EACTS European Association For Cardio-Thoracic Surgery

Daily News

The official newspaper of the 31st EACTS Annual Meeting 2017

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In this issue

Welcome to Vienna

The 31st Annual Meeting of the European Association for Cardio-Thoracic Surgery

It is with great pleasure to welcome you to the 31st EACTS Annual Meeting in Vienna, and we are honoured and delighted with your presence at this conference. The purpose of this event is to facilitate the exchange of knowledge and information for clinicians and researchers. As you will see, this year's programme covers the many different aspects of cardio-thoracic surgery, emphasising areas that are important in our daily clinical work. As ever, we are hoping to create an interactive meeting with the exchange of knowledge and ideas, fostering discussions and debates between delegates.

Honoured Guest Lecture

On Tuesday, our honoured guest lecture will be given by health economist Professor Pedro Pita Barros from Lisbon, who will provide his insights on '*Economics meets healthcare: how can it be useful?'*

Join us to hear what we can learn about health economics from a national and European perspective.

Guidelines

This year, we bring you three new clinical guidelines – which will be presented during the meeting – continuing to demonstrate the importance of the application of guidelines in every day clinical practice:

- ESC/EACTS Guidelines for the management of valvular heart disease
- EACTS and EACTA Joint Guidelines on Patient Blood Management for Adult Cardiac Surgery
- EACTS Guidelines on perioperative medication in adult cardiac surgery

Two of these guidelines have been the result of collaborative work with the European Society for Cardiology and with the European Association of Cardiothoracic Anaesthesiology.

Jeopardy

Special attention should also be reserved for the 'Jeopardy' sessions. During two competitions rounds on Sunday and Monday, national teams – composed of one cardiac and one general thoracic resident or two cardio-thoracic residents – will test their cognitive skills and compete for a ticket to the next STS Annual Meeting in Fort Lauderdale in January 2018. The winning team will represent Europe and will compete against the American winners for the 'World Champion' title. Come to cheer on the teams and try to test your own knowledge!

Gala Dinner

Join us for this year's Gala dinner at the Orangerie Schönbrunn on Tuesday 10 October, located within the grounds of the magnificent Schönbrunn Palace. One of the two largest Baroque orangeries in the world (the other being at Versailles), the building is 189 metres long and 10 metres wide and dates back to 1754. Joseph II was especially fond of arranging banquets in the plant-filled Orangery, emulating those he had experienced on his journey to Russia in the winter garden of the imperial palace in St Petersburg. Join us in these historic surroundings for a fun-filled evening of fine dining and entertainment! Dress code is Lounge Suits.

EACTS

If you appreciate what the EACTS presents during this event and you would like to support the work of the association, I encourage you to visit the EACTS booth and become a member. The membership fee is low, and you will receive the *European Journal of Cardio-Thoracic Surgery* and the *Interactive CardioVascular and Thoracic Surgery Journal* as well as a reduced rate for the Annual Meeting. Also, the EACTS has developed a digital portfolio management system to keep track of your residency training programme (for trainees and trainers) which is simple to use and ***free*** for members. You can complete your membership application online through the EACTS website (www.eacts.org) or by visiting the EACTS booth in the exhibition area. At the booth you will also find information on our new courses planned for 2018, our Quality Improvement Programme and how you can learn and publish with our multi-media manual *MMCTS*.

Of course, we thank our industry partners for their continued support of the Annual Meeting, and all the presenters who have taken the time to contribute to this year's *EACTS Daily News*.

We hope the information and techniques presented at this year's Annual Meeting will be of great interest. In addition to an outstanding scientific programme, the opportunity to explore Vienna's rich cultural heritage, including many historical buildings and engage with (new) friends over some Wiener Schnitzel, will make your stay in Vienna memorable.

I hope you enjoy the meeting and all that Vienna has to offer.

Domenico Pagano
EACTS Secretary General

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Prof. S. Ozaki,
Toho University, Tokyo Japan

General | EACTS Academy | First international EACTS VAD coordinators symposium

A new European perspective on VAD coordinators

Thomas Schlöglhofer is a biomedical engineer and VAD Coordinator at the Centre of Medical Physics and Biomedical Engineering and the Department of Cardiac Surgery, Medical University of Vienna, Austria, where he has worked since 2010. He has served on the board of the International Consortium of Circulatory Assist Clinicians (ICCAC) since 2015 and as President in 2016, and was Chair for the European Society for Artificial Organs (ESAO) - VAD Coordinator Symposium for the past three years. He is coordinator and co-moderator for the first International EACTS Ventricular Assist Device (VAD) Co-ordinators Symposium, which will be held this afternoon at the Annual Meeting. He spoke to *EACTS Daily News* to discuss the VAD coordination, the Symposium and its aims.

"We have many centres in Europe and VAD coordinators, but the problem is there is no clear role or job description."

Thomas Schlöglhofer

What is the role of a VAD coordinator?

In a team, you may have a surgeon, cardiologist and a VAD coordinator, technicians or engineers, perfusionists or ICU nurses that have special training to care for VAD patients in a technical way. We do the training for the staff, for the patients and caregivers so they can operate devices at home by themselves. We perform the technical supervision of the device, too, and we also do ward rounds in the ICU. We are the first level contact if there are any troubles in the hospital, or a potential readmittance. Staff and patients can call the VAD coordinators – we have a 24/7 emergency hotline. If there are any problems at home with a patient they will call us and we coordinate; we decide if this is a problem that requires the patient to come back to the hospital directly, for example. We can discuss this with the patient or help the patient on the telephone or we discuss the problem with our physicians and call the patient back.

What other roles do VAD coordinators have?

We supervise the hypertension management, because this is very important for VAD patients to prevent stroke and pump thrombosis, as well as training of anticoagulation self-assessment. We also educate patients and caregivers in how to change the driveline exit site dressings.

Why are you holding the first EACTS VAD Symposium?

EACTS has a long history in bringing cardiologists and surgeons together to share their experiences. So far, the VAD Coordinator role is not well-defined in Europe. It's been around for 10 years or so in America. We have many centres in Europe and VAD Coordinators, but the problem is there is no clear role or job description. Perfusionists or nurses may be doing the job as VAD coordinators but they have no exact role definition or job description in their hospital. Our goal is to let these perfusionists or nurses know that there are other people out there doing the same job that they do – that there is the role of a VAD Coordinator.

"...it is our job to prevent the readmission of patients."

Thomas Schlöglhofer

How do you see the future of VAD coordination?

Within EACTS, in the future, it could be a goal to have a standardised certification for example. People are trained, so it's important for us to continue the education too. We have a VAD coordinator training course in Berlin every year but additionally we want more educational meetings too. That's what we're doing at this Annual Meeting in Vienna.

What else will you be discussing here in Vienna?

We want to exchange knowledge on international best practices for VAD coordinators. Surgeons exchange knowledge during these meetings and VAD coordinators should their exchange their knowledge too, because that will improve patient care.

Tell us more about the Symposium…

We will also discuss how to set up a VAD programme with a multidisciplinary team. We will go over the role of the coordinator: this is really important. We will talk about anticoagulation in the course, as well as VAD patient management. We will also discuss, for example, how to detect adverse events and prevent them. Additionally we will look at technical aspects, such as how to interpret pump waveforms and parameters. And we will focus on patient management – such as blood pressure management and how to prevent readmissions of VAD patients. This is a major goal and it is our job to prevent the readmission of patients.

"Surgeons exchange knowledge during these meetings and VAD coordinators should their exchange their knowledge too, because that will improve patient care."

Thomas Schlöglhofer

Why is the VAD Coordinator role not recognised so much in Europe?

In the US, the therapy started a little bit earlier and I think the nursing sector is more academic, so the professional background of Coordinators in the US is different vs Europ. In Europe there are many small centres and the coordinators of many facilities are perfusionists. A major problem in Europe is the small implant volume in many centers: if you have a small programme, with maybe 5 to 10 implantations per year that's not enough to hire an additional person as a VAD coordinator. So, the perfusionist or nurse is responsible in parallel to their routine duties because the management says they can't afford to recruit a dedicated VAD coordinator.

In many big European VAD implanting centers, the role of the VAD coordinator is well-defined including the knowledge, about how to set up a VAD programme and that's the goal of this symposium – to share the knowledge on how to setup and learn from the experiences of bigger centers. We'd like to help new centres so they avoid making the same mistakes that we did, and don't try to reinvent the wheel.

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Saturday's Programme

The first day of the 31st EACTS Annual Meeting here in Vienna is packed with Techno College and Academy sessions, a hands-on congenital drylab, and a programme of Translational and Basic Science Course symposia that will extend into Sunday.

Don't miss

The Techno-College Innovation Award, held during the session 'New techniques: the developers corner' (13:30, Hall A)!

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Cardiac | Focus | What is new in left main disease

Working towards a NOBLE endpoint

Coronary revascularisation has been the main area of research for consultant cardiac surgeon Per Hostrup Nielsen of Århus University Hospital. One of his main studies was the SYNTAX-study[1], where his was the only Danish centre to participate. Today he is working with hybrid revascularisation and minimal invasive off-pump revascularisation with LIMA to LAD through hemisternotomy (JOBCAB). In tomorrow's session, however, Dr Nielsen will talk about the important Nordic-Baltic-British Left Main Revascularization Study (NOBLE)[2] trial, where he was one of the key investigators.

What work has led to the NOBLE trial, and why is it important?

From the late nineties we saw how cardiologists – in a kind of off-label way – began to treat left main stenosis with PCI. When we saw the first results from the SYNTAX-study which indicated equivalence between coronary-artery bypass grafting (CABG) and percutaneous coronary intervention (PCI) in LM, it was natural for us to start a regular randomised trial on this subject – leading to the NOBLE study.

The results from the SYNTAX study concerning the treatment of LM-stenosis was purely hypothesis-generating, but could easily be used to justify the use of PCI in these patients.

How have the risks to patients changed over the years, given the improvement in technology?

We have seen both CABG and PCI improve over the years with very few perioperative complications/fatalities, regardless of the kind of techniques we have used. With the newer generations of stents we see fewer major complications and fatalities with stent thrombosis but still the CABG protects against myocardial infarction and angina due to de novo lesions, which I consider an inborn weakness of the PCI technology.

What surprised you about the NOBLE trial?

Thinking it over, you must be impressed that over the years we have been able to develop two almost equally robust treatments that have been employed in many cardiac units in many countries. In our trial we see the results from a diversity of 34 clinical units in 9 countries to the benefit of our all-comers patients. We were looking at the major negative events over time following two different and both recognised treatments of coronary disease. Seen from a patient safety aspect, you could hope that the overall mortality was equal for the two treatments. Up till now that seems to be the case. In contrast to previous studies it was surprising that there were so few strokes in the CABG group. It might suggest a rather random occurrence of stroke disconnected from treatment modality, but more reflecting the course of the arteriosclerotic disease.

"I think both studies are obliged to do a long-term follow-up both at 10 and 15 years – then we will have a better idea of especially long-term survival."

Per Hostrup Nielsen

What is the most important finding from your point of view. And why is this important for patients?

Non-procedural MI and reintervention reflect to some degree the progress of arteriosclerotic disease. CABG seems to protect against these incidents, over time helping the CABG-patient to a less distressing disease course. Left main stenosis is a life-threatening condition and revascularisation at a later date is seldom – if ever – recommended. If equally eligible for both treatments, both the pros and cons will be explained to the patient based on the current knowledge – the NOBLE trial included.

Should guidelines should be changed in any way?

CABG and PCI remain complementary methods of revascularisation. Both NOBLE and the Evaluation of XIENCE versus Coronary Artery Bypass Surgery for Effectiveness of Left Main Revascularization (EXCEL)[3] show that repeat revascularisation is lower for CABG but longer follow-up is needed in order to discern a difference in mortality. The similar mortality rates up to three years call for an individualised (age, presentation, comorbidity, patient wishes) heart team-based decision and the guidelines may be changed toward 1A indication for both PCI and CABG when the SYNTAX score is below 33.

Any advice for surgeons or cardiologists approaching their patients as a result of this trial?

For the younger patients with LM-stenosis and low co-morbidity the CABG should be the treatment of choice. Use your heart team for an unbiased discussion of the individual patient and make sure to have a thorough information of the patient, so that he/she knows what to expect.

How did this trial differ from the EXCEL trial, which will also be discussed during the focus session?

The major difference between the two trials is the design of the combined endpoint, where EXCEL includes perioperative MI and excludes reintervention. On that background EXCEL concludes that PCI is non-inferior to CABG,

"CABG and PCI remain complementary methods of revascularisation."

Per Hostrup Nielsen

but evaluating the individual components of the composite endpoints both studies shows almost identical results at three years of follow-up.

Can we learn anything more from the trials, in future, after more time has elapsed?

Trials of these magnitudes are expensive and lengthy to perform. In many ways the results are in accordance with previous studies like SYNTAX. We should see some major improvement in one of the treatment modalities before going into a new major trial. But at the moment that major breakthrough is hard to see.

I think both studies are obliged to do a long-term follow-up both at 10 and 15 years – then we will have a better idea of especially long-term survival.

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TERUMO

Neo-tricuspidalisation of the aortic valve in a paediatric population – a clinical update.

Martin Kostolny[1,2], Branko Mimic[3], Vladimir Milovanovic[4], Slobodan Ilic[4] 1 Cardiothoracic Unit, Great Ormond Street Hospital, UK; 2 Slovak Medical University, Bratislava, Slovakia; 3 Leicester Congenital Heart Centre, UK; 4 University hospital Tirsova, Belgrade, Republic of Serbia

Neo-tricuspidalisation (Ozaki procedure) is an aortic valve plasty where all valve leaflets are removed and replaced with pericardium or bioprosthetic material after measuring distances between commisures with commercially available sizers (OZAKI VRec Sizer™). It offers a standardised way of aortic valve plasty without the need for long term anticoagulation and potential for annular growth. Results in the adult population have been excellent but those in the paediatric population have to be compared to other types of surgical treatment for systemic semilunar valvar stenosis and/or regurgitation.

We adopted this method for a selected group of patients and report on our early results.

Between 01/2016 and 08/2017 24 patients received the Ozaki procedure at 3 institutions. Mean age at surgery was 13.5 years (2.9-19.3yrs). CardioCel® or glutaraldehyde treated native pericardium was used according to institutional policies.

Indication for surgery were as follows: bicuspid aortic valve with stenosis and/or regurgitation was present in 18 patients, 1 patient had a previous arterial switch operation and another common arterial trunk repair with significant semilunar valve incompetence on follow up. 1 patient came for surgery with progressive valvar regurgitation and severe left ventricular function impairment after previous heart transplantation and 3 with other valve pathology. 8 had previous catheter and 5 patients had previous surgical interventions.

There were no early deaths. The patient with severely impaired ventricular function after previous heart transplant died 7 months after valve repair. His follow up echocardiogram at that stage showed mild aortic stenosis and regurgitation and moderately impaired ventricular function. One patient developed a thrombus inside the right coronary cusp that resolved under anticoagulation with preserved valve function and without neurological sequel. Two patients underwent re-operation for valve endocarditis; the repair was preserved in one after an interval of conservative treatment and the other required homograft aortic root replacement. Excluding these two, the freedom from greater than mild aortic regurgitation and stenosis was 100% after up to 18 months of follow up.

Neo-triscuspidalisation of the aortic valve offers an alternative to other forms of surgical intervention on the diseased semilunar systemic outflow valve with excellent results in short term. Indication criteria for the paediatric population are still evolving.

Disclosure: Martin Kostolny is a proctor for Terumo and JOMDD.

Cardiac | Focus | Atrial fibrillation surgery in 2017

Lone atrial fibrillation – how to implement the guidelines in daily practice

Anders Ahlsson, Associate Professor and Managing Director at the Cardiovascular Division of Karolinska University, Stockholm, Sweden, says setting up an atrial fibrillation (AF) Heart Team is the key message from the ESC guidelines on AF when it comes to treating lone AF.

Stand-alone AF surgery should be managed by a multi-disciplinary, integrated, AF Heart Team with both EP cardiologists and heart surgeons working together, according to new guidelines from the ESC and EACTS. The 2016 ESC guidelines for the management of AF contain new recommendations on the best ways to treat AF with surgical techniques, with the team approach heavily emphasised.

"Integrated AF care is a new thing, done in a multi-disciplinary setting, and the idea is that all patients should be treated in this way. It's also a nurse-based approach, and has been very successful in the Netherlands, in terms of introducing anticoagulation and preventing strokes," Dr Ahlsson, one of four surgeons on the Task Force who drew up the guidelines, told *EACTS Daily News*.

An AF Clinic should consist of an AF nurse, cardiologist (or general physician/electrophysiologist) and technology support, and these health professionals then work with a heart failure team, physiotherapists/dietitians, pharmacists, stroke physicians/neurologists, nephrologists, GPs, haematologists and electrophysiologists. Difficult or complex cases should be referred onto the AF Heart Team.

The model for AF Heart Teams should include an AF cardiac surgeon, electrophysiologist and referring cardiologist. These professionals should also consult with heart failure specialists, anaesthesiologists, cardiac imaging, LAA occluder implanters, neurologists/stroke physicians and other medical specialists. "An AF Heart Team is a small part of the AF integrated care team. Integrated care really doesn't exist in many places at the moment. There are just a few centres in Europe where this model is working very successfully," said Dr Ahlsson.

"However, there is no point in spending time and money to set up an AF Heart Team if surgeons don't collaborate with an EP cardiologist. It's useless: don't do it. Cardiac surgeons need to form alliances with EP cardiologists."

Dr Ahlsson said one of the big advantages of working in an AF team is that it is easier to run the scientific studies that are needed. "If you're working as part of a network it's much easier to get the results and answers to questions that you want. It's also much better for the patient to be treated by a multi-disciplinary team.

"My second main message would be that we need to enter more patients in large multi-centre trials, as we really don't have enough studies. The cardiologists have been much more successful in performing these studies. I would say we have one or two great studies, but we need to improve on this.

"We need to learn from the cardiologists about how to perform large multi-centred randomised controlled trials because they are ahead of us and their evidence base is better. We need to collaborate and learn from them."

Making up your mind on what type of surgical approach you are going to use whether it be RF energy/cryo, lesion sets, minimally invasive/totally endoscopic, unilateral/bilateral or left atrial appendage, is also very important, said Dr Ahlsson, adding: "You have to pick one method and develop your knowledge and skill.

"... there is no point in spending time and money to set up an AF Heart Team if surgeons don't collaborate with an EP cardiologist. It's useless: don't do it. Cardiac surgeons need to form alliances with EP cardiologists."

Anders Ahlsson

When you have decided what method to use, then you have to contact centres that have great experience in this, and then you have to go there and collaborate and you have to ask them to come to your place to get you started.

"There are a handful of centres out there with great experience, and you should connect with them." Other important steps to setting up a lone AF surgery include defining your patient population, designing the protocols, and getting informed consent from patients, he said.

Dr Ahlsson stressed that it's important for patients to be informed about the risks of procedures and explain that this is an area where the scientific evidence is not that great and include them in studies and ask for their consent.

"You have to remember that the patients coming for these procedures are severely handicapped by AF, and are looking for a way out, because they feel so limited by it, and because of this they are often very motivated to have surgery and take part," he explained. "They have usually exhausted other treatments, for example they have may have had catheter ablation many times or it has not been possible for them to have it."

Dr Ahlsson said that implementation of guidelines in daily practice is an issue. "Some things change very easily; for instance the old anticoagulants are replaced by the new ones from one day to the next – people adapt these changes fairly easily, but other recommendations such as forming AF integrated teams require manpower and planning and so that's not so easy and will take more time. Basically, we need people who are interested, you can't just order these things to happen, you need surgeons and cardiologists who are motivated, and want to go in this direction and explore."

He said that one of the most important new ESC/EACTS AF guideline was that catheter or surgical ablation should be considered in patients with symptomatic persistent or long-standing persistent AF refractory to AAD therapy to improve symptoms, considering patient choice, benefit and risk, and supported by an AF team.

"This is new advice. When we looked at the literature there was equal evidence for the success of surgery and catheter ablation. It's a consensus statement, as we don't have enough evidence to make a class B recommendation, but based on what we know we can't say one is better than the other. It will be for the AF Heart Team to decide which procedure is the best option. We do need more studies on this though."

"We need to learn from the cardiologists about how to perform large multi-centred randomised controlled trials because they are ahead of us and their evidence base is better. We need to collaborate and learn from them."

Anders Ahlsson

Dr Ahlsson presents 'Lone atrial fibrillation – how to implement the guidelines in daily practice' during Monday's session 'Atrial fibrillation surgery in 2017', held at 10:15 in Hall K2.

General | Focus | Health care design; opportunities and challenges for the future

Improving the patient consent process: from rhetoric to reality

In 2008 the UK General Medical Council's guidance set out the principles upon which good clinical decisions should be based, in 'Patients and doctors making decisions together'[1]. It emphasised that patients should be advised about alternative treatments. Bertie Leigh (ex-Senior Partner at Hempsons Solicitors, London, UK), who published last year on the importance of patient education in the decision-making process[2], spoke to *EACTS Daily News* ahead of the meeting to discuss where improvements need to be made in recording the counselling process, looking towards areas where this has already been done with success.

Mr Leigh will speak tomorrow as part of a review of the latest challenges in healthcare design and management which includes a discussion of Big Data, value-based reimbursement, clinical trials in surgery, and technology in healthcare.

Increasing patient engagement in the decision-making process has been accelerated by the advent of the Internet, with improvements in health literacy in the general population. Improvements in evidence-based practice also play a role in freeing communication between doctor and patient, noted Mr Leigh: "At the end of the war when I was born, the majority of medical interventions did more harm than good.

"Right up to the 1980s there was very little evidence base to support most medical interventions. Doctors have slowly and reluctantly started explaining things to us, partly because they understand them better themselves. What we are talking about is a levelling of knowledge between doctors and the rest of society as medicine has become more fit for purpose."

Naturally, the understanding and interpretation of the concept of the doctor-patient relationship continues to vary as a function of age, education, and country, according to an aggregated 2012 European Commission report[3].

Yet, as well as posing a challenge to patients, drawing the patient into the decision-making process requires change on the side of the health profession. If the patient is to be informed about a medical procedure, it is necessary for them to have access to reliable resources from the medical community that will help them to understand their options, the risks, and their own individual needs and desires. The autonomous patient will inevitably sometimes make decisions that surprise the doctor who is advising him.

"You have to treat me...You cannot push me through a consent process designed for your own convenience."

Bertie Leigh

Furthermore, explained Mr Leigh, this decision-making process needs to be recorded more thoroughly than it is at present. "The whole notion of consent is misconceived," he said. "The one thing that you don't need to bother about, when a patient climbs onto an operating table and asks to be anaesthetised, is whether they consent to what is happening to them. In 40 years of experience, I've never defended a claim by somebody who said that they did not consent to an operation, except where a mistake was made and they got the wrong operation by accident."

While this does not negate the importance of recording the consent that a patient has given with respect to a particular procedure, its prelude is of greater importance: "You need to have a record of the counselling process by which the patient has come to take the decision to have an operation. In elective surgery, that is something that happens slowly, over a period of weeks – long before they come into hospital.

"I regard a consent form, which contains a list of risks that has been given to the patient on the day of surgery or the day before surgery, as prima facie evidence of discourtesy, negligent treatment, and professional misconduct – because it is contemptuous to a patient to give them a list of risks on the day of the operation, weeks

Continued on page 6

General | Focus | Health care design; opportunities and challenges for the future

Improving the patient consent process: from rhetoric to reality

Continued from page 5

after they have decided to have an operation on your advice."

Hence, timing is crucial. That the patient be trained in an understanding of their options by their healthcare provider is a necessary condition of a well-reasoned decision, but can healthcare providers really deliver this? "I agree that it is not practical for doctors to convey that information in the outpatient clinic," said Mr Leigh. "Cardiac surgeons' outpatient clinics may be booked at 15-minute intervals. Of that, about eight minutes may be taken up with history, investigations, and the examination of the patient. That leaves seven minutes. In the course of seven minutes, someone who has just received the shocking news that they are going to need to have their chest cut open, that they will be off the road for three months, that they are risking their lives, has got to be equipped with all the information they need to make the decision. It is impossible to expect cardiac surgeons to discharge those obligations, let alone make an adequate record of the process.

"But we have to get rid of the fiction that only a surgeon can deliver this information. Yes, they have to write the text, but somebody else has got to deliver it: a teacher, armed with complex visual aids to explain the disease and the alternative remedies available."

Such a 'teacher' could be a web tutorial, and, if the patient has particularly difficulties, a trained tutor. "You should provide a sophisticated, interactive multimedia-based app with films, diagrams, and drawings, which will enable the patient to explore all the information they need to know. This is an interactive process."

It also must be a sophisticated one, given that the average patient simply will not understand terms such as 'PCI', 'left main stem' and 'CABG', let alone have an intuitive grasp over their implications to the extent a surgeon might. So communicating in the patient's first language is a must, and options for the cognitively impaired need to be available. "You have to treat *me*," summarised Mr Leigh. "You cannot push me through a consent process designed for your own convenience."

Some learning resources have already been implemented in some areas of medicine. Mr Leigh highlighted the work of the Cavernoma Alliance UK and the Trigeminal Neuralgia Association UK as examples of this[4,5]. These websites provide up-to-date learning resources, as well as patients' stories and access to community support resources. Reports of experience with web-based decision aids have been published in areas such as surrogate decision-making for patients receiving prolonged mechanical ventilation[6], and for those participating in clinical trials[7]. A 2016 review of shared decision-making in elective surgical care found the process to reduce conflict and improve decision quality, as well as leading patients to choose surgery less often.[8]

Reducing uncertainty in decision-making will at the same time reduce the frequency of complaints and litigation, by providing evidence of both the doctor and patient fulfilling their respective duties in the care process. "As a lawyer, what I am concerned about is not only providing a proper, sophisticated explanation of these things," noted Mr Leigh. "I want a record made of the patient's learning process. I want their use of this app to be downloaded onto the clinical notes of the hospital."

"I want a record made of the patient's learning process...downloaded onto the clinical notes of the hospital."

Bertie Leigh

This decision record, although adapting to different clinical scenarios, will broadly include the details of the patient's health complaint, and the expected benefits, disadvantages and risks as relayed by their physician, as well alternative therapies and recommended learning for the patient; this may take place, for example, in the surgeon's outpatient clinic in cases of elective surgery. The decision record will then include the resolution of any queries that the patient may have. It is upon this iterative basis towards understanding that the patient can make their decision as to treatment.

The resources required to create the educational tools needed to implement decision records has probably marred progress so far in the UK, as Mr Leigh explained: "This is not driven by the trusts, even now. It is being driven by the British Society of Cardiothoracic Surgeons. They are the ones who take the lead, because it is a professional issue – part of good medicine.

"At the moment, we are raising the bar of communication just as fast as clinical expectations, and unless we create a record of the patient's learning process, we will just be dooming ourselves to fall even further behind."

Clearly, much comes under the term 'decision record' when different conditions and treatments, let alone different specialties, are considered. And importantly, patients' willingness to get involved can vary: Mr Leigh reports: "I talk to a lot of cardiac surgeons, who tell me 'my patients really will turn off if I start doing detailed drawings of how I am going to make a power-saw incision through their sternum, break it open, tear open their pericardium and start cutting their cardiac vessels…'. They may not want to know, but they have to decide.

"Whereas men who are having prostate cancer surgery want to know every gory detail – for reasons you can imagine. In orthopaedics, it is a bit in-between. And neurosurgery is way beyond cardiac surgery because nobody can explain neurosurgery (even to neurosurgeons!). You know you are going to fiddle around in white tissue, and you know you are going to remove a cancerous lump. But you cannot show a patient the precious structures adjacent to it; you cannot tell them that a little bit of extra suction here or there would wipe out all of their memory of music. It is incomprehensible. So how we can deal with that? I don't know, but what I do know is that the parameters have to be explicitly set by the patient."

Mr Leigh discusses consent in tomorrow's Focus Session, 'Health care design; opportunities and challenges for the future', which takes place between 12:00 and 13:30 in Hall K2.

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Cardiac | Techno College | Transcatheter techniques and atrioventricular valves

Live case: Thoracoscopic tricuspid valve repair

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

Current guidelines recommend aggressive and early surgical correction since tricuspid valve (TV) disease has significant impact on early and late survival, and can advance even after proper surgical treatment of the mitral (or other) valves.

Along with the rising experience with minimally invasive surgery, TV surgery is more often a focus in many centres. The TV is mainly known by surgeons as an "additional" valve – during mostly mitral valve surgery or as an isolated tricuspid valve disease. Another interesting indication is not only the primary approach (secondary or isolated insufficiency) but also the minimally invasive approach to TV surgery as a reoperation after previous surgical intervention. Those patients are often multimorbid elderly patients who can benefit from small surgical trauma, as well as the other advantages of minimally invasive approaches such as lower blood loss, fewer atrial fibrillation onsets, shorter ventilation time and quicker rehabilitation.

Totally thoracoscopic periareolar access is performed through a natural scar in the body around the nipple (mainly in males). The operator is however usually forced to work only on the monitor, which needs some experience and a learning curve. In comparison to the right lateral minithoracotomy, an access seems to be the next step in reduction of the invasiveness – in experienced hands without affecting the rate of complications.

Tricuspid valve repair can be performed on the beating heart or arrested heart. The femoral vessels are used most often (from the right side), both small cut down or percutaneous. An additional cannula is put into the right atrium through the right internal jugular vein. The alternative is the use of a two-stage venous cannula via femoral access only.

