Daily News

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EACTS European Association For Cardio-Thoracic Surgery

TECHNO INNOVATION AWARD

The TEVAR App – A contemporary guide to thoracic endovascular aortic repair

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The number of devices used for thoracic endovascular aortic repair (TEVAR) is growing. Stent grafts and their delivery systems' designs differ substantially. The success of TEVAR is based on the correct use of stent graft delivery systems, and on identifying and understanding radiopaque markers and the new stent graft's accurate placement. Not just in the emergency situation, but also shortly before elective TEVAR procedures, it may be helpful to quickly review the instructions on how to use the device to avoid device-related complications. Many centres have more than one kind of TEVAR system at hand. The total number of TEVAR interventions per year, per centre is not always high. The quick and easily accessible information on TEVAR devices may aid those who perform TEVAR, and lower the number of adverse events.

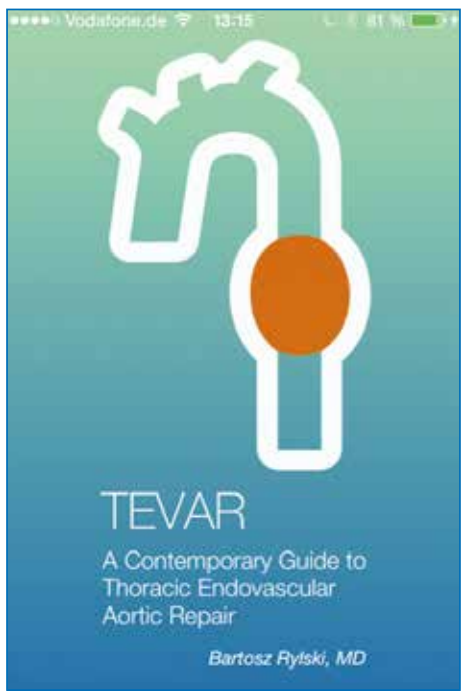

Figure 1. TEVAR App welcome screen.

More and more TEVARs are in fact reinterventions in patients with one or more stent graft prostheses already in place. Understanding what the radiopaque markers mean attached to an already-implanted stent graft is essential when planning and performing a TEVAR reintervention. At present, there is no single data source providing information of this nature on all the common TEVAR devices currently available.

TEVAR App

The TEVAR App is the first app for smartphones and tablets providing information on most of the TEVAR devices currently in use (Figures 1 and 2). Until now, there has been no other similar platform. This app has been developed as a reference tool for TEVAR procedures. It contains summarised instructions together with animations, demonstrating the stent grafts' deployment, as well as troubleshooting information on how to solve unexpected problems during implantation. The TEVAR App includes size tables that illustrate the diameter and length of each stent graft, as well as the outer diameters of the delivery system catheters. There are diagrams of each device showing the locations of radiopaque markers, their shape and meaning. Furthermore, the TEVAR App contains stent graft and delivery system photographs and chest X-rays, designed to help the user to visualise what the stent graft will look like on fluoroscopy. It helps evaluate the immediate result after stent graft deployment in the operating room, and can aid in planning a reintervention in patients with already-implanted stent grafts. The TEVAR App also includes information on magnetic resonance (MR) safety and compatibility, which is important since relatively young patients also undergo TEVAR, and MR (which requires no ionising radiation) is an attractive diagnostic tool in this patient group.

The TEVAR App is cost-free, and its development has not been financed by industry. It is a non-profit project with the aim to educate and help physicians carrying out TEVARs. It is easy to use. Once downloaded on the smartphone or tablet, it requires no internet access. It helps you plan and prepare for TEVAR without having to seek information from different sources. The TEVAR App has been available online since 25 July, 2015 and can be downloaded in the App Store for free by searching for 'TEVAR App'.

TEVAR Calculator

The TEVAR App contains the TEVAR Calculator, which has been designed to assist the surgeon when planning stent graft size according to indicated device, individual aortic dimensions and desired oversizing factors. The TEVAR Calculator suggests the most appropriate stent graft sizes and also provides information on the minimal and true length of the overlapping zone between stent grafts and the factual proximal and distal oversizing factors.

Conclusions

The TEVAR App is a novel guide to thoracic endovascular aortic repair. It provides key information that is quick to access and easy to understand on the thoracic aortic stent grafts currently available.

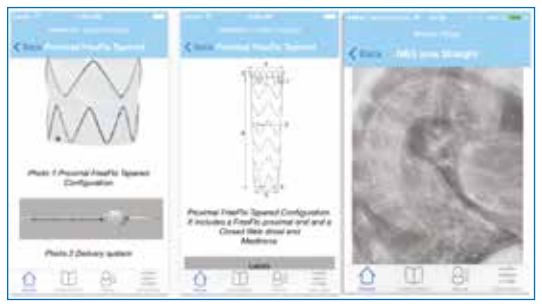

Figure 2. TEVAR App screen shot showing stent graft and delivery system photosgraphs including radiopaque markers and X-ray.

In this issue...

Somahlution, Medistim and Vascular Graft Solutions (VGS) will host a joint satellite lunch symposium **"Optimizing Vein Graft Outcomes for CABG: New Solutions"** on Monday, October 5th. The luncheon will be moderated by Professor David Taggart of the University of Oxford and will cover new intraoperative techniques that better warrant successful patient outcomes and may lessen rates of vein graft failure.

Somahlution is dedicated to providing medical products focused on relieving Ischemia Reperfusion Injury (IRI) to improve healthcare delivery to patients around the world. Somahlution's flagship product, DuraGraft® - an Endothelial Damage Inhibitor™, is first-in-class and the only commercially available product intended for the preservation, storage, and flushing of vascular grafts, a pivotal step in coronary artery and peripheral bypass surgeries. In addition to being buffered, DuraGraft is synergistically designed with components that preserve the overall structure and functionality of grafts whose performance is critical to successful patient outcomes. Professor John Pepper of the Royal Brompton Hospital will discuss the significant clinical outcomes when DuraGraft is used.

Medistim is an innovator and market leader within intraoperative Transit Time Flow Measurement (TTFM) and ultrasound imaging for surgical guidance and quality assessment. Medistim is serving the global market with the devices VeriQ™, VeriQ C™ and the latest generation, MiraQ™. These systems enable medical professionals to reduce risk and enhance quality of cardiac, vascular and transplant surgery.

Dr. Daniel Wendt of West German Heart Center Essen will present their experience with the combined use of TTFM and High-frequency Ultrasound Imaging to ensure successful clinical outcomes.

VGS develops external scaffolds for saphenous vein grafts (SVG) improving their longevity and the clinical outcome of peripheral and coronary bypass surgery. VEST, the company's leading product, is the only available technology that has demonstrated clinical effectiveness in mitigating SVG intimal hyperplasia and improving lumen uniformity and hemodynamics. In use in more than 40 leading heart centers across Europe, VEST offers the cardiac surgeon a hybrid conduit which combines the benefits of venous and arterial grafts. This simple tool, aims to drive a significant change in the clinical outcome of CABG. Prof. David Taggart (Oxford, UK) will present his clinical experience and discuss latest clinical results.

The luncheon will take place Monday October 5th, from 12:45–14:00 in Room E104/105 onsite at the RAI Amsterdam.

Nurses – Postgraduate Course: Quality improvements and innovation

Non-intubated uniportal VATS major pulmonary resections

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Minimally Invasive Thoracic Surgery Unit (UCTMI), Coruña, Spain
Shanghai Pulmonary Hospital, Tongi University, Shanghai, China

The evolution of thoracoscopic surgery to less invasive techniques, such as uniportal video-assisted thoracic surgery (VATS) allows us to consider the possibility of avoiding intubation and general anaesthesia. The choice of a single incision technique in an awake or non-intubated patient could reduce further the invasiveness of the procedure. We consider this to be very important for general intubated anaesthesia in high-risk patients such as elderly patients or those with poor pulmonary function. It is advisable to carefully assess the suitability of patients, especially during the learning process. Expected contraindications for major resections undertaken in awake patients are difficult airway management patients, obesity (body mass index >30), dense and extensive pleural adhesions, haemodynamically unstable patients, ASA >II and large tumours (>6 cm).

We recently introduced in our department the uniportal VATS lobectomy technique in non-intubated and awake patients with excellent postoperative results. The combination of non-intubated or awake thoracoscopic surgery and the single-port VATS technique is promising because it represents the least invasive procedure for pulmonary resections. Thanks to the avoidance of intubation, mechanical ventilation and muscle relaxants, side effects associated with anaesthesia are minimal, allowing most of the patients to undergo a fast protocol, and avoid a stay in an intensive care unit. Moreover, the perioperative surgical stress response could be attenuated in non-intubated patients undergoing uniportal VATS as a result of the reduced postoperative stress hormones and proinflammatory mediators related to mechanical ventilation. Given that only one intercostal space is opened, the use of local anaesthesia and blockade of a single intercostal space is enough for pain control at the beginning and during the surgery (no epidural or vagus blockade is necessary with the single-port approach). A trocar is not used and during instrumentation we try to avoid pressure on the intercostal nerve, thus reducing the risk of intercostal bundle injury. Oxygen (6–9 l/min) is supplied via a facial mask. Standard monitoring must include electrocardiography, non-invasive blood pressure monitoring, pulse oximetry and respiratory rate determination, along with an approximation of the end-tidal carbon dioxide via a catheter placed in one nostril. Pharmacological management is based on a target-controlled infusion of remifentanyl and propofol, with a premedication of midazolam (0.15–0.25 mg/kg) and atropine (0.01 mg/kg) 15 minutes before anaesthesia, adjusting the real-time rate of infusion with the aggressiveness of each period during the surgery. Nebulisation 30 minutes prior to surgery with 5 ml of lidocaine 2% helps to avoid coughing that could be troublesome when performing lung traction and hilar manipulation during dissection. These non-intubated major pulmonary resections must only be performed by experienced anaesthesiologists and uniportal thoracoscopic surgeons (preferably skilled in and experienced with complex or advanced cases and bleeding control through VATS). However, intraoperative conversion to general anaesthesia is sometimes necessary, and the surgical team must have a plan to minimise the risk to the patient. Thus, the anaesthesiologist must be skilled in bronchoscopic intubation, placing a double-lumen tube or an endobronchial blocker in a lateral decubitus position.

Thoracic – Postgraduate Course: Management of acquired tracheal disorders: from stenosis to laceration

Idiopathic subglottic stenosis

Douglas J Mathisen Massachusetts General Hospital, Boston, USA

Idiopathic subglottic stenosis is an uncommon condition predominantly affecting Caucasian women. It has a typical pattern of presentation, often extending over many years. Initially, patients notice some alteration in their breathing which as it progresses can lead to stridor and dyspnoea at rest. Simple X-rays of the neck can demonstrate the narrowing, and spiral CT scans are most valuable in making the assessment. Patients must be carefully screened for any connective tissue disease, autoimmune conditions, or Wegener's granulomatosis. Severe gastro-oesophageal reflux can also lead to conditions similar to this problem. When all these have been excluded, one is left with a diagnosis of idiopathic subglottic stenosis.

Bronchoscopy is an essential component of patients' evaluation, looking for active inflammation and the proximal extent of the problem. There are two theories of how to treat this problem. One is palliative treatment with repeated dilations, lasering, and/or the use of mitomycin C. The second approach is corrective treatment to resect the damaged trachea and perform a single-stage reconstructive repair. We have favoured the later approach. We have now operated on over 300 women with a success rate between 90% and 95%. A vast majority of these patients required a laryngotracheal resection and reconstruction often with a posterior membranous wall flap. Complications have been few and no mortality experienced to date. Risk factors for complications in multivariate analysis were the presence of postoperative oedema and the necessity for steroid treatment. Multivariate analysis showed that the risk factors for the recurrence of this condition were injury or involvement of the vocal cords and the prior use of stents. Recurrence of this condition has been unusual. Early failures are most often technical in nature. Mid to late recurrence seems to be a reactivation of the underlying condition that causes the problem in the first place. Studies are underway to determine the aetiology of this unusual condition and hopefully prevent its occurrence in the future.

Cardiac – Focus Session: Update on the results and rationale and design of ongoing clinical trials

2-year CoreValve US pivotal high-risk randomised trial results

Michael J Reardon The Houston Methodist Hospital, Texas, USA

The CoreValve US pivotal high-risk trial randomised 797 patients at 45 US sites to transcatheter aortic valve replacement (TAVR) or surgical aortic valve replacement (SAVR). The 1-year results showed superior survival for TAVR versus SAVR.[1] This was the first and only time superiority for TAVR over SAVR has been demonstrated in a randomised trial, so the durability of this advantage at 2 years is of great interest. The 2-year results of the trial are now available.[2]

In the 2-year analyses, Reardon et al. looked at factors considered important to the future position of TAVR.

They examined all-cause mortality, stroke, major adverse cardiovascular and cerebrovascular events (MACCE), and valve haemodynamics. Additional analyses on complications were performed. All comparisons were done using a two-tailed log rank test.

The superior survival seen at 1 year with an absolute survival advantage of 4.8% increased to 6.5% at 2 years (22.2% versus 28.6%; *p*=0.04), demonstrating a sustained, durable and increasing survival advantage. Stroke has been a significant concern for both TAVR and SAVR. In this trial, to capture all neurologic events, all patients had a National Institute of Health Stroke Scale prior to their procedure, immediately after their procedure, and at all follow-up points. The modified Rankin Score was collected after any possible neurologic events. Changes triggered a neurologic consultation and appropriate imaging for the most rigorous neurologic evaluation to date when published. The incidence of any stroke for TAVR versus SAVR was 10.9% versus 16.6% (*p*=0.05) with a strong trend in favour of TAVR. Major stroke for TAVR versus SAVR was 6.8% versus 9.8% (*p*=0.25). The rate of MACCE, which was superior for TAVR versus SAVR at 1 year with an absolute advantage of 6.5% (20.5% versus 27.0%), increased its advantage at 2 years to 8.9% (29.7% versus 38.6%; *p*=0.01) for sustained, durable and increasing superiority. Core lab derived echocardiographic flow parameters of valve area and mean gradient were superior for TAVR at every time point post-treatment. Paravalvular leak as expected was less in SAVR versus TAVR at 2 years (0.6% versus 6.1%).

Extensive sub-group analysis that included age, sex, body mass index, Society of Thoracic Surgeons Predictor of Mortality (STS PROM) greater than or less than 7%, left ventricular ejection fraction, hypertension, previous coronary artery bypass grafting, peripheral vascular disease and diabetes mellitus, favoured TAVR in every group. Of interest to me as a surgeon were the patients with an STS PROM of <7%. In the higher-risk groups a surgeon can perform a perfect SAVR, but the patient may succumb to other comorbidities or frailty that prevents recovery from major surgery. As we move down the risk scale this should be less of a problem and the ability of TAVR to compete with SAVR should diminish. At 2 years the absolute survival advantage of TAVR over SAVR in the group with STS PROM of <7% was 11.3% (log rank *p*=0.01), which makes the results for the current randomised intermediate risk trials of great interest.

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Cardiac – Focus Session: Safer surgery for who?

Open the box?

Bertie Leigh EACTS Solicitor

Of man's first disobedience, and the fruit
Of that forbidden tree, whose mortal taste
Brought death into the world, and all our woe

The last word of each of the first three lines of John Milton's *Paradise Lost* encapsulate the creation myth that unites the Judaic, Christian and Islamic traditions. The forbidden tree was the tree of knowledge, so this myth is a challenge to doctors who believe that all knowledge is good.

Lawyers know that half of us must lose all the cases that go to trial. If doctors are sued you may seek out one of the lawyers who wins all their cases, but lawyers know that such people should be avoided. They take good care not to fight cases that could go either way, to ensure their statistics will continue to glow at the expense of your reputation and your indemnifier's bank balance.

If I fall ill tonight with a dissecting aortic aneurysm I hope I will be carried swiftly into a hospital where one of you will be kind enough to take charge of my case. You may decide that my chances are pretty bleak and a sensible surgeon who has an eye on his own survival may well refuse to operate. My death will not appear in his statistics and he will be paid just as much for going back to bed as he would be for staying up all night, fighting to save me. If his senior colleague is on duty, a man within sight of retirement whose statistics are so good that he can afford the risk, he may be more likely to have a go and if we are both very lucky I will survive.

It is of course true that the EuroSCORE II offers some protection to us both. But it ignores the fact that the usual anaesthetist, perfusionist and scrub nurse are away on leave or have been stricken with bubonic plague.

Even worse, the mortality does not attempt to distinguish those who die in ICU as a result of events that have nothing to do with the surgeon. Still they are all attributed to the surgeon – 'even if he falls down a lift shaft' as one of you complained to me.

Lawyers have a rule that evidence is not admissible where the judge accepts that its prejudicial significance outweighs its probative value, and that may be the question here. In Britain we still cannot agree: some say it is making it much harder for some people to get surgery and young doctors are choosing safer specialties. Others that patients are not denied surgery because EuroSCORES are going up and that mortality is going down – there is a sort of Hawthorne effect because surgical data are being scrutinised. Critics say that the only things being pushed up by the Hawthorne effect are the EuroSCORES.

This concerns doctors outside the UK and USA because there is a second creation myth, that our woes are to be attributed to the opening of Pandora's Box. You will remember that once this was opened it could never be closed.

Those who get up early on Sunday 4 October can come and join in the debate about what to do with data that can now be collected. Sir Bruce Keogh, a former Secretary-General of EACTS and now one of the leaders of the NHS, says that if you do not know what your own results are then you have no right to operate. Does it follow that you must also publish them to the world?

Cardiac – Postgraduate Course: Extracorporeal life support devices and strategies for management of acute cardiorespiratory failure

Percutaneous or surgical cannulation?

Roberto Lorusso
Maastricht University Medical Center, Maastricht, the Netherlands

Extracorporeal life support (ECLS) is increasingly used in the presence of cardiac arrest, acute refractory cardiac dysfunction, severe respiratory distress syndrome, or concomitant significant cardiorespiratory compromise. Implantation of ECLS cannulae is a critical aspect of the clinical situation, the indication, type of support, and therapeutic strategy (bridge-to-recovery, bridge-to-transplant, bridge-to-bridge, bridge-to-decision, or bridge-to-destination therapy). Furthermore, new indications (sepsis, trauma, poisoning, and others) are providing new clinical scenarios and needs while planning ECLS with impact on type and modality of cannulation and access.

Historically, open surgical access, except veno-venous ECMO, was the most frequent mode of implant. Recent scenarios, mostly due to increased used in emergency situation, improved cannula design, and appraisal of sufficient support with reduced sizes, like 15 French-size,[1,2] have pushed forward the application of ECLS through a peripheral percutaneous approach by means of Seldinger technique.

Although percutaneous cannulation is preferred for cardiac arrest patients, controversy remains as to whether to favour percutaneous implantation, generally taking advantage of existing indwelling arterial and/or venous introducers applied in the catheterisation laboratory, or directly exposing femoral vessels to provide better view and control, particularly in relation to distal limb perfusion. Furthermore, cannulation not only accounts for types of cannula and vascular access, but also relevant issues like increased left ventricular afterload due to retrograde arterial flow with reduced left ventricular unloading (endocardial ischemia and risk of thrombus formation), and reduced coronary and brain oxygenation (Harlequin syndrome). Percutaneous access, usually at the groin or at the neck (mostly pediatric), has several advantages (less bleeding, better haemostatic control, reduced infective complications, Seldinger technique). But several disadvantages (severely calcified vessels, puncturing the vessel during cardiac massage, distal femoral artery perfusion) should not be underestimated, with 20% of patients experiencing major vascular complications.[3] If introducers and sheets are already in place at the moment of ECLS indication and positioning, the percutaneous approach should be contemplated and is preferable. In contrast, if no other vascular lines are present or cannulated, a surgical cut-down might be advisable, particularly during external cardiac massage.

Central cannulation (aortic or axillary artery) is usually used for open-heart surgery patients or in cases of unacceptable hypoxemia of the upper part of the thorax. The axillary artery is also used as potential access for shifting from ECMO to VAD configuration with an outflow cannula positioned in the left atrium trhough a transatrial approach, or in the left ventricular apex. In addition, it might be a good approach should peripheral access not be feasible, or in case of a marked high flow ECLS (septic shock) be required.

Percutaneous cannulation is, obviously, the first choice, for venous canulation (VV or VA ECMO), also in the case of large double-lumen cannulas. The use of echo or fluoroscopy guidance is certainly of great help for percutaneous arterial and venous cannulation.

In post-cardiotomy applications, even if central cannulation is already present, bleeding in these circumstances might be a major shortcoming, and a critical determinant for patient outcome. For these reasons, peripheral approaches might be considered, with axillary artery as a subsequent option, allowing the chest closure. The use of an end-to-side graft for inflow cannula, instead of direct cannulation, has been proposed for axillary or femoral artery cannulations to avoid distal limb ischaemia, but the occurrence of hyperperfusion and related compartmental syndromes should not be underestimated.[4]

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Inside Amsterdam

WHERE TO GO AND WHAT TO DO?

Stuart Head

GO TO

Vondelpark

The largest park in Amsterdam is the Vondelpark. A beautiful park where you can have a walk from between 30 minutes to about 2 hours. In the summer it is completely packed, but you will always find a nice place to sit or sip a coffee at one of the 4 restaurants/bars/coffee shops.

ACTIVITY

Concertgebouworkest, Royal Concert Orchestra Amsterdam

Every season, the RCO performs a requiem in the autumn, a tradition established back in 2010 to provide a moment of reflection. This year, the orchestra turns its attention to Gabriel Fauré's soothing requiem.

Sunday 4th October 2015
At the Concertgebouw, Jacob Obrechtstraat 51, 1071 KJ Amsterdam
http://www.concertgebouworkest.nl/
Phone +31 (0)20 3051015 (weekdays from 9.00 am - 12.30 pm)

MUSEUM

Stedelijk

Also at the Museumsquare just like Rijksmuseum and Van Gogh Museum, is the newly renovated Stedelijk Museum. If you are a fan of modern art, this is the place for you to go.

SWEET SNACK

Poffertjes

A real Dutch classic, you cannot leave the Netherlands without trying it. You can eat it in a number of places, but one of the best seems to be 'The Four Pillars'.

Located at Stadhouderskade 11.
Or go to 'Café Prins' which is at Prinsengracht 124

RESTAURANT

Envy

Sit down and enjoy a 4 or 5 course fusion dinner in a modern place in the middle of the city. From the same owners as the wine bar 'Vyne' and walking distance from each other.

Located at Prinsengracht 381

BAR

Vyne

Enjoy a good glass of wine? Go the Vyne for a tasting.

Located at Prinsengracht 411

RESTAURANT

Café Modern

It will seem like a journey to get there from RAI, but you go through the centre of Amsterdam and explore the most upcoming neighbourhood, the North. You even have to take the free ferry for <5 minutes to go here, a real Dutch experience. The menu at Café Modern is set for the evening, so no need to think about what to order. A great culinary experience.

Located at Meidoornweg 2

ACTIVITY

Soccer Ajax

One of the most anticipated soccer matches of the year in the Netherlands, one of the yearly 'Classics', is played Sunday October 4th in the Amsterdam Arena: Ajax – PSV. Will PSV be able to close the gap in the fixtures to relegate their championship or will Ajax after a few years of domination again take over?

Introducing

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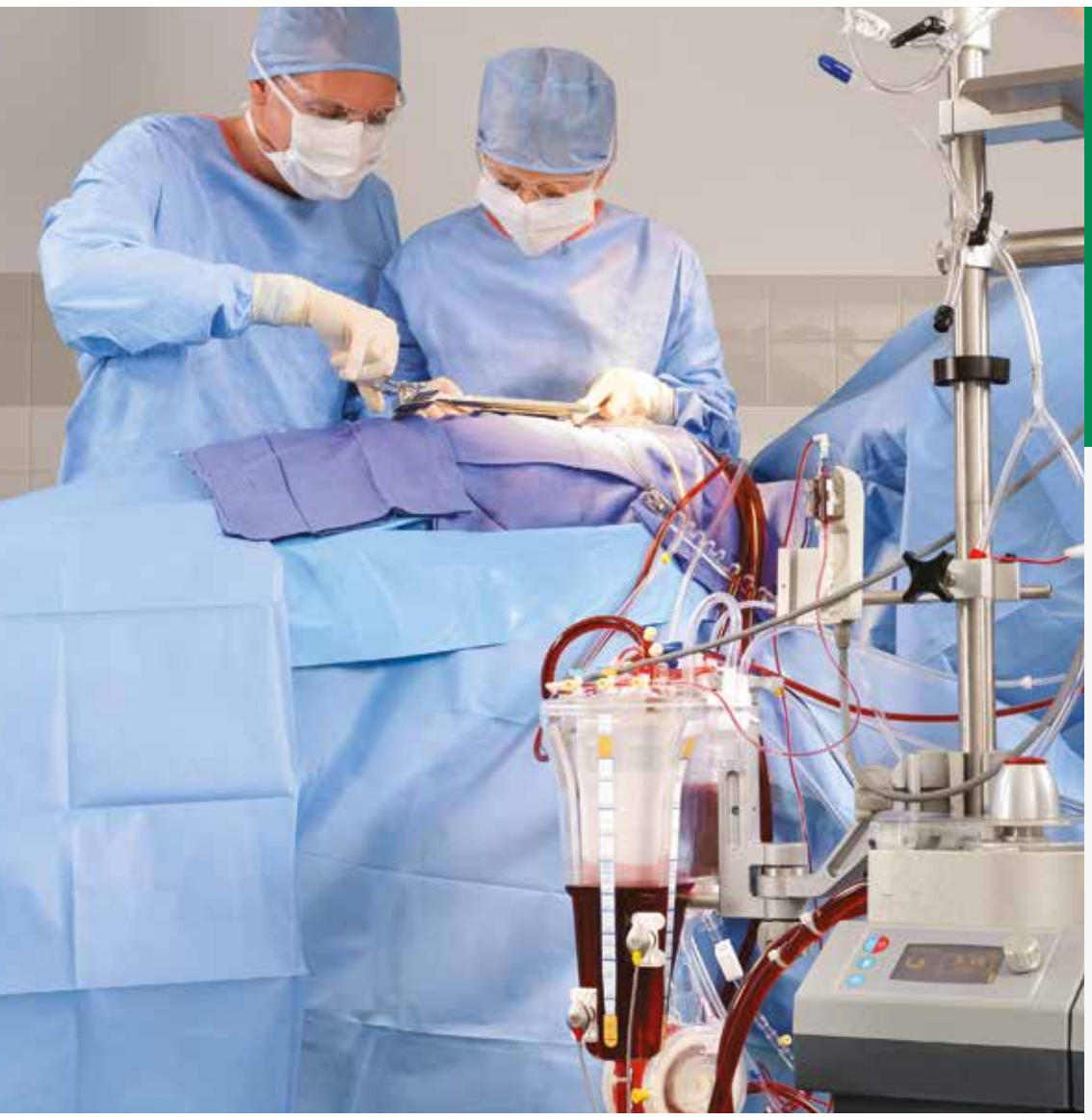

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Expanded patient range.

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Reference: [1]Internal testing.
CE Mark Pending

TERUMO

Cardiac – Focus Session: Women in cardiac surgery

Women in cardiac surgery: view from the United States

Ourania Preventza
College of Medicine, Houston, Texas, USA

The profession of cardiothoracic surgery, traditionally viewed as a male preserve, has a heritage of female surgeons that goes back to Greek myths and ancient Egyptian temple walls.[1,2] Dr Mary Edwards Walker, who was only the second woman to graduate from a US medical school (in 1855), became America's first female surgeon.[3] In 1943, Myra Adele Logan, who graduated from New York Medical College in 1933, became the first woman to operate on a human heart.[4] In 1961, Drs Nina Starr Braunwald, Ann McKiel, and Nermin Tuttunji became the first women certified by the American Board of Thoracic Surgery (ABTS), which had been established 13 years earlier. By 2011, a total of 200 female cardiothoracic surgeons had been certified by the ABTS.[5] Unofficial data show that this number increased to approximately 274 in 2015. Among the Accreditation Council for Graduate Medical Education (ACGME) thoracic surgery residents and fellows in the United States in 2013, 20.2% (63/312) were female, as compared to only 17% in the 2010–2011 academic year.[6] On average, these women undergo 9.1 years of training, and more than half receive additional non-ACGME training.[5]

With regard to subspecialties, women compose 3.4% of adult cardiac surgeons, 5.2% of congenital cardiac surgeons, and 7.9% of general thoracic surgeons.[7] Among the 4520 active practicing thoracic surgeons in the United States in 2013, 248 (5.5%) were female.[6] More than half of the female cardiothoracic surgeons in the United States have entered the profession since 2000, an indication of the current female workforce's youth. According to a questionnaire study conducted in 2010, increased subspecialisation, longer training, greater educational debt, and inadequate institutional support were major sources of discontent among female cardiothoracic surgeons.[5] Despite the increasing number of women entering the surgical field, women are advancing to leadership positions in academic surgery at a slow rate. This slow advancement and underrepresentation may influence their career choices.

Female cardiothoracic surgeons have come a long way, but we cannot rely on serendipity to increase the number of women in cardiac surgery. Everyone needs a mentor. Young women interested in science should be encouraged to pursue a career in cardiothoracic surgery. Women need to see other women at the podium. They need a supportive environment where achieving a work-life balance doesn't require tremendous effort. In a male-dominated field, they need to be able to communicate effectively, to feel that they can fit in, and to be given leadership opportunities.

The role of women in cardiothoracic surgery in the United States has expanded despite the barriers described here. Women have demonstrated that professional success and work-life balance are possible when you pursue a career you truly want. You just have to make it happen.

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Cardiac – Rapid Response: Aortic valve substitutes: the long-term view

Long-term follow-up after implantation of Shelhigh® aortic valve conduit

David Reineke University Hospital Bern, Switzerland

Under the lead of David Reineke and Abdul Kaya, the Departments of Cardiovascular Surgery at the University Hospital Bern, Switzerland (T Carrel) and Cardiothoracic Surgery at the St Antonius Hospital, Nieuwegein, Netherlands (W Morshuis) joined forces to combine their substantial data on the Shelhigh® No-React® biological aortic valved conduit.

Starting in the late nineties, both centres implanted this complete biological conduit liberally as initial haemodynamic and short-term data proved to be favourable.[1] However, conflicting clinical results occurred during the further clinical follow-up period, with patients requiring urgent and extensive reoperation after disintegration of the graft and rupture of the aortic root.[2,3]

The issue of a preliminary public health notification by the FDA on possible contamination and malfunction of devices manufactured by Shelhigh Inc. led to the use of this biological conduit being discontinued in 2007.

The study group is glad to present a complete long-term follow-up of 291 consecutive patients receiving the Shelhigh® No-React® biological aortic valved conduit in elective and emergent operations between 1998 and 2007. The operative mortality was 10%, with the main cause of death being cardiac. The follow-up study was conducted on 262 survivors, 126 (44%) of whom had died at the time of the study with a mean follow-up period of 70 months. The main causes of death were cardiac (14%), neurologic (6%), respiratory (5%) and endocarditis (5%). Reoperation was required in 25 patients (9%) due to endocarditis, aorto-ventricular disconnection, pseudo-aneurysm formation and structural valve degeneration.

While the Shelhigh® No-React® aortic valved conduit showed satisfying short-term operative results, long-term data confirmed conflicting mid-term results with pseudo-aneurysms, aorto-ventricular disconnection and sterile abscesses. Long-term follow-up revealed worrisome re-operation and death rates.

An extensive histologic work-up revealed a product-specific immune response limited to the first years after implantation, with a high proportion of failure due to graft disintegration.[4]

After a certain period of time, failure of the graft in the form of aorto-ventricular disconnection combined with sterile abscess formation seems to become less frequent. This could be due to immunogenic response being limited to the first years after implantation. The mode of failure then seems to be replaced by typical structural valve degeneration, where treatment can focus on the calcified valve.[5]

The secondary procedures were technically demanding, therefore we recommend a close follow-up of patients with the Shelhigh No-React® aortic valved conduit.

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Cardiac – Professional Challenge: Challenges in mitral valve repair: part I

How to handle systolic anterior movement after mitral repair

Manuel Castellá Hospital Clínic, University of Barcelona, Spain

Systolic anterior motion (SAM) of the mitral valve is a displacement of the anterior leaflet towards the outflow track of the left ventricle (LVOT) during systole, provoking from almost no alteration to severe haemodynamic compromise by mitral regurgitation and/or LVOT obstruction. It is considered mild when LVOT obstruction is absent and MR negligible; moderate when LVOT maximum pressure gradient ranges between 20 and 50 mmHg, MR is mild to moderate, or both; and severe when LVOT maximum gradient is over 50 mmHg, MR is severe, or both. Although initially thought to be typical of hypertrophic cardiomyopathy, SAM is a typical complication of mitral repair, ranging from 7% to 11% of cases. There are risk factors dependent on the patient, most commonly in myxomatous disease, leaflet prolapse or flail with ruptured chordae. Patients with ischaemic mitral regurgitation or rheumatic heart disease are not considered at risk for SAM after repair. Also, narrow angulation between the aortic and mitral planes, a bulging subaortic septum and a hyperdynamic small left ventricle are risk factors for SAM.

Predisposing SAM technical factors include a small annuloplasty ring relative to the area of the anterior mitral leaflet, and excessive posterior leaflet tissue that pushes the line of coaptation between leaflets towards the LVOT (Figures 1 and 2).

There is increased evidence that SAM weaning from bypass should be initially managed with medical interventions. The initial steps are directed towards increasing preload and afterload, maintaining mean arterial pressure over 80 mmHg and avoiding inotropes and tachycardia. If these measures control SAM, with disappearance of mitral regurgitation and LVOT gradient less than 50 mmHg, there is a high probability that SAM will not reproduce in the postoperative period, or that it could be easily controlled with temporal β-blockers. If mitral regurgitation and/or significant LVOT obstruction persist despite the initial haemodynamic manoeuvres, and despite some evidence that adding β-blockers in the operating room might control SAM, our experience is to resume cardiopulmonary bypass and re-check the repair technique. Surgical strategies to address SAM include replacing the ring with a larger size, performing a slide-plasty in quadrangular resections of the posterior leaflet larger than 1.5 cm, downsizing the height of the posterior leaflet to 1.5 cm, or, in case of neo-chordae, shortening the chordae to posterior leaflet and the longer chordae of the anterior leaflet to bring the line of coaptation towards the posterior leaflet, forming a 'smiley' shape.

SAM should be sought and discarded if a mitral-repaired patient does not have a haemodynamically correct postoperative period. If detected, β-blockers and fluid therapy should be initiated, and diuretics and inotropes should be avoided, while trying to maintain high arterial pressure. If symptoms are not controlled, the patient is haemodynamically still unstable or echocardiographic signs of SAM persist, early reoperation is highly recommended.

Of special interest are recent reports of long follow-up comparing patients presenting no SAM with patients in which SAM was successfully managed with haemodynamic manoeuvres. Evidence supports conservative management, being associated with good late clinical and echocardiographic outcomes, with no differences in mitral regurgitation or need for reoperation between groups.

Two cases of posterior prolapse with good water test:

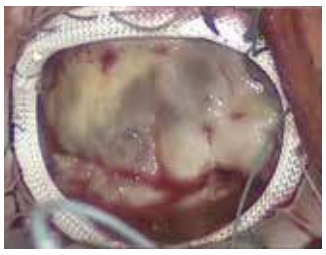

Figure 1. Triangular resection and closed annuloplasty ring. Good height of the posterior leaflet, drawing a 'smiley' line of coaptation.

Figure 2. Posterior prolapse managed with two neo-chordae and an annuloplasty ring. Good function on the water test, but at high risk for SAM, since the line of coaptation is too close to the LVOT. Neo-chordae need to be shortened to bring the line of coaptation towards the posterior leaflet.

Cardiac – Focus Session: Safer surgery for who?

Results under scrutiny. Can we train safely?

Eduard Quintana University of Barcelona Medical School, Spain

Cardiovascular surgery is probably the one medical specialty that has been more prone to outcome judgement since its birth. There is no paralleled scrutiny of results in other fields of medicine. Death and poor outcomes may be related to an inappropriate indication, a not perfectly executed operation or to other errors across the process including during the pre- and post-operative periods.

The cardiovascular surgery community has developed tools that are very helpful to stratify the risk of a planned operation. Pre-operative risk stratification scores (e.g. EuroSCORE II) were designed to predict the risk of death following heart surgery. These are important tools to establish common language and allow detection of poor individual or institutional performance. Undoubtedly, these scores have been instrumental in creating a league of competition among surgeons. Unfortunately, this competition does not always translate into a benefit for patients. For example, it is well known that certain individuals are less prone to offer high-risk surgery threatened by public reporting of outcome data.

Positive as it may be, scrutiny of surgical outcomes poses a new challenge for surgeons responsible for training the next generation. The aforementioned differences in clinical practices, patient risk profiles and intense scrutiny of outcomes have an impact on training. The rationale is affected in both directions: practice is kept low risk to ensure almost no-mortality and no complications, on the other hand, practice is too high risk to allow performance… the perversity of modern medicine potentially affecting trainees.

Furthermore, patients often request that their surgery is not performed by the trainee. Obviously certain operations cannot be fully executed by surgeons in training, but parts of procedures can be performed adequately under supervision. We should be sound and clear against this sort of request from patients in academic environments where knowledge and learning has to be guaranteed. Results should by no means be compromised if a trainee is performing a certain procedure, and this can almost always be achieved by absolute surveillance and assistance. Trainees should have negligible mortality and this requires a great deal of judgement from the consultant selecting the case and overseeing the procedure.

