During the past two years we have organised more than 10 courses, and trained over 100 surgeons from all over the globe during EACTS endoscopic port-access mitral valve repair drylab training in Maastricht. The course lasts two days, and has an air-pilot-like training concept.

The participants undergo a theoretical pre-assessment and technical pre-assessment on the simulators. In the subsequent two days, 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 step-by-step manner, with participants finally performing a full repair on 3D-printed pathologic silicone replicas.





Organizer	EACTS
Course director	Peyman Sardari Nia, MD, PhD
Venue:	Maastricht University Medical Center (MUMC), Emtrac, Maastricht, the Netherlands
Dates and times	Four times per year
Next course	14-15 December 2017
Capacity	Maximum of 12 for each drylab
Duration	Two days
Registration	EACTS online
Registration fee	495 Euro (includes course material, breaks and lunch beverages)
Learning goals	Indication and results of minimally invasive mitral valve repair Patient selection Surgical repair techniques Complications Gain familiarity and knowledge in instrumental necessities for endoscopic mitral valve repair Practice and learn the basic techniques in endoscopic surgery for mitral valve repair on high-fidelity simulators Mitral valve repair using annuloplasty ring and neochords on high-fidelity simulators
Specifics of the simulators	True simulated physical model of endoscopic port-access set-up whereby the operator can train from the basic technique to full complex repairs. Disposable mitral valves and papillary muscles that have been created out of material resembling the physical characteristics of connective tissue giving the operator true experience Simulator can give feedback about the length and depth of each stich on mitral valve annulus with picture of each created stich. The operator can train his/her skills based on pre-set parameters of length and depth. 3D-printed pathologic mitral valve replicas are used to do the full repairs.

New standards in aortic valves with INSPIRIS RESILIA

Excellent early safety and efficacy are demonstrated by the new RESILIA tissue, which is now available as INSPIRIS RESILIA aortic valve featuring both the novel RESILIA tissue and VFit technology.

The first-in-class resilient heart valve was the subject of yesterday's lunch symposium hosted by the following speakers: Anno Diegeler, MD, from Herz- und Gefäßklinik, Bad Neustadt, Germany, who addressed the packed hall with, 'What's new about the new European and American guidelines?; Ruggero De Paulis, MD, from the European Hospital, Rome, Italy, who discussed, 'Epidemiology and current treatment options in younger patients'; David Heimansohn, MD, from St.Vincent Heart Center of Indiana, US, who reported the 'RESILIA tissue: 2-year clinical safety trials update'; and finally Olaf Wendler, MD, from King's College Hospital, London, UK, discussed 'Real-life clinical decision making with INSPIRIS RESILIA aortic valve'. Chairing the Edwards Lifesciences-sponsored session were Professor Diegeler and Professor Wendler.

One notable highlight of the symposium was the reporting of the recent two-year clinical trial results from the COMMENCE trial of RESILIA showing two-year actuarial freedom from mortality in isolated aortic valve replacement (AVR) patients, and for all patients was 95.3% and 94.3% respectively. At two years, New York Heart Association class improved in 65.7%, effective orifice area was 1.6 ± 0.5 cm2; mean gradient was 10.1 ± 4.3 mmHg; and paravalvular leak was none/trivial in 94.5%, mild in 4.9%, moderate in 0.5% and severe in 0.0%.

INSPIRIS RESILIA aortic valve approved by the FDA and the European regulatory authorities, and commercially available in Europe

In July this year, the INSPIRIS RESILIA aortic valve received US Food and Drug Administration (FDA) approval; and in Europe, the valve became commercially available earlier this year, after the granting of approval in 2016.

The result of 12 years of research, the INSPIRIS RESILIA valve is different to its predecessor for a number of reasons. Firstly, the RESILIA tissue comprises a breakthrough Tissue Integrity Preservation technology incorporating stable capping of the free aldehyde acid groups (the binding site for calcium) and glycerolisation, which enables dry storage without further exposure to the gluaraldehyde solution.

Professor De Paulis pointed out that RESILIA tissue should offer greater durability than more conventional biological valves according to preclinical studies in an aggressive sheep model "but the time will tell". The largest known pre-clinical randomised controlled trial (RCT) found that RESILIA tissue offered key benefits, such as significantly reduced calcification and sustained haemodynamics compared to current treatment options.

Another design feature that marks a departure from the design of previous heart valves is the INSPIRIS' first-of-its-kind expandable frame known as VFit technology that incorporates three fluoroscopically-visible size markers and an expandable area designed for potential future valve-in-valve (ViV) procedures. This means that, under fluoroscopy, physicians can recognise the size of the valve so there is no need to check medical records for this information, as is required currently.

Dr Heimansohn commented on the importance of valve durability. "You're trying to pick the best prosthesis that gives the patient possibly only one more intervention, because if the valve you put in isn't so durable they'll require three or four more interventions and probably shorten their lifetime," he said. "This is where the appeal of the new tissue process come in – if it lasts 15-20 years until the patient is in their 70s, then you probably only need one intervention to keep the patient on a normal life course, and that is where this will have major impact."

2017 ESC/EACTS Guidelines

Professor Diegeler's presentation concentrated on patients aged 65 years or over, and he referred to the core of the 2017 ESC/EACTS Guidelines including the new indications for TAVI and surgical AVR with a focus on the role of the Heart Team, new indications for TAVI in intermediate risk and for ViV procedures, and the indication to implant biological and mechanical valves with respect to the latter. The differences between the US and the European guidelines were discussed.

Recent 2017 AHA/ACC Guidelines widened the so-called 'grey zone' where either mechanical or biological valves can be proposed for patients from 60-70 years to those aged 50-70 years. The newly released ESC/EACTS Guidelines indicate that this grey zone relates to patients of 60-65 years when

used in the aortic, and 65-70 years in the mitral position (this indication didn't change compared to the 2012 Guidelines). This difference in recommendation reflects the difficulty in identifying clear-cut medical-based evidence in the literature.

However, most indications for mechanical and biological valves have a class IIa recommendation, whereas the wishes of an informed patient in collaboration with consultation of the Heart Team are emerging as preponderant in the clinical decision making with a class I recommendation.

Summarising the guidelines, Professor Diegeler said that the choice between mechanical or bioprosthesis should not overstress age but take into account the patient's wishes; patients with a mechanical prosthesis need lifelong vitamin K antagonists (VKA); the addition of low-dose aspirin to VKA is restricted to certain patients; after ACS or PCI in a patient with mechanical prosthesis, antithrombotic therapy should be individualised according to ischaemic and bleeding risks; and management of anticoagulant therapy during non-cardiac surgery should be adapted to the type of surgery.

Addressing the needs of younger patients (under 65 years), Professor De Paulis explained how the aetiology and the treatment options changed in this age group. Older patients usually have a biological valve replacement carried out by surgery or TAVI, while younger patients mainly receive mechanical valves, but may occasionally receive biological ones or another type of surgical intervention such as Ross, or aortic valve repair that is dependent on their aetiology, anatomy and personal preferences. At the end of his talk Professor De Paulis formulated a hypothesis about what should be a significant clinical benefit from a novel biological valve prosthesis.

"I speculate we can have a 20% increase in durability with a new bioprosthesis," remarked Professor De Paulis. He explained that in the over 60s, if known actuarial average duration of pericardial valves was 18 years, plus 20% would bring duration to 22 years plus eight years bonus with ViV, lasting 30 years. "The duration of the valve exceeds expected average survival," he said. Using the same calculation in patients aged 50 to 60 years, duration was predicted at 26 years, "so this is a reasonable choice,' he remarked. Finally in patients aged between 40 and 50 years, this calculation predicted that duration would extend to 24 years, so the expected age with a functioning valve ranges from 64 to 74 years if implanted at age 40. "We need to weight quality of life versus risk of reoperation," he said.

COMMENCE prospective multi-centre IDE trial

The COMMENCE pivotal trial, which was a global FDA premarket approval study that enrolled 689 patients who underwent surgical AVR using the Carpentier-Edwards PERIMOUNT Magna Ease aortic valve with RESILIA tissue in a prospective, multinational, multicentre study. Mean age was 67.0±11.6 years; 71.8% were male; 26.3% were New York Heart Association Class III/IV. Mean STS PROM was 2.0±1.8 (0.3-17.5).

Two-year results, reported by Dr Heimansohn, showed that isolated AVR was performed in 59.1% of patients; others had additional concomitant procedures, usually coronary artery bypass graft (CABG). Thirty-day outcomes for all patients included all-cause mortality 1.2%, thromboembolism 2.2%, bleeding 0.9%, major paravalvular leak 0.1% and permanent pacemaker implantation 4.7%. Median intensive care unit and hospital length of stay were 2 and 7 days respectively.

Also presented here at EACTS 2017, were four-year follow-up data from the European Feasibility RESILIA Trial on clinical outcomes after use of the new bioprosthesis valve with RESILIA tissue for surgical AVR, showed an excellent and sustained safety profile, no valve failures, and good procedural outcomes with patients requiring only a brief intensive care unit length of stay.

Take into account patient preferences

Turning to Professor Wendler's presentation, he reminded the audience that, as a general principle, the decision around choice of a patient's therapy is the responsibility of the treating physician, who should take into consideration the patient's values and preferences, the clinical status of the patient, as well as current evidence supporting a given therapy.

He concluded his talk by discussing three challenging case studies of patients undergoing AVR, taking the audience through the various considerations noted above. Ultimately it was concluded by the Heart Team in agreement with the patients' preferences that the INSPIRIS RESILIA valve was the most appropriate solution in these patients.

Addressing the hall with his key concluding remarks, Professor Wendler highlighted that in patients with aortic regurgitation, the aim should be to repair or preserve the aortic valve. "However, patients in whom the aortic valve needs to be replaced, there is no ideal substitute. Using the INSPIRIS aortic valve, one can potentially improve durability compared to the well-established PERIMOUNT prosthesis."

The Edwards Lifesciences symposium was held on Monday 9 October, 2017

Vascular | Focus | The changing trend in the treatment of thoraco-abdominal aortic aneurysm

Open surgical repair of post-dissection thoraco-abdominal aortic aneurysms: Early and late outcomes of a single-centre study involving over 200 patients

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Chronic, post-dissection thoraco-abdominal aortic aneurysms (CTAAD) are increasingly being treated by (hybrid) endovascular means. Although less invasive, TEVAR is technically complex, with the risk of incomplete aneurysm exclusion, necessitating frequent re-interventions with potentially reduced long-term outcomes. The aim of this study was to evaluate contemporary early and late outcome after open, surgical repair of CTAAD.

In Nieuwegein, the Netherlands, over the last 20-years (1994 to 2015), 633 patients underwent open repair for TAAA[1], including 217 patients (34%) for CTAAD, that we selected for the analysis. Circulatory support was obtained by either left heart bypass (173 pts [79.7%]), deep hypothermic circulatory arrest (41 pts [18.9%]), or simple aortic cross-clamping in three patients. We analysed all relevant perioperative and intra-operative variables with respect to adverse outcome. Additionally, long-term survival and the need for aortic re-interventions was studied. Mean age was 60.2 ± 11.9 years (male, 68.2%). We identified 66 Type I (30.4%), 113 Type II (52.1%), 25 Type III (11.5%), 10 Type IV (4.6%) and 3 Type V TAAA (1.4%). Early mortality and spinal cord deficit was 5.9% and 5.5%, respectively. Follow-up was 100% complete (mean 6.0 ± 5.8 years). Freedom from aortic re-intervention was 96.2% at 10 years, with long-term survival of 71.4% at 10 years.

In this report, we describe one of the largest series of open surgical repair for post-dissection thoraco-abdominal aortic aneurysms to date.

In CTAAD we found better early outcomes in comparison to our previously reported series of degenerative TAAA patients[1]. This is in line with the results recently published by Coselli et al.[2]

An endovascular approach to TAAA is becoming an appealing alternative to the traditional open repair due to better early outcomes – including lower perioperative mortality and morbidity rates, especially for TAAA with degenerative aetiology. On the other hand, after TEVAR, the need for a secondary intervention is common, and the complication rate after the procedure is still high.[3] In the future, when endovascular devices become widely available, the paradigm of treatment of CTAAD will likely change.

In our opinion, open and endovascular repair should be complementary. Although more invasive than currently employed endovascular approaches for CTAAD, open surgical repair can be performed safely with acceptable morbidity and mortality when performed in a specialised aortic centre.

Dr Jacopo Alfonsi (left) and Dr Giacomo Murana

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Cardiac | Advanced Techniques | Controversies & Catastrophes in Adult Cardiac Surgery

Hybrid repair for the treatment of Acute DeBakey type I dissection will be the gold standard

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The classic therapeutic operation for acute DeBakey type I aortic dissection was developed, and addresses the four fundamental reasons why people die in the first two weeks after the dissection. This "classic" operative design treats:
1) Aortic insufficiency with either valve resuspension or replacement;
2) coronary malperfusion with an aortic root stabilisation procedure;
3) cerebral malperfusion (CVA) and brachiocephalic vessel dissection with an open distal anastomosis, hemiarch, or arch replacement; and of course 4) replacement of the proximal aorta to mitigate against free ascending aortic rupture (Table 1). This classic design of an operation has been in existence for the past 15-20 years and has been very successful.

However, multiple series from the global "cardio-aortic" community have noted the significant combination of distal reoperation requirement, aortic related death, and the growth of the downstream aorta after DeBakey I proximal repair. There is no doubt – we definitely have a problem with the downstream aorta.

The most important concept for the future will be eliminating distal (residual) dissection after DeBakey I dissection. Numerous reconstructive variations have been developed to address the fundamental problem with the dissected downstream aorta. They are as follows:
1) Direct antegrade TEVAR replacement using an open aortic arch followed by standard hemiarch repair
2) Zone 2 or Zone 3 classic frozen elephant trunk (FET) procedure
3) Zone 2/1 arch with sequential branched graft TEVAR completion

It is probable that for properly selected patients a solution at the index procedure will include either an FET operation or a planned sequential branched TEVAR completion after a Zone 2/1 index operation (Figure 1).

The advantages to the Zone 2 arch with sequential branched TEVAR completion are significant. It is a simple distal anastomosis at the index operation which is psychologically beneficial to the operating surgeon in an operation that is inherently difficult. (Most surgeons dread a complex arch procedure during a DeBakey I repair that also requires a root reconstruction!) This is especially true if complex root reconstruction is required. The Zone 2 arch with slight "proximalisation" of the innominate and carotid, thereby constructing a robust Dacron Zone 2 TEVAR landing zone (LZ) of 3 cm, can address most complex arch tears and eliminates the flap in proximal head vessels. This index procedure ensures a shorter ACP time than a Zone 3 FET. The reconstructive concept allows all definitive TEVAR options in the future. Importantly, this sequential "conduct of operations" avoids TEVAR when it is not needed which is approximately 35% of the time. Moreover, and importantly, there is less risk of recurrent laryngeal nerve injury in the Zone 2 arch compared to a Zone 3 FET.

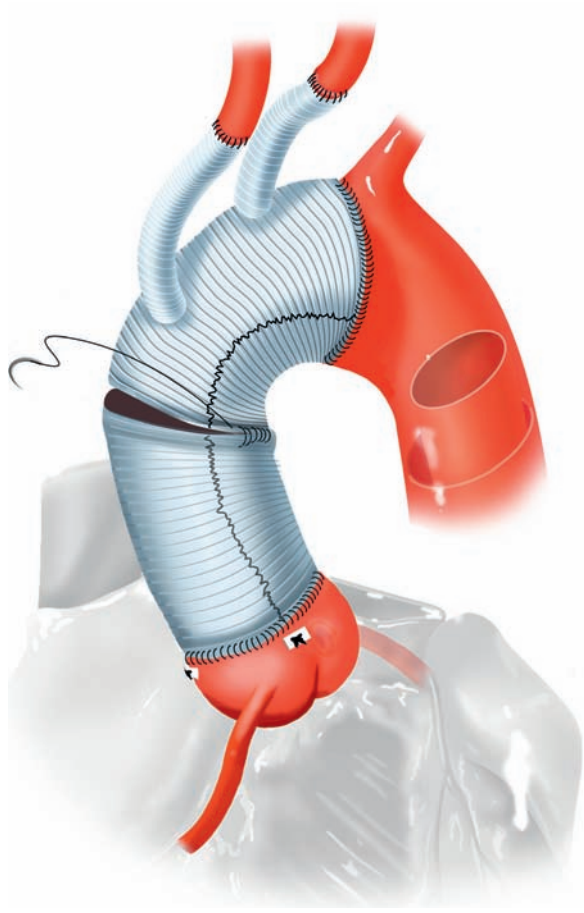

Figure 1. Illustration showing staged Zone 2 arch open repair.

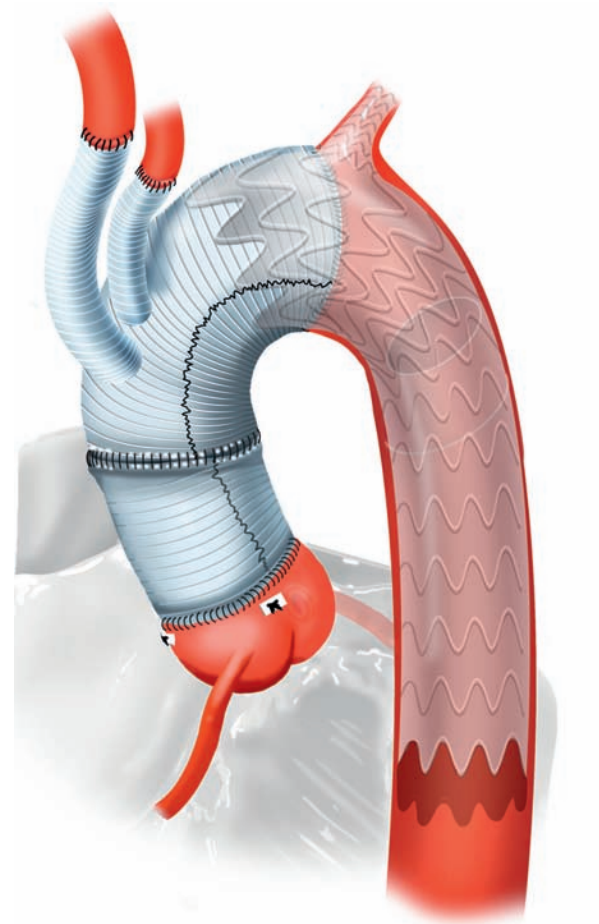

Figure 2. Illustration showing endograft completion of sequential DeBakey I repair.

For all these reasons, coupled with the availability of new branched arch endografts, there is a compelling argument that an index Zone 2 arch procedure with construction of a Dacron LZ will be an extremely attractive solution for repair of acute DeBakey type I dissections (Figure 2).

Presently, the FDA early feasibility trial has been completed with zero mortality and very low CVA rates using this sequential DeBakey I treatment strategy. The mean time to the TEVAR solution is four weeks after index DeBakey I repair. US FDA pivotal and CE Mark trials are now ongoing for U.S. and European approval.

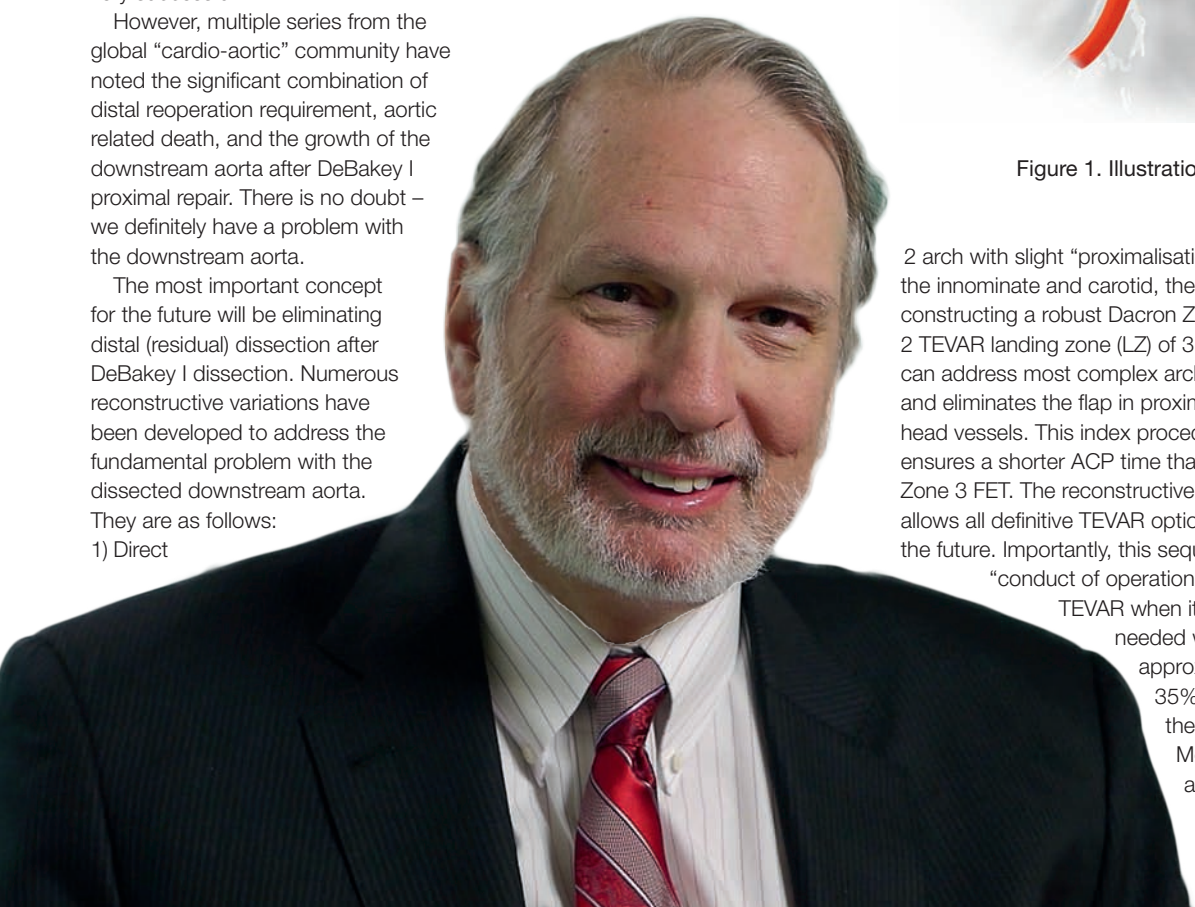

Table 1. Acute DeBakey Type I Dissection: Design of an Operation

Cause of death	Treatment
1. Acute CHF due to AI	Aortic valve resuspension
2. Coronary malperfusion	Aortic root repair
3. Cerebral malperfusion	Arch replacement
4. Free Ascending rupture	Ascending aortic replacement

Congenital | Professional Challenge | Challenging issues in Fontan pathway: Part 1

Thoracic duct decompression for prevention and therapy of protein losing enteropathy

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Benjamin Bierbach

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In the Fontan circulation central venous pressure is elevated, impeding lymphatic return and enhancing lymphatic production itself. This lymphatic system imbalance may result in lymphatic stasis, which plays an important role in the physiology of the failing Fontan and may itself contribute to the development of Fontan failure. As such, lymphatic engorgement may result in protein-losing enteropathy (PLE). PLE is characterised by intestinal protein loss, hypalbuminaemia and hypoproteinaemia. Additionally, retained intestinal lymphatics, lymphopenia, electrolyte abnormalities, diarrhoea and oedema may be present. Clinically this leads to malnutrition, obstipation as well as diarrhoea, immunoincompetence, osteopenia and other consequences of malnutrition. The prognosis of Fontan patients suffering from PLE is very poor with mortality between 30% and 50% at 5 years after onset of symptoms.