The latest developments in 3D endoscopic vision systems are, in my opinion, no longer just "a toy" but are able to significantly facilitate minimally invasive – especially totally thoracoscopic – surgery, and influence the time of procedure. They also facilitate some precise manoeuvres and eye-balling in certain planes and axes, for example movement in the ventricle or precise distance assessment for chordal replacement, which can be difficult using a 2D monitor.

In conclusion, totally thoracoscopic periareolar 3D vision augmented surgery becomes a validated and standardised approach not only for mitral, but also tricuspid, valve surgery.

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Cardiac | Techno College | Surgery at the crossroads

Live-in-a-box: Mitral valve repair in functional disease using posterior leaflet augmentation

Anno Diegeler, Fitsum Lakew Bad Neustadt-Center of Cardiac and Vascular Medicine, Germany

Anno Diegeler

Fitsum Lakew

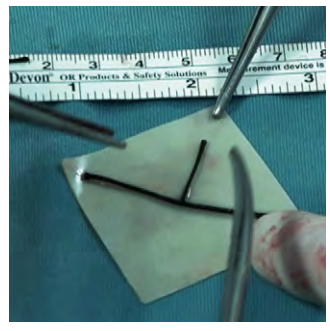


Figure 1

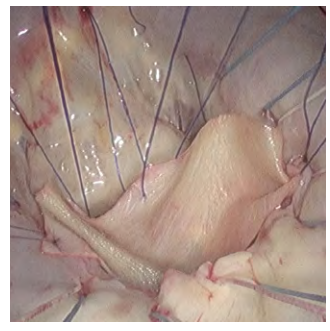


Figure 2

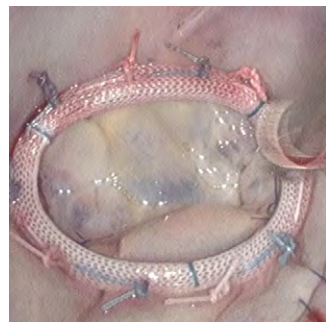


Figure 3

The repair of secondary mitral valve incompetence (MI) due to a displacement of the papillary muscle and/or the enlargement of the left ventricle may lead to a disappointing result. Acker MA et al. (*NEJM* 2014, 370: 23-32) showed a high recurrence rate of MI already at 12 months after the surgical repair. On the basis of echocardiographic findings, we see a "tenting height" between the line of the coaptation and the plane of the ring of more than 1 cm as a threshold for an uncertain sustained result and the risk of recurrence of MI. The augmentation of the posterior leaflet is a surgical alternative to the isolated annuloplasty.

The enlargement/augmentation of the posterior MV-leaflet leads to an elevation of the level of coaptation. Furthermore, it improves and stabilises the length/height of the area of coaptation between the anterior and posterior leaflet (Figure 4). In the "live-in-a-box" case presented during the EACTS Techno College, we demonstrate the augmentation of the posterior mitral valve using a de-cellularised patch (CardioCel™) in conjunction with a conventional annuloplasty ring (Physio II™, Edwards Lifesciences, USA). The patch is available in various thicknesses and sizes. We used a 30 µm thickness, and the largest available patch (4X4 cm). Larger patches are needed and will be available in the future.

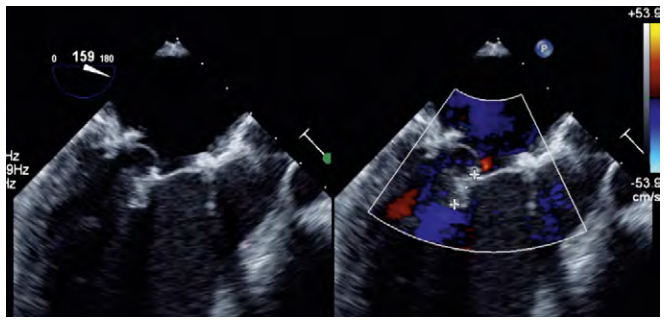


Figure 4

When assembling intraoperatively, we reach a maximum attainable length of approximately 5 cm by means of a diagonal cutting (Figure 1). The height of the patch varies between 1.6 and 2 cm. The posterior MV-leaflet is detached from the respective length of 5 cm from the annulus. If the length of the rear ring is larger, the detachment should be placed in the area of the maximum displacement of the leaflet. Individual "Stay-Sutures" facilitate the presentation and sewing of the patch. The suture line is performed with 5/0 Prolene™ or equivalent (Figure 2). The patch should not reduce the circumference of the posterior annulus. The height of the anterior leaflet serves as a reference for the size of the annuloplasty ring, which should not be undersized. (Figure 3). With this technique, we achieved a sustained repair in a series of already more than 100 cases. At first glance, at our medium-term results (four years of follow-up), a sustained competence of the mitral valve < Grade II could be achieved in 95% of the patients (Grade 0, 57%; Grade I, 38%, Grade II, 5%). Only one patient needed a valve replacement due to a recurrence of a significant MI. We will publish the five-year follow-up data soon.

Congenital | Focus | Grown-up congenital heart 1

Grown-up congenital heart = a new specialty

Laurence Iserin Adult cardiac congenital Unit, Hopital Europeen Georges Pompidou, Paris, France

Congenital heart defects (CHD) are the most common congenital malformations. Surgical corrections of these defects were performed for more than 50 years. Forty years ago, the mortality (natural history) of these defects was extremely high, especially for complex defects. Nowadays, survival to adulthood has dramatically improved because of improved foetal diagnoses, advances in neonatal intensive care, improved surgical and interventional techniques, early complete surgical repair, lower perioperative mortality, and increased mid-term and late survival. More than 85% of infants with CHD are now expected to reach adulthood. In the world, there are now more adults with CHD than children.

The population of adult CHD patients is growing at a rate of 5% per year (1.3 million in the US). Around two thirds of them have complex to moderately severe defects, who need dedicated follow up.

The most common defects seen in adult patients are atrial septal defects, aortic stenosis, coarctation of the aorta, pulmonary stenosis, Ebstein anomaly, tetralogy of Fallot, and corrected transposition. Other common defects seen in adults are double-outlet right ventricle, postoperative atrioventricular canal, subaortic stenosis, abnormal mitral valve, primum atrial septal defect, and single ventricle.

Th medical community has not fully anticipated the need for specialised care units dedicated to these patients. Nevertheless, international guidelines have driven attention to this population, and they also emphasise the need to set up transition programmes from paediatric to adult care. This population needs a lot of different sub-specialists in order to understand and manage complex arrhythmias, specialised imaging such as MRI, specialised cardiac catheters and specialised cardiac surgeons. Non-cardiologists – such as hepatologists, obstetricians and geneticists – should also be accustomed to these rare patients.

The main reasons for admission – about 10% of the population each year – are heart failure, arrhythmias, interventional catheterisations and endocarditis. Surgical procedures will be needed in some patients (up to 40% of the patients with operated tetralogy of Fallot will need pulmonary valve replacement before the age of 40).

Reoperations represent technical challenges in multi-operated patients who carry specific comorbidities (such as chronic cyanosis, pulmonary hypertension, genetic syndromes, renal and hepatic failure), and in 20% adding to their defect-acquired heart disease such as coronary artery disease. Nevertheless, with dedicated teams (including congenital cardiac surgeons), results of these operations are acceptable (around 2% early mortality).

In very complex diseases, the choice between heart transplantation and a new operation is always very challenging, while the number of adults with CHD requiring heart transplant is gradually increasing.

There is a need for dedicated units and specialised nurses, physicians and surgeons to offer comparable management to that which these patients received in infancy.

EACTS Academy

EACTS Academy: Fundamentals of Aortic Valve Repair

In the past two decades, aortic valve preserving surgery and isolated aortic valve repair have become an increasingly accepted alternative to valve replacement. It has become clear that valve preserving aortic root replacement must be performed in such a way that aortic valve form is normalised, making it – in essence – aortic repair.

In recent years, objective information on normal aortic valve form has become available, facilitating the selection of adequate substrates for repair or valve preservation. It also provides intraoperative guidance to the surgeon who can follow geometric principles rather than simple intuition. Thus, aortic valve repair is in transition from "surgical art" to a reproducible operation, and an increasing number of surgeons are performing such procedures.

If predictable results are to be achieved, however, the surgeon should familiarise himself with the principles of aortic repair and the established and proven tools that he can apply.

The upcoming workshop "Fundamentals in Aortic Valve Repair", as part of the EACTS Academy calendar, serves the purpose of introducing these principles to the surgeon who has had no or only minimal experience, but wishes to enter this field. The Department of Thoracic and Cardiovascular Surgery in Homburg/Saar, Germany under Professor Hans-Joachim Schäfers has been actively involved in the development and refinement of repair strategies over the past 20 years. They have also been active in teaching these principles and techniques for more than 10 years. In cooperation with the EACTS and renowned EACTS faculty they now offer this course for beginners in aortic valve repair.

Through lectures, the basic knowledge necessary for understanding the principles of aortic valve repair will be presented. Explorations of technique and surgical decision making will be highlighted by surgical videos, and there will be several live operations with repair procedures for different pathologies – focusing on the more frequent scenarios – to emphasise important aspects.

In order to enhance interaction, the group will be kept small, with attendance limited to 20 participants. Ample time is provided for questions and discussion, and the organisers will make an effort to ensure every participant feels welcome and integrated.

The course is designed in such a way that it will provide the basic information necessary to help participating surgeons actively start aortic repair procedures themselves.

The Fundamentals of Aortic Valve Repair Academy course will be held on November 16-17, 2017 at Saarland University Medical Center, Homburg Saar, Germany.
For further information, head to http://www.eacts.org/educational-events/programme/favr/

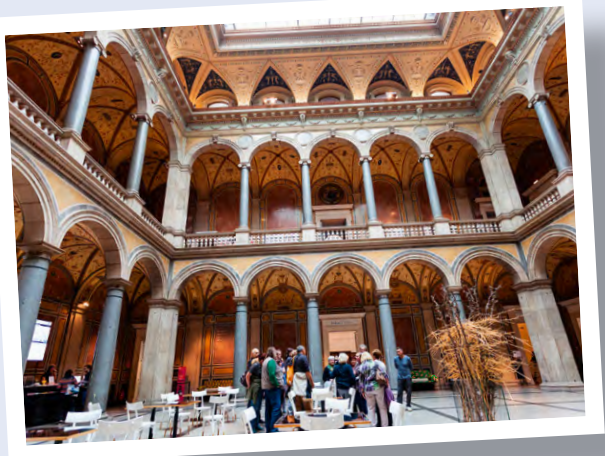
INSIDE VIENNA

Where to go? What to do?

MUSEUMS

MAK

The **Museum fuer angewandte Kunst**, or simply MAK as it's better known, claims to be "virtually unparalleled" in its combination of historical and contemporary exhibits.



ART HISTORY / NATURAL HISTORY MUSEUMS

Facing each other across the Maria-Theresien-Platz, the outsides of the **Kunsthistorisches Museum** and **Naturhistorisches Museum** are both sights to behold in their own right. However, do venture in and enjoy a range of exhibits, as well as the late 19th century ornate decorations that adorn the interior of the buildings themselves.

FUNERAL MUSEUM

Some might find it morbid, but if you're in the mood, the **Bestattungsmuseum** serves up a fascinating exploration of funeral customs, burials and a quintessentially Viennese perspective on death.

SIGMUND FREUD MUSEUM

Founded in 1971, this homage to the late, great pioneer of psychoanalysis is the very same building in which he lived for over 40 years.

COFFEE, CAKES AND MORE...

DEMEL

Some say it's the 'Holy Grail' for cakes and patisserie, others just enjoy the 230+ years of experience that make this Royally-appointed pastry shop a never-miss.

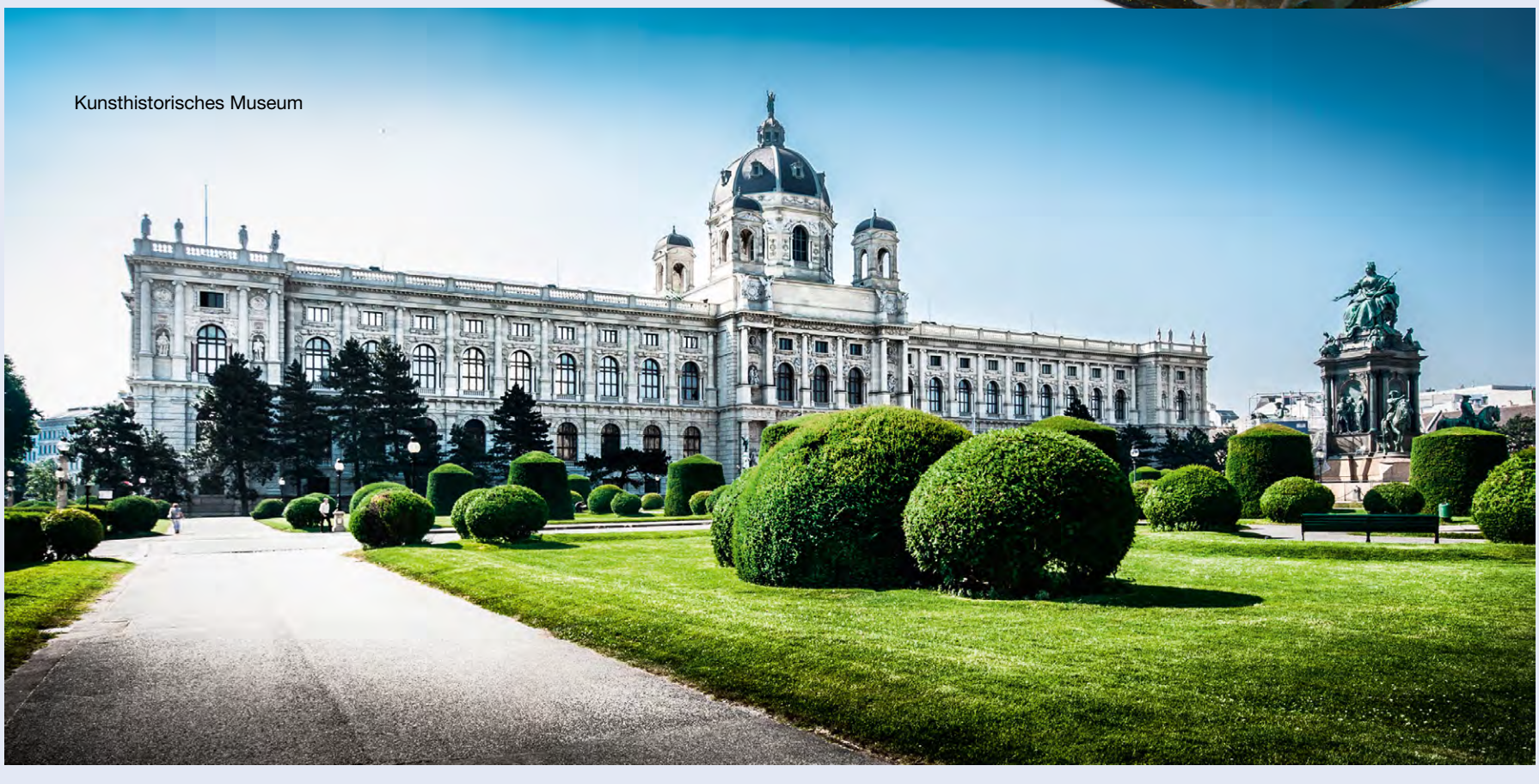
TRY: ***Sachertorte*** – This synonymous Viennese chocolate cake is credited to **Demel** back in the 1800s. That is, unless you are on the side of Hotel Sacher, who engaged in a protracted legal battle regarding the cake's origin.

VIENNA SAUSAGE

Würstelstands – little huts selling traditional wurst (sausage) – are a real gem of Vienna. **Bitzinger** at the Albertina (www.bitzinger-wien.at) is one of the best.

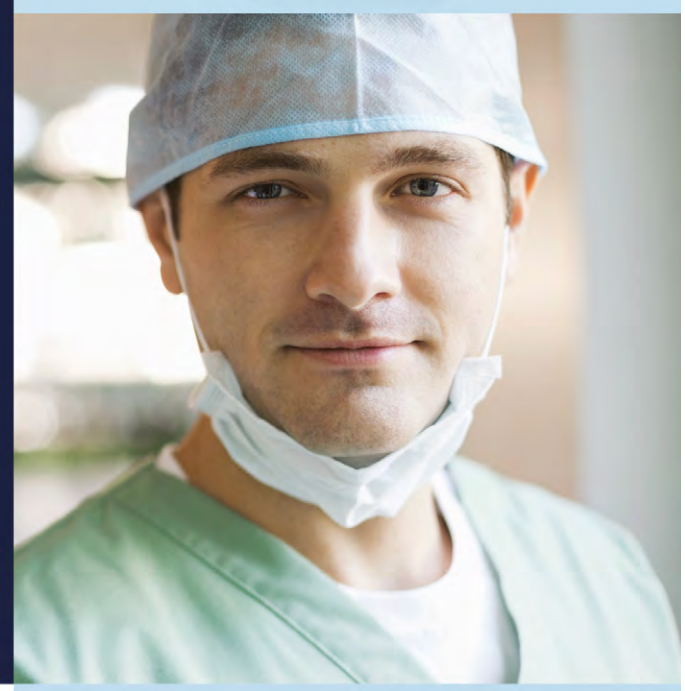
COFFEEHOUSES

Coffee in a Wiener Kaffeehaus is a must. It has been said that the Viennese coffeehouse is "where time and space are consumed, but only the coffee is found on the bill". There are oodles to choose from, but **Café Prückel**, along Ringstasse, gets the kind of "secret mention" that can only pass from person to person. Bring cash, not card – and an open mind – and sit among students, locals and the occasional piano recital.



Kunsthistorisches Museum

WE BACK YOU.



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Cardiac | Techno College | Imaging and 3D techniques

Function driven revascularisation

Filip P Casselman[1], Johan Vander Merwe[1], Frank Van Praet[1], Emmanuele Barbato[2] OLV Clinic Aalst, Belgium: 1. Department of Cardiovasular and Thoracic Surgery; 2. Department of Cardiology

From the starting days of coronary artery bypass surgery till today, the decision-making of whether or not to bypass a certain coronary artery has been based on a visual appreciation of the stenosis severity. This is a subjective interpretation, and we all have experienced the differences in stenosis estimation between persons, especially in the intermediate range. Whether a certain stenosis really limits the blood flow through a vessel (in other words 'whether a stenosis is functionally important') is impossible to accurately determine with this visual estimation.

This is however important information as an non-significant stenosis may cause competition of flow through the native coronary artery with a potential bypass of this stenosis, and hence cause subsequent bypass occlusion.[1] In addition, coronary artery disease progression has been demonstrated to be accelerated in bypassed coronary artery vessels versus non-bypassed vessels and this happens irrespective of the type of bypass (artery versus vein)[2]. Therefore, it is important to avoid unnecessary bypass grafting.

Fractional flow reserve is a functional evaluation of a stenosis severity and is defined as the maximal myocardial blood flow in a stenotic artery expressed as a percentage of the normal maximal flow (in case no stenosis would be present in that vessel)[3].

Above 0.8, there is no functional limitation of flow, and below 0.75 there is an almost 100% certainty of reversible myocardial ischaemia. The grey zone is situated between 0.75 and 0.8.[3] Subsequent studies have demonstrated a poor correlation between angiographic and functional evaluation of stenoses in multivessel disease.[4]

The FAME 1 study evaluated the interventional catheter-based treatment of coronary artery stenoses in a randomised fashion between angiographic-based decision making and FFR-based decision making. The outcomes were in favour of an FFR-based strategy with better survival, lower MACE rate, fewer lesions treated, lower need for repeat revascularisation, lower use of contrast product, fewer stents placed and lower procedural costs.[5]

The FAME 2 trial investigated the combination of PCI (for lesions with an FFR < 0.8) and optimal medical therapy for lesions with an FFR > 0.8 with optimal therapy alone. The combination of PCI and optimal therapy resulted in a 44 % reduction in relative risk of hard end points such as death and myocardial infarction.[6] Currently, the FAME 3 trial is randomising FFR-guided PCI versus angiography-guided CABG in patients with double or triple vessel disease and equipoise between PCI and CABG.

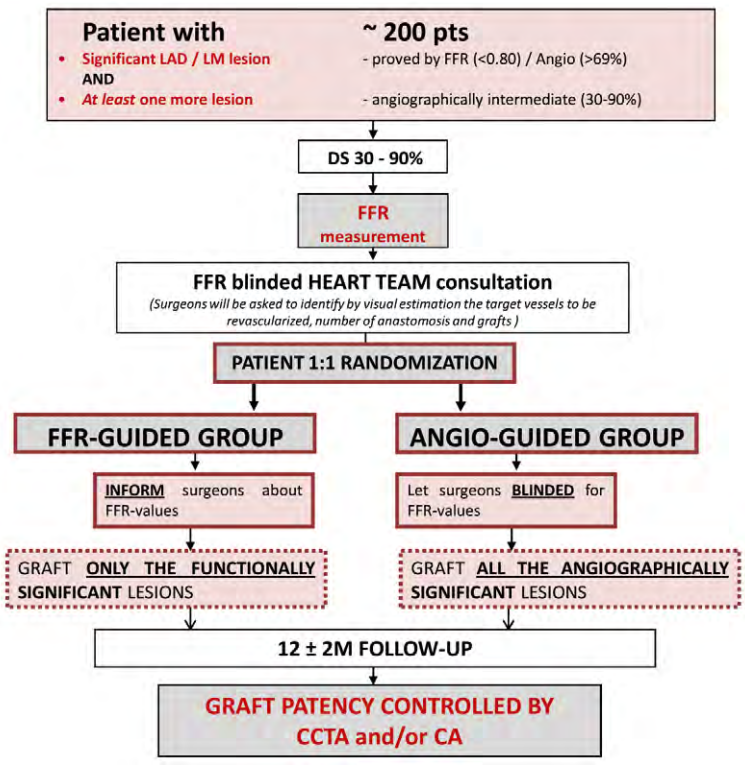

Figure 1. The decision-making process in the GRAFFITI trial.

Overall, the PCI literature is convincingly in favour of a functional oriented approach towards coronary intervention versus an angiographical approach. However, whether this approach is also applicable for surgical intervention remains a matter of investigation.

Toth et al. have retrospectively investigated CABG patients who were either screened angiographically or functionally before CABG.[7] Both groups were relatively comparable, and findings were in favour of an FFR-based strategy: there was no excess in clinical endpoints in the FFR group at 36 months (similar overall survival, similar MACE-free survival, similar repeat target vessel revascularisation rate and similar myocardial infarction free survival). Yet patients in the FFR group received a lower number of grafts, had a better functional class at follow-up and a higher graft patency rate.

The GRAFFITI trial (graft patency after FFR-guided versus angiography-guided CABG trial) is a prospective, randomised clinical trial currently investigating the outcome and patency rates in patients undergoing CABG using an angiography-guided or FFR-guided revascularisation strategy. The study flowchart is depicted in Figure 1. Patient enrolment has been concluded, and one-year follow-up is almost completed. We are currently still awaiting the results of this trial. This study is an important one since the results will give us some insights into whether we should change our decision-making process for CABG – in favour of a functional analysis and decision-making process rather than the angiography-based strategy that has proven its value for years.

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EBCTS

European Board of Cardiothoracic Surgery (EBCTS) Examination

Tim Graham
on behalf of EBCTS

The EACTS council have approved the new format for the European Board of Cardiothoracic Surgery (EBCTS) examination, commencing during this year's Annual Meeting in Vienna.

The aspiration of the EBCTS is to develop a fit for purpose high stakes professional exam for patients, the profession and governance bodies. This will be a quality assured cross-border European exam. The goal is to have an examination which is at least the equivalent of the American Boards examinations across the breadth of the specialty, and also in the sub specialty areas of acquired cardiac; congenital cardiac and thoracic surgery. The European Union of Medical Specialists (UEMS) and EACTS have jointly agreed to the governance and delivery of this European examination under the auspices of the EBCTS. A representative of STS/ABTS, Dr David Fullerton, sits on the EBCTS Board.

The examination is now split into two parts: The Level 1 examination (Membership of EBCTS) tests the knowledge and clinical judgement of a surgeon to the standard expected at the end of training in the generality of cardiothoracic surgery. This examination is a written MCQ examination of two papers of two hours duration. The first will be held at the EACTS Vienna meeting on Tuesday 10th October.

The Level 1 examination must be successfully completed before continuing to the Level 2 examination (Fellowship of EBCTS) which tests the knowledge, clinical judgement and application of the principles and practice of an independently practicing surgeon in one or more of the three areas of established specialist practice as above depending on the candidate's preference.

This examination will be a series of scenario based oral/viva examinations and is due to commence around the time of the EACTS Annual Meeting in October 2018.

The syllabus for the 2017 EBCTS examination(s) and beyond has been completely rewritten by an international group with educationalist input, and is available via the EBCTS website. The syllabus clearly describes the purpose and standards of the Level 1 and Level 2 examinations. The

MEBCTS examination assesses Level 1 outcomes across the entire syllabus and the more advanced FEBCTS examination assesses Level 1 outcomes across the entire syllabus in addition to Level 2 outcomes within general and specific sub-specialty areas of the syllabus according to candidate preference. For the first time in Europe, there are professional quality assured examinations in the three principle sub specialties in cardiothoracic surgery.

The Level 1 examination is led by Eduard Quintana and a Level 1 writing group of over 20 young European surgeons have prepared a MCQ bank – all these questions have been standard set by a panel of experienced examiners for the Vienna examination.

The Level 2 examination is being led by Stephen Clark, and sub specialty leads are being identified. Oral/viva clinical-scenario based questions are being written for a question bank which will be standard set. EBCTS has recently engaged Ripley systems to provide an examination software system to assist with Question Banks, examinations, marking and results administration.

The EBCTS website (www.ebcts.org) has recently been revised and information can be obtained there regarding the syllabus, standards, eligibility, application processes, examiners and the Board.

If members of EACTS are interested in participating in EBCTS activities please contact Amanda Cameron, Eduard Quintana or Stephen Clark at ebcts@eacts.co.uk

Perceval: 10 Years of Clinical Use

Efforts to develop a sutureless heart valve date back to the early 1960's. However, the introduction of the Perceval Aortic Pericardial Heart Valve ten years ago and the completion of the valve's first-in-man (FIM) trial in 2008 completely transformed the surgical replacement of aortic valves. Cardiac surgeons who participated in the foundational Perceval FIM trial said Perceval has kept its promises and delivered excellent results.

Axel Haverich, M.D., Professor of Medicine and Surgery at Medizinsche Hochshule Hannover (MHH) said: "To have a stented valve without suturing was a revolution in terms of cardiac surgery at the time. Perceval has broadened the armamentarium of what we can offer to patients."

According to Bart Meuris, Professor, M.D., Cardiac Surgery, University Hospitals, Leuven, Belgium, two key advantages of Perceval compared to traditional valves are speed of implantation and the minimal manipulation needed to position the valve inside the aortic root.

"Perceval has met its promise of good performance, which means low transvalvular pressure gradients and very good clinical outcomes", said Mattia Glauber, MD, a surgeon with the Istituto Clinico Sant'Ambrogio, Milan, Italy, "Any new biological prosthesis that comes on the market needs to reach this type of milestone. It needs to demonstrate freedom from reoperation and freedom from degeneration, which are strongly correlated with good hemodynamic performance."

Over the past ten years, the self-expandable Perceval aortic valve bioprosthesis has transformed the surgical valve landscape. With the broadest clinical history of any sutureless valve, it has overachieved in performance, establishing itself globally as a highly trusted platform.