Although some may argue against, training in our field has to be delivered in a holistic way. It has to engage emotional surgical education, clinical knowledge, surgical skills and surgical behaviour, ethics and so on. The European Working Time Directive has received extensive criticism, because it definitely has a negative impact on training. Now we have to train 'supposed-to-be better' surgeons in less time, able to perform more complex operations and with superior predicted outcomes. On the contrary, complexity of surgical procedures and exigency in quality outcomes beyond mortality is increasing. Are these two factors going to condition the relationship of your trainee with the procedure? The vast majority of us would agree: yes.

It is becoming clear that limited clinical time to acquire certain skills, together with the need to learn highly complex procedures, will require additional support and training through the use of simulation-learning approaches. However, this can only complement training to facilitate faster escalation in the clinical arena, it cannot replace real surgery.

There are several extremely good surgeons with excellent outcomes but with near-zero engagement when it comes to training, due to the fear that outcomes will be compromised. Undeniably, teaching positions are not suited to every surgeon. The academic surgeon scrubs and assists the student. Nowhere is this more important than in the field of cardiovascular surgery, where a misplaced suture or an improper incision can lead to serious consequences. The academic surgeon accepts responsibility for all mishaps or in other words: gives credit and takes the blame. This is the huge responsibility that we, as cardiovascular surgeons, must accept to enable us to successfully pass the torch on to the next generation.

EACTS
European Association For Cardio-Thoracic Surgery

Meeting EACTS – National Societies

Date: Tuesday 6 October 2015

Time: 16:15–17:15

Venue: Room G108 – Auditorium Building (1st floor)

RAI Congress Centre – Amsterdam (The Netherlands)

Agenda

1. **Welcome and introduction (M Grabenwöger)**
2. **EACTS QUIP (D Pagano)**
   - 2.1. Database
   - 2.2. Benchmarking tool
3. **Training and education (A Kappetein)**
   - 3.1. Courses
   - 3.2. Skills programme
   - 3.3. Portfolio
4. **Clinical guidelines (M Sousa Uva)**
5. **Adjournment**

Cardiac – Postgraduate Course: Perfusion: haemostasis and fluid management

Fluid replacement in ECC: crystalloid versus colloids

Torsten Doenst University of Jena, Germany

Administration of intravenous fluid is one of the most common interventions in the management of patients undergoing cardiac surgery with extracorporeal circulation and also in the intensive care unit. Broadly, such resuscitation fluids can be divided into colloids and crystalloids. Colloids are preferred because short-term clinical studies suggested that they result in faster haemodynamic stabilisation and better cardiac performance than crystalloids, and that 3–4 times less volume was required to achieve the same haemodynamic endpoints. It is expected that lower fluid requirements result in less positive fluid balances and reduced tissue oedema, and therefore improved patient outcomes.

Hydroxyethyl starch (HES) is the most widely used colloid. However, Cochrane and other groups failed to identify data that prove the superiority of one type of crystalloid or colloid over another. Recent evidence from randomised controlled trials and meta-analyses suggests that the use of high and medium molecular weight (200 kD) HES may result in an increased incidence of renal failure and that the volume-sparing effect of colloids is <50%. Last generation 6% HES 130/0.4 is perceived to have an improved safety profile, but the clinical data in support of this claim have also been questioned. In addition, both crystalloids and modern HES preparations are available as chloride and sodium rich 'unbalanced' and 'balanced' preparations, which are low in NaCl but high in lactate or acetate. 'Unbalanced' fluids may result in metabolic acidosis, 'balanced' fluids may cause severe alkalosis.

The discussion on the associated benefits and harms of these fluids has been intense over the past few years, but the evidence is mainly based on studies that do not primarily include cardiac surgery patients or even address the effect of these fluids with the use of ECC. This presentation will address the evidence specifically in the context of ECC use and cardiac surgery.

We will conclude that a prospective randomised trial is necessary in this field, because it is the perception of many that colloids are beneficial, but neither benefit nor harm has been clearly demonstrated. It is important to establish this however, because a large group of patients are affected worldwide.

Cardiac – Postgraduate Course: Perfusion – Improving perfusion

Wound infections in cardiac surgery – What should perfusionists know?

Tomas Gudbjartsson University of Iceland, National University Hospital

This state-of-the art presentation, primarily aimed at perfusionists, but also of interest to practising surgeons and nurses, will review the evidence on prevention and treatment of surgical site infections (SSIs) following open heart surgery, with special focus on advances in treatment, especially negative-pressure wound therapy (NPWT).

Wound infections are common complications following open heart surgery, occurring at the site of sternotomy and following vein harvesting. Other surgical site infections (SSIs), such as infections around cannulation sites in the groin or after radial artery harvest, are much less frequent. Late infections, which can result in formation of sternocutaneous fistulas, are encountered less often, although they often represent a complex surgical problem, involving several hospital admissions, prolonged antibiotic treatment and repeated wound debridements.

Finally, SSIs occurring at the vein harvest site are often problematic and associated with significant patient morbidity and high costs for the healthcare system.

Fortunately, most sternal wound and leg vein harvest infections are superficial and respond to minor wound debridement and antibiotics. However, 1–3% of patients develop deep sternal wound infections. These are among the most significant complications seen after open heart surgery, resulting in increased morbidity and prolonged length of hospital stay for patients. Deep wound infections of this nature can sometimes be fatal and are associated with significantly increased hospital costs. In our presentation, the current literature on established risk factors of sternal wound infections (LIMA harvest, diabetes, smoking etc.) will be reviewed, together with the more debated risk factors such as the use of bilateral internal mammaries (BIMA) for coronary revascularisation. Prophylactic measures for sternal wound infections will also be covered, including the appropriate timing and dosage of antibiotics, use of gentamycin-sponges, sternal wire closure techniques and chest stabilisers. The pros and cons of NPWT will be reviewed and the physiological principles behind this novel treatment explained.

Finally, advances in the treatment of late sternocutaneous fistulas and prophylactive measures for leg vein harvest SSIs, such as use of triclosan-covered sutures, will be discussed.

The take-home message is that the knowledge of SSIs following open heart surgery has increased over the past decades, and much is now known about the pathogenesis, prevention and treatment. Furthermore, in modern open heart surgery practice, the rate should be low and when an infection arises, the measures should be swift and effective. Importantly, by using state-of-the-art techniques, mortality due to SSIs should be close to zero. Prophylactic measures should remain a priority, however, because the long-term survival of patients with complex wound infections is negatively affected regardless of treatment used.

Vascular – Postgraduate Course: Basics in proximal thoracic aortic surgery: session 2

Is there a place for TEVAR in the ascending aorta?

Ali Khoynezhad
Cedars-Sinai Heart Institute, Los Angeles, USA

Image-guided therapeutics and thoracic endovascular aortic repair (TEVAR) has become the standard of care for most patients with descending thoracic aortic pathologies. In fact, many patients with distal aortic arch aneurysm or thoracoabdominal aortic aneurysm are treated using endograft – especially if they are deemed poor surgical candidates. This is due to morbidity and mortality rates and the protracted recovery associated with open repair of distal arch and thoracoabdominal aorta. Compared with open repair, TEVAR has been shown to have lower neurological complications, lower mortality rates and shorter recovery time.
Concerning the ascending aorta, open aortic root and ascending aortic replacement, with or without hemiarch replacement for aneurysmal pathology, currently demonstrate extremely low mortality (in single figures). How can TEVAR compete with such stellar outcomes? Especially when the long-term follow-up of open ascending aortic surgery is already established. TEVAR, by comparison, has a limited record of longevity and follow-up, and there is also presently a lack of dedicated devices for ascending aorta. However, it is foreseeable that dedicated ascending stent grafts, operated by experienced endovascular specialists (which must include cardiothoracic surgeons), in morphologically-suitable patients, will become the preferred approach for high-risk sub-groups such as type A aortic dissection and surgical turn-downs. Furthermore, branched graft technology will allow for an endovascular approach to the ascending aorta and aortic arch, while the marriage of transcatheter aortic valve replacement (TAVR) and TEVAR could expand the treatment options to include both the aortic root and the ascending aorta.
The use of TEVAR in the ascending aorta is the next frontier in the less-invasive treatment of patients with aortic pathologies. Given the morbidity and mortality rates associated with open repair in elderly patients with multiple comorbidities, we believe ascending aortic stent grafting could represent a ground-breaking technology in a subset of patients. Endovascular treatment of ascending aortic lesions has been reported in the literature using off-label stent grafts, but this is the first physician-sponsored investigational device exemption (PS-IDE) by the Food and Drug Agency (FDA) dedicated to ascending stent grafts in this location, to analyse safety, feasibility and the critical factors involved.
This pivotal PS-IDE study's primary focus is on safety and good patient outcome; it is not about numbers. A total of 39 patients were screened for the study, but only six were enrolled. It is expected that the results of this PS-IDE will influence future feasibility studies involving the ascending aorta, particularly in the US.
The preliminary evaluation of endovascular treatment for ascending aortic pathologies demonstrates uniform accuracy of deployment and secure fixation for up to 1 year. There is positive remodelling of the excluded aortic segments, as has been observed in the descending aorta. However, because of the severe aortic/cardiac angle encountered in some patients, approval to utilise transapical access for device deployment has been granted by the FDA, indicating that it will be used in further patients where needed. Transapical approach is especially favourable and should improve outcomes in patients with horizontal aorta or with acute type A aortic dissection.

Cardiac – Focus Session: Women in cardiac surgery

Woman and a migrant: a double disadvantage. Tips to succeed

Indu Deglurkar University Hospital of Wales, Cardiff

It has been a long and hard journey. Having decided to become a cardiac surgeon at the age of seven adoring Michael DeBakey most of my life, I learnt that I had to qualify as a doctor to achieve those goals. Since arriving in the UK and it has been a saga of emotional, financial, physical and mental endurance. I had only one contact in the country, with no family or friends. At my very first interview for a position in cardiac surgery as a junior doctor, I was categorically told by the consultant on the interview panel that I was better off doing something else, because there were practically no women in the field of cardiac surgery. I calmly stood my ground and expressed surprise at his views, especially after travelling 7000 miles west from India. Even in India, we have female surgeons in most specialties. To my astonishment I was offered the job. I rejected it at first because I felt uncertain about working in a place where people had such views about women surgeons. However, I was very serious about my intention to become a cardiac surgeon and eventually decided I would accept the position; a decision I have never regretted since.
After my basic surgical training, I joined the National Training Programme competing against 72 male applicants. It was a milestone. As a lone female crusader in most departments, I was surrounded by challenges. A migrant faces a 'triple jeopardy' of racism, sexism and immigration status. Not once did I encounter a female role model in the surgical profession during my training. However, with one or two exceptions, I received excellent support from the majority of consultants I trained under.
The challenges of integration in a new, vastly different and somewhat prejudiced society, where everyone is polite and decent, but where a strict closed-door policy is the norm was quite daunting. Beating the odds of culture, language, gender relations and different types of education, whilst creating and seizing every opportunity, was quite a task. I was the first female, Asian cardiac surgery trainee in Wales in a specialty where women were non-existent. There were no career development resources with fundamental information relevant to female surgical trainees.
Racism and sexism are less overt nowadays and issues facing women go beyond discipline and practice type. Mentoring, leadership roles and administration are challenges confronting women as they seek to advance in a changing field that is still predominantly populated by men. It is of utmost importance to realise that a field consisting predominantly of men does not mean that it is male dominated! On the contrary, women who take up surgical specialties are inherently capable of 'leading the troops' in a uniquely feminine manner and can cohesively bring together different personalities to form a successful team.
We have been doing this from time immemorial. As women, we must cherish the fact that our 'x' genes are unique to us and there is no need emulate masculine behaviour to fit into a predominantly male environment. Instead, let your department adapt to your style of practice and leadership.
Combining a family with career advancement was a challenge with no regulation of working hours. Family support is vital. They make huge sacrifices and are the pillar of support when one is emotionally and physically exhausted. For a woman to succeed in cardiac surgery, it is not just sufficient to have the surgical skills and ability to handle intense pressure calmly. It takes courage, unwavering focus, stamina, persistence, patience and the ability to stand your ground.
The path behind me has been long and difficult, but the path ahead is longer still, as the goal posts and definition of success change constantly, but attitudes remain the same.

Indu Deglurkar with Dr DeBakey: a dream come true.

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Valve choice for patients under 65: the surgeon's role when moving towards shared decision-making


Ben Bridgewater

The paper published by Bourguignon et al. in The Annals of Thoracic Surgery documents the 20 year outcomes of 2659 Edwards PERIMOUNT valves implanted in the aortic position. The highlights include an expected valve durability of 19.7 years for all age groups and freedom from reoperation due to structural valve deterioration (SVD) of 98.1±0.8% at 15 years in patients older than 70 years at the time of implantation.[1] A follow-up paper focusing on patients younger than 60 years at time of implant demonstrated that expected valve durability remained above 17 years.[2]

Given such a low incidence of SVD and solid hemodynamics it is hard to see past these valves as a good choice for elderly patients. Younger patients have to make a trade-off between anticoagulation risks and potential redo surgery when choosing between a mechanical and tissue valve. Bourguignon et al. suggest that their results support using bioprosthetic valves at least from the age of 60.[1] The UK trend is of increasing use of tissue valves in under 65 year olds because of[3]:

(1) Better proven longevity of tissue valves

(2) Lower risk of planned reoperation

(3) TAVI valve-in-valve solutions for degenerated tissue valves

The risk of redo surgery is indeed low with the publication reporting a 2.3% reoperation mortality amongst patients younger than 60 at the time of first implant.[2] These results are supported by an overall mortality in the UK for isolated first time AVR of 1.7% and 5.5% for redo surgery. Given the UK risk for redo surgery in patients without significant comorbidities is 2.3%, it is reasonable to implant tissue valves in younger people who are otherwise well.[5] Patients with other risk factors do however have a higher risk profile (e.g. low LVEF) for redo surgery.

Additionally valve-in-valve TAVI is an alternative for treating degenerated tissue valves, but again there must be caution. At present the best results are obtained in valves greater than 23 mm.[4] Long-term outcomes for patients that have undergone a valve-in-valve procedure are not yet available, but a patient aged 55 having a pericardial valve today will be unlikely to need further intervention. Bourguignon et al. report a probability of 10% for patients that are 55 years at first implant to undergo a redo procedure after 13.1 years.[1] There are of course still opportunities for continued improvements to catheter based treatment options, but this is a voyage into un-navigated waters.

As delivery of healthcare is moving towards shared decision-making with patients it is the surgeon's role to support them in making the best choice. What AVR option would I prefer being under the age of 55? With a good LVEF, without other comorbidities and assuming a valve reasonable orifice size, I would choose a tissue valve that should see me through my life comfortably with the knowledge that treatment options of low risk would be available if needed.

Expert opinions, advice and all other information expressed represent contributors' views and not necessarily those of Edwards Lifesciences.

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Congenital – Postgraduate Course: Update on Tetralogy of Fallot with pulmonary valve atresia and major aortopulmonary collateral arteries

Unifocalisation of pulmonary atresia

Roberto M Di Donato
Prince Sultan Cardiac Center, Riyadh, Saudi Arabia

Current surgical approach to pulmonary atresia with ventricular septal defect and major aortopulmonary collateral arteries (PA/VSD/MAPCAs) greatly varies among centres worldwide. Two main strategies have been adopted. One predominantly relies on the growth of native pulmonary arteries, avoiding as much as possible the recruitment of MAPCAs on account of their unpredictable morphology and the intrinsic nature of bronchial arteries with an allegedly limited potential for growth ('rehabilitation' of pulmonary arteries). The other makes assertive use of MAPCAs, seeking to primarily assemble a unified, all-inclusive and possibly unobstructed neo-pulmonary artery arborisation ('unifocalisation' of MAPCAs). Both the rehabilitation and the unifocalisation approaches produce good results and, in our opinion, are not necessarily mutually exclusive. In fact, a so-called 'integrated approach' can be tailored on the individual morphometric features of pulmonary blood sources, selectively employing either one-stage unifocalisation or first-stage palliative right ventricular outflow tract reconstruction.[1–3]

In the integrated approach, patient selection is initially based on preoperative calculation of the total neo-pulmonary artery index (TNPAI; i.e. the cumulative indexed cross-sectional areas of pulmonary arteries and MAPCAs), assuming a cut-off value of ≥150 mm^2/m^2 as indicative of an overall compliance of the pulmonary vascular tree sufficient to accommodate one-stage unifocalisation and repair. In the majority of these cases, the pulmonary blood supply is provided by good-sized MAPCAs and the pulmonary arteries are either severely hypoplastic or absent. In contrast, in cases with a TNPAI <150 mm^2/m^2, characterised by severely hypoplastic, though dominant, pulmonary arteries combined with MAPCAs supplying only a few lung segments, primary unifocalisation would be less effective. Therefore, these patients are electively treated by primarily establishing forward flow into the true pulmonary arteries to promote their growth. Afterwards, second-stage midline unifocalisation should also be carried out if there are associated sizeable MAPCAs, especially those providing isolated supply. In our experience, this strategy maximises the possibility of closing the VSD at the time of unifocalisation. The final decision about suitability for VSD closure at the time of the unifocalisation is based on the so-called 'pulmonary flow study', a sort of intraoperative compliance test of the unifocalised pulmonary arterial tree.

In our initial experience with the integrated approach on 90 patients at Bambino Gesù Hospital in Rome, the 14-year survival rate, freedom from conduit reintervention and freedom from percutaneous intervention on the pulmonary arteries were 75%, 46% and 52%, respectively. At a median interval of 95 months, the right/left ventricular pressure ratio did not differ significantly from early postoperatively. The outcomes were negatively affected by neonatal age, low body weight and chromosome 22q11 deletion, and positively affected by simultaneous or staged VSD closure.

Admittedly, unifocalisation is technically more demanding than the rehabilitation procedures, and its success rate is crucially influenced by early timing of surgery and by extensive neo-pulmonary artery reconstruction up to intraparenchimal stenotic branches, using all the MAPCAs available and favouring native tissue-to-tissue anastomoses. However, by virtue of primarily recruiting all available lung segments, unifocalisation has several advantages over the rehabilitation strategy. First, it frequently allows simultaneous two-ventricle repair, whereas rehabilitation inevitably involves two or more staged procedures. Second, it may allow a higher overall chance of repair, as rehabilitation is limited by the extent of peripheral distribution of the native pulmonary arteries (often incomplete). Third, for the same reason, unifocalisation may achieve lower post-repair right ventricular pressure. In conclusion, we believe that unifocalisation, whether primary or secondary, is the best method to generate adequate pulmonary artery arborisation in PA/VSD/MAPCAs and that a rehabilitation strategy may also have a role in selected cases.

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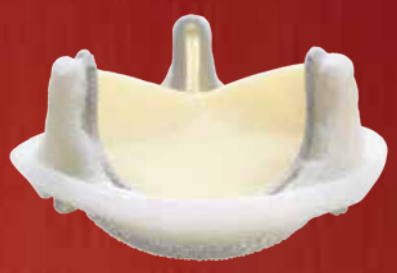

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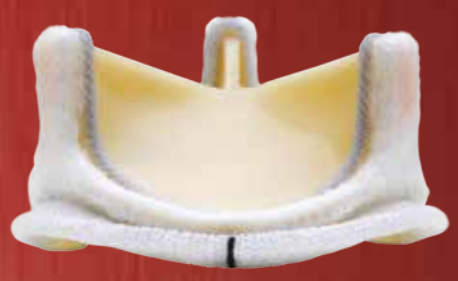

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Cardiac – Professional Challenge: Challenges in mitral valve repair: part I

How to achieve optimal exposure in minimally invasive mitral valve surgery

Piotr Suwalski
Central Clinical Hospital of the Ministry of Interior, Warsaw, Poland

In recent years we have witnessed the process of establishing minimally invasive (MICS) mitral valve surgery as an alternative to median sternotomy approach. An apparent advantage of the MICS through the right mini-thoracotomy is the resulting cosmetic appearance. Possible advantages of this procedure are a shorter ventilation time, shorter hospital stay, and less blood transfusion. With regard to hard endpoints, such as operative mortality, freedom from reoperation, or cardiac death, this method is reportedly equivalent, but not superior, to the standard median sternotomy technique.

However, this technique has yet to gain widespread adoption, partly because of concerns that this approach might not secure the same quality of surgery, including e.g., the rate of durable repair. The experience from centres conducting persistent high volume mitral MICS programmes show that, on the contrary, the minimally invasive approach is not only comparable to sternotomy but offers a number of unique advantages augmenting accessibility and visibility of the valve and deeper localised structures like subvalvular apparatus and the left ventricle outflow tract (Figure 1). In experienced hands minimally invasive techniques tend to shorten operation time, aortic cross-clamping and also reduce perioperative costs by simplifying the operating procedure. However, proper standardised access is the key. Unlike sternotomy surgery where the procedure is determined by the way of opening the chest, in minimally invasive techniques the quality of access is defined by the very first skin incision. The coexistence of many, often subtle, factors enables a good surgical approach and high quality surgery.

Figure 1. Resection of the interventricular septum in HOCM with SAM in minimally invasive technique.

The location of the minithoracotomy in a proper axis, for instance, enables good accessibility to the left atrium and also the aorta, far enough from the dome of the diaphragm that can hinder the vision. The proper placement of the endoscopic camera plays a crucial role as well. The view should be undisturbed and stable throughout all the procedure, but the conflict with the working instruments, aortic clamp and atrial retractor should be avoided. Currently, improving technology like 3D-vision significantly helps achieving proper visibility and space orientation.

In recent years constant progress in equipment and the growing experience of cardiac surgeons have led to the development of even less invasive approaches such as a totally thoracoscopic one, using for example nipple incision (Figure 2), that further improve cosmetic appearance and can reduce some factors like postoperative pain.

Undoubtedly, MICS will replace the sternotomy approach to mitral valve surgery in the future. It is 'a must' for the cardio-surgical community to develop new less invasive techniques and maintain the quality and durability of surgery at the same time. 'Many roads lead to Rome' says the proverb, and there are many ways to conduct good MICS mitral valve surgery. However, every step should be well established and reproducible, bearing in mind the need for standardised teaching of the next generation of cardiac surgeons.

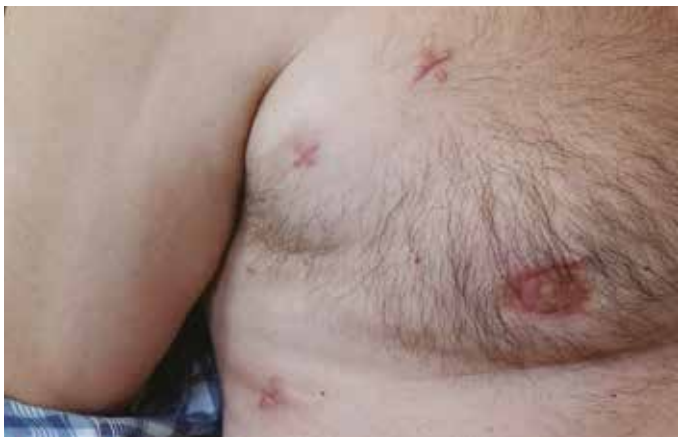

Figure 2. Post-operative appearance after nipple incision MICS.

Cardiac – Focus Session: Update on the results, rationale and design of ongoing clinical trials

What every cardiac surgeon should know of the latest results of clinical trials with novel antithrombotic agents

Freek WA Verheugt
Onze Lieve Vrouwe Gasthuis, Amsterdam, the Netherlands

Novel antiplatelet agents

Besides aspirin, the platelet adenosine diphosphate (ADP) receptor blocker clopidogrel has become the standard of care in patients with acute coronary syndromes (ACS) and those who have received a coronary stent. Since clopidogrel is effective in only 60% of patients, stronger ADP blockers have been developed and tested in ACS: prasugrel and ticagrelor.[1,2] As these agents increase bleeding even more than clopidogrel, they should be discontinued before heart surgery: prasugrel at least 7 days, and ticagrelor 5 days prior to surgery.

Novel oral anticoagulants (NOACs)

In the past decade, several oral direct inhibitors of thrombin and factor Xa have been developed. These novel oral anticoagulants (NOACs) have proven to be specific antagonists and show a dose-efficacy relationship. In studies in which NOACs were compared with vitamin K antagonists (VKA) for stroke prevention in atrial fibrillation (AF), NOACs demonstrated superior efficacy and safety over VKA[3]; in light of this evidence they have been approved for use in AF. A major advantage of NOACs is that there appears to be no drug tolerance or food interactions, and there is also no requirement for monitoring. They have a fast onset of activity and a relatively short duration of action, which in the case of bleeding or planned surgery is another advantage over VKA, which has a very slow offset of action. However, an antidote algorithm for the NOACs has yet to be firmly developed, unlike for warfarin where this is well established. Given the fast offset of action, the NOACs can be stopped the day prior to heart surgery, and restarted the day after surgery.

Conflict of interest: The author is advisor to the manufacturers of the agents mentioned within this article.

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Cardiac – Focus Session: Update on the results, rational and design of ongoing clinical trials

A controlled, randomised trial of a sutureless heart valve (PERCEVAL) versus standard bioprosthesis in the surgical treatment of aortic valve disease; rationale and design

Theodor Fischlein[1] and Roberto Lorusso[2]
[1]Paracelsus Medical University, Nuremberg, Germany,
[2]Maastricht University Medical Center, the Netherlands

Sutureless valves are prostheses that are anchored in the aortic annulus without the need for surgical sutures. These valves belong to a new generation of aortic bioprostheses, which have already shown advantages in shortening ischaemic time and facilitating minimally invasive aortic valve replacement.

The Sorin Perceval Aortic Heart Valve (PERCEVAL) is a self-expanding prosthesis made of bovine pericardium mounted in a Nitinol stent, which does not require anchoring sutures.

To date, promising results with Perceval have already been reported in terms of postoperative outcomes, haemodynamic performance, and freedom from structural valve deterioration and reoperation up to five-year follow-up. Early trials have also reported significant cost savings, primarily driven by reduced hospital stay and significantly lower procedural costs.

Despite these initial positive results, there remains a lack of prospective, randomised trials comparing Perceval with standard prostheses (stented biological valves). To overcome this void Sorin has agreed to sponsor an international, prospective, randomised multicentre trial [**Per**ceval **S**utureless Implant versus **S**tandard **A**ortic **V**alve **R**eplacement **(PERSIST-AVR)** – a controlled randomised trial in the surgical treatment of aortic valve disease]. The primary endpoint of the trial is to demonstrate non-inferiority of major adverse cardiac and cerebrovascular (MACCE) events at one-year follow-up. While it also aims to show superiority in resource consumptions at hospital discharge for patients treated with a Perceval valve, compared with standard aortic valve replacement. For the purpose of comparing the cost profile of the two treatment groups, a specific resource consumption index has been developed within the frame of this trial.

Patient enrolment for PERSIST-AVR is planned to start in Q4 2015, with the aim to recruit over 1200 patients with severe symptomatic aortic stenosis or steno-insufficiency, who are also candidates for surgical replacement of their native aortic valve according to established guidelines following in the current medical practice. Patients will be recruited after a standard preoperative CT scan to optimise annulus measurement and to avoid crossover between groups. The bioprosthesis will be implanted by full sternotomy or mini-sternotomy, according to standard practices at each investigational site. Patients will be randomised 1:1 to either Perceval or commercially-available, conventional-stented bioprostheses. In the postoperative phase quality of life data will be collected and specific questionnaires will be used to assess occurrence of cerebrovascular events.

An independent Clinical Event Committee will adjudicate the relevant serious adverse event(s) pertaining to the primary endpoint. An independent Data Safety Monitoring Board will be established to oversee the safety of the trial. Clinical endpoints will be reported according to the VARC-2 (Valve Academic Research Consortium) standard definitions. The trial will be conducted worldwide with a two-year enrolment period and 5-year follow-up phase. If the enrolment target can be achieved within the given period, it is expected that primary endpoint data will be reported at the end of 2018.

The Principal Investigators of PERSIST-AVR are Theodor Fischlein (Klinikum Nürnberg, Paracelsus Medical University, Nuremberg, Germany) and Roberto Lorusso (Maastricht University Medical Centre, the Netherlands). A Steering Committee has been established, which comprises: AP Kappetein (Rotterdam, the Netherlands), M Shrestha (Hannover, Germany), B Meuris (Leuven, Belgium), T Folliguet (Nancy, France) and E Roselli (Cleveland, OH, USA). The study is fully supported by the Sorin Group.

If confirmed, the results of this landmark trial will substantially impact the normal daily practice of aortic valve replacement indicating Perceval as the prosthesis of choice.

Cardiac – Professional Challenge: Challenges in mitral valve repair: part I clinical trials

Minimally invasive mitral valve surgery – Standard of care?

Martin Misfeld University of Leipzig, Germany

Minimally invasive mitral valve surgery (MIMVS) has been known for more than two decades. Its popularity has increased in the last couple of years because it has been proven to achieve the same surgical results as mitral valve surgery through standard sternotomy and has the advantage of quicker recovery from surgery and improved cosmesis. Data from the annual data report of the German Society of Cardiac, Thoracic and Vascular Surgery (GSCTVS) showed that 47.2% of all isolated mitral valve surgery was perfomed through minimally invasive surgical access. Around 80% of all German centres performed MIMVS. In these centres, the percentage of minimally invasive surgery of the mitral valve ranged from less than 5% to more than 96%. GSCTVS data further showed that the mortality rate for MIMVS was 0.9% (n=2347), compared with 2.7% (n=1540) in sternotomy cases. This may be attributed to patient selection, but it may also express higher expertise in centres in which MIMVS is performed. Patients clearly benefit from MIMVS and, in our experience at the Heart Centre in Leipzig, only a very limited number of patients have clear contraindications for MIMVS. These contraindications are previous right thoracotomy with severe lung adhesions, severe annular calcifications or annular abscess formation and aortic valve regurgitation >I°. Complex mitral valve repair and additional surgical procedures such as tricupid valve surgery, Maze procedure, ASD/PFO-closure and myectomy for hypertrophic obstructive cardiomyopathy can additionally be performed via minimally-invasive access.

It has even been shown that MIMVS as a reoperation following aortic valve and/or coronary artery bypass grafting can safely be performed and be beneficial for patients. Therefore, it is not clear why MIMVS is not accepted more widely by the surgical community. One reason might be that, with the excellent surgical results obtained with mitral valve surgery through a standard sternotomy, surgeons weigh the benefit to the patient of faster recovery and improved cosmesis as being less important against the background of a learning curve which is present when starting a MIMVS programme. Indeed, MIMVS requires specific surgical skills and knowledge. In addition, for some surgeons limited patient numbers may also contribute to their decision not to use this technique. If patient numbers are limited, it is recommended that MIMVS should not be performed and that patients be transferred to centres which have expertise in mitral valve surgery, i.e. centres that perform an adequate number of procedures each year.

MIMVS also requires more focus on a team approach including the whole team in the operating room, as echocardiographic expertise and guidance is mandatory, not only to access mitral valve pathology and the surgical result, but also to avoid and detect potential pitfalls.

In addition, the surgeon needs to be open to using new instruments and equipment. If MIMVS is performed completely thorascopically, this surgical technique differs even more to standard mitral valve surgery. It is, therefore, advisable that centres that aim to start a MIMVS programme follow specific aspects:

1. The surgeon should get used to MIMVS instruments, which can be advantageous in specific settings during cardiac surgery through standard sternotomy;
2. Courses of MIMVS should be attended to gain knowledge of the standardisation of this procedure and potential pitfalls to overcome the learning curve;
3. Centres of expertise in MIMVS should be visited by a team which intends to start a MIMVS programme, consisting of a cardiac surgeon, anaesthesiologist, perfusionist and scrub nurse, to get to know the routine set-up and performance of this procedure;
4. It is also recommended that the first cases are performed in the presence of a proctor, who can guide the surgeon through the set-up and procedure.

From my perspective MIMVS should be the standard of care in mitral valve surgery. It has clear advantages, which should benefit patients. If educational pathways are followed, patients are not put at increased risk. If the surgical community are not open to beneficial techniques, we will miss this particular opportunity. With a new interventional technique for treating mitral valve disease coming over the horizon, cardiac surgeons need to be more open to using this technique, which is already available.

Thoracic – Postgraduate Course: Management of acquired tracheal disorders: from stenosis to laceration

Benign tracheal stenosis: surgical treatment

Federico Rea University of Padova, Italy

Benign tracheal stenosis (BTS) is mostly an iatrogenic occurrence due to prolonged endotracheal intubation, tracheostomy, trauma, etc. The management of BTS remains a challenge, often requiring a multidisciplinary approach by well-trained personnel. Meticulous preoperative assessment and preparation associated with a perfect surgical technique are mandatory to obtain good results.

Preoperative assessment is a crucial step in the surgical management of BTS. The precise definition of the injury in the subglottic area, the length of the stenosis, the degree of tracheal involvement, and the presence of active inflammation or oedema should be carefully evaluated, and surgery should be delayed to allow time for the inflammation to regress and the stenosis to stabilise. Rigid bronchoscopy is the cornerstone for the assessment of BTS and may be essential for maintenance of a safe airway, while awaiting definitive surgical treatment, by direct dilatation. CT-scan provides multiplanes reconstruction permitting evaluation of tracheal stenosis and of the extra-tracheal tissue.

Preoperative treatments, such as laser resection or cryosurgery, provide only temporary benefit in patients with circumferential lesions. Furthermore, repeated laser resections may increase the extent of injury in some cases or may result in damaging of the cricoid posterior plate. Similarly, the use of an endotracheal prosthesis could increase the length of stenosis, thus we recommend avoiding these treatments in all patients who are candidates to receive surgical operations, unless strictly necessary.

When a prolonged period prior to surgical correction of the stenosis is needed, either because of temporary individual contraindications or because of the inflammatory state of the trachea, we recommend the use of a tracheostomy and a Montgomery T-tube.

Tracheal resection and primary anastomosis remain the standard of care for the definitive treatment of tracheal stenosis with success rates greater than 90% (95% excellent or good results in our series).

As regards the surgical technique, we recommend the basic principles of tracheal reconstruction introduced by Grillo and Pearson. These include avoidance of excessive anastomotic tension, maintenance of tracheal blood supply and meticulous dissection and anastomosis. For the end-to-end anastomosis, we adopt a running suture with a monofilament absorbable sutures (PDS 4-0) in the posterior membranous wall of the trachea and an interrupted absorbable sutures (Vicryl 3-0) in the anterior cartilaginous wall. Major complications are: (i) anastomotic dehiscence or (ii) fistula, usually managed by reintervention or conservative treatment (tracheostomy and stenting with a Montgomery T-tube) and (iii) stenosis usually managed by endoscopic approach (laser or dilatation).

In our experience, associated illness (mostly diabetes) and repeated preoperative procedure may play a role in postoperative complications.

Nurses – Postgraduate Course: Quality improvements and innovation

Clinical guideline for the prevention of postoperative infections by systematic oral hygiene associated with elective thoracic surgery interventions in adult patients

Inge Madsen VIA Faculty of Health Sciences, Aarhus, Denmark

The National Board of Health in Denmark has launched a 4-year project to prepare 60 clinical guidelines. To date, the Centre for Clinical Guidelines at Aalborg University in Denmark, in collaboration with the national board, has produced 45 clinical guidelines (since 2008), with 40 more underway.

There are major challenges to implementing these guidelines in routine clinical practice, due to the busy world in which we work. By preparing a generic module, the aim of this project is to make the process of guideline implementation easier by providing individual tools to help support the implementation process. This includes adaptation of national recommendations for local organisations and cultures, and the implementation of staff and patient education through the use of videos, websites and SMS services (which can be used to remind patients about certain important aspects of their medical care for example). It is hoped that initiatives like these will make guideline implementation more successful.

Studies and clinical experience show that there are major challenges in implementing research findings into clinical practice. Many resources are spent on initiatives that only have a short-term effect. In a systematic review, one of the reasons for this appears to be that research was not translated into meaningful actions in clinical practice. Studies show that local adaptation of research should be based on an analysis of the specific organisation, relevant stakeholders, procedures and culture. The focus of this new project initiated by the Cardiopulmonary Department at Aalborg University Hospital is to change this.

We have chosen the following clinical guideline from the Centre for Clinical Guidelines as the focus for our work: *'Clinical guideline for the prevention of postoperative infections by systematic oral hygiene associated with elective thoracic surgery interventions in adult patients'*. This particular guideline was chosen because, with relatively simple effort and at low cost, it has the potential to reduce the number of infections and be of great benefit to patients, as well as reduce consumption of unnecessary resources.

Based on a validated implementation model, we have developed an implementation strategy to ensure local anchoring in the Cardiopulmonary Department, Aalborg University Hospital. In addition, a website for patients has been created to show them how, even before hospitalisation, they can take practical steps to prevent respiratory infections following cardiac surgery, thus ensuring patient involvement from a very early stage. Evidence suggests that it is not only respiratory infections, but also other potentially more serious types of infection that need to be prevented, for example to treat an infection in the sternum post-surgery it costs between €35,000 and €65,000. These complications occur in 1–2% of patients and are relatively constant. The costs obviously go beyond those that are financial, and must include the level of patient suffering experienced as a result of the infection and not least the prolonged illness they will endure. This project is a part of a much larger study, where compliance and effect are also being examined.