We introduced a concept based on thoracic duct decompression to the low pressure systemic atrium. The operation is performed during any type of Fontan operation on cardiopulmonary bypass. The superior vena cava, the innominate vein and partially the left subclavian and jugular vein are dissected free. All venous branches of the left subclavian and jugular vein are clipped. Care is taken not to dissect the posterior aspect of the subclavian-jugular confluence, to avoid inadvertent damage to the thoracic duct. After completion of primary surgery, the junction of the right jugular vein and innominate vein is clamped and transected. The stump of the jugular vein is oversewn. Subsequently, anastomosis of the transected innominate vein is performed with the right or left atrial appendage. The length of the innominate vein, the size and position of the appendages, and the ability to mobilize these structures to provide tension-free anastomosis determines the choice between the left and the right appendage.

Between 08/2011 and 03/2016, 15 single ventricle patients for high-risk Fontan completion (n=12) or Fontan conversion due to PLE (n=3) received an 18-mm non-fenestrated external conduit and thoracic duct decompression. Additionally, one patient with repaired pulmonary atresia and intact ventricular septum suffering from PLE underwent thoracic duct decompression plus implantation of a 18-mm right ventricular to pulmonary artery conduit.

Three patients died early resulting in mortality at 12 months of 81.3%. At both 24 and 36 months the mortality was 75%. The anastomosis patency was 93.8%.

Currently, only one out of four patients is suffering from PLE, although the condition had completely resolved after thoracic duct decompression; unfortunately she developed a superior caval vein thrombosis and the disease reoccurred thereafter. Only in this patient was the albumin level below the normal range. The median albumin level was 3.8 g/dl (range 2.5-4.3 g/dl). Survivors experience an excellent functional result (median NYHA class IIa). Saturation ranges from 83-98% (median 92.5%). There are only three patients with saturation at rest of below 90%.

Thoracic duct decompression reduces the morbidity in patients affected by PLE preoperatively. Additionally, secondary occurrence of PLE and profound desaturation has not been observed. Therefore, we consider this adjunct method safe for affected patients and patients at high-risk for PLE at Fontan completion.

Cardiac | Advanced Techniques | Surgical challenges in bicuspid aortic valve syndrome

BAV repair: towards repair oriented classification and systematic repair approach

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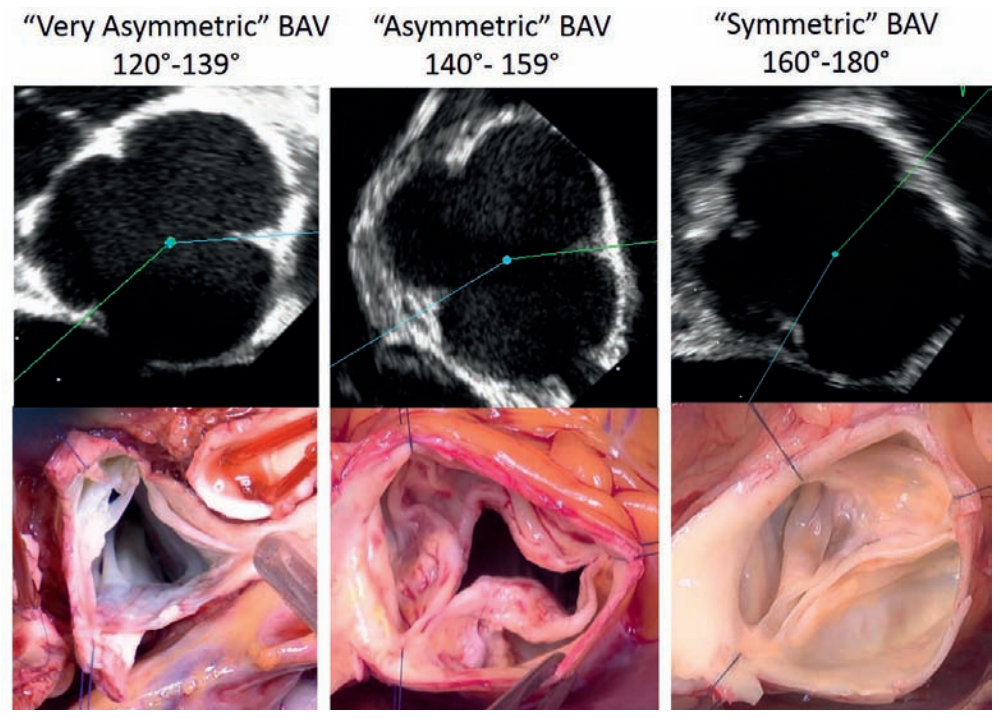

Figure 1. Echocardiographic and intraoperative pictures illustrating three types of bicuspid valve phenotypes.

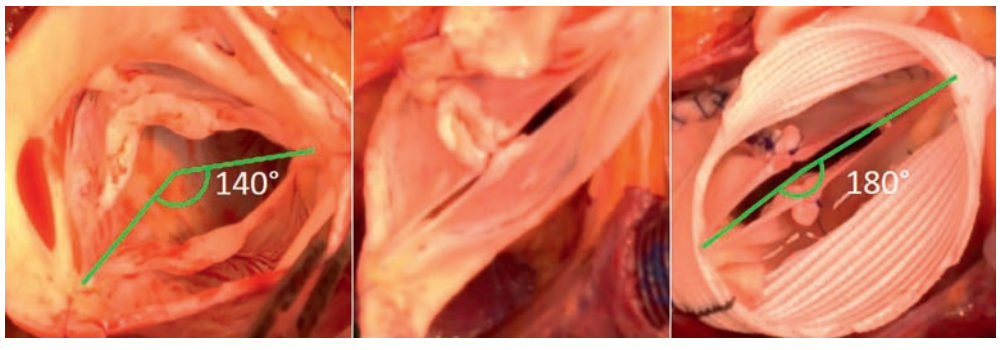

Figure 2. Intraoperative pictures illustrating modification of BAV geometry by reimplanting the commissure at 180° with valve-sparing reimplantation technique.

Bicuspid aortic valve (BAV) disease affects 1% to 2% of the population. Although BAV can occasionally be associated with normal lifelong valve function, its presence is associated with a risk of early valve degeneration and aortopathy leading either to aortic insufficiency (AI), aortic stenosis and aortic aneurysm formation during adulthood. Young adults, who generally present with predominant AI, tend to have a higher rate of aortic root dilatation. In contrast, the older patients who typically present with predominant AS tend to have a higher rate of ascending aorta dilatation. Aortic valve repair is an attractive alternative to replacement in young adult with regurgitant BAV. During the last two decades, increased knowledge on BAV disease and refinement of surgical techniques have led to improve standardisation and reproducibility of BAV repair.[1-3]

BAV phenotypes follow a continuous spectrum with at one extremity the "symmetric" BAV with commissure orientation of 180° and at the other extremity "very asymmetric" BAV with commissure orientation near to 120°. (Figure 1) In "symmetric phenotypes" (≈160° to 180°) sinuses of Valsalva and aortic cusps are of nearly equal size; the conjoin cusp is almost or completely fused with no or discrete raphe remnant. In "asymmetric" (≈140° to 160°) or "very asymmetric" (≈120° to 140°) BAV, fused cusp and corresponding sinuses of Valsalva occupied a larger portion of the root circumference compared to non-fused cusp. Cusp fusion is generally incomplete and tend to be shorter as much as the commissure orientation is close to 120°. Cusp fusion, also called the raphe, form a rudimentary abnormal commissure of which the height is lower than that of the two normal commissures but it tends to reach sinotubular junction as much as commissure orientation is close to 120°. (Figure 1) The source of those observations on BAV morphopathology is an ongoing multi-centre study performed in Homburg and Brussels by Dr Schäfers and Dr de Kerchove. Their goal is to develop a repair oriented classification for regurgitant BAV. (Study presented at EACTS meeting on Monday, October 9th) Next to cusp phenotypes, BAV present also with relatively large annulus (ventriculo-aortic junction, VAJ of 28-32 mm in BAV vs 23-24 mm in TAV) and eventually dilatation of aortic root or ascending aorta.

Even if BAV repair techniques still varies among the centres with larger experience[1-3]; over the years their approaches have progressively reached very similar goals consisting in: 1) restoring cusp configuration with central cusp plication and intraoperative measure of effective height; 2) reduction/stabilisation of VAJ with circumferential annuloplasty when VAJ > 25-27 mm (i.e. external ring annuloplasty, suture annuloplasty or valve sparing reimplantation); 3) Valve-sparing root replacement using reimplantation or remodelling techniques when root diameter > 40-45 mm; 4) Improving valve geometry making it more symmetric (close to 180° commissure orientation) or leaving it at 120°. A valve-sparing root replacement techniques allows reimplantation of the commissure at 180° (Figure 2); and in normal root size, a sinus plication stitch on the side of the fused cusp can increase the commissure orientation towards a better valve geometry (> 160°).

Currently, BAV repair has reach a certain maturity traduced in excellent long-term durability that can reach 90% or more freedom from reoperation at 10 years.[1-3] Further studies are necessary to validate whether our new classification is able to guide surgeons across reparative approach and to evaluate how this classification can predict outcomes to improve patient selection for BAV repair.

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Cardiac | Abstract | Sternal wound complications

Deep sternal wound infection has no impact on longer term mortality of cardiac surgery patients: a longitudinal case control study

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Sternotomy and leg wound after harvesting a vein are the most commonly infected sites following cardiac surgery and may become apparent in the first month or even years after the procedure.

The deep sternal wound infection (DSWI) is a rare complication with an incidence of 1% to 5% and mortality rate of up to 10% to 20%. This mortality rate has remained constant for the last two decades. This complication can increase the length of stay and the cost of the procedure at least two-fold.

Apart from its devastating early impact, DSWI (also known as mediastinitis) has been reported to have a negative impact on late mortality, some studies claiming that there is an increase in late deaths of two – to three-fold. In contrast, some recent studies demonstrated that there is no impact of DSWI in late deaths when it is treated properly.

The treatment of this complication is either conventional, such as wound packing or flapping, or by the application of negative pressure for the healing of the wound. The vacuum-assisted closure (VAC) technique was introduced as a modality of treatment less than two decades ago.

We conducted a longitudinal case-control study aiming to investigate the impact of DSWI treated with negative pressure wound therapy (NPWT) on long-term mortality in post-cardiac surgery patients.

All patients who underwent any type of adult cardiac surgery, apart from heart transplanation, in a single cardiothoracic surgery department from May 2012 to December 2016 constituted the initial study population.

From the initial population, the patients who experienced DWSI post-operatively and were treated with NPWT, constituted the group of cases.

A random number-generating algorithm was applied to identify a random population of patients without DSWI that would constitute the control group.

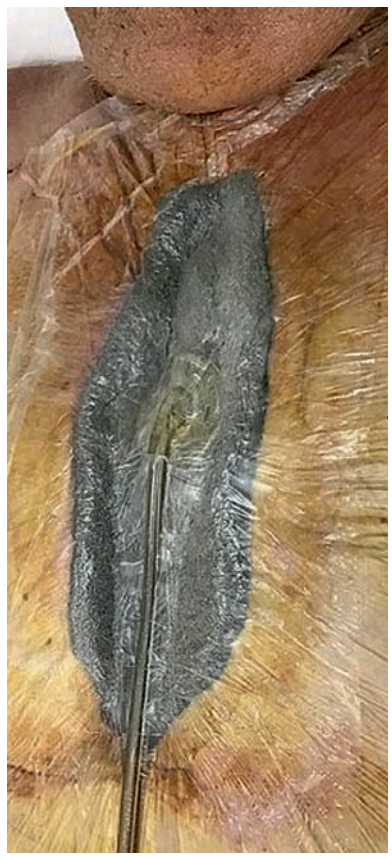

Figure 1. The vacuum-assisted closure (VAC) technique.

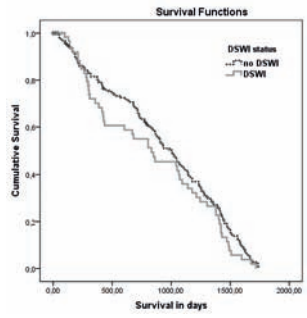

Figure 2. Cumulative survival curve comparing patients with deep sternal wound infection (DSWI) and no DSWI.

The ratio of number of cases to number of controls was calculated to be 0.5, with an estimated ~10% of patient lost to follow-up.

The survival status of all cases and controls at March 2017 was assessed by telephone contact.

The Kaplan–Meier survival curve with the Log-rank comparison was used to assess the impact of DSWI on mortality and to estimate the median survival of the group of cases and group of controls, as well as corresponding 95% confidence intervals.

From a total of 2,103 patients, 80 were identified as having DSWI. As such, an initial random population of 180 controls was constructed.

Seven (8.8%) patients with DSWI and 15 (8.3%) patients without DSWI were lost to follow-up, resulting in a final study sample of 73 cases and 165 controls.

Age (66.7±10.5 vs 65.9±10.4; p = 0.598), sex (78.1% vs. 75.2% male; p = 0.625), EUROSCORE II (2.7±2.4 vs. 2.1±2.1; p = 0.071) and type of operation (p = 0.296) were similar between cases and controls.

19 cases and 12 controls (p<0.001) died during follow-up, with 16 of all deaths (84.2%) occurring within the first year of follow-up.

Long-term survival did not differ between cases and controls (833 (459.6-1206.4) days versus 1004 (871-1117) days; p = 0.171), while duration of follow up was similar between the two groups (1072 (754-1390.8) days vs 1022 (880.2-1163.8) days).

Based on these findings we can conclude that the presence of DSWI treated with NPWT did not have a negative impact on the long-term patient survival in this longitudinal, case-control, single centre study.

Thoracic | Abstract | Thoracic Case session 2

Congenital chylothorax managed antenatally and postnatally

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Congenital chylothorax (CC) is an erratic congenital abnormality, affecting nearly 1/15000 pregnancies. It the commonest cause of congenital pleural effusion and incorporates a 25-50% mortality rate, compromising lung development and cardiovascular function[1].

CC is often idiopathic, but can be conveyed by multiple lymphatic or chromosomal abnormalities (Noonan, Turner and Down syndromes). Evidence-based treatment choices are lacking and interdisciplinary long-term follow up is needed[1].

Herein, a female foetus at 26 weeks' gestation presented with mild right hydrothorax without hydrops during the antenatal care of her 30-year-old healthy mother.

Sonography at 28 weeks showed massive right pleural effusion causing mediastinal shift, mild pericardial effusion, with a diagnosis of non-immune fetal hydrops meriting intrauterine intervention.

Ultrasonography-guided transabdominal transuterine thoracentesis was done to decompress the lung (Figure 1 A,B). The fluid was straw coloured with a white cell count of 5200 cells/µl (97% lymphocytes), suggesting CC. With remounting CC at 38 weeks gestation, thoracocentesis was repeated.

The female was born at term through elective caesarian section. Postnatal x-ray displayed right pleural effusion which increased with enteral feeding. Pleural fluid unveiled straw colour (Figure 2B), no odor, biochemically and cytologically suggesting chyle and sterile on culture[2].

Total enteric rest and parenteral nutrition (TPN) were started and right thoracostomy tube was inserted.

Thoracostomy output was replaced intravenously to maintain intravascular volume. Drainage stopped at day 6 with complete lung expansion (Figure 2C). No further octreotide or surgery were indicated. Needle lung and pleural biopsy was vetoed by the mother.

Medium chain triglyceride (MCT) formula and breast milk were introduced with gradual weaning of TPN. The drain was removed without pleurodesis following and no recurrence. At one-year of follow-up, the child was developing normally.

With escalating dimensions in fetal interventions, early (<32 weeks) aspirations, thoracoamniotic shunting, and open or fetoscopic surgery, have saved more fetuses with CC from severe life-threatening hydrops.[2].

The gold standard in diagnosis is still lung biopsy with subsequent immuno-histochemical staining[1].

The treatment algorithm is largely conservative, beginning with drainage, respiratory support, enteric rest, and TPN, reaching surgery in tenacious cases[2].

As chyle is composed of fats, immune cells (mainly lymphocytes) and proteins, progressive loss is anticipated and replaced to confine drastic metabolic, nutritional and immunological depletion[2].

Octreotide, propranolol, sirolimus and sildenafil have shown promising results[2].

However, once medical management fails with drainage of >10 ml/kg/hr after 2 weeks of conservation, chemical pleurodesis or thoracic duct ligation with pleurodesis, pleuroectomy or pleuroperitoneal shunt, is the definitive treatment[1,2].

References

1. Attar MA, Donn SM. Congenital chylothorax. Semin Fetal Neonatal Med 2017;22:234-9.
2. Perisson C, Nathan N, Larroquet M, Corvol H. An idiopathic congenital chylothorax: surgery or conservative management? BMJ Case Rep 2014; doi:10.1136/bcr-2014-204147.

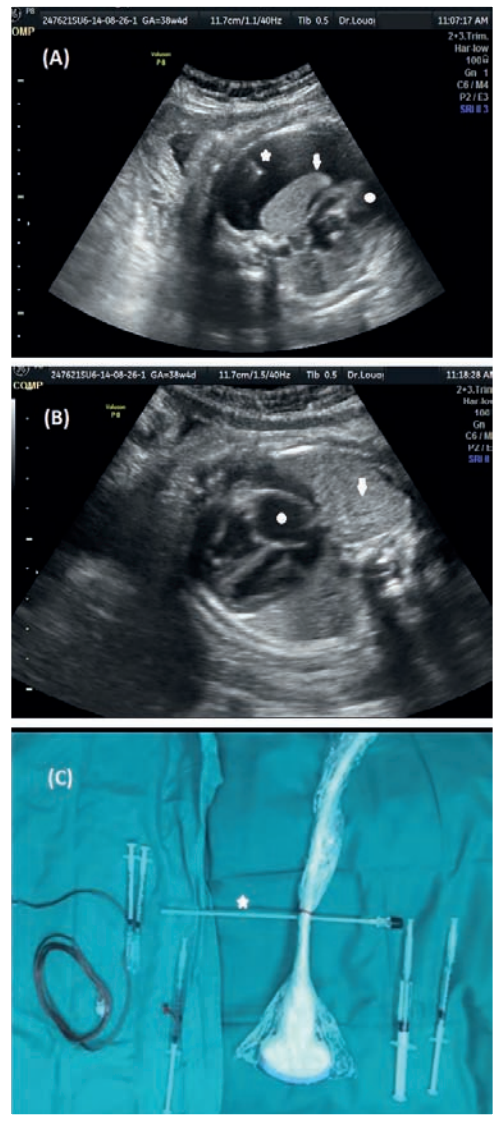


Figure 1. Ultrasound guided fetal thoracocentesis. (A) Massive pleural effusion with collapsed right lung (white arrow) causing mediastinal shift (white circle); chiba needle (white star) is introduced. (B) Following drainage.

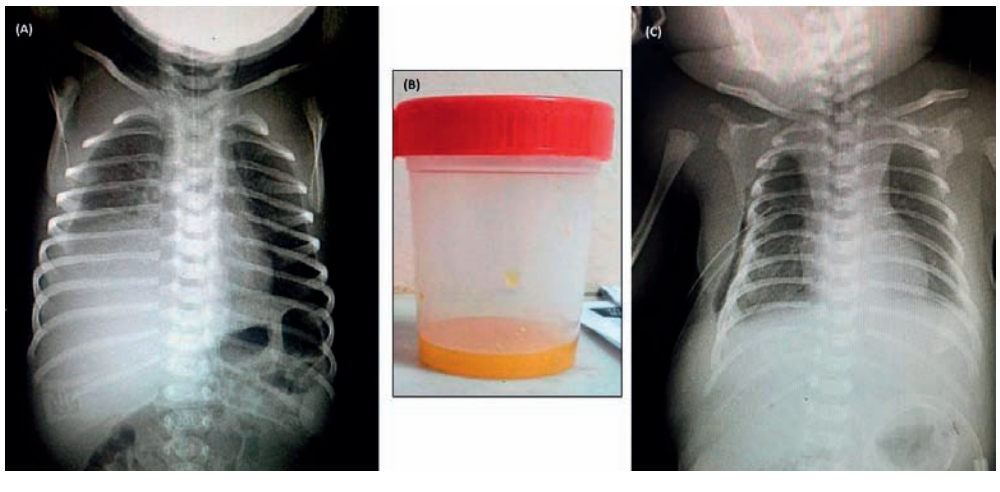


Figure 2, left. (A) Postnatal findings: X-ray showing moderate right chylothorax. (B) Aspirated chylothorax. (C) Resolution with thoracostomy.

EACTS

The Quality Improvement Programme: Adult Cardiac Database and EUROMACS

Join today to improve clinical outcomes for patients.

EACTS initiated the Quality Improvement Programme in 2012 to improve clinical outcomes for patients. Since its inception, two international databases have become the highlight of the programme, with cardiothoracic centres collaborating across borders to collect data for scientific purposes and to create benchmarking tools for local quality improvement initiatives.

The Adult Cardiac Database is one of the EACTS Quality Improvement Programme's international benchmarking databases, providing adult cardiac surgical data and a benchmarking tool for participating hospitals, enabling surgeons to access anonymous data of surgical procedures and compare their own hospital's data with all other hospitals in the database, anonymously. It is also possible to anonymously compare data of a patient and their outcomes in a participating hospital with similar cases in the database.

2017 marks the first year for the publication of annual and bespoke reports for each contributing hospital, generated by EACTS using data from the Adult Cardiac Database, which can be used by contributing centres to carry out research.