Cardiac | Techno College | Imaging and 3D techniques

Live Case: MICS-CABG with a Y-graft

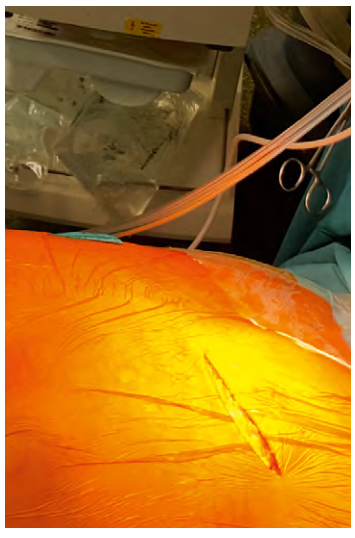

Figure 1. The incision: more lateral than a MIDCAB incision

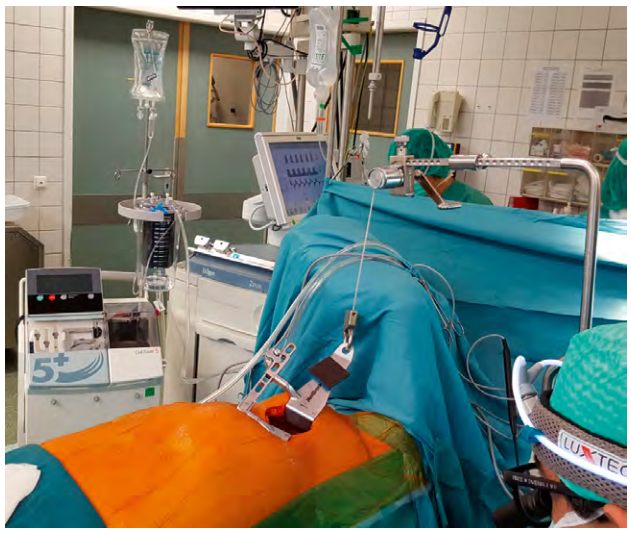

Figure 2a. Retractor for ITA harvest elevates the upper rib-cage

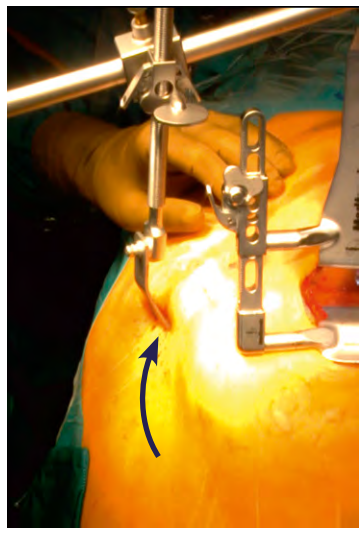

Figure 2b. Subxyphoid hook to additionally elevate the lower end of sternum during right ITA harvest

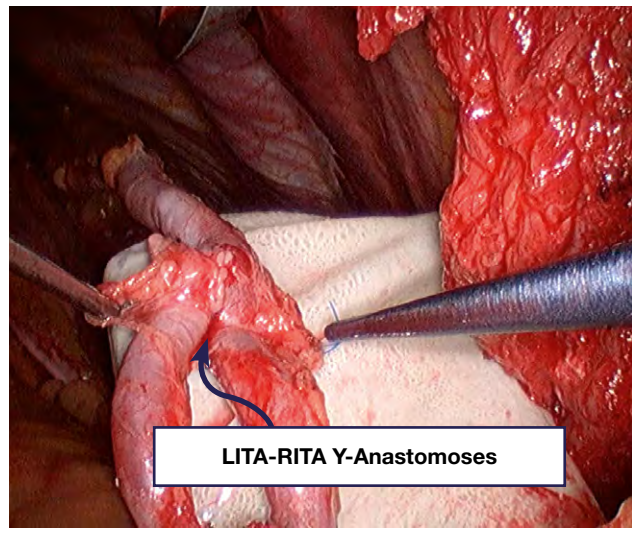

Figure 3. A completed Y-Anastomosis within the thorax stabilised on the glove-clad pods of the stabiliser

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Coronary artery bypass graft surgery (CABG) performed with the use of cardiopulmonary bypass (CPB) through a median sternotomy has been considered the "gold standard" of treatment of patients with coronary artery disease for more than half a century. However, in a minority of patients CPB has been known to be associated with development of bleeding complications, stroke, acute renal insufficiency, and occasionally severe systemic inflammatory reaction, whereas sternotomy results in loss of sternal integrity, which subjects patients to a potential risk of non-healing, superficial and deep sternal wound infections, especially with the use of bilateral internal thoracic arteries (ITA) and a delayed return to full physical activity and work. Therefore, reducing the invasiveness of CABG involved addressing not only the avoidance of CPB, but also doing away with sternotomy.

Off-pump CABG (without CPB) was developed to prevent or reduce the adverse effects of CPB and has been recently shown by the multicentre, prospectively randomised CABG Off or On Pump Revascularization Study to have similar survival and freedom from repeat revascularisation to on-pump CABG at mid-term follow-up[1]. The initial step towards a non-sternotomy approach for CABG was first described by Calafiore et al, when he reported the left ITA to left anterior descending artery (LAD) through a left anterior small thoracotomy[2]. This procedure, which popularly came to be known as MIDCAB (Minimally Invasive Direct Coronary Artery Bypass) was chiefly used in patients with isolated LAD disease to graft LIMA to the LAD. For many years multi-vessel bypass grafting was still performed through a sternotomy, because of the ease with which all the coronary vessels could be accessed through this approach and the lack of instrumentation to do so through a lateral thoracotomy. Nevertheless, development of specialised retractors to simplify the harvest of the ITAs and improvisation of heart stabilisers and positioners made safe and efficacious multi-vessel coronary artery grafting through a small thoracotomy incision possible[3,4]. Enough real-world practice data exists in literature, which demonstrates that bilateral ITAs provide survival benefit as compared to a single ITA. However, the use of bilateral ITAs is associated with an increased risk of sternal wound complications. Additionally, aortic manipulation during on- or off-pump CABG is associated with an increased risk of perioperative stroke[5], which can be reduced if not eliminated with avoidance of aortic manipulation. Therefore, minimally invasive coronary surgery (MICS-CABG) with bilateral ITAs using a Y-configuration, thus avoiding aortic manipulation would provide the best possible state-of-the-art surgical revascularisation strategy for at least a select group of patients.

The harvest of bilateral ITAs without the use of an endoscope and multi-vessel grafting with a composite Y-graft through a left small thoracotomy is a particularly challenging operation, which requires appropriate patient selection, planning, skill, patience, concentration and precision. The live case would involve tips and tricks that could be used to simplify various steps of the operation so that a larger number of cardiac surgeons can adopt this technique in their daily practice. It would particularly stress on patient selection, the incision site (Figure 1), harvest of the left and right ITAs through a left thoracotomy (Figures 2a and b), the performance of the Y-anastomosis (Figure 3) at the level of the pulmonary artery and the distal anastomoses, which could involve a sequential anastomosis.

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Cardiac | Abstract | Coronary artery bypass grafting - Intraoperative graft flow assessment

A novel classification of intraoperative fluorescence imaging for on-site assessment of coronary bypass graft patency

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Objectives

The purpose of this study is to define intraoperative fluorescence imaging (IFI) patterns and devise evaluation criteria, and to research the impact on early graft patency.

Methods

A total of 573 distal anastomoses in 167 patients received IFI analysis, intraoperative transit-time flowmetry, and predischarge X-ray angiography between January 2012 and December 2016. Six groups were classified as follows. (1) Invisible group (I): the graft was not visualised. (2) Good flow group (G): <10 s was required for a graft to appear uniformly. (3). Slow flow group (S): >10 s duration required for a graft to be visualised uniformly. (4) Antegrade group (CA): graft flow was superior to coronary artery flow. (5) Retrograde group (CR): coronary artery flow was superior to graft flow. (6) Coronary-coronary (CC) group: cases with angiographic visualisation as coronary-coronary bypass.

Table 1. Anastomosis location and graft type (n)

	RITA	LITA	GEA	SVG
LAD	132	29	1	1
Diagonal	6	68	0	12
Circumflex	3	110	27	25
RCA	7	0	128	24
Total	148	207	156	62

RITA: right internal thoracic artery; LITA: left internal thoracic artery; GEA: gastroepiploic artery; SVG: saphenous vein graft; LAD: left anterior descending artery; RCA: right coronary artery.

Table 2. Relationship between each classification and early graft occlusion

Group	No of anastomoses	No. of occlusions	HR	95% CI
I	5	–		
G	481	2 (0.4%)	1	
S	23	4 (17.3%)	37.15	7.12–193.62
CA	39	0	0	0
CR	15	1 (6.6%)	16.1	1.54–167.94
CC	10	3 (30.0%)	55.73	10.15–305.76
Total	573	10 (1.7%)		

HR: hazard ratio; CL: confidence limit.

Results

Among 573 anastomoses, we classified 5 (0.9%) in the I group, 481 (83.9%) in the G group, 23 (4.0%) in the S group, 39 (6.8%) in the CA group, 15 (2.6%) in the CR group, and 10 (1.7%) in the CC group. All anastomoses in the I group were intraoperatively reanastomosed. Postoperative early occlusion occurred in 2 anastomoses (0.4%) in the G group, 4 (17.4%) in the S group, none in the CA group, 1 (6.7%) in the CR group, and 3 (30%) in the CC group.

Discussion

In this study, we classified the intraoperative patterns of graft AG using IFI in CABG into six groups. We investigated the relationship between early graft patency and patterns of graft AG. Few early graft occlusions in the G and CA groups were confirmed, while the numbers in the S and CC groups were significantly high. The importance of this classification lies in its indicating the relationship with postoperative early graft patency.

Conclusions

Our novel classification of IFI offers the possibility of improving graft patency after CABG.

Cardiac | Focus | News from the trials world

SurTAVI: the final word in intermediate risk?

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Transcatheter aortic valve implantation (TAVI) has enjoyed rapid adoption and growth for the treatment of symptomatic severe aortic stenosis in patients with an increased risk for surgery. This initially began with patients who were either not surgical candidates[1,2] or considered at high surgical risk[3,4], defined as a potential operative mortality of 10% or greater. Randomised, well-adjudicated trials in the high-risk population showed TAVI to be non-inferior[3] or superior[4] to surgery. Randomised, well-adjudicated trials have also been done in the intermediate risk population, defined as an estimated surgical mortality of 3% to 10%.

The first intermediate risk trial to be completed and reported was PARTNER IIA which showed TAVI to be non-inferior to surgery for the primary endpoint of all-cause mortality or disabling stroke at two years (TAVI 19.3% vs. Surgery 21%, P = 0.253)[5]. The second randomised intermediate risk trial to finish and be reported was the SURTAVI trial and is the subject of this manuscript.[6]

SURTAVI randomised 1,746 patients from June of 2012 to June 2016 in a 1:1 fashion between TAVI and surgery. Ultimately, 863 patients had TAVI and 794 underwent surgery. This was mainly a first-generation device trial with 84% receiving the first generation Corevalve and 14% the second generation Evolut valve. Interesting is the fact that 94% of the cases were done with a transfemoral approach. The primary endpoint was all cause mortality or disabling stroke at two years. A Bayesian statistical approach was used which allowed an early valid determination of this endpoint. A two-year primary endpoint was reached in 12.6% of the TAVI patients and 14% of the surgery group. This yielded a Bayesian posterior probability of > 0.999 showing a very strong non-inferiority. The other two-year endpoint of interest is the all-cause mortality of 11.4% vs 11.6% for TAVI vs surgery. This occurred despite the fact that the 30-day surgical mortality was 1.7% with an STS PROM of 4.5% yielding an O:E of 0.38. This is the best surgery survival seen in any of the randomised trials and is unlikely to matched or beaten in the future. The 30-day outcomes of interest were superior outcomes in TAVI for all stroke, transfusions, cardiogenic shock, acute kidney injury and atrial fibrillation. Surgery had less major vascular injury, pacemaker and paravalvular leak.

Haemodynamic flow parameters were superior to surgery at all time points with TAVI showing EOA of over two, and mean gradients in the single digits. Other secondary endpoints at 30 days showed superior improvement in quality of life and six-minute walk.

TAVI is now well accepted in the intermediate risk population in Europe and the US for those anatomically appropriate. With the strong data provided by the SURTAVI trial this will be the last intermediate risk trial randomised against surgery. Future intermediate risk trials will randomize newer TAVI valves against accepted valves in the intermediate risk population. With the accepted value of randomized trials, SURTAVI will indeed be the last word.

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Cardiac | Abstract | Structural valve deterioration in aortic valve

Can bioprosthetic valve thrombosis be promoted by aortic root morphology? An *in vitro* study

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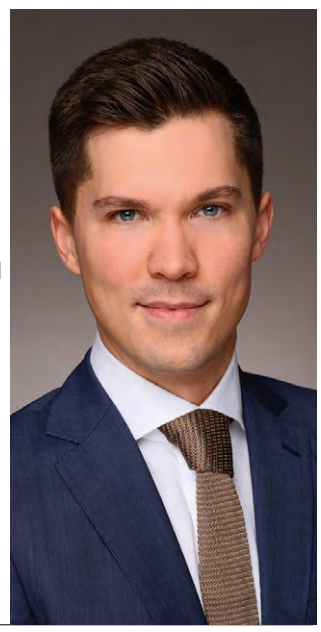

Bioprosthetic valve thrombosis (BPVT) has been considered uncommon, but recent studies have shown that BPVT is a much more frequent event than previously thought. Regions with low blood flow or stasis, as well as regions with turbulent flow, have been linked to thrombus formation. Insufficient wash-out of the sinus portions is believed to be a risk factor for BPVT.[1,2] The objective of this *in vitro* experiment was to investigate the impact of aortic root morphology on blood flow in the aortic root. Two aortic root phantoms with different morphologies (one symmetric and one patient-specific) were fabricated using transparent silicone (Figure 1). The 3D dataset of the patient-specific aortic root was extracted from an electrocardiogram synchronised computed tomography angiography from a vascular healthy patient.

A sutureless bioprosthetic 21 mm aortic valve (Edwards INTUITY Elite, Edwards Lifesciences, USA) was inserted in both phantoms. The flow in the aortic root was visualised by continuously injecting red dye, as contrast-agent (CA), directly upstream of the valve. The results were compared with angiographic images after transcatheter aortic valve implantation (TAVI) showing the contrast-enhanced flow in the aortic root of two patients, who received a balloon-expandable transcatheter aortic valve (Edwards Sapien 3, Edwards Lifesciences).

We found that blood flow distal to the aortic valve was significantly affected by aortic root morphology. This had also a direct effect on the wash-out of the sinus portions: in the symmetric phantom, we observed a vortex starting from the leaflet tip towards the base of the sinus, and returning along the sinus wall towards the sinotubular junction. No vortex structure was observed in the patient-specific phantom. In both phantoms, CA transport toward the sinus was driven by a retrograde flow along the ascending aortic wall. CA arrives at the aortic sinus of the two phantoms at different time points during systole (0.09 s and 0.16 s after valve opening in the symmetric and the patient-specific phantom, respectively; Figure 2). This delayed CA arrival was also observed in the two TAVI patients.

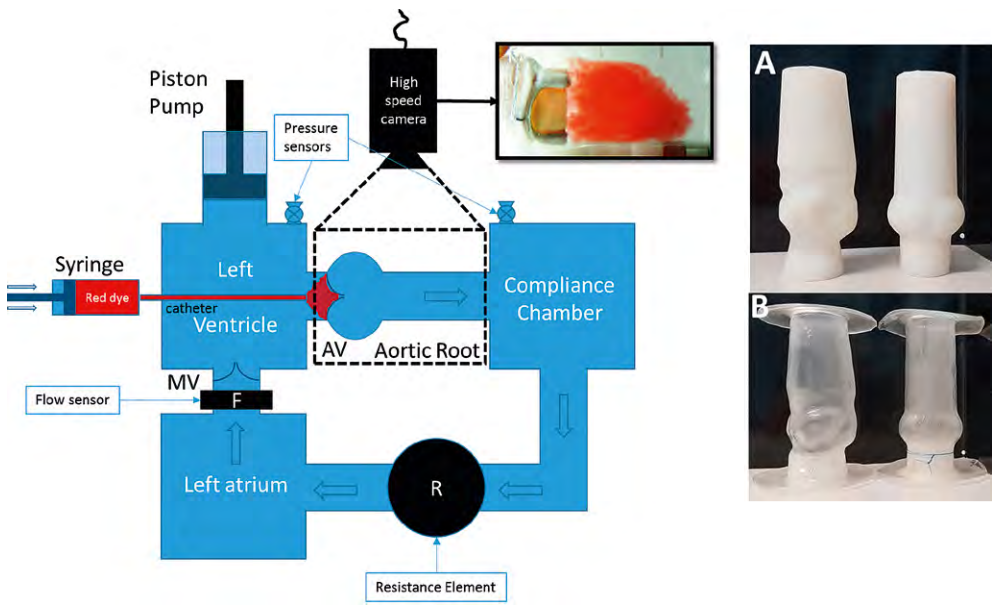

Figure 1. Overview of the in vitro flow loop. Panel (A) shows the 3D-printed negative model of the two aortic root phantoms, and panel (B) shows the aortic root phantoms.

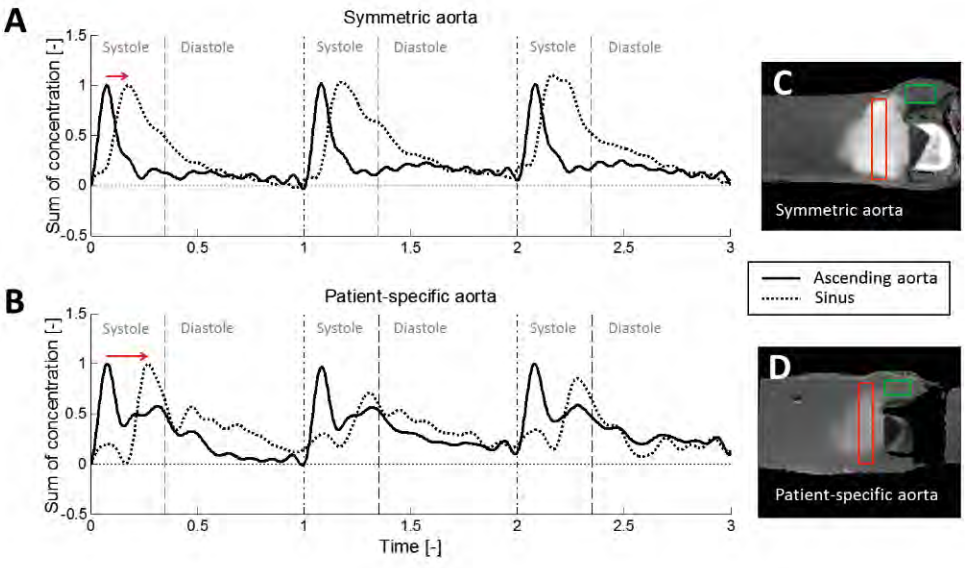

Figure 2. Normalised concentration of CA (solid line: ascending aorta; dotted line: aortic sinus) over normalised time for three consecutive heart beats in one of the sinus portions and in the ascending aorta in the symmetric aortic root phantom (A), and in the patient-specific phantom (B). The red arrows indicate the delayed arrival of the CA in the sinus portion compared to in the ascending aorta (A and B). The red and green squares (C and D) show the area used to calculate the sum of concentration over time for the ascending aorta and the sinus, respectively, for the two different aortic roots.

The different arrival times of CA (later in the patient-specific root) and the different flow patterns in the sinus portion (vortex in the symmetric aortic root; no vortex in the patient-specific aortic root) indicates that the wash-out of the sinus portion does not only depend on the bioprosthetic valve design and its positioning in the aortic root, but also on the patient's aortic root morphology (Figure 2). Furthermore, the analysis of angiographies from TAVI patients indicates that at least some of these *in vitro* effects are also present *in vivo*. This suggests that prosthesis selection and positioning should also consider patient-specific aortic root morphology to find the best fit for each patient. Furthermore, it is likely that the risk for BPTV is also affected by aortic root morphology.

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Vascular | Abstract | Getting to the root

Aortic elongation and the risk of type A aortic dissection

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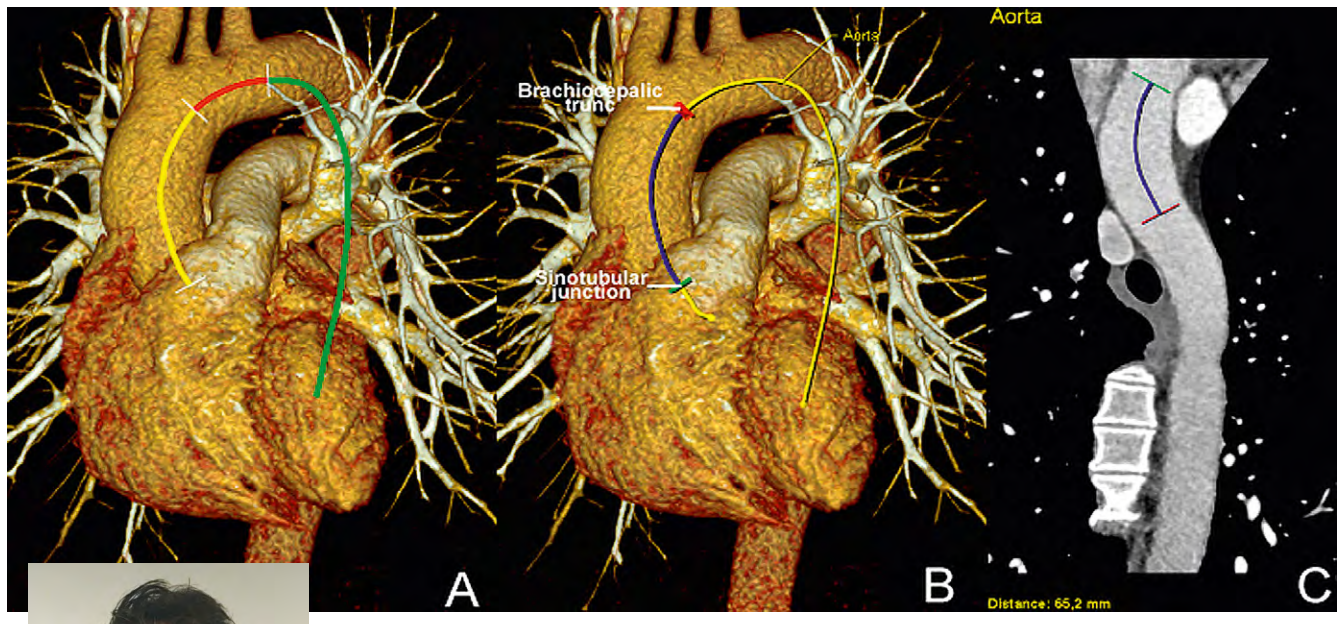

Figure 1. Length measurements of different aortic segments. A: segmental division of the aorta (yellow: ascending aorta, red: aortic arch, green: descending aorta); B: Three-dimensional length measurement of the ascending aorta; C: Two-dimensional length measurement of the ascending aorta.

Indication for prophylactic surgery to prevent acute type A aortic dissection (ATAAD) is solely based on an ascending aortic diameter of >55 mm in patients without elastopathy. Recent literature shows 70-90% of ATAAD patients fail to meet this indication criterion. Elongation of the ascending aorta could potentially act as a predictor for ATAAD as well. Ascending aortic length seems to be age-associated, but is poorly studied. Therefore, we investigated the normal aortic length in a healthy control group after which we compared this with ATAAD patients to evaluate the potential role of elongation in the occurrence of ATAAD.

The study group consisted of all consecutive adult patients who were diagnosed with ATAAD based on CT angiography (CTA) findings between January 2010 and December 2016. All patients with known elastopathy (Marfan's, Ehlers-Danlos, Loeys-Dietz, Familial TAAD and bicuspid aortic valve) were excluded. The control group consisted of all consecutive patients who were referred for contrast-enhanced CT of the chest between December 2015 and December 2016. Patients with known conditions that might cause distortion of aortic shape were excluded. A three-dimensional model of the thoracic aorta was created and divided into three anatomical segments following current guidelines (Figure 1). Age related elongation was studied in the healthy control group alone. Ascending aortic, aortic arch and descending aortic length was compared between the ATAAD group and the healthy control group using a propensity score matching analysis in order to create statistically equal groups. Aortic diameters were measured in the ATAAD group as well.

Forty patients were included in the ATAAD group, and 210 in the healthy control group. Age proved

to be significantly correlated with ascending aortic length (R=0.50, p < 0.001). By use of propensity score matching, 32 statistically equal pairs were created. Ascending aortic length was significantly increased in ATAAD patients (85.8 ± 9.4 mm vs 65.6 ± 8.2 mm respectively, p < 0.001) and increased by a mean of 3 mm/decade (Figure 2). The lengths of the aortic arch (35.9 ± 10.4 mm vs 33.0 ± 6.1 mm, p = 0.18) and descending aorta (210.3 ± 28.4 mm vs. 212.3 ± 36.6 mm, p = 0.81) did not differ between the two groups (Table 1). Seventy percent of ATAAD patients had a maximal ascending aortic diameter of <55 mm.

To conclude, ascending aortic diameter has proven to be an insufficient stand-alone predictor for the occurrence of ATAAD. We found a significant relation between age and ascending aortic length and we demonstrated that the ascending aorta of ATAAD patients is significantly longer compared to their propensity matched counterparts. No difference was found between the lengths of the aortic arch and descending aorta, implying ATAAD to have a specific pathophysiological origin in the ascending aorta. Future studies need to be conducted to confirm elongation as an additional risk factor for ATAAD.

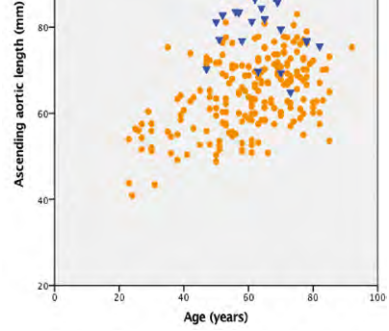

Figure 2. Ascending aortic length of ATAAD patients and healthy controls. Scatter plot depicting the length of the ascending aorta in healthy controls (orange) and ATAAD patients (blue). ATAAD: Acute Type A Aortic Dissection

Table 1. Aortic length per segment. ATAAD: Acute Type A Aortic Dissection

	Control group (n = 32)	ATAAD group (n = 32)	p-value
Ascending aorta (mm)	65.6 ± 8.2	85.8 ± 9.4	<0.001
Aortic arch (mm)	33.0 ± 6.1	35.9 ± 10.4	0.18
Descending aorta (mm)	212.3 ± 36.6	210.3 ± 28.4	0.81

Cardiac | Focus | Perfusion session 1: Heater cooler induced infections

Heater-cooler devices and Mycobacterium chimaera infections

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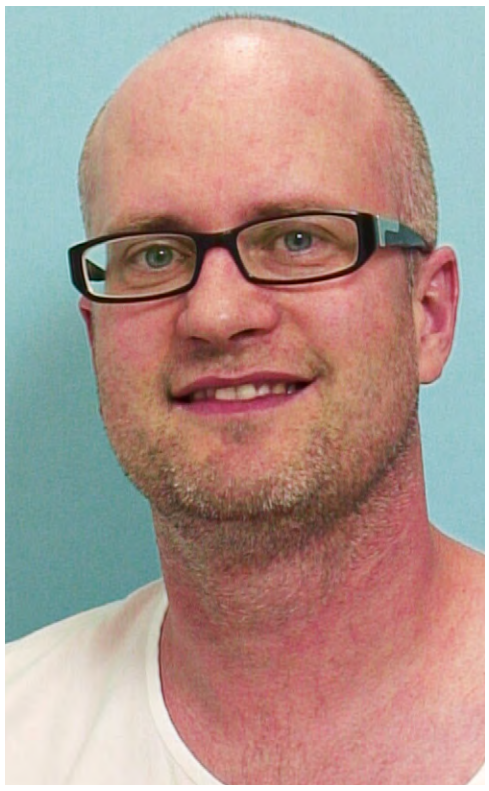
This presentation will focus on a prominent, recently discovered, infectious problem associated with the use of heater-cooler-devices. All cardio-surgeons, cardiologists and infectious diseases physicians should be alert to cardiac surgery-associated M. chimaera infections.

The uncommon diagnosis of M. chimaera infection of two patients in 2011 at the University Hospital Zurich triggered an outbreak investigation. The common element for both affected patients was prior cardiosurgery and implantation of prosthetic material.[1] As M. chimaera belongs to nontuberculous mycobacteria (NTM) and knowing that NTM prefer water as habitat, water-bearing devices were tested for Mycobacteria sp. These investigations identified M. chimaera in water samples of Sorin (Milan, Italy; now LivaNova, London, UK) 3T heater-cooler devices (HCDs). If contaminated HCDs were operating, air samples also grew M. chimaera – this insight resulted in the hypothesis of an airborne transmission from HCD to implants during surgery.[2] Later experiments were able to locate aerosol generation within Sorin HCDs.[3] The considerable airflow generated by the fan in the lower part of Sorin HCDs proved to be able to disrupt the ultraclean air ventilation system in an operating room.[4]

Sadly, M. chimaera infections are characterised



by a poor prognosis with a case fatality rate of approximately 50%. Diagnosis is often delayed due to unspecific symptoms such as fever, dyspnoea and weight loss, and a latency of months to years between surgery and manifest infection.[5] Given the histological pattern of granuloma formation, sarcoidosis has often be suspected, which prompted unfavourable immunosuppressive treatment. A diagnostic hint can be ophthalmological examination revealing frequently choroidal lesion.[6] Despite aggressive treatment efforts consisting of combination antibiotic therapy and revision surgery, curability remains uncertain.[7]

Investigation of water samples from HCDs manufactured by different brands gathered growth of M. chimaera.[8] Remarkably, only Sorin HCDs were associated with cases of M. chimaera infection. However, one must be aware that M. chimaera infections after cardiac surgery are overall rare and Sorin has the largest market share.[9]

Recent studies addressed the question of initial contamination of these devices. A report on detection of M. chimaera at the production site favoured the hypothesis of a point-source.[10] A large whole genome sequencing study concurred this hypothesis but, in addition found that HCD contamination can also occur at the local hospital level.[8] The risk of local HCD contamination with NTM was reinforced by outbreaks caused by other Mycobacteria sp such as M. abscessus[11] and M. wolinskyi[12].

Today, strict separation of air volumes between operating rooms (and other critical medical areas) and the potentially contaminated exhaust air from HCDs is the only proven method of prevention.

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General | Focus | Research in medicine: the ultimate currency for every academic career?

Leveraging social media: Getting the attention you want for your academic work

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Social media use continues to explode globally, with currently more than 2.8 billion registered users of such networks. This represents more than 37% of the world's population, with the highest penetration in North America, where 66% of the population possesses active social media accounts. It's estimated that more than 80% of these account holders engage in regular use.

While social media use has grown worldwide, exploitations of its benefits by medical professionals, and surgeons in particular, has been somewhat delayed. Despite initial concerns regarding oversharing of private health information, public image, and unprofessional interactions, skepticism among surgeons has been dissipating, and with good reason. Leaders in health care social media have broadened our minds regarding the potential benefits of social media activity to our practices, our scholarly activity, and the public and patients whom we serve.

In order to receive academic recognition for your work on social media, there are essentially two important arms to consider (Figure 1). Traditional scholarship may be promoted via social media, while it's also possible to receive academic credit for original social media content.

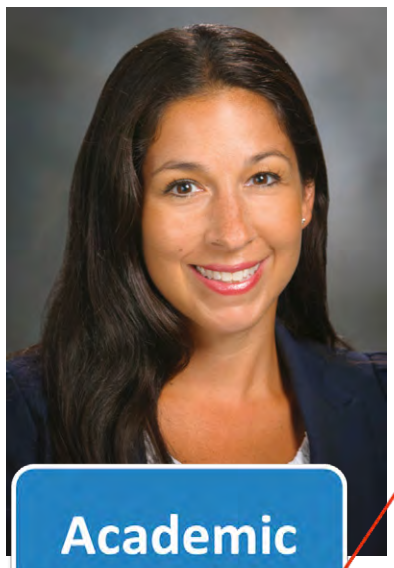

Figure 1. Academic recognition for social media activity.