Financial support: The Ministry of Health, Denmark, The Northern Region of Denmark, and the Centre of Clinical Guidelines, Denmark.

Acknowledgement to Anita Tracey and Jens Grønlund, Cardiopulmonary Department at Aalborg University Hospital, Denmark.

Vascular – Postgraduate Course: Basics in proximal thoracic aortic surgery: session 2

Management of the aortic root and coronary malperfusion

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Despite significant improvements in perioperative anesthetic and surgical management, surgical treatment of acute type A aortic dissection (AAAD) remains associated with high mortality, ranging from 15% to 30% in published series.[1,2] Although numerous risk factors have been evaluated, the preoperative status of the patient, mainly due to organ malperfusion, is the most important predictor of in-hospital outcome. Approximately one third of all patients with AAAD have preoperative end-organ malperfusion syndromes and coronary malperfusion, which is associated with a very high in-hospital mortality (30–40%).[3,4]

The principal objective of surgery is prevention of lethal aortic rupture by resection of the proximal intimal tear and restoring blood flow in the distal true lumen. However, there is still controversy concerning the appropriate surgical treatment. Supracommissural replacement of the ascending aorta with conservative aortic root reconstruction is a well-established technique for treatment of AAAD. Unquestionably, reconstruction of the aortic root with gelatin-resorcinol-formaldehyde (GRF) glue and replacement of the ascending aorta represents the easiest, and quickest, approach, but diseased aortic tissue is left in place, ignoring the underlying aortic wall pathology. Possible re-dissection or aneurysm formation may develop and may require further operation of the proximal ascending aorta. In fact, aortic root morbidity represents the main reason for reoperations during follow-up (from 10 to 40%).[5,6]

Some preoperative predictors for late root dilatation and aortic valve regurgitation requiring reintervention have been demonstrated. Dilated aortic root diameter at initial presentation and connective tissue disease such as Marfan Syndrome or Loyes-Dietz are the most important.[5-7]

Aortic root replacement using composite graft prosthesis, now routinely performed by a greater proportion of cardiac surgeons, has been described as a radical treatment for AAAD with satisfactory results.[8] However, it is accompanied by manifold disadvantages of mechanical and biological valve prosthesis, mainly thromboembolic events, and haemorrhage due to lifelong anticoagulation and reoperations due to degeneration of biological valve prosthesis.[9]

In some centres with particular expertise and extensive experience in aortic surgery, valve-sparing operations have been used in cases of AAAD giving very good short-term results and avoiding the shortcomings of the composite graft replacement.[10] The reimplantation technique should be preferred to remodelling because it seems to be associated with favourable long-term outcomes.[11] However, due to the fact that these operations are more demanding than the standard techniques, their applicability in AAAD remains debatable and results are limited.

In our department, between 1999 and 2014, 296 patients were treated for AAAD and in 40.2% of them we performed a root replacement intervention (Bentall or David procedure). We found no differences in early or long-term mortality in these two groups of patients even after propensity-score analysis. On the other hand, we demonstrated an increased risk of late re-intervention in patients undergoing conservative root management (freedom from proximal aortic re-intervention at 7 years: 80.1±6% versus 96±2.8%; log-rank p=0.029).

In summary, supracommissural ascending aorta replacement with aortic valve preservation and root reconstruction is the treatment of choice of acute type A aortic dissection. A more extensive root procedure, with potential additional operative risk, can be justified for the potential benefit of long-term results in all patients with extensive dissection of the sinuses or of the coronary ostia, in the presence of dilated aortic sinuses or severe aortic regurgitation and in patients affected by connective tissue disease such as Marfan syndrome. Valve-sparing operations should be performed only in centre with good experience.

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Cardiac – Postgraduate Course: Update on the results, rationale and design of ongoing clinical trials

Revolutionary new method of postoperative wound drainage after cardiac surgery

David R Koolbergen Academic Medical Center, Amsterdam and Leiden University Medical Center, Leiden, the Netherlands

In the Sunday afternoon session 'Update on the results, rationale and design of ongoing clinical trials' we will present our study protocol, 'A randomised trial of continuous postoperative pericardial flushing to reduce postoperative blood loss'. During this presentation, a method will be unveiled that has shown 30% blood loss reduction in a pilot study that we hope to confirm in our clinical trial.

The continuous postoperative pericardial flushing (CPPF) method is a completely new approach to postoperative wound drainage following cardiothoracic surgical procedures. We believe that traditional systems (low-pressure suction on a variable amount of chest tubes) carry an unnecessarily high risk of partial or complete clogging of the chest tubes, especially when postoperatively the coagulation system starts to stabilise and normalise. In this situation, blood and clots tend to accumulate in the pericardial space and consequently induce high fibrinolytic activity. This will maintain and increase blood loss, and result in a higher need for re-interventions for bleeding and acute cardiac tamponade. In addition, clots and blood remnants left behind after chest tube removal, may cause inflammation-related complications such as adhesion formation, at a later stage.

Our innovative method has been developed in the Academic Medical Centre at the University of Amsterdam in the Netherlands, and has specifically been designed to promote the continuous and complete evacuation of contaminated blood and clots from the pericardial cavity. The CPPF method works by continuously flushing the pericardial cavity with a warm saline irrigation solution, starting towards the end of surgery just before sternal closure and continuing for 6–12 hours postoperatively or for as long as necessary. Continuous flushing of the pericardial cavity results in a lower viscosity mixture that will prevent chest tube blockages and promote the complete evacuation of blood and clots from the pericardial cavity.

The CPPF method was developed with the primary aim to reduce postoperative blood loss, thus lowering the need for transfusions and re-interventions for bleeding and/or acute cardiac tamponade. But it is also hoped that it could reduce the incidence of late cardiac tamponade, caused by remaining pericardial haematomas and inflammation-related complications (such as adhesion formation and possibly even arrhythmias).

A safety and feasibility pilot study[1] (Figure 1) performed in 21 patients, showed the CPPF method to be safe and feasible in an experimental setting and demonstrated a reduced blood loss of 30%. We hope to confirm these findings in the present randomised clinical trial (n=170), and provide definitive proof of concept. During the presentation the experimental setting and study protocol will be explained. Until now, all CPPF procedures have been conducted in a highly-controlled setting, where a research assistant continuously monitors the in- and outflow volumes to maintain an accurate record of the amount of actual blood loss or lagging flushing fluid. For a safe and effective application of the CPPF method in daily clinical practice a new medical flushing device was invented and a spin-off company was founded (Haermonics) to develop, validate and produce the flushing device.

The Haermonics flushing system (Figure 2) is needed for regulation of the inflow volume and temperature, and the analysis of the outflow fluids with the use of haematocrit and volume sensors. The device will continuously calculate the balance of in- and outflow volumes, and registers and clearly displays the actual amount and trend of blood loss.

The device comes with a multi-lumen chest tube with integrated inflow canals for the irrigation solution, and temperature and pressure sensors. Naturally, alarms can be set, for example to alert when haematocrit values rise, or outflow volumes or intrapericardial pressure reaches a critical value. In this way, the clinical evaluation of postoperative bleeding problems is secured and even improved because of continuous registration, trend information and alarms.

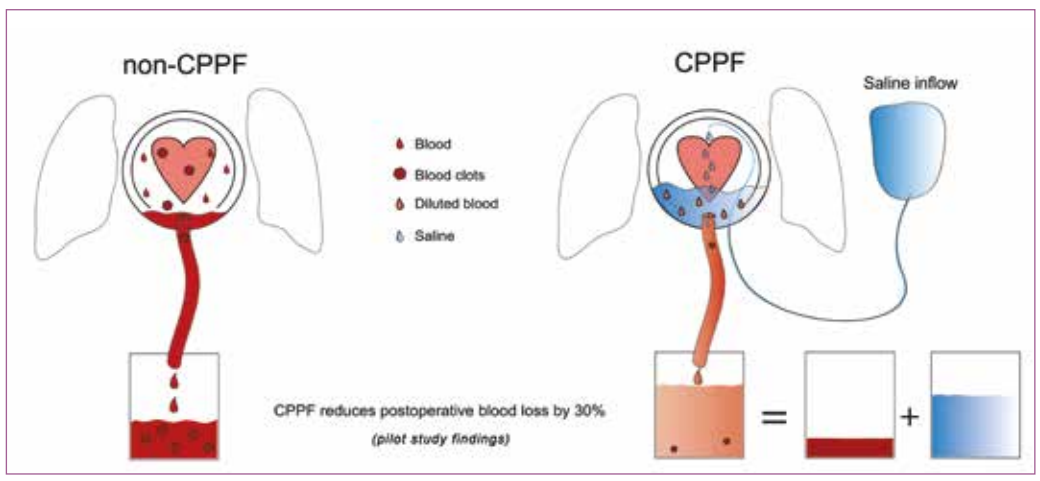

Figure 1. Graphical abstract of the CPPF method.

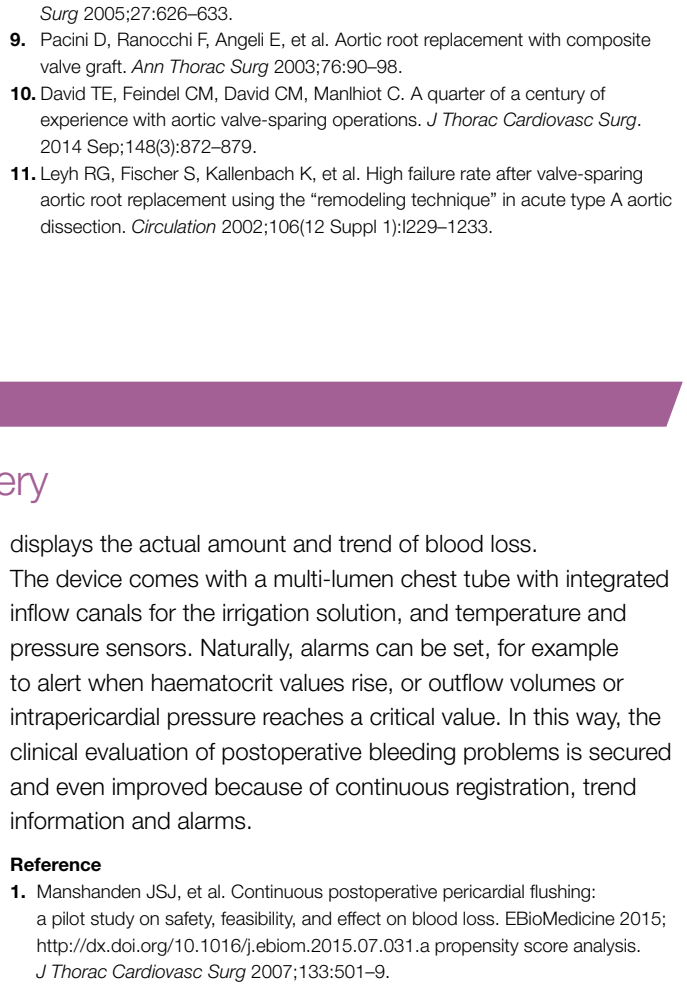

Figure 2. Impression of the Haermonics CPPF system.

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QUIP – Focus Session: Quality improvement

Using cumulative sum charts to explore surgical performance

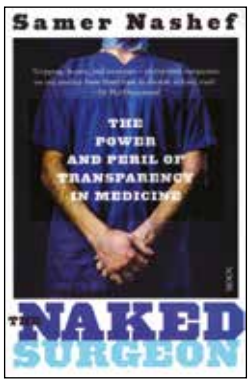
Tom Treasure University College London, UK

The first time I became aware of the potential of Cumulative Sum (CuSum) charts to explore surgical performance was listening to Marc de Leval's presentation to the American Association of Thoracic Surgeons in 1993.[1] De Leval had an unsurpassed record of success with the then innovative arterial switch operation. Because he was closely monitoring his results he was immediately aware of a change in his success rate. A couple of deaths became a cluster of seven deaths from case 53 to 68. No unifying cause was identified, nor was it possible to attach statistical significance to the change, or to its resolution, but the ability to see deviations from the norm is what has made CuSum so compelling as a monitoring method. When a sufficiently long series of cases is displayed, the time related trends of learning and deteriorating skills can be seen as well as clusters.

This study of a series of his own cases allowed de Leval to test some hypotheses and seek solutions but simple CuSum presupposes that cases are much the same in terms of difficulty and risk. If that is the case (e.g. monitoring a manufacturing process) patterns may be attributable to operator performance. But in the reality of surgery, among two or more trained and experienced surgeons, a large component of the variation in outcome is attributable to the patient primary disease and comorbidity. At St George's we had Parsonnet data on 5000 patients from 1992 to 1996. On returning from the AATS I took the problem to my late great friend Steve Gallivan, a mathematician at University College, London. He varied the size of the steps of the CuSum according to the preoperative risk of the patient. This led to VLAD plots – an easily understood way of displaying data for any outcome of importance, incorporating prior inherent risk.[2]

It is vital to remember that VLAD plots are indicators, early warnings and not statistical proof of error or deterioration. Their strength is the early warning and the insight into trends and patterns they provide. Consider testing a surgeon's performance against a standard of 2% risk adjusted mortality for coronary surgery. A steady 6% mortality rate would still be within test limit after 200 consecutive operations (12 versus 4 deaths). If before intervening we insist on statistical proof by hypothesis testing and the standard of p=0.05, the difference would be deemed just 'significant' after 250 operations when there has been an excess of 10 deaths, arguably avoidable. That might take several years to identify. Using VLAD plots this trend will have been detected much earlier, near-misses analysed, and remedial action will have been taken. There are various arguments against this strategy.

One is the disruption of repeatedly investigating surgeons who experience statistically insignificant clusters of deaths. During her Reith Lectures on 'Trust' the Irish philosopher Onora O'Neill likened this to pulling up a seedling every few days to inspect its roots.[3] Then there is the statistical problem of repeated looks, a no-no in clinical trials. Inevitably some surgeons will have been besmirched and unjustly driven out of work. For a masterly exposition on these issues and much more read Samer Nashef's book *The Naked Surgeon*.[4]



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Scientific Programme of the Surgical Training and Manpower Committee (STMP) during the 29th Annual Meeting of the EACTS

Peyman Sardari Nia Maastricht, the Netherlands
Chairman of the Surgical Training and Manpower (STMP) Committee on behalf of the STMP Committee members:

Peyman Sardari Nia, Maastricht, the Netherlands
Lucio Careddu, Bologna, Italy
Ilkka Ilonen, Helsinki, Finland
Raili Ermel, Tartu, Estonia
Fabian Kari, Freiburg, Germany
Eduard Quintana, Barcelona, Spain
Marco Scarci, Cambridge, UK
Joerg Seeburger, Leipzig, Germany
Matthias Siepe, Freiburg, Germany

I am honoured and pleased once again to announce the scientific programme for the Annual Meeting of the European Association for Cardio-Thoracic Surgery (EACTS) in Amsterdam. For those of you unfamiliar with the STMP Committee of EACTS, the committee represents the views of young surgeons and residents, the future of our specialty. We believe that training, research and innovation are the fundaments of our practice and future of our specialty. We believe that excellence in training, research and innovation should be recognised, pursued and applauded, and we have supported and initiated this by awarding each year different prizes for research (Young Investigators Awards), for training (Leonardo DaVinci Award for Excellence in Surgical Training) and for innovation. We organise courses on new procedures, and have created new initiatives, such as a minimally invasive courses in adult cardiac surgery and drylab training sessions. Today the STMP Committee has a full programme dedicated to training and novel techniques. During the Annual Meeting in Amsterdam we welcome you to join us for a number of activities.

On Monday we will have our yearly session entitled *'Work in progress abstract session'*. Although there is enough time during our Annual Meetings to present data regarding the individual studies, less opportunity exists to discuss ongoing research projects. Therefore, 4 years ago, we introduced a new session for our young colleagues to present their preliminary results. The idea is to open up opportunities for innovative work and thinking, and create a medium whereby new ideas can be exchanged and new collaborations created. The focus is the project as whole, possible implications for our specialty, and future perspectives.

Another session on Monday is *'Meet the experts'*. This session was first introduced last year and was incredibly popular. We have identified three topics of interest within thoracic, adult cardiac, and vascular surgery and invited a panel of experts for each topic. Participants have been invited to submit case reports ahead of this session, and during the session these case reports will be discussed with the expert panel and the audience. The idea is to stimulate discussion on difficult cases and dissect the problems in detail with the expert panel.

There is also another session on Monday that took place last year – *'Pro and con debates'*. During this session prominent surgeons are invited to clash intellectually with each other on contemporary topics within cardiac surgery. The session is designed to broaden one's perspectives and remind all of us that there are no axioms in medicine.

Finally, we are introducing two new sessions that will also take place on Monday. The first session is an informal *'Resident coffee break'* in which we invite residents and programme directors from across Europe to join us for informal discussion. We have also invited the existing resident's associations of different European countries to this session. The incentive is to listen to all those invited and forge new collaborations. We would like to involve residents structurally in the association and will be announcing new vacancies in the STMP Committee for the upcoming year, for which residents are invited to apply.

Another new initiative from our committee is *'Live-heart team, complex pathologies'*. Complex cases will be presented and discussed by cardiologists, cardiac surgeons, and delegates. This session is fully interactive and will focus on a multidiscipilinary approach to cardiac surgical patients.

On Tuesday we are once again organising *'Nightmares in cardiothoracic surgery'*. This session was so full last year that we had to open a parallel room to accommodate the delegates! During this session cardiothoracic surgeons present their nightmares and difficult cases in an interactive manner. The idea is to simulate discussion about the process of decision-making and problem solving.

Also on Tuesday we are organising the *'Residents luncheon'* for the fifth time. The subject and title of this year's luncheon is *'Cardiothoracic mixture'*. The luncheon consists of seven tables, each having been designated a specific subject within cardiothoracic surgery. Prominent surgeons with expertise in related subjects are invited to moderate at each table. Residents can register at the Annual Meeting onsite to attend the luncheon for free. Questions can be sent in advance and will be compiled in envelopes to be opened at tables to facilitate discussion and interaction.

Also on the Tuesday we are organising a completely new session *'Pre-operative planning, simulation, 3D printing, and intra-operative navigation in cardiothoracic surgery'*. With emergence of the new concept of individualisation of patient treatment, the focus will shift from whether a new procedure is better than conventional treatment, to which patients will benefit the most from which techniques. New emerging technology such as simulation, 3D printing, and intra-operative navigation will be explored.

During both Monday and Tuesday, we will run drylabs on minimally invasive mitral valve repair (MIMVR) on high-fidelity simulators. Dexterity of open surgery is insufficient for starting a MIMVR, and new dexterity should be developed in endoscopy and working with long shafted instruments. The most critical technical steps are working with long shafted instruments endoscopically and placing sutures on the mitral valve annulus. Therefore, the learning curve of MIMVS is steep and unfortunately still developed in patients. These drylab sessions will enable residents, fellows and surgeons to develop their skills in MIMVR and practice those skills endlessly on the simulators.

On Wednesday we will have our yearly session titled *'How to do it: live-in-box'*. This session is fully dedicated to techniques in adult cardiac surgery. Live-in-box videos of different techniques will be presented. The emphasis is on the technical aspects of each procedure and pitfalls related to these techniques. The aim of this session is to stimulate discussion and the exchange of ideas, and give young surgeons an insightful introduction into these challenging techniques.

We as the representatives of the STMP Committee hope that the proposed activities serve the surgeons well. A lot of energy has been put into creating these innovative sessions and selecting the prominent faculty involved in them. We very much hope that the format of the sessions and quality of the faculty, will create a highly instructive atmosphere.

Programme details

Monday
Work in progress
Meet the experts
Pro and con debate
Resident's coffee break
Live-heart team, complex pathologies
Endoscopic drylabs

Tuesday
Nightmares in cardiothoracic surgery
Resident's luncheon
Preoperative planning
Endoscopic drylabs

Wednesday
How to do it with live-in-box

Nurses – Postgraduate Course: Science

Negotiated work-based learning (NWBL) to up-skill an advanced nurse practitioner (ANP) to interpret plain film chest radiographs

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Prolonged air leaks are a recognised complication following thoracic surgery. As a thoracic advanced practitioner, interpretation of chest radiographs was deemed essential to enable autonomous management of patients discharged with chest drains so they could be managed in an outpatient clinic. Achievement of this advanced clinical skill would decrease delays by reducing the need for medical staff intervention, and improve the patient experience within the current service. However, ANPs who undertake image interpretation must be trained to a level comparable with that of a middle-grade doctor to maintain patient safety. This could not be achieved by traditional methods of learning due to its bespoke nature. Hence, NWBL was the appropriate pedagogy.

This NWBL approach enabled expert guidance from the University and work-based mentorship from the thoracic consultants and radiologists. The project was part of an MSc in advanced practice module equating to 20 credits. A tutor at the University of Liverpool was used as an expert resource and guide for the development of the assessment tools and portfolio of evidence of competence. The initial project was focused on patients with chest drains, pneumothoraces and effusions as these patients would be commonly referred to the clinic. The consultant radiologists were key in learning the basics of X-ray interpretation. However, assessment was done directly with the thoracic consultants as holistic patient assessment, accurate X-Ray interpretation and best management strategy could be assessed in the workplace with real cases under their supervision. Assessment strategy involved direct observation of clinical skill (DOPS) whereby an assessment tool, MINI IPX (adapted from the Royal College of Radiologists, 2013), was utilised to address the skills needed to gain competence, once high standards were met final assessments were undertaken formative and summative assessments. This involved interpretation of a series of 10 chest radiographs on two separate occasions by the ANP. This test-retest method ensured reliability and consistency. Importantly 100% accuracy in correct diagnosis was required to ensure patient safety. Maintenance of competence is assessed regularly by the consultants within daily practice by participation in daily ward rounds and a portfolio of evidence has been kept for reference.

Increasing competence and capability in this advanced clinical skill has enabled autonomous management of patients attending the nurse-led chest drain clinic and within the ward environment; expediting treatment, improving patient outcomes and service efficiency.

Cardiac – Rapid Response: Transcatheter aortic valve implantation versus surgical aortic valve replacement

Risk factors for permanent pacemaker after implantation of self-expanding aortic prosthesis



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The nickel-titanium alloy nitinol is experiencing increasing use in medicine. Although the first trans-catheter aortic valve implantation (TAVI) was performed with a stainless-steel balloon-expandable stent, widespread adoption of this procedure has been achieved after the advent of a nitinol auto-expandable device. Cardiac surgery has evolved rapidly after the introduction of nitinol-based sutureless prostheses for aortic valve replacement (AVR).

Atrio-ventricular block requiring permanent pacemaker (PPM) implantation has emerged as a frequent event after TAVI and was initially related to auto-expandable prostheses. Even in the surgical environment, the incidence of PPMs grew with the use of nitinol-based valve stents. PPMs, although lifesaving, have been supposed to reduce the benefit of aortic valve procedures as well as the specific device morbidity.

Identification of high-risk patients, for such complications, is of great clinical and economic importance. The present investigation aimed to identify risk factors for the need of pacemaker implantation in patients undergoing aortic valve replacement (AVR or TAVI) by means of a nitinol self-expanding prosthesis.

CoreValve (Medtronic, Minneapolis, USA) in TAVI and Perceval (Sorin Group, Milan, Italy) in AVR can be considered the prototypes of the auto-expanding devices. A study group was created between two Institutions with extensive experience with these prostheses, providing a pool of patients for a retrospective analysis.

In 43 (12.8%) of 335 patients without an indwelling stimulation device at admission, a PPM was implanted during hospitalisation for the aortic valve procedure (TAVI 17.5% versus AVR 6.8%, p=0.007). PPM patients had higher logistic EuroSCORE (20.8% versus 15.6%, p=0.015), lower use of statins (20.0% versus 34.2%, p=0.04), longer QRS (117 ms versus 98 ms, p=0.002), higher incidence of conduction disturbances (29.3% versus 16.8%, p=0.034) and high prevalence of right bundle branch block (RBBB). Immediate PM dependency was prevalent in the PPM group (p<0.0001). At the first ECG, unstimulated PPM patients showed longer PR (208 versus 182 ms, p=0.007), longer QRS (150 versus 113 ms, p<0.001) and longer QTc (p=0.005). The prevalent intraventricular conduction disorder in both groups was left bundle branch block (LBBB). AVR patients received the PPM later than the TAVI group (6 days versus 3 days, p=0.01). TAVI was an independent predictor of PPM using logistic regression analysis (OR 3.18; 95% CI 1.19–8.48, p=0.021), but non-significant after incorporation of post-procedural ECG variables.

Preoperative use of statins was a protective factor for PPM. This finding expands the debate about the pleiotropic effects of this drug class: a protective effect of statins on the conduction system had not previously been reported. Baseline atrio-ventricular conduction disturbances (QRS and RBBB) are predisposed to the need of PPM. Multiple studies on CoreValve are consistent with our findings but post-Perceval investigations are rare. But appearance of LBBB after the aortic valve procedure with a nitinol device (AVR or TAVI) is quite frequent. Occurrence of LBBB can be detrimental in cases of pre-existing RBBB and this explains why RBBB has consistently been identified as a risk factor for PPM. Morbidity and early mortality did not differ. However, intensive care and overall stay were significantly longer in the PPM group.

Nitinol technology represents a groundbreaking option for aortic valve procedures. The radial forces of the self-expandable mechanism could be implicated in the increased need of PPM mostly in cases of TAVI. In the context of a transcatheter procedure, *in situ* calcium clusters could locally load the nitinol structure, alter force distribution and provoke localised excess of radial force that can eventually harm conductive tissue. During an open surgical procedure, the possibility of calcium debridement and direct prosthesis sizing may preserve stent shape and consequently assure homogeneous energy distribution.

Cardiac – Rapid Response: Aortic valve substitutes: the long term view

BioValsalva or BioIntegral: Which biological aortic valved conduit has a better hemodynamic performance?

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The aortic valved prosthesis with reimplantation of coronary arteries is a reliable solution to repair the aneurysm in aortic root and ascending aorta with involved aortic valve. Bentall and De Bono came up with the surgical technique that involved replacing the aortic valve and ascending aorta with a composite mechanical valved conduit in 1968, as a therapy to treat aortic root aneurysm.

The introduction of biological valved conduits brought important benefits to a large group of patients suffering from the anticoagulation therapy and in whom David or Yacoub procedures cannot be performed. However, biological valves are not durable due to degradation. There was a need to compare the differences in haemodynamic performance and durability between the different available bioprostheses because they differ in structure.

Two of the most commonly used pre-sewn stentless biological conduits are BioValsalva™ and BioIntegral BioConduit™. As a result of the lack of comparative studies between the different biological valved conduits, there was a need to review the mid-term haemodynamic performance of these two conduits.

Both of the biological valved conduits are similar in the respect that they have stentless biological valves; however, they differ with regards to two main characteristics: 1) the graft of the BioValsalva conduit is made of polyester, whereas the graft of the BioIntegral conduit is made of bovine pericardium, and is therefore a complete biological conduit, which may demonstrate a stronger resistance to infection; 2) the BioIntegral conduit is a straight pericardial graft with an incorporated stentless valve inside the graft with no extra sewing ring. By contrast, the BioValsalva conduit is composed of a graft and a valve sewn together with an extra sewing ring around the valve that adds 4 mm to the diameter of the valve, which in turn decreases the effective orifice area. Conversely, the design of the BioValsalva conduit has two advantages: 1) the BioValsalva conduit is composed of two parts, which can be separated in case of a reoperation and the diseased part can be replaced; and 2) the design of BioValsalva recreates the sinuses of Valsalva, which may reduce the distance between the coronary ostia and the graft itself, and help to reduce tension on the coronary anastomoses.

Between July 2008 and June 2014, a total of 55 patients underwent aortic root replacement using a BioValsalva conduit (n=27) or a BioIntegral conduit (n=28) at the University Hospital of Essen, Germany. The echocardiographic follow-up for the BioIntegral group was shorter because of the novelty of BioIntegral prosthesis in our centre. The median echocardiographic follow-up for the BioValsalva group was 44.0 months compared with 8.4 months for the BioIntegral group. It was hypothesised that the BioIntegral prosthesis with no sewing ring, will provide benefits in valve haemodynamics; however, these potential benefits were not observed when compared with the BioValsalva prosthesis in our echocardiographic follow-up. The effective orifice area in the BioValsalva group was 1.85 cm² compared with 1.80 cm² in the BioIntegral group (p=0.24). The mean pressure gradient in the BioIntegral group was 11.5 mmHG compared with 11.0 mmHg in the BioValsalva group (p=0.82).

In conclusion, the use of biological valved conduits is increasing due to an aging population and the durability of the new biological valved conduits. We did not observe a significant difference in the outcome between the two biological valved conduits, and both of them had excellent outcomes. Despite our mid-term results suggesting a favourable outcome, a long-term follow-up is needed.

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Mitroflow LXA® structural deterioration following aortic valve replacement: a single-centre experience

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One of the most widely used pericardial tissue valve prostheses for aortic valve replacement,[1] the Mitroflow LXA® (Sorin Group, Salugia, Italy) model, replaced the Mitroflow 12A® model in 2007. The manufacturing process improvements for the LXA model were implemented to increase manufacturing efficiencies, without affecting the design or performance of the prosthesis, which advocates the advantage of better haemodynamic efficiency in smaller aortic annuli. An anti-calcification process was not integrated into the manufacturing procedure. Recently, reports from other centres have alerted to the possibility of early structural valve deterioration (SVD) for the Mitroflow prosthesis, but without distinguishing between the 12A and LXA models.[2]
In this single-centre retrospective study, we evaluated 227 patients implanted with a Mitroflow LXA from February 2007 to October 2011. Echocardiographic data during follow-up, as well as explantation for degeneration, were used to define SVD. Mean follow-up time was 49.9±23.5 months and completeness of follow-up was 95%. Overall mortality, and mortality from cardiac or unknown causes, in our series were 30.3% and 21.6%, respectively.

Structural valve degeneration occurred in 19 patients (8.4%), 50±20 months from implantation. Sixteen patients required a re-intervention; two patients were treated with a percutaneous procedure and 14 patients by an open procedure. Three patients presented with increased mean transvalvular gradients (>50 mmHg) on follow-up. SVD during follow-up was more frequent in smaller valve sizes, 19 and 21 at 15.4% and 17.2%, respectively, whereas larger prostheses showed a smaller occurrence of degeneration, sizes 23 and 25 at 4.3% and 4.8%, respectively.
With the existing follow-up estimated freedom from structural valve deterioration after 7.5 years was 71%±8% (Figure 1).
When prosthesis size was taken into account, estimated freedom from SVD at 7.5 years was 55.5%±12% for sizes <23, compared with 76.5%±11% for sizes ≥23 (p=0.001). Estimated mortality after 7.5 years, was 54.7%±4.9% and estimated freedom from valve-related mortality was 67.5%±4.9%.

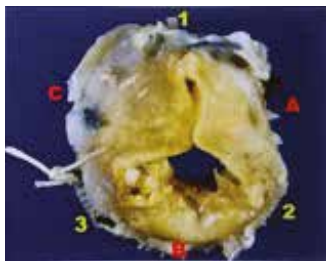

Figure 1. Macroscopic evaluation of a degenerated Mitroflow LXA prosthesis showing heavily calcified leaflets and tears at the commissural stress points.

The last explanted valve was sent for histological evaluation. This included macroscopic, radiologic and microscopic evaluation of Haematoxylin and Eosin stains of the pericardial leaflets. Laboratory evaluation of the explanted prosthesis showed intrinsic leaflet calcification causing stiffening and reduced mobility of the cusps.
In our experience the Mitroflow LXA showed evidence of early structural valve degeneration especially for smaller sizes 19 and 21. This is in accordance with other studies, which also used echocardiographic criteria on follow-up to define SVD.[2] Intrinsic calcification leading to cusp stiffening and reduced leaflet motion seems to be the mechanism underlying this degeneration, which is explained by the lack of an anti-calcification process in this Mitroflow model. A close echocardiographic follow-up is advised for patients implanted with this type of prosthesis.

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Nurses – Postgraduate Course: Science

Nurses and allied professionals at EACTS


Christina Bannister and Richard van Valen
on behalf of the organising committee

This year will be the 5-year anniversary of the postgraduate course for nurses, nurse practitioners and physician assistants.

In 2009, the council decided to give these allied professionals a platform within the European Association for Cardio-Thoracic Surgeons (EACTS). Since that moment a small pan-European group has worked on creating a day with topics of interest for operating room (OR) staff, nurses, nurse practitioners and physician assistants from the intensive care unit (ICU) and the ward. This course has been extremely well received by all who have attended, and networking opportunities across Europe have been created as a result of the course.

Topics this year include care of the geriatric patient. A geriatrician, surgeon and nurse practitioner will present on quality of life, issues during screening for frailty and the pre-, peri- and postoperative management of these patients. In a section on innovation there will be a presentation on uniportal thoracic surgery and the use of extracorporeal membrane oxygenation (ECMO). Another topic of importance is safety; presentations will be given on the time-out procedure in the OR and pitfalls in the handover of patients in the OR.

Our secondary goal is to create a platform for research and best practice by allied professionals. Research aimed at improving care during the clinical and outpatient period has been presented since the first postgraduate session in 2010. This year we will be rewarding the best presentation with a peer-selected travel grant (our thanks go to Maquet for their support) to show that evidence-based care is another vital topic in improving patient outcomes. Great surgery needs to be accompanied by excellent care before and after surgery; we encourage all nurses and allied professionals who are performing research and best practice to share it with our group.

The third goal of the group is to cooperate and create learning opportunities together with other parties within EACTS. An excellent example of this cooperation is the left ventricular assist device (LVAD) coordinator training course, initiated by EACTS Euromacs (Figure 1).

The growing group of patients with LVAD as their destination therapy requires highly skilled healthcare professionals; in different countries different professions fulfil this role. These professionals came together in the German Heart Center in Berlin to learn trouble-shooting, management of fluid status, screening process and other important subjects. This course received great feedback because of its hands-on approach and highly interactive sessions; the course is planned to be run again in 2016.

The collaboration between the council and staff of EACTS has always been good. There are, however, issues that can only be addressed by the key opinion leaders within the different countries. The options for nurses and other allied professionals to attend important meetings, such as our annual meeting, are very limited. Financial resources need to be freed, and recognition by surgeons on the important role of allied professionals and joint working needs to be confirmed. The knowledge we have on evidence-based care in cardiothoracic surgery should be shared by all involved in the field, and we must work together to make this possible. Furthermore, surgeons should inspire allied professionals to play their role in expanding the body of existing knowledge, and encourage them to share this knowledge with the rest of the community.

Figure 1. Participants at the first LVAD coordinator course.

Cardiac – Postgraduate Course: Perfusion – Improving perfusion

Visceral organ protection during aortic surgery

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Visceral organ protection remains one of the most technical challenges of modern aortic surgery. The pathogenesis of visceral organ damage is complex and multifactorial, mainly depending on temperature and the duration of circulatory arrest. Deep hypothermia was the first strategy used to avoid ischaemic damage to the CNS, visceral organs and spinal cord.[1] Different techniques for organ protection according to the aortic segment that has to be replaced are available. In aortic arch surgery the three main methods used to protect the CNS are deep hypothermic circulatory arrest, retrograde cerebral perfusion and antegrade selective cerebral perfusion (ASCP).[2,3] The Kazui technique is the most popular ASCP approach.

Concerns have grown over the effectiveness of mild-to-moderate hypothermia for visceral organ protection during circulatory arrest,[4] although some authors have reported excellent results.[5,6] Moderate hypothermia is associated with a low histological organ damage and a lower systemic inflammatory response (SIR).[7] Our results suggest moderate systemic hypothermia, at a nasopharyngeal temperature >25°C, is not less effective in visceral organ protection and should be preferred for visceral ischaemia <60 min because it may reduce SIR and reperfusion organ injury.[8,9]

In arch surgery innovative strategies perfusing the distal aorta have been introduced to improve visceral organs protection. One comprises perfusion of the thoraco-abdominal aorta using a Fogarty occlusion catheter; which is antegradely inserted into the descending aorta with perfusion to the visceral organs kept distal to the balloon through the femoral artery.[10] Nappi described an innovative cannulation and perfusion technique where a cuffed endotracheal cannula, connected to an arterial line geared by a separate roller pump, is inserted into the descending aorta. Perfusion is started in the distal body, while the brain is perfused through the right axillary artery.[11]

Three techniques of circulatory support can be used in surgery of the descending and thoraco-abdominal aorta: total extracorporeal circulation with deep hypothermic circulatory arrest, partial extracorporeal circulation and left heart bypass (Bio-pump). Cardiopulmonary bypass can be performed with either femoro-femoral or pulmonary artery-femoral cannulation. Partial cardiopulmonary bypass is especially advantageous in patients with inadequate pulmonary reserve who may not tolerate single lung ventilation. Left heart bypass, undertaken by cannulation of the inferior pulmonary vein or left atrial appendage and the common femoral artery or descending aorta, allows distal perfusion of the abdominal viscera, spinal cord and lower extremities.