With the increasing number of centres and procedures contributing to the Adult Cardiac Database, more rigorous data validation processes have been implemented, and new pages and benchmarking features have been added to the tool to improve statistical analysis and research. This includes information on how many records do not meet reasonable validation criteria, additional metrics for hospital comparison, more detailed filters and procedures, statistical controls (mean + / – 1SD, 95% CIs and IQRs), survival curves by individual procedures or all-cases, an updated clinical support tool page and an interactive updates page for participants.

With the increasing number of centres and procedures contributing, new features have been added to the tool including more filters, more detailed procedures and better quality.

With already over 70,000 procedures in the database from participating centres across 10 countries since 2015, the Adult Cardiac Database is becoming a key tool in global benchmarking for improving clinical outcomes for patients.

Go to www.eacts.org/quip to find out more or come see us at the EACTS booth in the Exhibition Hall to see a demonstration of the Adult Cardiac Database.

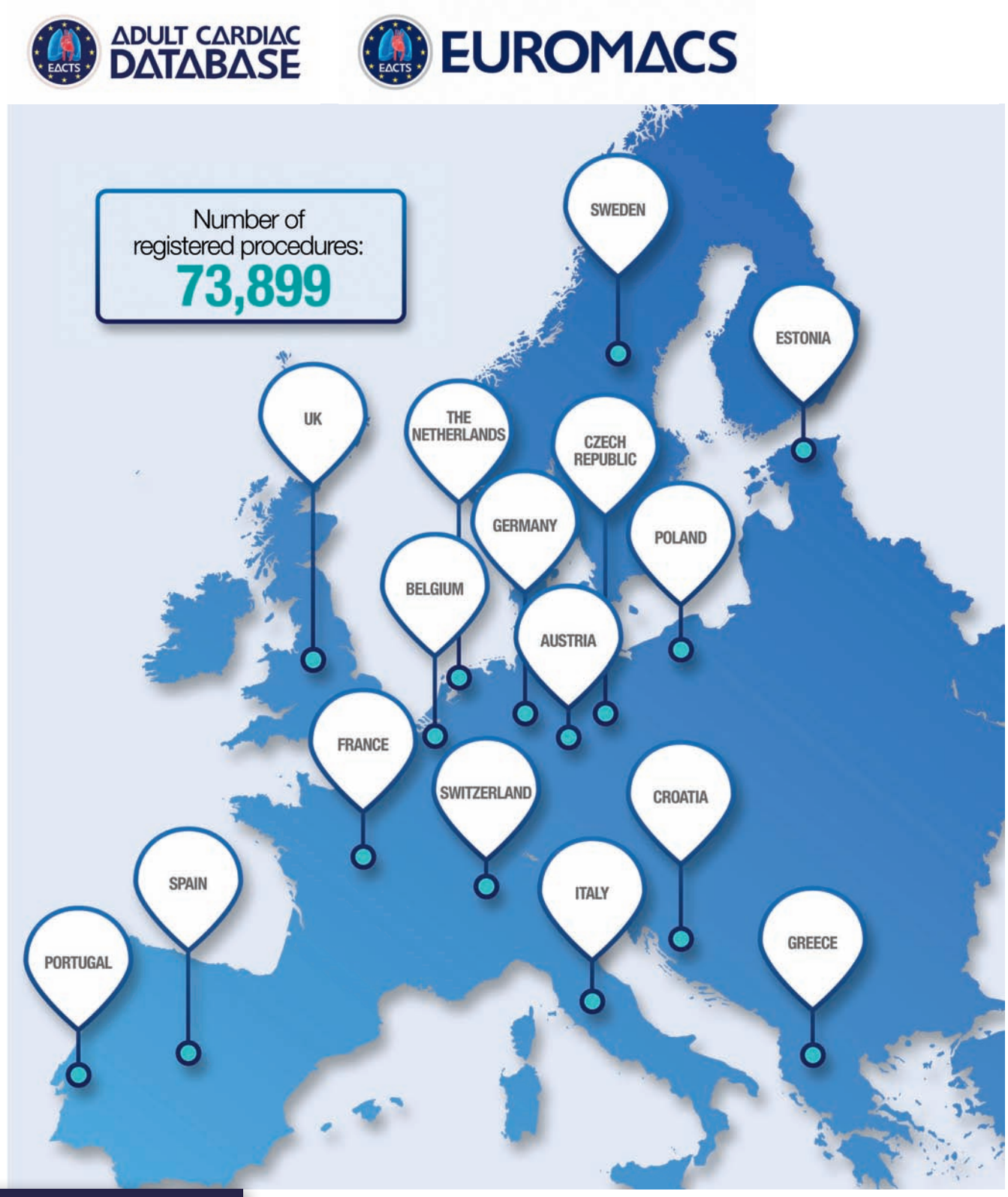
EUROMACS, the Mechanical Circulatory Support Database for Scientific Purposes, has continued to grow as a registry and pool of scientific research in the field of mechanical circulatory support. Since launching the EUROMACS Registry in 2012, hospitals have contributed data for patients receiving mechanical circulatory support (MCS). 3,300 implantations (including 178 in children) of long-term assist devices and 12,500 follow-up records have been registered from hospitals in 18 countries.

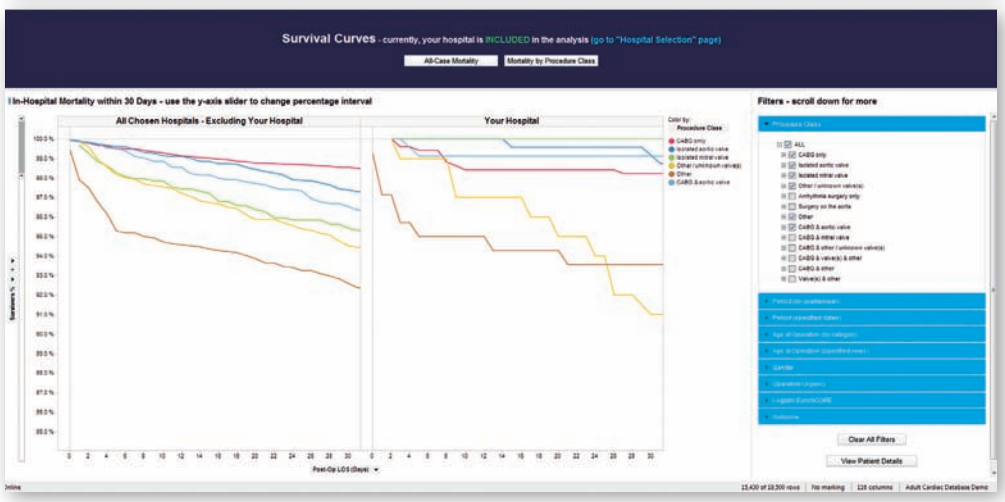
This data has been, and are being, used for scientific research and studies. To see the list of scientific publications with data from EUROMACS please see the EUROMACS website at www.euromacs.org/downloads/scientific-articles.

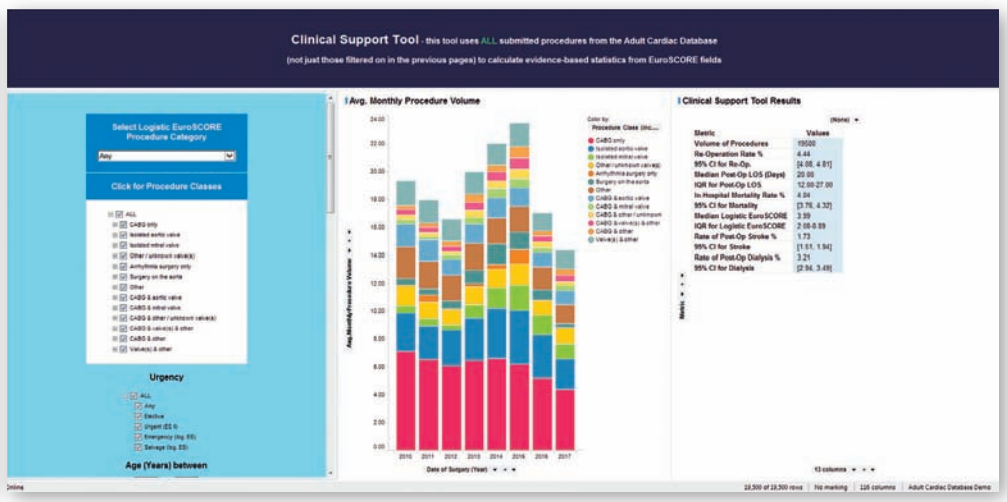
Since 2016, EUROMACS has been actively part of the EACTS Quality Improvement Programme, providing the EUROMACS community with a new benchmarking platform for statistical analysis, which will be available soon.

To find out more about EUROMACS, please visit the team at the EACTS Booth in the Exhibition Hall, or you can email quip@eacts.co.uk or visit the website at www.eacts.org/quip/euromacs/.

The EACTS Quality Improvement Programme task force is made up of 11 members to further develop all aspects of the Programme's quality improvement initiatives. The task force presented their research and advancements in adult cardiac surgical data and discussed quality outcomes for patients in the EACTS Quality Improvement Programme's Focus Session at this year's 31st EACTS Annual Meeting on Sunday 8 October.







Disclaimer All screenshots are from the Adult Cardiac Database demo tool. This tool does not resemble the analysis contained in the real Database, and all data contained in this tool is computer-generated at random.

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Cardiac | Focus |
Beyond artificial chords

Are PTFE neo chordae necessary for optimal results in mitral valve repair?

Gilles D Dreyfus
Cardiothoracic Center of Monaco, Monaco

Mitral valve repair (MVr) is well established as being the gold standard to treat mitral regurgitation, especially from degenerative aetiology. As MVr is not just one technique for all lesions, there is an armamentarium of techniques to allow durable and reproducible results, and if patients are treated early enough, their life expectancy returns to normal.

PTFE became popular when pioneers like T David and R Frater published their results. It has gained a wide use over time and shown to be a safe alternative to native chord transposition. However, Carpentier's long-term results along with his "French correction" publication had shown, long before PTFE chordae, that MVr could provide excellent results, and last longer than any other techniques. Are PTFE neochaordae necessary for optimal results in MVr? At first glance, one would answer no.

It seems basic knowledge, but quite necessary to remind to ourselves that when dealing with degenerative MVr, there are four areas to sort out: excess height of a segment or of the entire valve, excess width (localised or extensive), both being part of the billowing concept, some degree of prolapse, either localised or extensive, and ultimately the annular dilatation.

Therefore, chordae whether native or artificial should mainly be used to address prolapse and nothing else.

The evolution of MVr and the boom in the minimally invasive approach, either endoscopic or robotic, has favoured the use of

PTFE chordae. Altogether, there is less and less surgical analysis, and there is a trend to address all lesions by pulling the leaflet tissue down into the ventricle, without separate analysis of the lesions. With such a policy, PTFE chordae are indispensable in achieving such goals.

For a standard fashion procedure, we use 70% native chordal transfer and in 30% PTFE chordae. If we are using a robotic approach, we are more in the range of 40% native chordae and 60% of PTFE chordae. Using one does not exclude the other.

We must emphasise that the aetiology plays a major role: if the mitral is myxomatous, there are often good and strong secondary chordae and we tend to use them more frequently. We use them either exclusively or in addition with PTFE chordae to improve the closure line shape and the coaptation surface. If we deal with a fibroelastic deficient valve, most of the chordal replacement will be done using PTFE chordae, as the tissue is often thin, fragile and not suitable to be transferred.

Our message is that PTFE chordae is one way to support the free edge, but using it should neither allow someone to bypass the learning curve of MVr, nor to avoid resection if needed. Provided these rules are respected, PTFE chordae are an excellent substitute, and may be necessary for optimal MVr, as they are a great tool for achieving all goals.

EACTS

Aortic Valve Repair Summit 2018

A new EACTS event in Paris: June 18-19, 2018

Emmanuel Lansac
on behalf of the AVRS scientific committee.

The Aortic Valve Repair Summit (AVRS) was created three years ago in Brussels from a collaboration between Professor Gebrine El Khoury and Professor Hans Joachim Schäfers's teams, joining their experiences for the widespread of aortic valve repair. Initial success was confirmed with the last edition in Ottawa. This coming year, AVRS 2018 – held June 18-19 in Paris – will be conducted by EACTS for the first time.

EACTS' implication in aortic valve repair is in compliance with recent European 2017 guidelines for Heart Valve Disease, which recommend "a Heart team discussion in selected patients with pliable, non-calcified tricuspid or bicuspid aortic valve insufficiency in whom aortic valve repair may be a feasible alternative to valve replacement" (class 1C indication; Figure 1).[1] New guidelines also overcome the initial valve-sparing debate on remodelling versus reimplantation by recommending (since 2014) "aortic valve repair using the re-implantation or remodelling with aortic annuloplasty technique, in young patients with aortic root dilation and tricuspid aortic valves" (class I indication; Figure 1).[1]

AVRS is the world's largest scientific meeting, gathering together the different schools of thoughts in aortic valve repair. It will cover all aspects of the disease including medical therapy, imaging, patient selection and surgical techniques focused on patient outcomes. The aim is to integrate state-of-the-art into daily practice, as well as to challenge current knowledge via high level scientific debates on the main burning topics of aortic valve repair. Abstract submission is strongly encouraged in order to stimulate the scientific debate and enlarge the community of AVRS.

This two-day session will also provide an in-depth overview on aortic valve repair from valve-sparing root replacement to isolated aortic valve repair for tricuspid, bicuspid and unicuspid valves. It will feature live surgeries, offering a fascinating overview of the whole procedure, which will be combined with a short video session illustrating specific lesions and technical issues. In addition, specific facets of aortic dissections as well as the paediatric population will be addressed. The programme will also include a 'failure session', in which attendees will discuss cases all the way from echo analysis to surgical repair, learning how to identify predictors of repair failure and bailout techniques in such conditions

As AVRS reflects the multi-disciplinary aspect of aortic valve repair, course delegates could include cardiac surgeons, echocardiographers (cardiologists and anaesthesiologists) and radiologists who are willing to start, or are already part of, a valve-sparing aortic root replacement and aortic valve repair programme. Advanced residents interested in the field of valve repair are also welcomed and encouraged to present their scientific work via abstract submission.

We look forward seeing you in Paris next June to share your experiences, and help raise better medical evidence to clarify the place of repair versus replacement in aortic valve surgery.

For more information, please contact EACTS House. Email: info@eacts.co.uk; Tel: +44 (0)1753 832 166.

Indications for surgery in (A) severe aortic regurgitation and (B) aortic root disease (irrespective of the severity of aortic regurgitation)

Indications for surgery	Class[a]	Level[b]
A. Severe aortic regurgitation		
Surgery is indicated in symptomatic patients [57, 58, 66, 67].	I	B
Surgery is indicated in asymptomatic patients with resting LVEF ≤50% [57, 58].	I	B
Surgery is indicated in patients undergoing CABG or surgery of the ascending aorta or of another valve.	I	C
Heart Team discussion is recommended in selected patients[c] in whom aortic valve repair may be a feasible alternative to valve replacement.	I	C
Surgery should be considered in asymptomatic patients with resting ejection fraction >50% with severe LV dilatation: LVEDD >70 mm or LVESD >50 mm (or LVESD >25 mm/m^2 BSA in patients with small body size) [58, 66].	IIa	B
B. Aortic root or tubular ascending aortic aneurysm[d] (irrespective of the severity of aortic regurgitation)		
Aortic valve repair, using the reimplantation or remodelling with aortic annuloplasty technique, is recommended in young patients with aortic root dilation and tricuspid aortic valves, when performed by experienced surgeons.	I	C
Surgery is indicated in patients with Marfan syndrome who have aortic root disease with a maximal ascending aortic diameter ≥50 mm.	I	C
Surgery should be considered in patients who have aortic root disease with maximal ascending aortic diameter: • ≥45 mm in the presence of Marfan syndrome and additional risk factors[e] or patients with a *TGFBR1* or *TGFBR2* mutation (including Loeys–Dietz syndrome).[f] • ≥50 mm in the presence of a bicuspid valve with additional risk factors[e] or coarctation. • ≥55 mm for all other patients.	IIa	C
When surgery is primarily indicated for the aortic valve, replacement of the aortic root or tubular ascending aorta should be considered when ≥45 mm, particularly in the presence of a bicuspid valve.[g]	IIa	C

BSA: body surface area; CABG: coronary artery bypass grafting; CT: computed tomography; ECG: electrocardiogram; LV: left ventricular; LVEDD: left ventricular end-diastolic diameter; LVEF: left ventricular ejection fraction; LVESD: left ventricular end-systolic diameter.
[a]Class of recommendation.
[b]Level of evidence.
[c]Patients with pliable non-calcified tricuspid or bicuspid valves who have a type I (enlargement of the aortic root with normal cusp motion) or type II (cusp prolapse) mechanism of aortic regurgitation [6, 48, 49].
[d]For clinical decision making, dimensions of the aorta should be confirmed by ECG-gated CT measurement.
[e]Family history of aortic dissection (or personal history of spontaneous vascular dissection), severe aortic regurgitation or mitral regurgitation, desire for pregnancy, systemic hypertension and/or aortic size increase >3 mm/year (on repeated measurements using the same ECG-gated imaging technique measured at the same level of the aorta with side-by-side comparison and confirmed by another technique).
[f]A lower threshold of 40 mm may be considered in women with low BSA, in patients with a *TGFBR2* mutation or in patients with severe extra-aortic features [60].
[g]Considering age, BSA, aetiology of the valvular disease, presence of a bicuspid aortic valve and intraoperative shape and thickness of the ascending aorta.

Figure 1. From the 2017 ESC/EACTS Guidelines for the management of valvular heart disease.[1]

References

1. Falk V, Baumgartner H, Bax JJ, De Bonis M, Hamm C, Holm PJ, et al. 2017 ESC/EACTS Guidelines for the management of valvular heart disease. European Journal of Cardio-Thoracic Surgery 2017;52:616-664.

CABG: Back to the Future

The concept of external vascular support is not new, but only recently has positive data emerged in this field. Interventional cardiologist Carlo Di Mario (Università degli Studi di Firenze, Florence, Italy) and cardiac surgeon David Taggart (John Radcliffe Hospital, Oxford, UK) spoke during yesterday's Vascular Graft Solutions satellite symposium on the latest developments in the Venous External Scaffolding Technology (VEST), which is launching its 1,000-strong EU registry after encouraging RCT findings.

Although coronary artery bypass grafting (CABG) remains the gold standard for severe coronary artery disease, saphenous vein graft (SVG) failure is a key limitation to its long term clinical outcomes, with more than 20% failure at one year, 40% by 5 years, and more than 60% at 10 years. VEST is a kink-resistant cobalt chrome external scaffold for vein grafts with 3D shapeability which can be quickly implanted during the CABG procedure with no need for glue or sutures. As delegates heard, this could represent the next generation of surgical revascularisation techniques.

VEST was developed to address and interrupt the progress of SVG degeneration that occurs in the months and years following implantation. This degeneration commences due to high shear stresses upon vessel walls leading to luminal enlargement. A later phase is then dominated by inflammation-driven remodelling, giving rise to intimal hyperplasia and vessel stiffness. VEST provides external support, with the idea of minimising luminal enlargement.

The VEST technique has built up a solid body of randomised controlled evidence from 15 international sites with up to 5 years of follow up and an EU registry, speakers told the Congress. VEST I, which took place between 2012 and 2013, found a significant reduction in intimal hyperplasia ($p>0.05$), a significant improvement in lumen uniformity ($p<0.05$) and significant reduction in oscillatory shear stress ($p<0.05$). VEST II (2014 to 2015), found that avoidance of both clip ligation and VEST fixation to the anastomoses significantly increases SVG patency to 86.2% in the right coronary territory. VEST III (2015 to 2019), found excellent 6 months patency rates of 90% for externally stented SVG. The VEST IV trial (2011 to 2016) found that preventing SVG disease progression 4.5 years after CABG, plus a significant reduction in intimal hyperplasia ($p<0.0001$) and significantly higher perfect patency rates compared to unsupported grafts (80% vs 50%; $p<0.001$). The VEST EU Registry is being launched in the last quarter of 2017, completing in 2025.

Dr Di Mario, who presented during the session, has lent his expertise in intravascular imaging to the VEST trials, he told *EACTS Daily News*: "I have been involved in the VEST programme from the very start, after the experimental data were completed.

"I appreciate very much the research programme that they started, coming to centres with dedicated surgeons and high volumes and designing a trial which was quite small, but which was run rigorously with core laboratories and with in-patient randomisation."

In-patient randomisation was such that each patient received at least two vein grafts, of which one was randomly assigned to receive VEST implantation. "This makes an enormous difference in how reliable the data is for even a relatively small cohort of patients," noted Dr Di Mario, "Because you can take away all the potential confounders coming from the clinical differences, angiographic differences, and the fact that was one done by one operator instead of another. I think the data are really strong and consistent."

Dr Di Mario was involved in the control of angiography during follow-up, as well as intravascular ultrasound and optical coherence tomography. He also advised the Core Laboratory under which all cases were independently reviewed.

The primary endpoint was mean neointimal hyperplasia area in the supported or unsupported grafts. This was met, with a 14% difference in the mean area between the VEST-supported and unsupported graft groups, in a comparison of 20 supported and 23 unsupported grafts. A greater uniformity of calibre was also noted, with fewer VEST-supported grafts possessing ectatic segments.

Session co-chair and VEST principle investigator Dr Taggart, who has conducted over 100 VEST implantations to date, commented after yesterday's session on his experience of the procedure: "One of the advantages of VEST is its simplicity of use. It has a very low learning curve. After 4 or 5 cases, you know completely how to use it. It takes a minute to implant it, and it means you don't have to change any other aspect of your surgical technique."

Asked for his thoughts on patient selection for VEST, he continued: "In general terms I think most patients do better with arterial grafts. But there is still an important role for vein grafts in many situations. If you are going to have a vein graft, the current data we have suggests that you would be better off adding a VEST stent to that.

"There is always going to be a place for vein grafts. The reality is that it is what the vast majority of surgeons are using worldwide - because they are technically easier to use, and they are very forgiving. And there are definite, very important indications where you do want to use vein grafts."

Describing the VEST trials' approach to data collection - both from the biomechanical as well as the clinical perspective - he added: "We have not only looked at overall patency of the graft, but we have learned enormously about the physiology of graft function in terms of the flow, and the way the stent can significantly improve the nature of flow and making it much more laminar, which reduces the risk of disease in the vein graft."