Promoting traditional scholarship on social media

Social media is a great tool to improve visibility of your publications and to initiate meaningful interdisciplinary conversations regarding impactful work. There are even online journal clubs and TweetChats dedicated to these endeavors, such as the International General Surgery Journal Club and the Thoracic Surgery Social Media Network.[1] There are a number of helpful strategies to help disseminate your paper, after it's been published: 1) ask the journal and your institution to tag your handle in Tweets about the article; 2) tag the journal's handle and those of your co-authors, institution, and subject experts in your posts; 3) use relevant hashtags to capture a broad audience; and 4) include links to the article and visuals from the paper.[2] Sharing on Twitter has been a proven format for post-publication peer review,[3] and has further served as a reliable predictor of subsequent citations.[4]

Not only can you use social media to promote your peer-reviewed publications, but it's also an outstanding way to share content from meetings. This avenue allows sharing of your own research, promoting your colleague's presentations, connecting with others with shared interests, and forming collaborations. Again, using the appropriate hashtags will increase the breadth of reach.

Getting academic credit for social media activities

In 2016, the Mayo Clinic began using social media scholarship metrics for promotion, recognising that changing paradigms have increased the emphasis on digital platforms and social media, suggesting that scholars should make their impact in these new spaces as well as classical venues.[5] Of course, this type of progressive cultural change requires evolution on the parts of institutions, academic promotions committees, and scholars themselves. In particular, scholars are advised to create digital portfolios detailing their activities, how they align with their strategic priorities, and metrics of their social media work.

There are enormous benefits to one's academic advancement that can be derived from engagement in social media. Once one familiarises him or herself with some basic strategies for participation, it's possible to get considerable mileage for traditional work and nontraditional outreach that are already being performed.

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Cardiac | Abstract | Heart transplantation is still the best long-term option

Clinical outcomes of heart transplantation with thirty years follow-up

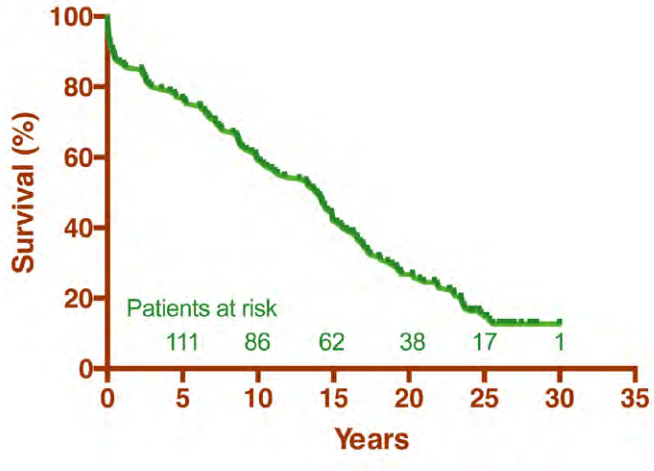

Figure 1. Actuarial survival of patients undergoing primacy heart transplantation between 1985 and 1991

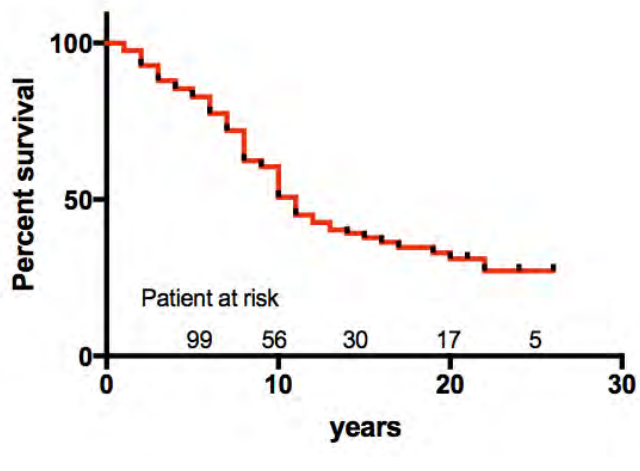

Figure 2. Survival without graft coronary artery disease

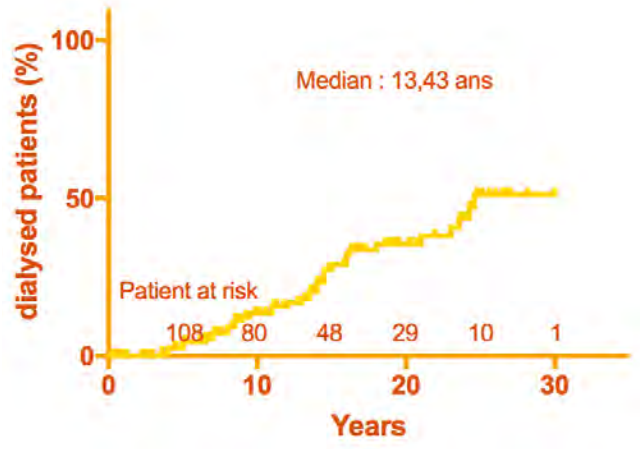

Figure 3. Proportion of severe renal function requiring dialysis or renal transplantation

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Objectives

The study was conducted to determine the long-term outcome of patients who underwent heart transplantation 30 years ago, in the cyclosporine era. This improved graft and patient survival, however, has led to an increase incidence of serious adverse effects related to the long-term use of immunosuppressants. This retrospective study was undertaken to:

- determine the long-term survival of patients who underwent heart transplantation (HTx) at our institution more than 25 years ago
- describe the incidence of rejection, allograft vasculopathy, malignancy and renal dysfunctions
- identify risk factors adversely affecting survival

Methods

A retrospective analysis was performed in 148 patients who had undergone heart transplantation between 1985 and 1991 at a single centre. Operative technique and immunosuppressive treatment were comparable in all patients.

Results

The cause of end-stage heart failure and the indication for HTx was dilated cardiomyopathy in 67 patients (45.3%), ischaemic cardiomyopathy in 60 (40.5%), valve-related disease in 3 (2%), and other causes in 18 (12.2%). Actuarial survival rates were 75% (n = 110), 58% (n = 86), 42% (n = 61), 26% (n = 38) and 11% (n = 16) at 5, 10, 15, 20 and 25 years, respectively (Figure 1). The mean follow-up period was 14.7 ± 7.7 years for patients who survived more than three months after transplantation (n = 131).

The major causes of death were malignancy (31.2%) and cardiac allograft vasculopathy (22%). No death related to acute rejection was reported during the follow-up. The survival without graft coronary artery disease, detected on angiography, was 50.7% (n = 56) at 10 years, 31% (n = 17) at 20 years, and 7 (5.3%) patients required re-transplantation (Figure 2). Malignancies developed in 79 patients (60%), including skin cancers in 43 (54%), solid tumours in 33 (42%), and haematologic malignancies in 17 (21%). Proportion of severe renal function requiring dialysis or renal transplantation is 13.5% at 10 years, and 35.5% at 20 years (median 13.4 years; Figure 3).

Conclusions

Long-term survival after cardiac transplantation remains excellent in the cyclosporine era. In our series, a history of smoking is the sole preoperative risk factor of late death. A tritherapy associated with induction of immunosuppression with cytolytic antibodies allows optimal control of acute rejections. Nevertheless, a high level of immunosuppression seems to be associated with a high incidence of neoplastic complications and long-lasting renal insufficiencies.

Cardiac | Focus | Will mini aortic valve replacement become the gold standard?

Propensity matched comparison between minimally invasive and conventional sternotomy in aortic valve resuspension

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Minimally invasive valve surgery has become more and more popular as patients benefit from reduced pain and surgical trauma. Faster recovery, wound healing and need for packed red blood cells (pRBC) may also be advantageously affected by the minimal access approach.

In selected cases of aortic valve insufficiency and aneurysm of the ascending aorta, the David technique can be applied. A minimally invasive approach in aortic valve resuspension procedures like the David technique has also been reported. After earning more experience with minimally invasive isolated aortic valve replacement, we moved on and performed the David technique via a minimally invasive access through a ministernotomy up to the left, fourth intercostal space.

The aim of our study was to compare two different ways of approach for the David procedure and review outcome between the two groups. Therefore we report our propensity matched results of the David procedure and its modifications via partial upper ministernotomy up to the left fourth intercostal space vs a complete sternotomy approach. From 1991 to 2016, we performed the David procedure and its modifications in 327 patients with aortic valve insufficiency (AI) and aneurysm of the aortic root and ascending aorta. The minimally invasive approach was performed in 120 patients.

To compensate for differences in preoperative patient characteristics, propensity matching was done between the complete and partial upper sternotomy group so that 103 patients of each group could be identified. Patients' mean age was 57±14 years in the minimally invasive group and 57±13 years in the complete sternotomy group; 23% were female in each group. In 99 (96%) patients (minimally invasive group), and 42 (41%) patients (complete sternotomy group) a modification of the David technique was performed by creating a neosinus ($p<0.01$). There was only one in-hospital death (in the complete sternotomy group, $p = 0.5$). The applied amount of pRBC was significantly higher in the complete sternotomy group (3.4±4 vs 1±0.5, $p<0.01$). Mean follow up time was 3±2 years (minimally invasive group) and 8±4 years (complete sternotomy group).

Late mortality was zero in the minimally invasive group but 14 died during longer follow-up in the complete sternotomy group ($p<0.01$). Freedom from reoperation or aortic valve insufficiency ≥ 2° was 95% vs 93% (minimally invasive vs complete sternotomy group) at five years and 95% vs 79% at 10 years ($p<0.01$).

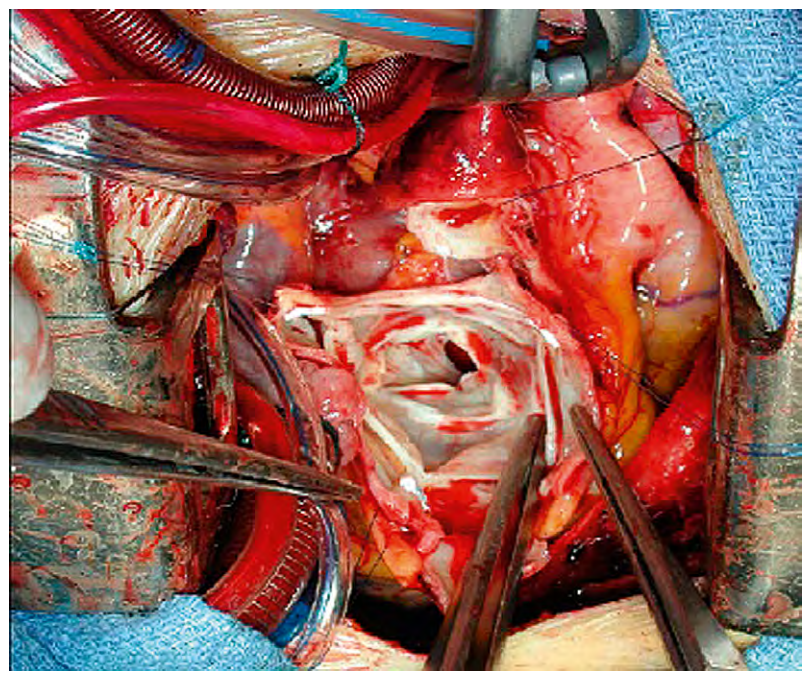

Figure 1: Approach through partial upper sternotomy showing the aortic valve.

The minimally invasive aortic valve reimplantation technique for selected patients with ascending aortic aneurysm and aortic valve insufficiency is a durable procedure with low valve-related morbidity and mortality at mid-term follow-up. With an experienced team, the minimally invasive David procedure is technically feasible. Intra- and perioperative application of pRBCs is significantly lower in the minimally invasive group. However, comparison of long-term follow-up data in both groups is necessary to evaluate valve function.

Cardiac | Abstract | Coronary artery bypass grafting - Intraoperative graft flow assessment

Computational fluid dynamic study of sequential coronary artery bypass grafting in the native coronary occlusion model: Distribution of flow and energy efficiency

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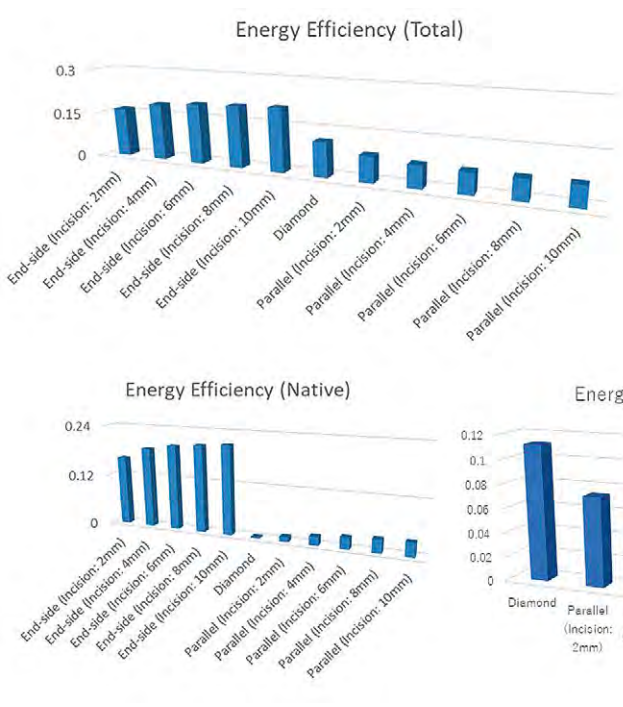

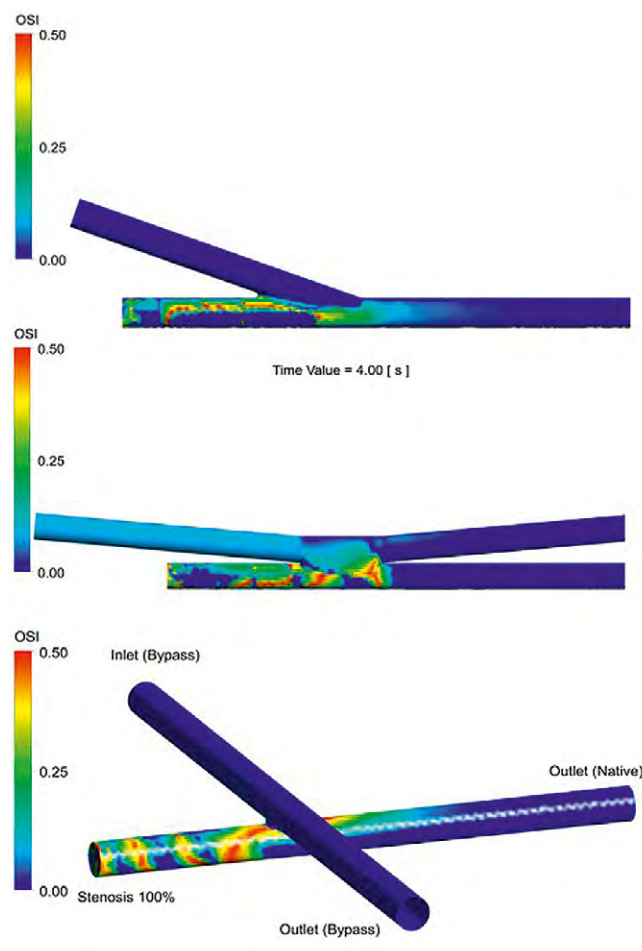

Recent surgical candidates for coronary artery bypass grafting (CABG) have more complex coronary lesions, that is, they have higher SYNTAX (Synergy between Percutaneous Coronary Intervention with Taxus and Cardiac Surgery) scores. To achieve total revascularisation for these patients, an optimal anastomosis design that includes sequential bypass grafting is necessary. It is crucial to maintain optimal flow to both the target native artery and the bypass conduit outflow in sequential anastomosis, to avoid competition or insufficient graft flow. Additionally, to achieve long-term patency, it is also very important to avoid intimal hyperplasia or atherosclerosis progression, believed to be induced by high wall shear stress (WSS) or turbulent flow. Computational fluid dynamic (CFD) models allow the evaluation of these values in each anastomosis.

However, only a few studies in literature have compared the different types of anastomosis using CFD models. The objective of this study was to evaluate which types of sequential anastomoses render better haemodynamics, flow distribution, and lower wall shear stress using CFD models.

Fluid dynamic computations were carried out with ANSYS CFX (ANSYS Inc., USA) software. The incision lengths for parallel and diamond anastomoses were fixed at 2 mm. Native vessels were set to be totally occluded. The diameter of both native and graft vessels were set to be 2 mm. The inlet boundary condition was set by a sample of the transient time flow measurement which was measured intraoperatively.

Diamond anastomosis was observed to reduce flow to the native outlet and increase flow to the bypass outlet; the opposite was observed in parallel anastomosis. Total energy efficiency was higher in diamond anastomosis than parallel anastomosis. The anastomosis length was longer and the total energy efficiency was higher in end-side anastomosis. However, the total energy efficiency plateaued and ceased to increase after the anastomosis length become more than 6 mm. The energy efficiency at the native outlet was lower but that at the bypass outlet was higher in diamond anastomosis. A high oscillatory shear index was observed at the bypass inlet in parallel anastomosis and at the native inlet in diamond anastomosis.

Diamond sequential anastomosis would be an effective option for multiple sequential bypasses because of the better flow to the bypass outlet than with parallel anastomosis. However, flow competition should be kept in mind while using diamond anastomosis for moderately stenotic vessels because of worsened flow to the native outlet. Care should be taken to ensure that the fluid dynamic patterns are optimal and prevent future native and bypass vessel disease progression.

Cardiac | Focus | Decision making in mitral surgery: trying to fill the gaps in evidence!

Surgical management of moderate ischaemic mitral regurgitation at the time of CABG remains controversial

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Ischaemic mitral regurgitation (IMR) is a consequence of myocardial ischaemia or infarction induced regional wall motion abnormalities. Adverse left ventricular remodelling develops in approximately 50% of patients after a myocardial infarction and moderate regurgitation occurs in upwards of 10% of patients. Mitral regurgitation results from a combination of papillary muscle displacement, leaflet tethering, reduced closing forces and annular dilatation. Most patients have multi-vessel coronary artery disease requiring revascularisation, so surgeons must consider whether to add a mitral valve repair procedure to coronary artery bypass grafting (CABG) in patients with moderate IMR.

The appropriate surgical management of moderate IMR at the time of CABG remains controversial. Some experts advocate revascularisation alone for moderate IMR, expecting improvements in regional and global left ventricular (LV) function and geometry following CABG to lead to a reduction in MR. Others support restrictive mitral annuloplasty repair at the time of CABG to address more directly the IMR, expecting to prevent further adverse remodelling and decrease the risk of heart failure. Importantly, the addition of a mitral valve procedure to CABG surgery necessitates open-heart exposure and is associated with longer durations of aortic cross-clamp and cardiopulmonary bypass that can increase perioperative risk.

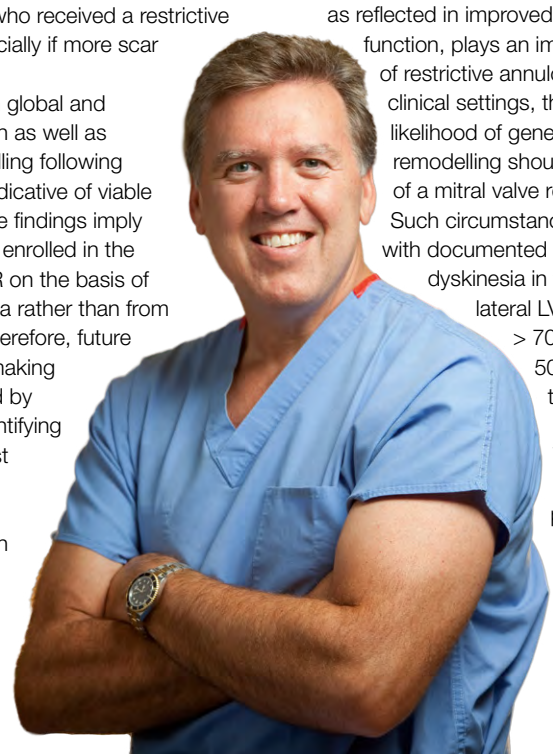
The Cardiothoracic Surgical Trials Network (CTSN) conducted a multicentre randomised trial comparing CABG alone to CABG plus restrictive annuloplasty (RA) in 301 patients with moderate IMR. RA resulted in a significant reduction in mitral regurgitation at one and two years with no progression to severe MR. There was no difference in left ventricular reverse remodelling (left ventricular end-systolic volume index [LVESVI]), survival, or major adverse cardiac and cerebrovascular events (MACCE) at one and two years. RA was associated with a longer hospital stay after surgery, a higher incidence of post-operative supraventricular arrhythmias and more neurologic events. Among survivors and irrespective of treatment arm, patients with resolution of IMR had greater reverse remodelling than those who did not.

Two previous randomised trials showed that the addition of a restrictive annuloplasty provided improvement in LV reverse remodelling, LVEF, NYHA Class, and MR grade, but not survival. Fattouch and colleagues randomly assigned 102 patients to CABG alone or CABG plus RA. These authors demonstrated that the addition of RA significantly reduced LVESD (8 mm vs 2 mm). The Randomized Ischemic Mitral Evaluation (RIME) trial randomly assigned 73 patients to CABG alone or CABG plus RA and demonstrated a 28% reduction in LVESVI over baseline (baseline mean 78 ml/m^2) compared to only a 9% reduction in the CTSN trial from baseline (baseline mean 57 ml/m^2).

There are a few comparative points to emphasise. First, the sample sizes differed greatly, with the CTSN trial enrolling over three times the number of patients than the other trials. Second, the clinical trials had different endpoints and analytical approaches; e.g., the CTSN trial included patients who died as treatment failures in the primary endpoint analysis, while the other trial used a survivor analysis. Third, persistent IMR in the CTSN trial was largely moderate in severity and never progressed to severe IMR in the RA group. Fourth, the CTSN trial was rigorous in defining MR and excluding patients with degenerative mitral valve disease. Fifth, the CTSN trial had significantly lower rates of baseline prior MI and thus, possibly less LV scar. Finally, and probably most importantly, baseline LV size was significantly larger in the Fattouch and RIME trials, which may have favoured patients who received a restrictive annuloplasty, especially if more scar was present.

Improvements in global and regional wall motion as well as reverse LV remodelling following CABG alone are indicative of viable myocardium. These findings imply that many patients enrolled in the CTSN trial had IMR on the basis of reversible ischaemia rather than from non-viable scar. Therefore, future surgical decision-making could be enhanced by pre-operatively identifying those patients most likely to have an improvement in regional wall motion and global LV function following CABG alone. Although these trials did not specify pre-operative evaluation of myocardial viability, echocardiographic assessment of regional and global LV systolic function can predict the effectiveness of revascularisation in specific patient populations and may be useful in this setting. Cardiac Magnetic Resonance (CMR) imaging with gadolinium hyperenhancement is an appropriate tool when echo or radionuclide imaging is equivocal.

Individual treatment decisions require balancing the risks of adverse perioperative events against the predicted benefits of a lower incidence of post-operative IMR. Effective revascularisation, as reflected in improved regional and global LV function, plays an important role independent of restrictive annuloplasty repair. In certain clinical settings, the anticipated low likelihood of generating significant reverse remodelling should lead to the performance of a mitral valve reparative procedure. Such circumstances include patients with documented scar or basal aneurysm/dyskinesia in the inferior-posterior-lateral LV, a large ventricle (LVESVI > 70 ml/m^2 and LVEDD > 50 mm) or poor coronary targets in the circumflex/right coronary distribution. Whether a restrictive mitral annuloplasty repair will predictably benefit patients with baseline inferior-posterior-lateral wall motion abnormalities that are considered to be scar remains unknown.



Cardiac | Abstract | LV restoration and hypertrophic cardiomyopathy surgery – Healing the LV

Surgical correction of hypertrophic obstructive cardiomyopathy in patients with mid-ventricular obstruction after failed alcohol septal ablation.

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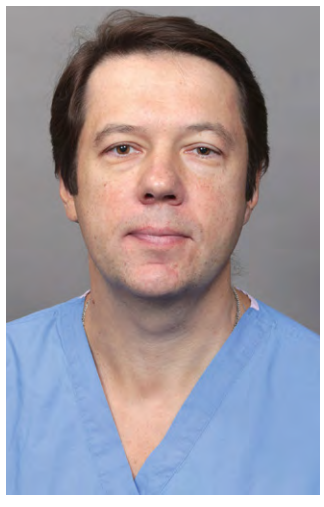

Alcohol septal ablation (ASA) is ineffective in patients with substantial LV hypertrophy (>25 mm wall thickness), since sufficient septal thinning cannot be reliably achieved.[1] Quintana et al.[2] observed a strong correlation between more advanced degrees of interstitial fibrosis and worsening diastolic function measured by strain at the septal level in patients after failed septal ablation. In addition to diastolic dysfunction, septal scar from alcohol septal ablation may contribute to rhythm abnormalities. An earlier Mayo Clinic study also showed a ventricular tachyarrhythmia and complications rate of 20% with ASA.[3] Given the development of left bundle branch block in many HOCM patients after Morrow myectomy, patients who develop right bundle branch block after alcohol septal ablation (ASA) have a higher likelihood of complete AV block occurrence after surgery.[4]

We proposed the technique of HOCM surgical correction without damage to the heart conduction system in patients with severe hypertrophy after unsuccessful ASA. Five symptomatic HOCM patients with obstruction in the left ventricular midcavity and severe septal hypertrophy (mean NYHA Class 3.0) underwent surgical procedure at 14.0 ± 7.0 months after failed septal ablation. The excision of the hypertrophied area of the interventricular septum (IVS) septum causing midventricular obstruction was performed from the conal part of the right ventricle, in the middle part of the right side of the IVS and corresponding to the area of LV intraventricular obstruction. The septal scar area from septal ablation was removed simultaneously and corresponding to the zone of delayed enhancement imaging. Septal scar was detected by cardiovascular magnetic resonance. The follow-up period was 32 ± 19 months.

In the present study of five HOCM patients with midventricular obstruction and severe hypertrophy after failed ASA, there were no early or late deaths after surgery. Patients showed significant improvements in clinical status. After surgery all five patients were free of symptoms (NYHA class 1.0). The mean echocardiographic intraventricular gradient in LV decreased from 77.8 ± 8.8 to 10.4 ± 2.1 mmHg. Echocardiographically-determined septal thickness was reduced from 32.8 ± 3.1 to 15.6 ± 2.0 mm, and follow-up echocardiography showed reduction of atrial size from 46.7 ± 1.5 to 42.7 ± 1.3 mm. Sinus rhythm without block of His bundle left branch was noted in all patients after surgery. Ventricular tachycardia was not registered. None of the patients needed the implantation of a pacemaker.

The tissue necrosis after ASA was extended into the inferior portion of the septum at the midventricular level involving primarily the right ventricular portion.[5]. Our technique of HOCM surgical correction provides the effective elimination of LV intraventricular obstruction in patients after unsuccessful ASA. The possibility of precise removal of areas of septal scarring simultaneously, and avoidance of damages to the conduction system, are important advantages of the surgical technique. However, number of patients is small. Future studies could further clarify the significance of right ventricle myectomy for patients after failed alcohol septal ablation.

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Vascular | Focus | Facing complications during and after emergent surgery for aortic dissection

Ascending aortic central cannulation for acute type A aortic dissection with cerebral malperfusion

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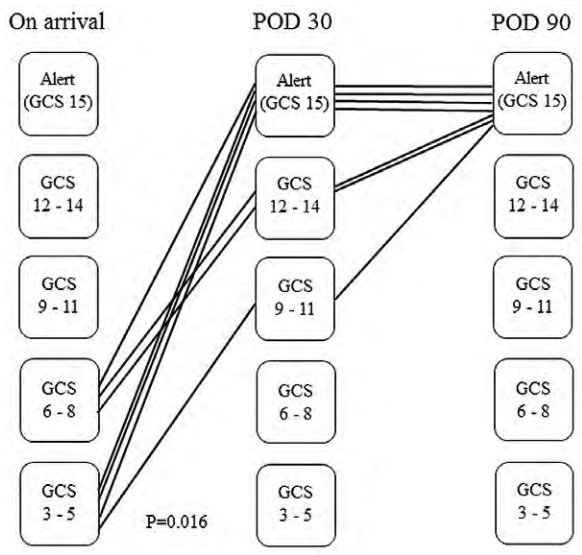

Figure 1. GCS scores of patients with preoperative coma. In these patients, the postoperative GCS score improved significantly at 30 days. POD: Postoperative day. This figure was made based on the design of a similar figure in Tsukube et al.[1]

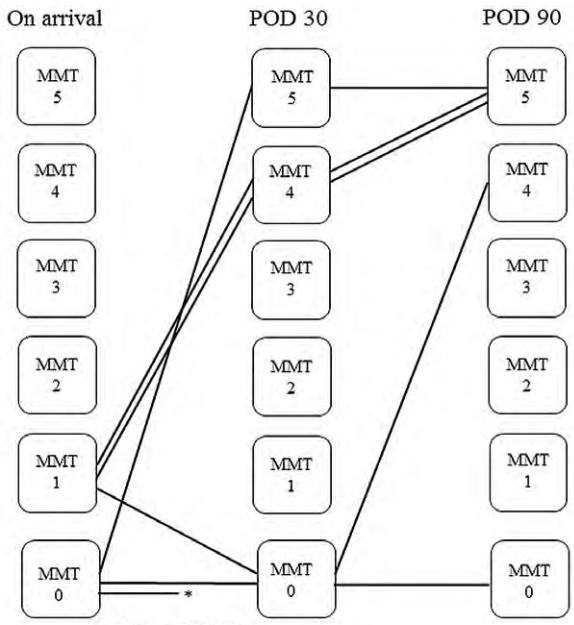

Figure 2. MMT scores of patients with preoperative hemiplegia. POD: Postoperative day.