We have multiple tools to prevent ischemic injury and to protect spinal cord, kidney, liver and intestine. One of these strategies is the sequential clamping of the aorta that decreases the duration of ischaemia obtaining immediate reperfusion as soon as the anastomoses are completed. Use of a cold (4°C) crystalloid renal perfusion has been demonstrated to be effective in reducing the rate of postoperative acute renal failure. Selective visceral perfusion is advocated by some authors, using balloon-tipped catheters and a separate arterial inflow circuit. Particular attention is given to spinal cord protection: monitoring of its function using evoked potential. Preoperative identification of artery of Adamkiewicz facilitates the identification of critical intercostal vessels for reimplantation.[12] In conclusion current strategies have reduced more complications and organ damage during aortic surgery but additional studies are needed to improve visceral protection.

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Nurses – Postgraduate Course: Quality improvements and innovation

Uniportal VATS lobectomy

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Uniportal video-assisted thoracic surgery (VATS) has a history spanning more than 10 years and recently has become an increasingly popular approach for managing most thoracic surgery. Its potential advantages include less pain, reduced access trauma and better cosmesis, and patient demand has helped uniportal VATS to become widespread throughout the world. Since we developed the uniportal technique for VATS major pulmonary resections in 2010, we have increased the number of indications in which it is used, thanks to greater experience with the technique as well as improvements in surgical instruments and technology.

The use of specially adapted conventional materials (long curved instruments with both proximal and distal articulation) is one of the key requirements for accomplishing a successful single-incision lobectomy. The technological improvements of high-definition cameras, curved tip appliers for vascular clips, and more narrowed angulated staplers have made this approach safer and increased the number of indications for single-port thoracoscopic resections. The use of a video laparoscope with the distally mounted CCD design enhances the instrumentation. The surgeon and the assistant must be positioned in front of the patient in order to have the same thoracoscopic vision throughout the procedure. Even though the field of vision can only be obtained through the anterior access site, the combined movements of the 30° thoracoscope along the incision allow for different angles of vision. The advantage of using the thoracoscope in coordination with the instruments is that the vision is directed to the target tissue. By doing this, we are lining up the instruments to address the target lesion from a direct, sagittal perspective. Optimal exposure of the lung is vital in order to facilitate the dissection of the structures and to avoid any instrument interference.

The patient is placed in a lateral decubitus position as is usual for conventional VATS. The incision, about 3–4 cm long, is preferably made in the fifth intercostal space in the anterior position. This location of the incision provides better angles for hilar dissection and insertion of staplers. It is helpful to rotate the surgical table away from the surgeons during the hilar dissection and division of structures, and towards the surgeons for the subcarinal lymph node dissection. We always recommend inserting the staplers through the anterior part of the incision with angulation. The use of curved-tip stapler technology allows for improved placement around the superior pulmonary vein and bronchus through a single incision; these are the most difficult structures to divide through a single port. It is important to dissect the vessel as distal as possible in order to achieve better angles for insertion of the stapler. When the angle is difficult for stapler insertion we can use vascular clips or ligate the vessels using sutures.

It is crucial that the thoracoscope remains at the posterior part of the utility incision at all times, as it works with the instruments in the anterior part. The only step where we place the camera below the stapler insertion (anterior part) is for the division of the anterior part of the minor fissure.

In upper lobectomy, the pulmonary artery is normally divided first, followed by the vein. When the lobectomy is completed, the lobe is removed in a protective bag and a systematic lymph node dissection is accomplished. At the end of the surgery, the intercostal spaces are infiltrated with bupivacaine under thoracoscopic view. A single chest tube is placed in the posterior part of the incision.

Cardiac – Postgraduate Course: Perfusion: haemostasis and fluid management

Perioperative management of patients receiving new oral anticoagulants and platelet inhibitors

Anders Jeppsson
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Oral anticoagulants include warfarin and the new oral anticoagulants (NOACs) dabigatran, rivaroxaban and apixaban. Dabigatran inhibits thrombin directly while rivaroxaban and apixaban inhibits coagulation factor X. Today an increasing number of patients are treated with NOACs instead of warfarin due to atrial fibrillation and other conditions with an increased risk of thrombosis. The NOACs differ markedly in pharmacokinetic and pharmacodynamic profiles compared with warfarin. These differences constitute a challenge if the patient requires an operation. The time to peak concentration with the NOACs is much shorter than for warfarin, 2–3 hours versus 120 hours, and the half-life is also shorter, 9–17 hours versus 50 hours. The offset time of the effect is more dependent on renal function than with warfarin. One special problem in surgical patients is that there are currently no available antidotes for the NOACs. In addition, the anticoagulation effect of the NOAC cannot be easily detected with standard clinical coagulation tests. During the presentation a handling strategy for surgical patients treated with NOACs will be discussed.

The new platelet inhibitors may also increase the risk for bleeding complications in patients in need for acute or urgent surgery. Dual antiplatelet therapy with acetylsalicylic acid and a $P2Y_{12}$ antagonist in patients with acute coronary syndrome reduces the risk of thrombotic complications compared with treatment with acetylsalicylic acid only. The risk of thrombotic complications is further reduced if one of the new $P2Y_{12}$ antagonists, ticagrelor or prasugrel, is used instead of clopidogrel. On the other hand, the risk of surgical bleeding complications may be increased, especially if the treatment can't be discontinued before surgery. The new inhibitors have a stronger antiplatelet effect than clopidogrel and a markedly shorter time to effect, 30 minutes compared with 3 hours. Ticagrelor has a shorter offset time than clopidogrel or prasugrel.

$P2Y_{12}$ antagonists are withdrawn before surgery to reduce the risk of excessive bleeding but the patient's condition sometimes renders this impossible. The optimal period of discontinuation varies between the $P2Y_{12}$ antagonists. Current guidelines recommend 5 days for clopidogrel and ticagrelor, and 7 days for prasugrel. During this period most patients are hospitalised which is resource-consuming and costly. An alternative method to a set discontinuation time is to measure platelet function and operate when this has sufficiently recovered. During the presentation the pros and cons of this approach will be discussed together with recently published real-life studies about experiences with the new platelet inhibitors and surgery-related bleeding complications. Furthermore, a handling strategy for surgical patients treated with dual antiplatelet therapy will be discussed.

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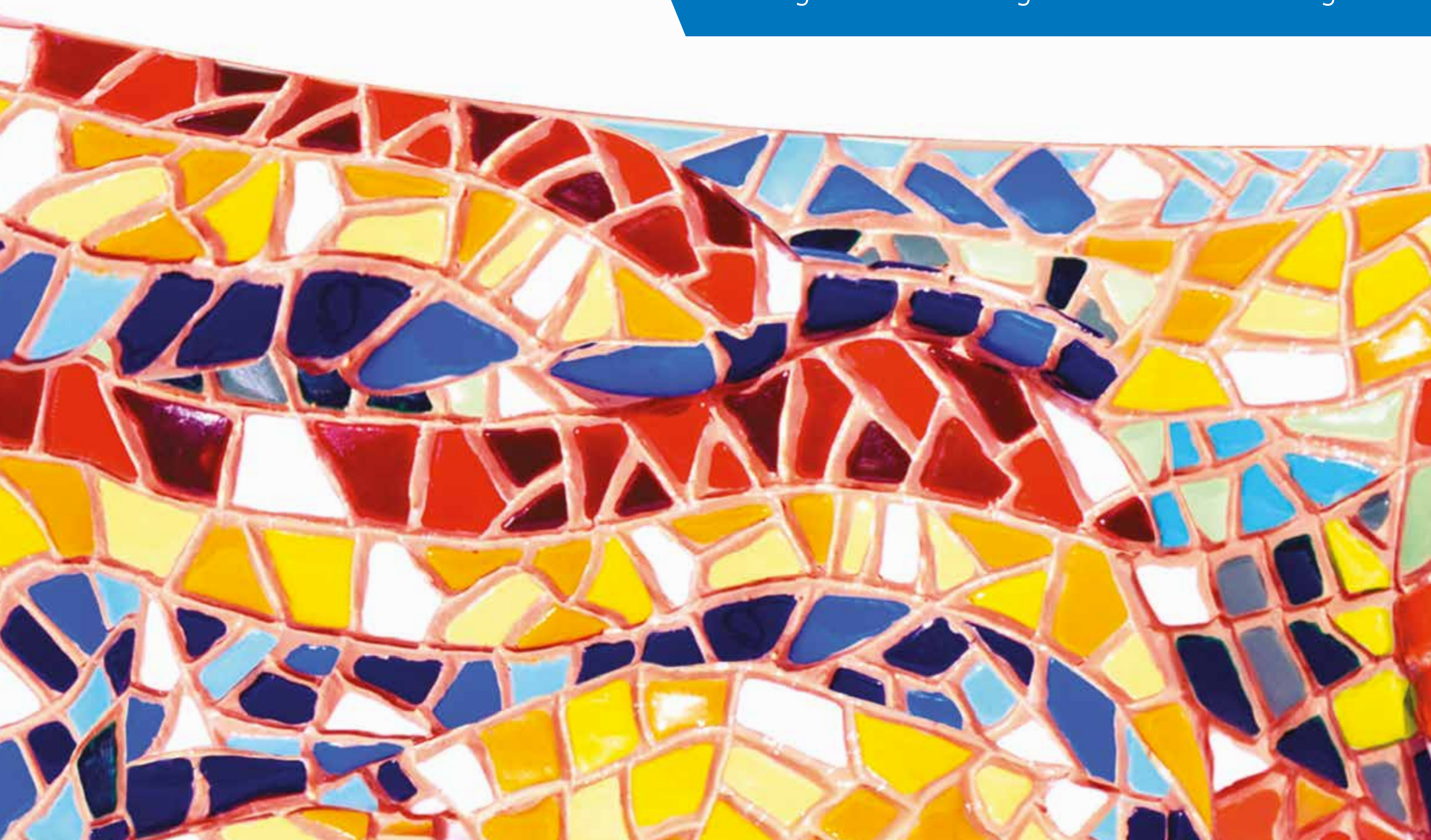

Cardiac – Postgraduate Course: Extracorporeal life support devices and strategies for management of acute cardiorespiratory failure

Transformation of percutaneous access to a safe peripheral cannulation

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The Cardiac Surgery Service, Cardiocentro Ticino, Lugano, Italy

Venoarterial extracorporeal membrane oxygenation support (VA-ECMO) is an accepted life-saving approach for cardiogenic shock inside, and more recently, outside the hospital setting. In these circumstances percutaneous cannulation of the groin vessels is frequently used to initiate extracorporeal support and stabilise the patient. Inadequate arterial flow distal to the cannulation site can cause limb ischaemia and significant morbidity.[1] In Figure 1, a surgical technique is presented, which allows for a timely transformation of a percutaneous to a safe peripheral arterial cannulation, to prevent the deleterious effect of distal limb ischaemia.[2]

There are several techniques for distal perfusion after peripheral arterial cannulation,[3–6] including the introduction of an additional perfusion catheter in the distal artery.

The effective distal perfusion flow can be inadequate, as it is determined by the resistance of the stopcock connection of the perfusion catheter to the circuit and of the catheter itself.

After decannulation, the artery is left with two openings that need to be taken care of. The proposed surgical technique ensures adequate distal perfusion, prepares for safe decannulation and stenosis-free reconstruction of the artery, and gives the surgeon the chance to reconstruct the insertion hole of the percutaneous cannula and/or the possibility to perform an embolectomy of the distal femoral arteries under undisturbed ECMO perfusion.

This technique should be seen as an enrichment of the armamentarium and lowers the threshold for a proactive approach towards prevention of distal limb ischaemia in critically ill patients placed on percutaneous VA-ECMO.

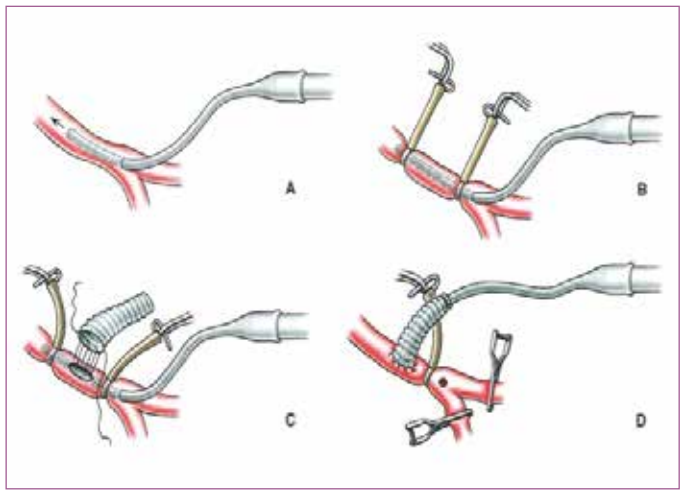

Figure 1. (A) An arterial cannula is introduced in the femoral artery by means of either a percutaneous or direct puncture after surgical exposure. (B) Under ongoing perfusion the artery is freed and tourniquets are placed proximally and distally. (C) It is important to ensure that the tourniquet at the distal portion of the cannula is placed in such a way that the tip and the outflow openings of the cannula are well within the non-occluded segment of the artery, perfusion must continue; an appropriate arteriotomy is performed (the field should be almost blood-free) and an 8 mm beveled vascular prosthesis is sutured to the artery. (D) A second arterial cannula is advanced at the level of the anastomosis, the prosthesis is tied securing the correct position of the cannula. The tourniquet towards the tip of the 'old' cannula is released and the prosthesis de-aired with a needle. Anastomotic bleeding can now be controlled. The perfusion is interrupted for some seconds, the arterial line is rapidly connected to the 'new' cannula and perfusion commences again. The 'old' cannula is withdrawn, the arterial insertion hole is controlled by the tourniquet and vascular clamps on the distal branches of the femoral artery.

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Thoracic – Postgraduate Course: Management of oesophageal perforations

Delayed perforations/malignant tracheo-oesophageal fistula

Marcelo F Jimenez Salamanca University Hospital, Spain

Managing patients with a large malignant tracheo-oesophageal fistula is a surgical challenge because they are not suitable for convenient short-term procedures such as the use of expandable stents or tissue glue, or a relatively easy surgical repair with direct closure by interposition of healthy tissue (e.g. intercostal, sternocleidomastoid or pectoralis muscle). Those are the methods used for small tracheo-oesophageal fistulas or in benign conditions where the fistula usually grows in patients with other major medical problems, mainly as a complication of prolonged intubation. In those cases, good results can be obtained if the patient recovers from the underlying major medical problems.

Tracheo-oesophageal fistulas develop in approximately 15% of patients with an oesophageal malignancy. The incidence of malignant tracheo-oesophageal fistulas seems to have increased over the last years to a level well above 10% of all nonresected oesophageal cancers.

Malignant tracheo-oesophageal fistulas usually develop during or after completing radiochemotherapy for tumor necrosis in an area that previously showed tumor progression into the wall of the tracheobronchial system. This phenomenon can be increased by the presence of an oesophageal stent, often used in the pretreatment period, resulting in a large tracheobronchial fistula due to oesophageal self-expanding metal stent migration with tracheal erosion. This complication accounts for 2% of all tracheo-oesophageal fistulas.

With a post-radiotherapy malignant tracheo-oesophageal fistula, the fistula site is predominantly oesophagotracheal or oesophagobronchial, and in few cases a connection is established peripherally, as an oesophagopulmonary fistula. Malignant tracheo-oesophageal fistulas are more frequently observed after radiation therapy, probably related to the prolonged survival observed in patients treated with chemoradiotherapy.

Typically, patients suffered from severe coughing attacks right after fluid consumption; fever, purulent tracheobronchitis and recurrent pneumonia were detected in all patients, and weakness and fatigue were long-lasting symptoms. However, due to these symptoms being often associated with the disease and chemoradiotherapy of the patients with oesophageal cancer, detection of the formation of a tracheo-oesophageal fistula may be delayed for 1 to 18 months after the first clinical symptom.

Management aims to stabilise the airway and seal off oesophagorespiratory communication. Treatment options for oesophagorespiratory fistulas are resection of the oesophagus, collar oesophagostomy with gastrostomy or jejunostomy for nutrition, oesophageal bypass, oesophageal stenting and supportive treatment (gastrostomy or jejunostomy, parenteral nutrition, etc.). In the presence of a fistula, it is practically impossible to carry out an oesophageal resection, but when a tracheobronchial fistula is related to oesophageal stent migration to the airway, surgery is usually unfeasible due to the poor clinical condition of the patient, and palliative treatment typically consists of placing a stent in the trachea, oesophagus, or both. In some circumstances, even with poor medical condition stenting is not feasible due to the extension of the communication, and exclusion with collar oesophagostomy and gastrostomy or jejunostomy for nutrition is the only possibility to save the patient's life. Determining when to remove the stent and when to leave it in place in the oesophagus is a difficult decision. The stent can be left in place when performing a palliative exclusion. If curative surgery was considered, the stent needs to be removed before surgically excluding the oesophagus, with the aim of creating a new tracheal wall with the posterior oesophagus.

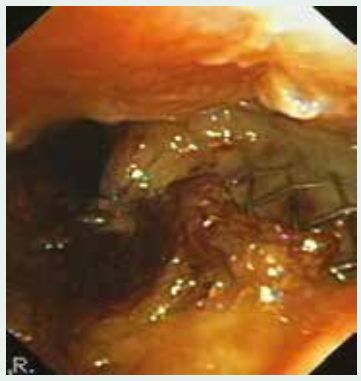

Figure 1. Large tracheobronchial fistula due to oesophageal self-expanding metal stent migration with posterior tracheal wall erosion.

And naturally, in this complicated setting, all decisions must be made by the multidisciplinary team (surgeons, gastroenterology endoscopist, ENT surgeons, ICU care providers).

Cardiac – Rapid Response: Aortic valve substitutes: the long-term view

Freestyle root replacement improves haemodynamics and exercise capacity in young (<60 years) patients: results from a stress echocardiographic study

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The impact on functional capacity of an aortic valve prosthesis remains controversial in patients younger than 60 years. The aim of this study was to evaluate functional capacity and haemodynamics during exercise in those younger patients, comparing stentless versus mechanical valve prostheses.

Between January 2008 and August 2013, a total 84 patients younger than 60 years underwent a stentless root replacement (FSR, n=42) or a mechanical valve/conduit replacement (MV, n=42). Patients who received a stentless prosthesis had a higher chance of having a bicuspid aortic valve (54.8% versus 78.6%, p=0.04), a larger aortic annulus (23.2±2.40 mm versus 25.9±4.13 mm, p=0.01), an ascending aorta (35.7±7.35 mm versus 40.7±7.93 mm) and a higher left ventricle stroke volume (52.7±13.0 ml versus 70.7±26.0 ml, p=0,01). A propensity score matching was used to reduce patient variability.

After propensity score matching, 27 patients were selected in each arm. These patients underwent a semi-supine bicycle exercise test with concomitant Doppler echocardiography and ergospirometry to determine functional capacity (VO_2max), TVG and effective orifice area (EAO) both at rest and during maximum exercise.

FSR patients (mean age 49.0±8.4 years), compared with MV patients, had significantly lower mean and peak TVG at rest (mean: 9.62±6.64 versus 14.7±7.07 mmHg, p<0.01; peak: 11.1±3.13 versus 17.4±3.05 mmHg, p<0.01).

During exercise, the TVG benefit increased (mean: 5.28±3.28 versus 11.2±3.24 mmHg, p<0.001; peak: 9.97±6.34 versus 21.5±5.89, p<0.001) for a similar increase in cardiac output (9.81±1.92 versus 9.0±1.9, p=0.14). A similar improvement in FSR patients was registered for functional capacity at maximal exercise (VO_2max: 23.2±6.7 versus 28±6.1, p=0.02).

In conclusion, compared with MV, FSR offers superior haemodynamics and subsequently enhances functional capacity, making it especially suitable for active patients.

Cardiac – Rapid Response: Transcatheter aortic valve implantation versus surgical aortic valve replacement

Transapical transcatheter aortic valve implantation versus surgical aortic valve replacement in a prospective randomised trial: comparable health-related quality of life (HRQOL) in low-risk patient

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The transcatheter stent valve concept was introduced in 1989 as an alternative to conventional aortic valve replacement,[1] and in 2002 the first in human transcatheter aortic valve implantation (TAVI) was performed.[2] Since then the technology has improved rapidly and an increasing number of studies have compared TAVI with conventional surgery (SAVR). However, quality of life data are sparse. The aim of this study was to evaluate apical TAVI (a-TAVI) against conventional aortic valve replacement in terms of HRQOL among the low-risk patients included at the STACCATO trial at our institution.[3]

In our prospective randomised controlled trial patients were randomised to either a-TAVI or SAVR. Operable patients with isolated aortic valve stenosis and age ≥75 years were included. Key exclusion criteria were emergency surgery, previous heart surgery, and coronary artery disease. SAVR was performed during cardiopulmonary bypass with resection of the native valve and replacement with a bioprosthesis (PERIMOUNT, Edwards Lifesciences) through a median sternotomy. a-TAVI was performed via mini-thoracotomy with introduction of the prosthesis (Edwards SAPIEN, Edwards Lifesciences) via the apex of the heart and antegradely advanced over the pre-dilated native valve and during pacing.

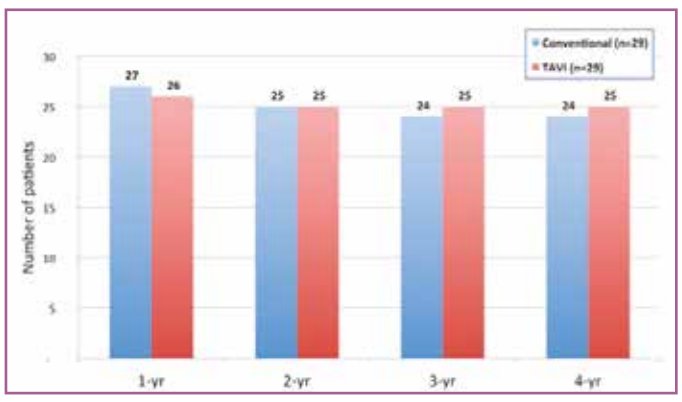

Figure 1. Number of patients alive in the intention-to-treat groups.

A total of 59 patients were randomised at our institution: 29 were assigned to a-TAVI and 30 were assigned to SAVR. One patient in the SAVR group declined participation, resulting in 29 SAVR procedures. Patients randomised for SAVR had lower peak aortic valve gradient, otherwise baseline characteristics were similar. Procedural outcomes were previously reported.[3]

After 4 years intention-to-treat survival rates were 25/29 (86%) and 24/29 (83%) in the a-TAVI and SAVR groups ($p>0.05$), respectively. In the a-TAVI group a total of four patients died during follow-up; one patient died on the waiting list, one died following treatment for left coronary artery obstruction due to valve implantation, one from respiratory problems, and one from cerebral infarction. A total of five patients in the SAVR group died during follow-up; one died from brain haemorrhage, one due to acute coronary syndrome, one from pelvic cancer, and we were unable to identify the causes of death in the remaining two patients. The year-by-year survival rates are displayed in Figure 1 and we found no statistically significant difference between the two groups ($p>0.05$).

HRQOL was comparable in the two groups as displayed in Figure 2a (physical score) and Figure 2b (mental score). The only statistically significant difference was observed with SF-36 composite physical scores at 1-year follow-up in the intention-to-treat data ($p<0.05$).

In summary, we examined the 4-year HRQOL and survival rates in a year-by-year manner from patient groups of the STACCATO trial.[3] Our data from these low-risk patients display equivalent self-estimated quality of life and survival rates after a-TAVI and SAVR, except for self-estimated physical condition at 1 year, where a-TAVI was statistically superior to SAVR. However, the results of our trial must be interpret with caution because of its early termination and the small number of patients. In terms of HRQOL the a-TAVI procedure provides a robust alternative to SAVR in low-risk patients. Moreover, our 4-year survival rates after a-TAVI appear comparable with SAVR.

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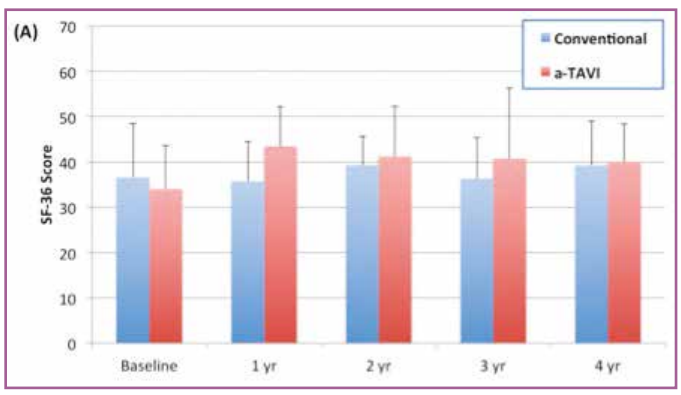

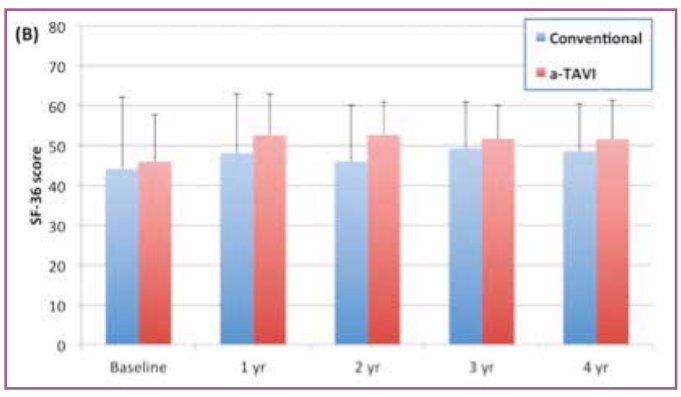

Figure 2. SF-36 scores in the intention-to-treat groups.
(A) Composite physical score; (B) Composite mental score.

Cardiac – Postgraduate Course: Update on the results, rationale and design of ongoing clinical trials

Hybrid coronary revascularisation – Combining minimally invasive coronary artery bypass surgery (MIDCAB/EACAB) with percutaneous coronary intervention is feasible and safe compared with traditional CABG

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Silesian Center for Heart Diseases in Zabrze, Poland

When it comes to invasive treatment of multivessel, complex coronary artery disease (CAD), conventional coronary artery bypass grafting (CABG) is considered to be the 'gold standard' or the treatment of choice, well supported by evidence-based medicine.
Total revascularisation, augmented by arterial grafting is associated with significantly reduced risk of death, myocardial infarction and recurrences of angina. Most importantly, the use of left internal mammary artery (LIMA) to the left anterior descending (LAD) has been proven to provide an excellent long-term patency rate, far superior to any percutaneous intervention. Unfortunately, despite overwhelming evidence, arterial revascularisation remains underutilised, because vessels other than LAD are often bypassed using venous grafts, which are known to have less optimal patency with occlusion (ranging from 6.2% to 30% at 12 months). Conversely, the 12-month rate of drug-eluting stent (DES) restenosis and thrombosis after percutaneous coronary intervention (PCI) in non-LAD coronary vessels is similar or even lower than the rate of saphenous vein graft (SVG) failure. Therefore, it seems that PCI with DES in non-LAD targets may provide a promising alternative to SVG and constitutes the fundamental basis for hybrid coronary revascularisation (HCR), defined as minimally invasive direct coronary artery bypass LIMA-LAD grafting, utilising endoscopic LIMA harvesting (MIDCAB/EACAB) and catheter-based techniques with implantation of DES in non-LAD vessels.
Because of the lack of data from prospective randomised trials comparing HCR with standard surgical revascularisation in patients with multivessel coronary disease, the HYBRID (PL-MIDES) study was designed as the first to assess feasibility, safety and efficacy of such an approach.
Two hundred consecutive patients, with angiographically-confirmed, multivessel CAD involving the LAD and a critical (>70%) lesion in at least one major epicardial vessel (except LAD) amenable to both PCI and CABG, were randomised in a 1:1 fashion to HCR or standard surgical revascularisation. The primary objectives of this trial were to investigate the feasibility and safety of HCR. The feasibility assessment was defined both as the percentage of patients in the hybrid group that underwent a complete HCR procedure according to the study protocol and a percentage that had to be converted to standard CABG. The safety endpoint was the occurrence of MACE (major adverse cardiac events) such as death, myocardial infarction, stroke, repeat revascularisation, and major bleeding within the 12-month period after randomisation. In the trial, 93.9% of patients in the hybrid group had a complete HCR procedure and 6.1% were converted to CABG. At 1 year, 92.2% of the CABG group and 89.8% of the hybrid group were free from MACE. No strokes were reported in either group. The rate of death was 2.9% in the CABG group and 2.0% in the HCR group. Angiographic follow-up was performed in 85% and 81% of patients in HCR and CABG groups, respectively (p=0.41). The patency of arterial grafts to the LAD was substantial and equaled 94% and 93% (HCR versus CABG). While one LIMA conduit was significantly narrowed in the HCR group, five grafts were found narrowed in the CABG group; 79% of the remaining conduits were free from occlusion and obstruction.
The HYBRID (PL-MIDES), being the first randomised pilot study for HCR is unique from a trifold perspective. Firstly, it proved that HCR is safe and feasible in a select population of patients with multivessel CAD. Secondly, it confirmed the promising results supporting the idea of HCR being an efficacious, safe and reliable method of coronary revascularisation in patients with multivessel disease. Thirdly, minimally invasive CABG with LIMA to LAD as a first-stage procedure in HCR-patients was not associated with significant increase in adverse events.
Our study has proven HCR to be safe in patients with multivessel CAD, with surgical treatment preceding endovascular repair. However, in six patients (6.1%) conversion to full sternotomy had to be performed. In four cases the conversion was not emergent, but rather planned, as the consequence of either inability to perform single lung ventilation due to severe chronic obstructive pulmonary disease (COPD), or inability to visualise LIMA due to pleural adhesions. In these cases, only port incisions were necessary, no thoracotomy incisions were performed.
In the other two cases, endoscopic LIMA harvesting was successful, but LADs could not be identified once thoracotomy was performed. In one case there was a significant muscular bridge-covering LAD, while in the second patient there was a large amount of fatty tissue covering the entire myocardium. In both cases full sternotomy provided better visualisation enabling complete surgical revascularisation.
This first randomised pilot study on hybrid coronary revascularisation shows promising feasibility and safety results supporting the idea of HCR in patients with multivessel disease.

Cardiac – Professional Challenge: Challenges in mitral valve repair: part I

3D vision: Added value for minimally invasive?

Ludwig Müller Innsbruck Medical University, Austria

Minimally invasive mitral valve surgery (MIMVS) has found increasing interest and application in recent years, culminating in close to 50% of isolated mitral procedures performed through mini-thoracotomy in Germany in 2014. Nevertheless, MIMVS is still restricted to a select number of highly specialised centres. Video-assisted direct vision MV surgery (Leipzig technique) was the gold standard until recently, leaving a total endoscopic approach to only a very few extremely specialist, high-volume surgeons around the world. With the availability of a new high definition 3D technology (Einstein Vision®) total endoscopic MV surgery has become a reality for many less busy surgeons. The system comprises a double-channel endoscope, which is connected to two high-definition videocameras permanently fixed to the endoscope. No sterilisation is required since the whole videoendoscope is covered by a disposable sterile cover.
Since June 2014, 52 MIMVS operations have been performed with the aid of this system in our centre. There was no hospital mortality. Complications included one extracorporeal membrane oxygenation (ECMO) for severe lung oedema, one re-exploration for bleeding from the thoracotomy, and one re-exploration for a lost annuloplasty ring after a larger ring had been implanted for correction of systolic anterior motion (SAM). One reoperation was done through median sternotomy for a ruptured papillary muscle after MV replacement. All operations were performed by two experienced surgeons, however, three more surgeons have been trained in total endoscopic mitral surgery with 3D videoendosopic assistance from the beginning.
As a result of the 3D videoendoscopic technique, all surgeries are performed without the use of a rib retractor and, in the most experienced hands, access came down to a 3 cm linear (Figure 1) or semicircular periareolar microincision. Up-to-date 3D videoendosopic technology definitely represents a major step forward and added value for MIMVS.

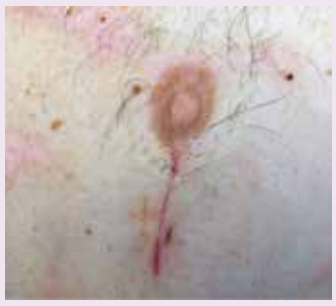


Figure 1. Microincision for MIMVS.

Nurses – Postgraduate Course: Science

Nurses can play a vital role in reducing pain after cardiac surgery

Richard van Valen Nurse practitioner Erasmus Medical Center, Rotterdam, the Netherlands

Pain after cardiac surgery is often described as severe in the first days after surgery. Many different regimes of pain medication have been examined in the past, with different results. Often the most effective regimes were those requiring complex interventions. In our centre (academic teaching hospital) we decided to take advantage of those who spend the most time with the patients and have the skills and knowledge required to assess patients using a specific protocol. The protocol allows nurses to administer morphine if a patient (a) is not sedated, (b) has normal blood pressure values, and (c) has a normal respiratory rate. Under these circumstances, nursing staff are allowed to apply the protocol without consulting the attending physician and can repeat the intervention if needed. The protocol was compared with a standardised regime of pain medication with morphine and acetaminophen. The feasibility of the protocol was proven in a previous study.
We enrolled 4260 patients into this study, of whom 2725 were treated according to the nurse-driven flowchart protocol that is presently in use (EG-group), while the other 1535 patients were treated according to a classical pain management approach (Ctrl-group). The study was designed as a single-centre, prospective, cohort study and was performed over a 5-year period. The population predominantly consisted of males (66%). This study found that using a nurse-driven protocol with a tailored pain medication regime gives a sustained lower visual analogue scale (VAS) score during the first 72 hours on a nursing ward after cardiac surgery. The mean VAS level in the control group was 2.8, compared with 2.3 in the intervention group. This effect continues, even three years post-introduction. Examining the difference between different patient groups confirmed our previous findings: younger patients experience more pain, as do patients with a critical preoperative state.
The overall opinion of nurses, assessed by semi-structured interviews, was that by using the nurse-driven protocol, it enhanced their possibilities to optimise patient care. According to the nurses involved, there are however associated time constraints, and it was also suggested that the protocol does not recognise the clinical knowledge of nurses in assessing a patient before performing an intervention. Nurses can assess if a patient is sedated without using a specific sedation score (Ramsay score). This can, however, lead to potential legal problems. If a patient should develop complications, adherence to the protocol needs to be clear. This directly relates to another potential problem: there was a poor registration of the required measurement before an intervention in our electronic patient database. A challenge for the future should therefore be to improve the registration of parameters needed for interventions. Another challenge is that this protocol only works with median sternotomies. In a changing surgical practice with more and more minimally invasive surgery being undertaken, the group of patients for whom this protocol is insufficient is growing. For example, the lateral thoracotomy patient undergoing mitral valve surgery is at present not included under this protocol. These patients appear to require more pain medication and more complex interventions by specialised healthcare professionals. The presentation of this study will take place during the postgraduate meeting for nurses, nurse practitioners and physician assistants.

Surgical treatment of lung failure, 16–18 November 2015, Windsor, UK

Course Directors: J Pepper and A Simon, London, UK

Recent developments in extracorporeal organ support and the use of pre-operative extracorporeal membrane oxygenation have radically improved the prospects for patients waiting for new lungs. This course will bring you up-to-date with these developments, describe in detail how these technologies are applied and enable you to manage the complications for the benefit of your patients.

Please refer to the EACTS Academy website for further information and registration http://www.eacts.org/academy/courses/lung-failure

The surgical treatment of lung and heart failure courses will run consecutively in Windsor, UK. A specially discounted fee is available for delegates wishing to attend both.

Thoracic surgery: Part II,

Date/duration: 8–11 December 2015
Location: Windsor

Course Director: P Rajesh, Birmingham, UK

Course overview

The course will include didactic presentations with interactive discussions and seminar sessions with faculty to promote discussion with delegates. The course material will be such that, at the conclusion of the 4 days, the delegates will have an understanding of the principles of airway management, mediastinal and oesophageal disorders, indications and contraindications and techniques and access for surgery.

Target Audience

This course is designed for Senior Trainees in Cardio-thoracic Surgery and newly appointed Consultants in Europe. The faculty are experts in the various subspecialities of General Thoracic Surgery. Senior Trainees in Cardio-thoracic Surgery and newly appointed Consultants.