Some very important practical lessons also emerged from initial clinical experience with VEST, noted Dr Di Mario. Outcomes in the first patients were jeopardised by the fact that the closure of the side branches was performed by clipping; only later was it understood that the metal clip can partially crush the vessel lumen. "Now we know that we need to suture these vein grafts before the implantation of supported

stents. If this is done, and especially for left-sided grafts, the results were excellent with almost 90% patency at one year."

He continued: "Of course, this is not a device which is supposed to give an immediate benefit, but it is a device with a goal of improving patency in the longer term. We are normally speaking about 6 to 7 years when around about 50% of [unsupported] vein grafts would fail."

Turning to angiographic results, Dr Di Mario noted that the differences in calibre of grafts was striking. "Those ultrasound and angiographic images are the best way to convince us that there is a difference and that there is something more to explore in waiting for 7 years results."

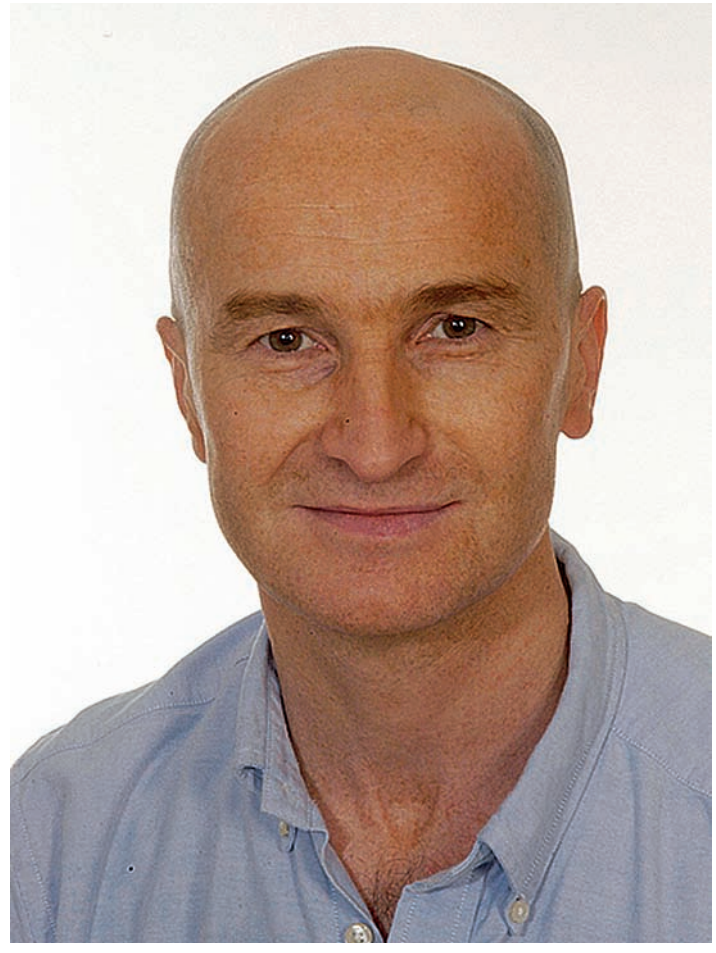
Future implications of these findings are difficult to guess; however, Dr Di Mario noted that the principles underlying VEST are sound, and offer an alternative to existing solutions which tend to have a very high failure rate after 5 to 7 years post-implantation. "The graft operation does very well because the mammary artery has a very longstanding effect on the main left anterior descending (LAD) artery.

"However, we all see - especially we cardiologists, more so than surgeons - patients with late failure. And this is extremely difficult to treat, because stents in vein grafts have higher rates of reocclusion. There is a recent trial showing that drug-eluting stents or bare metal stents in vein grafts do make a difference, and the reason is that the failure is not related to the segment treated, but to the fact that the graft degenerates. Then, there is a 50-60% or more rate of reocclusion within 2 to 3 years. The hope is that, in having a [vein] graft that behaves like an artery, you truly have a long-term benefit.

"The alternatives have been explored by the main PI of this study, Dr Taggart, who was also the PI of the ART trial. The ART trial unfortunately did not show additional benefit of the presence of two mammaries instead of one. There is also not an exceptional difference when you use other arterial conduits. VEST can give a different magnitude of advantage, and truly lead to a very long term patency. Once they maintain a uniform calibre, the wall stress is optimised throughout the grafted segment."

Concluding the interview, Dr Di Mario commented: "Watch this space! Certainly, you don't have conclusive evidence from what has been shown. However, it is all highly suggestive that getting regular support around the vessel achieves a better patency of the lumen, reducing neointimal hyperplasia, and reducing the potential for the irregularities that come from tension effects that is the cause of failure in other grafts. All the data seems to be in favour, and there will be a large FDA-approved randomised trial, as well as a very large european registry with over 1,000 patients, which are likely to give more convincing answers."

"This is a very exciting potential technology," added Dr Taggart. "There is the genuine possibility that it could change the way we routinely perform CABG."



EACTS 2017 **Agenda**

Saturday 7 October

08:00	Translational and Basic Science Course – Theory and reality of university-based enquiry	0.31/ 0.32	Academy
08:00	Surgery at the crossroads	Hall A	Techno College
09:00	Update on the Thymus	Hall K1	Techno College
10:00	Translational and Basic Science Course – Cardiac: Alpha Gal and Bio valve Immunology	0.31/ 0.32	Academy
10:00	Imaging and 3D techniques	Hall A	Techno College
12:00	Translational and Basic Science Course – Thoracic: The tissue is the issue: Building translational…	0.31/ 0.32	Academy
12:30	1st International EACTS Ventricular Assist Device (VAD) Co-ordinators Symposium and anti-c…	0.11/ 0.12	Academy
13:30	New techniques: the developers corner	Hall A	Techno College
14:00	Translational and Basic Science Course – Cardiac: Repair medicine and Application: from expe…	0.31/ 0.32	Academy
14:00	Hands-on arterial switch operation – Congenital drylab	Hall K2	Advanced Techniques
16:00	Translational and Basic Science Course – Regulatory aspects of Innovation: What do we have to know as innovative surgeons	0.31/ 0.32	Academy
16:00	Transcatheter techniques and atrioventricular valves	Hall A	Techno College

Sunday 8 October

08:30	Getting to the root	0.11/ 0.12	Abstract
08:30	Translational and basic science course – when regulatory where overcome: Human trials	0.31/ 0.32	Academy
08:30	Challenges in patients with connective tissue disorders	Hall E1	Focus Session
08:30	Controversies on perioperative management of infant undergoing procedure	Hall F2	Focus Session
08:30	Making vein grafts great again	Hall G1	Focus Session
08:30	Optimal antithrombotic management in patients undergoing coronary artery bypass grafting; …	Hall G2	Focus Session
08:30	Pleural empyema management	Hall K1	Focus Session
08:30	Will mini aortic valve replacement become the gold standard?	Hall K2	Focus Session
08:30	Perfusion session 1: Heater cooler induced infections	0.14	Focus Session
08:30	Research in medicine: getting acquainted with a scientific meeting as a starting researcher	2.31	Focus Session
08:30	Young Investigator Award – Semi Final 1	Hall E2	Rapid Response
08:30	Coronary artery bypass grafting – a bit of science	Hall F1	Rapid Response
08:30	Arterial revascularisation after the ART trial	Hall D	Professional Challenge
08:45	Allied Health Professionals – Prevention and management of wounds	2.32/ 2.33	Focus Session
	Break		
10:15	Translational and basic science course – Discussion and outcomes	0.31/ 0.32	Academy
10:15	Innovative techniques for mitral valve therapy	Hall G1	Abstract
10:15	Left ventricular restoration and hypertrophic cardiomyopathy surgery – Healing the left ventricle	Hall K2	Abstract
10:15	Facing complications during and after emergent surgery for aortic dissection	Hall E1	Focus Session
10:15	Grown-up congenital heart 1	Hall F2	Focus Session
10:15	Current and future options in the treatment of aortic valve stenosis	Hall G2	Focus Session
10:15	End-stage emphysema management	Hall K1	Focus Session
10:15	Perfusion session 2: Improving perfusion	0.14	Focus Session
10:15	Allied Health Professionals – Quality improvement initiatives	2.32/ 2.33	Focus Session
10:15	Research in medicine: your manuscript as the next scientific breakthrough	2.31	Focus Session
10:15	Young Investigator Award – Semi Final 2	Hall E2	Rapid Response
10:15	Jeopardy	Hall F1	Rapid Response
	Cash lunch available		
12:00	Minimally invasive coronary artery bypass grafting	Hall D	Focus Session
12:00	Complications after endovascular aortic repair: new challenge for open surgery	Hall E1	Focus Session
12:00	Grown-up congenital heart 2	Hall F2	Focus Session
12:00	Hot topics in transcatheter aortic valve implantation	Hall G1	Focus Session
12:00	Mitral Repair – Decision making in mitral surgery: trying to fill the gaps in evidence!	Hall G2	Focus Session
12:00	Health care design; opportunities and challenges for the future	Hall K2	Focus Session
12:00	Perfusion session 3: Mechanical circulatory support – state of the art	0.14	Focus Session
12:00	Interdisciplinary competency training: Standardisation, assessment and risk reduction in the tra…	0.11/ 0.12	Focus Session
12:00	Allied Health Professionals – Abstracts	2.32/ 2.33	Focus Session
12:00	C. Walton Lillehei Young Investigator Award / EACTS/ LivaNova Cardiac Surgery Innovation A…	Hall E2	Rapid Response
12:00	The icing on the cake	Hall F1	Rapid Response
12:00	How to set up thoracic surgery research trials	Hall K1	Focus Session
14:00	Surgical Videos	Hall F2	Abstract
14:00	Short-term mechanical support	0.14	Abstract
14:00	Heart transplantation is still the best long-term option	0.31/ 0.32	Abstract
14:00	An old battlefield with casualties: infection of the aorta	Hall E1	Focus Session
14:00	What is new in left main disease	Hall G1	Focus Session
14:00	Work life balance in cardio-thoracic surgery	Hall G2	Focus Session
14:00	Update on chest trauma	Hall K1	Focus Session
14:00	Personalised external aortic root support	Hall K2	Focus Session
14:00	Evolution in bioprosthetic valve design	0.11/ 0.12	Focus Session
14:00	Allied Health Professionals – Hands on session	2.32/ 2.33	Focus Session
14:00	Research in medicine: the ultimate currency for every academic career?	2.31	Focus Session
14:00	Coronary artery bypass graft: Miscellaneous, robotics and off-pump	Hall F1	Rapid Response
14:00	The 2017 EACTS/ESC Guidelines on valvular heart disease	Hall D	Focus Session
14:30	The Quality Improvement Programme	0.49/ 0.50	Focus Session
	Exhibition Opens		
15:45	Thoracic Rapid Response 1	Hall E2	Rapid Response
15:45	Congenital Rapid Response	Hall F1	Rapid Response

Monday 9 October

08:15	Risk score	0.14	Abstract
08:15	Coronary artery bypass grafting: Factors effecting outcomes	0.31/ 0.32	Abstract
08:15	Late breaking clinical trials & evidence	0.49/ 0.50	Abstract
08:15	Robotics in general thoracic surgery	2.32/ 2.33	Abstract
08:15	Coronary problems	Hall F2	Focus Session
08:15	Endocarditis surgery	Hall G1	Focus Session
08:15	Work in progress	Hall G2	Focus Session
08:15	Anatomical segmentectomies	Hall K1	Focus Session
08:15	Ethical and surgical issues in organ transplantation	Hall K2	Focus Session
08:15	Research in medicine: increasing the impact of your study	0.11/ 0.12	Focus Session
08:15	EACTS/PASCaTS – Controversies in Rheumatic Heart Valve Surgery: Valve Selection	0.94/ 0.95	Focus Session
08:15	Rhythm issues	Hall E2	Rapid Response
08:15	Aortic valve repair	Hall F1	Rapid Response
08:15	A snapshot on transcatheter aortic valve implantation	Lnge 6	Postgraduate Education
08:15	Minimally invasive mitral and tricuspid valve surgery – standard of care?	Hall D	Professional Challenge
08:15	Challenges in the management of aortic arch diseases	Hall E1	Professional Challenge
	Break. Exhibition Halls		
10:15	Valves	Hall F2	Abstract
10:15	Lung cancer – controversies	Hall K1	Abstract
10:15	Conduction disturbances after aortic valve interventions	0.14	Abstract
10:15	Cardiac tumours	0.31/ 0.32	Abstract
10:15	Lung transplant advanced techniques	2.32/ 2.33	Abstract
10:15	The poor right ventricle in combination with tricuspid regurgitation	Hall G1	Focus Session
10:15	Rarities in cardio-thoracic surgery	Hall G2	Focus Session
10:15	Atrial fibrillation surgery in 2017	Hall K2	Focus Session
10:15	Statistics in medicine: 'learning the basics' for clinicians	0.11/ 0.12	Focus Session
10:15	Rapid deployment valves: New evidence & clinical cases discussion	0.49/ 0.50	Focus Session
10:15	SBCCV – Clinical, social and economic impact of the new valve technologies in southern hemisp…	0.94/ 0.95	Focus Session

Congenital | Vascular | Cardiac | Thoracic | Plenary | All

10:15	Coronary artery bypass surgery – latest updates	Hall E2	Rapid Response
10:15	Extra corporeal life support – Always a good solution	Hall F1	Rapid Response
11:50	Presidential Address	Hall D	Plenary
	Lunch. Exhibits. Satellite Symposia		
14:15	Management of miscellaneous aortic valve disease	Hall F2	Abstract
14:15	Minimally invasive aortic valve replacements	0.31/ 0.32	Abstract
14:15	Meet the Experts	0.94/ 0.95	Abstract
14:15	Chest wall	2.32/ 2.33	Abstract
14:15	How to approach the aortic valve in a dilated root	Hall E1	Focus Session
14:15	2017 Perioperative blood management guidelines	Hall G1	Focus Session
14:15	Nightmares in cardiothoracic surgery	Hall G2	Focus Session
14:15	Metastasectomy	Hall K1	Focus Session
14:15	Short-term mechanical circulatory support	Hall K2	Focus Session
14:15	Aviation medicine and cardiac surgery	0.14	Focus Session
14:15	Statistics in medicine: more advanced statistics for the clinician	0.11/ 0.12	Focus Session
14:15	Beating heart mitral valve repair	0.49/ 0.50	Focus Session
14:15	Awards Final	Hall E2	Rapid Response
14:15	Jeopardy Final	Hall F1	Rapid Response
14:15	News from the trials world	Hall D	Focus Session
	Break. Exhibition Halls		
16:00	Surgical management and outcomes	Hall F2	Abstract
16:00	Patient blood management to reduce surgical risk	Hall G2	Abstract
16:00	Oncology-preoperative assessment	Hall K1	Abstract
16:00	Light and shades of the arch	0.14	Abstract
16:00	Structural valve deterioration in aortic valve	0.11/ 0.12	Abstract
16:00	Coronary artery bypass grafting – Intraoperative graft flow assessment	0.31/ 0.32	Abstract
16:00	Non-Oncology pleura/ pneumothorax	2.32/ 2.33	Abstract
16:00	Bicuspid aortic valve repair as primary option in young patients	Hall E1	Focus Session
16:00	Catastrophic complications and super saves	Hall G1	Focus Session
16:00	The surgeons role in cardiac implantable electric devices	Hall K2	Focus Session
16:00	Beyond artificial chords	0.49/ 0.50	Focus Session
16:00	Aortic valve replacement in a nutshell	Hall E2	Rapid Response
16:00	Welcome to the machine – new concepts in ventricular assist device therapy	Hall F1	Rapid Response

Tuesday 10 October

08:15	"La terra di mezzo" The middle earth of aortic surgery	0.14	Abstract
08:15	Tricuspid valve: no longer forgotten	0.31/ 0.32	Abstract
08:15	Mitral valve surgery: Complex issues	0.49/ 0.50	Abstract
08:15	Ventricular assist device therapy – choose the treatment and deal with the complications	Hall D	Focus Session
08:15	PROs and CONs arena on aortic controversies	Hall E1	Focus Session
08:15	Outside the box of cardiothoracic surgery	Hall G2	Focus Session
08:15	VATS-lobectomy adoption rates – why aren't we all doing VATS and how can we improve this?	Hall K1	Focus Session
08:15	Everything on randomized trial design and data interpretation	0.11/ 0.12	Focus Session
08:15	Challenging issues in Fontan pathway: Part 1	Hall K2	Professional Challenge
08:15	Long-term follow-up after cardiac surgery	Hall E2	Rapid Response
08:15	Risk scores; indications, contraindications and side effects	Hall F1	Rapid Response
08:15	A snapshot on transcatheter aortic valve implantation	Lnge 6	Postgraduate Education
08:15	Improving outcomes of coronary artery bypass grafting	Hall F2	Professional Challenge
08:15	Cardiac crossroads: deciding between mechanical or bioprosthetic heart valve replacement	Hall G1	Professional Challenge
	Break. Exhibition Halls		
10:15	Oncology lymph nodes and staging	Hall K1	Abstract
10:15	The challenges of endovascular approach in thoracic aorta	0.14	Abstract
10:15	Ross / Homograft	0.31/ 0.32	Abstract
10:15	Sternal wound complications	0.49/ 0.50	Abstract
10:15	Oncology – Lung cancer: Outcome	2.32/ 2.33	Abstract
10:15	Complex mitral valve repair video session	Hall D	Focus Session
10:15	How far away are we from setting guidelines for arch surgery?	Hall E1	Focus Session
10:15	How to use coronary, valvular and aortic guidelines in clinical practice	Hall G2	Focus Session
10:15	Statistics in medicine: meta-analysis from start to finish	0.11/ 0.12	Focus Session
10:15	Challenging issues in Fontan pathway: Part II	Hall K2	Professional Challenge
10:15	Current developments in transcatheter aortic valve implantation	Hall E2	Rapid Response
11:50	Honoured Guest Lecture	Hall D	Plenary
	Lunch. Exhibits. Satellite Symposia **Residents Luncheon, Crystal Lounge, Level 1**		
12:45	Nightmare cases	Hall K1	Focus Session
14:15	Tetralogy of Fallot / Pulmonary atresia	Hall K2	Abstract
14:15	Surgical management of effective endocarditis: analysis of early and late outcomes 1	0.49/ 0.50	Abstract
14:15	Oesophageal Surgery	2.32/ 2.33	Abstract
14:15	Left atrial appendage occlusion when and how	Hall D	Focus Session
14:15	How to cope with the aberrant right subclavian artery (ARSA) in aortic surgery	Hall E1	Focus Session
14:15	2017 Perioperative medication guidelines	Hall F2	Focus Session
14:15	Everything you need to know about transcatheter mitral valve replacement	Hall G1	Focus Session
14:15	How to do it; Live in a box	Hall G2	Focus Session
14:15	Surgery for Stage IIIAN2 NSCLC	Hall K1	Focus Session
14:15	Statistics in medicine: from 'simple' multivariable models to complex	0.11/ 0.12	Focus Session
14:15	Alternative surgical approaches for aortic valve replacement	0.31/ 0.32	Focus Session
14:15	New aspects in mitral valve surgery	Hall F1	Rapid Response
	Break. Exhibition Halls		
16:00	Outcomes in arterial and off-pump coronary artery bypass grafting	Hall F2	Abstract
16:00	Growing needs: ablation, lead extraction and left atrial appendage – closure	Hall G1	Abstract
16:00	Improving transcatheter aortic valve implantation	Hall G2	Abstract
16:00	Preoperative assessment of lung cancer patients	Hall K1	Abstract
16:00	Coarctation	Hall K2	Abstract
16:00	Managing degenerated aortic prosthesis	0.11/ 0.12	Abstract
16:00	Controversies in left ventricular assist device therapy	0.31/ 0.32	Abstract
16:00	Surgical management of effective endocarditis: analysis of early and late outcomes 2	0.49/ 0.50	Abstract
16:00	Airway	2.32/ 2.33	Abstract
16:00	Secondary mitral regurgitation – still a surgical problem?	Hall D	Focus Session
16:00	The changing trend in the treatment of thoraco-abdominal aortic aneurysm	Hall E1	Focus Session
16:00	Is no-suture the future for aortic valves?	Hall E2	Rapid Response
16:00	Advances in mitral valve surgery	Hall F1	Rapid Response
16:00	Thoracic Rapid Response 2	0.14	Rapid Response

Wednesday 11 October

09:00	Outcome of mitral valve surgery	Hall G1	Abstract
09:00	Thoracic Case Session 1	0.49/ 0.50	Abstract
09:00	Nightmares in cardiac surgery	2.31	Abstract
09:00	Tricuspid valve: surgery for who, when and how	0.31/ 0.32	Advanced Techniques
09:00	Wetlab – Chest Wall Reconstruction & "Bronchial Sleeve Resections"	2.91	Advanced Techniques
09:00	Aortic root pathology	Hall D	Focus Session
09:00	Multi-arterial coronary revascularisation in coronary artery bypass grafting: State of the art an…	2.32/ 2.33	Focus Session
09:00	Introduction to mitral valve repair & Wetlab	Hall K2	Advanced Techniques
09:00	Controversies & Catastrophes in Adult Cardiac Surgery	Hall G2	Advanced Techniques
10:45	Innovative strategies for surgical AVR	Hall G1	Advanced Techniques
10:45	Surgical challenges in bicuspid aortic valve syndrome	Hall D	Advanced Techniques
11:00	Thoracic Case session 2	0.49/ 0.50	Abstract
11:00	Dealing with complex adult cardiac surgery including transplantation. Live-in-a-box	0.31/ 0.32	Advanced Techniques
11:00	Wetlab – Chest Wall Reconstruction & "Bronchial Sleeve Resections"	2.91	Advanced Techniques
11:00	When saphenous veins are a necessary choice use them wisely and for the appropriat…	2.32/ 2.33	Focus Session

Congenital | Professional Challenge | Challenging issues in Fontan pathway: Part II

Long-term outcomes of the Fontan for pulmonary atresia with intact ventricular septum

Patrick Elias[1,2], Chin L Poh[2,3], Karin du Plessis[2,3], Diana Zannino[2], Kathryn Rice[4], Dorothy J Radford[5], Andrew Bullock[6], Gavin R Wheaton[7], David S Celermajer[8], Yves D'Udekem[1,2,3]; 1. Department of Cardiac Surgery, The Royal Children's Hospital Melbourne, Melbourne, VIC, Australia; 2. The Murdoch Children's Research Institute, Melbourne, VIC, Australia; 3. Department of Paediatrics, Faculty of Medicine, University of Melbourne, Melbourne, VIC, Australia; 4. Green Lane Paediatric and Congenital Cardiac Service, Starship Children's Hospital, Auckland, New Zealand; 5. Adult Congenital Heart Disease Unit, The Prince Charles Hospital, Brisbane, QLD, Australia; 6. Children's Cardiac Centre, Princess Margaret Hospital for Children, Perth, WA, Australia; 7. Department of Cardiology, Women's and Children's Hospital, Adelaide, SA, Australia; 8. Department of Cardiology, Royal Prince Alfred Hospital, Sydney, NSW, Australia

Pulmonary atresia with intact ventricular septum (PA-IVS) is a rare type of cyanotic congenital heart disease with a wide variation in severity. Patients with the most severe form of this disease have hypoplastic right ventricles and small tricuspid valves[1,2]. Up to one third of these patients develop coronary sinusoids as a result of the high pressures in the hypertrophied right ventricles[3]. A right ventricle dependent coronary circulation occurs when the left ventricle is partially dependent upon retrograde blood flow through these sinusoids due to proximal coronary stenoses[4]. Those at the most severe end of the spectrum, including those with coronary sinusoids and RVDCC, will have a Fontan procedure. The outcomes of these patients have been limited to 10 years from birth, with little follow-up after a Fontan circulation and small study populations. This study identified late outcomes of patients with PA-IVS in Fontan survivors.