Type A acute aortic dissection (TAAAD) with cerebral malperfusion (CM) has poor outcomes and resulting in higher in-hospital mortality or a longer stay. TAAAD patients with comas who undergo immediate aortic repair have improved consciousness and neurological function.[1] We use ascending aortic central cannulation (AAC) as a supportive technique for surgery for TAAAD because AAC promptly provides antegrade blood flow which improves dynamic obstruction in the true lumen due to increased pressure in the false lumen through prompt core cooling.[2] This mechanism appears to relieve CM associated with dynamic obstruction in TAAAD, but there is no evidence for this effect. The purpose of this study was to examine the efficacy of AAC for TAAAD presenting with CM.

Between April 2009 and May 2017, 173 patients with TAAAD were treated using AAC. The subjects were 13 of these patients (7.5%; median age 64 years, six males) with neurological deficits due to CM, including seven in a comatose state (Glasgow Coma Scale (GCS) ≤8) and six with hemiplegia (manual muscle test (MMT) ≤1) at arrival. The true lumen of the ascending aorta was immediately cannulated. Deep hypothermic circulatory arrest was used to protect the brain. Consciousness of patients with preoperative coma was assessed using GCS scores and motor function of the paralytic side in subjects with preoperative hemiplegia was evaluated using MMT scores. The Modified Rankin Scale (mRS) was used to evaluate the degree of independence in activities of daily living (ADL) at the later stage.

The median times to establishment of CPB were 331 (192-561) minutes from onset, and 34 (30-40) minutes from the start of surgery. Ascending aortic graft replacement was performed in seven patients, and TAR in six. The 30-day mortality was 8% (1/13). In patients with preoperative coma, the postoperative GCS score improved significantly to 14.0±1.8 (p = 0.016) at 30 days (Figure 1). Full recovery of consciousness at 90 days was achieved in 11 patients (85%). Of six subjects with preoperative hemiplegia, four tended to have improved motor function of MMT ≥4 at 90 days (Figure 2). Postoperative mRS significantly improved from 5.0±0 to 1.7±1.9 (p = 0.005) in follow-up, and independence in ADL (mRS ≤2) was achieved in nine patients (69%). The mean follow-up period was 92±7 months and the cumulative five-year survival rate was 93%. A representative case is showed in Figure 3: a 68-year-old woman who was in a coma (GCS 7) with left hemiplegia on arrival. Total arch graft replacement was performed three hours after onset. She fully recovered consciousness and had improvement of hemiplegia postoperatively. Finally, she was able to drive a car again at six months after operation.

Ascending aortic central cannulation for TAAAD presenting with cerebral malperfusion provides a rapid and reliable route of antegrade central systemic perfusion.

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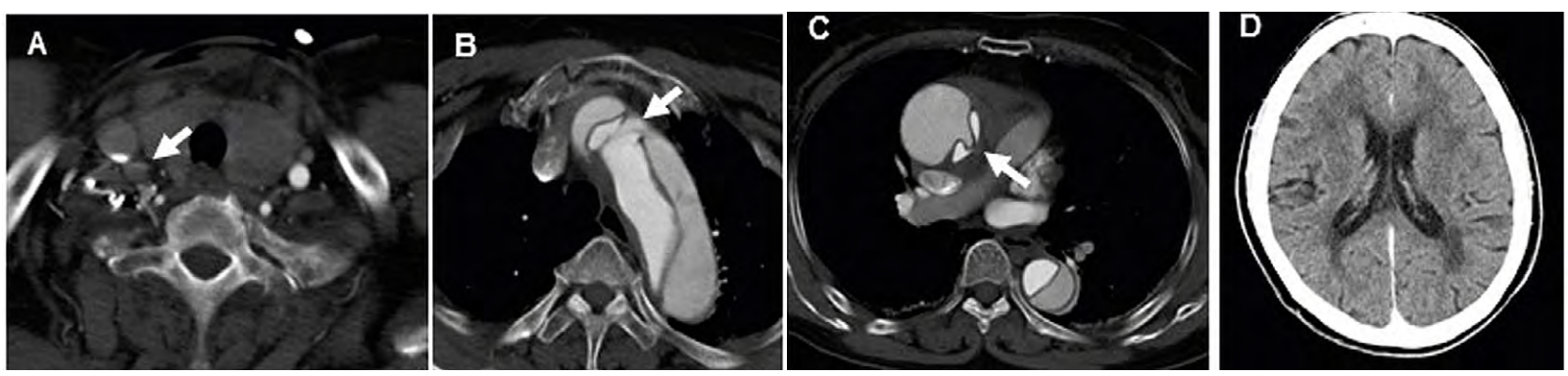

Figure 3. Preoperative enhanced CT scan of the thorax (A-C) and a plain CT scan of the brain (D) in a representative case. A. Occluded right common carotid artery (arrow). B. Intimal tear in the aortic arch (arrow). C. Compressed true lumen of the ascending aorta (arrow). D. A preoperative brain CT scan showed no ischaemic findings.

Cardiac | Rapid Response | Aortic valve replacement in a nutshell

The effect of prosthesis-patient mismatch on perioperative and early outcomes in patients receiving a novel stented bovine pericardial tissue valve

Vivek Rao on behalf of the Perigon Investigators; Division of Cardiovascular Surgery, Peter Munk Cardiac Centre, Toronto General Hospital, Toronto, Ontario, Canada.

Despite the advent of transcatheter aortic valve technology, surgical aortic valve replacement remains a cornerstone for the management of patients with congenital and acquired valve disease.[1,2]

Commonly implanted tissue valves include the Medtronic Hancock II porcine valve (Medtronic Inc; Minneapolis, MN), the TriFecta (St. Jude Medical; St. Paul, MN) and the Edwards Magna (Edwards LifeSciences; Irvine, CA) pericardial valves.[3,4] Arguably, the Hancock II porcine valve has proven to have superior durability while the TriFecta valve has demonstrated superior early haemodynamics.[3,4] The Avalus valve is a novel, pericardial valve manufactured by Medtronic Inc with the

goal of combining early haemodynamic performance with long-term durability.[5] The Avalus is a trileaflet, stented, low-profile bovine pericardial valve with a flexible sewing cuff, a polyester-covered, barium sulfate-impregnated base frame, and alpha amino oleic acid (AOA)-treated, laser-cut leaflets.

The PERIGON (PERIcardial SurGical AOrtic Valve ReplacemeNt) Pivotal Trial is a prospective, non-randomised, multicentre, international study of the safety and early clinical and hemodynamic performance of the Avalus valve. The trial was conducted at 19 sites in the United States, 13 sites in Europe and four sites in Canada. Recruitment began in 2014 and the trial is designed to provide five years of postoperative follow-up on all surviving patients.

The goal of this study was to examine the prevalence of prosthesis-patient mismatch (PPM) and its impact on clinical outcomes with this next generation pericardial valve.[7,8] We compared haemodynamic performance with echocardiographic assessments at discharge and at one-year. Parameters measured included effective orifice area (EOA), EOA index (EOAI), peak pressure gradient, mean pressure gradient, valvular regurgitation and paravalvular regurgitation.

At the time of data analysis, 864 patients had received a study valve with 10 early deaths (1.2%) and an additional 28 late deaths (>30 days from implant). A total of 577 had completed one-year of follow-up and were available for review. There were a range of implanted valve sizes from 17-29 mm with a 23 mm valve being the most commonly implanted size.

Using a previously defined cut-point of 0.75 cm/m^2 as evidence of prosthesis-patient mismatch,[7,8] PPM remained quite prevalent across all valve sizes at one year (44%) with an increased prevalence in the smaller sized valves (87% in sized 19 mm valves). While PPM continues to be prevalent in this series of patients receiving a novel pericardial tissue aortic valve, there was a minimal effect on mean transvalvular gradients and most patients reported resolution of symptoms, even in those patients with PPM. This novel pericardial tissue valve provides excellent haemodynamics and resolution of symptoms across a range of implanted valve sizes.

References

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EACTS/ESVS

EACTS/ESVS Endovascular Skills Course for cardiac surgeons

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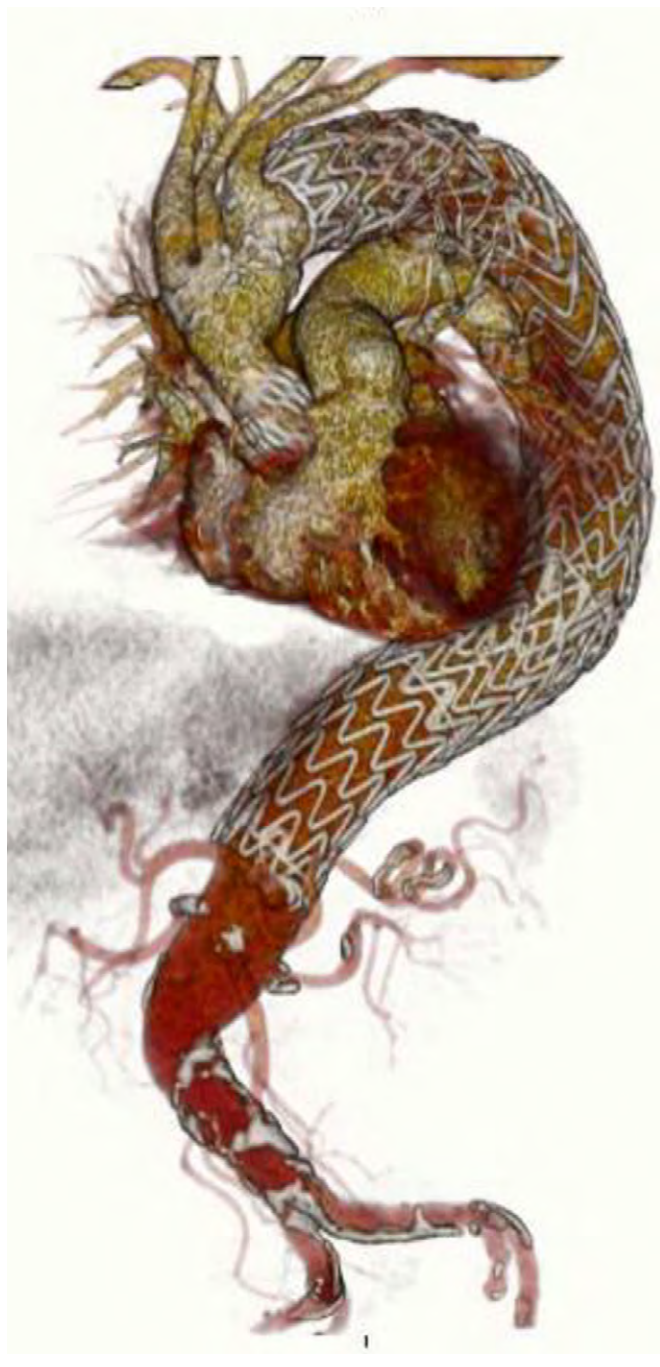

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Nowadays, endovascular stent-graft treatment represents the first choice in the treatment of various descending aorta pathologies, including aneurysms, trauma and dissections. Its minimal invasiveness nature is reflected by a reduced postoperative mortality and morbidity, and this makes the treatment attractive both in elective and emergency situations.

Hybrid-room technologies are used to facilitate such endovascular procedures, and support the extension of the treatment in the arch or in the ascending aorta. Combination with a surgical approach makes it possible to implement stent-graft technology in the marginal landing zone of the distal arch. In addition, the use of modern fenestrated and branched grafts facilitates a complete endovascular treatment of the aortic arch.

These emerging endovascular techniques require special skills in order to effectively plan and perform the aortic treatment, and knowledge is important in order to define the best therapeutic approach for each given aortic pathology. Thus, acquisition of endovascular skill becomes more important for a surgeon aiming for a complete and safe treatment of thoracic aortic disease.

In this context, the European Association of Cardio-Thoracic Surgery, in cooperation with the European Society for Vascular Surgery (ESVS) has organised an endovascular course for cardiac surgeons, which will take place for the first time on 21-22 October, 2017 in Hamburg, Germany. In this two-day course, an international faculty of cardiac and vascular surgeons will give a comprehensive review of various aspects of endovascular treatment, specifically designed to help experienced and ambitious cardiac surgeons get acquainted with this technology.

The programme includes basic and advanced skills on wires, catheters and artery access. The participants will learn how to plan a TEVAR based on imaging technology, and how to smoothly go through the steps of insertion and delivery of an endovascular stent-graft, while avoiding or dealing with potential complications. Indications for the use of TEVAR in various clinical and anatomical scenarios will also be presented and discussed.

Basic or advanced techniques will be presented step by step, and participants will then have the chance to get their 'hands-on' with the help of a high-fidelity simulator. Both faculty members and training specialists will assist throughout a 'real-life simulator procedure', with three separate delegate groups spending 90 minutes training on each training unit. The training will then be followed by specialist-led discussion, focussing on the change in paradigms.

Different features and characteristics of the various stent-grafts available in the market will be also be presented, with participants learning which features are preferred for peculiar anatomical conditions, and how they can choose between two different stent grafts.

The programme concludes with an up-to-date overview of endovascular techniques, treatment of the thoracoabdominal aorta, and the potential for fenestrated and branched devices.

The course is followed by the 4th Aortic Live Symposium (23-24 October, Hamburg, Germany) www.aortic-live.com, in which the participants will have the opportunity to follow live advanced endovascular and surgical techniques and discussions about the current trends and future of aorta treatment.

The EACTS Vascular Domain encourages the participation of cardiac surgeons in this unique course. Cardiac surgeons must get their hands on endovascular procedures to be able to offer the best modality of treatments to their patients. Interested colleagues can proceed to online registration at: http://www.eacts.org/educational-events/programme/endovascular-skills-course

EACTS 2017 **Agenda**

Saturday 7 October

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

Sunday 8 October

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

Monday 9 October

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

Congenital | Vascular | Cardiac | Thoracic | Plenary | All

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

Tuesday 10 October

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

Wednesday 11 October

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

Thoracic | Abstract | Robotics in general thoracic surgery

Ten years' experience in robotic thoracic surgery for early stage lung cancer: **Evolution and lessons learned**

Monica Casiraghi[1], Domenico Galetta[1], Alessandro Borri[1], Adele Tessitore[1], Rosalia Romano[1], Cristina Diotti[1], Daniela Brambilla[1], Patrick Maisonneuve[2], Lorenzo Spaggiari[1,3] 1. Division of Thoracic Surgery, European Institute of Oncology, University of Milan, Milan, Italy; 2. Division of Epidemiology and Biostatistics, European Institute of Oncology, Milan, Italy; 3. University of Milan, Department of Oncology and Hematology (DIPO), School of Medicine, Milan, Italy

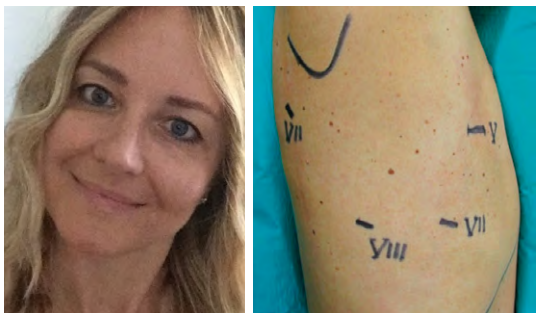

Figure 1. Incisions and robotic positions.

Minimally-invasive surgery is undoubtedly the future of thoracic surgery. The feasibility and safety of both video-assisted thoracic surgery (VATS) and robotic-assisted surgery (RATS) have already been demonstrated in the treatment of early stage lung cancer.[1-7]

VATS lobectomy has not yet become the standard approach to early-stage lung cancer treatment probably related to technical limitations, such as two-dimensional imaging and the limited manoeuvrability of instrumentation. To address the limitations of conventional thoracoscopy, a telesurgical system was developed offering surgeons the benefits of three-dimensional high-definition imaging and greater hand movements using wristed instruments and the master-slave surgical cart, and computer-assisted scaling down of motion and reduction of hand-related tremors (da Vinci system, Intuitive Surgical, Sunnyvale, CA, USA); this new technique offers surgeons an innovative approach to lung cancer resection and staging with a more precise dissection and theoretically better oncological results. Although different studies have demonstrated that RATS is associated with reduced mortality, shorter hospital stay, and fewer overall complications[8,9], few studies have hitherto evaluated oncological outcomes in terms of long-term survival[10,11] showing acceptable results compared to VATS and open surgery.

In our study, we analyse the short and long-term outcomes of RATS for early stage non-small cell lung cancer (NSCLC) to evaluate the oncological impact of this technique and its future development. We retrospectively reviewed the outcomes of 339 patients who underwent anatomical pulmonary resection performed by RATS (four-arm robotic approach with utility incision) for clinical stages I and II NSCLC (Figure 1).

Twenty-nine patients underwent segmentectomy, 307 lobectomy and three pneumonectomy. Conversion occurred in 22 patients (6.5%): 15 (4.4%) due to technical issues, four (1.2%) for oncological reasons, and three (0.9%) for bleeding. Median operative time was 192 minutes for lobectomy, 172 minutes for segmentectomy, and 275 minutes for pneumonectomy. Median length of hospital stay was five days (2-191). The most common postoperative complication was prolonged air leak (12.1%), whereas major complications occurred in eight patients (2.4%), with 30-day operative mortality of 0%.

Our nodal upstaging rate for N1 (cN0-to-pN1) and N2 (cN0/N1-to-pN2) was 8.8% and 8.8%, respectively, with an overall upstaging rate of 17.6% in line with literature data, also considering the open surgery outcomes.

Park et al. in 2012[10] evaluated long-term oncological outcomes after robotic lobectomy for NSCLC[10], showing that robotic surgery had acceptable long-term and stage-specific survival rates (five-year OS of 91% and 88% for stages IA and IB, respectively, and 49% for stage II), comparable with the recently published outcomes for VATS[12] and open surgery[13]. Our study showed excellent five-year OS and cancer-specific survival rates of 90% and 91.5% (Figure 2), respectively, with five-year stage-specific survival of 96.4% and 76.4% for stages I and II, respectively, and 57.8% for stage IIIA (Figure 3).

In conclusion, besides the well-known short-term outcomes showing very low morbidity and mortality rates, mediastinal lymph node dissection during RATS adequately assesses lymph node stations detecting occult lymph node metastasis and leading to excellent oncologic results. However, these results await longer follow-up studies.

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Figure 2. a) Overall survival; b) cancer-specific survival.

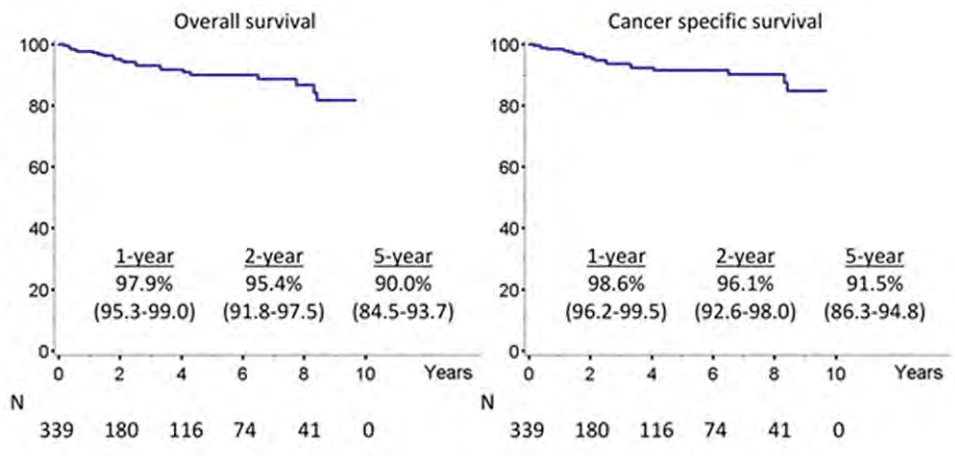
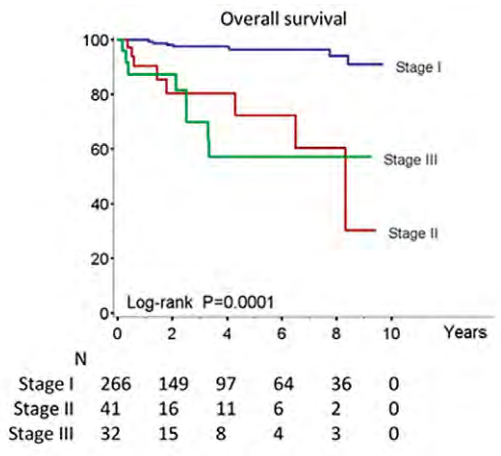


Figure 3. Overall survival according to pathological stage.



Cardiac | Rapid Response | Coronary artery bypass grafting – a bit of science

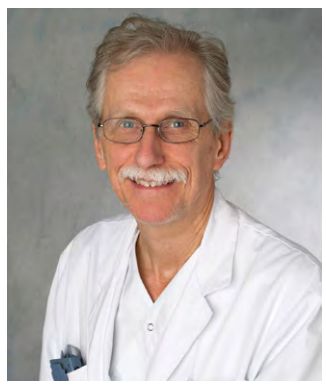
Five-year patency of no-touch saphenous vein grafts in on-pump versus clamp-less off-pump coronary artery bypass surgery: A sub-study of a multicentre randomised trial

Mikael Arbeus[1], Domingos Souza[1], Lennart Bodin[2], Håkan Geijer[3], Mats Lidén[3], Ninos Samano[1]; 1. Department of Cardiothoracic and Vascular Surgery, Faculty of Medicine and Health, Örebro University, Örebro, Sweden; 2. Intervention and Implementation Research, Institute of Environmental Medicine, Karolinska Institute, Stockholm, Sweden; 3. Department of Radiology, Faculty of Medicine and Health, Örebro University, Örebro, Sweden

Randomised controlled studies (RCT) have shown high long-term patency for no-touch saphenous vein grafts (NTSVGs), comparable to the internal thoracic artery in on-pump coronary artery bypass grafting (CABG)[1-3]. RCTs on patency in NTSVGs in off-pump CABG have not been published yet. Our centre participated in the CABG Off- or On-pump Revascularization study (CORONARY, ClinicalTrials.gov number, NCT00463294)[4-6] and included 56 patients. Accordingly, this is a sub-study and the aim was to assess the midterm patency in NTSVGs in clamp-less off-pump versus on-pump CABG at five-year follow-up.

Forty-nine patients were alive at the final five-year follow-up, and were asked for written informed consent to participate in the additional study of graft patency. Forty patients were included. Twenty-one patients in the on-pump group and 19 patients in the off-pump group.

All patients received NTSVGs. Clamp-less aortic technique (Heartstring) was used in all off-pump patients. Computed Tomography Angiography (CTA) was used to evaluate graft patency. Two independent radiologists that were blinded to the technique evaluated the graft patency. All operations



were performed by two surgeons who were experienced in both techniques.

Crude graft patency was numerically higher in on-pump CABG but not statistically significant. The patency rate for the NTSVGs was 57/64 (89.1%) in on-pump vs 37/45 (82.2%) in off-pump p = 0.781. All left internal thoracic arteries (LITAs) were patent except for one anastomosed to a diagonal branch in the off-pump group. All NTSVGs to the left anterior descending artery (LAD) and diagonal targets were patent. Lowest patency for the NTSVG was to the right coronary territory, particularly in off-pump surgery (80.0/62.5%, on/off-pump). The overall five- year patency rate was 122/137, 89.1%. The total patency rate for LITA was 96.6% and for the NTSVGs it was 87%.

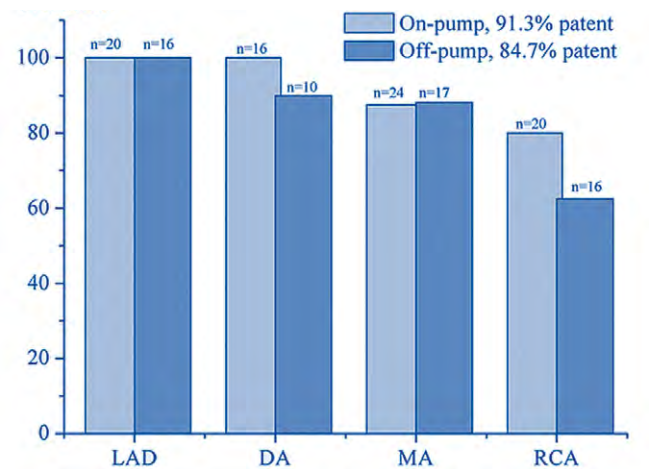


Figure 1. Total patency (LITA+NTSVG) according to the coronary artery targets.

In conclusion, no significant difference in overall patency between on-pump and off-pump CABG was seen. High patency rate was found in all grafts (LITA+NTSVGs) to the left coronary territory in both techniques. Graft patency in off-pump CABG was jeopardised when anastomosed to the right coronary artery.

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The Pectoscope: A novel scopic device for pectus surgery

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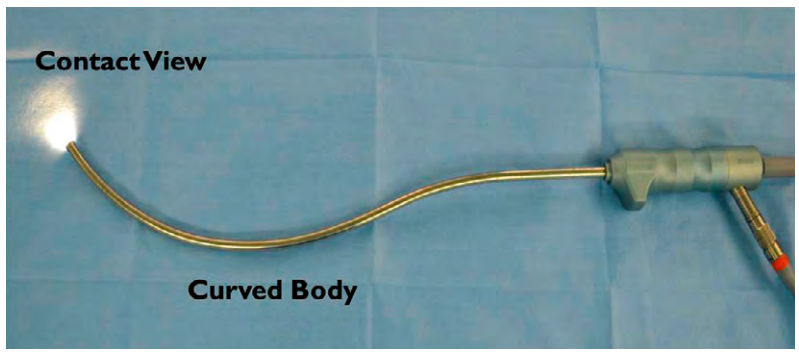

Figure 1: The Pectoscope. Contact view plus dissection for passage of Pectus Bar

Figure 2: The curved pectoscope provides a critical view to the heart to avoid injury

The most dreadful concern for pectus surgeons is heart injury during bar passing, because once it happens, the consequences could be catastrophic. Thoracoscopy was one way to visualise the internal thoracic structures during pectus surgery, however there has been a worry that the conventional thoracoscope would not be accurate enough to show a correct path, thus misleading the surgeon at the critical point of injury.

A main reason for failure in thoracoscopic visualisation appears to be that its body is straight, which is not suitable to follow targets because the heart is often concealed behind the excavated chest wall, especially in deep chest wall depressions. Second, the thoracoscope loses the view when contacting the object where there is no open space at the interface between the depressed chest wall and the heart.

To avoid this lethal cardiac event, I have developed a novel pectus surgery-specific scoping device. I first conceived the idea of the pectoscope is in 2006, aiming to achieve 100% safety from cardiac or other internal organ injuries that might happen inherently in pectus repair. After a hard time harnessing the optical science to develop the scope, at last I could apply it to my patients in 2011.

The unique features of this novel endoscope are listed below, and illustrated in Figures 1 and 2.

1. It has a curved body to follow the curvature of the excavated chest wall easily: descending and ascending along the slopes of the chest wall
2. It is designed to view the contacted surface of the heart and the chest wall. Even the lens touches the object in the path
3. It provides a continuous view through the mediastinum, with no blind spot throughout the track
4. It provides a forward view at the critical point

Therefore, if we use it correctly, it can guarantee 100% safety during the mediastinal pass. Furthermore, no additional introducer is necessary; only a single transit of the scope suffices the introduction of the guide, followed by the pectus bar.

As a result, with the aid of the pectoscope I have had no mortality or any case of internal organ injuries in 1,215 consecutive de novo pectus repairs. Also, since the pectoscope is designed for single travel of the scope to pass the pectus bar guide, the whole procedure was simplified by eliminating additional procedures, such as introducer passage, single lung ventilation, CO2 insufflations, or additional thoracoscopic ports, which made the procedure an uniportal single pass surgery.

In conclusion, the pectoscope is an effective pectus surgery-specific endoscopic device that offers visualisation of the critical point at the interface between the heart and the depressed chest wall for pectus bar passage. The pectoscope could play a vital role to keep our patients safe from catastrophic cardiac injury.

Thoracic | Abstract | Non-Oncology pleura/pneumothorax

VATS decortication for stage-3 empyema: A trial of a minimally invasive approach in a delayed-presentation disease

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Late presentation of pleural infection is still a problem that thoracic surgeons should deal with in everyday practice. Traditionally, the surgical option for management of advanced stage empyema was open thoracotomy for decortication with posterolateral thoracotomy to access into the chest cavity. Mini-thoracotomy and muscle sparing techniques then developed, aiming to decrease post-operative pain and hospital stay. VATS has become a golden tool for the surgical management for fibropurulent pleural space disease. We try to reduce the postoperative pain and hospital stay for patients with stage-3 empyema by trial of VATS decortication in every case.

In this prospective study, we included all cases (from a single, assigned surgeon) with diagnosis of turbid and/or haemorrhagic pleural effusion that showed loculations with thick peel or failed simple chest tube drainage admitted to our thoracic surgery service. An informed consent was used, noting a trial for a thoracoscopic procedure, with the possibility of open surgery in cases where thoracoscopy failed. The operative technique was to completely remove the fibrous peel at the surface of the lung without parietal decortication.