Agenda

Saturday 3 October

Techno College

08:00	Transcatheter aortic valve implantation/aortic valve	Auditorium
11:00	Heart failure/aortic disease	Auditorium
14:30	Atrioventricular valves	Auditorium
09:00	Diagnosis and surgery	G102+G103
13:30	Outcome	G102+G103
13:00	3D Technology	G104+G105
16:20	Mechanical support	G104+G105

Sunday 4 October

Professional Challenge

08.15	Challenges in mitral valve repair	Auditorium

Focus Session

08:15	Safer surgery for who?	G104+G105
10:15	Quality improvement	E106+E107
10:15	Safer surgery for who?	G104+G105
13:45	Women in cardiac surgery	F003
13:45	Quality improvement programme update	F002
13:45	Basic science – heart	G109
10:15	Basic science – lung	G109

Abstract Rapid Response

10:15	Transcatheter aortic valve implantation versus surgical aortic valve replacement	E102
13:45	Aortic valve substitutes: the long-term view	E102

Plenary

12:00	CanBetter: optimising training programmes in cardiothoracic surgery	Auditorium

Postgraduate Education

08:15	Perfusion	Forum
08:15	Nurse and nurse physician postgraduate programme	E108
13:15	Update on the results and rationale and design of ongoing clinical trials	Auditorium
13:45	Extracorporeal life support devices and strategies for management of acute cardiorespiratory failure	G104+G105
08:15	Pneumonectomy controversies: what is the problem?	E104+E105
10:15	Management of oesophageal perforations	E104+E105
13:45	Management of acquired tracheal disorders: from stenosis to laceration	E104+E105
08:15	Update on hypoplastic left heart syndrome management	G106+G107
10:15	Update on Tetralogy of Fallot with pulmonary valve atresia and major aortopulmonary collateral arteries	G106+G107
13:45	Meet the experts	G106+G107
14:45	Surgical film session	G106+G107
08:15	Basics in proximal thoracic aortic surgery: session 1	G102+G103
10:15	Basics in proximal thoracic aortic surgery: session 2	G102+G103
13:45	Outcome and follow-up after major thoracic aortic surgery: session 3	G102+G103
14:45	Thoraco-abdominal aneurysms revisited: session 4	G102+G103

Monday 5 October

Professional Challenge

08:15	A lifetime living with transposition of the great arteries – part I	G106+G107
10:15	A lifetime living with transposition of the great arteries and left ventricular outflow tract obstruction – part II	G106+G107
08:15	Arch involvement in acute aortic dissection: a surgical challenge EACTS/STS	G102+G103
10:15	Uncertainties in the treatment of chronic dissection EACTS/STS	G102+G103
08:15	Wire skills for the surgeon	Auditorium
10:15	Wire skills for the surgeon	Auditorium

Focus Session

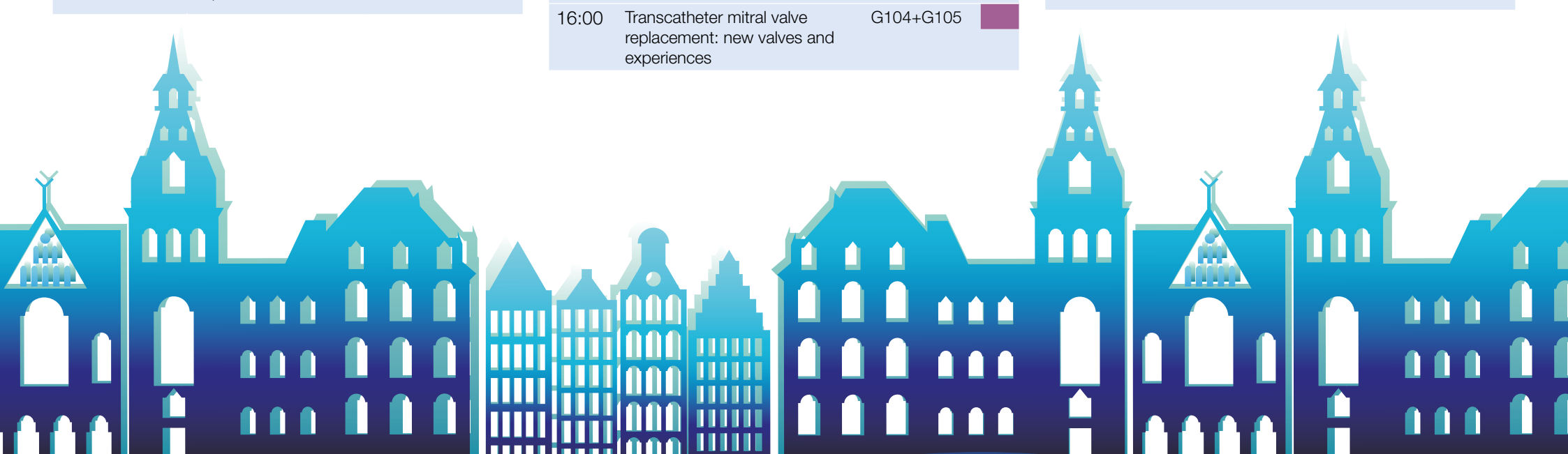
10:15	Avoiding disasters in cardiac surgery	E106+E107
10:15	Meet the experts	Emerald Room
14:15	Coronary artery bypass graft is on the rise, don't give it up	Auditorium
14:15	Infectious problems	E106+E107
14:15	Transcatheter aortic valve implantation: current and future perspectives	E104+E105
14:15	Pro and con debates	Emerald Room
14:15	Joint session EACTS SBCCV PASCaTS – Cardiothoracic surgery	G109
16:00	Fast-track management	E104+E105
16:00	Live-heart team of complex pathologies	Emerald Room
16:00	Transcatheter mitral valve replacement: new valves and experiences	G104+G105
16:00	Joint Session EACTS SBCCV PASCaTS – Cardiac surgery in the emerging economies: the evolving management strategies	G109
10:15	Minimally invasive surgery for lung cancer: up-to-date debates	E108
14:15	Meet the experts in robotic cardiothoracic surgery	E103
16:00	TNM classification: 8th edition	E103

Abstract

08:15	Heart transplantation in the modern era	Forum
08:15	Endocarditis: a continuous dilemma	G104+G105
08:15	Risk models in coronary surgery	E104+E105
08:15	Work in progress	Emerald Room
10:15	Left ventricle – strategies in left ventricular moderations	Forum
10:15	Aortic valve replacement: what is new?	G104+G105
10:15	Cardiac general	E104+E105
10:15	Basic science 1	G109
14:15	Future of sutureless valves	Forum
14:15	Challenges in surgical aortic valve replacement	G104+G105
14:15	Basic science 2	F002
16:00	The two faces of arterial revascularisation	Auditorium
16:00	Results of Ross procedures and homografts in aortic surgery	E106+E107
08:15	Thoracic oncology I: staging	E103
08:15	Non-oncology I	E108
10:15	Thoracic oncology II: perioperative management	E103
14:15	Mediastinum	E108
16:00	Fontan circulation	G106+G107
14:15	A broad view on acute dissection	G102+G103
16:00	A 4D view of the aortic root	G102+G103

Abstract Rapid Response

08:15	Reducing invasiveness	E102
10:15	Supporting the heart and lung	E102
16:00	Thoracic quick fire session	E102
14:15	Congenital	E102



	Plenary	
11:50	Presidential Address	Auditorium

	Residents Session	
10:15	EACTS Cardiothoracic Masters Jeopardy	F002
12:45	Cardiac surgery residents – where do we come from and where are we heading	F002
16:00	Endoscopic port access mitral valve repair	F004

	Training in Research	
10:15	All you need to know for your next research project – part I	F003
14:15	All you need to know for your next research project – part II	F003
16:00	How to statistically analyse your next research project	F003

Tuesday 6 October

	Professional Challenge	
08:15	Less invasive procedures for complex patients	Auditorium
10:15	Less invasive procedures for complex patients	Auditorium

	Focus Session	
08:15	Aortic valve disease and heart failure: how do they connect?	E104+E105
10:15	Acute extracorporeal support and mechanical circulatory assist	Forum
10:15	Is minimally invasive cardiac surgery the present and the future of mitral valve repair?	G104+G105
10:15	Perioperative complications in cardiac surgery	E104+E105
10:15	Nightmares in cardiothoracic surgery	Emerald Room
14:15	Pilots and passengers after cardiac surgery: so you want to fly again?	F002
14:15	Challenging the options for younger patients – minimising long-term risks with biological valves along the patient journey	Forum
14:15	Pre-operative planning, simulation, 3D printing and intra-operative navigation in cardiothoracic surgery	Emerald Room
16:00	Aortic valve replacement: ever had any problems?	Forum
16:00	Better outcomes through optimising international normalised ratio management and anticoagulation in aortic valve replacement	E104+E105
16:00	A contemporary approach to the aortic valve and aortic root	E106+E107
14:15	Guidelines	E103
16:00	Sublobar resections: controversies	E103
08:15	Paediatric and congenital cardiac activities in emerging economies	F002
14:15	Infections and chylothorax	G106+G107
08:15	Inflammatory and infectious aortic disease: a difficult environment	G102+G103
14:15	Arch repair	G102+G103
16:00	A contemporary approach to the aortic valve and aortic root	E106+E107

	Abstract	
08:15	Current challenges for extracorporeal life support	Forum
08:15	Native and prosthetic valve endocarditis: an update	G104+G105
08:15	Revisiting the tricuspid valve	E106+E107
10:15	Functional mitral regurgitation	E106+E107
14:15	Optimising outcomes in coronary surgery	G104+G105
14:15	Left ventricular assist device: Latest advances	E104+E105
14:15	Degenerative mitral regurgitation	E106+E107
16:00	What is new in transcatheter aortic valve implantation	Auditorium
16:00	Case reports and videos	G104+G105
08:15	Thoracic oncology III: Postoperative follow-up	E103
08:15	Thoracic non oncology II	E108
10:15	Session case report	E103
10:15	Lung transplantation	E103
14:15	Basic science and education	E108
16:00	Chest wall	E108
08:15	Tetralogy of Fallot	G106+G107
10:15	Valve surgery	G106+G107
16:00	Congenital miscellaneous	G106+G107

	Abstract Rapid Response	
08:15	How to perform an effective surgical atrial fibrillation ablation	E102
14:15	General cardiac	E102
16:00	New technology in mitral surgery	E102
10:15	Innovation and new strategies in thoracic aortic surgery	E102

	Plenary	
11:50	Honoured Guest Lecture	Auditorium
12:25	EACTS Award Presentations	Auditorium
12:35	Presidential Inauguration	Auditorium

	Residents Session	
12:45	Residents Luncheon	Amsterdam Cafe

	Simulator Session	
08:15	Endoscopic port access mitral valve repair	F004
10:15	Endoscopic port access mitral valve repair	F004
14:15	Endoscopic port access mitral valve repair	F004
16:00	Endoscopic port access mitral valve repair	F004

	Training in Research	
08:15	A summary of essentials for your next research project	F003
10:15	Clinical studies	F003

Wednesday 7 October

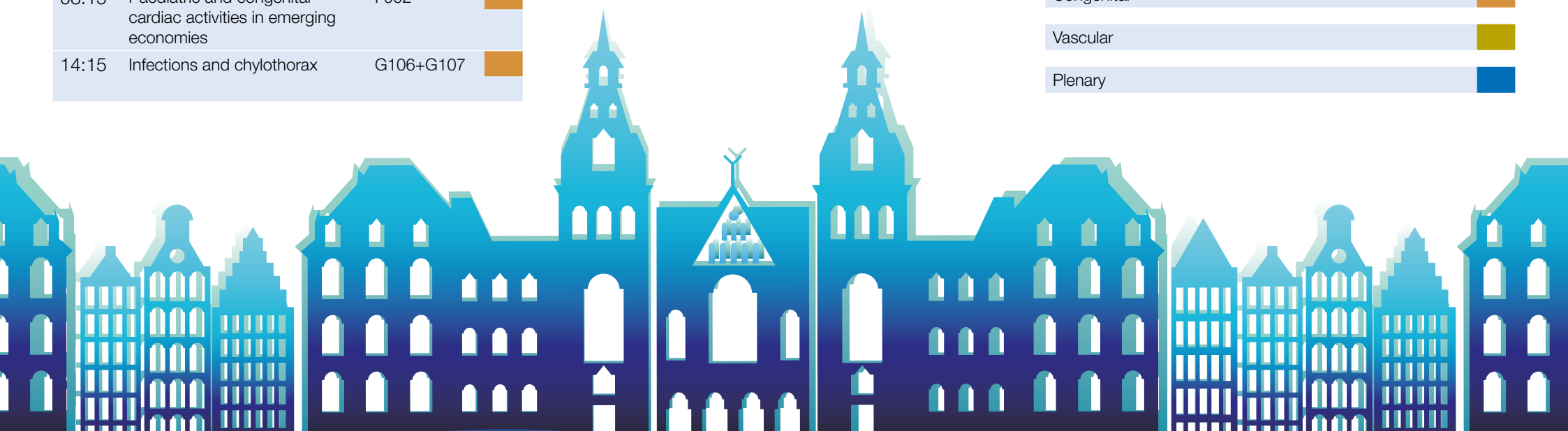
	Advanced Techniques	
09:00	Controversies and catastrophes in adult cardiac surgery	G102+G103
09:00	A future without suture	G104+G105
09:00	Advance technique session on multiple arterial grafting	G106+G107

	Focus Session	
09:00	How to do it? With live in a box	Emerald Room

	Wetlab	
09:00	Learn from the experts how to do a remodelling or a re-implantation procedure	E106+E107
09:00	Mitral valve repair	E104+E105
10:30	Learn from the experts how to do a remodelling or a re-implantation procedure	E106+E107
09:00	VATS lobectomy	E103
09:00	AoV reconstruction and Senning	E102

	Abstract	
09:00	Video session	G109

Key
Cardiac
Thoracic
Congenital
Vascular
Plenary



Vascular – Postgraduate Course: Basics in proximal thoracic aortic surgery: session 1

Is an individualised approach to bicuspid aortopathy possible?

Hans-Joachim Schäfers Saarland University Medical Center, Homburg/Saar, Germany

With a prevalence of 1% to 2% in the general population, bicuspid anatomy of the aortic valve is the most common cardiovascular malformation. Aortic dilatation occurs in 50% to 60% of individuals with a bicuspid aortic valve, probably irrespective of degree and type of malfunction of the valve. Two different patterns of this bicuspid aortopathy have been identified. The more frequent seems to involve mainly the tubular ascending aorta; extension of the dilatation into arch is seen in a relevant proportion. The other dilating pattern involves primarily the aortic root with extension into tubular aorta; it rarely extends into the arch. In addition, severe regurgitation of the bicuspid aortic valve is associated with marked annular dilatation, which may be considered as a purely annular form of aortopathy.

The consequences of aortopathy depend on its location. A diameter of 4 cm seems to be the upper end of normal, although current data do not differentiate between root and tubular aortic dimensions. Ascending aortic dilatation has been found to continue even after correction of the valve lesion once a diameter of 4.5 cm is exceeded; consideration of prophylactic aortic replacement is recommended beyond this threshold. It is unclear whether diameters of between 4 and 4.5 cm are safe in terms of long-term prognosis. Annular dilatation has been found to progress after valve repair if the dilated annulus (>26 mm to 27 mm) is not specifically addressed at the time of initial surgery. In judging the extent of aortopathy at this time, there is no evidence that involvement of one aortic segment (annulus, root or tubular aorta) implies an increased probability of secondary dilatation of the remaining segments.

In the absence of specific risk factors, a diameter of 5.5 cm is currently considered the threshold for aortic replacement, irrespective of the need for aortic valve surgery. For surgery on the aortic valve (valve replacement or repair) any segment exceeding 4.5 cm is probably best replaced at the time of the initial procedure. If surgery is performed as valve repair for isolated AR, the annulus should be stabilised by an annuloplasty in order to minimise the risk of repair failure and need for valve reoperation.

Thus, in clinical practice the extent of aortopathy guides surgical treatment. Diameters of annulus, root, and tubular aorta should be carefully measured. An isolated valve procedure (with or without annuloplasty) will be sufficient for all patients with aortic diameters of less than 4 cm. Root or tubular diameters of 4.5 cm require prophylactic replacement of the respective segment, which should be considered separately. If root dimensions are preserved, tubular aortic replacement will suffice. In the presence of root dilatation it should be replaced, including the neighbouring part of the tubular aorta. Current evidence suggests that such an individualised approach limits the complexity of the operation while achieving a good long-term result. An individualised approach to bicuspid aortopathy is therefore advisable.

Cardiac – Rapid Response: Transcatheter aortic valve implantation versus surgical aortic valve replacement

Comparison between aortic valve replacement with rapid deployment valve and transfemoral transcatheter aortic valve implantation in the 'grey zone' patients with severe aortic stenosis

Alessandro Di Cesare, Marialisa Nesta, Piergiorgio Bruno; Francesco Burzotta, Cristian Colizzi, Filippo Crea, Carlo Trani, Massimo Massetti

Catholic University of the Sacred Heart, Rome, Italy

The past decade has seen a trend towards less invasive medical procedures in virtually all medical specialties. Clinical outcome studies have shown that less invasive procedures can provide reductions in procedure and hospitalisation times, cost savings and improvements in patient recuperation and outcomes.

Minimally invasive heart surgery dramatically reduces the traumatic impact of the operation. Aortic valve stenosis is currently the most frequent valve disease treated in daily cardiac surgery practice. Despite the development and recent clinical technical advances of transcatheter aortic valve implantation (TAVI), originally designed to extend indications in patients unsuitable for a surgical procedure or with high-risk factors for morbidity and mortality, surgical aortic valve replacement (AVR) remains the gold standard to treat aortic valve degeneration and dysfunction.

Aortic valve replacement with rapid deployment valve (RD-AVR) and transfemoral transcatheter aortic valve implantation (TAVI) represent emerging techniques for managing patients with aortic stenosis. The key question in the current medical setting is whether RD-AVR will benefit patients with severe aortic stenosis who are deemed operable but considered as presenting a high surgical risk. In recent years several studies have focused on comparing AVR and TAVI in this 'grey zone' of patients. TAVI has shown excellent early and mid-term clinical and haemodynamic results in inoperable or high-risk patients. However, its increased costs, the non-removal of the calcified aortic valve and the resulting risk of paravalvular leakage, coronary occlusion and aortic rupture have been recognised as important limitations of TAVI.

For these reasons aortic valve replacement with rapid deployment valve (RD-AVR) has been proposed as an additional option for the treatment of high-risk patients, with the aim of reducing the aortic cross-clamp time and facilitating minimally invasive access.

RD-AVR has also proven to be well tolerated, and it provides good early clinical and haemodynamic outcomes, therefore it may be commonly considered as a hybrid procedure indicated for 'grey-zone' patients who are at high risk for aortic valve replacement (AVR), but who are not really inoperable. Because TAVI and RD-AVR are both indicated for the treatment of these intermediate to high-risk patients, this study aimed to compare the immediate clinical and echocardiographic outcomes after TAVI and RD-AVR with the Intuity Valve System (Edwards Lifesciences, Irvine, California).

A total of 122 consecutive patients between 75 and 85 years old with severe aortic stenosis underwent either TAVI or RD-AVR at our institution. Sixty patients, 30 treated by TAVI and 30 by RD-AVR, were identified and matched 1:1 according to age and EuroSCORE II, as to define a 'grey zone' of indication for either RD-AVR or TAVI. Hospital mortality was similarly low in both study groups (0% and 3.1% in RD-AVR and TAVI groups, respectively). Permanent pacemaker implantation was more frequently required in TAVI patients (37.5% versus 3.3%, after RD-AVR (p=0.001). Conversely, the RD-AVR group had a higher rate of postoperative atrial fibrillation (66.7% versus 34.4%, p=0.015) and a longer stay in the intensive care unit (75.4±62.1 versus 50.5±23.4 in TAVI, p=0.051).

At the echocardiographic examination, significant differences in prosthesis performance were detected. In particular, the absence of any aortic regurgitation was more common in the RD-AVR group (no aortic regurgitation in 96.7% versus 50% of the TAVI group), while the postoperative mean transprosthetic gradient was lower in the TAVI group (9.0±4.0 mmHg versus 11.5±3.9 mmHg, p=0.025).

Study results suggest that TAVI and RD-AVR are promising treatment options for 'grey-zone' patients, but as both techniques are associated with specific patterns of prosthesis function, further evaluations of their impact on late clinical outcome are warranted.

Cardiac – Postgraduate Course: Update on the results and rationale and design of ongoing clinical trials

Will bioresorbable scaffolds close the gap between percutaneous coronary intervention and coronary artery bypass graft?

Rafael Cavalcante Silva[1,2] and Patrick W Serruys[1,3]

[1] Erasmus University Medical Center, Rotterdam, The Netherlands; [2] Heart Institute (InCor), University of São Paulo Medical School, São Paulo, Brazil; [3] International Centre for Circulatory Health, NHLI, Imperial College London, London, UK

Background

In recent years, percutaneous coronary intervention (PCI) has largely surpassed coronary artery bypass graft (CABG) surgery as the preferred revascularisation strategy in several scenarios of the coronary artery disease (CAD) spectrum.[1–4] One of these scenarios, in which CABG still shows better long-term results is the subgroup of patients with multivessel disease.[5] In this group, the outcomes gap between the two strategies still persists, despite having decreased considerably following the introduction of drug eluting stents (DES).[5-8]

This difference in outcomes is mainly driven by repeat revascularisation procedures and myocardial infarction rates.[5] The former is related with in-stent restenosis, incomplete revascularisation and disease progression, and the latter with stent thrombosis and also with non-flow limiting lesions that might become unstable and provoke acute coronary events.[9]

The recent advances in stent technology have sought to solve both these efficacy (restenosis) and safety (thrombosis) issues. One of these technological advances, which has been called the 'Fourth Revolution' in the field of percutaneous coronary intervention (after balloon angioplasty, bare metal and drug eluting stents), is the development of bioresorbable vascular scaffolds (BRS).[10,11] These are 'stent-like' devices that disappear over time freeing the caged vessel and restoring vasomotion, working as an 'endoluminal bypass'. In the next few lines, we describe the features that give BRS the possibility of finally closing the outcomes gap between PCI and surgery for the treatment of coronary disease.

Preventive plaque sealing and the 'endoluminal bypass'

One of the most important characteristics of normal coronary vessels is their ability to dilate or contract in response to vasomotor stimuli. While coronary segments treated with metallic stents show a permanent endothelial dysfunction associated with the caging of the vessels, BRS have shown a restoration of vasomotion following the disappearance of the mechanical integrity associated with the resorption process. This return of vasomotion has been demonstrated to occur in the first 6 to 12 months following BRS implants.[12,13]

Furthermore, in contrast with metallic stents, the resorption process of BRS is also associated with the disappearance of the compliance mismatch that is created at the edge of the implanted device.[14] The return to normal vessel compliance and cyclic strain is associated with the normalisation of vessel wall shear stress, which in turn is related to neointimal formation and vessel healing.[15]

In addition to these favourable changes in vessel wall characteristics, longer-term follow-up studies showed that they were accompanied by late lumen enlargement and plaque regression. Interestingly, 5-year optical coherence tomography imaging has shown the formation of a tissue layer that covers plaque with necrotic core, shielding and recapping the atherothrombotic components of atheroma plaques, thus potentially leading to a 'passivation' of coronary atherosclerotic plaques[16,17] (Figure 1).

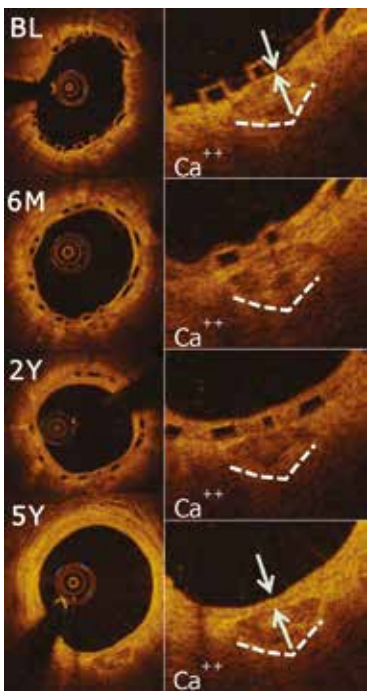


Figure 1. Baseline, 6-month, 2-year and 5-year follow-up of an Absorb BRS (Abbott Vascular, Santa Clara, CA, USA) implanted in a coronary artery. At 6 months, a calcified plaque is seen behind BRS struts with a thin fibrous cap (arrows). At 5 years, a signal rich layer (thick fibrous cap) is seen separating the calcified plaque from arterial lumen (arrows) after complete BRS resorption.

All these changes lead to the formation of a coronary vessel with a refurbished endoluminal lining, with cap sealed atheroma plaques, late lumen enlargement and restored vasomotion and cyclic strain. This 'golden tube', in reference to its OCT appearance, might be the endoluminal bypass that the interventional cardiologists have been looking for (Figure 2). This could potentially close the outcomes gap that still exists, at least in some instances, between PCI and CABG for the treatment of coronary artery disease.

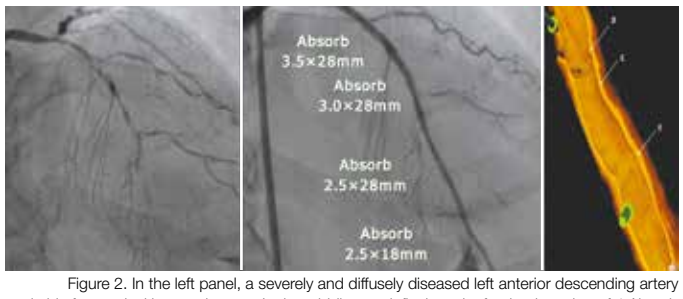


Figure 2. In the left panel, a severely and diffusely diseased left anterior descending artery unsuitable for surgical bypass is seen. In the middle panel, final result after implantation of 4 Absorb BRS (Abbott Vascular, Santa Clara, CA, USA), totaling 102 mm of 'endoluminal bypass' is shown. In the right panel, an example of the 'golden tube' on optical coherence tomography is seen.

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Satellite sessions at the 29th EACTS Annual Meeting

Monday 5 October 2015

Company	Time	Room	Session
AtriCure Europe BV	12.45–14.00	E106/E107	Does AF ablation also have a role in AVR and CABG patients?
Edwards Lifesciences	12.45–14.00	Forum Room	Innovation in aortic valve therapy: procedural trends and outcome
JOMDD Inc	12.45–14.00	G109	Ozaki's autologous pericardium aortic valve neo-cuspidisation
MAQUET Vertrieb und Service Deutschland GmbH	12.45–14.00	E102	To pump or not to pump? What is the role of IABP in cardiac surgery?
Medos Medizintechnik AG	12.45–14.00	E108	Talking about extracorporeal therapies – there is much more beyond ECMO
Medtronic International Trading Sàrl	12.45–14.00	G104/105	Evolution of aortic stenosis treatment options: perspectives from cardiac surgeons, cardiologists and industry
Somahlution, VGS and Medistim	12.45–14.00	E104/105	Optimising vein graft outcomes for CABG: new solutions
Sorin Group Italia SRL	12.45–14.00	Emerald Room	Current controversies and future perspectives in aortic and mitral fields
St Jude Medical	12.45–14.00	G102/103	Novel technologies for aortic stenosis, built on close to 40 years of valve expertise, deliver better patient outcomes on short- and long-term view
Vascutek Ltd	12.45–14.00	G106/107	Management and treatment of the diseased aortic arch

Tuesday 6 October 2015

Company	Time	Room	Session
AtriCure Europe BV	12.45–14.00	E106/E107	Integrated management of persistent atrial fibrillation – how, when and why?
Auto Tissue Berlin GmbH	12.45–14.00	E108	The use of decellularised tissue in cardiac surgery
JOTEC GmbH	12.45–14.00	G109	10 years E-vita OPEN PLUS – a track record
Medtronic International Trading Sàrl	12.45–14.00	G104/105	Mitral valve disease management: positioning yourself for success today and tomorrow
PneuX Life Systems	12.45–14.00	E103	Improving cardiac surgery outcomes by reducing VAP rates
Symetis	12.45–14.00	E102	ACURATE TAVI: easy, stable TAVI for all access and anatomies
Thoratec Corporation	12.45–14.00	Forum Room	HeartMate 3™: early experiences and outcomes

Coffee reception for residents

The Surgical Training and Manpower Committee (STMP) will host a coffee reception for all residents on **Monday 5th October at 12:45–14:00 in room F002**.

The aim of the meeting is to inform you about the activities of the STMP, both at the Annual Meeting and throughout the year.

We will also be looking for new members to join us and we will announce new vacancies for which residents can apply.

Furthermore, we will inform you about resident's associations across Europe and their needs and explore how we can collaborate.

Peyman Sardari Nia

Vascular – Postgraduate Course: Basics in proximal thoracic aortic surgery: session 2

Sparing the aortic root in acute type A aortic dissection: risk reduction or gross negligence?

Sven Peterss[1]*, Julia Dumfarth[2]*, John A Rizzo[1], Nikolaos Bonaros[2], Hai Fang[1], Bulat A Ziganshin[1], Michael Grimm[2], John A Elefteriades[1]

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[2] Department of Cardiac Surgery, Medical University Innsbruck, Innsbruck, Austria

* The first two authors contributed equally to this work.

Sven Peterss (left) and **John A. Elefteriades** from the Aortic Institute at Yale-New Haven, Yale University School of Medicine.

Root sparing replacement, conduit graft replacement, or David V procedure – is less or more surgery better? The optimal treatment of the proximal aorta in acute type A aortic dissections remains controversial, and not only depends on the extent of the pathology, but also on the surgeon's preference, experience and caseload. But how much surgery is really necessary with regards to the aortic root? Replacing the entire root (with re-implanting of the coronary arteries) represents a bulletproof solution in the future perspective. Yet is sparing the root, which is technically easier and associated with fewer postoperative morbidities, such an inferior choice during follow-up, thus justifying a more aggressive approach? This retrospective study addressed these questions and aimed to determine whether proximal extension is necessary or not.

Therefore, we merged two databases of acute type A aortic dissections from the Aortic Institute of Yale University (New Haven, U.S.) and the Department of Cardiac Surgery of Medical University Innsbruck (Innsbruck, Austria) and analysed the data of 338 patients according to the treatment strategy at the proximal aorta. We excluded syndromic diseases like Marfan's syndrome from our study, because, in our opinion, a root replacement is highly recommended in these patients. Among our cohort, 26% received a root replacement (valved conduit prosthesis [87%], David V procedure [14%]), and 74% underwent ascending replacement in root sparing technique resecting the aorta in supracoronary fashion.

We found that, besides a prolongation of the cardiopulmonary bypass times reflecting the higher technical complexity, patients undergoing root replacement showed an increased incidence of postoperative bleeding, low cardiac output syndrome, and vasoplegia (sepsis/SIRS), and thus incurred prolonged hospital stays. Operative mortality was substantial (17%), but did not differ significantly between the root sparing (15%) and root replacement (20%) approach.

But is an untouched root really safe in the long term? To answer this question, we evaluated the growth rate and root events after root sparing ascending replacement. The root dilates very slowly, at 0.40 mm/year (equal to patients with solely underlying aneurysm disease [Figure 1]), and thus slower than the other portions of the aorta. The often proclaimed higher incidence of secondary dilation, recurrent dissection and need for root sparing reoperation could not be confirmed in our study (3% root events only in the long term). On the contrary, the freedom from root events was statistically not different compared with root replacements, even if the proportional data showed a slight trend with 97% versus 100% after 5 years (Figure 2). Even though the root sparing group was significantly older, long-term survival showed no inferiority of an untouched root.

In our opinion, sparing the root is an appropriate technique which can be performed with excellent results in stabilising the native root without disadvantages, compared with complete root replacement. Due to lesser technical complexity and better postoperative outcomes, this technique should be preferred, if not indicated separately. These observations and recommendations do not apply to patients deemed at risk for above-mentioned secondary complications. In our opinion, these are namely younger patients, with connective tissue disease (i.e. Marfan's disease), a diseased valve with bicuspid morphology, or root dilation >40 mm, in whom root replacement is strongly recommended.

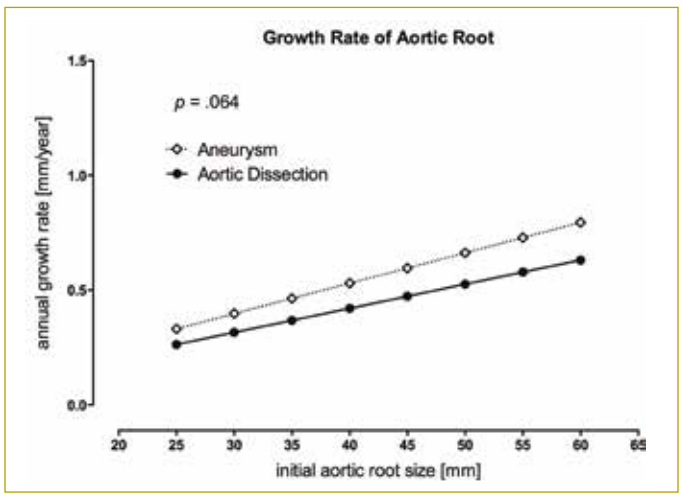

Figure 1. Growth rate of the aortic root.

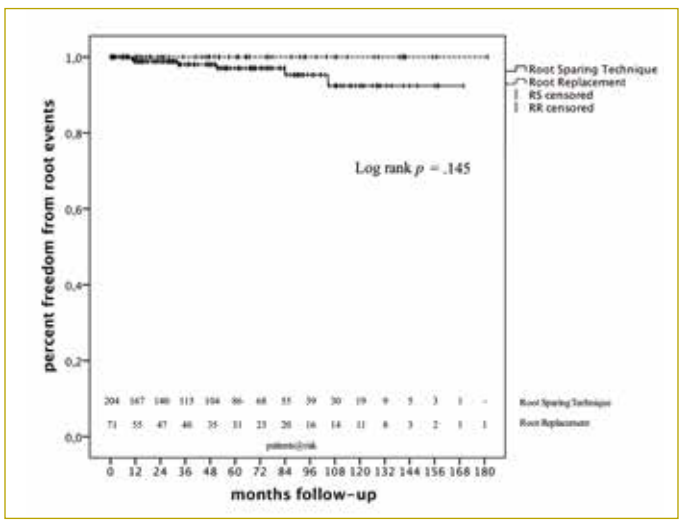

Figure 2. Freedom from aortic root events.

Vascular – Postgraduate Course: Thoraco-abdominal aneurysms revisited

Validating collateral network near-infrared spectroscopy (cnNIRS) for real-time monitoring of spinal cord oxygenation

K von Aspern, J Haunschild, A Hoyer, M Luehr, F Bakhtiary, M Misfeld, FW Mohr and CD Etz

University of Leipzig, Herzzentrum, Leipzig, Germany

Paraplegia due to acute/subacute spinal cord injury (SCI) during or after repair of extensive thoracic and thoracoabdominal aortic pathologies remains the most devastating complication with an incidence of 5%–20% reported in contemporary series.[1–3]

Although invasive tools for monitoring spinal cord viability – such as motor- or somatosensory evoked potentials – are widely accepted,[4] to date no validated method for non-invasive real-time monitoring has made its way into routine clinical practice. Direct feedback as to the effectiveness of conventional peri- and postprocedural strategies to prevent SCI by continuous monitoring of spinal cord viability is difficult to achieve. Previously our group trialed paraspinous near-infrared spectroscopy (NIRS) in a clinical series of patients undergoing extensive procedures on the thoracoabdominal aorta and found it to be technically feasible.[5] This approach was based on the 'collateral network (CN) concept' developed by Griepp and Etz et al., which demonstrates that blood supply to the spinal cord is provided by a rich network of paraspinous arterial collaterals.[6,7]

In order to validate NIRS as a real-time tool for monitoring CN-oxygenation and ultimately spinal cord integrity, its evaluation against direct oxygenation measurements of the paraspinous muscles and the spinal cord is essential.

For this purpose we designed an animal model comparing laser Doppler flowmetry (LDF) – an already validated method for direct flow- and oxygenation measurements[8,9] – to evaluate paraspinous NIRS during aortic blood flow alterations.

Experiments were performed in our established pig model with four paravertebral NIRS optodes positioned bilaterally at thoracic and lumbar levels (Figure 1). Continuous paravertebral muscle and spinal cord oxygenation and microcirculatory blood flow were measured invasively using LDF probes. NIRS and LDF were compared during consecutive repeated periods of baseline, descending aortic cross-clamping and recovery.

Following aortic cross-clamping and clamp release, lumbar NIRS signals instantaneously responded analogously to LDF oxygenation and microcirculatory flow measurements. Spinal cord oxygenation changes were subject to a delay compared with their respective microcirculatory flow measurements.

Thoracic NIRS signals remained relatively stable throughout the entire procedure as expected (Figure 2). Comparison showed no significant difference for lumbar NIRS, direct muscle- and spinal cord oxygenation (p=0.135–0.654).

With results from these experiments we gain insight into the physiology of spinal cord perfusion during aortic blood flow variations in real time. Lumbar NIRS of the paraspinous vasculature responded instantly and analogously to direct muscle/spinal cord oxygenation measurements and may be a promising tool for real-time non-invasive monitoring of spinal cord blood supply during and after extensive procedures on the thoracoabdominal aorta.

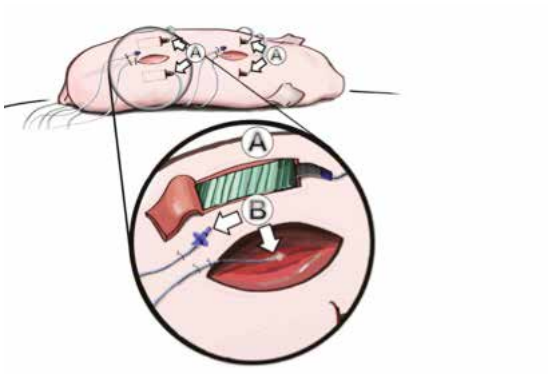

Figure 1. Simplified illustration of the experimental setup
(Top) Pig from dorsal view showing the subcutaneously positioned bilateral NIRS optodes (A) and the exposed spinal cord at thoracic and lumbar levels; (bottom) magnified view of a lumbar paraspinous NIRS optode (A) and the directly placed laser Doppler probes in the paravertebral muscle (transcutaneously via the blue introducer) and the spinal cord (B).