The study design was a retrospective analysis of the data of all patients with PA-IVS who have undergone a Fontan procedure in Australia and New Zealand between 1972 and 2012. Operative reports, discharge summaries and follow up letters were reviewed retrospectively, as well as cardiac investigation reports. Late death was defined as death in patients who survived the Fontan completion hospital admission. An ischaemic event was defined as new ST segment depression or T-wave inversion that was determined to be a sign of ischaemia by the reporting cardiologist, an episode of chest pain or dyspnoea in association with ischaemic ECG changes, inducible-ischaemia on exercise tolerance test or elevated cardiac enzymes associated with angina or dyspnoea. Kaplan Meier and Cox Regression were used for time-to-event analysis of mortality and ischaemia that occurred after Fontan.

The study included 120 patients: 20 (17%) had a RVDCC and 100 (83%) had a non-RVDCC. Overall survival for the entire cohort was 80% at 25 years. For the entire cohort there were 11 (9%) deaths a median of nine years (IQR 5-16 years) after hospital discharge. There were six sudden unexpected deaths and RVDCC was present in four of these. Patients with RVDCC were at greater risk of late death and sudden death. By univariable analysis, RVDCC was associated with late death and developing ischaemia after Fontan. The RVDCC group had a 10-year survival of 77% compared to 96% in the non-RVDCC group. Coronary ischaemia was also an independent predictor of death when used as a time-dependent covariate.

Table 1. Results of univariable and multivariable Cox proportional hazards analysis for late outcomes

	Univariable	
Variable	HR	95% CI
Late death		
RVDCC	4.7	1.4-16
LCA stenosis	6.3	1.6-24
RCA stenosis	9	2.7-29
Ischaemia		
RVDCC	3.9	2-7.6
LAD stenosis	4	2.1-7.8
RCA stenosis	2.9	1.4-5.9
TV Z-score (per unit increase)	0.7	0.5-0.9
Fontan before 2000	0.4	0.2-0.9

HR: hazard ratio; 95% CI: 95% confidence interval; RVDCC: right ventricle dependent coronary circulation; LCA: left coronary artery; RCA: right coronary artery; LAD: left anterior descending artery; TV: tricuspid valve.

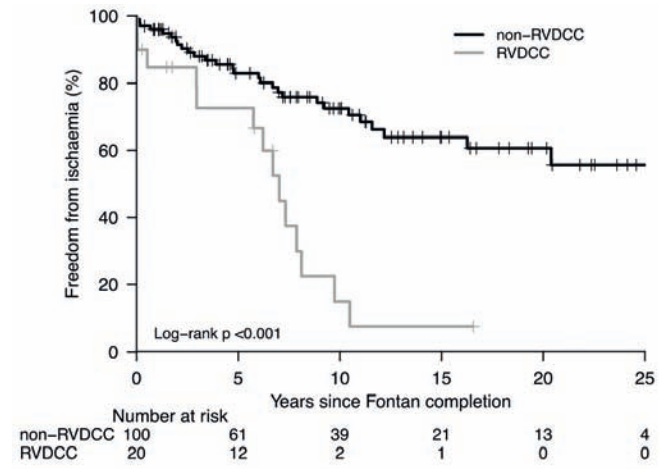


Figure 1. Kaplan-Meier survival curve of freedom from new onset ischaemia following Fontan completion, subdivided by RVDCC status. Log-rank test p<0.001. RVDCC, right ventricle-dependent coronary circulation.

Long-term survival of patients with PA-IVS after the Fontan procedure remains excellent. Patients with an RVDCC remain at risk of sudden death. Furthermore, coronary ischaemia seems to be a major issue even late after Fontan completion, particularly those with an RVDCC. It is possible that ischaemia is playing a role in the pathogenesis of sudden death in these patients. This increased risk of sudden death and coronary ischaemia justifies closer surveillance in this group, and the benefits of preventative implantation of a defibrillator should be investigated in patients with RVDCC.

References

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Thoracic | Abstract | Oncology lymph nodes and staging

Mediastinal up-staging during surgery in non-small cell lung cancer: Which patterns of mediastinal lymph-node metastasis better predict the outcome? A multicentre analysis

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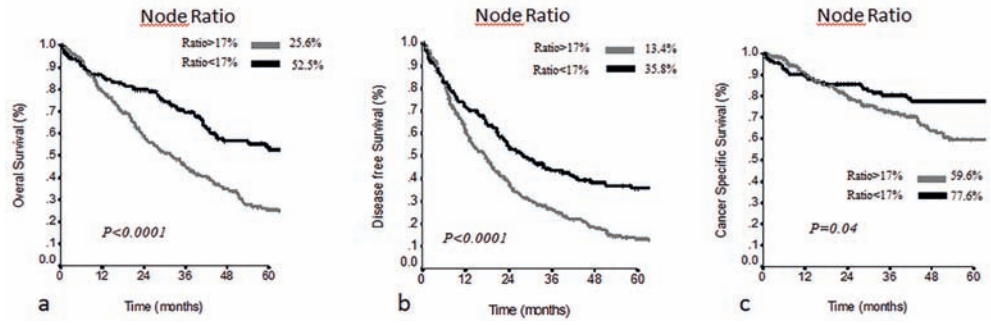

Figure 1. Overall Survival (OS), Disease Free Survival (DFS) and Cancer Specific Survival (CSS) according to the lymph node ratio. (NR: Node Ratio).

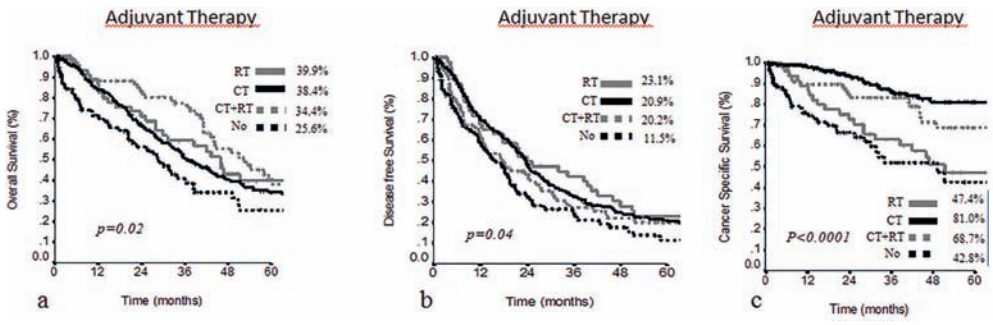

Figure 2. Overall Survival (OS), Disease Free Survival (DFS) and Cancer Specific Survival (CSS) according to the kind of adjuvant treatment performed. (CT: Chemotherapy, RT: radiotherapy, NO: no adjuvant treatment performed).

Despite the improvements regarding the preoperative detection of mediastinal lymph-nodes metastasis in Non-Small Cell Lung Cancer (NSCLC), N2 involvement occurs in about the 5-20% of clinically negative patients[1], and which are the prognostic factors in this class patients is still unclear.

For these reasons, the survival outcomes and the prognostic factors of 550 NSCLC patients – from 01/2002 to 12/2012 with preoperative negative but pathologic positive N2 involvement undergoing anatomical lung resection and hilo-mediastinal lymphadenectomy among six centres – were analysed focusing on the type of N2 lymph node sub-classification. The pattern of lymph-nodes considered was: number of Resected Nodes (#RNs), Metastatic Nodes (#MNs), ratio between the #MNs and #RNs (NR), proposal N2 subgroups for the VIIIth TNM edition[2], lobe-specific vs non-specific metastasis.

At multivariate analysis, independent prognostic factors for Overall Survival (OS) were NR < 17% (p = 0.009), proposal N2 classification subgroups(p = 0,014), age < 66 (p < 0.0001) and pT(p = 0.005); for Disease Free Survival (DFS) were NR < 17% (p = 0.003), Adjuvant treatment (p = 0.026) and pT (p = 0.026) while independent prognostic factors for Cancer Specific Survival (CSS) were NR < 17% (p = 0.008), grading (p = 0.001) and Adjuvant treatment (p < 0.0001).

In particular, the NR < 17% was the only independent prognostic factor valid for OS, DFS and CSS (Figure 1), while any kind of adjuvant treatment seemed to be effective and fundamental for survival in this group with incidental N2 involvement (Figure 2).

Moreover, also in the group having the most favourable outcome (patients with NR < 17%), the administration of adjuvant therapy gave survival advantage: 5-year OS of 59% vs 40% (p = 0.001), 5-year DFS of 40.2% vs 20.7% and 5-year CSS of 88.6 vs 47.8% compared to patients that didn't receive adjuvant treatment.

So, as emerged in the proposal VIIIth TNM classification, a sub-classification for patients with lymph node involvement is needed. Which is the optimal one is still argument of debate. Analysing the most utilised in patients with incidental N2 involvement, we confirmed that the proposal for the VIIIth TNM edition is effective regarding OS and DSF, but not CSS prediction – an outcome that has not been well investigated yet. Conversely, we found that only the NR was effective for all the outcomes considered (OS, DFS and CSS), and this fact is statistically significant.

In conclusion, we confirmed the fundamental role of adjuvant therapy In the management patients with unexpected N2 involvement, and we found that that lymph node ratio is the only independent prognostic factor for OS, DFS and CSS, identifying a cut off of 17% as the optimum in this class of patients.

References

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Adult cardiac | Abstract | Surgical management of effective endocarditis: analysis of early and late outcomes 1

The clinical results of valve surgery for active infective endocarditis complicated with acute heart failure –When should they undergo the surgery?

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Corresponding author: Ryohei Matsuura

Co-authors Koichi Toda (left), Yoshiki Sawa (middle, Professor), Daisuke Yoshioka (right)

Background

Several guidelines have generally recommended early surgery for infective endocarditis (IE) patients with symptomatic acute heart failure (AHF), however the detailed timing of 'early surgery' remains unknown. Though it is clear that emergent surgery is essential for patients in cardiogenic shock, it is unclear that emergent or urgent surgery should be performed for patients with AHF without cardiogenic shock, because it is impossible to judge at the timing of IE diagnosis whether AHF without cardiogenic shock will be responsive or unresponsive to medical therapy. This study evaluated the impact of initial treatment for these patients.

Method

We investigated 470 patients with active IE who underwent valve surgery between 2009 and 2016. Of these, 177 patients had symptomatic AHF at the time of IE diagnosis (patients with cardiogenic shock or those who were intubated for AHF were excluded). These 177 patients were divided into two groups according to the initial intention to treat: group S included those who underwent valve surgery as soon as possible (n=74); and group M included patients who were initially given medical treatment for AHF and infection (n=103). The characteristics of patients and results were compared.

Results

The median waiting period from diagnosis to surgery was 1(1-3) day and 15(8–33) days (p<0.001) for group S and group M, respectively. Although no significant difference was observed between the two groups in any other preoperative parameter, there was a trend of higher survival rate at five years in group S (80% vs 64%, p = 0.108, Figure 1).

In 103 group M patients, 62 patients (60%) could proceed to planned elective valve surgery after medical treatment at a median of 22 days after IE diagnosis (group P), whereas 41 patients (40%) required conversion to emergent surgery because of deteriorating AHF at a median of nine days after diagnosis (group E). Although there were no differences in in-hospital mortality (20% vs 13%, p = 0.369), patients in the group E had a trend of longer hospital stay after valve surgery (36 days vs 52 days, p = 0.089), and the ratio of patients who were transferred to long-term rehabilitation facilities was significantly higher in group E (19% vs 52%, p = 0.001). Overall survival rate at 5 years was significantly worse in group E than P (79% vs 42%, p<0.012, Figure 2).

The multivariate analysis in the 177 AHF patients, revealed prosthetic valve endocarditis (HR 2.83(1.29-5.88)), p = 0.011) and conversion to emergent surgery (HR 2.62(1.34-5.12), p = 0.005) were independent risk factors for mortality. Therefore, we further analysed the risk of conversion to emergent surgery in the group M, and the analysis showed Staphylococcus aureus infection (OR 3.82(1.19-13.3), p = 0.024) was a significant risk factor for conversion to emergent surgery.

Conclusion

Considering poor outcomes of patients who required emergent surgery for medically refractory AHF, early surgery may be reasonable option for every IE patient with AHF, especially those who suffer from Staphylococcus aureus infection.

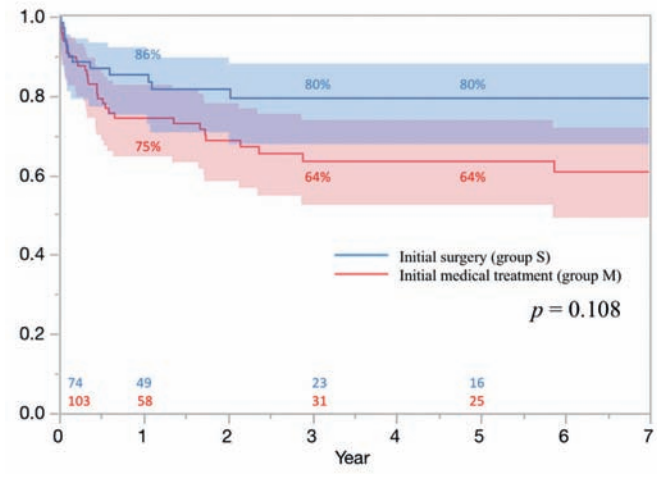

Figure 1. Overall survival and 95% confidence intervals after surgery for HF patients who underwent initial surgery (group S, blue) and initial medication (group M, red).

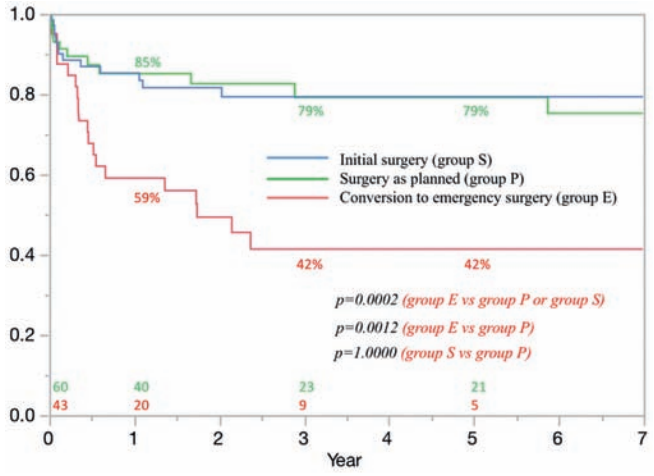

Figure 2. Overall survival after valve surgery for patients who underwent initial surgery (group S, blue), and those who underwent planned elective surgery after medical treatment (group P, green), and those who required conversion to emergent surgery regardless of initial medication (group E, red).

Vascular | Abstract | The challenges of endovascular approach in thoracic aorta

Long-term results of endovascular stent graft implantation for the treatment of acute penetrating aortic ulcer

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Acute aortic syndromes are associated with a high risk of mortality. One disease in this group is the symptomatic penetrating aortic ulcer (PAU), based on an atherosclerotic plaque penetrating the internal elastic layer, causing haematoma formation within the media of the aortic wall. The incidence of PAUs is unclear, and varies in literature between 2.3-7.6%.[1]

Complicated or acute PAUs are defined as a development of aneurysms, pseudoaneurysms, dissections or rupture. In case of symptomatic PAUs of the descending aorta, TEVAR is a fast and safe treatment option, especially for elderly patients. Anatomy or unfavourable location of the PAU makes this procedure more complex. For covering of the pathology in landing zone 0-2, an arch rerouting is inevitable, especially in an acute setting. For elective cases, a custom-made, scalloped, single/double branched or fenestrated stentgraft could be used to avoid prior aortic arch rerouting for successful PAU exclusion.

Acute arch rerouting may lead to an increased morbidity or increased neurological event rate.

In this study, 41 patients, predominantly male (81%) underwent TEVAR for acute, symptomatic PAU. Thereof, five patients with PAU who were treated under pending rupture underwent an arch rerouting prior to TEVAR. Neurological deficits after transposition occurred in four out of five patients (80%). One patient developed signs of paraplegia after TEVAR, which could be resolved with acute spinal chord drainage resulting in a complete regression of the symptoms.

No patients died within 30 days. The overall survival rate was 90%, 57% and 48% at 1-, 5 – and 10-years follow-up. Freedom of reintervention was achieved in 95% of the patients with a mean follow-up of six years.

Based on these results, TEVAR is the method of choice in the treatment of symptomatic PAUs, with excellent long-term results and a low rate of reintervention. Further outcome improvement and treatment of a more complex aortic anatomy or pathologies could be achieved in the future with fenestrated, scalloped or single branch prostheses "off the shelf". Therefore, fast and safe treatment, avoiding an additional operation on high risk patients in an acute setting should be achieved shortly.

References

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EACTS Birmingham Review Course in Cardiothoracic Surgery

Aaron Ranasinghe Birmingham, UK

The Birmingham Review Course in Cardiothoracic Surgery (BRC) is approaching its 25th Anniversary. The idea of a review course in cardiac surgery – primarily to help surgeons approaching the end of their training, prior to sitting the FRCS exit examination – was conceived by the late Professor Robert Bonser and Mr Tim Graham in 1993. In 1995, Mr Pala Rajesh joined the programme committee and an all-encompassing Review Course in Cardiothoracic Surgery was started.

Over the years, and under the stewardship of different Course Directors, there have been iterations to allow the BRC to stay current. The nature of the faculty has changed from local faculty to national and international experts, including presidents of the STS and AATS.

The BRC attracts approximately 50-60 candidates per year, and the demographic has changed from UK trainees to a more international feel, with candidates attending from both Europe and USA. In the past 10 years, two bursaries concerning course fees, travel and accommodation have been available to EACTS trainees.

Aside from the educational programme, there is an active social programme every evening which allows candidates to sit with the faculty and continue with their education in a more relaxed fashion.

We look forward to the future success of the BRC and the continuing involvement of EACTS members both as candidates and faculty.

Cardiac | Focus | How to use coronary, valvular and aortic guidelines in clinical practice

How to use 'Guidelines' to guide you

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The Merriam-Webster definition for 'guideline' is: 'an indication or outline of policy or conduct'. However, the Wikipedia definition includes all aspects of 'Guidelines' as we know them: 'A guideline is a statement by which to determine a course of action. A guideline aims to streamline particular processes according to a set routine or sound practice. By definition, following a guideline is never mandatory. Guidelines are not binding and are not enforced.'

Guidelines are suggestions not rules but they descend from peer-review. The following rules pertain to 'How to use guidelines in clinical practice':

1. Guidelines are 'guides', not rules.
2. Read them (the guidelines)
3. Read them with a critical eye; if you don't agree with a certain aspect, read the references to see from where the Guideline authors took their concepts of advice for practice.
4. Look at your own practice with a critical eye to see if it differs from the guidelines; if you see a trend in a certain group, for a certain procedure, study it, write it up and publish it.
5. By reviewing your own practice with a critical eye to improving surgical and medical treatment, and then by publishing this work, you may modify practice and hence may contribute to the next set of guidelines. Guidelines then come full circle from 'the real world' giving rise to studies of the 'real world' – retrospective reviews which in turn may give rise to randomized controlled trials, all of which may be referenced in adopted guidelines which are then used by 'the real world'.

So instead of lamenting that the guidelines do not reflect 'the real world', become part of the solution: don't be shy. Contribute by publishing thereby paying it forward. Guidelines are most useful when drawn from all that have contributed. The following are two examples of this author's unintended inclusion in guideline references. Not wishing to sound boastful, these studies were simply attempts at trying to improve patient care.

Example No. 1

Having used transit-time flow measurement (TTFM) for three years, this author had no idea whether the Medistim machine made any difference to patient outcome and was curious to find out. Hence the publication of a retrospective review of its use in 1,000 (actually 990) arterial grafts.[1] Bottom line: if a surgeon ignores the high Pulsatility Index (PI) of TTFM of a bypass graft, the patient has a statistically greater chance of not only increased major adverse cardiac events (MACE) but also of dying. End result: this paper is referenced in three guidelines: ESC/EACTS 2010, and 2014 Guidelines on Myocardial Revascularization[2,3] and the National Institute for Health and Clinical Excellence (NICE) Unit Medical Technology Guidance United Kingdom Nov 2011. To paraphrase, these guidelines say: it is prudent to use TTFM to measure bypass graft function intraoperatively.

Example No. 2

At the 2010 EACTS meeting in Vienna, Mohammadi et al[4] presented a well-thought out study on the age up until which BIMA grafting was beneficial. During the presentation the 'age of benefit' suggested was 65 years of age; when the study was published the age of benefit had dropped to 60 years. Being a strong arterial grafting proponent, this author was deeply disturbed at this age level and went on to review the Calgary data of a similar population, and a similar timeframe. The subsequent study[5] yielded a spline analysis in which the Hazard Ratio crossed the age line at exactly 69.9 years, i.e. 70 years of age. End result: this study is referenced in two Guidelines on both sides of the Atlantic: the 2016 Society of Thoracic Surgeons Clinical Practice Guidelines on Arterial Conduits for Coronary Artery Bypass Grafting[6] and ESC/EACTS Guidelines on Myocardial Revascularization 2014[3]. These guidelines suggest that use of BIMA is of survival benefit up to age of 70 years.