Forty-seven patients who met the inclusion criteria were assigned for the study, comprising 38 males and 9 females. Mean age was 45.32, the youngest 17, and the oldest 82 years. Twenty-eight cases needed only drainage and debridement with lysis of fine adhesions without the need for visceral decortication. The remaining 19 cases were subjected to VATS decortication (Figure 1). All decortication cases performed during the last year of the study were via uniportal approach. Of the 19 cases of decortication, two cases (10.52%) needed conversion to open thoracotomy, and one case was converted from uniportal to two-port approach. All cases were discharged with mean drainage of 5.42 days. Mean operative time for decortication cases was 116.68 minutes (Table 1).

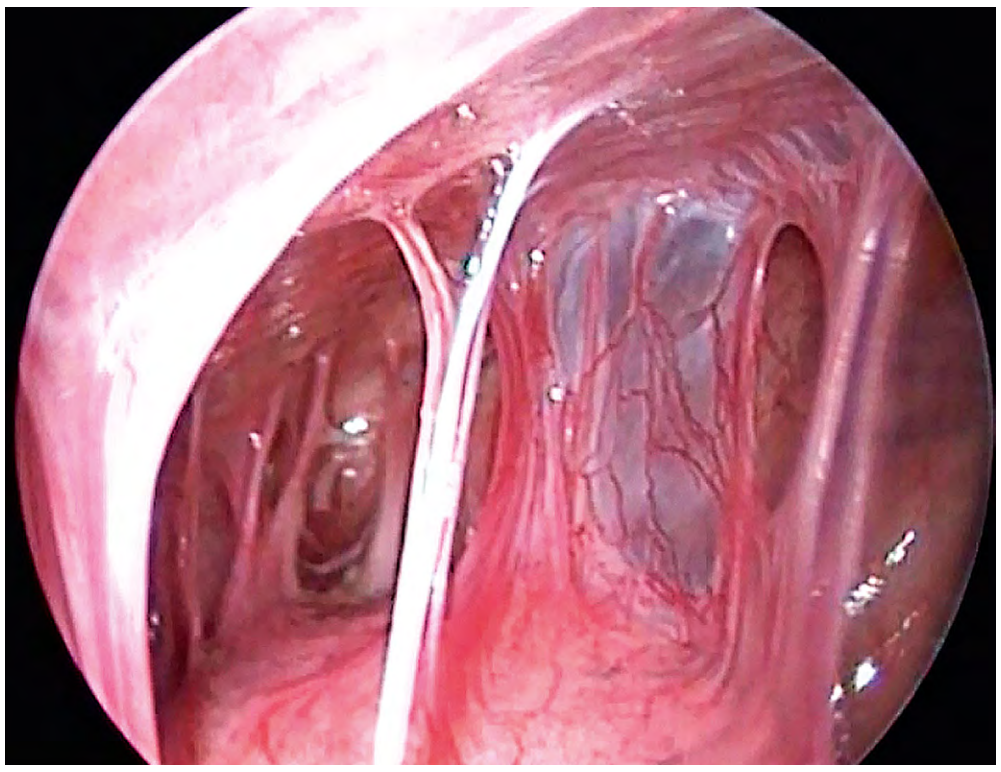

Figure 1. Thoracoscopic view of thick adhesions with entrapped lung

With advancement of VATS procedures and equipment, together with the learning curve, VATS decortication showed significantly less morbidity and mortality as well as decreasing conversion rates from 41.67% in previous studies to 10.52% in this study.

Stage-3 empyema is no longer an absolute contraindication for VATS; not all cases with a preoperative diagnosis of stage-3 empyema need decortication. We encourage a trial of VATS decortication for empyema despite the delay in presentation or radiological findings, considering that the results are comparable with open decortication with the benefits of reasonable operative time, hospital stay and postoperative morbidities and mortalities.

Table 1.

	VATS debridement	VATS decortication
Number of cases	**28(59.57%)**	**19(40.43%)**
Age	47.71	41.79
Sex	6;1	3.8;1
Previous intervention	10	11
Number of ports		
Uniportal	15	8
2 ports	12	11
3 ports	1	
Treatment delay	52.93 days	57.16 days
Operative time (minutes)	90.93	116.68
Drainage days	2.68	5.42
Conversion to thoracotomy	2(7.14%)	2(10.52%)

EACTS

The EACTS Professional Leadership Workshop

It's often said that 'soft' people skills are the hardest, but they are a critical part of the mix for high-performing individuals and teams. Following the success of a two-day leadership workshop in Windsor last year, EACTS is repeating the offering for consultant surgeons this autumn, held on 27–28 November. The word from the majority of participants last year was that it was "A good investment", and "Something they would definitely recommend to a colleague or friend."

The programme will be delivered once again by the warm, self-effacing master of emotional intelligence, Roger Delves, together with leadership coach and Britain's first woman to climb Mount Everest, Rebecca Stephens. And as an added input over last year, it will also feature Dr Jane Stevens, a consultant haematologist with special interest in the personal development of doctors and the sustainability of the NHS.

The course aims not to be too 'clinical', rather to explore the core values of leadership of people. It aims to be inspirational, and is certainly interactive, fully engaging participants with the objective of increasing self-awareness and developing leadership skills for the benefit of themselves, the team – and most importantly – the patient. Ethics is a key theme throughout, and it is understood that in today's environment, hospital departments are in a continuous state of flux, and thus navigating the politics and managing high-performance teams is critical if the best outcome for the patient is to be ensured.

But the uniqueness of the course is that it touches both the intellectual and emotional core of our beings, drawing on tested academic behavioural models for the following: emotional intelligence and authenticity, building and maintaining high-performance teams, integrity and ethical decisions and – particularly popular last year – a highly interactive workshop on 'Political Savvy', designed to equip and encourage individuals to steer a course around organisational barriers, and engage actively in the political sphere in an ethical and systematic way.

There'll be reading beforehand, so come prepared, and expect to be stretched. This is a course for consultant surgeons serious to further every aspect of their careers.

Roger Delves
Professor of Leadership Practice and Dean of Qualifications at Ashridge Business School. Member of the Global Academic Team and Hult Ashridge Academic Board, teaching across a range of Ashridge and Hult qualification programmes.

Rebecca Stephens, MBE
First British woman to climb Everest and the Seven Summits, the highest mountain on each of the seven continents. Writer, lecturer and leadership coach, Visiting Fellow at Ashridge Business School and leader of The Rotterdam School of Management Kilimanjaro MBA Leadership elective.

Jane Stevens, MB ChB, MD (Res), MCRP, FRCPath
Studied medicine at Manchester University, and specialised in malignant haematology. With 20 years experience in the NHS, it became apparent to her that even the best physician was unable to excel if working in a failing system. A need to understand the challenges facing the healthcare sector led her into clinical leadership within the NHS, and to take a Master's degree in Business Administration (MBA). In 2016, she stepped down from her role as divisional director for Cancer and Clinical Support in a large acute Trust in London to prepare for a Doctorate in Organisational Change at Ashridge Hult Business School, where she is an Associate.

http://www.eacts.org/educational-events/programme/professional-leadership-workshop/

EACTS

Awards @ the 31st EACTS Annual Meeting in Vienna

In 2017 we will be introducing a new format for the Awards Selection Process.
After review, the Programme Committee has selected the best abstracts submitted for the Young Investigator Award, as well as the C. Walton Lillehei Young Investigator Award/EACTS/LivaNova Cardiac Surgery Innovation Awards. These abstracts will be presented in one or more Rapid Response sessions with the Award Panel present.
The best nine abstracts from these sessions (decided by the Jury) will then move forward to the 'Final'.
In the Final, abstracts will be presented without slides, instead taking the format of a five-minute oral presentation followed by an additional five-minute discussion. The Award Winner/s will be announced at the end of the Final session.

PROGRAMME – All held in Hall E2

Sunday
08:30–11:00
Young Investigator Award – Semi-final 1
10:15–11:45
Young Investigator Award – Semi-final 2
12:00–13:30
C. Walton Lillehei Young Investigator Award/ EACTS/LivaNova Cardiac Surgery Innovation Award – Semi Final

Monday
14:15–15:45
Awards Final

General | Focus | Statistics in medicine: 'learning the basics' for clinicians

How to learn statistics as a starting researcher

Milan Milojevic
Department of Cardiothoracic Surgery, Erasmus University Medical Center, Rotterdam, the Netherlands

When considering the title of this lecture, many will only think of the application of statistical methods to the analysis of data arising in your medical studies. However, if there's one aspect of education for clinicians that I consider to be paramount, at least when it comes great responsibility for treatment decision-making and use the guidelines or findings published in majors journals, it is a firm grounding in the basic statistical methods.

Unfortunately, in medical school, there are not many students interested in scientific research. In fact, it is pretty hard to be focused on the research courses together with major medical exams such as anatomy, internal medicine and surgery. A lifelong dream of becoming a doctor gives priority to the understanding of pathophysiology/treatments with no particular interest in lectures about 'significance testing of two different variables'. Over time, there is no easy way to correct this gap. Many clinicians are not able to reflect critically on studies conclusions and therefore 'blinded for their judgment' follow straightforwardly mainly underpowered guidelines or make significant barriers to the application of research evidence to daily practice.

I advocate evidence-based medicine in which the highest quality scientific data are undergoing judgment by the experts of the field in term of its trustworthiness, scientific value and relevance in a particular context. The randomised controlled trials (RCTs) are the currently the most valuable source for data on the effects of treatment for evidence-based medicine. Because randomisation evenly distributes known and unknown factors among two treatment groups, RCTs are an excellent source of basic statistics.

How much effort and time are necessery to learn an essential statistical skill is hard to answer. Remember, once you are already past statistical courses I think you are totally on your own. In the beginning, the biggest tip I can give you is to emphasise theory over practice to understand what are you doing. I recommend a four step process to picking up the needed basic statistics skills:

1. Start off by reading 'the study design' papers or buy a book on the topic to understand the main concept of patient follow–up and different types of studies.
2. Take the basic statistical course which usually lasts a week to learn: descriptive statistics, statistical hypothesis testing, statistical inferences on means and proportions, and estimates for association measures. During the lectures, you will spend part of the time on practical exercises using the published articles and statistical programmes; pick an analytical software like SPSS.
3. Continue reading or taking lessons for more advanced statistical methods, including time-to-event analysis, linear correlation and regression, the logistic regression model, the Cox proportional hazard regression model and just keep going.
4. In the last step, start with your study and perform statistical analyses by yourself. It may not be easy, but consult your book(s), the lecture notes, ask for help from your colleagues and move slowly toward your goal. Also, a useful source of knowledge – that is sometimes ignored is Youtube.

Basic biostatistics knowledge is worth your best effort to successfully build a bridge between research evidence and clinical decision making, and also as a motivation to start seeking your answers through research. Therefore, let's start learning biostatistics together now!

General | Focus | Research in medicine: increasing the impact of your study

Follow-up data from national government registries: the Sweden experience

Ulrik Sartipy[1,2] 1 Heart and Vascular Theme, Karolinska University Hospital, Stockholm, Sweden; 2 Department of Molecular Medicine and Surgery, Karolinska Institutet, Stockholm, Sweden

National registries – quality registers and government health-data registers

Sweden has a universal and publicly financed health insurance coverage that guarantees equal access to health services, regardless of employment status, individual financial situation or regional residency. Every individual who has resided in Sweden on a permanent basis is assigned a personal identity number.[1] The personal identity number is an important prerequisite for register linkages for research purposes, and is used as the key number in all national registers in Sweden.

Government administered health-data registries obtain information on, for example, hospital-based inpatient and outpatient care, prescribed medications, cancer diagnoses, and cause of death. Although the government administered registries cover the total population, they may lack details regarding disease- or intervention-specific data, laboratory findings, and patient reported outcome measures. Complementing the government administered health-data registries in Sweden are more than one-hundred healthcare quality registers with the purpose of examining and improving the delivery of healthcare, monitoring the adherence to guidelines, and to support clinical research.

The Swedish Web-system for Enhancement and Development of Evidence-based care in Heart disease Evaluated According to Recommended Therapies (SWEDEHEART)[2] is a national healthcare quality register resulting from the merge of four distinct cardiac care quality registers, including the Swedish Heart Surgery Register. Although quality registers, such as SWEDEHEART, holds valuable information in themselves, the real power is unleashed when registers are linked to other sources of information in order to tackle specific research questions.

This strategy may be employed to investigate research questions not possible to address in prospective randomised trials, e.g. the association between income and prognosis.[3] Information from SWEDHEART was combined with government registries holding information on household disposable income, educational level and other socio-economic variables. Linkage was possible through the personal identity number. Other data sources may include multinational databases such as the Scandinavian Donations and Transfusions database.[4] Such an approach could be useful in order to acquire a sufficiently sized study population, sometimes necessary to reach enough statistical power to demonstrate a lack of effect.[5]

Main message

High-quality national health-data registers can be utilised for acquisition of robust outcome data in large observational studies and in registry-based randomised clinical trials.

Registry-based randomised clinical trials

A randomised controlled trial is considered the gold-standard for a clinical trial testing the effect of a given treatment or intervention. Assuming the randomisation procedure was successful, it has the important potential to effectively reduce or eliminate bias in treatment assignment, most importantly selection bias and confounding. Is it possible to integrate the concept of randomisation into the field of register-based research? By adding a randomisation module to a large, clinical quality register with broad and consecutive patient enrolment, some of the most important features of a traditional prospective randomised trial could be integrated into the infra-structure of an established clinical register. This concept is known as a registry-based randomised clinical trial[6]. As demonstrated by the innovative design in the recent TASTE, VALIDATE-SWEDEHEART, and DETO2X trials, the SWEDEHEART register identified potential study subjects for the trials and collected endpoints and other data. The trials were carried out successfully at a fraction of the cost associated with a traditional randomised clinical trial. We expect that this powerful, efficient, and cost-effective study design will assist the cardiac surgical scientific community in providing the best possible care to our patients in the near future.

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Thoracic | Abstract | Oncology-preoperative assessment

Comparison of new (Pro-gastrin-releasing peptide) versus old (NSE, CEA, CYFRA 21-1 and LDH) circulating biomarkers in the differential diagnosis of lung cancer

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Tumour markers have been extensively studied in patients with lung cancer as means to differentiate between the two major subtypes of lung cancer – non-small cell lung cancer (NSCLC) and small cell lung cancer (SCLC) – and thereby improve diagnosis and treatment selection.

A number of serum components have been proposed as markers for lung cancer: carcinoembryonic antigen (CEA), squamous cell carcinoma antigen (SCC), tissue polypeptide antigen (TPA) and cytokeratin 19 fragment (CYFRA 21-1) have been investigated in NSCLC and neuron specific enolase (NSE) in SCLC.[1-3] None of these markers is specific for lung cancer and there is no clear relationship with the histological type. Some studies demonstrate CYFRA 21-1 is a prognostic and predictive marker mainly in the squamous subtype on the contrary NSE in SCLC. NSE alone has a low sensitivity especially in patients with limited disease therefore it is frequently combined with other tumour markers as CEA and CYFRA 21-1.[3,4]

In recent years, studies have been focused on a new marker: gastrin releasing peptide (GRP), a bombesin-like peptide present in the adult human gastrointestinal and respiratory tract.

GRP is a neuropeptide hormone originally isolated from porcine gastric tissue. Because of its short half-life which is about two minutes, GRP is not suitable in laboratory practice. On the other hand, ProGRP, a serum precursor peptide of GRP, is stable in serum and it may be used as a possible tumour marker of SCLC.[5] Only few data are available concerning the utility of ProGRP as a marker for monitoring the disease and for the detection of recurrences.

In this study, we assessed the relative diagnostic accuracy of ProGRP for the differential diagnosis of small cell lung cancer (SCLC) and compared it with more conventional biomarkers.

We enrolled a cohort of 489 consecutive patients with a clinical suspicion of lung cancer and for whom a histologic assessment was available. Serum or plasma samples were assayed for ProGRP, CEA, CYFRA 21-2, LDH, and NSE. The performance of each biomarker in discriminating the SCLC and squamous cell carcinoma (SCC) / adenocarcinoma (ADK) from non-malignant lung disease (NMLD) and SCLC from SCC/ADK was assayed by ROC curve analysis.

Table 1. Sensitivity and Specificity of biomarkers with respect to NMLD

Biomarker	Histology	True Positive Rate Counts	Sensitivity % (95% CI)
ProGRP (Cut-off = 37.7)	SCLC	43/46	93.5 (82.1,98.6)
	SCC/ADK	230/371	62.0 (56.8,67.0)
ProGRP (Cut-off = 100)	SCLC	21/46	45.6 (30.9,61.0)
	SCC/ADK	5/371	1.3 (0.4,3.1)
CEA	SCLC	10/29	34.5 (17.9,54.3)
	SCC/ADK	100/285	35.1 (29.6,40.9)
CYFRA 21-1	SCLC	15/46	32.6 (19.5,48.0)
	SCC/ADK	83/371	22.4 (18.2,27.0)
NSE	SCLC	22/43	51.2 (35.5,66.7)
	SCC/ADK	28/358	7.8 (5.2,11.1)
LDH	SCLC	45/46	97.8 (88.5,100)
	SCC/ADK	358/370	96.8 (94.4,98.3)

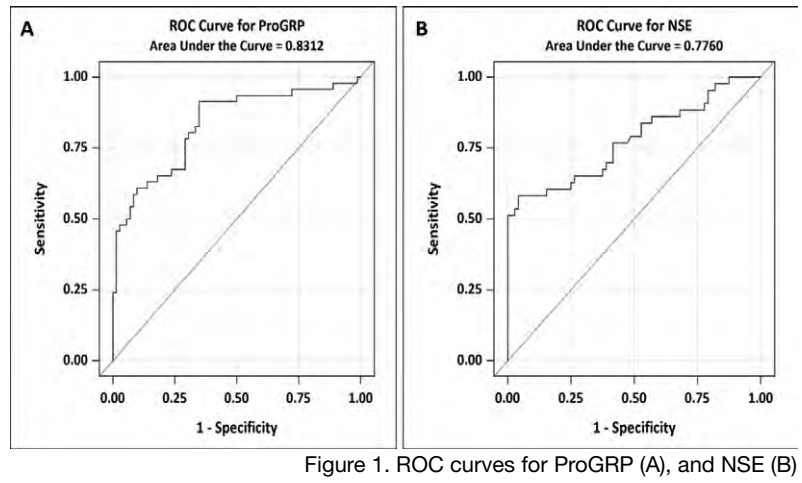

Figure 1. ROC curves for ProGRP (A), and NSE (B)

At the cut-off levels recommended by the manufacturers, ProGRP showed the higher sensitivity (93.5%) (Table 1) and accuracy (AUC = 83.1%) (Figure 1, A) in discriminating SCLC with respect to NMLD, while NSE was less sensitive (51.2%) (Table 1) and showed an AUC of 77.5% (Figure 1, B).

Regarding the discrimination between SCLC and SCC/ADK, all the biomarkers showed a good accuracy with the exception of CEA and CYFRA 21-1.

In conclusion, ProGRP appears more accurate than NSE and other conventional biomarkers for SCLC and the addition of NSE does not increase accuracy. The positivity in NSCLC could be due to difference in histology: it may be speculated that in patients with NSCLC and increased levels of ProGRP a neuroendocrine differentiation within a tumour may be present.

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Dates for your Diary

Cardio-Thoracic Event Listings

27-31 January 2018
54th Annual Meeting of the Society of Thoracic Surgeons (STS)
Fort Lauderdale, USA
www.sts.org

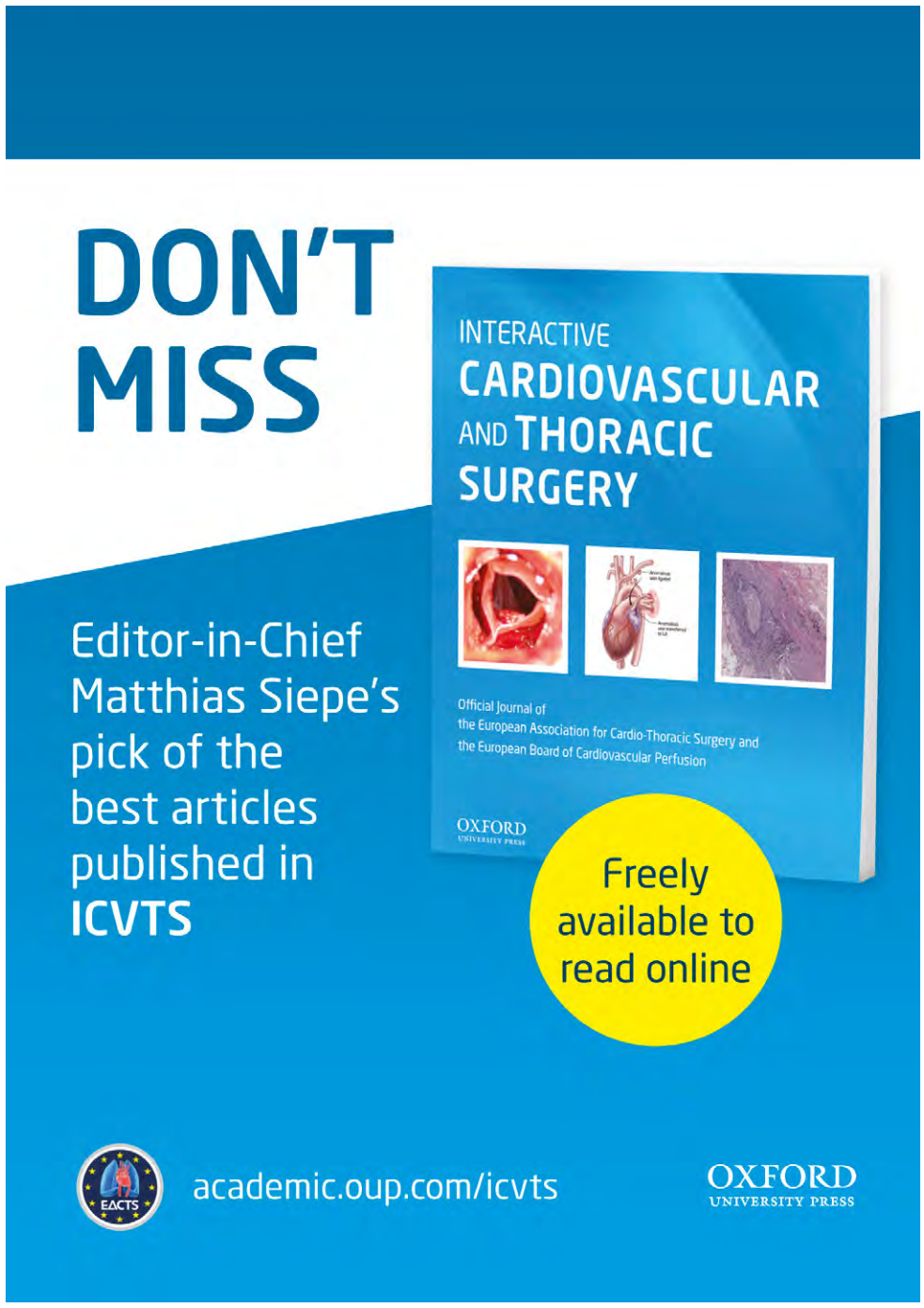
17-20 February 2018
Annual Meeting of the German Society for Thoracic and Cardiovascular Surgery
Leipzig, Germany
www.dgthg-jahrestagung.de

18-20 March 2018
Annual Meeting of the Society of Cardiothoracic Surgery in Great Britain and Ireland
Glasgow, UK
www.scts.org

28 April-1 May 2018
Annual Meeting of the American Association for Thoracic Surgery (AATS)
San Diego, USA
www.aats.org

24-27 May 2018
26th Annual Meeting of the Asian Society for Cardiovascular and Thoracic Surgery (ASCVTS)
Moscow, Russia
www.ascvts2018.org

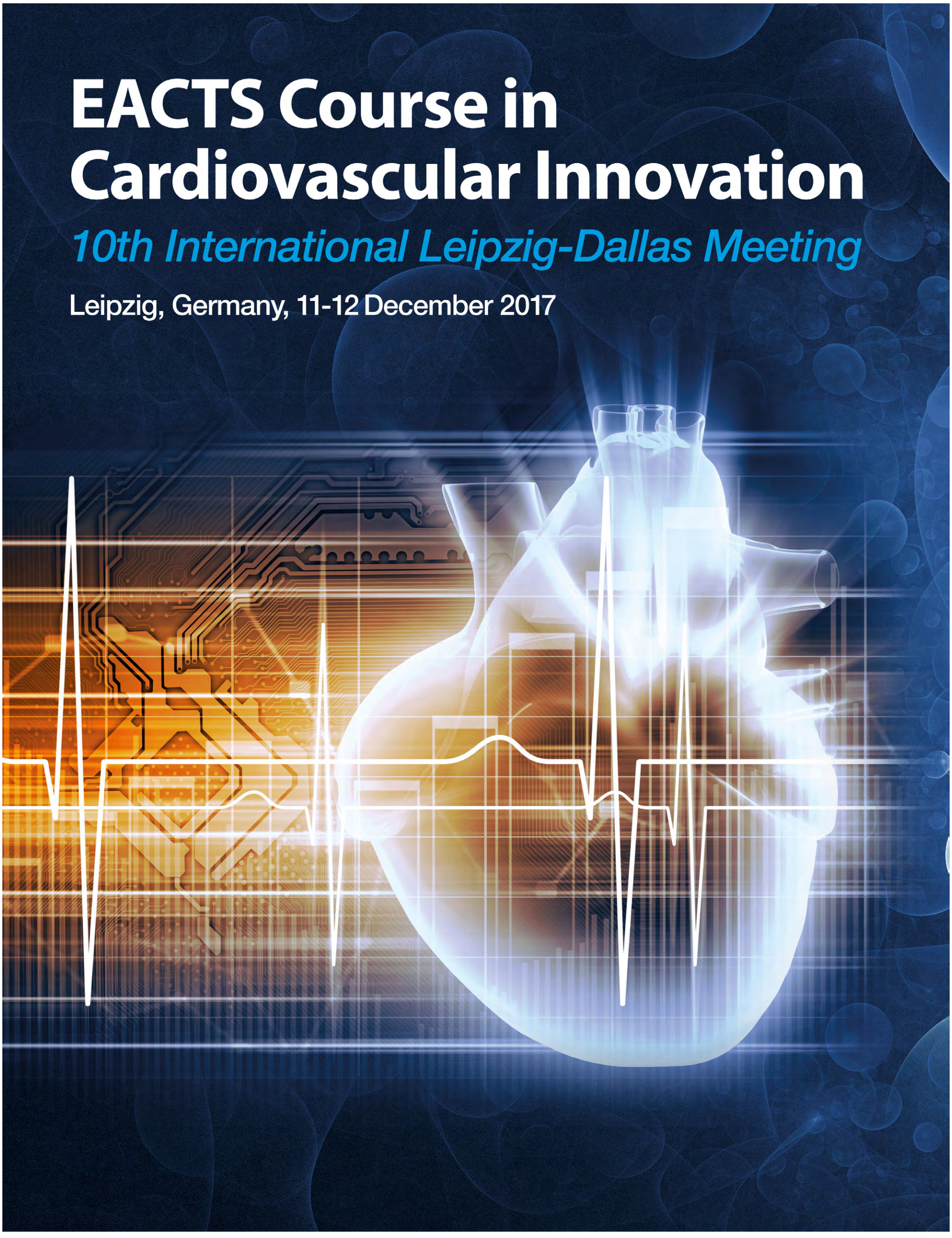
18-20 October 2018
32nd Annual Meeting of the European Association for Cardio-Thoracic Surgery (EACTS)
Milan, Italy
www.eacts.org



EACTS Course in Cardiovascular Innovation

10th International Leipzig-Dallas Meeting

Leipzig, Germany, 11-12 December 2017



Raising Standards through Education and Training

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General | Focus | Research in medicine: increasing the impact of your study

Working together: upgrade from single- to multi-centre and the role of data sharing

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"Working together", is a mantra that repeatedly comes into a surgeon's life. Surgeons are trained to work together in the operative field, and the updated definition of "Heart Team" has further emphasised the adjunctive value of cooperation for obtaining sharable decisions and increasing benefits for patients.

The concept of teamwork is gaining a more and more critical role also in clinical and basic research, and cardiothoracic surgery is participating to this dynamic evolution in all fields of research. Debated issues that have not been clarified in the last decades are calling for an increased number of multicentre trials and the wide development of multicentre registries has been facilitated by the advent of new technologies, such as TAVR. Moreover, methodological limitations of single observational studies have led a higher quote of researchers to link singular clinical databases to overcome all potential drawbacks.

Multicentre studies show several advantages[1]. They enhance the ability to investigate low-incidence disease or exposure, as they permit to enroll a larger number of participants and to guarantee a sample size that is sufficiently large to ensure statistical power. External validity and consequently the generalisability of outcomes may be enhanced by conducting studies at multiple sites. Again, multicentre studies lead to faster rate enrollment, potentially reducing costs and logistical difficulties that may be related with a longer recruitment period.

Nonetheless, all that glitters is not gold, and multicentre studies intrinsically carry some potential drawbacks and difficulties[1,2]. Both multicentre observational studies and trials are considerably more complex in coordination, quality control and data management and it is essential to have efficient central coordination of all study activities. They could have high costs and therefore require adequate funding from the onset. In prospective studies, data collection should be standardised as much as possible and adhesion to study protocols should be similarly implemented and monitored in all centres, as inter-site variability can result in a high degree of clustering and in substantially reduced study power. A similar issue of standardisation of data collection widely emerges in multicentre retrospective studies, as linkage-related biases could depend on different

definitions of matched variables among centres. Multicentre studies also give rise to numerous ethical challenges, related to privacy protection and operationalisation of informed consent.