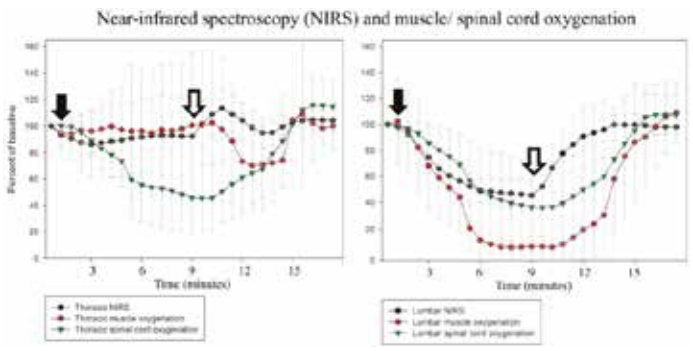

Figure 2. Near-infrared spectroscopy and direct muscle/spinal cord oxygenation
(Left) thoracic NIRS and muscle/spinal cord oxygenation measurements; (Right) lumbar NIRS and muscle/spinal cord oxygenation measurements. Black arrows = aortic cross-clamping; white arrows = cross-clamp release.

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HVS – HEART VALVE SOCIETY – LEADING THE FUTURE OF THE HEART TEAM IN ACTION

The Heart Valve Society
An International Heart Team. Leaders in Evaluation, Management & Research.

The HVS held its historic inaugural meeting in May at the stunning Grimaldi Forum in Monte Carlo, Monaco. President Dr. Michael Borger noted during his Presidential Address that the HVS is the first truly collaborative, multi-disciplinary society dedicated to the full range of treatment of heart valve disease across the globe. Even in our short existence, our membership is reflective of a truly inclusive international organization. Our Monaco meeting was attended by over 430 medical professionals, plus 80 industry partners, for a total attendance of more than 500.

The future is boundless for our organization, and we intend to stay to true to our message – "The Heart Team in Action."

HVS also offers all members of the heart valve community the opportunity to volunteer, participate, and become active in our committees and working groups. We offer the opportunity to work with the AVIATOR Registry, to serve in one of the many aspects of the ever-growing Scientific Research Committee, and to be a part of our 2016 Scientific Program Committee, which is putting together our 2016 Annual Meeting Program. Our 2016 Meeting will be held in New York City, from March 17 to 19, at the Marriott Marquis, located directly in the heart of Times Square. Abstract submission is now open and we invite you to submit your work for consideration by going to our website, **www.heartvalvesociety.org**.

We also encourage you to join our vibrant new organization! HVS members receive a significant discount on registration fees for our meetings – plus get the ground floor opportunity to be a part of the most collaborative and inclusive society supporting the care and treatment of heart valve disease. Whether you are a cardiologist, surgeon, researcher, physician assistant, anesthesiologist, nurse, pulmonologist, or another member of the crucial valve disease treatment team – HVS welcomes you to become a part of something very unique and very special. Membership is available online at www.heartvalvesociety.org/membership.

On behalf of our President, Dr. Maurice Sarano, our Secretary, Dr. Hanneke Takkenberg, and our President-Elect, Dr. Gilles Dreyfus, we hope you become a part of the HVS!

Cardiac – Rapid Response: Transcatheter aortic valve implantation versus surgical aortic valve replacement

Managing bleeding and thrombosis in extracorporeal membrane oxygenation

Andre Simon Royal Brompton and Harefield NHS Foundation Trust, London, UK

Extracorporeal membrane oxygenation (ECMO) is capable of supporting heart and lung function and has emerged as potentially life-saving instrument, but it may prove equally hazardous due to its inherent tendency towards thrombosis and haemorrhage. In patients supported with ECMO, thrombin is constantly generated and the coagulation–anticoagulation processes are strongly activated; keeping them in a state of equilibrium is a challenge. Tailor-made anticoagulation management is essential for the smooth running of and weaning from ECMO. Anticoagulation is achieved with continuous intravenous unfractionated heparin and is regularly monitored using the activated clotting time (ACT; target range 160–180 sec) and/or activated partial thromboplastin time (aPTT; target range 60–80 sec).[1] ACT, generally less sensitive than aPTT, is an acceptable but not accurate monitor of anticoagulation, but is still the best available bedside test. A relatively new approach is a direct quantitative measurement of heparin plasma levels (AntiXa; target range 0.3–0.7 U/ml). During the first 24 hours after initiation of ECMO, heparin administration should be monitored 2–4 hourly using ACT measurements (160–180 sec). Later the heparin dose should be titrated, preferably, via measurement of aPTT (60–80 sec) at intervals of 4–6 hours. Measurement of anti-Xa is essential together with aPTT and should be performed at least once a day to confirm the reliability of the aPTT value.

Bleeding in patients supported with ECMO, despite stringent anticoagulation protocols is not uncommon. Incidence of bleeding remains under-reported; a meta-analysis of 12 studies involving almost 1800 patients showed an incidence of 33%.[2] Bleeding can occur at the cannula exit site, surgical site, nose, mouth, respiratory tract or gastrointestinal tract. As measures to control bleeding at a particular site may temporarily stop bleeding, it is essential to regulate anticoagulation and maintain an adequate level of clotting factors and platelets. Apart from monitoring ACT/aPTT and titrating the heparin dose, it is essential to address other laboratory markers such as platelet count, prothrombin time (PT), international normalised ratio (INR) and fibrinogen level. In a bleeding patient, platelets should be topped up when the platelet count decreases to below $50x10^9$/l; fresh frozen plasma should be given when PT is >17 sec and cryoprecipitate or fibrinogen concentrate should be given when fibrinogen level drops below 2 g/l.[1]

Thrombosis is relatively less common; however, inadequate anticoagulation (to control bleeding) or low flow (weaning trails) in circuit may lead to potentially life-threatening situations like clotting of the oxygenator, and thrombosis at connectors and cannulae with subsequent systemic emboli leading to stroke or acute mesenteric ischaemia. In the most recent annual ELSO report, clots were reported to occur in the oxygenator in nearly 13% of patients.[3] Extracorporeal circulation subjects blood to non-physiological shear stress, osmotic forces, turbulence and contact with artificial surfaces leading to activation of several systems involved in blood coagulation.

Minimising the length, connectors and complexity of the ECMO circuit and utilisation of heparin-bonded tubing can reduce activation, the artificial surface area and sites of turbulent flow. Maintenance of flow though heart chambers using inotropes and adjusting ECMO flow may avoid stasis and potential thrombus formation in patients with low cardiac function. Postoxygenator pressure drop, postoxygenator gas exchange and d-dimer estimation predicts oxygenator failure (most common reason being clotting), and immediate exchange may avoid embolism.

It is worth noting the increasing incidence of heparin-induced thrombocytopenia in ECMO patients. It is an immunologic disorder mediated by antibodies to heparin-platelet factor 4 complex characterised by the occurrence of thrombocytopenia in conjunction with thrombotic manifestations after exposure to unfractionated heparin or low molecular weight heparin. It is managed by removing all exposure to heparin and switching to alterative anticoagulation – direct thrombin inhibitors (argatroban and bivalirudin), fondaparinux and danaparoid.

Continuous, vigilant monitoring, early detection and management of complications, protocol-based anticoagulation, and strategic and early weaning remain key for good results in patients supported on ECMO.

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Congenital – Rapid Response: Congenital rapid response

Long-term results of novel modification to the lateral tunnel Fontan procedure for the prophylaxis of intra-atrial reentrant tachycardia

Hong-Gook Lim, Jeong Ryul Lee, Yong Jin Kim
Department of Thoracic and Cardiovascular Surgery, Seoul National University Hospital, Korea

Refractory atrial arrhythmias and haemodynamic abnormalities are responsible for the significant late morbidity and mortality seen after the Fontan procedure. Use of the lateral tunnel Fontan procedure often leaves patients with extensive atrial scarring and subject to atrial dilatation, hypertrophy and fibrosis, which are responsible for atrial tachyarrhythmia. Intra-atrial reentrant tachycardia, a type of macro-reentrant tachycardia, is the most common form of atrial tachyarrhythmia in Fontan patients.

It is related to incision and suture line, atrial remodelling, atrioventricular valve regurgitation, haemodynamic deterioration, cardiac anatomic substrates etc. The incidence of intra-atrial reentrant tachycardia also increases with the duration of Fontan circulation. The intricacies and mechanisms of the intra-atrial reentrant tachycardia circuits are well known in Fontan patients, but antiarrhythmic medications and the use of radiofrequency catheter ablation with mapping are not satisfactory because of limited efficacy or side effects. Fontan conversion with arrhythmia surgery may improve arrhythmia control, and be appropriate for selected patients. Intra-atrial reentrant tachycardia reduces the quality of life and may even cause death in haemodynamic compromised patients. Therefore, intra-atrial reentrant tachycardia should be aggressively controlled, and can be also prophylactically prevented at the time of the Fontan operation.

Our novel surgical technique was developed, because the mechanisms for intra-atrial reentrant tachycardia in lateral tunnel Fontan patients are complex. The atrial incisions and suture lines for the lateral tunnel baffling contribute to the occurrence of intra-atrial reentrant tachycardia. The interventional atrial incision/cryoablation connecting the right atriotomy to the coronary sinus/right atrioventricular valve annulus would create intra-atrial conduction block, interrupt intra-atrial reentrant tachycardia circuits from developing around the atriotomy, coronary sinus and right atrioventricular valve annulus, and reduce the overall incidence of intra-atrial reentrant tachycardia. Based on this concept, right atriotomy was extended to the coronary sinus to block slow rate conduction isthmus, and cryoablation was performed between right atriotomy and right atrioventricular valve annulus. Because the location of the intra-atrial suture line in relation to the crista terminalis can also induce intra-atrial reentrant tachycardia, the lateral tunnel baffling was modified to avoid injury to the crista terminalis. In addition, the surgical technique was also modified, and sandwich technique was used with closure of right atriotomy incorporating the Gore-Tex patch to reduce atrial suture line.

Between August 1997 and December 2003, 27 patients underwent our novel modification to the initial lateral tunnel Fontan procedure with an interventional atrial incision/cryoablation from the atriotomy to the coronary sinus/right atrioventricular valve annulus, which might increase conduction time. We evaluated the long-term feasibility, safety, and efficacy of a prophylactic atrial arrhythmia surgery performed concomitantly at the lateral tunnel Fontan operation. There have been no early deaths and one late death after re-operation, which was not arrhythmic in aetiology. At late follow-up 14.7±2.8 years (range: 5.5 – 17.5 years) post-Fontan, spontaneous intra-atrial reentrant tachycardia occurred in one patient, and inducible intra-atrial reentrant tachycardia in one that required beta blocker medication without ablation attempts. There was no evidence of early or late-onset complications related to the interventional atrial incision/cryoablation. Four patients required late pacemaker implantations for sinus node dysfunction after the Fontan operation.

The prophylactic arrhythmia surgery with our novel modification of the lateral tunnel Fontan procedure to reduce the development of intra-atrial reentrant tachycardia was feasible and safe. Long-term follow-up results also demonstrated that this novel modification is effective for the prophylaxis of intra-atrial reentrant tachycardia.

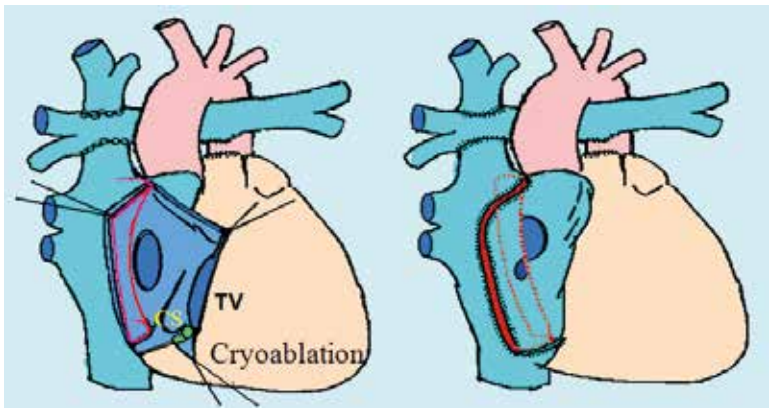

Figure 1.

Daily News EACTS European Association For Cardio-Thoracic Surgery

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A NEW TISSUE ENGINEERING APPROACH TO CREATE A VERSATILE COLLAGEN SCAFFOLD FOR APPLICATION IN CARDIOVASCULAR SURGERY.

Prof Leon Neethling FACA PhD (CTS)
School of Surgery (Cardiothoracic Surgery)
University of Western Australia
Perth WA 6009 Australia

Numerous biological substitutes are used for congenital and adult cardiovascular repair procedures. Most of these substitutes have a limited life span due to degeneration and calcification. Alternative approaches with autologous tissue substitutes and synthetics have shown some improvement but fail due to retraction, surface thickening and calcification. The primary objective of this innovation was to create a versatile collagen scaffold with outstanding biocompatibility, durability, optimal physical properties and maximum calcification resistance for congenital and adult cardiovascular applications.
Biological substitutes are chemically treated to improve durability and reduce antigenicity. The cytotoxic nature of these chemicals have a negative effect on biocompatibility and also on the physical properties of these substitutes. The reduced biocompatibility induces a cascade of inflammatory responses after implantation which result in calcification and graft failure. This problem was addressed by a multi-step treatment approach. Bovine pericardium from BSE-free cattle were used for all studies and clinical trials. All tissue-related factors responsible for the cascade of inflammatory responses were eliminated. The pericardium was exposed to a multi-step tissue engineered treatment regime which is called the ADAPT® process. Tissue engineering principles such as delipidation, decellularisation and nuclease treatment form part of the ADAPT® process. The collagen scaffold was cross-linked in a novel way using monomeric glutaraldehyde at a significantly lower concentration compared to what is currently being used in the industry (12 times less than the conventional glutaraldehyde concentration which is done with the polymeric form of glutaraldehyde). The cross-linked scaffold was exposed to a detoxification treatment after crosslinking which addressed unbound and residual glutaraldehyde moieties. The detoxified, crosslinked scaffold was sterilized and stored in a non-glutaraldehyde solution which allows for direct application without any rinsing procedures.
Assessment included *in vitro* assessments (tensile testing, stem cell interactions, enzymatic degradation studies, residual glutaraldehyde levels, burst testing) and *in vivo* assessments (small and large animal models as well as a Human Phase II Clinical Trial).
Results demonstrated a unique collagen scaffold with outstanding physical properties and a significantly high resistance to calcification in both pediatric and adult patients.
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Cardiac – Abstract: Left ventricle – strategies in left ventricular moderations

Left ventricular stroke work index predicts reverse remodelling after submitral procedures for ischaemic dilated cardiomyopathy

Yasushige Shingu Hokkaido University Hospital, Sapporo, Japan

Surgery for ischaemic dilated cardiomyopathy with functional mitral regurgitation (MR) is still challenging. Besides its high surgical mortality, recurrence of MR and left ventricular re-dilatation are two key concerns after surgery for these patients. Our objective was to examine whether left ventricular stroke work index (LVSWI) estimated by transthoracic echocardiography predicts LV reverse remodelling after surgery for patients with ischaemic dilated cardiomyopathy. A total of 23 patients with ischaemic dilated cardiomyopathy with functional MR were included in the study. LVSWI was calculated as follows: (LV stroke volume) x (mean arterial pressure – left atrial pressure)/body surface area x 0.0136 (gm-m/m^2/beat).
The left atrial pressure was approximated to estimated pulmonary artery diastolic pressure. All cases underwent mitral valve repair including submitral procedures. When LV end-diastolic dimension (LVDd) was more than 65 mm, LV restoration procedure was also employed. LV reverse remodelling was defined as follows: (pre-operative LVDd) – (LVDd at the last follow-up) (mm).
The mean follow-up was 33±21 months. Freedom from cardiac-related death was 90% and 90%; freedom from all-cause mortality was 82% and 77%, 1 and 3 years after surgery, respectively. LVDd decreased from 67±6 mm to 60±8 mm (p=0.001); LV ejection fraction (LVEF) increased from 27±7% to 34±12% (p=0.026); MR grade decreased from 3.2±0.8 to 0.7±0.6 (p<0.001), pre-op and at the last follow-up (27±15 months), respectively. Pre-operative LVSWI was 25±12 gm-m/m2/beat. Only two patients (9%) with a low LVSWI of 15 gm-m/m^2/beat presented with re-dilatation of the LV, but it did not correlate with the recurrence of MR. Pre-operative LVSWI significantly correlated with LV reverse remodelling (R=0.681, p=0.005), while LVEF, MR grade and LV size did not. We conclude that LVSWI predicts LV reverse remodelling after surgery for patients with ischaemic dilated cardiomyopathy. LVSWI may be useful for establishing surgical strategy in these high-risk patients.

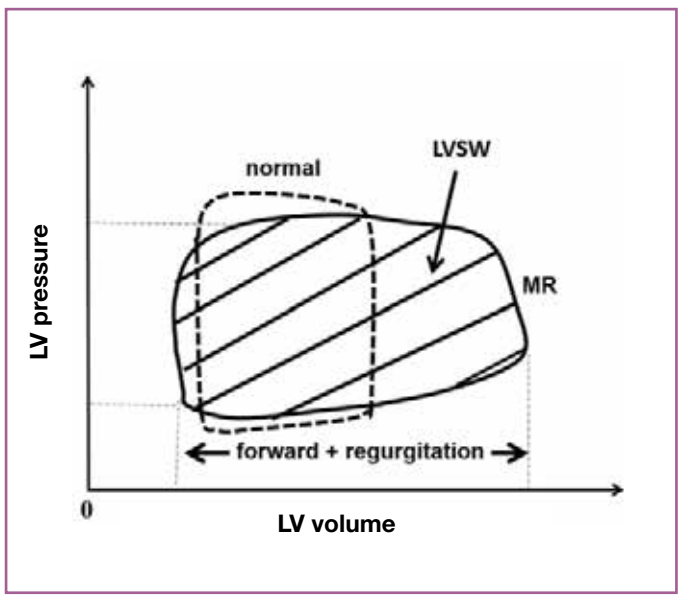

Figure 1.

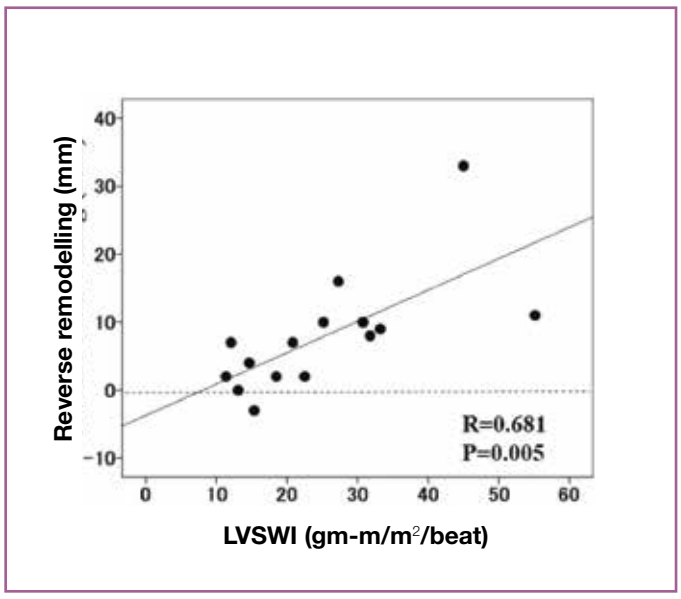

Figure 2.

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How to get your abstract accepted for a meeting

Friedhelm Beyersdorf University Heart Center Freiburg, Germany

After any scientific work has been completed, researchers are eager to publish their results in order to make their work available to the wider scientific community. Not only for general discussion and stimulation of further research, but also as verification of their data, to add further knowledge to their special field of research, to acknowledge the support of others (e.g. research funding societies), and to receive credit from their peer group. In general, the first step in this process is the submission of an abstract to a meeting.
The likelihood of acceptance of an abstract depends upon many prerequisites. The main factor of any abstract is the 'scientific content'. Therefore, one should spend as much time as possible in a) generating an important and timely hypothesis; b) planning and careful conduct of a (e.g. interdisciplinary) study; c) including all necessary members for a specific study; and d) precise documentation of all data for further evaluation and discussion.
After all the necessary data are compiled, the next consideration has to be to which meeting the abstract should be submitted and to check the submission deadline. The 'acceptance rate' depends upon the number of abstracts submitted and the number of oral presentations/posters that are being included in the final programme. In general, the acceptance rate at local meetings is much higher compared with established international meetings. However, presentations at international meetings have a much higher impact and dissemination, compared with data that are presented at regional meetings.
Once the most appropriate meeting to which to submit your abstract has been selected, it is important to read the specific 'instructions for authors' and to write the abstract accordingly.
For international meetings the content should be written in perfect English. To achieve this, ask a native speaker to read and correct your abstract.
Next, find an interesting and meaningful title. The standard abstract is divided into the following four sections: objectives, methods, results and conclusions. Add a table or a figure to illustrate the most important findings of the study. Recently, some meetings are asking authors to provide an alternative abstract submission in the form of a PowerPoint® presentation.
Another very important aspect of any abstract is the art of writing the sections using terminology that is easily understood. With this in mind, it is important to explain complex coherences in simplified terms so that even a non-expert in the field can understand it. In addition, the conclusions drawn have to be substantiated by the results presented.
To write a good abstract is hard work and is an art in itself, which needs years of experience (as well as numerous acceptance and rejection letters!), with a constant strive to improve further.
To write an abstract takes both many hours and many revisions. Therefore one should start writing the abstract long before the abstract deadline for a meeting. A good abstract cannot be written the evening before the deadline. It has to be circulated to all co-authors who must approve the content, the chosen co-authors and the wording. All co-authors must be invited to make suggestions to improve the abstract, and once complete, you should get as many friends as possible to correct it and ask them if they understand the importance of your work.
Once the abstract has been accepted, prepare your oral or poster presentation carefully. This is again an art in itself and is different from the abstract writing. Thereafter, an original article needs to be written for submission in a scientific journal, such as the *European Journal of Cardio-Thoracic Surgery* or the *Interactive CardioVascular and Thoracic Surgery*.
The harder you work, the luckier you get!

EACTS
European Association For Cardio-Thoracic Surgery

Chest Wall Diseases

Date/duration: 2-4 December 2015

Location: Windsor

Course Director: M Yüksel, Istanbul, Turkey

2013 Chest Wall Disease in Windsor.

Course overview

This course aims to teach the indications, techniques and follow-up of minimally invasive and open surgery in pectus deformities, alternative treatments for pectus deformities, chest wall resection and reconstruction techniques in chest wall diseases, the surgical techniques in thoracic outlet syndrome. As well as learning the treatment options in sternal dehiscence.

The programme will include a combination of both high level interactive discussion and lectures delivering theoretical knowledge.

Thoracic – Abstract: Chest wall

Chest wall stabilisation and reconstruction: short- and long-term results five years after the introduction of a new titanium plates system

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Chest wall integrity and stability are the main factors that ensure the protection of intrathoracic organs and an adequate respiratory function. The thoracic surgeon often has to deal with neoplastic, traumatic and malformative diseases affecting the chest wall and requiring the demolition and reconstruction or stabilisation of the thoracic cage. For this purpose, many techniques have been proposed, including the use of various and different materials, but to date there are still no clear guidelines in the management of chest wall diseases.

Approximately five years ago, in 2010, a new dedicated titanium plates system (Synthes®) was introduced for the treatment of chest wall diseases and is nowadays available in the current practice of the thoracic surgeon. However, studies about the outcome of patients in whom these plates were implanted have not yet been published. In our retrospective study we report short- and long-term results obtained with this new system for the stabilisation and reconstruction of the chest wall.

From January 2010 to December 2014, 27 consecutive patients (22 males, 5 females), with a median age of 60 years (range: 16–83 years), were treated with the dedicated Synthes® system (titanium plates, splints and screws) for sternum and rib reconstruction and stabilisation. There were 3 patients with primary and 8 with secondary chest wall tumour, 5 with flail chest, 5 with multiple rib fractures, 3 with sternal dehiscence-diastasis, 1 with sternal fracture, 1 with sternoclavicular joint dislocation and 1 with Poland syndrome.

Short-term results were evaluated as: operating time, post-operative morbidity, mortality, hospital stay. Long-term results were evaluated as: survival, plate-related morbidity, spirometric values, chest pain (using the Verbal Rating Scale – VRS – and the SF12 standard V1 questionnaire). A median of two (range: 1–10) titanium plates/splints were implanted in each patient, with a median operating time of 150 minutes (range: 115–430 minutes). The post-operative course was uneventful in 15 patients (55.6%), 10 patients (37%) presented minor complications, 2 patients (7,4%) major complications; no post-operative mortality was observed. Median post-operative hospital stay was 13 days (range: 5–129 days). At a median follow-up of 20 months (range: 1–59 months), 21 patients (78%) were alive, 6 patients (22%) died. Three patients presented long-term plate-related morbidity: plates rupture in 2 cases, pin plate dislodgment in one; two patients required a second surgical look.

One-year from surgery median spirometric values were: FVC 3.31 l (90%), FEV1 2.46 l (78%), DLCO 20.9 ml/mm Hg/min (76%). These data confirmed restoration of good respiratory function. The 21 surviving patients, evaluated with the VRS, 7 (33.3%) reported no pain (VRS score 0), 10 (47.6%) mild (score 2), 4 (19.1%) moderate (score 4), and 0 severe (score >4). Moreover, at evaluation with the SF12 standard V1 questionnaire 15 patients (71.5%) reported none or mild, 6 (28.5%) moderate pain influencing quality of life.

In conclusion, an optimal chest wall stabilisation and reconstruction in neoplastic, traumatic and malformative disease were achieved using the Synthes® titanium plates/splints and screws system, with minimal morbidity, no post-operative mortality, acceptable operating time and post-operative hospital stay. Long-term restoration of normal respiratory function was achieved, with minimal plate-related morbidity and chest pain.

Thoracic – Abstract: Chest wall

Intensive care unit (ICU) readmission after major lung resection: prevalence, pattern, and mortality

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The rate of hospital mortality is significantly higher for patients who are readmitted to the intensive care unit (ICU). Many studies have reported on the aetiology of ICU readmission after cardiac, general and orthopaedic surgeries. However, there is only limited data evaluating the aetiology of readmission following pulmonary resection. Song et al. reported that the rate of ICU readmission after thoracic oncology surgery was 8.6% and in-hospital mortality was 33.0%. The aim of the present study was to define the prevalence, pattern and predictive risk factors for ICU mortality after initial recovery from major lung resection in patients with thoracic tumours (both lung and oesophageal).

We retrospectively reviewed the case records of all patients who underwent major lung resection surgery for variable lung diseases from February 2011 to May 2013; a total of 1916 patients were included in the analyses. Of these, 63 (3.3%) patients required ICU care after initial recovery. Preoperative and perioperative data, including ICU factor and outcome data, were analysed. The patient group included 57 males (90.5%), with a mean age of 65.3 years. Pathologic evaluation revealed malignancy in 92.1% of patients and benign tumours in 7.9%. Open thoracotomy was performed in 84.1% of patients, whereas minimally invasive approaches were chosen in 15.9%. In-hospital mortality occurred in 16 (25.4%) patients. Patients were classified as either survivors (n=47, 74.6%) or non-survivors (n=16, 25.4%). The most common cause for ICU readmission was pulmonary complications (n=50, 79.4%). A total of 31 patients (49.2%) required mechanical ventilation, seven patients (11.1%) required extracorporeal membrane oxygenation (ECMO) and three patients (4.8%) required renal replacement therapy. Multivariate analysis showed that acute respiratory distress syndrome (ARDS) and delirium were independent risk factors for in-hospital mortality (Table 1). In addition, delirium frequently occurred in patients with ARDS.

In summary, readmission to ICU after initial recovery from major lung resection was associated with high in-hospital mortality. The most common cause of ICU readmission was pulmonary complications, with ARDS and delirium found to be independent risk factors for in-hospital mortality in those patients readmitted to ICU after major lung resection surgery.

Table 1: ARDS, delirium and in-hostpital mortality

Prevalence of delirium			
	ARDS group (n=32)	Non-ARDS group (n=31)	*p* value
Delirium	9 (28.1%)	2 (6.5%)	0.023
In-hospital mortality of delirium in patients with ARDS			
	Occurred in patients with ARDS (n=9)	Did not occur in patients with ARDS (n=23)	*p* value
Death	6 (66.7%)	8 (34.8%)	0.102

Cardiac – Abstract: Revisiting the tricuspid valve

Outcomes of tricuspid valve replacement: a meta-analysis

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Tricuspid valve replacement (TVR) is quite an uncommon intervention. However, recently published registry data show that the number of tricuspid procedures has more than doubled from 1999 to 2008. In addition, the role of TVR is critical for those patients, presenting with heavy clinical deterioration and functional limitation, in whom repair is not feasible or where attempts at repair have failed because of technical issues (e.g. high calcification or severe degeneration/dilatation).

Thanks to scientific and technological progress, recent studies reported improving results for TVR; but great concerns about mortality risk and debate about valve choice still remain. Indeed, the current knowledge of long-term results of TVR is limited, while risk assessments are not clear or univocal.

A systematic review and meta-analysis retrieved a total of 35 papers, including 3380 patients who underwent TVR, which reported clinical outcomes at a mean follow-up of more than 7 years. The resulting study population was the largest TVR cohort ever investigated, and with a worldwide spread. One previous meta-analysis did not include 'historical' cohorts from the 1970s and 1980s, but we decided to include such data in our analysis because even the most recent papers report data also regarding patients operated on in that era.

Pooled analysis showed cumulative 30-day and follow-up mortality rates (16.9% and 41.5%, respectively) that confirmed the well-known high risk associated with such procedure. In fact, tricuspid valve disease requiring replacement is often considered to be a marker for end-stage valvular heart disease, especially when right ventricular dysfunction and/or anasarca are present. Unfortunately, clinical and echocardiographic data were sparse, and heterogeneous, in the source publications, hence not allowing their analysis.

Moreover the 56.1% (1896/3380) patients who received a tissue valve did not show significantly better survival. On the other hand, patients who were re-operated on the tricuspid valve (1659/3380, 49.1%) showed significantly worse survival, both at 30 days and at follow-up (mean 84.3±2 6.8 months). In addition, despite a significant benefit in terms of hospital survival for patients receiving isolated TVR (hospital mortality 7.6±2.9% versus 12.9±4.3%, respectively), no significant difference was found between the latter and those undergoing concomitant procedures (follow-up mortality 42.4±15.6% versus 32.5±19.9%, respectively).

The rate of reoperation on the tricuspid valve through the mean follow-up of 7 years was 9.4%, and was more likely to occur in smaller series. Despite a trend towards lower reoperation rates among patients initially receiving mechanical prostheses (9.7% versus 14.1%), the difference did not reach statistical significance.

In conclusion, TVR is still burdened by considerable mortality and morbidity, especially when it is a repeated procedure. This may be attributable to underlying heart failure, and functional impairment. The type of prostheses implanted (biological versus mechanical) does not seem to influence outcomes (both mortality and the need for reoperation). Operative mortality is lower in those who did not require additional procedures, but those patients also showed worse long-term outcomes. Failure of TVR and the need for reoperation are more likely to occur in smaller-volume centres.

Vascular – Rapid Response: Innovation and new strategies in thoracic aortic surgery

Perioperative and mid-term results of endovascular management of complicated type B aortic dissection using proximal thoracic endoprosthesis and selective distal bare stenting

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Malperfusion syndrome, as a result of type B aortic dissection, carries a heavy burden of mortality and morbidity, and will involve at least half of patients referred for treatment.[1–7] The goal of thoracic endovascular aortic repair (TEVAR) in complicated type B aortic dissection is to cover the most proximal entry tear and reduce false lumen (FL) perfusion enhancing true lumen (TL) expansion.
We present our results in the treatment of complicated type B aortic dissection with a tailored strategy of proximal entry tear coverage using endoprosthesis implantation followed, whenever required, by bare stenting of the distal thoracic aorta, to achieve homogeneous aortic TL expansion, correct persistent distal malperfusion, and facilitate FL thrombosis.
Endovascular treatment was performed in a case series of 35 patients with complicated Stanford type B aortic dissection. The aim was to include all distal re-entries to minimise the risk of continuous retrograde perfusion of the FL. Indications for endovascular treatment were: malperfusion syndrome (71.4%), aortic rupture (14.3%), rapid FL enlargement (8.6%), uncontrollable thoracic pain (2.8%), and unresponsive systemic arterial hypertension (2.8%). In all patients with preoperative malperfusion syndrome (n=25; 71.4%), intra-procedural recovery of good organ perfusion was documented at the end of the intervention. No significant differences were observed between patients undergoing standard endovascular treatment and elongation with bare metal stents. Kaplan–Meier analysis showed a 1- and 3-year survival probability of 80.0±6.8%.
The 1- and 3-year survivals, free from any major adverse vascular events, were 77.1±7.1% and 67.6±9.0%, respectively. No significant differences were observed in the estimated survival and event-free survival of patients treated with and without bare metal stent elongation (p=0.7). In nine patients (25.7%) endoleaks were diagnosed at CT angiography, before hospital discharge. Five endoleaks occurred in patients after standard endovascular treatment and four after bare metal stent extension (p=ns).
An imaging follow-up (16.6±13.7 months) was performed with CT angiography. The degree of FL thrombosis was investigated at four different thoraco-abdominal aortic levels. A thrombosis of the FL at the level of the aortic segment I (thoracic aorta from LSA ostium to the level of the left atrium) was observed in 76.4% of patients. A complete FL thrombosis along the entire extension of the aorta from segments I–III (renal arteries ostia) was seen in 17.6%. No differences in terms of FL thrombosis extension and distribution were observed in patients treated with or without bare metal stent extension. At the various abdominal aorta levels, there was a significantly higher regain of the TL diameter in patients undergoing endovascular treatment with bare metal stents extension compared with those treated with sole-covered endoprosthesis.
Distal malperfusion is often a dynamic event, resulting from the siphoning of the dissection lamella and the alternate occlusion of the arterial branches ostia originating from the TL. The PETTICOAT (Provisional ExTension To Induce COmplete ATtachment after stent graft placement in type B aortic dissection) procedure is the name given to extension of the endoprosthesis using bare metal stents.[4,8–11] We believe that to avoid iatrogenic malperfusion, PETTICOAT should be tailored to the individual patient, and only used in cases when preoperative malperfusion is not resolved after initial deployment of the covered endoprosthesis. In our experience, malperfusion was present in over 70% of referred patients, and in up to 90% of these patients we reported a dynamic malperfusion. The arterial branches were originating from the aortic TL and were either occluded by the 'flapping' intimal dissection membrane, which at times also extended within the arterial branches, or were malperfused as a result of a proximal diastolic collapse of the TL. In summary our findings confirm that, whenever visceral ischaemia occurs as a result of dynamic malperfusion, and possibly TL collapse, bare metal stents elongation may enhance distal perfusion of those branches originating from the TL.
Although in our experience, patients treated with extension had 'abdominal branches' originating from the TL; PETTICOAT in patients with origin of arterial branches from the FL should be considered cautiously because it may lead to branch occlusion, unless there is evidence of a large more distal re-entry tear. In any case, the possible benefits of PETTICOAT should be evaluated in terms of late aortic remodelling, FL regression/thrombosis, and TL volume regain. In this context, even when using extensive aortic stenting, a complete sealing of the aortic FL is difficult to achieve. Moreover, it appears that although PETTICOAT did not increase the FL thrombosis rate, it contributed to a consistent and significantly greater TL gain, particularly at the abdominal aortic level.
Finally, in this series late mortality was most often related to aortic complications (mainly retrograde aortic dissection/ascending aorta haematoma) and accounted for 14.2%. Moreover, the 3-year freedom from any major adverse vascular events was 67.6%. Both these findings confirm that, independent of the strategy used (with or without bare metal stents extension), and even using a tailored approach, the risk of further catastrophic aortic complications persists even after initially successful endovascular handling of acute aortic type B dissection.
In conclusion, although our findings are encouraging, randomised data and longer-term follow-up are required to confirm whether this technique is beneficial in these high-risk patients.