Now this author's concern is the guidelines for use of the novel oral anticoagulants (NOACs)[7,8]; specifically regarding when to stop NOACs before cardiac surgery. The guidelines suggest three days for 'high bleed risk surgery', but cardiac surgery is 'mega-high bleed risk surgery'. There is no other procedure that opens up a major body cavity and then gives enough heparin that would exsanguinate a patient if left unchecked. Cardiac surgery should be in a class all by itself.

In a recent 76-year-old patient with normal renal function, in whom rivaroxaban was stopped for four full days (one day more than the recommended time) undergoing aortic valve replacement and double bypass, the substantial bleeding from the non-surgical sites (bone marrow in particular) caused a drop of haemoglobin from 154 gm preoperatively to 92 gm at discharge on the patient's sixth postoperative day. Two units of fresh frozen plasma and $600 worth of Evicel (fibrin sealant) sprayed on the marrow were required to stop the bleeding. This bleeding was so excessive and out of context to the patient's health and operative procedure; one could only question the possibility of a lingering NOAC drug. Although this is an anecdotal report, observation of multiple similar circumstances by many surgeons may ultimately lead to 'new guidelines' on the appropriate timing for cessation of NOACs prior to cardiac surgery.

Guidelines are an orphan until adopted. But they have to be 'adoptable'. And to be perfectly blunt: peer review begins with your review of you. Keen observation and a curiosity to further develop an idea are key to the improvement of the practice of medicine. The development of useful guidelines is up to each and every one of us…

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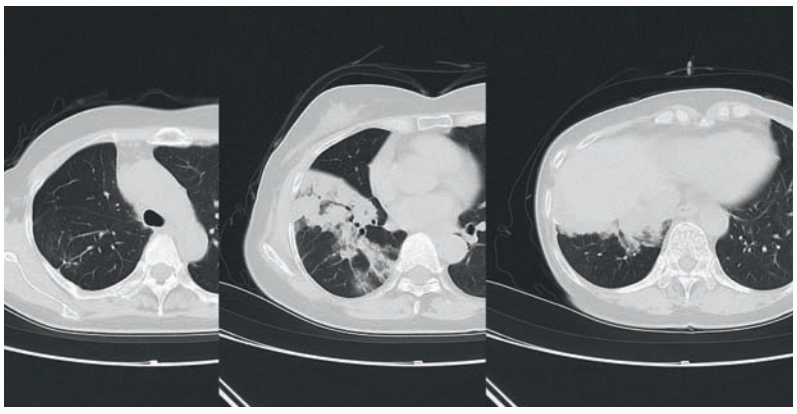
Thoracic | Abstract | Thoracic Case Session 1

Salvage right lower lobectomy after right upper lobectomy followed by chemotherapy for T4(pm2) NoMo lung cancer



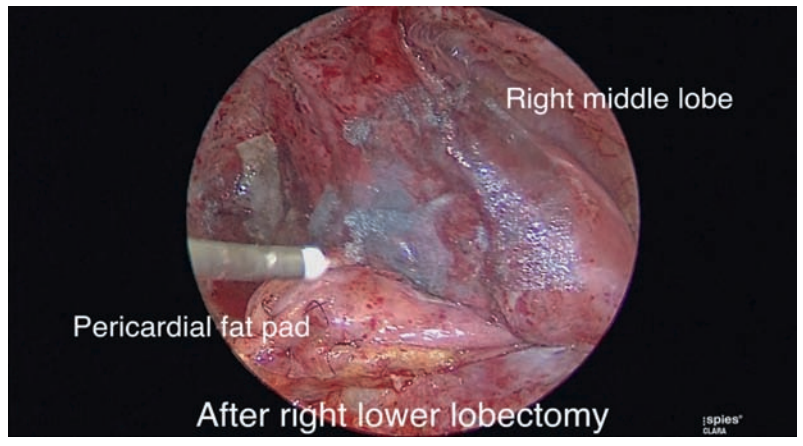


Figure 1 (above). Figure 2 (right).

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Salvage surgery after chemotherapy or radiation therapy for local relapse or pulmonary metastasis is of great concern to thoracic surgeons. Salvage operations after surgical resection might be particularly challenging. Hence, the indications for such procedures should be fully considered, and special attention should be paid to appropriate patient selection.

A 65-year-old woman who underwent right upper lobectomy, partial resection of the right lower lobe, and mediastinal lymph node sampling for T4N0M0 pulmonary adenocarcinoma six years ago was referred to our department. Despite several postoperative chemotherapy sessions, follow-up CT revealed a gradually increasing metastatic nodule leading to consolidation in the right lower lobe. HRCT showed no lesions in the right middle lobe. In the lower lobe, ground glass opacity and consolidation formed a tumour shadow. The tumour covered the right inferior vein and shared a wide border with parietal pleura, pericardia and diaphragm. On PET, the tumour showed a SUV max of 6.89 in the consolidated area. There was no metastasis to the residual lung, and no extrathoracic metastatic lesions were identified. We planned right lower lobectomy to preserve her pulmonary function. Complete right pneumonectomy would have been performed if the interlobar artery could not be dissected, or if tumour invasion to the middle lobe had been confirmed. Predicted postoperative percentage vital capacity and forced expiratory volume per second were 50% and 810 ml, respectively, after completion of right pneumonectomy. Through a posterolateral incision in the right sixth intercostal space, we dissected adhesions around the right lower lobe to avoid tumour dissemination. After dissecting the interlobar space, the basal artery was identified and cut using a stapler. Although adhesions existed around the apical artery, they could be safely cut using a stapler. The right lower vein and lower bronchus were also cut using a stapler. The bronchial stump was covered with a pericardial fat pad. The patient's postoperative course was uneventful and she was discharged on postoperative day 11. Postoperative pathological evaluation revealed invasive mucinous adenocarcinoma with no metastasis to the resected lymph nodes.

We have previously reported right lower lobectomy after upper lobectomy and suggested the benefit of middle lobe preservation. In this case, pulmonary function testing could not be performed because of prolonged air leak. However, the condition of the patient is good and she is living without any exertional dyspnea and metastasis.

Salvage right lower lobectomy after right upper lobectomy, followed by chemotherapy, for T4(pm2)N0M0 lung cancer is a feasible procedure for curative resection and preservation of pulmonary function.

Thoracic | Abstract | Airway

Tracheal resection and anastomosis combined with tracheoplasty utilising autologous costal cartilage in post intubation tracheal stenosis

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Different challenging scenarios are sometimes encountered after resecting the severe main tracheal stenosis. The removal of complicated stents leaving damaged tracheal mucosa, focal tracheomalacia, long additional mild stenosis, long resected stenotic segment with a high expected tension on the anastomotic sutures are all possible examples. Resection of these additional diseased parts will develop a very long resected segment difficult and hazardous to anastomose. For such situations we utilised autologous harvested costal cartilages and integrated them in the diseased residual segment after completely resecting the main severe stenosis.

Twelve patients were included in this retrospective study (seven males and five females), Median age was 25 years (range 3-66). All patients had previous multiple bronchoscopic dilatations, eight patients had complicated tracheal stents, and three were tracheostomised. All patients were investigated by direct laryngoscopy, CT with airway volume rendering, and bronchoscopy.

Dissection and mobilisation of the trachea was performed according to Grillo's technique. After opening of the airway and securing it distally, examining the stenotic area and the rest of the trachea alarmed an uneasy surgery. The presence of different pathologies separately of the main stenotic area forced us to think how will we avoid an anastomosis under severe tension?! We removed eight complicated metallic stents leaving a mutilated mucosa with significantly weak anterior tracheal wall, focal tracheomalacia was sometimes encountered, some patients had additional stage two stenosis. Excising all the diseased tracheal rings ensured a dangerous anastomosis while leaving them behind threatened a future postoperative restenosis. So, after performing routinely a laryngeal drop, and once the posterior membranous wall was anastomosed, costal cartilage harvesting was done with subpericondrial manner, then fashioned (BOAT Shaped) and incorporated with the trachea via 5/0 PDS sutures.

All Patients had autologous costal cartilage tracheoplasty combined with tracheal resection and anastomosis. Tracheoplasty was needed after stent removal in seven patients (58.3%), focal tracheomalacia in two patients (16.6%), additional long mild stenosis in three patients (25%). Median tracheal length resected was 4 cm, median costal cartilage length was 3 cm. All patients were decannulated intraoperatively.

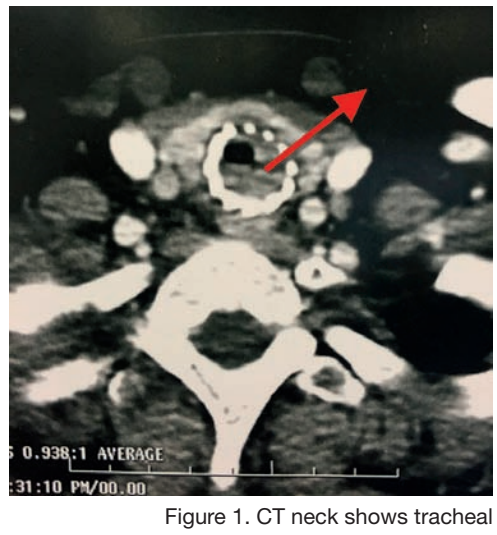

Figure 1. CT neck shows tracheal in-stent stenosis

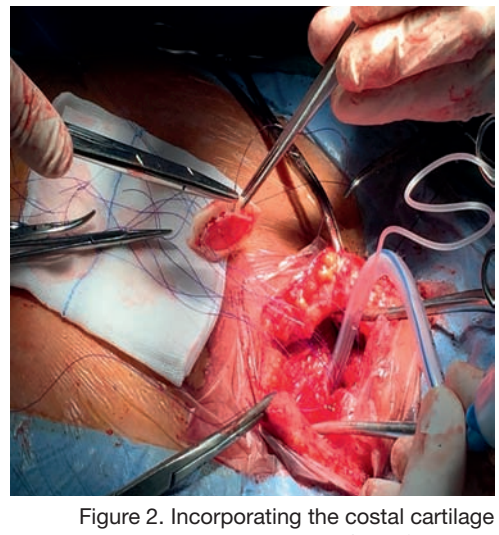

Figure 2. Incorporating the costal cartilage via 5/0 PDS sutures

Postoperatively, follow up was done by bronchoscopy at four months. It showed excellent integration of the costal cartilage into the tracheal wall. Eleven patients (91.66%) were cured and one female patient who was complicated with wound infection developed restenosis. She was managed by serial bronchoscopic dilatations.

Both tracheal resection and anastomosis, and laryngotracheal reconstruction combined with tracheoplasty using autologous harvested costal cartilage seem a safe option in treating post intubation tracheal stenosis accompanied by other pathologies. The most important of these are damaged tracheal segment after complicated tracheal stents removal, and the encountered focal tracheomalacia.

Cardiac | Rapid Response | Current developments in transcatheter aortic valve implantation

Impact of low-flow, low-gradient aortic valve stenosis on early and long-term outcomes after transcatheter aortic valve replacement. Results from a national registry

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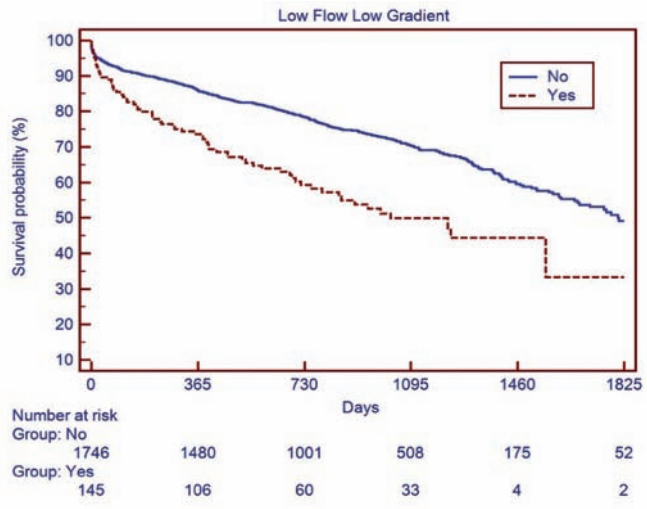
Classical low-flow, low-gradient aortic valve stenosis (LF/LGAS) is characterised by a low flow rate across the aortic valve due to left ventricular systolic dysfunction with reduced left ventricular ejection fraction (LVEF). This condition is associated with poor results following surgical aortic valve replacement but there is uncertainty about the outcomes of patients with LF/LGAS undergoing transcatheter aortic valve replacement (TAVR).

The aim of this retrospective multicentre study was to compare the outcomes of LF/LGAS patients versus "conventional" aortic stenosis (AS) patients undergoing TAVR and to assess if LF/LGAS is directly associated with mortality. We analysed data from a "real-world", "all-comers" National Registry that included all patients who underwent TAVR with the balloon-expandable Sapien/Sapien XT bioprosthesis (Edwards Lifesciences, USA) at 33 Italian centres. The study population was divided into two groups: 1) LF/LGAS that included patients with LVEF≤40% and mean transaortic gradient < 40 mmHg; 2) "conventional" AS that included all the remaining patients. Outcomes were defined according to the updated VARC definitions. Kaplan-Meier method was used for survival analysis. Cox proportional hazards regression model was fitted to determine the relative risk for death. From 2007 to 2012, 1,904 patients undergoing TAVR were enrolled in the Registry. We excluded 13 patients from the analysis for missing or incomplete data. Out of 1,891 patients that represent the population of this study, 145 (7.7%) were in the LF/LGAS group and 1746 (92.3%) were in the AS group. LF/LGAS patients were more likely to suffer from diabetes (44.1% vs 24.3%, p < 0.0001), chronic kidney failure (17.2% vs 7.2%, p < 0.0001), peripheral vascular disease (49% vs 34.4%, p = 0.0004), coronary artery disease (59.3% vs 39.4%, p < 0.0001). STS score and Euroscore II were significantly higher in LF/LGAS patients (STS: 13±11.2% vs. 8.9±7.1%, p < 0.0001; ESII: 13.1±13.5% vs 6.8±5.5%, p < 0.0001). VARC mortality (30-day) was significantly higher in the LF/LGAS group (12.4% vs 6.8%, p = 0.0113). Mortality at follow-up was significantly higher in the LF/LGAS group, as demonstrated by Kaplan-Meier analysis. Survival at three years was 49.9±4.7% and 70.4±1.3% in LF/LGAS and in AS group, respectively; while at five years it was 33.2±10.5% and 49.1±2.8% (Log-rank, p < 0.0001; Figure 1). Gender, preoperative creatinine, preoperative rhythm abnormalities, NYHA class, previous operation but not LF/LGAS were identified as independent predictors of mortality.



Patients with LF/LGAS undergoing TAVR have worse early and late outcomes if compared to those suffering from AS. This is related to the higher incidence of comorbidities and to the worse preoperative status of these patients rather than to the LF/LGAS itself.

Cardiac | Advanced Techniques | Dealing with complex adult cardiac surgery including transplantation. Live-in-a-box

Mechanical circulatory support for failing systemic right ventricle: technical tips

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Mechanical assist devices specifically designed for failing right ventricles are not currently available in the clinic, or their use is very limited. Adult patients born with isolated congenitally corrected transposition of great arteries (ccTGA), in which the systemic circulation is supported by a morphological right ventricle, can be asymptomatic and reach adulthood (usually the fourth-fifth decade of life) with no signs of congestive heart failure. For these patients, as in our presented clinical case, a common first sign of cardiac dysfunction is new onset of heart AV-block, requiring biventricular pacemaker implantation. A morphological right ventricle cannot face systemic load and pressure for more than few decades, when it starts to show progressive failure. Certainly, heart transplantation remains the best option for these patients, but the number of donors is not always sufficient to satisfy recipients' requests.

Totally implantable ventricular assist devices

(VAD) are valid therapeutic options for adolescents and adults with end-stage left ventricular failure, either as destination therapy or bridge to transplantation. Procedural steps for implantation are described as follows: i) an hypothermic (32°C) cardiopulmonary bypass (CPB) is established and the type of cannulation chosen based on heart anatomy (e.g. presence of an intra-atrial baffle compels bicaval cannulation); ii) If no other intracardiac procedures are planned and there are no other contraindications, VAD can be implanted in a beating heart. The role of the intraoperative transesophageal echocardiogram (TOE) is essential during iii) evaluation process of the correct site for the pump insertion, which in these patients is usually found ("finger test") more posteriorly than in normally conformed hearts, because of the presence of dense cordae, trabeculae and the moderator band, and potentially causes device inflow obstruction. Additionally, TOE is a precious aid to confirm inflow cannula positioning and functioning postoperatively.

After ventricular site selection, iv) a sewing ring is fixed to the ventricular wall with single U stitches, mounted on haemostatic pledgets. If preferred, surgeons can further help haemostasis by applying surgical glues at this stage. Next, v) a specifically designed coring tool is used to create an intramyocardial tunnel; once the first cone of muscle is removed, if visible, the remaining obstructing trabeculae can be also cut and the internal rim trimmed. At this point, vi) the inflow cannula can be inserted, and the vii) pump fixed to the ventricular wall. The pericardial cavity, in these patients, has gradually dilated as well as the failing heart, therefore it is capable of accepting the device, with no need for abdominal surgery. Afterwards, viii) a subcutaneous tunnel is created to connect a driveline from the intrapericardial device to the external controller. After pump and appropriate lines, ix) an outflow cannula, armed on its proximal portion, is x) connected to the ascending aorta and the device circulatory support commenced. Finally, xi) all clinical and device parameters are verified and a gradual weaning from the CPB is achieved. At our centre, minimally invasive surgical approaches are often preferred at the time of VAD surgery, especially in patients waiting for transplant, to minimise risk of complications and bleeding at the time of re-sternotomy.

Our experience reproduces other previously described results, which have shown that third generation VAD to support failing right systemic ventricles in ccTGA reduces early mortality and pulmonary vascular resistance and improves quality of life of patients waiting for transplant.

Cardiac | Focus | Multi-arterial coronary revascularisation in coronary artery bypass grafting: State of the art and recommendations

How to use the RGEA in 2017, tips and pitfalls?

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The optimal strategy for coronary artery bypass grafting (CABG) in patients with multi-vessel disease may be total arterial grafting. The benefits of using bilateral internal thoracic artery (ITA) grafts to perform total arterial revascularization have already been well documented. However, whether the third best arterial graft choice is the radial artery (RA) or the right gastroepiploic artery (RGEA) has not yet been proven. In western countries, the RA is more popularly used, whilst in Japan the RGEA is more popular. This year marks the 30th anniversary of Pym et al.1 and Suma et al.2 reporting their successful use of RGEA grafts in clinical application, and the start of RGEA grafting.

There are several concerns regarding the use of the RGEA for CABG. The main concerns are spasm and flow competition. Long-term results are also another concern.

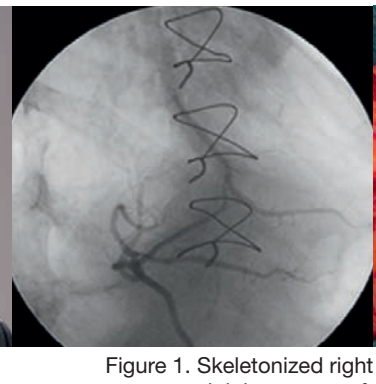

Figure 1. Skeletonized right gastroepiploic artery graft

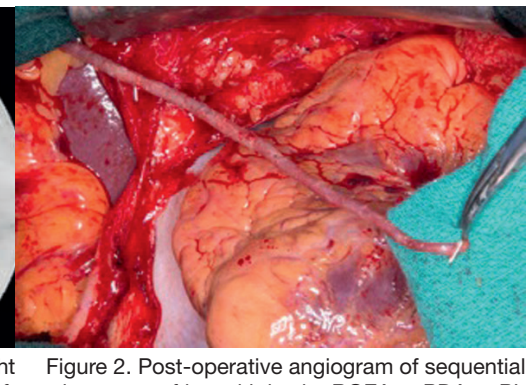

Figure 2. Post-operative angiogram of sequential bypass grafting with in situ RGEA to PDA to PL

The propensity for spasm is due to the histological characteristics of the RGEA having a muscular component in its wall. Topical vasodilators such as papaverine have been used to relieve and prevent spasm during surgery. Recent research has shown that denervation of the GEA can also reduce spasm, and skeletonization technique might be able to remove the periarterial sympathetic nerves.3 Mild stenosis is thought to be one of the causes of flow competition. To avoid these concerns, the target vessel should be the distal RCA, and stenosis of the target vessel should exceed 90%. Suma et al. reported 20 years' experience with using RGEA grafts for CABG, and patency was 66% at 10 years in their series.4 One of the reasons for this result is that the number of patients at risk was only 24, and most of those patients were symptomatic, making it difficult to determine the real patency rate. In addition, in their study, the target vessel was not always the distal RCA, but sometimes also the LAD and proximal circumflex and without tight stenosis. Moreover, the RGEA was not prepared in a skeletonized fashion. This relatively low 10-year patency rate can be improved by using a skeletonized RGEA graft and targeting coronary arteries with a tight >90% stenosis. Using this approach, Suzuki et al.5 reported 97.8%, 94.7%, and 90.2% cumulative patency rates immediately, and then 5 and 8 years after surgery, respectively. In my personal experience over the past 10 years with 426 consecutive patients, I strictly follow these indications using the RGEA graft to the RCA territory. All of these patients were operated on without cardiopulmonary bypass, and graft patency was 90.1% at 10 years.

Heavy RGEA users believe it is the correct conduit to choose for grafting to the RCA; and those who apply RGEA grafts with skeletonization and proper target selection find it to be reliable as the third best arterial conduit for CABG.

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32nd EACTS Annual Meeting in Milan

Looking ahead to EACTS 2018

Miguel Sousa-Uva EACTS President 2016-17

It will not surprise you to learn that while we are all currently enjoying the 31st EACTS Annual Meeting, a significant amount of thought and work has already gone into planning ahead for next year's meeting.

The new MedTech Europe's Code of Ethical Business Practice, which will be implemented from 1 January 2018, will mean that support of individual healthcare professionals to attend third party organised educational events shall no longer be possible. We realise the potential impact this policy may have on many of you, and have undertaken market research among our members and delegates to understand how we can best help you negotiate these changes.

As a result of our market research, next year's meeting has been restructured to a three-day programme (Thursday, Friday and Saturday) to ensure the meeting is more accessible and cost-effective. During an intensive three days, you can expect the same high-quality programme of scientific innovation, focus sessions with key opinion leaders presenting best practice, and the latest research in each domain.

We understand the withdrawal of industry financial support next year will mean delegates need to think carefully about how they use the funding available to them. Despite this, I strongly recommend that you continue to value the continuous medical education offered by EACTS; this high-quality and independent education is vital for both your career and the care of your patients

Visit EACTS Booth to find out more. I hope to see you in Milan next year.