The new frontier is data sharing: the availability of data from published trials for new analyses. The amount of data collected, analysed and stored has increased enormously and they can provide inputs to new hypotheses, enabling new scientific inside and driving innovation[3]. Sharing data produced from clinical trials has two principal purposes, evaluation of new aims and verification of the original analysis; 35% of reanalyses led to different interpretations compared with the original article[4]. It has become an ethical and scientific imperative, as the potential for leveraging existing results for even more benefit pays appropriate increased tribute to the patients who put themselves at risk to generate data, according to a recent position statement from the International Committee of Medical Journal Editors[5]. The data sharing process has obviously generated new controversies; nonetheless it is increasingly mandated by trial sponsors and supported by influential groups, and it will grow in the coming years.

The scale tips towards "working together".

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Cardiac | Focus | EACTS/PASCaTS - Controversies in Rheumatic Heart Valve Surgery: Valve Selection

Shaving the rheumatic mitral valve: For how long?

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Valvular heart disease remains the major heart problem in this region, with the mitral valve being the most commonly affected valve. Rheumatic valvular heart disease is the main causative factor and unfortunately, most of the patients in this group are young, live in remote areas, and many of them have problems with warfarin compliance – needed for optimal anticoagulation in those who receive mechanical valve replacement. Although prosthetic valve replacement offers immediate and good function, there are many disadvantages, major setbacks and problems for good long-term outcomes.

Although mitral valve repair has proven to be better than valve replacement in many aspects, rheumatic valve disease poses a special entity, and has become a big challenge for cardiac surgery. Because of the complexity of lesions which in turn end up in malfunction, surgical approaches and techniques need to be adapted and applied to restore normality in mitral valve dynamics and function.

Through this presentation, several innovative techniques for treating rheumatic mitral valve disease will be demonstrated from MR, mixed MS MR and predominantly MS. One of these is the Peeling-plasty of the thickened leaflets of rheumatic mitral valves. Shaving of the leaflets significantly improves pliability and attenuates valve repair. With better understanding of the integrated function of the mitral complex, the scope of mitral valve repair has been progressively expanded with gratifying results. These techniques will be illustrated in detail through video presentations.

In conclusion, rheumatic mitral valve repair in this region has been improved impressively. Several advances and innovative approaches have greatly expanded the scope of mitral valve repair with gratifying outcome.

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Daily News

The official newspaper of the 31st EACTS Annual Meeting 2017 Issue 1 Saturday 7 October

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Welcome to Vienna

The 31st Annual Meeting of the European Association for Cardio-Thoracic Surgery

It is with great pleasure to welcome you to the 31st EACTS Annual Meeting in Vienna, and we are honoured and delighted with your presence at this conference. The purpose of this event is to facilitate the exchange of knowledge and information for clinicians and researchers. As you will see, this year's programme covers the many different aspects of cardio-thoracic surgery, emphasising areas that are important in our daily clinical work. As ever, we are hoping to create an interactive meeting with the exchange of knowledge and ideas, fostering discussions and debates between delegates.

Honoured Guest Lecture
On Sunday, our honoured guest lecture will be given by health economist Professor Pedro Pita Barros from Lisbon, who will provide his insights on *'Economics meets healthcare: how can it be useful?'*
Join us to hear what we can learn about health economics from a national and European perspective.

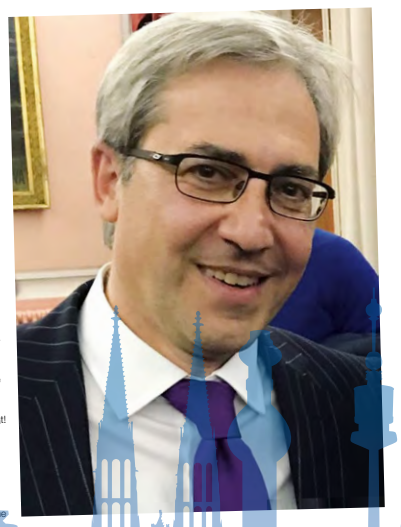
Guidelines
This year, we bring you three new clinical guidelines – which will be presented during the meeting – continuing to demonstrate the importance of the application of guidelines in every day clinical practice:
- ESC/EACTS Guidelines for the management of valvular heart disease
- EACTS and EACTA Joint Guidelines on Patient Blood Management for Adult Cardiac Surgery
- EACTS Guidelines on perioperative medication in adult cardiac surgery

Two of these guidelines have been the result of collaborative work with the European Society for Cardiology and with the European Association of Cardiothoracic Anaesthesiology.

Jeopardy
Special attention should also be reserved for the 'Jeopardy' sessions. During two competitions rounds on Sunday and Monday, national teams – composed of one cardiac and one general thoracic resident or two cardio-thoracic residents – will test their cognitive skills and compete for a ticket to the next STS Annual Meeting in Fort Lauderdale in January 2018. The winning team will represent Europe and will compete against the American winners for the 'World Champion' title. Come to cheer on the teams and try to test your own knowledge!

Gala Dinner
Join us for this year's Gala dinner at the Orangerie Schönbrunn on Tuesday 10 October, located within the grounds of the magnificent Schönbrunn Palace. One of the two largest Baroque orangeries in the world (the other being at Versailles), the building is 189 metres long and 10 metres wide and dates back to 1754. Joseph II was especially fond of arranging banquets in the plant-filled Orangery, emulating those he had experienced on his journey to Russia in the winter garden of the imperial palace in St Petersburg. Join us in these historic surroundings for a fun-filled evening of fine dining and entertainment! Dress code is Lounge Suits.

EACTS
If you appreciate what the EACTS presents during this event and you would like to support the work of the association, I encourage you to visit the EACTS booth and become a member. The membership fee is low, and you will receive the *European Journal of Cardio-Thoracic Surgery* and the *Interactive CardioVascular and Thoracic Surgery Journal* as well as a reduced rate for the Annual Meeting. Also, the EACTS has developed a digital portfolio management system to keep track of your residency training programme (for trainees and trainers) which is simple to use and ***free*** for members. You can complete your membership application online through the EACTS website (www.eacts.org) or by visiting the EACTS booth in the exhibition area. At the booth you will also find information on our new courses planned for 2018, our Quality Improvement Programme and how you can learn and publish with our multi-media manual *MMCTS*.



Of course, we thank our industry partners for their continued support of the Annual Meeting, and all the presenters who have taken the time to contribute to this year's *EACTS Daily News*.

We hope the information and techniques presented at this year's Annual Meeting will be of great interest. In addition to an outstanding scientific programme, the opportunity to explore Vienna's rich cultural heritage, including many historical buildings and engage with (new) friends over some Wiener Schnitzel, will make your stay in Vienna memorable.

I hope you enjoy the meeting and all that Vienna has to offer.

Domenico Pagano
EACTS Secretary General

Vascular | Abstract | Light and shades of the arch

Unilateral or Bilateral Antegrade Cerebral Perfusion? A Report from the ARCH Multi-Institutional Database

Martin Misfeld, David H Tian, Roberto Di Bartolomeo, Himanshu J Patel, Deniz Goksedef, Alberto Pochettino, Scott LeMaire, Aung Oo, Michael Borger, Tristan Yan and Sergey Leontyev on behalf of the International Aortic Arch Surgery Study Group

There has been a gradual preferential shift favouring antegrade cerebral perfusion (ACP) as the primary neuroprotection strategy in aortic arch surgery. However, significant variations in ACP techniques exist, with opinions differing regarding whether to perfuse the brain unilaterally or bilaterally.

The current study analysed the impact of unilateral ACP (uACP) compared to bilateral ACP (bACP) in elective aortic arch surgery. It is one of the projects of the International Aortic Arch Surgery Study Group (IAASSG).

IAASSG

The IAASSG has been formed by 41 academic surgeons from 34 cardiac centres and 10 countries (Figure 1). The rationale of this collaboration is to evaluate optimal neuroprotection strategies and surgical techniques, to assess perioperative mortality and morbidities and formulate predictors for operative risk, as well as to evaluate long-term survival and quality-of-life in patients undergoing aortic arch surgery.

uACP versus bACP

Patients from the ARCH Multi-Institutional Database 5, who underwent elective hemiarch or total arch aneurysmal replacement with ACP as the sole neuroprotection strategy between 2000-2015 were identified for subsequent analysis. From this cohort, 148 patients underwent unilateral ACP cannulation via either the innominate or axillary artery, while 1556 patients received bilateral ACP through the innominate or axillary artery with left common carotid and/or left subclavian artery perfusion. No discrimination was made with regards to the temperature or duration of circulatory arrest.

After one-to-one propensity matching, 140 patient-pairs were identified. Proportions of total arches and descending aortic graft procedures were similar in both groups. The duration of lower body and brain circulatory arrest time was significantly reduced in the unilateral ACP cohort, as was cerebral perfusion time (19 vs 27 mins, p < 0.001). The two matched groups demonstrated similar postoperative outcomes, with comparable rates of mortality and PND, as well as ICU and hospital lengths of stay.

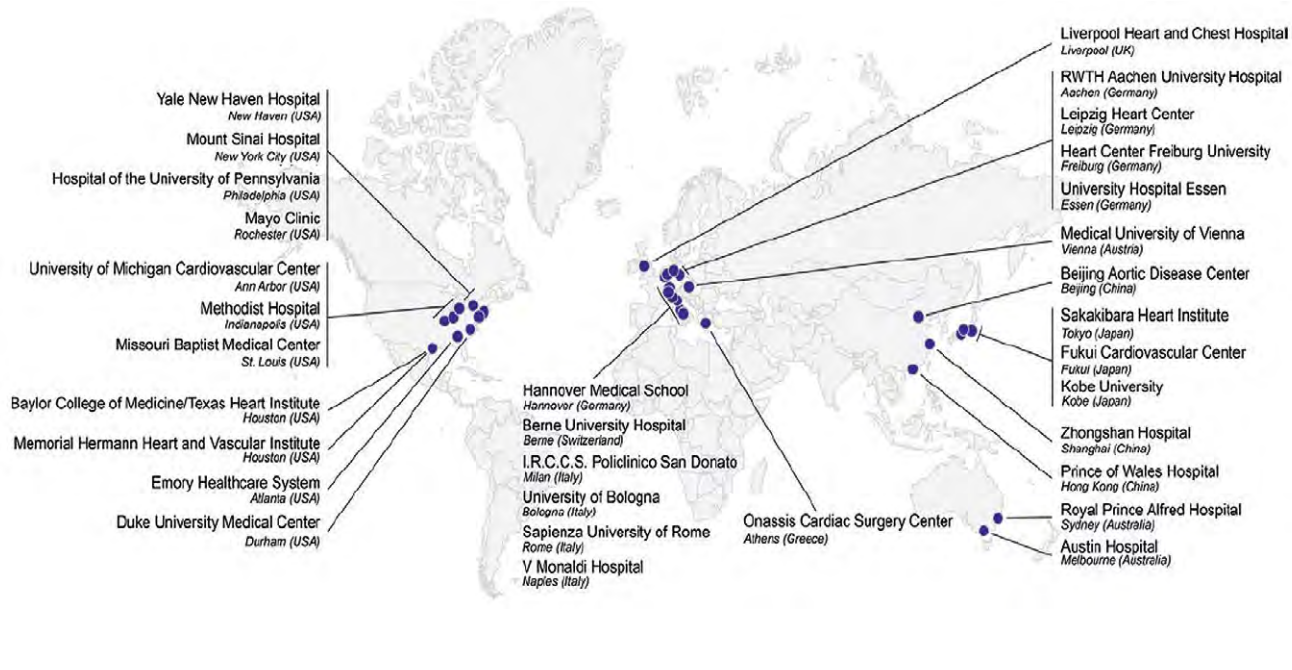


Table 1

	Overall			Propensity-matched		
	Unilateral (n=44)	Bilateral (n=1004)	P value	Unilateral (n=38)	Bilateral (n=38)	P value
Operative durations						
CPB time (mins)	197 (150-265)	197 (158-242)	0.543	201 (150-280)	206 (163-264)	0.568
Cross-clamp time (mins)	120 (81-164)	116 (82-155)	0.609	120 (87-182)	113 (78-143	0.268
Lower body circulatory arrest time (mins)	50 (37-64)	50 (40-67)	0.640	49 (37-61)	56 (42-80)	0.158
Brain circulatory arrest time (mins)	9 (2-30)	2 (1-4)	<0.001	6 (1-29)	3 (0-7)	0.041
Cerebral perfusion time (mins)	39 (30-49)	69 (52-89)	<0.001	42 (30-54)	63 (41-88)	0.003
Clinical outcomes						
Mortality	6 (12.2)	86 (8.4)	0.330	5 (13.2)	5 (13.5)	0.558
PND	3 (6.1)	57 (5.6)	0.879	2 (5.3)	1 (2.6)	0.455
TND	1 (2.0)	68 (6.7)	0.182	1 (2.8)	4 (11.4)	0.248
Myocardial infarct	0 (0.0)	13 (1.3)	0.482	0 (0.0)	1 (3.3)	NA
Arrhythmia	14 (28.6)	268 (26.2)	0.698	11 (31.4)	9 (34.6)	0.629
AKI	5 (10.2)	100 (9.8)	0.755	4 (13.8)	4 (11.4)	0.704
Wound infection	0 (0.0)	34 (3.3)	0.153	0 (0.0)	3 (9.4)	NA
Bleeding	5 (10.2)	97 (9.5)	0.602	4 (12.9)	4 (10.8)	0.570
ICU LOS	3 (1-6)	3 (2-6)	0.142	2 (1-5)	4 (2-9)	0.216
Hospital LOS	11 (8-15)	18 (11-28)	<0.001	11 (8-17)	13 (8-22)	0.457

AKI, acute kidney injury; CPB, cardiopulmonary bypass; ICU, intensive care unit; LOS, length of stay; PND, permanent neurological deficit; TND, temporary neurological deficit

Subgroup analysis of circulatory arrest time longer than 30 minutes

These patients were separately analysed to determine whether uACP or bACP has any impact in complex cases. Within this cohort, thirty-eight propensity-matched patient pairs were identified. CPB and circulatory arrest durations were similar between both groups, but cerebral perfusion time was significantly longer for bACP patients (42 vs 63 minutes, p = 0.003). Comparable outcomes, including mortality and neurological deficits, were seen in both groups (Table 1). This study demonstrates that in patients undergoing elective hemiarch or total arch replacements, clinical outcomes following uACP and bACP are comparable.

The ARCH project promotes closer collaboration of centres focusing on aortic arch surgery to improve patient outcome. At this year's EACTS Annual Meeting, two papers from the ARCH project will be presented.

Thoracic | Abstract | Lung cancer – controversies

Survival rate and prognostic factors of surgically resected clinically synchronous multiple primary non-small-cell lung cancer (SMP-NSCLC) and further differentiation from intrapulmonary metastasis

Fei Xiao, Xiaowei Wang, Zhenrong Zhang, Deruo Liu, Chaoyang Liang National Clinical Research Center for Respiratory Diseases; Department of Thoracic Surgery, China-Japan Friendship Hospital, Beijing, China

Synchronous multiple primary non-small-cell lung cancer (SMP-NSCLC) is a rare entity, but there has been a gradual increase in the number of patients diagnosed with SMP-NSCLC as a result of advances in the diagnostic methods. However, the staging and therapeutic strategy for SMP-NSCLC remains unclear. Distinguishing SMP-NSCLC from intrapulmonary metastasis is difficult but of great importance for selecting the surgical procedure and prognoses.

Our single-centre, retrospective study enrolled 52 patients diagnosed with SMP-NSCLC according to the modified Martini-Melamed criteria. A total of 106 tumours were surgically removed, and were all subjected to pathological examination. The perioperative morbidity rate was 5.8%, without any perioperative death. Close follow-up and survival analysis for risk stratification were performed. The overall five-year survival rate was 40.6%, the cancer-specific five-year survival rate was 54.5%, and the median survival time was 52 months. Older age (p = 0.553), sex (p = 0.600), smoking history (p = 0.496), tumour distribution (p = 0.461), video-assisted thoracoscopic surgery (p = 0.398), and adjuvant chemotherapy (p = 0.078) did not affect survival. Preoperative percentage of forced expiratory volume in the first second (p = 0.022), Charlson comorbidity index (p = 0.034), surgical procedure (p = 0.040), and highest pT stage (p = 0.022) were independent risk factors identified in the multivariate analysis. Lung adenocarcinomas were classified as pre-invasive lesion such as atypical adenomatous hyperplasia (AAH) and adenocarcinoma in situ (AIS), minimally invasive adenocarcinoma (MIA), and invasive adenocarcinoma classified by a predominant pattern after using comprehensive histologic subtyping with lepidic, acinar, papillary, micropapillary and solid patterns. Variants of invasive adenocarcinomas were included as well. Different pathological subtypes were identified in 13 of 18 cases of multiple adenocarcinomas.

Next generation sequencing was applied to six cases of multiple primary lung adenocarcinoma with similar pathological subtypes for further differentiation from intrapulmonary metastasis. Semiconductor sequencing based on the Ion Personal Genome Machine (PGM™) System was performed with the Ion AmpliSeq Cancer Panel v2 to sequence more than 2,800 loci from 50 oncogenes and tumour suppressor genes in tumour DNA.

Our work indicated that the postoperative survival rates in SMP-NSCLC were satisfactory. Non-radical resection might improve the prognosis for patients with a tolerable general condition and pulmonary function. Higher pT stage might result in poorer survival rates. Larger sample size and future study are still needed to identify the independent prognostic factors. Comprehensive histologic assessment and next generation sequencing could be effective methods for screening SMP-NSCLC.

Cardiac | Focus | Rapid deployment valves: New evidence & clinical cases discussion

What can we say after five years, and five hundred implants?

Martin Andreas[1], Iuliana Coti[1], Raphael Rosenhek[2], Shiva Shabanian[1], Stephane Mahr[1], Keziban Uyanik-Uenal[1], Dominik Wiedemann[1], Thomas Binder[2], Alfred Kocher[1], Guenther Laufer[1] 1. Department of Surgery, Division of Cardiac Surgery, Medical University of Vienna, Vienna, Austria; 2. Department of Internal Medicine II, Division of Cardiology, Medical University of Vienna, Vienna, Austria

The Edwards INTUITY valve system is a balloon-expandable bioprosthesis inspired from the Edwards Magna valve and transcatheter technologies, with a subvalvular stent frame to enable rapid-deployment (Figure 1). We participated in early and recent clinical trials and selected the INTUITY valve as our standard valve for surgical aortic valve replacement[1]. We previously compared this rapid-deployment valve to standard bioprostheses and analysed the effects of the anchoring mechanism on transvalvular gradients (Figure 2)[2,3].

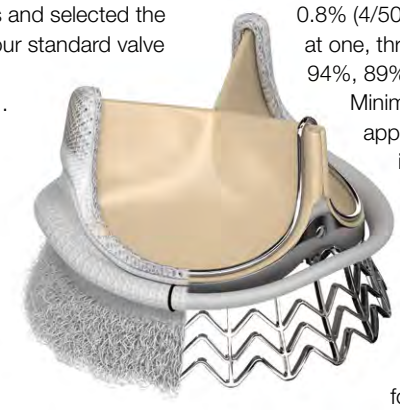


Figure 1: Edwards INTUITY ELITE valve. Copyright Edwards Lifesciences

Herein, we report our experiences after more then 500 implants between May 2010 and July 2017 (mean age 73.6 ±7.9 years, 45.6% female) in patients with severe aortic stenosis. Median follow-up was 12 months and the total accumulated follow-up was 818 patient years. Preoperative characteristics, operative specifications, survival, valve related adverse events and valve haemodynamics were assessed.

Implantation success was 99% (500/504), 30-day mortality was 0.8% (4/500) and overall survival at one, three and five years was 94%, 89% and 81% (Figure 3). Minimally invasive surgical approach was chosen in 236 patients (47%), of which 122 (24%) were through anterior right thoracotomy. Cross-clamp and cardiopulmonary bypass times for isolated AVR were 53±17 and 89±29 minutes for full sternotomy and 75±23 and 110±31 minutes for minimally invasive approaches. The mean gradients at discharge, one year, three and five years were 13±5, 11±4, 12±5 and 11±3 mmHg. Pacemaker implantation was performed in 43 patients (8.6%). A single case (0.2%) of structural degeneration (6 years FU) was registered and treated with a valve-in-valve (ViV) implantation. The INTUITY prosthesis appears to be a low-risk prosthesis for ViV procedures compared to other surgical valves. Valve explantation for non-structural dysfunction or endocarditis occurred in nine cases (1.8%).

The implantation of a RD-AV has shown excellent results concerning haemodynamic performance, is feasible, safe and reduces the cross-clamp and cardiopulmonary bypass times, facilitating minimally invasive approaches[3]. Rhythm disturbances requiring pacemaker implantations remain a matter of concern and are currently under further study. Implantation requires correct sizing and proper training to avoid paravalvular leakage or valve pop-out. Long-term survival and valve durability is excellent and underlines the value of this technique for surgical aortic valve replacement.

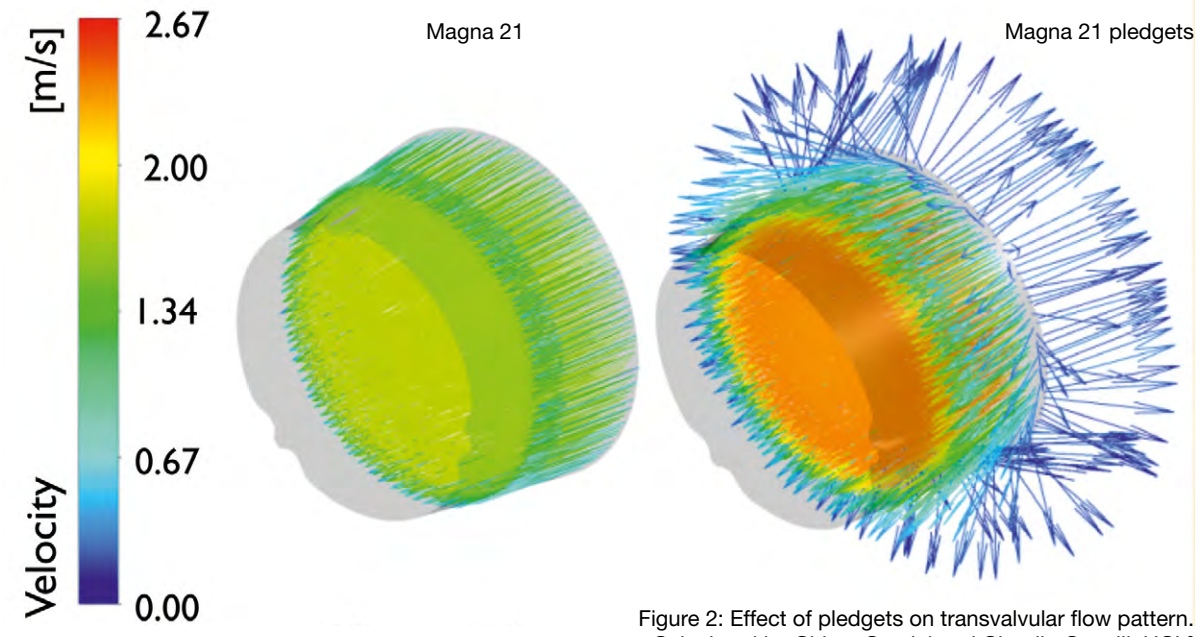


Figure 2: Effect of pledgets on transvalvular flow pattern. Calculated by Chiara Corsini and Claudio Capelli, UCL[2]

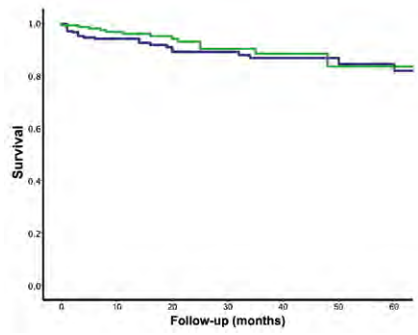


Figure 3: Single centre long-term survival. Standard access (blue line), minimally invasive approach (green line)

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Congenital | Abstract | Surgical management and outcomes

Outcomes of double-patch and Warden techniques in patients with supracardiac partial anomalous pulmonary venous connection: a prospective randomised study

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Among pulmonary venous return anomalies, a partial anomalous connection of the right pulmonary veins (PARPVC) to the superior vena cava (SVC) is the most frequent type, occurring in approximately 10% of patients with atrial septal defects (ASDs). The most significant complications after PARPVC to the SVC correction are sinus node dysfunction (SND) and systemic and pulmonary venous (PV) obstruction. Any surgical technique could pose the risk of these events, which is caused by the specific anatomy in the region of this anomaly. Trauma to the sinus node or its blood supply elements can cause serious rhythm disturbances, which can require permanent pacemaker implantation. Up to 18.1% of patients have SND at midterm follow-up. Up to 6% of patients with PAPVC were reported to undergo pacemaker implantation at late follow-up.

Hypothetically, procedures (excluding cavoatrial incision) such as the Warden procedure (WP) or the transcaval technique could minimise the risk of arrhythmias, which is supported by some retrospective studies. According to this data and lack of prospective studies in this field, we decided to perform a prospective trial, comparing double-patch (DP) and Warden techniques in terms of SND and stenosis of pulmonary and systemic veins. Between September 2013 and March 2016 we enrolled 80 patients with PARPVC to the SVC, which were randomly assigned into DP and WP group. Preoperative 24-hour Holter ECG monitoring and contrast cardiac CT were performed in all patients. SND was defined as a change in rhythm from sinus to nodal or low atrial after surgery and, in cases of sinus rhythm with inappropriately low heart rate requiring temporary atrial pacing. There were patients in each group who were operated on through right midaxillary thoracotomy (17 in the DP and 19 in the WP group). Intraoperatively and in the early postoperative period, heart rhythm was assessed by online ECG monitoring with trend recording. At discharge and at midterm follow-up all patients underwent 24-hour Holter ECG. Also, cardiac contrast CT was performed in all patients at follow-up for precise assessment of the SVC and PV anatomy.

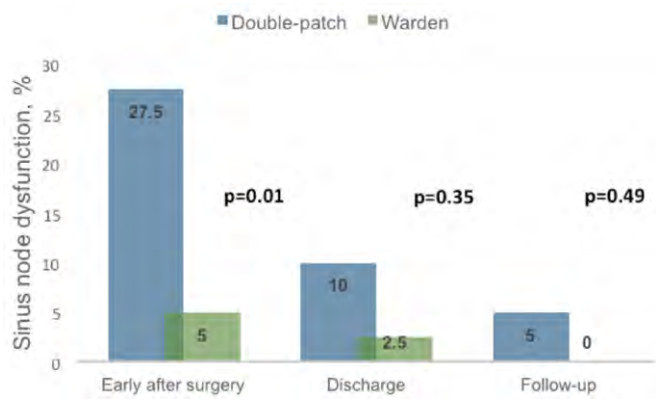

Figure 1. Sinus node dysfunction dynamics during the study

No mortality occurred in the early and late postoperative period. Immediately after surgery SND was observed in 27.5% of cases after DP correction and in 5% after the WP. The multivariate logistic regression analysis revealed that the DP method was an independent risk factor for SND in the early period. At follow-up (22.5 (range, 12-39) months) SND persisted in 2 (5%) patients after DP correction and was manifested as an atrioventricular nodal rhythm with a sufficient heart rate during all monitoring periods. All patients had normal sinus rhythm after the WP (Figure 1). No late pacemaker implantation occurred in either group. No significant SVC or PV stenosis were revealed in any patient.

Surgical correction of the PARPVC to the SVC with any technique has excellent outcomes in terms of survival and has a low rate of serious complications, independent from the surgical approach used. Warden procedure had benefits in transient SND in the early postoperative period compared to those for the DP technique. SND after PARPVC to the SVC correction tends to disappear spontaneously. There was no significant difference in SND after the DP technique and Warden procedure at the mid-term follow-up.

Cardiac | Abstract | Managing degenerated aortic prosthesis

Technical feasibility does not guarantee clinical improvement: A word of caution for valve-in valve procedures in small surgical prosthesis

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The reoperation of a degenerated small aortic bioprothesis is challenging for standard cardiac surgery as well as for transcatheter aortic valve implantation (TAVI). To avoid a more complex aortic root anuloplasty to enlarge the native aortic annulus, many surgeons tend to rather implant smaller aortic valves. Because of the promising developments and longer durability of bioprostheses, they were used more generously even in younger patients. In addition, life expectancy is increasing. That is why we will be facing a growing number of patients with a degenerated aortic valve prosthesis.

Although it is technically feasible to implant a small transcatheter aortic valve in a degenerated bioprosthesis, we are still dealing with the problem of the high postoperative gradients, especially in the treatment of frail octogenarians.

Use of a small diameter heart valve ends up in a higher gradient after surgery, due to a small inner diameter and consecutively smaller aortic valve area. Additionally there is a significant variety between the different companies (Table 1). However, small diameter TAV-Prostheses (20 mm) are available for bioprosthetic valves with an inner diameter of at least 17 mm.

This case report points out the problem of TAVI in small bioprosthetic heart valve. The patient, an 85-year-old woman, presented with NYHA III and fatigue six years after aortic valve replacement (Mitroflow 19 mm) and coronary bypass surgery. The echocardiography examination revealed a severe degeneration of the bioprosthesis with a mean gradient of 40 mmHg and an AVVmax 4.4 m/s, and preserved left ventricular function. Due to her risk profile with a log. EuroScore of 38.7% and an EuroScore II of 15%, we deemed the patient inoperable. Because of severe peripheral artery disease, the patient was rejected for TF-TAVI, so we decided to perform an off label implantation of a 20 mm TF Edwards Sapien prosthesis through a transapical approach.