Thoracic – Abstract: Basic science and education

Patch replacement of left hemidiaphragm in dogs by decellularised heterograft

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Diaphragmatic defect occurs mainly after tumour resection and occasionally as congenital malformations or post trauma. The reconstruction of large-size defects needs reconstruction. To evaluate the possibility of using diaphragm allografts in humans, we conducted a study comparing decellularised with cryopreserved heterograft diaphragm patches.
Heterografts were prepared using en bloc left hemidiaphragms from deceased donors which were transported in PBS solution, repacked under laminar airflow, frozen at –70 to –80°C, and preserved ≥1 to 2 months. Alternatively left hemidiaphragms were taken, transported in PBS solution, subjected to 25 cycles of washing with sodium deoxycholate/DNase, then stored at 5°C in PBS until utilisation.
Six adult healthy clinical mongrel dogs, weight 20±2 kg, were anaesthetised, then posterolateral thoracotomies through the 8th intercostal space were performed in left up position.
A prepared patch of 10 x 7 cm of cryopreserved heterograft was replaced subsequently to native diaphragm with running 2-0 polypropylene sutures. Animals were intensively monitored with CT scans performed 3 weeks after the operation. Patch replacement of decellularised heterograft diaphragms was performed in 5 dogs using the same technique (Figure 1). Sonography was done in all, and two had CT scans 6 months after operation. After sacrifice 6 months samples were subjected to clinical and microscopic examination.
No surgical complications, or mortality, arose in any cases, and grafts were intact in all animals. Sonography showed an intact hemidiaphragm with no sign of disruption or collection with only impairment of motion of patch. CT scan of frozen heterografts showed mild atelectasis and scattered infiltration in left lower lobe with some adhesion and minimal fluid collection under diaphragm (Figure. 1). Decellularised heterografts showed a small thin fibrotic band and elevation of diaphragm in one and normal in the other (Figures 2 and 3). There was no evidence of gross disruption and complete healing of suture line in necroscopy.
The transplanted patch was completely replaced by fibrous tissue and well incorporated into the native diaphragm.
Patches were shiny and well vascularised with peritonealisation on abdominal site. Histology showed that all of the graft parenchyma had been replaced with dense fibrous tissue.
Foreign body granulomas were clearly seen all over the previously frozen, grafted tissue.
Vascular changes were nil and vasculitis or fibrinoid necrosis of vessel wall was not seen. Inflammatory cells were mainly confined to lymphocytes and macrophages.
Histology of decellularised heterografts showed less inflammatory cell infiltration and scattered granulomatous foreign body reaction.
A wide range of synthetic, biological, autologous and even bioartificial materials are available. Due to the limitations of non-absorbable synthetic meshes and the incidence of infections, surgeons have started to explore the use of biologic scaffolds. Cryopreserved and/or decellularised diaphragm patches are in the category of bioprosthesis. The healing process in both techniques should be the same as a bioprosthesis to prepare lattice to induce migration of fibroblast and neovascularisation. They are well incorporated in tissues without disruption, or hernia, with less inflammation and adhesion. Our methods reduce the cost of bioprostheses and seem more appropriate for reconstructed diaphragms after extrapleural pneumonectomy and pherenectomy. The limitation of this study is a partial diaphragmatic replacement, we recommend further studies resecting nearly complete diaphragms and reconstruction.
Excellent results were obtained using decellularised diaphragm as a patch bioprosthesis in this study. The gross healing process was the same as with cryopreserved heterografts but with more adhesion despite reduced inflammatory cell infiltration and foreign body granuloma. More complex and expensive techniques are required to process decellularised diaphragms than cryopreserved patches.

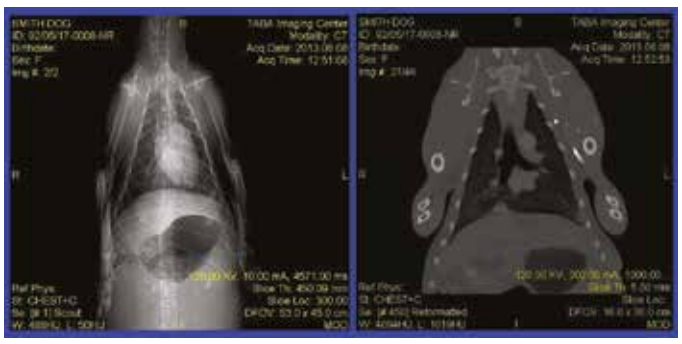

Figure 1. CT scan Cryopreserved diaphragmatic Patch (topography and coronal image).

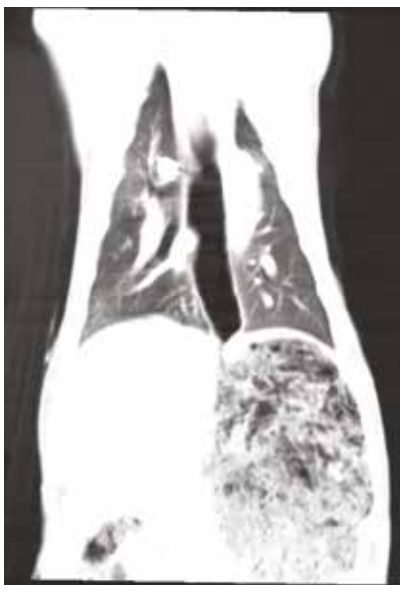

Figure 2. Patch replacement of left hemidiaphragm in dogs by decellularised heterograft.

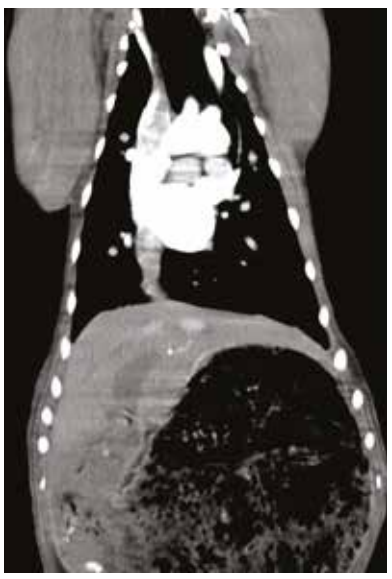

Figure 3. CT scan decellularised diaphragmatic patch (coronal image).

Thoracic – Abstract: Session case report

Withdrawal of lungs from uncontrolled donation after cardiac death: the lesson learned from the first case

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Procuring lungs from donors after cardio-circulatory determination of death (DCDD) has been identified as a strategy to increase the number of transplantations. Procurement from DCDD donors opens challenging new scenarios for the surgeon. We report the first case of lungs drawn from an uncontrolled DCDD (uDCDD) after an open-lung *in situ* preservation strategy. Our uDCDD lung procurement programme commenced in 2014. The first eligible donor was a 46-year-old man who died after cardiac arrest because of ascending aorta dissection. Cardio-pulmonary resuscitation (CPR) started out of hospital, and continued during the transfer to emergency room with the auto pulse LUCAS™. After CPR suspension, death was declared according to cardio-vascular criteria (20 min of flat ECG according to national laws), and consent to donation obtained from the next of kin. In order to preserve the lungs in the donor, an open-lung strategy was applied consisting of recruitment manoeuvres, CPAP, and protective mechanical ventilation. Chest X-ray and bronchoscopic evaluation were performed meanwhile. In the operating room, after a median sternotomy, pleural spaces were opened, and the lungs inspected. Examination revealed a large haematoma at the fissure in the left lung and a significant amount of blood evacuated from the pericardium opening. Due to the aortic dissection, a huge haematoma filled the ascending aorta and the main pulmonary artery, making the usual vessels preparation extremely difficult. The false lumen was identified, opened and a very fragile media layer exposed; as a consequence, a clamp was positioned in spite of the usual aorta encircling.

Standard pulmonary artery cannulation and prostaglandin administration were followed by digital pump manoeuvre in order to promote drug progression. The superior and inferior *venae cavae* were clamped and the left atrium appendage amputated. Perfadex cold pneumoplegia started ≥4 h after death, preceded by administration of 15 mg of rTPA. Pleural spaces were topically cooled with ice slush saline, while pulmonary ventilation continued; the abdomen was opened and organs inspected. Pneumoplegia was stopped (6 l) when a clear perfusate was collected. Remarkably, lung washout was free of blood clots.

The heart was removed according to our usual practice, and retrograde pulmonary flush was performed through a Foley catheter in each pulmonary vein. Finally, the bi-pulmonary block was removed, paying attention to keep both the trachea and the main pulmonary artery as long as possible for the purpose of *ex vivo* lung perfusion (EVLP). Furthermore, the oesophagus was removed *en bloc* for the presence of haematoma in the posterior mediastinum.

The lungs were deemed suitable for transplantation after EVLP. Small lacerations of lung parenchyma causing significant air leakage were noted during the procedure and properly sutured. The recipient was a young female patient with cystic fibrosis (LAS 46). Nine months after transplantation she is in good clinical condition (FEV1 102%), with no sign of rejection at surveillance biopsies, and she is back at work.

In conclusion, the application of an open-lung preservation strategy consisting of recruitment manoeuvres, CPAP and protective ventilation in uDCDD provided us with a suitable graft for lung transplantation, even after an extended period of warm ischaemia. Evaluation by EVLP is an essential step in this setting and an experienced organ harvesting team is required.

Cardiac – Rapid Response: How to perform an effective surgical atrial fibrillation ablation

Left atrial appendage exclusion to prevent cerebrovascular events during surgical ablation of atrial fibrillation: is it worthwhile?

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The strong interest in atrial fibrillation (AF) is due to the five times higher risk of stroke associated with thrombus formation and embolisation. Evidence from clinical and diagnostic imaging indicates that at least 70% of all strokes in patients with AF are cardio-embolic from the left atrium and 90% of these arise from the left atrial appendage (LAA). Hence, the surgical exclusion of this left atrial remnant could play a role in preventing ischaemic cerebrovascular events (CVE).

We retrospectively analysed 187 patients (mean age 64.34±9.12, 69 [36.9%] males) who underwent Maze procedure alone or during other cardiac surgical operations, including mitral valve repair/replacement and tricuspid valve repair with or without LAA exclusion, from 2003 to 2014 at our institution. Paroxysmal AF was present in 14 patients (7.5%), persistent AF in 87 (46.5%) and permanent AF in 86 (46%). Exclusion of the LAA was performed in 140 patients (Group 1) with suture ligation or epicardial clip device, and preservation was carried out in 47 patients (Group 2). Radiofrequency with or without cryoenergy was used to perform the Maze lesions box. The primary efficacy endpoint of our study was to evaluate the possibility of LAA exclusion during cardiac surgery to prevent postoperative ischaemic CVE (transient ischemic attack and stroke). Other outcomes included freedom from AF with or without antiarrhythmic drugs (AADs) at final follow-up and the rate of postoperative permanent pacemaker implantation.

There were no significant differences in baseline profiles between the two groups. During a median follow-up of 54 months (range 1–144) there were 28 deaths (15%) and 10 cases of ischaemic CVE (5.3%), four of these were in Group 1 and six in Group 2. By comparing the CVE rates between the two groups we found a significant difference (p=0.017). By contrast, freedom from AF at final follow-up (24-hour Holter monitoring) did not differ significantly (p=0.982) between Group 1 and Group 2, being 78.6% and 78.7%, respectively. Similarly, the difference in postoperative permanent pacemaker implantation for the two groups was not statistically significant (p=0.660).

Current echocardiographic studies suggest that LAA exclusion only removes a cardiac-embolic source of thrombi, but cannot achieve complete effectiveness in stroke prevention because LAA is not the only source of thrombi. The complete exclusion of LAA has to be achieved during surgery, because several case series have shown that incomplete closure is more dangerous than no exclusion at all for the development of thrombo-embolic sequelae. LAA exclusion is often performed concomitantly during surgical ablation procedures, but the efficacy of this practice during other cardiac surgery in patients with AF for CVE prevention is quite variable. However, the results of our retrospective study suggest that the addition of LAA exclusion during Maze procedure alone, or in conjunction with other cardiac surgery, significantly reduces the postoperative rates of ischaemic CVE, but does not affect postoperative freedom from AF or postoperative permanent pacemaker implantation. Further large randomised trials to test the hypothesis that surgical exclusion of the LAA at the time of other routine cardiac surgery can reduce long-term risk of stroke in patients with AF are important.

Cardiac – Rapid Response: How to perform an effective surgical atrial fibrillation ablation

Using an iPhone ECG to self-monitor for atrial fibrillation recurrence

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Postoperative atrial fibrillation (AF) occurs in 25–40% of patients following cardiac surgery, and is associated with a significantly increased risk of stroke both before and after discharge. Although often thought to be transient, postoperative AF recurs in at least 18% of patients within the first year and episodes are often asymptomatic, consequently recurrences may go undetected. A practical solution for detecting asymptomatic recurrence is for patients to monitor themselves for AF post-discharge, using a smartphone with an ECG cover. This may assist stroke prevention.

Our study demonstrated the feasibility of patient self-surveillance for recurrence of AF post-hospital discharge, using a handheld iPhone ECG (AliveCor heart monitor) (iECG). We provided the iECG to 44 patients who had experienced a 'transient' episode of AF post-cardiac surgery, and were discharged home in stable sinus rhythm, but had no past history of AF. Patients were requested to record a 30-second iECG, 3–4 times a day, over 1 month. Each iECG was automatically transmitted to a secure server, where the recordings were reviewed by our research assistant, and analysed by a validated algorithm for the presence of AF. If AF was identified, the participant was reviewed and managed by their treating physician.

Within 3 weeks of discharge, the iECG detected recurrence of AF in 25% of patients. The majority (78%) of these patients had a stroke risk high enough to recommend anticoagulation (mean CHA_2DS_2-VASc score: 2.3±1.2). Symptoms were not a reliable indicator of AF recurrence, as only 44% of AF episodes were associated with palpitations. Additionally, 25% of all participants reported palpitations which were not AF-related but due to atrial and ventricular ectopic beats. Therefore, the majority of AF recurrences would not have been identified without additional iECG monitoring, and many palpitations were not AF recurrences.

We have previously validated the iECG device for detection of AF in various settings used by health professionals, and shown it to be highly sensitive (98%) and specific (97%). However, this is the first time we have provided the device to patients for self-monitoring. Patients closely adhered to the suggested screening schedule, and reported self-monitoring was not onerous. Indeed, patients stated they appreciated the additional monitoring post-discharge and felt an increased sense of reassurance and peace of mind. Surprisingly, age was not a barrier to using the iECG technology, with the average age of patients being 68 years, and the oldest patient 85 years. The main reported barriers encountered were forgetting to charge the phone and, in some rural/remote areas, poor mobile-phone reception affected the quality of ECG readings.

Providing patients with an ECG case to attach to a smartphone is a non-invasive, inexpensive, convenient, and feasible way to monitor for AF recurrence in post cardio-thoracic surgery patients, and the AF diagnostic algorithm is now available on the smartphone. The success of patients using this technology also has implications for extending the use of iECG self-monitoring to other patient groups such as those undergoing ablation for AF.

Figure 1. ECG displayed on iPhone ECG.

Cardiac – Abstract: Case reports & videos

Hybrid treatment of thoracoabdominal aneurysm and dissection: visceral debranching

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Thoracoabdominal aortic pathology remains one of the most serious problems in modern vascular surgery. Traditional surgical treatment is linked with a high risk of perioperative complications and in-hospital mortality. Hybrid surgery has been introduced as a less traumatic method of treatment for high-risk surgical patients. It does not require cardiopulmonary bypass, is linked with shorter aortic cross-clamping duration, less blood loss and consequently a lower rate of complications and mortality.

The following report presents the successful hybrid treatment of a patient with Crawford II type thoracoabdominal aneurysm (TAA) and DeBakey IIIb type aortic dissection and with high risk of surgical intervention.

This 62-year-old man with connective tissue disorder had previously undergone aortic replacement from the isthmus to the Th11 level with reimplantation of 3 pairs of spinal arteries (in 2012). The postoperative period was complicated by bilateral pneumonia, severe encephalopathy and wound infection. During standard follow-up we observed rapid abdominal aortic dilatation (+2 cm in 3 months), according to CT scanning the terminal aortic diameter was 6.0 cm (Figure 1). Considering the previous intervention with complicated postoperative period, we chose the hybrid method of treatment in order to perform the most radical treatment with a lower risk of complications.

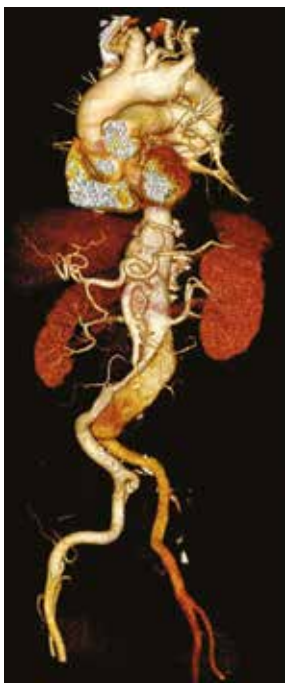

Figure 1. Pre-operative CT scan: Previously replaced descending aorta and abdominal aortic aneurysm observed. Aortic diameter on the level of visceral branches – 4.9, 5.2 cm; terminal aorta – 6.0 cm.

On the first stage the patient underwent infrarenal aortic replacement with visceral debranching using multibranched Coselli Thoracoabdominal Graft (Gelweave, Vascutek, Terumo Company, Scotland, UK). The intervention was performed through midline laparotomy and the aorta mobilised from the level of renal arteries to its bifurcation. All the visceral branches were mobilised. Infrarenal (immediately distal to renal arteries) aortic cross-clamping and separate iliac clamping were performed. After aortotomy both true and false lumen were observed. The proximal anastomosis between abdominal aorta and Coselli multibranched graft (26x10x10x8x8 mm) was performed in end-to-end fashion with a Prolene 4-0 running suture. After that the distal anastomosis between the prosthesis and aortic bifurcation was performed in end-to-end fashion and aortic clamps were removed. One-by-one were performed anastomoses between the branches of Coselli graft, right and left renal arteries and the superior mesenteric artery in end-to-end fashion with running suture. Due to the inadequate length of branches we had to use additional 8 mm grafts (Vascutek, Terumo Company, Scotland, UK). Anastomosis to the coeliac artery was performed in the end of the branch side of the artery. Biological glue was applied to all anastomoses followed by restoration of blood flow in all the visceral branches (Figure 2).

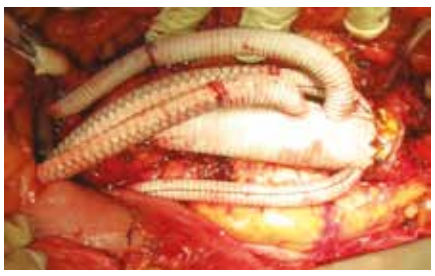

Figure 2. Intraoperative view of surgical reconstruction.

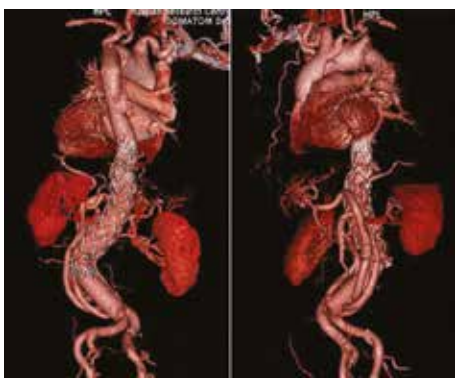

Figure 3. Final CT scan (after endovascular stage of treatment). Coselli Thoracoabdominal Graft and Valiant Thoracic Stent Graft.

After a smooth postoperative period, suprarenal aortic stenting was performed 14 days later using a Valiant Thoracic Stent Graft (Medtronic, USA) (Figure 3). On the control CT no deformation or endoleak were detected, all the branches were patent. The patient was discharged on the eighth day after aortic stenting.

The hybrid method of treatment is an effective, but less aggressive alternative technique to treat thoracoabdominal pathology and should be recommended as a method of choice in high-risk surgical patients. The use of Coselli Thoracoabdominal Graft facilitates the whole surgical repair and shortens reconstruction time.

Still more data, experience and randomised trials are required in order to determinate all the advantages and disadvantages of the presented method of treatment.

Cardiac – Rapid Response: General cardiac

Metabolic syndrome affects outcomes of heart valve surgery

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Metabolic syndrome results from the accumulation of abdominal fat and is characterised by obesity, insulin-resistance, hypertriglyceridaemia, low high-density lipoprotein cholesterol and hypertension. The cluster of metabolic alterations constituting metabolic syndrome has been estimated to affect 35–40% of the population in industrialised countries.

Its components are frequently associated with coronary artery disease, whereas less is known about its influence on heart valve disease.

Recently, synergistic effects leading to a pro-thrombotic state have been demonstrated in the contest of metabolic syndrome, which has been implicated in both accelerated native aortic valve stenosis and progression of bioprosthetic valve degeneration.

The aim of the present study was to assess the impact of metabolic syndrome on postoperative outcomes of patients undergoing heart valve surgery.

A consecutive series of 749 patients undergoing elective, first-time, heart valve surgery at one institution was studied. Metabolic syndrome was diagnosed using the modified Adult Treatment Panel III of National Cholesterol Education Program criteria. A total of 307 (40.9%) patients showed metabolic syndrome at baseline. Major adverse cardiac and cerebrovascular events (MACCE; including death, myocardial infarction, cerebrovascular accident, prosthetic dysfunction, and need for re-operation) were investigated.

At a mean follow-up of 37±16 months, mortality was 19/307 (6.2%) versus 17/442 (3.8%) in patients with and without metabolic syndrome, respectively (p=0.04). At three years, freedom from MACCE was significantly poorer among patients with metabolic syndrome (47±6% versus 59±8%; χ^2 3.82; p=0.004; Figure 1). Of note, the occurrence of every single component of the composite outcome 'MACCE' was significantly increased among patients with metabolic syndrome. In particular freedom from prosthetic valve dysfunction (because of thrombosis, endocarditis or paravalvular leak) was 82±4% in the metabolic syndrome subgroup versus 91±3% for patients without metabolic syndrome (χ^2 4.03; p=0.02; Figure 2).

Metabolic syndrome is associated with poorer outcomes after heart valve surgery.

In addition, metabolic syndrome has shown to exert a synergic effect, much more deleterious than its individual components and their arithmetic sum. The synergic effect seems to be related to a pro-inflammatory and pro-thrombotic state previously demonstrated by the founding of higher levels of inflammatory markers in these patients (especially C-reactive protein and interleukin-6). In conclusion, patients with metabolic syndrome appear as a selected high-risk population and the poor long-term outcomes shown seem to be correlated with that patient profile. Given its modifiable nature, metabolic syndrome should be recognised as an independent preoperative variable to identify high-risk patients and, moreover, should be corrected with lifestyle modifications and pharmacologic therapy to improve the results of valvular surgery.

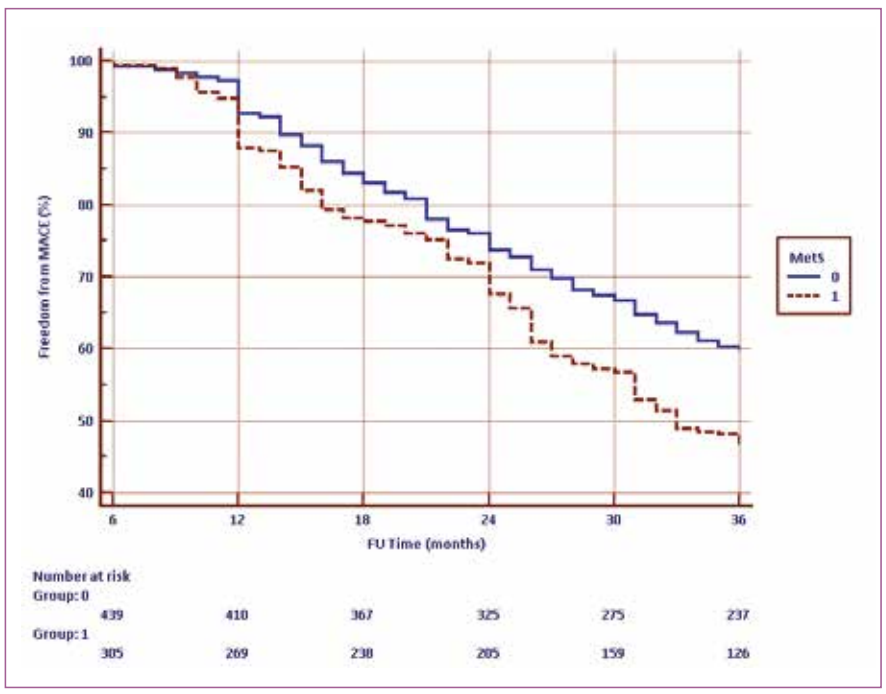


Figure 1. Kaplan-Meier MACCE-free survival curves stratified for metabolic syndrome.

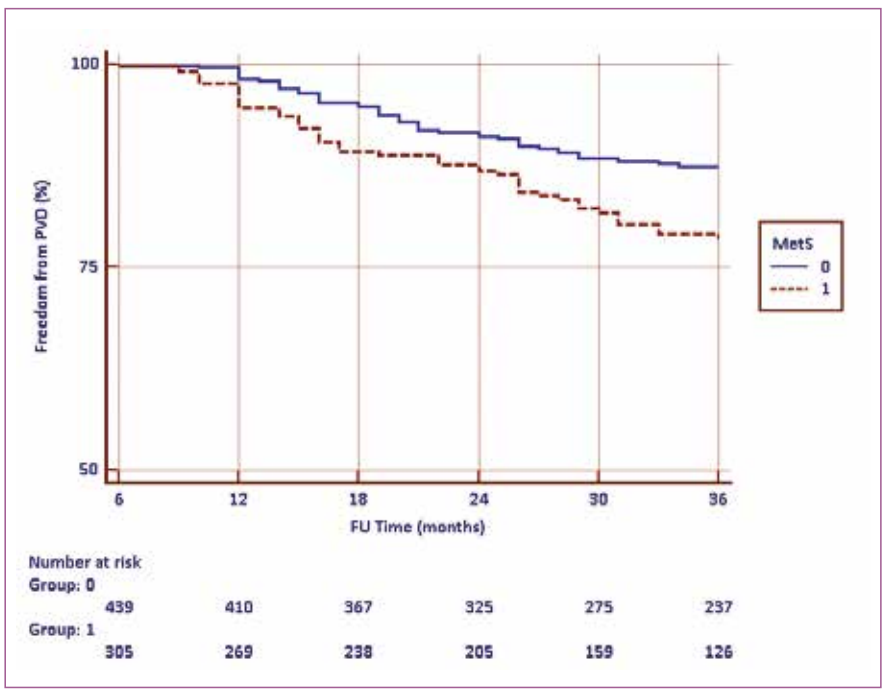


Figure 2. Kaplan-Meier PVD-free survival curves stratified for metabolic syndrome.

Cardiac – Abstract: Case reports & videos

Extra-anatomic TAVI in a GUCH patient with a Rastelli channel

Gry Dahle Oslo University Hospital, Oslo, Norway

An increasing number of grown-ups with congenital heart defects (GUCH) are in need of secondary procedures. Sometimes a third or fourth sternotomy is needed; these are very complex procedures with abnormal anatomy. The transcatheter valve technology is evolving, and 'custom made' extra-anatomical procedures may be an alternative.

In addition, imaging is evolving and 3D printing may be useful in the planning of the procedure.

We present a case report of a 31-year-old male patient with AVSD (atrial-ventricular septal defect), DORV (double outlet right ventricle), TGA (transposition of the great arteries) and pulmonal atresia, gone through surgery three times before: GOBT (Great Ormond Street modification of the Blalock-Taussig) shunt, then a second procedure with rerouting of left ventricle to aorta (the Rastelli procedure) with a GORE-TEX® (Gore Medical, Arizona, U.S.) patch and a homograft to the RVOT with a Dacron Y-graft to left and right pulmonary artery, then a third operation with reconstruction of RVOT with a GORE-TEX® graft and a Perimount Magna (Edwards Lifesciences, Irvine, U.S.) 25 mm valve and reconstruction of the aortic root (the Yacoub technique) with a 28 mm Hemashield graft (Maquet, Rastatt, Germany) and re-implantation of the coronary arteries.

Now presenting with aortic regurgitation and left ventricular dilatation, the patient was evaluated for a fourth procedure, and an alternative to open surgery was discussed. CT images were segmented using software from Materialise (Materialise, Leuven, Belgium). Images were discussed for best performance in the process. After generating a STL (stereo litography) file from the patient data set, the images were printed on a 3D printer, creating a 3D plaster model. The images were also further processed digitally to obtain information on access and angulation (Figure 1). Measurements for annular diameter were taken with the OsiriX software for eventual transcatheter treatment. The diameter of the native annulus was too wide for the catheter valves available on the market, but the subannular dimension was suitable for a catheter valve (Figure 2). A decision was made to perform a transcatheter procedure.

The procedure was conducted in a hybrid operation room under general anesthesia, with TEE and fluoroscopic guidance. No predilatation was done. An Edwards Sapien S3#26 (Edwards Lifesciences, Irvine, U.S.) was deployed transapically under rapid pacing. It was positioned below the anatomical aortic valve in the Rastelli channel with good support from the calcification. The apex was closed with two pledgeted purse strings. The control angiography showed that the valve was positioned correctly presented no leak. The patient was extubated in the operation room. On echographic control before discharge on day five, the valve performance was found to be excellent. On CT reconstruction, the valve was correctly positioned in the Rastelli channel (Figure 3).

This technique can be useful in complex anatomy redo heart surgery, especially in the growing population of GUCH patients, and it may also postpone the eventual need for heart transplantation in this group. For these particular patients, this may be a solution with a valve-in-valve procedure in either or both valves in pulmonary and Rastelli position before a new open surgery with another reconstruction.

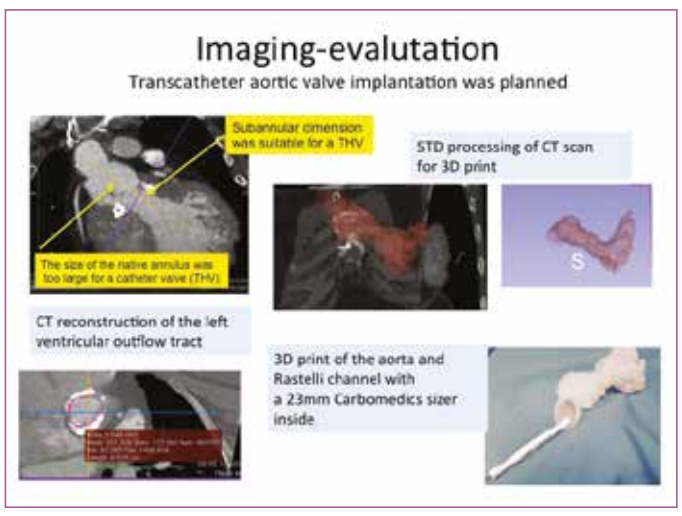
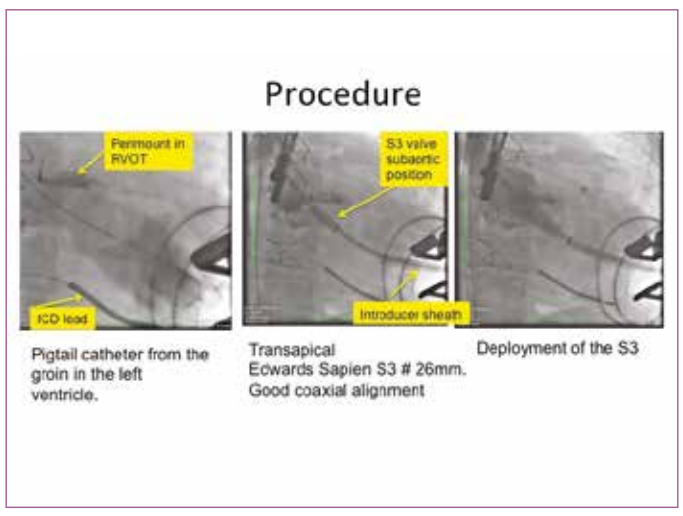


Figure 1.



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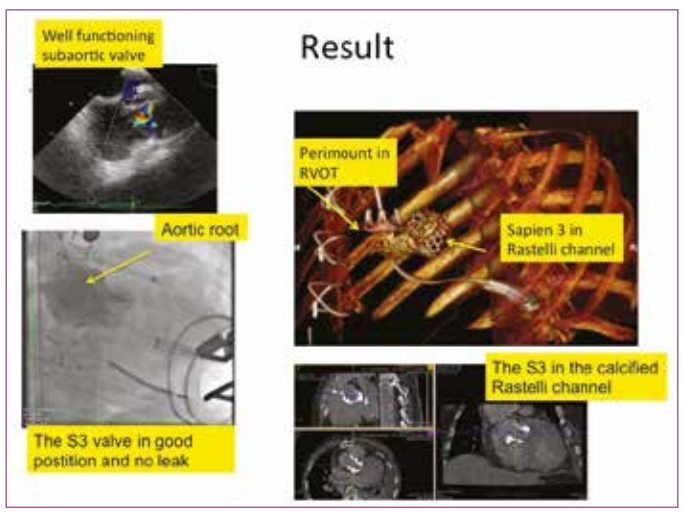

Figure 3.

Cardiac – Rapid Response: New technology in mitral surgery

A matched-pair analysis of non-rib-spreading, fully endoscopic, mini-incision technique versus conventional mini-thoracotomy for mitral valve repair

S Westhofen[1], L Conradi[1], T Deuse[1], C Detter[1], H Reichenspurner[1], H Treede[1]
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Recently, minimally invasive mitral valve surgery (MIMVS) via right lateral mini-thoracotomy has become the preferred access for mitral valve repair (MVR) in a growing number of centres. Several studies have proved feasibility, safety, and benefits including reduction of surgical trauma, faster postoperative recovery and mobilisation, and improved cosmetic results, with high patient satisfaction. Despite potential advantages, some surgeons still have concerns about the technical feasibility of complex MVR, for example in cases of Barlow's disease.

At our institution, we have standardised the minimal access approach for MVR and have evolved the method to further reduce invasiveness and trauma. In order to achieve this, we performed the procedure fully endoscopically without rib-spreading, using only a soft tissue retractor. To improve visualisation and orientation for complex repair we introduced 3D endoscopy. Furthermore, arterial and venous heart-lung machine-cannulas were implanted completely transcutaneously. In a matched-pair analysis, we compared patients who underwent conventional mini-thoracotomy for MVR with rib-spreading versus patients who received a non-rib-spreading, fully 3D endoscopic access with transcutaneous cannulation procedure.

We present our early results regarding feasibility and safety, functional results, and mid-term outcome.

From June 2013 to March 2015, 50 consecutive patients underwent non-rib-spreading (NRS) minimally invasive MV repair or replacement in our institution. We compared this group with a historic collective of 50 age, gender and preoperative diagnoses matched patients, who received a rib-spreading (RS) procedure in the period from January 2011 to December 2012. The indication for MV surgery was isolated severe mitral regurgitation (MR). Exclusion criteria were cardiac reoperations, concomitant procedures except for atrial ablation, chest wall deformities or apparent radiation therapy injuries, and severe peripheral arterial disease.

Access was via a 3–4 cm incision in the inframammary fold through the fourth intercostal space, in the NRS group using only a soft tissue retractor. In 10 male patients in this group a reduced skin incision along the periareolar margin was performed. Operative visualisation in the NRS group was provided by 3D endoscopy, creating improved and detailed visualisation and overview. Surgical data, early postoperative outcomes, patient responses regarding postoperative pain and cosmetic satisfaction were analysed. Repair results, ejection fraction, NYHA, and freedom from major adverse cardiac events (MACE) were determined after 1 year, using standardised questionnaires and echocardiography.

Both the non-rib-spreading and rib-spreading procedures were successful in all patients without technical repair limitations. Valve replacement was only performed in one patient of each group with a stenotic valve due to rheumatic alteration. Mortality was 0% in both groups. Significant differences were seen for operation times (delta = 20 min shorter operation time in the NRS-MIMVS group; p=0.012) and length of stay (LOS) in the hospital (delta = 2.4 days shorter stay in the NRS-MIMVS group; p=0.002). Postoperative pain was significantly lower in the NRS-MIMVS group (p=0.020), and patient satisfaction regarding cosmetic results were comparable in both groups. Regarding repair results, ejection fraction, perioperative morbidity, postoperative NYHA class and MACE, no significant differences between groups were observed. Follow-up echocardiography at 3 months and 1 year showed sufficient repair in all patients from both groups.

In conclusion, we believe that NRS 3D endoscopic MV repair and replacement is feasible and safe, improves postoperative pain and has no limitations with regards to surgical repair technique or results. Significantly shorter operation times and postoperative hospitalisation were observed in the NRS-MIMVS group. 3D endoscopy proves to be a helpful tool, especially for complex cases and placement of artificial neochords.

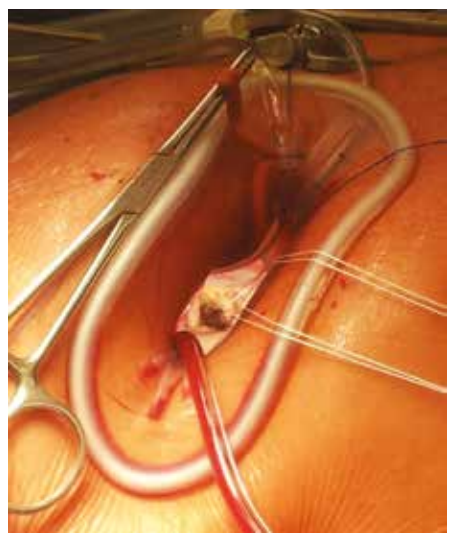

Figure 1. Non-rib-spreading access with only a soft tissue retractor.

Figure 2. Operative setting with 3D endoscopy.

Cardiac – Abstract: Revisiting the tricuspid valve

How to improve outcomes of surgery in patients with carcinoid heart disease

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Carcinoid heart disease (CHD) is common in patients with carcinoid syndrome (CS), affecting approximately one half of patients.[1] Surgical treatment can improve the generally poor prognosis of CHD, but the reported perioperative mortality is high (17%, range: 1–63%),[2] mainly due to perioperative right heart failure, coagulopathy and carcinoid crisis. We implemented a standardised treatment protocol (Table 1) for surgical management of patients with CHD at a UK Neuroendocrine Centre of Excellence in order to improve surgical outcomes. Surgical features such as invasive pulmonary valve inspection and preservation of the tricuspid subvalvular apparatus were established. Other characteristics included early detection of CHD through serial measurements of brain natriuretic peptide and echocardiography screening in patients with CS, as well as perioperative medication with octreotide. Between 2008 and 2015, a total of 11 patients were treated according to this protocol and we analysed outcomes retrospectively.