32nd EACTS Annual Meeting Milan, Italy

18-20 October 2018

Deadline for Abstracts - 30 April 2018

To find out more or to register for the event visit:

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EACTS

European Association For Cardio-Thoracic Surgery

Raising Standards Through Education and Training

Thoracic | Abstract | Thoracic Case Session 1

Uniportal right upper bilobectomy after previous anterior thoracotomy for cardiac surgery: is still previous surgery a limit?

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Video-assisted thoracic surgery (VATS) lobectomy has become the gold standard for the treatment of early-stage lung cancer. Uniportal video-assisted thoracoscopic resections seem to offer potential benefits in terms of postoperative pain and morbidity. Previous cardio-thoracic surgery has been considered for years as being a contraindication for thoracoscopic lobectomies, for the presence of intra-thoracic adhesions and pleural symphysis. With increasing experience in VATS, this strategy is often proposed, even in complex procedures.

We report a case of uniportal VATS right upper bilobectomy in a patient who previously underwent an anterior thoracotomy for mitral valve replacement.

Case report

A 69-year-old man – a former smoker – was referred to our institution for a highly suspected solitary pulmonary nodule in the right upper lobe. The patient underwent a mitral valve replacement (biological Edwards 29) via an anterior thoracotomy approach three years prior. A bicameral pacemaker was also implanted for a complete atrio-ventricular parossistic block. The positron emission tomography (PET) scan revealed a nodule with 4.5 standardised uptake value, no lymphadenopathy and no signs of distant metastasis. A transthoracic needle biopsy

confirmed an adenocarcinoma. The patient had normal pulmonary function.

The procedure was performed under general anaesthesia and using selective one-lung ventilation. An uniportal approach was used with a single 4-5 cm incision made in the auscultatory triangle in the 5th intercostal space, parallel to the previous thoracotomy scar. A 10-mm, 30°-angled camera was placed in the posterior part of the incision. The initial step was to lyse, with a harmonic scalpel, all the adhesions between the lung parenchyma, the mediastinum, the diaphragm and the chest wall.

This part of the operation was very long, but with the high-definition angled camera the adhesiolysis was precise and safe, even at the apex and in the costophrenic sinus. Furthermore, the amount of bleeding was moderate. The lesion melted the minor fissure with middle lobe infiltration, so we decided to proceed with an upper bilobectomy. Then, an anatomic dissection with individual ligation of arteries, veins and bronchi was performed in a standard manner. The specimen was retrieved through the utility incision in an endoplastic bag. A systematic lymph node dissection completed the operation and a single 28 F drainage was left in pleural cavity.

The operative time was 405 minutes; no intraoperative or post-operative complications were observed, and the chest drainage was removed after three days. Histology revealed a pT1aN0 adenocarcinoma, and the patient is alive without recurrence one year after surgery.

Discussion

The uniportal approach offers a straight view, allowing a safe surgical field, even in complex cases. As expected, a great amount of adhesions increased the complexity of the case, but the magnification of the angled camera permitted a safe dissection even at the apex, that is always technically demanding in open surgery.

We believe that uniportal video-assisted thoracoscopic resections are not contraindicated in patients who previously underwent cardio-thoracic surgery. If hilar and mediastinal adhesions are too dense for a safe dissection of vital structures, conversion to open thoracotomy is mandatory: this is not a surgical failure and should be considered early enough to prevent vascular injuries.

References

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EACTS

The 2017 Vascular Domain Academy programme: **Past, present and future activity**

Ruggero De Paulis Chairman of the Vascular Domain

At the end of my mandate as a Chairman of the Vascular Domain, I am proud to summarise the Academy programme we have offered this year. As with every year, we have offered the young community of cardiac surgeons a course – spanning two-and-a-half days – focused on the various aspect of aortic surgery.

This course, better known as an Introduction to aortic surgery, is considered to be the first step (Level 1) into the skill programme of the EACTS Academy, where delegates can learn how best approach this peculiar branch of cardiac surgery. In a continually-changing world where endovascular technology modifies the paradigm of standard and well-known surgical techniques, it is important to acquire all the basic information that will form the foundation for future decision making.

Anatomy, physiology, surgical technique, postoperative care and quality control aspects have all been considered in accordance to the educational spirit of our Academy courses. The entire faculty of the Vascular Domain – plus a few experts from specific fields – have contributed to a packed programme of lessons, video presentations and wet labs, offering a most ample and comprehensive review of the subject.

The course was completely redesigned by the inclusion of a large number of live-in-the box presentations for more practical and live interaction. The new format included several keynote lectures where a technique was shown, explained theoretically, discussed, and followed by an analysis and movie of the real surgical manoeuvre. A continuous live interaction with the audience was the most appreciated factor, allowing young trainees to overcome the difficulties that are often present when dealing with more complex procedures.

The first day was devoted to a comprehensive review of the pathology of the ascending aorta. Lessons on how to reach a formal indication in case of dilated root, ascending or arch portion were followed by a lively discussion in line with some controversies still present into the various guidelines on the subject. In particular, the different decision-making processes in the presence of a bicuspid valve or different aortopathies were discussed with a major expert in the field. Such controversial aspects fuelled much interest, and helped to keep the discussion alive.

As for surgical techniques, the two well-known techniques of a valve-sparing procedure – remodelling and re-implantation – were both broke down in detail, the tips and tricks exposed/discussed and, on day two, re-analysed during a much-appreciated wet lab. To this extent, the participants had the possibility the go through the whole spectrum of a standard learning experience from the theory of indication, to the clinical decision process, to the visualisation of the real surgical techniques, and finally to hands-on experience with an isolated pig heart.

The day continued with more-or-less the same format when presenting the pathology of the aortic arch. Given the recent introduction of hybrid devices to better approach this pathology, the faculty did their best to go over the various form of surgical, hybrid, or total endovascular options. At the end of the session, participants had a clearer view on the decision-making process in different anatomical and clinical presentations. A lively session featuring the most controversial aspects when dealing with an acute dissection concluded the first day.

The second day was first devoted to presentation and discussion of less-frequent clinical conditions such as an infected graft prosthesis, or the problem of a small aortic annulus. Experts in the field, along with all faculty members, contributed to a comprehensive review of these uncommon clinical situations, hinting as to how to avoid the most common complications.

Finally, one of the most appreciated parts of the course was the use of a simulator in the TEVAR session. The increasing use of this technology has been seen within the majority of the cardiac surgeon community, and with it there is a clear message that better expertise in this field is necessary. At the course, interest was very high, and the simulator helped the delegates not only to practice, but also to discuss proper landing zones, how to choose the size of prostheses, and the best indication in different anatomical condition.

To this extent, and given the importance of learning how to properly approach endovascular technology, the European Association of Cardio-Thoracic Surgery, in cooperation with the European Society for Vascular Surgery (ESVS), has organised an endovascular course for cardiac surgeons, which will take place for the first time on 21-22 October in Hamburg, Germany (http://www.eacts.org/educational-events/programme/endovascular-skills-course).

As part of the continuing effort in education, EACTS is also planning to increase the number of meetings focused on the third and fourth level of the skill programme. These meeting are usually aimed at the educational activity of a specific subject (mitral, aortic, coronary etc.). In particular, we are currently working on finalising the organisation for an annual large meeting (Level 3) devoted to the much-debated topic of aortic-valve sparing and repair. Such a course will be hosted once a year across different cities in Europe, and where all experts in the field will convene in order to present and discuss their preferred approach. In the same vein, a series of smaller courses (Level 4) will be organised in centres of expertise, and where delegates will be able to learn a specific technique with the help of the live surgery and a closer contact with the faculty.

Further details will be announced at this year's Annual Meeting.

Cardiac | Rapid Response | Advances in mitral valve surgery

A propensity score analysis of fully endoscopic, non-rib-spreading technique versus conventional mini-thoracotomy for mitral valve surgery

Giacomo Bianchi, Rafik Margaryan and Marco Solinas Ospedale del Cuore, Fondazione Toscana "G. Monasterio", Massa, Italy

Over the last decades minimally invasive mitral valve surgery (MIMVS) has experienced both an evolution and a substantial revolution through well-defined steps: from direct vision to video-directed procedures, passing through reduction of surgical incision towards robotic telemanipulation, and eventually percutaneous procedures.

Many studies have shown that MIMVS is associated with low mortality, reduced need for blood-product transfusion, less ventilation time and shorter intensive care unit (ICU) and hospital stay when compared to standard sternotomy. Furthermore, it offers a comparable rate and durability of valvular repair, even in cases with complex anatomy.

Our Center embraced the philosophy of less-invasive valve surgery back in 2003, progressively extending this approach to all-comers and developing our 'flavour' of MIMVS, using central cannulation and direct aortic clamping. Our results published two years ago in over 1,600 patients undergoing MIMVS show an overall mortality rate of 1.1% and a 95% repair rate in the setting of degenerative disease, with a freedom from reoperation of 94% at 10 years. Now we have reached over 2,400 MIMVS procedures and counting with the same results (intra-institutional data).

While the aforementioned development of percutaneous procedures is ongoing, we have focused upon further reducing surgical trauma by minimizing the chest wound and avoiding rib spreading.

From July 2015, a small team (the authors) dedicated themselves to evolve our standard MIMVS technique towards an endoscopic, non-rib-spreading approach (eNRS).The aim of our study was to compare standard right mini-thoracotomy (sRMT) MIMVS versus a eNRS in terms of feasibility and safety, functional status and early outcome.

A propensity score model (1:1 ratio) was built to compare mitral valve surgery patients who underwent sRMT with those receiving eNRS, yielding two groups, each of 105 patients.

From right to left, Rafik Margaryan, Marco Solinas and Giacomo Bianchi

We were able to successfully complete the endoscopic procedure in all patients; 30-day mortality was absent in both groups. Duration of anaesthesia and overall procedure did not differ substantially.

While cardiopulmonary bypass (CPB) time was longer in the eNRS group, we found no differences in terms of cross-clamp (X-clamp) time and overall repair rate (92% vs. 89%, eNRS vs. sRMT; p = 0.17); furthermore, length of hospital stay and home discharge rate favoured the eNRS approach.

Patient satisfaction was higher in the eNRS group as measured by SF 12 evaluation.

A cumulative sum (CUSUM) curve analysis also demonstrated that the process was consistent, exhibiting a learning curve length of about 60 patients.

In our experience, eNRS is safe, reproducible and yields results comparable with sRMT. A learning curve effect was present, but it did not affect the operative results, nor did it impact early mortality. This approach offers, even at initial stages of development, substantial advances in terms of early discharge and higher mental and physical fitness, linked to an early return to daily activities, increased effectiveness, and satisfaction with the procedure.

Cardiac | Rapid Response | Current developments in transcatheter aortic valve implantation

Are sutureless valves a serious alternative to TA-TAVI? A matched pairs analysis

Rawa Arif, Gabor Szabo Department of Cardiac Surgery, University Hospital Heidelberg, Germany

Conventional surgical aortic valve replacement (AVR) remains the gold standard for symptomatic aortic stenosis. However, in intermediate and high-risk patients transcatheter aortic valve implantation (TAVI) is a feasible alternative with expanding indication. Sutureless valves (SU-AVR) were suggested to decrease procedural risks in conventional treatment, especially due to reduced aortic cross-clamp time. These features raised the question, if SU-AVR can compete with the continuously improving TA-TAVI procedure. We aimed to answer this question by paired-match analysis. Our retrospective database analysis revealed 214 patients undergoing transapical TAVI (TA-TAVI) procedure and 62 SU-AVR procedures including 26 patients in need of concomitant coronary artery bypass grafting (CABG). After matching for age, gender, BMI, emergency indication, dialysis and additive EuroSCORE, 52 pairs of patients were included and analysed.

Our results show that the in-hospital mortality (TAVI: n=3, 5.8% vs. SU-AVR: n=2, 3.8% death; p=0.647) was comparable between TAVI (mean age 77 ± 4.3 years) and SU-AVR groups (mean age 75 ± 4.0 years) including 32 females in each group. The calculated logistic EuroSCORE was similar (TAVI: 19 ± 12 vs. SU-AVR: 17 ± 10; p=0.257). The perioperative analysis revealed surprising results. Atrial arrhythmia occurred frequently without significant difference (TAVI: n=20, 36% vs. SU-AVR: n=15, 29%; p=0.538). Despite the risk factor of extracorporeal circulation within the SU-AVR group, renal failure requiring dialysis (TAVI: n=4, 7.7% vs. SU-AVR: n=1, 1.9%; p=0.169) and cerebrovascular accidents (TAVI: n=0 vs. SU-AVR: n=1, 1.9%; p=0.315) were without significant difference. Furthermore, maximum postoperative bilirubin levels showed also no significant difference (TAVI: 0.85 ± 0.5 mg/dl vs. SU-AVR: 1.05 ± 0.7 mg/dl; p=0.115). Surprisingly, complete heart block requiring permanent pacemaker was relatively rare in both groups (TAVI: n=1, 1.9% vs. SU-AVR: n=4, 7.7%; p=0.169) and also did not differ significantly, while emphasising the extremely low incidence in the TAVI group. As expected, intraoperative use of blood transfusion was higher in SU-AVR group (TAVI: 0.72 U vs. SU-AVR: 1.46 U, p=0.014), while only one patient of the TAVI group required re-thoracotomy (TAVI: n=1, 1.9% vs. SU-AVR: n=0; p=0.315).

During ICU stay ventilation time was also comparable (TAVI: 26 ± 66 d vs. SU-AVR: 25 ± 21 d; p=0.914) with low need of reintubation in both groups (TAVI: n=4, 7.7% vs. SU-AVR: n=1, 1.9%; p=0.169). Kaplan-Meier estimated survival calculated no significant difference between both groups after 6 months (TAVI: 74 ± 8% vs. SU-AVR: 92 ± 5%; log rank p=0.068).

In conclusion, this present study showed that SU-AVR is as safe and effective as TA-TAVI in patients at intermediate and high risk for conventional surgery, with low early morbidity and mortality. Combining the advantage of standard diseased valve removal with shorter procedural times, sutureless aortic valve replacement may be the first-line treatment for high-risk patients considered in the 'gray zone' between TAVI and conventional surgery, especially if concomitant myocardial revascularization is required.

Congenital | Professional Challenge | Challenging issues in Fontan pathway: Part II

What is the optimal timing for hepatic vein inclusion following the Kawashima operation in single ventricle patients with interrupted inferior vena cava?

Bahaaldin Alsoufi Emory University School of Medicine, Atlanta, GA, USA

In patients who have undergone the Kawashima operation for palliation of single ventricle anomalies associated with interrupted inferior vena cava, development of pulmonary arteriovenous malformations (PAVMs) with subsequent cyanosis necessitates later hepatic vein inclusion into the cavopulmonary circulation in order to provide the necessary hepatic factor that would allow regression of those PAVMs and improvement of the cyanosis. However, once established, complete regression of PAVMs is unpredictable and often incomplete. Therefore, several institutions have advocated early referral of those patients to receive hepatic vein inclusion prior to significant clinical evidence of PAVMs.

One additional challenge is the choice of operation that would provide even distribution of the hepatic factor into the pulmonary arteries and, subsequently, uniform resolution of those PAVMS. The flow from the hepatic veins to the pulmonary artery following hepatic vein incorporation with a completion Fontan operation might be streamed to one lung versus the other based on several factors such as the presence of pulmonary artery stenosis, and streaming effects of the blood coming from the superior vena cava. The high incidence of bilateral superior vena cava in those patients further complicates the issue with various streaming effects of flow and the presence of central pulmonary artery hypoplasia. Procedures other than the Fontan operation to include hepatic flow into the pulmonary circulation have been proposed, such as H graft between the hepatic veins and the azygos vein, or a long extracardiac Fontan that extends from the hepatic veins to the superior vena cava that is attached to the azygos continuation of the interrupted inferior vena cava.

We report the results of a policy of early referral of those patients at our institution to receive hepatic vein inclusion surgery prior to development of major PAVMs and subsequent cyanosis. Between 2002 and 2012, 22 children with single ventricle and interrupted inferior vena cava underwent the Kawashima operation. Twenty-one patients (95%) had left atrial isomerism and 21 (95%) had previous first-stage palliation surgery (Norwood=9, Blalock-Taussig shunt=7, pulmonary artery band=5). Median age at time of Kawashima was 9.6 months. Median O2 saturations at time of discharge from the hospital following the Kawashima operation was 87% (IQR 81-90%). At last follow up, there were 21 survivors (95%). Among those, 18 underwent hepatic vein inclusion at a median age of 4.0 years and median interval of 3.4 years from the Kawashima operation. The median O2 saturation prior to hepatic vein inclusion was 76% (IQR 72%-82%), while the immediate post-operative O2 saturation at time of hospital discharge was 82% (IQR 76%-91%), including 4 patients who required supplemental home oxygen therapy. However, we noted a significant improvement of saturation on subsequent outpatient follow up with median O2 saturation of 96% and 88% of those patients had O2 saturation above 90%. Those findings are favorable compared to published reports and support the policy of timely inclusion of hepatic flow in those children to enhance the resolution of PAVMs.

One additional improvement to surgical planning that has been adopted recently at our institution includes the preoperative MRI modeling of the vascular anatomy, coupled with virtual surgical planning that derives multiple possible surgical strategies. Following that, computational flow dynamic study of those various surgical models allows estimation of power loss and flow distribution from the hepatic veins for various models and subsequently identifies the surgical option that will allow even distribution of hepatic factor with minimal energy loss. This is a valuable tool that will help the outlook of Fontan patients in general and those with interrupted inferior vena cava specifically.

Cardiac | Focus | Everything you need to know about transcatheter mitral valve replacement

Imaging of the mitral valve, new tools: 3D echo, Tomtech software, CT reconstruction, fusion imaging

Thilo Noack Department of Cardiac Surgery, Heart Center Leipzig University, Leipzig, Germany

Imaging of the mitral valve (MV) is an important column in the clinical diagnostics and therapy of mitral valve diseases. In particular, transthoracic 2-dimensional echocardiography (2D TTE) as a non-invasive imaging method allows a quick and easy assessment of the MV function and dysfunction.

New percutaneous transcatheter or surgical MV interventions require a more exact quantification of the MV geometry, which is important for therapeutically decision making and surgical or interventional planning. In particular, new treatment options, such as fully-endoscopic MV repair or catheter-based techniques, require a precise pre-interventional analysis of the MV due to the missing direct vision and inspection of the MV during the procedure. Furthermore, the asymmetrical MV complex as well as its dynamics throughout the cardiac cycle must be considered.

These specific requirements have led to new and varied developments in MV imaging. Among the most important are the Live 3D transesophageal echocardiography (3D TEE), new comprehensive software solutions for the geometric quantification of the MV or the image fusion of ultrasound and fluoroscopy systems.

The Live 3D TEE allows an excellent 3D representation of the MV in a high temporal and spatial resolution. The advantage is independence from cardiac rhythm or heart rate. Thus the Live 3D technology is also suitable for guidance during catheter-based interventions. Previous problems with the 3D TEE, such as stitching over four cardiac cycles, are now a thing of the past.

New software solutions (e.g. Philips QLAB, Siemens eSie Valves, Tomtec 4D MV-Assessment) offer extensive post-processing options. Recorded 3D TEE or 3D computed tomography (CT) image data can be analyzed extensively using additional software. The 3D TEE dataset is then imported into a software and then a user-driven analysis takes place. These range from geometric quantification (Figure 1), fluid-structure interaction analysis to the planning and simulation of a MV intervention, to the prediction of a possible therapeutic result. In particular, the initial problems of long processing time and complex operation are solved with the current solutions.

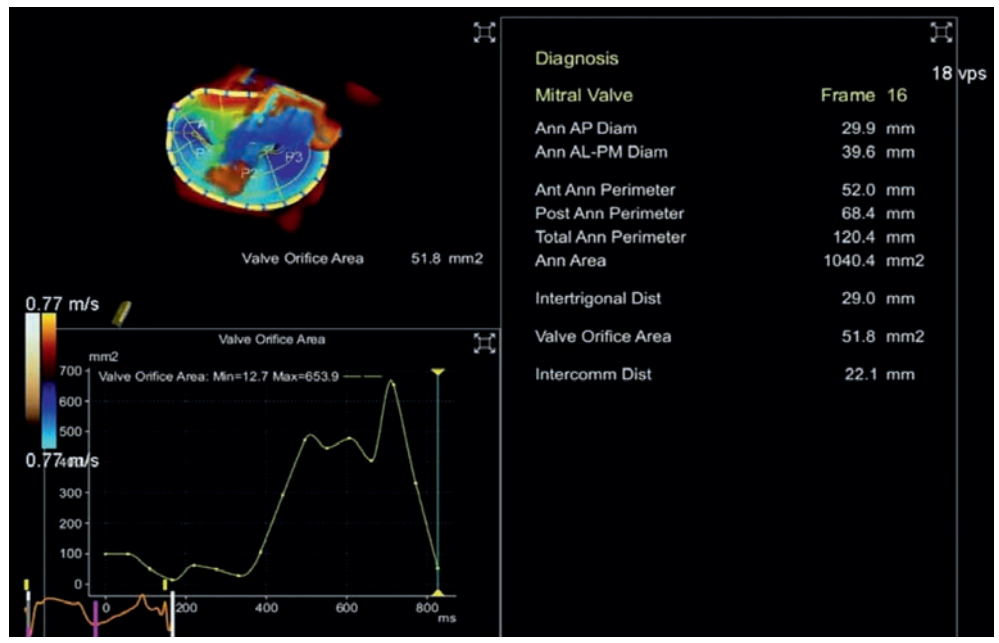

Figure 1. Mitral valve assessment with eSie Valves.

Image fusion between fluoroscopy and TEE is technically extremely demanding. The goal of image fusion of ultrasound images and fluoroscopy images for a better intraprocedural guidance. In the first development steps, this was due to the overlay of the ultrasound signal (2D and 3D TEE) with the fluoroscopy. Further developments are the overlay of static and dynamic anatomical landmarks (e.g. trigones, annulus) on fluoroscopy systems. The extent to which image fusing is entering the clinical routine remains unanswered. It is certain that specific interventions such as the transcatheter MV replacement can be a potential application field.

In summary, the developments in MV imaging are fast-paced and their possibilities in cardiac surgery are underrepresented. New imaging techniques will significantly influence diagnostics, treatment planning, and delivery, especially in the context of catheter-based techniques. The aim of this lecture is therefore to present a comprehensive overview of current developments in MV imaging and to demonstrate possibilities of application in cardiac surgery.

EACTS 2017 **Floor Plan**

Exhibition opening times:
Sunday 8 October: 15:00–19:00
Monday 9 October: 09:00–17:00
Tuesday 10 October: 09:00–17:00

59	3-D Matrix Ltd
35 & 36	A&E Medical Corporation
21	AATS-American Association for Thoracic Surgery
69	Abbott
94A	Acute Innovations
63	Admedus GmbH
112	Advancis Medical
10	Andocor NV
75	AngioDynamics
93B	Ansabere Surgical, S.L.
96	Asanus Medizintechnik GmbH
42	AtriCure Europe BV
83	B Braun
43	Berlin Heart GmbH
45	BioCer Entwicklungs-GmbH
99	Biointegral Surgical, Inc
94C	Biomatic International Inc.
40	Biometrix BV
73	BioStable Science & Engineering, Inc
23 & 25	Boston Scientific International
64	Cardia Innovation AB
85 & 86	CardiaMed BV
97	Cardio Medical GmbH
5	Changzhou Waston Medical Applicance Co., Ltd.
39	ClearFlow Inc
29	CORONEO Inc
T3	Cryolife Europa
54	Cryolife Europa
19	CTSNet
105	Cura Surgical Inc
89A-89C	CytoSorbents Europe GmbH
95	De Soutter Medical Limited
24 & 26	Delacroix-Chevalier
93A	Dendrite Clinical Systems Ltd
76	Dextera Surgical Inc

79 & 80	Dr. Franz Koehler Chemie GmbH
68	EACTS-The European Association For Cardio-Thoracic Surgery
93C	EBM Corporation
T6	Edwards Lifesciences
52	Edwards Lifesciences
70	Eurosets SRL
11	Evaheart, Inc
109	Exstent Limited
32 & 34	Fehling Instruments GmbH & Co KG
94B	Genesee BioMedical Inc
T2 & 82	Getinge
74	Heart Hugger / General Cardiac Technology
93D	Heart Valve Museum
13	Heart Valve Society
77	HMT Medizintechnik GmbH
22	ISMICS – International Society for Minimally Invasive Cardiothoracic Surgery
37	Japan Lifeline Co., Ltd.
111	Jarvik Heart Inc
102	Jeil Medical Corporation
94D	JOMDD Inc
27 & 28	JOTEC GmbH
67	Kephalios
31 & 33	KLS Martin Group – Gebrueder Martin GmbH & Co KG
50	Labcor Laboratorios Ltda
53	LivaNova
T1	LivaNova
57 & 58	LSI Solutions
T5	LSI Solutions
107	MDD Medical Device Development
38	Medela AG
71	Medistim ASA
81	Medtronic International Trading SÁRL
92C & 92D	Meril Life Sciences Pvt. Ltd

98, 101, 103	NeoChord
6	NORDIC PHARMA
108	OmniGuide Surgical
62	OpInstruments GmbH
106	Oxford University Press
113	PEROUSE-A Vygon company
44 & 46	Peters Surgical
7	Posthorax Limited
72	Qualiteam s.r.l.
104	RUMEX INTERNATIONAL Co.
1, 2, 3 & 4	Scanlan International Inc
78	Siemens Healthcare GmbH
55 & 56	Somahlution
88	Spectrum Medical
30	stroke2prevent
20	STS-The Society Of Thoracic Surgeons
48	Sunoptic Technologies
65	SynCardia Systems Inc
12	TEH-Tube
41	Terumo & Vascutek
T4	Terumo & Vascutek
89D	Tianjin Plastics Research Institute Co Ltd (TPRI)
110	Transonic Europe
8 & 9	Vascular Graft Solutions
92A	WEIRICH Medizintechnik GmbH
47 & 49	Wexler Surgical, Inc. & TeDan Surgical Innovations
87	Wisepress Online Bookshop
92B	WL Gore & Associates GmbH
90	Xenios AG
66	Xenosys Co Ltd
51	ZAMMI
100	Zeon Medical Inc
60 & 61	Zimmer Biomet

Satellite Symposia @ the 31st EACTS Annual Meeting

Company	Room	Time	Title
Tuesday 10 October			
Abbott	K2	12:45–14:00	Improving your outcomes with the HeartMate 3™ LVAD
Edwards Lifesciences	E1	12:45–14:00	Contemporary TAVI and SAVR indications and future perspectives
Medtronic	F2	12:45–14:00	Aortic Complex Cases: Current Options & Outcomes

EACTS – New membership applications approved by the General Assembly 2017

New Active Members List 2017

We are pleased to confirm that we have received 330 complete EACTS Membership Applications for 2017. Please find below the list of new members elected at the General Assembly.

From now on, we are happy to receive new EACTS Membership Applications for the year 2018. Please, spread the word amongst your colleagues: **www.eacts.org/membership**

Last Name First Name	*Country*
Abuchaim Decio	*Brazil*
Afanasyev Alexander	*Russian Federation*
Akchurin Renat	*Russian Federation*
Alhussini Khaled	*Germany*
Allison Melissa	*Netherlands*
Alsamir Samer	*Germany*
Andreev Dmitrii	*Russian Federation*
Anghel Diana	*Romania*
Antonopoulos Achilleas	*United Kingdom*
Anwer Muhammad	*United States*
Arabadzhian Igor	*Russian Federation*
Astrosa Martin Eduardo	*Spain*
Aydin Selim	*Turkey*
Bazylev Vladlen	*Russian Federation*
Beeman Arun	*India*
Beis Ioannis	*Greece*
Bellino Ilaria	*Italy*
Berastegui Garcia Elisabeth	*Spain*
Beregovoy Oleg	*Ukraine*
Bhandtivej Preecha	*Thailand*
Bochenek Maciek	*Poland*
Bogachev-Prokophiev Alexander	*Russian Federation*
Botterbusch Carl	*United States*
Boyce Steven	*United States*
Branecky Peter	*Germany*
Brenes Gonzalez Javier	*Costa Rica*
Buczynski Michal	*Poland*
Bueno Gutierrez Silvia	*Dominican Rep.*
Camacho Margarita	*Costa Rica*
Caputo Massimo	*United Kingdom*
Carillo Carolina	*Italy*
Ceresa Fabrizio	*Italy*
Cetinkaya Ayse	*Germany*
Chacon Carlos	*Costa Rica*
Chanmayka Thiti	*Thailand*
Chien Chen-Yen	*Taiwan, Prov. of Ch*
Conradi Lenard	*Germany*
Costetti Alessandro	*Italy*
Dajer-Fadel Walid	*Mexico*
Davidson Murray Brian	*South Africa*
Davierwala Piroze	*Germany*
De Ben Heiko	*Germany*
De Cabanyes Sara	*United Kingdom*
Dhannapuneni Ramana	*United Kingdom*
Dhillon Jatinder	*United States*
Diehl Kris	*United States*
Dilawar Ismail	*Indonesia*
Dmitrii Dmitry	*Russian Federation*
Dolzhenko Evgeniy	*Russian Federation*
Dreizler Thomas	*Germany*
Drozdovski Konstantin	*Belarus*
Eforakopoulos Fotios	*Greece*

Last Name First Name	*Country*
El Oumeiri Bachar	*Belgium*
Elefteriades John	*United States*
Ellensen Vegard S.	*Norway*
El-Mahrouk Ahmed	*Saudi Arabia*
Elmanzhi Roman	*Russian Federation*
Ersel Simon	*Germany*
Estrin Sergii	*Ukraine*
Faerber Gloria	*Germany*
Farmas Arkadiusz	*Poland*
Ferrari Paolo Albino	*Italy*
Flores Gerardo	*Colombia*
Folesani Gianluca	*Italy*
Fukuda Tomofumi	*Japan*
Gaer Jullien	*United Kingdom*
Gambardella Ivancarmine	*United Kingdom*
Gehlot Rajeev	*India*
Gkouma Antonia	*United Kingdom*
Graves K	*Switzerland*
Grishin Aleksei	*Russian Federation*
Grujic Milos	*Serbia and Mont.*
Guglielmone Juan	*Argentina*
Gureev Sergei	*Russian Federation*
Haiet Mohamed	*Saudi Arabia*
Halbe Maximilian	*Switzerland*
Hatachi Go	*Japan*
Hemrungrote Teera	*Thailand*
Hosseinzadeh Maleki Mahmood	*Iran, Islamic Rep. of*
Hugi-Mayr Beate	*Switzerland*
Iba Yutaka	*Japan*
Ikarashi Jin	*Japan*
Isaev Maxim	*Germany*
Isaeva Irina	*Russian Federation*
Ise Hayato	*Japan*
Jahanyar Jama	*United States*
Janson Jacques	*South Africa*
Jawad Khalil	*Germany*
Jimeno San Martin Leticia	*Spain*
Junio Jay	*Philippines*
Kalscheuer Gregory	*Belgium*
Kamiya Hiroyuki	*Japan*
Kandemir Ozer	*Turkey*
Kang Shinkwang	*Korea, Republic Of*
Kanghae Sakolphat	*Thailand*
Karakhalis Nikolay	*Russian Federation*
Kasemsarn Choosak	*Thailand*
Kato Masaaki	*Japan*
Kazantsev Konstantyn	*Russian Federation*
Kennedy Ronald	*United States*
Khabbaz Kamal	*United States*
Kikusaki Satoshi	*Japan*
Kocica Mladen	*Serbia and Mont.*
Kokotsakis John	*Greece*

Last Name First Name	*Country*
Komarov Roman	*Russian Federation*
Kondratiev Dmitry	*Russian Federation*
Korolkova Elena	*Belarus*
Korun Oktay	*Turkey*
Kozłowicz Michał	*Poland*
Krasnaliev Yordan	*Bulgaria*
Kruchinenko Andrey	*Russian Federation*
Kueri Sami	*Germany*
Kumar Sanath	*India*
Labrousse Louis	*France*
Lam Geoffrey	*United States*
Langlois Yves	*Canada*
Lavee Jacob	*Israel*
Leontyev Sergey	*Germany*
Liang Chaoyang	*China*
Lyager Nielsen Sten	*Denmark*
Lynch William	*United States*
Ma Wei-Guo	*United States*
Mahtab Edris	*Netherlands*
Mair Rudolf	*Austria*
Makeev Sergey	*Russian Federation*
Maliwa Michael	*Germany*
Marianeschi Stefano	*Italy*
Marques Bruno	*Brazil*
Martin Del Campo Madariaga Emmanuel	*Mexico*
Martinez Marvin	*Philippines*
Mastroroberto Pasquale	*Italy*
Matsumiya Goro	*Japan*
Mattila Ilkka	*Finland*
Mehrotra Deepak	*Australia*
Methrujpanont Jessada	*Thailand*
Meza Jimenez Rafael Jose	*Colombia*
Mikulenka Vladimir	*Czech Republic*
Mommerot Arnaud	*France*
Mourad Fanar	*Germany*
Mubeen Mohd	*India*
Naik Madhava	*Singapore*
Nand Parma	*New Zealand*
Nichay Nataliya	*Russian Federation*
Nishi Satoshi	*Japan*
Oliveira Marco Antonio Praca	*Brazil*
Orru Francesco	*Italy*
Pablo Ramiro Thadeus	*Philippines*
Pavlov Alexey	*Russian Federation*
Pecoraro Ylenia	*Italy*
Perrier Stéphanie	*France*
Petrella Francesco	*Italy*
Pisani Angelo	*France*
Ponomarev Dmitry	*Russian Federation*
Porapakkham Pramote	*Thailand*
Pyetkov Oleksandr	*Ukraine*
Raddad Basim Duhaim	*Sweden*

EACTS – New membership applications approved by the General Assembly 2017

Last Name First Name	Country
Radwan Medhat	*Germany*
Raimondi Cominesi Silvia	*Italy*
Rao Vinay	*United Kingdom*
Reich Ronald	*Germany*
Repossini Alberto	*Italy*
Rimsukcharoenchai Chartaroon	*Thailand*
Roberts Harold	*United States*
Rogulina Natalia	*Russian Federation*
Ronchey Sonia	*Italy*
Roselli Eric	*United States*
Rousse Natacha	*France*
Ruttmann-Ulmer Elfriede	*Austria*
Saad Ahmed	*United Kingdom*
Sachpekidis Nikos	*Greece*
Safadi Faouzi	*UAE*
Sakovich Valery	*Russian Federation*
Saku Kosuke	*Japan*
Samiotis Ilias	*Greece*
Schaeuble Martin	*Germany*
Schloeglhofer Thomas	*Austria*
Schmidt Alexandra	*France*
Schneider Yuri	*Russian Federation*
Scognamiglio Mattia	*Italy*
Sharifulin Ravil	*Russian Federation*
Sharma Digvijay	*India*
Shikhranov Aleksei	*Russian Federation*
Silva Giuliano	*Brazil*
Sinelnikov Yury	*Russian Federation*
Sitthisombat Chanawit	*Thailand*
Smirnov Sergei	*Russian Federation*
Smith Julian	*Australia*
Soerensen Gro	*Norway*
Soncini Da Rosa George	*Brazil*
Stabel-Mahassine Chourok	*Germany*
Suijker W.	*Netherlands*
Takagi Kazuyoshi	*Japan*
Tamura Kentaro	*Japan*
Taniguchi Daisuke	*Japan*
Tatoulis James	*Australia*
Tcherveniakov Peter	*United Kingdom*
Temrezow Marat	*Russian Federation*
Tolis George	*United States*
Topalidis Dimitrios	*United States*
Tosi Davide	*Italy*
Tripodi Alberto	*Italy*
Turra Jan	*Germany*
Uehara Kyokun	*Japan*
Urtaew Rolan	*Russian Federation*
Van Loo Ines	*Belgium*
Vasile Rasvan	*Romania*
Vasiliu Bogdan	*Romania*
Wachirasrisirikul Sitichok	*Thailand*
Waikittipong Somchai	*Thailand*
Wongbuddha Chawalit	*Thailand*
Wongkornrat Wanchai	*Thailand*
Xiao Fei	*China*
Yaghoubi Golverdi Alireza	*Iran, Islamic Rep. of*
Yamgurov Dmitriy	*Russian Federation*
Yang Shouguo	*China*
Yuriko Kiriya	*Japan*
Zanoni Paulo	*Brazil*
Zeeshan Ahmad	*United States*
Zelenchuk Oleg	*Ukraine*
Zeya Ayubi Rashid	*India*
Zhang Ruoyu	*Germany*
Zhauyrova Madina	*United States*
Zhuravleva Irina	*Russian Federation*

Last Name First Name	Country
Trainee Members	
Abdelkafi Ezedin	*France*
Abdelnour Ali	*United Kingdom*
Adzintsou Vitali	*Belarus*
Akca Ferdi	*Netherlands*
Al Khaddour Ahmad	*Syrian Arab Republic*
Al-Adhami Ahmed	*United Kingdom*
Alethan Ali	*Germany*
Alexandrová Lea	*Slovakia*
Alshaikh Bayan	*Saudi Arabia*
Ameworgbe Gidisu Jerryson	*China*
Antonides Stan	*Netherlands*
Aphram Gaby	*Belgium*
Arab Muhammad	*Egypt*
Arnold Zsuzsanna	*Austria*
Bastopcu Osman Murat	*Turkey*
Beckers Paul	*Belgium*
Bening Constanze	*Germany*
Berardi Marianna	*Italy*
Bernhardt Alexander M.	*Germany*
Boshkoski Gjoko	*Germany*
Bouza Mónica	*Spain*
Braga Ana	*Portugal*
Brambate Agrita	*Germany*
Braun Inka	*Germany*
Caldaroni Federica	*Italy*
Ciortea Elena	*Romania*
Croo Alexander	*Belgium*
Douaidia Nesrine	*France*
Dullabh Kaylesh	*South Africa*
Dumont Karl	*Norway*
Eixerés Esteve Andrea	*Spain*
Elghnam Ahmed	*Saudi Arabia*
Fabry Thomas	*Germany*
Fleerakkers Jelle	*Belgium*
Fujita Akira	*Japan*
Galea Nicola	*Italy*
Garrasi Carlo	*Italy*
Gassa Asmae	*Germany*
Gasser Simone	*Germany*
Gisler Fabian	*Switzerland*
Gumus Fatih	*Turkey*
Guzmán Rudith	*Spain*
Hussain Azar	*United Kingdom*
Huuskonen Antti	*Finland*
Ivanov Borko	*Germany*
Iyer Swetha	*United Kingdom*
Jakobsen Oyvind	*Norway*
Jansen Klomp Wouter	*Netherlands*
Junior Gilberto	*Brazil*
Karampinis Ioannis	*Germany*
Khachatryan Zara	*Russian Federation*
Klapkowski Andrzej	*Poland*
Kozaryn Radoslaw	*Poland*
Krachak Valeriya	*Belarus*
Łachmańska Joy	*Poland*
Larsson Marten	*Sweden*
Lazar Adela	*Germany*
Linnik Yury	*Belarus*
Lodhia Joshil	*United Kingdom*
Lopes Sara	*Portugal*
Lozekoot Pieter	*Netherlands*
Madeira Márcio	*Portugal*
Makela Jussi	*Finland*
Mäkelä Tuomas	*Finland*
Mani Romel	*Italy*
Mehsood Dawood	*United Kingdom*

Last Name First Name	Country
Meyer Alexander	*Germany*
Mueller Christoph	*Germany*
Nałńcz Tomasz	*Poland*
Nazari-Shafti Mir Timo Zadegh	*Germany*
Nenna Antonio	*Italy*
Ntinopoulos Vasileios	*Switzerland*
Oliveira Joao	*Brazil*
Olivieri Guido Maria	*Italy*
Ortega Zhindón Diego	*Mexico*
Paczkowski Konrad	*Poland*
Park Ilkun	*Korea, Republic of*
Pasare Alexandra	*Romania*
Pavy Carine	*United Kingdom*
Pitoulis Fotios	*United Kingdom*
Poddar Aayush	*India*
Podonyi Anna	*Switzerland*
Provost Bastien	*France*
Radakovic Dejan	*Germany*
Romano Gaetano	*Italy*
Rose David	*United Kingdom*
Rotaru Iulian	*Romania*
Rutkowski Simon	*Germany*
Salazar Hernandez Ignacio	*Mexico*
Salem Razan	*Germany*
Sanad Mohammed	*Egypt*
Schmiady Martin	*Switzerland*
Schneider Bastian	*Austria*
Shadmanian Ali	*Hungary*
Shehada Sharaf-Eldin	*Germany*
Silva Igor	*Brazil*
Spetsotaki Konstantina	*Greece*
Stark Christoffer	*Finland*
Syrjälä Simo	*Finland*
Thyregod Hans	*Denmark*
Tsimashok Valey	*Belarus*
Tytyuk Viktor	*Ukraine*
Vazaios Christos	*Greece*
Vikholm Per	*Sweden*
Weedle Rebecca	*Ireland*
Yim Ivan	*United Kingdom*
Zubair Muhammad	*United States*

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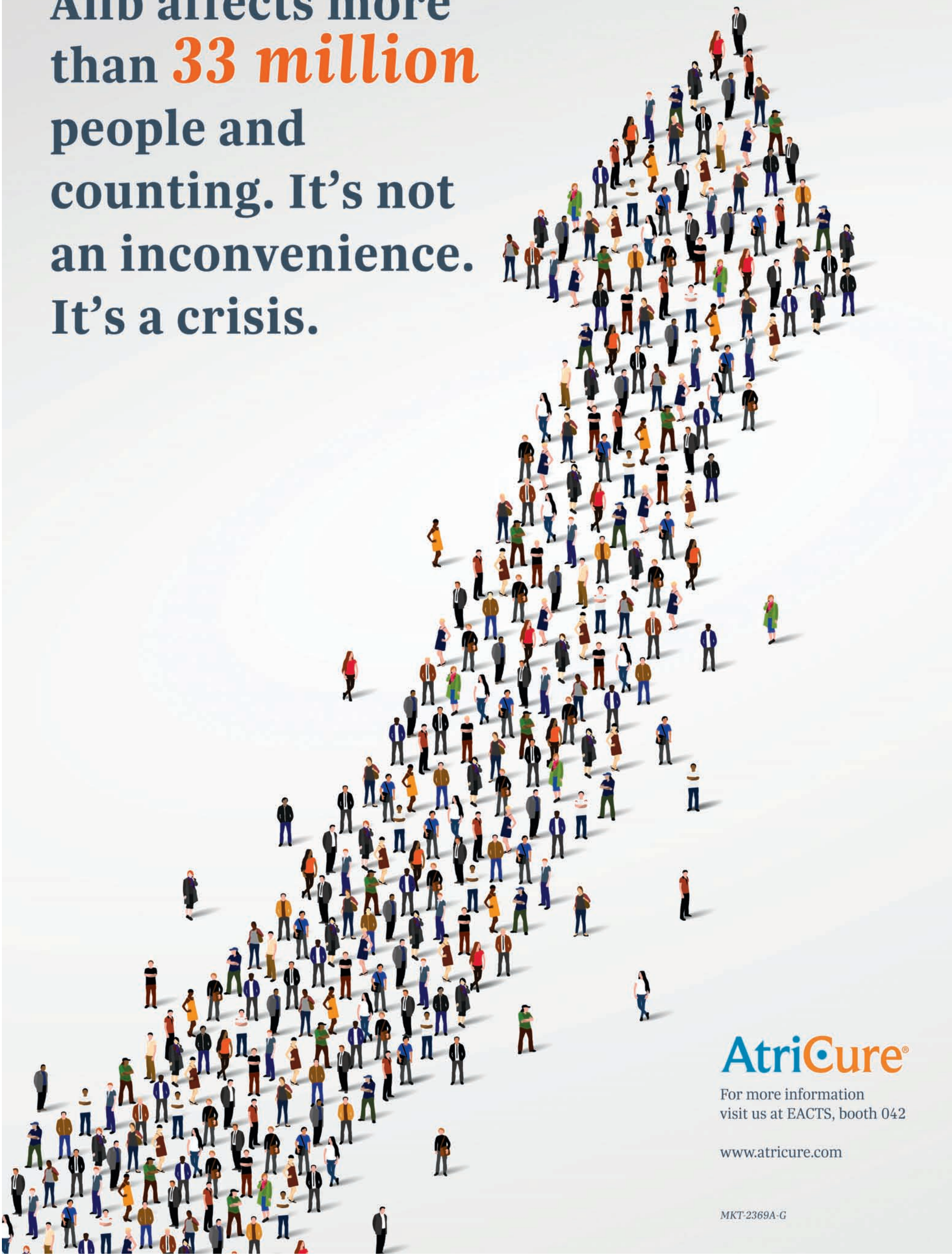

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