Median patient age was 63 years (interquartile range [IQR]: 56–70 years). All patients had metastatic liver involvement of CS and symptomatic CHD. Median time from first diagnosis of CS to cardiac surgery for CHD was 5 months (2–17 months). Median right ventricular function was normal at time of surgery (tricuspid annular plane systolic excursion [TAPSE]: 23.5 mm [21.3–26.8 mm]). In ten patients both pulmonary valve replacement (PVR) and tricuspid valve replacement (TVR) occurred, one patient underwent isolated TVR. Additional aortic valve replacement was performed in one patient, as was coronary artery bypass grafting. Tissue valves were used in all patients, stented for TVR, stentless for PVR. Median cross-clamp and bypass times were 70 minutes (60–84 minutes) and 108 minutes (90–132 minutes) respectively. Invasive pulmonary valve inspection led to detection of pulmonary valve involvement and unplanned PVR in three cases (27.3%). In-hospital mortality was 0%. Postsurgical right heart failure occurred in one case (9.1%), in which the tricuspid subvalvular apparatus had not been preserved at first-time surgery. No coagulopathy and carcinoid crisis occurred during admission. During 1-year follow-up, one death occurred due to progression of CS on day 346 (1-year survival: 90.9%). The carcinoids primary was resected in five patients (45.5%) during a median interval of 10 months (4.5–19.5 months) post cardiac surgery. Clinically relevant degeneration of implanted tissue valves was not seen in any patient.

Improved surgical results can be achieved in patients with CHD using a standardised treatment protocol. The pulmonary valve should always be invasively inspected during surgery as echocardiography may underestimate pulmonary dysfunction and even minimal involvement may lead to inferior outcomes. The geometry of the right ventricle should be respected to prevent right heart failure and tissue valves should be used as these patients have a limited prognosis[3] and are likely to undergo future non-cardiac surgery. In our experience tissue valves have excellent durability. In summary, our data show that, supported by a multidisciplinary team and if referred at the onset of cardiac symptoms, cardiac surgery in patients with CHD is a safe procedure with excellent outcomes.

Table 1: Standardised protocol for medical and surgical management of patients undergoing surgery for CHD.

Medical and Surgical Treatment Protocol in Patients with CHD	
Medical Treatment	*Preoperative:* – Start i.v. octreotide 12 hours prior to procedure (50–200 mcg/hour) – Bolus of hydrocortisone 1 hour prior (100 mg) *Intraoperative:* – Continue octreotide – In case of crisis/hypotension bolus i.v. doses (500–1000 mcg at 5-minute intervals) – Start milrinone after CPB in case of pre-existent RHF *Postoperative:* – Continue octreotide for 48 hours – Decrease before discontinuation – Continue milrinone as needed
Surgical Treatment	*Pulmonary Valve:* – Invasive inspection independent from echo – Use a stentless valve to optimise orifice area and right ventricle haemodynamics *Tricuspid Valve:* – Preserve the subvalvular apparatus during replacement to support right ventricle function – Use large bioprosthetic valves

CPB = cardiopulmonary bypass; CHD = carcinoid heart disease; i.v. = intravenous; RHF = right heart failure.

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Cardiac – Abstract: Functional mitral regurgitation

Optimal results immediately after MitraClip or surgical edge-to-edge for functional mitral regurgitation: are they really stable at 4 years?

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Recurrent mitral regurgitation (MR) is common after surgical and percutaneous (MitraClip) treatment of functional MR and its negative impact on patient outcome has been documented.

However, the Everest II randomised controlled trial suggested that, even in the challenging setting of secondary MR, patients with initially successful MitraClip therapy maintain stable results at 4 years. As acknowledged by the investigators, this important finding should be considered as exploratory and needs to be confirmed by other studies.

For that reason, we decided to address this issue. We assessed whether, in patients with severe left ventricular (LV) dysfunction and secondary MR, the initial favourable MitraClip results (residual MR ≤1+ at hospital discharge) remained stable at 4 years.

We reviewed the prospectively collected data of the first 85 consecutive patients with secondary MR and severe LV dysfunction (ejection fraction [EF] 28±8.5%) treated with percutaneous edge-to-edge (EE) repair (MitraClip system) who were discharged from hospital with an initial optimal result defined as no or mild (1+) residual MR. Patients with residual MR that was at least moderate (≥2+) at hospital discharge were excluded.

Regular echocardiographic follow-ups were performed in a dedicated outpatient clinic. According to the inclusion criteria of the study, at hospital discharge, 94.5% of the MitraClip patients had mild (1+) residual MR and 5.4% had no MR. At 1 year, the echocardiographic prevalence of MR ≥3+ was 6.8% and increased to 15% at 3 years (both $p<0.001$ compared with hospital discharge). When recurrent MR ≥2+ was considered, the rate of this echo finding was 32.5% at 1 year and 55% at 3 years ($p<0.001$ versus hospital discharge; Figure 1).

The increasing rate of recurrent MR over time translated into a freedom from MR ≥3+ of 93±2.8% at 1 year and 75±7.6% at 4 years, and a freedom from MR ≥2+, which decreased from 87±3.8% at 1 year to 37±7.2% at 4 years.

Therefore, in this series of patients with very satisfactory immediate outcomes, the initial optimal results of the percutaneous EE repair did not remain stable throughout the follow-up period.

In addition, we compared the MitraClip patients with a group of 58 patients with secondary MR in advanced dilated cardiomyopathy, who underwent surgical EE repair combined with annuloplasty with an initial optimal result (no or mild residual MR).

The two groups were comparable. Only age ($p=0.0001$) and logistic EuroSCORE ($p=0.04$) were significantly higher in the MitraClip group. Recurrent MR also occurred in the surgical group but the overall efficacy of surgery was significantly higher than MitraClip. Indeed, the 4-year freedom from MR ≥3+ was 75±7.6% in the percutaneous EE and 94±3.3% in the surgical one ($p=0.04$). Freedom from MR ≥2+ was 37±7.2% versus 82±5.2%, respectively ($p=0.0001$).

Therefore, we observed that in patients with functional MR and optimal mitral competence after MitraClip implantation, the recurrence of significant MR at 4 years is not uncommon.

Our study, although involving a limited number of patients, does not confirm previous observations reported in the Everest II trial indicating that, if the MitraClip therapy was initially successful, the results were sustained at 4 years. Moreover, when compared with MitraClip therapy, the surgical EE associated with annuloplasty provides higher efficacy at 4 years.

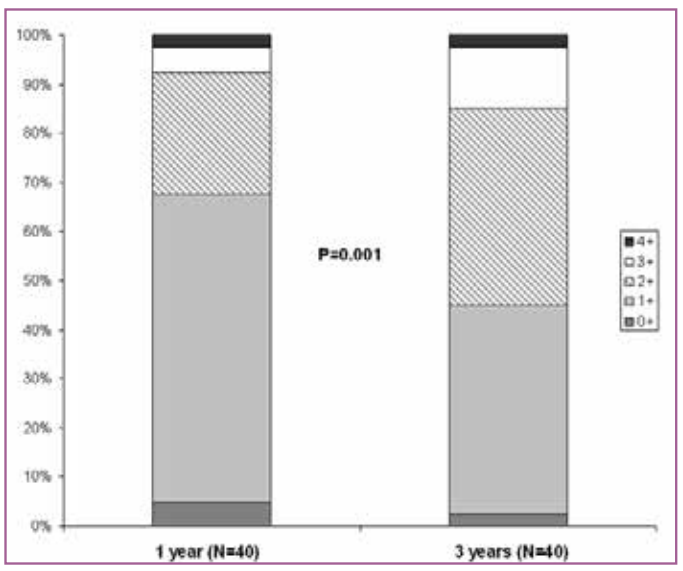

Figure 1.

Cardiac – Abstract: Optimising outcomes in coronary surgery

Bilateral internal mammary artery grafting: *in situ* versus Y-graft: similar 20-year outcome

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Since the basic paper from Loop, et al.[1] demonstrating the overwhelming superiority of the LITA over the SVG when grafted to the LAD, LITA to the LAD became the gold standard in coronary artery bypass grafting (CABG). However, a subsequent paper from the same institution,[2] demonstrating superiority of ITA grafting over single LITA, did not show the same impact on clinical practice. Data analysis from LaPar, et al.[3] found that, from 2001 until 2013, BITA utilisation had been 3% in the overall CABG population and 6% in a subgroup of 'low-risk' patients for BITA use. A recent analysis of the Society of Thoracic Surgeons database showed that use of BITA was 3.5% in 1999 and 4.1% in 2009.[4]

This is partly due to the fear of sternal wound complications. However, there is a wide body of evidence that ITA skeletonisation minimises wound infections,[5,6] whilst providing extra conduit[6] length and a larger internal diameter. In addition, a recent propensity matched study from our group[7] reported a better 17-year survival in patients with skeletonised BITA grafts than in those with pedicled BITA grafts.

The second motive is lack of experience. Most surgeons are not accustomed to using the *in situ* RITA. However, using it as a free graft and anastomosing it to the LITA has many advantages. The 'effective' RITA length increased, especially if the graft is harvested in a skeletonised fashion. It is possible to reach distal targets, even the posterior descending artery.

Arterial revascularisation of the left side becomes easy, the only decision remaining whether or not to use another arterial graft for the right side.

As with all surgical techniques, there are possible drawbacks. Grafting two territories with different run off is the Achilles heel of Y-grafting (e.g. 90% proximal LAD stenosis of a large territory and 50% proximal circumflex artery stenosis). Grafting territories with different expected run off can be associated with lower patency rate,[8,9] as flow competition presents a risk of graft failure.[8–13]

Our study clearly showed that both strategies yield similar results and that Y-grafting can be used safely to achieve the same long-term results of *in situ* grafting and makes RITA utilisation easier and user-friendly. While a propensity matched study is not as strong as a randomised controlled study, the latter would take too long. Our study includes close to 1500 propensity matched patients and, even being a single-centre experience, strongly suggests that using BITA as a composite conduit increases the possibility of grafting the lateral wall and provides long-term results similar to the *in situ* configuration (Figure 1). It increases the flexibility of BITA grafting and must be taken into account when planning a revascularisation surgical strategy.

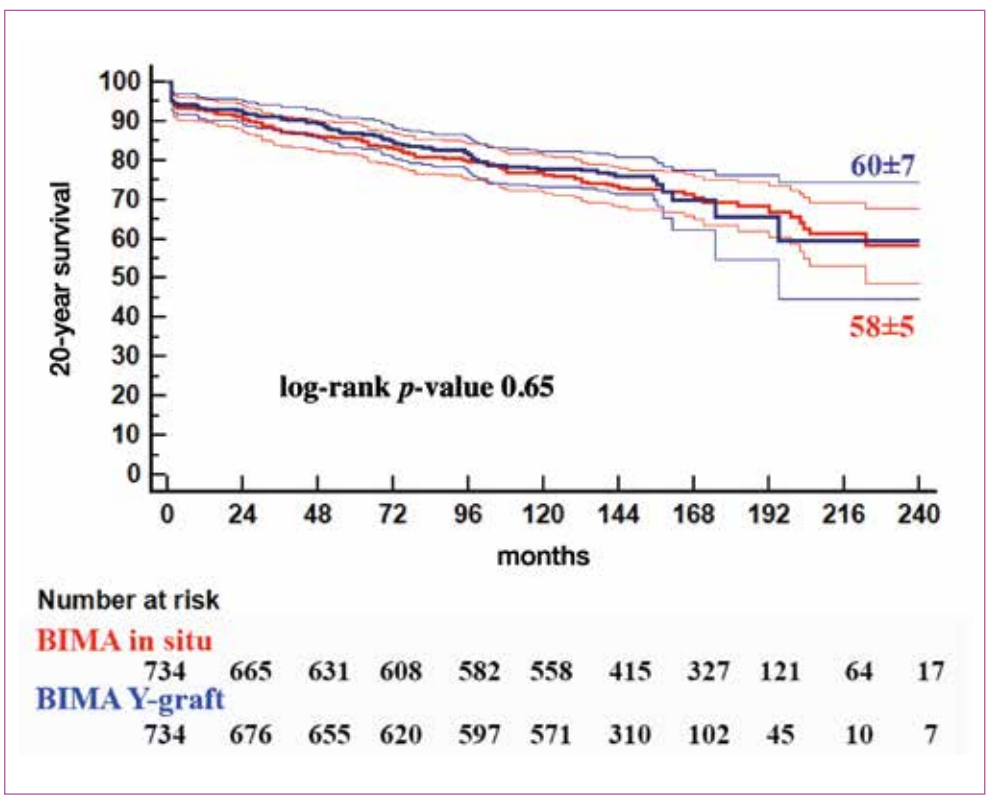

Figure 1. Twenty-year survival; BIMA *in situ* (red line); BIMA Y-graft (blue line).

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Cardiac – Abstract: Revisiting the tricuspid valve

Midterm results of leaflet augmentation in severe tricuspid functional regurgitation

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Objective: Functional tricuspid regurgitation (FTR) is primarily due to tricuspid annulus (TA) dilation, right ventricular enlargement and dysfunction, which lead to abnormalities of tricuspid anatomy and function. FTR is usually managed surgically using various methods of tricuspid annuloplasty. However, FTR has been reported to persist post-operatively in up to 45% of patients, and severe leaflet tethering is a risk factor for such recurrence. The aim of this study is to report our clinical and echocardiographic midterm results after leaflet augmentation in patients with functional regurgitation due to leaflet tethering.

Between May 2008 and July 2014 22 patients had a diagnosis of severe FTR with tethering height greater than 8 mm; all underwent a leaflet augmentation. This involved detaching the anterior and part of the posterior leaflet from the anterior annulus; a patch of autologous pericardium is used to generously fill the gap between the anterior annulus and the detached leaflet. A running suture locked at every step is used to avoid any purse string effect.

In two patients the septal leaflet also needed to be augmented using the same technique. In all patients bar one (annular calcification) a ring annuloplasty was added. Mean age was 70.3±8.9, redo surgery was performed in 12 cases (54.5%), 11 patients (50%) had right ventricle failure and 7 (31.8%) had renal failure.

The 30-day and 4-year survival were 80.9±8.6% and 70.7±10.1% respectively. At the last echocardiogram, no or mild TR was detected in 19 patients (86.3%) and moderate in three patients (13.6%). No patients needed re-intervention.

Tricuspid leaflet augmentation leads to very satisfactory clinical and echocardiographic mid-term results even in the presence of severe leaflet tethering and right ventricular failure.

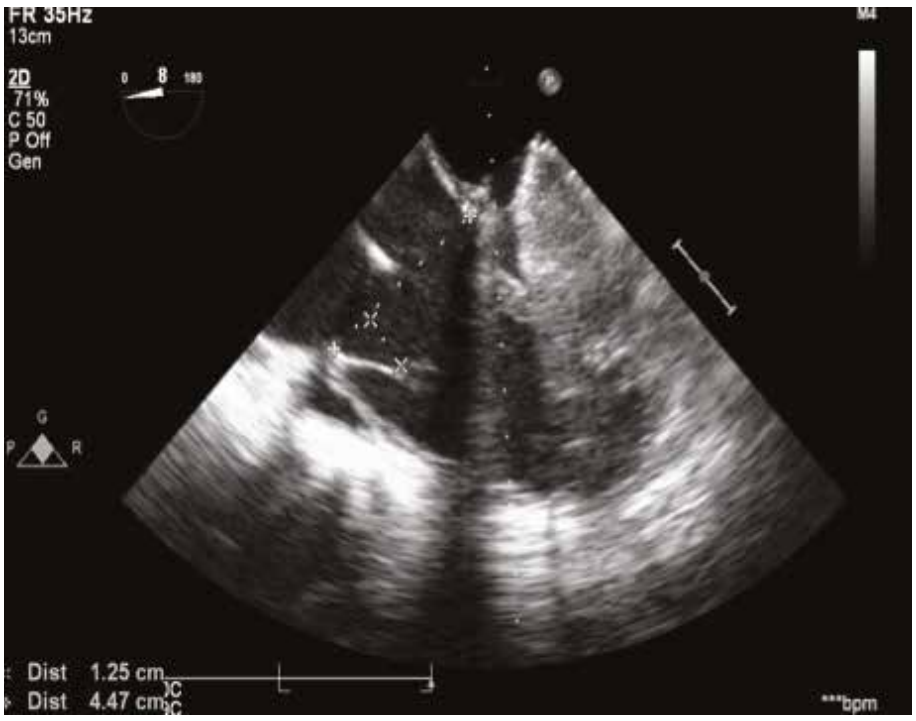

Figure 1. Preoperative image showing severe tenting.

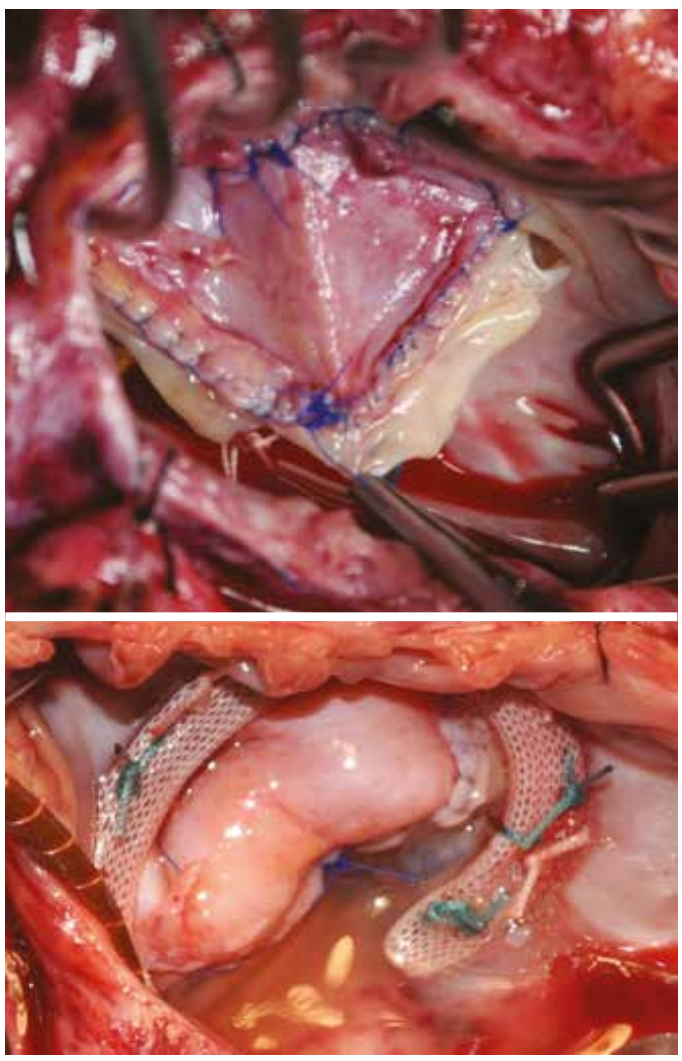

Figure 2. Intraoperative view of leaflet augmentation and final water test.

Cardiac – Abstract: Degenerative mitral regurgitation

Comparison of first with redo surgery for non-infective mitral valve disease

Manuel Wilbring, Konstantin Alexiou, Klaus Matschke Sems-Malte Tugtekin
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Redo valve surgery is considered to be associated with impaired surgical outcome. Usually, studies dealing with this issue involve a mix of heterogeneous procedures and indications. Particularly, endocarditis is included, which is a completely different entity, per se being associated with higher peri-procedural risk. Thus, data concerning the real surgical risk of redo mitral valve replacement for non-infective isolated mitral disease remain scarce. The present study sought to evaluate the initial and long-term outcomes of isolated mitral redo surgery and compares the results with first surgery for isolated mitral disease.

A total of 3450 mitral valve procedures were analysed; however, the study was restricted to isolated non-infective mitral valve procedures. The final study included 402 patients undergoing isolated mitral valve surgery, comprising 102 redo surgeries and 300 first surgeries. Mean patient's age was 65.2±10.9 years. The calculated mean logistic EuroSCORE of 10.8±12.1% identified an intermediate-risk population.

The comparison of baseline characteristics revealed a higher logistic EuroSCORE (25±2% versus 8±1%; $p<0.001$) in the redo group. These patients likewise had a higher incidence of atrial fibrillation (46.2% versus 31.1%; $p=0.005$), COPD (17.9% versus 7.9%; $p=0.05$) and CAD (21.6% versus 7.3%; $p=0.003$) and suffered more often from impaired ejection fraction (<30%: 10.3% versus 3.0%; 30–50%: 43.6% versus 19.2%; $p=0.002$). Analysis of primary outcomes showed no significant differences concerning hospital mortality (first surgery: 4.1%; redo surgery: 7.8%; $p=0.271$) or long-term survival. Nonetheless, patients in the redo group were characterised by a longer mean procedure time (197±90 min versus 150±51 min; $p=0.003$), longer primary ICU-stay (>24 hours: 74.5% versus 43.1%; $p=0.001$), more postoperative bleeding (1311±140 ml versus 591±62 ml; $p<0.001$) and subsequently more re-exploration for bleeding (10.3% versus 2.0%; $p=0.04$). Furthermore, postoperative morbidity from stroke, respiratory or renal failure, and myocardial infarction was not significantly different.

Redo mitral valve surgery is an infrequent treatment. Only a small percentage of mitral cases are allotted to re-operative surgery; however, patients undergoing this procedure are affected by nominally higher surgical risk. This resulted in higher postoperative morbidity, but mortality did not differ significantly. Redo mitral valve surgery can be performed at nearly identical surgical risk compared with first mitral surgery and, of particular note, the results are not limited by surgery itself. Nonetheless, postoperative bleeding and consecutive re-exploration remain a major issue in re-operative surgery.

Cardiac – Abstract: Degenerative mitral regurgitation

Surgical factors and complications affecting hospital outcome in redo mitral surgery: insights from a multicentre experience

Francesco Onorati[1], Andrea Perrotti, Daniel Reichart, Giovanni Mariscalco, Ester Della Ratta, Giuseppe Santarpino, Antonio Salsano, Antonio Rubino, Fausto Biancari, Giuseppe Gatti, Cesare Beghi, Marisa De Feo, Carmelo Mignosa, Aniello Pappalardo, Theodor Fischlein, Sidney Chocron, Christian Detter, Francesco Santini, Giuseppe Faggian

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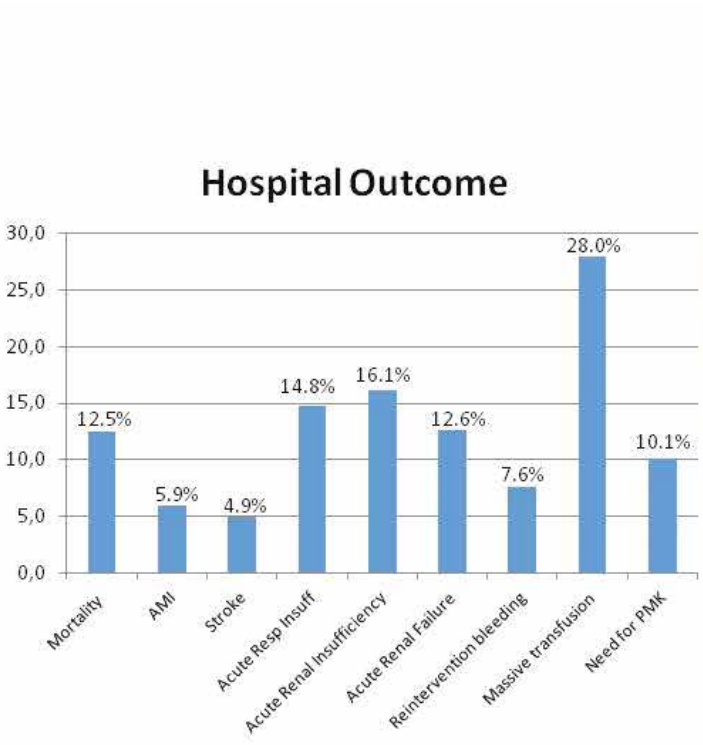
Redo mitral valve surgery has traditionally been considered a demanding procedure with high risk of mortality or major morbidity. Despite several centres reporting a progressive reduction of hospital mortality in redo mitral surgery during the last few years, reports from other centres show that hospital mortality remains high. Moreover, although some studies identified preoperative risk factors for a poor outcome, no study has ever clarified technical issues and perioperative complications affecting early survival in this high-risk population. Therefore, a multicentre European registry led by the Division of Cardiac Surgery, University Hospital of Verona, Italy, which is already reporting outcome data for redo AVR (RECORD registry), collected and analysed hospital outcome data for redo mitral surgery from nine European Institutions, in Besançon, Catania, Genova, Hamburg, Napoli, Nuremberg, Trieste, Varese and Verona, in order to identify intraoperative technical issues and early postoperative events affecting early survival.

The analysis from this large (n=832 patients) multicentre study is presented at the 29th EACTS Annual Meeting. It confirmed that redo mitral surgery is still associated with significant hospital mortality (12.5%) and major morbidity (Figure 1). Interestingly, injury of a patent previous LIMA graft (O.R. 2.4, 95% C.L. 1.2–5.7; $p=0.02$), iatrogenic cardiovascular major lesions at re-entry (O.R. 24.4, 95% C.L. 11.1–53.8; $p<0.01$), extracellular crystalloid cardioplegia (O.R. 10.7, 95% C.L. 1.9–57.8; $p<0.01$), and incremental cardiopulmonary bypass time (O.R. 1.1, 95% C.L. 1.0–1.2; $p<0.01$) independently predicted hospital mortality, whereas combined antegrade and retrograde cardioplegia was the only protective factor identified (O.R. 0.2, 95% C.L. 0.1–0.5; $p<0.01$). Of postoperative complications, acute myocardial infarction, need for IABP, intubation lasting more than 48 hours, and massive (>6 units) transfusions also predicted hospital mortality (Figure 1). The authors conclude that major lesions to cardiovascular structures and injury of a previous patent LIMA graft at re-entry are the most serious iatrogenic complications of redo mitral surgery. A prolonged cross-clamp time, extracellular crystalloid cardioplegia, and massive transfusion also predict a poor early outcome. In contrast, combined antegrade and retrograde delivery of cardioplegia increases the chance of successful treatment.



Postoperative complications predicting hospital mortality

Factor	O.R.	95% C.L.	p
AMI	5.6	2.4 - 12.8	<.01
Need for IABP	4.9	2.6 – 9.1	<.01
Prolonged Intubation (>48 h)	6.3	3.6 – 11.2	<.01
Massive Transfusions (>6 Units)	5.8	3.2 – 10.3	<.01

Figure 1.

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RECENTLY INTRODUCED BIO-MEDICUS NEXTGEN CANNULAE - WELL ACCEPTED AND VERSATILE!

The Bio-Medicus NextGen family of adult and pediatric sized cannulae products were made available first to CE market countries earlier this year. Since introduction, Cardiothoracic Surgeons and Perfusionists have responded with very positive feedback on the many feature enhancements and overall performance of the Bio-Medicus cannulae. The most frequently commented on new feature is the improved smoothness of the cannula tip transition that eases the insertion into the vessel. This smooth transition is possible in part by the new integrated stainless steel reinforcement with tip "fingerlets". This tip reinforcement design contributes to ease of insertion and removal by creating smoother radius shape side hole edges. Other well appreciated features include an improved hemostasis cap design and radiopaque suture ring. Cardiothoracic surgeons comments about using NextGen include - "Smart cannulation, easy transition, limited blood loss. That's all I need for femoral cannulation" and "Great transition. It almost enters by itself". Versatility of the NextGen pediatric sized models is enhanced with features to allow placement either with traditional solid introducer or by Seldinger technique capable introducer over an .025" guidewire (Insertion Kit with vessel dilators and guidewire available separately).
The NextGen femoral arterial length models are now additionally indicated to be used for jugular venous drainage to better accommodate advancing technics in MICS. Femoral venous models can be positioned traditionally with the tip near the IVC/Atrial junction or as a bi-caval femoral venous with tip into the SVC allowing the option of right atrial isolation with a single cannula.
To accommodate a range of flow rates for large or small patients, adult NextGen models are available in a wide range of sizes (Venous from 15Fr to 29Fr & Arterial/Jugular from 15Fr to 25Fr). Perfusionists commented about using NextGen - "Pressures and flows are great, this is an excellent perfusion. The cannula does what it is supposed to do". The thin wall and additional configurations of the Bio-medicus NextGen provide versatility to meet a variety of cannulation needs. Centers using the NextGen have routinely commented that new packaging allows easier handling and transfer into the sterile field for the OR staff.

EACTS Cardiothoracic Masters Jeopardy

The European Association for Cardio-Thoracic Surgery (EACTS) is offering a unique opportunity for two EACTS residents to attend the Society of Thoracic Surgeons (STS) 52nd Annual Meeting in Phoenix, Arizona, USA, 23–27 January 2016.

The Joint Council on Thoracic Surgery Education, Inc. (JCTSE) has organised a cognitive skills competition among US residents during the American Association for Thoracic Surgery (AATS) and STS in previous years. The competition is based on the US TV show 'Jeopardy'.
(https://www.youtube.com/watch?v=pFhSKPOF_II) and has been a great success among US colleagues.

This year, the EACTS has decided to organise a European version during the 29th Annual Meeting of the EACTS in Amsterdam. The competition will be entitled EACTS Cardiothoracic Masters Jeopardy. The EACTS will sponsor the winning team to go the STS 52nd Annual Meeting to compete in the final against the winning US team. EACTS will pay each team member's registration fee for the meeting, economy travel and hotel accommodation.

Participation is voluntary with all EACTS European and other non-US residents in cardiac, cardiothoracic, cardiovascular or thoracic surgery, eligible to participate.

Prior to the Annual Meeting, anyone wishing to participate was asked to:
1. Create a team comprised of two cardio-thoracic trainees or one cardiac trainee and one thoracic trainee
2. Take an individual online screening exam and answer 60 questions in 20 minutes

The European Competition
The top four national teams will compete during the Annual Meeting here in Amsterdam, on **Monday 5 October 2015**. Two rounds of 'Jeopardy' will be conducted in a live competition with the top two teams competing in the final round. The team with the best overall score will be the EACTS 2015 Resident Jeopardy Winners. The winners will go forward to play the US Resident Jeopardy Winners during the STS 52nd Annual Meeting.

We encourage you to join us for this new and exciting competition for residents.

EACTS
European Association For Cardio-Thoracic Surgery

2015 COURSES

Congenital heart disease	27–30 October
Mitral valve surgery	9–11 November (Barcelona, Spain)
Surgical treatment of lung failure	16–18 November
Surgical treatment of heart failure	18–20 November
Endoscopic port-access mitral valve repair drylab training using high-fidelity simulators	19–20 November (Maastricht, The Netherlands)
Hospital leadership: the human factor	23–24 November
Chest wall diseases	2–4 December
Advanced course on anatomic correction of ccTGA	3–4 December (Sankt Augustin, Germany)
Thoracic surgery part II	8–11 December
Endoscopic port-access mitral valve repair drylab training using high-fidelity simulators	17–18 December (Maastricht, The Netherlands)

All courses to take place at EACTS House in Windsor, UK, unless stated otherwise.

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Floor plan – Exhibition opening times: *Sunday 4 October 15.00–19.00 Monday 5 October 09.00–17.00 Tuesday 6 October 09.00– 17.00*

2.65	3-D Matrix Ltd
2.73	A&E Medical Corporation
3.08	AATS-American Association for Thoracic Surgery
2.51	Admedus
2.72	Advancis Surgical
2.68	Andocor NV
2.54B	AngioDynamics
2.55	Argentum Medical LLC – Curasurgical LLC
3.26	Asanus Medizintechnik GmbH
2.47	ATMOS MedizinTechnik GmbH & Co. KG
2.50	AtriCure Europe BV
2.19	B Braun Surgical S.A.
2.22	Bard Davol
3.12	Berlin Heart GmbH
2.52	BioCer Entwicklungs-GmbH
2.11	Biointegral Surgical, Inc.
2.56	Biometrix BV
2.46	Cardia Innovation AB
2.25	CardiaMed BV
2.06	Cardica GmbH
2.53A	Cardio Medical GmbH
3.29	Carmat
2.76	ClearFlow Inc.
2.41	Cook Medical
2.52A	CorMatrix Cardiovascular Inc.
2.79	CORONEO Inc.
2.32	Cryolife Europa Ltd.
3.10	CTSNet
2.42	CytoSorbents Europe GmbH
3.01	De Soutter Medical Limited
2.59	Delacroix-Chevalier
2.13	Dendrite Clinical Systems Ltd
2.23	Direct Flow Medical GmbH
3.09	EACTS-Euromacs and QUIP Programme
3.17	EACTS-The European Association For Cardio-Thoracic Surgery
3.16	Edwards Lifesciences
Training Village Unit 2	Edwards Lifesciences
2.78	ESCVS 2016-European Society for Cardiovascular and Endovascular Surgery
3.14	Eurosets SRL
3.32	Fehling Instruments GmbH & Co KG
2.66	Gebemed medical systems GmbH
2.18	Geister Medizintechnik GmbH
2.36	Genesee BioMedical Inc.
2.67	GUNZE Int'l Europe GmbH
2.16	Hamamatsu Photonics Deutschland GmbH
2.74	Heart and Health Foundation of Turkey
3.24	Heart Hugger / General Cardiac Technology
2.33	HeartWare Inc.
2.61	Hemotec Medical GmbH
2.70	HMT Medizintechnik GmbH
2.23A	Inter Medical Services Ltd
3.07	ISMICS-International Society for Minimally Invasive Cardiothoracic Surgery
2.53	Jena Valve Technology GmbH
3.04	Johnson & Johnson Medical S.p.A.
Training Village Unit 6	Johnson & Johnson Medical S.p.A.
3.28	JOMDD INC – Japanese Organisation for Medical Device Development, Inc
3.20B	JOTEC GmbH
2.07	KLS Martin Group – Gebrueder Martin GmbH & Co KG

2.44	Labcor Laboratorios Ltd.
3.20	LSI Solutions
2.04	Mani, Inc.
2.31	MAQUET
Training Village Unit 5	MAQUET
2.37	Master Surgery Systems AS
2.14	MDD Medical Device Development GmbH
2.63	Medela AG
2.77	Medex Research Ltd
3.20C	Medical Concepts Europe BV (co-exhibitor with Wexler Surgical Inc.)
2.20	Medistim ASA
2.21	Medos Medizintechnik AG
2.28	Medtronic International Trading SARL
Training Village Unit 1	Medtronic International Trading SARL
2.10	Meril Life Sciences Pvt. Ltd
2.22A	Moeller Medical GmbH
3.03	NeoChord Inc.
3.19	On-X Life Technologies INC™
2.58	OpInstruments GmbH
2.05	Oxford University Press
3.02	PEMCO Medical
3.22	Peters Surgical
2.22C	PneuX Life Systems
2.54	Posthorax Ltd
2.09	Qualiteam SRL
2.40	Redax S.p.A.
2.26	ReliantHeart
2.39	RTI Surgical Inc.
2.52B	Rumex International Co.
2.12	Sage Products
2.01	Scanlan International Inc.
2.49	Siemens Healthcare
3.31	Smartcanula LLC
2.54A	Somahlution
3.15	Sorin Group Italia Srl
Training Village Unit 3	Sorin Group Italia Srl
2.48	Spectrum Medical
Training Village Unit 4	St Jude Medical
2.30	St Jude Medical
3.25	stroke2prevent
3.11	STS-The Society Of Thoracic Surgeons
3.18	Symetis SA
2.17	SynCardia Systems Inc.
3.20C	TeDan (co-exhibitor with Wexler Surgical Inc.)
3.21	Terumo & Vascutek
2.53C	The Heart Valve Society
2.38	The Medicines Company
3.13	Thoratec Corporation
2.24	Tianjin Plastics Research Institute Co. Ltd (TPRI)
2.34C	Tianjin Welcome Medical Equipment Co Ltd
2.34A	Transonic Europe BV
2.34	VGS-Vascular Graft Solutions Ltd
2.15	Weigao Group
3.20C	Wexler Surgical Inc.
2.80	Wisepress Online Bookshop
2.45	WL Gore & Associates GmbH
2.75	WSPCHS-World Society for Pediatric and Congenital Heart Surgery
2.37	Xenosys (co-exhibitor with Master Surgery Systems)
2.71	Zimmer Biomet

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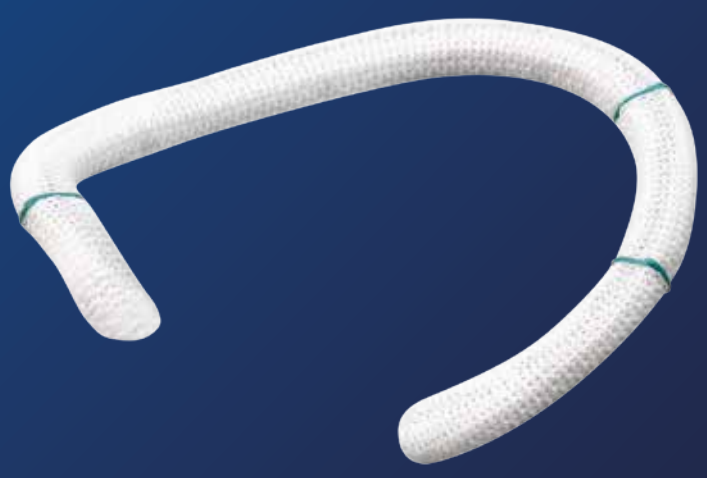

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"Early Experiences With a New Three-Dimensional Annuloplasty Ring for the Treatment of Functional Tricuspid Regurgitation" (Ann Thorac Surg 2014;98:2039–45)

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