The implantation was uneventful resulting in an excellent positioning of the valve prosthesis and no paravalvular leakage. Despite of this technical success, the invasively measured peak to peak gradient remained as high as 21 mmHg, the echocardiography revealed a peak gradient of 13 mmHg.

The postoperative hospital stay was uneventful and the patient was discharged on the 10th post-operative day, with marginal regression of dyspnoea and a discharge mean gradient of 37 mmHg, which was similar to the preoperative gradient.

Almost one year after surgery, the patient still suffers from dyspnoea with a mean gradient of 26 mmHg and reduced left ventricular ejection fraction.

Although it is technically feasible to implant a small TAVI prosthesis (like Edwards Sapien 20 mm) into a small bioprothesis, we have to pay attention to achievable haemodynamic improvement postoperatively.

Knowing these results, we have to address these findings when implanting bioprostheses in younger patients. Furthermore, the implantation of small surgical valves in the context of the first operation should be avoided, to leave the option of a valve-in-valve TAVI open.

Table 1. Dimensions of aortic bioprostheses

Aortic bioprosthesis	Labelled size (mm)	Inner diameter (mm)	External diameter/ incl. sewing ring (mm)
Edwards Magna Ease	19	18	24
Edwards Magna		18	24
Edwards Perimount		18	26
Medtronic Mosaic		17.5	25
Medtronic Mosaic Ultra		17.5	24
Sorin Mitroflow		15.4	21
SJM Epic Supra		19	25
Edwards Magna Ease	21	20	26
Edwards Magna		20	26
Edwards Perimount		20	28
Medtronic Mosaic/			
HancockII		18.5	27
Medtronic Mosaic Ultra / HancockII Ultra		18.5	26
Sorin Mitroflow		17.3	23
SJM Epic Biocor		19	25
SJM Epic Biocor Supra		21	28

Thoracic | Abstract | Lung transplant advanced techniques

The Munich Lung Transplant Group: Five-year experience with the Lung Allocation Score

Barbara Schuba[1], Miriam Scheklinski[2], Christian Hagl[2], Christian Schneider[3], Vera von Dossow[1], Gerhard Preissler[3], Nikolaus Kneidinger[4], Claus Neurohr[4], Sebastian Michel[2] and Rene Schramm[2,5]
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The Lung Allocation Score (LAS) was first introduced in the United States in 2005 with satisfactory results, and was consequently implemented in Germany in December 2011.There are only limited and short-term data on the effect of the LAS on lung transplantation programs within the influential area of the Eurotransplant Foundation (ET).

The aim of this study was to evaluate the effect of the LAS five years after its implementation on waiting list characteristics and posttransplant outcomes at our clinic, a high-volume lung transplant centre. Our study included 294 patients who underwent single or bilateral lung transplantation for end-stage lung disease at our centre after implementation of the LAS until December 2016. Patients were divided into four groups according to their primary diagnosis: i.e. obstructive lung disease, e.g. chronic obstructive pulmonary disease (COPD) or emphysema; interstitial lung disease (ILD), e.g. idiopathic pulmonary fibrosis; cystic fibrosis (CF) and others, e.g. sarcoidosis or primary pulmonary hypertension.

We noted a shift of lung transplant procedures performed within the groups of underlying diagnosis. The proportion of patients with COPD and CF undergoing lung transplantation declined over a period of 5 years. In reverse, patients with interstitial lung disease were transplanted with increased frequency. Consequently, we observed an increasing proportion of COPD patients on the waitlist without relevant changes in waiting times. However, overall survival outcome was independent of the underlying disease entity or the height of the LAS. Notably, single lung transplantation was associated with significantly higher mortality compared to double lung transplantation at our cohort.

We conclude that our five-year experience with the LAS confirm previous findings from the United States demonstrating that the LAS recognizes well the disease specific rapid deterioration in patients with interstitial lung disease. The LAS did not shorten overall waiting times in transplanted patients. Further multicentre long-term data respecting differential transplant centre activities are required for additional evaluation.

Table 1. Characteristics of patients undergoing lung transplantation 2011-2016

	mean LAS	n	Waiting time	ILD	COPD	CF	Others	1-year survival
2012	50.6 ± 18.0	73	205 ± 507	27.4%	28.8%	32.8%	11.0%	84.9%
2013	47.6 ± 17.4	57	205 ± 386	33.3%	33.3%	26.3%	7.0%	77.2%
2014	48.2 ± 14.6	57	141 ± 230	35.1%	21.1%	35.1%	8.8%	86.0%
2015	47.3 ± 16.0	37	248 ± 461	43.2%	18.9%	29.7%	8.2%	84.0%
2016	45.2 ± 16.2	63	194 ± 300	54.0%	19.0%	20.6%	6.4%	-

Values are n (%) or mean ± SD.

Cardiac | Abstract | Patient blood management to reduce surgical risk

Bloodless cardiac surgery in Jehovah's Witness Patients: 20-year single-centre experience

Emilio Monguió, Nieves de Antonio, Daniel Muñoz, Corazón M Calle, Anás Sarraj, Mar Orts, Carlos Figueroa and Guillermo Reyes Hospital Universitario de La Princesa, Madrid, Spain

Although transfusion is a major concern in cardiac surgery, it still occurs in up to half of patients undergoing this procedure. Multivariate analyses have identified transfusion as an independent factor for mortality. There are more than 1,500,000 Jehovah's Witnesses (JW) across Europe. In order to conform to their strongly held beliefs, JW refuse to receive blood or its derivates.

A retrospective study involving nearly 20 years and 138 JW from the beginning of our surgery programme was conducted. 23.9% of patients had previous cardiac surgery and 18.8% left ventricular dysfunction. NYHA class III or worse was observed in 65.2% of patients.

We applied our JW institutional protocol, of which the main lines are: Specific informed consent, optimisation of preoperative haemoglobin and iron metabolism, discontinuation of antiplatelet or anticoagulant therapy, prevention of excessive haemodilution and inadvertent blood loss, systematic use of cell saver, aggressive treatment of post-CPB coagulopathy, and early reoperation in case of postoperative bleeding.

In-hospital mortality occurred in 12 patients (8.7%): four due to cardiogenic shock, three due to A-V groove disruption, two of postoperative haemorrhage. There was one fatal cerebrovascular accident, one sudden cardiac arrest and one iatrogenic haemothorax. Regarding morbidity, 13 patients (9.4%) required early reoperation for bleeding, AKI requiring renal substitution therapy in 8 patients (5.7%), sternal complications in 8 patients (5.7%), cerebrovascular accident in 7 (5.1%), and IABP insertion in 5 patients (3.6%).

From left to right: Anas Sarraj, Guillermo Reyes, Mar Orts, Emilio Monguió and Carlos Figueroa.

EuroScore I and NYHA class IV were significantly related to mortality and a tendency was observed in patients with preoperative haemoglobin <12g/dL. Multivariate analysis confirmed these three variables related to mortality: EuroScore I OR 1.1 (1.03-1.2), p = 0.01; NYHA IV OR 23.2 (1.5-364.9), p = 0.03; preoperative haemoglobin <12g/dl OR 11.5 (1.7-78.8), p = 0.01.

To our knowledge, the most important aspect of surgery in JW is preoperative optimisation to avoid anaemia at the time of surgery and to correct any deficiency of blood components. It has been established that anaemia is an important risk factor for bad postoperative outcomes. Transfusion and anaemia also increase mortality, especially in patients with major bleeding following surgery. We did not find any complication with systematic use of preoperative intravenous iron and erythropoietin suggesting that this strategy may be applied more widely.

Usual cardiac surgery procedures in JW patients may be performed with acceptable results respecting their blood transfusion refusal. Early referral to surgery, preoperative optimisation, intraoperative blood saving and a multidisciplinary management in experienced centres are the key aspects to treat these patients safely. A cut-off of 12 g/dL of preoperative haemoglobin may be useful to schedule patients for surgery.

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Cardiac | Rapid Response | Aortic valve repair

Aortic cusp free edge often plicated but never measured: A clinical study in aortic valve sparing and repair surgery

Laurent de Kerchove[1], Stefano Mastrobuoni[1], Silvia Solari[1], Michel van Dyck[2], Christine Watremez[2], Phillipe Noirhomme[1], Parla Astarci[1], Gebrine el Khoury[1] 1. Université Catholique de Louvain and Division of Cardiothoracic and Vascular Surgery, Cliniques Universitaires Saint-Luc, Brussels, Belgium; 2. Division of Anesthesiology, Cliniques Universitaires Saint-Luc, Brussels, Belgium

Aortic valve (AV) repair and sparing surgery is an attractive option to treat selected young patients with severe aortic insufficiency (AI) and dilated root. During the last two decades, intense developments have standardised surgical techniques improving reproducibility and long-term results. Still, better knowledge of anatomy and morphopathology must help to improve further AV assessment and develop more objective repair techniques.

The systematic measure of geometric height (gH) help to assess the quantity of cusp tissues, orient the decision to repair and guide annuloplasty sizing. Free edge length (FEL) shortening with central plication aims to treat cusp prolapse and optimises valve configuration and coaptation (Figure 1). We already know from an echocardiographic study by Thubrikar et al. (Eur J Cardiothor Surg,2005;28:850-856) that the FEL increases in dilated aorta with AI but echo is relatively imprecise in measuring the FEL especially in prolapsing cusp and bicuspid AV (BAV). The aim of this study was to analyse, for the first time, the FEL (and gH) in normal and pathological circumstances.

Therefore, we intraoperatively measured the FEL and gH in 96 patients operated for AI, dilated aorta, endocarditis or fibroelastoma. Root dimensions were recorded from transoesophageal echocardiography. Patients were divided depending on AV function: 1/ normal (control group, TAV=8), 2/ dilated aorta (±central AI) (TAV=28, BAV=16), 3/ eccentric AI (±aorta dilatation) (TAV=27, BAV=17). The FEL and gH were compared between groups and between prolapsing and non-prolapsing cusp. "Cusp mobility ratio" was defined as FEL/STJ (sinotubular junction diameter) and was calculated for each group.

The results are summarised in Figure 2. In TAV, FEL and gH were increased by 30% and 10% respectively in patients with dilated aorta compared to control group (FEL p < 0.001, gH p = ns). In those two groups, FEL and gH were similar between three cusps (p = ns). In patient with eccentric AI, FEL and gH of the prolapsing cusp were increased by 15% and 3% respectively compared to non-prolapsing cusp (FEL p < 0.001, gH p = ns) and by 43% and 12% respectively compared to control group (FEL p < 0.001, gH p = ns). Cusp mobility ratio was 1.3 in controls, 1.1 in dilated aorta and 1.4 for the prolapsing cusp in the eccentric AI group. In BAV with dilated aorta, FEL was similar between two cusps (p = ns) and increased by 35% compared to control group (p < 0.001). In BAV with eccentric AI, FEL of fused cusp (prolapsing) was increased by 19% compared to non-fused cusp (non-prolapsing; p < 0.001) and by 74% compared to control group (p < 0.001). In all BAV patients, gH of non-fused cusp was significantly larger compared to gH of fused cusp and control group (p < 0.001). Cusp mobility ratio was 1.2 in dilated root and 1.7 for fused cusp in eccentric AI group.

This study shows that in dilated aorta and cusp prolapse, the FEL increases significantly compared to patients with normal AV function. The gH increases only slightly in those pathological circumstances and its size seems to depend more on valve anatomy (TAV vs BAV). The so called "cusp mobility ratio" decreases in dilated aorta as an expression of restricted cusp motion and it increases in cusp prolapse as an expression of excessive cusp motion. These data can help to develop more objective techniques of cusp assessment and repair using eventually a dedicated free edge sizer.

Figure 1. Intraoperative picture of a right coronary cusp prolapse (FEL elongation) treated by central plication of the cusp (FEL shortening)

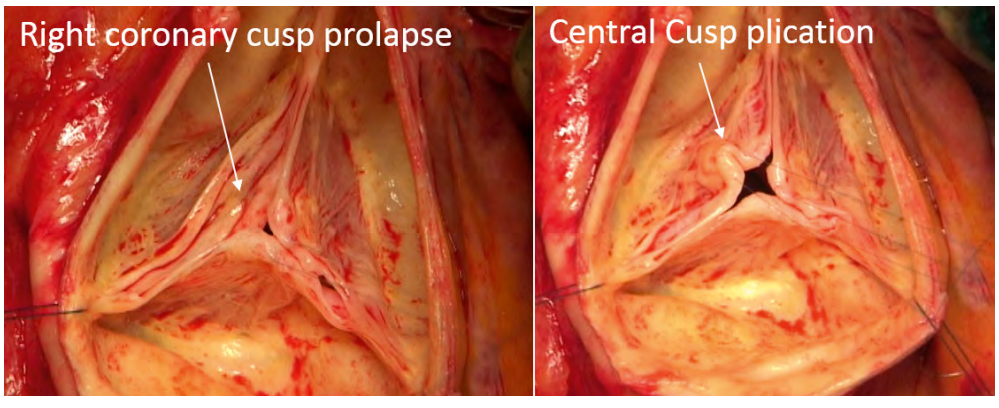
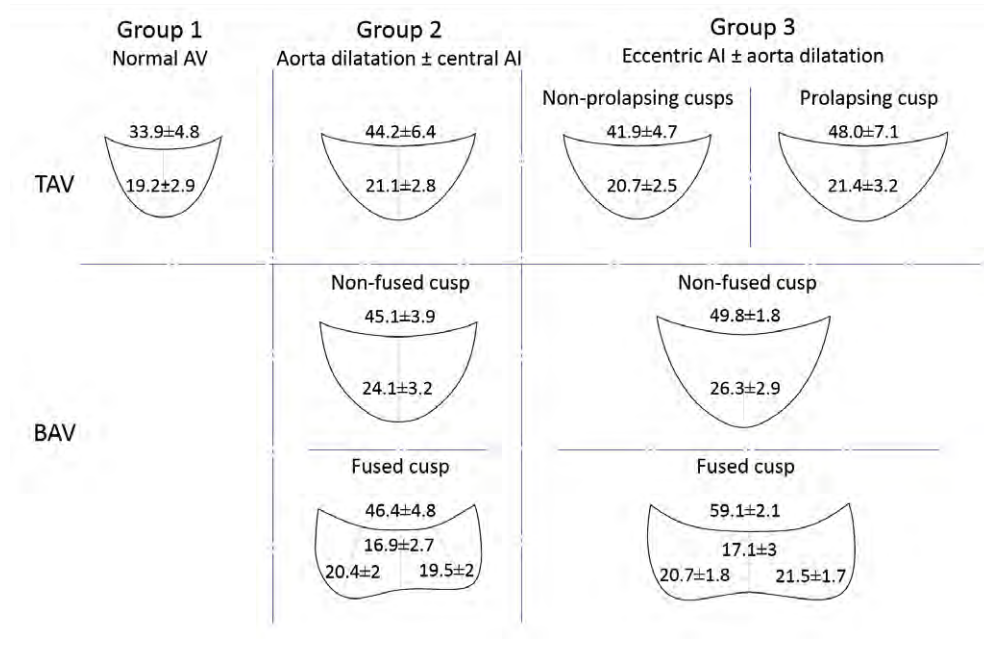


Figure 2. Mean values of FEL and gH for TAV and BAV in the different functional groups.



Cardiac | Focus | Endocarditis surgery

What type of valve prosthesis should be used in patients with endocarditis

A Leite-Moreira
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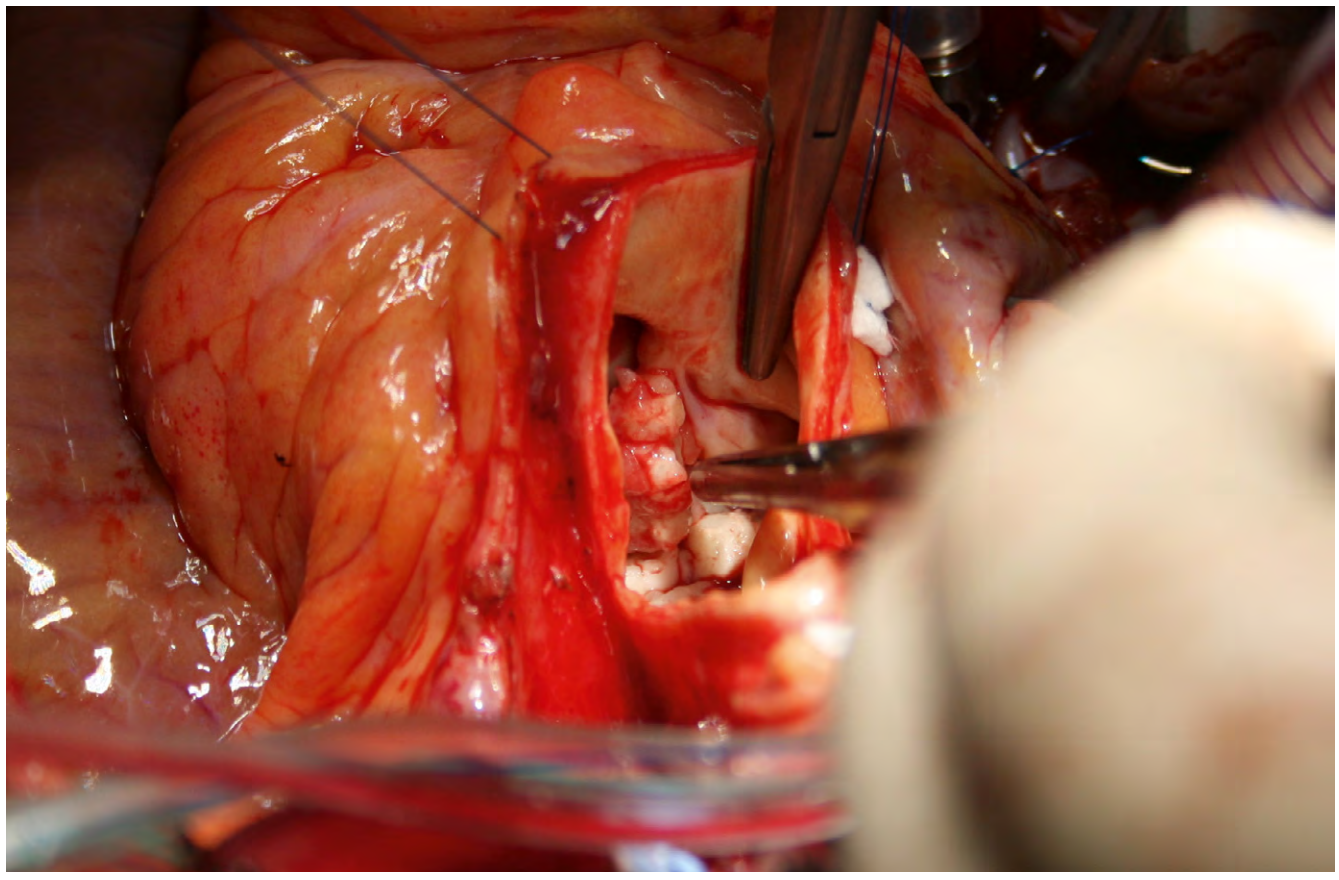

Infective endocarditis (IE) is a clinically and surgically challenging condition, and remains associated with substantial morbidity and mortality despite improvements in medical management and innovative operative techniques. Surgical intervention is the end treatment, aiming for total removal of the infected and necrotic tissues, reconstruction of cardiac structures (including repair or replacement of the affected valves) and the prevention of systemic embolisation. The choice of the ideal prosthesis in native valve IE (NVE) or prosthetic valve IE (PVE) remains controversial. It is, however, generally accepted that it should be tailored based namely on patient's age, life expectancy, comorbidities and compliance with anticoagulation therapy.

PVE, which represents 20% of all cases of IE, carries, as expected, a worse prognosis than NVE. The pathological process is different, depending both on the type of contamination and type of prosthesis, while its diagnosis is more challenging. In mechanical prosthesis, infection begins frequently in the sewing ring or annulus. In contrast, bioprostheses show higher infection of the leaflets leading to vegetations, cusps rupture and perforation as late pathological process, similar to what happens with native valves.

In IE, most authors emphasise the importance of an adequate removal of infected tissue and antibiotic therapy over the type of prosthesis chosen. When periannular abscesses are present, mechanical and biological prostheses performance is similar, if radical debridement is performed and the prosthesis anchored in healthy and strong tissue. Nonetheless, some reports showed survival benefit with mechanical prosthesis, a benefit that is more evident in patients under 65-years-old, and disappear in older subgroups.

In extensive aortic valve IE, however, homografts and patch reconstruction are recommended despite its durability, more demanding surgical implantation technique and limited availability. Stentless bioprostheses are good alternatives as they show similar results to homografts with the advantage of easier implantation technique, availability in multiple sizes and anti-calcification treatment. Stented bioprostheses present higher reinfection rate than homografts and stentless ones, as well as a trend to lower cumulative survival.

In mitral valve IE, both mechanical and biological protheses show similar survival rates and freedom from re-infection. However, a higher risk of reoperation was associated with bioprostheses. In tricuspid valve IE, prosthesis choice should follow the same criteria used in patients without IE.

In conclusion, similar to what happens in other causes valvular heart disease, choice of the type of prosthesis in both NVE, PVE shall follow a personalised approach based on careful evaluation of the patient, the valve and adjacent structures.

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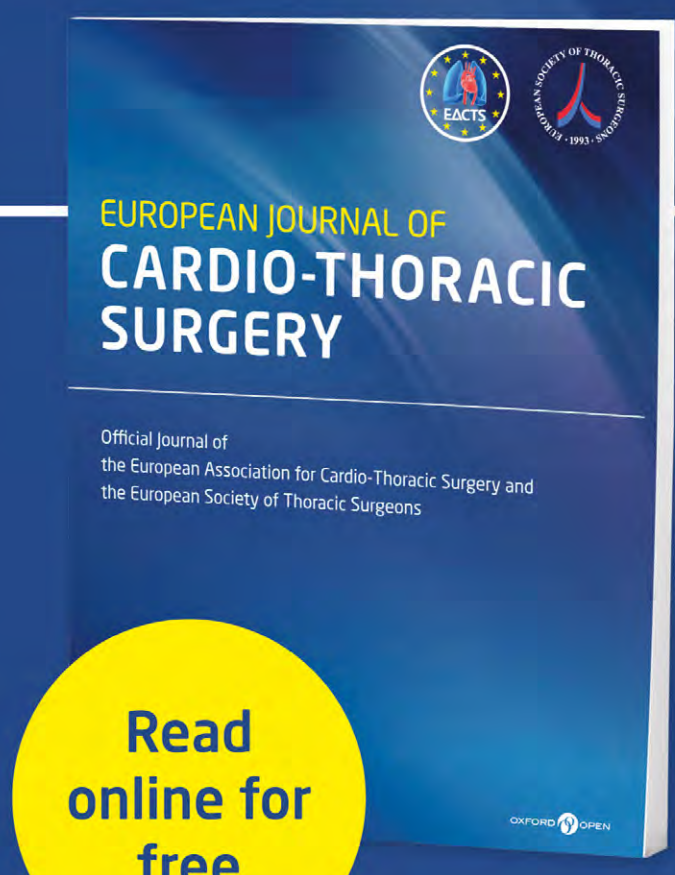

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Cardiac | Rapid Response | Coronary artery bypass surgery - latest updates

Are men from Mars and women from Venus (or surgeons from Pluto)?
Gender-related differences in CABG practice of a prospective European Registry

Francesco Onorati[1], Daniel Reichart[2], Antonino S. Rubino[3], Andrea Perrotti[4], Francesco Nicolini[5], Giuseppe Gatti[6], Marisa De Feo[7], Giuseppe Santarpino[8,9], Giovanni Mariscalco[10], Riccardo Gherli[11], Antonio Salsano[12], Saverio Nardella[13], Matteo Saccocci[14], Sidney Chocron[4], Theodor Fischlein[8], Francesco Santini[12], Giuseppe Faggian[1] on behalf of E-CABG Investigators. 1. Division of Cardiovascular Surgery, Verona University Hospital, Verona, Italy ; 2. Hamburg University Heart Center, Hamburg, Germany; 3. Centro Clinico-Diagnostico "G.B. Morgagni", Centro Cuore, Pedara, Italy; 4. Department of Thoracic and Cardio-Vascular Surgery, University Hospital Jean Minjoz, Besançon, France ; 5. Division of Cardiac Surgery, University of Parma, Parma, Italy; 6. Division of Cardiac Surgery, Ospedali Riuniti, Trieste, Italy; 7. Division of Cardiac Surgery, Department of Cardiothoracic Sciences, Second University of Naples, Naples, Italy; 8. Cardiovascular Center, Paracelsus Medical University, Nuremberg, Germany; 9. Città di Lecce Hospital, GVM Care & Research, Lecce, Italy; 10. Department of Cardiovascular Sciences, Clinical Sciences Wing, University of Leicester, Glenfield Hospital, Leicester, UK; 11. Department of Cardiovascular Sciences, Cardiac Surgery Unit, S. Camillo-Forlanini Hospital, Rome, Italy; 12. Division of Cardiac Surgery, University of Genoa, Genoa, Italy; 13. Department of Cardiac Surgery, St. Anna Hospital, Catanzaro, Italy; 14. Department of Cardiac Surgery, Centro Cardiologico–Fondazione Monzino IRCCS, University of Milan

Female gender is traditionally considered a risk-factor for augmented early mortality after CABG. Indeed, the literature has presented contradictory findings on the topic, with studies confirming female gender as incremental risk-factor for mortality, and others denying that. Recent studies suggested that the female gender incremental risk is actually linked to a global worse risk profile, shifting the core of the debate to other baseline risk factors. Other studies have shown the opposite: a higher prevalence of surgical confounders in females – e.g. less left or double internal mammary grafting, more incomplete revascularisation, lower number of distal anastomoses – thus attributing the worse outcome to suboptimal surgery. Finally, some evidences seem to support the existence of yet-undefined physiologic risk-factor differences between genders, which are the real factors responsible for outcome differences (the so-called theory that "men are from Mars, women are from Venus"). However, most of these contradictory findings stem from retrospective studies, single-centre analyses, and/or limited sample size cohorts. Therefore, all these data – together with their evident limitations – leave the debate still unaddressed.

The recent institution of a large, prospective, all-comers, multicentre European Registry of all isolated CABG performed at 16 different European Institutions (University Hospitals of Verona, Hamburg, Besancon, Parma, Naples, Genoa, Oulu, Stockholm, Nuremberg, Leicester, Milan, Rennes, Civic Hospitals of Rome, Trieste, Pedara, Catanzaro) allowed the collection of 3,788 consecutive CABG outcomes during the first five months. In order to understand if a negative prognostic role of female gender on early outcome really exists, 30-day mortality and major morbidity were stratified by gender. Moreover, two different propensity-score matchings were employed – the former based on preoperative risk-factors, the latter on preoperative risk-factors plus intraoperative surgical factors – aimed at clarifying if differences in outcome must be ascribed to preoperative risk-factors different from gender (with different prevalence in females and males), to differences in the quality of surgery performed in the two categories, or to really unexplained and unaddressed physiologic risk-factors (again, the Mars/Venus argument).

In the study presented here at the 31st EACTS Annual Meeting, we were able to demonstrate that:

1) Compared to males, females have a worse preoperative risk-profile (older age, higher EuroSCORE-II, lower renal filtration rate, worst NYHA, etc.; all p < .01), and a lower quality of surgery (less LIMA-grafting, less BIMA-grafting, higher OPCABG, less mean number of distal anastomoses), resulting in a worse 30-day outcome (higher mortality, transfusions of red packed cells, sternal wound infections and overall rate of complications, leading to a longer ICU length of stay; all p < .01) (Figure 1)
2) Propensity-matching for preoperative risk-factors selected a comparable population of 1,038 patients still showing higher mortality (4.0% vs 1.7% in male, p = .02) and transfusion rates (57.4% vs 37.4%, p < .01) in females, but even reporting less distal anastomoses (p = .01), less BIMA-grafting (p = .02) and higher OPCABG (p = .03) (Figure 2)
3) Propensity-score matching for both preoperative risk factors and intraoperative surgical factors selected a comparable population of 746 patients showing no mortality difference (p = .24) between genders (Figure 3)

We concluded that the traditional opinion about a female gender-related unexplained factor responsible for a higher mortality early after CABG is not supported by these data. Indeed, gender seems an important baseline confounder on hospital mortality, because of the worst preoperative risk-profile and the lower quality of surgery offered to female patients. In the presence of comparable baseline and surgical factors, there is no female-gender related worsening of outcome, thus proving the proof that there are no females coming from Venus and men from Mars, but only men and women coming from the same planet.

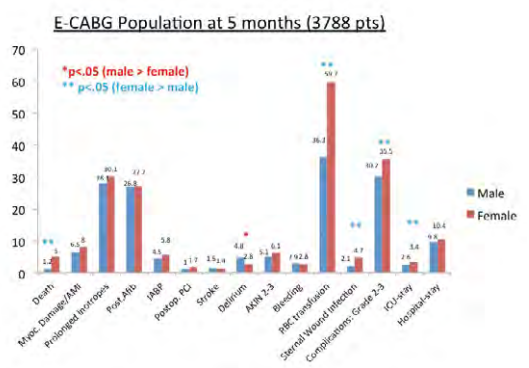
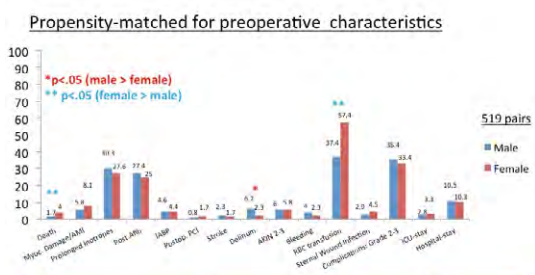
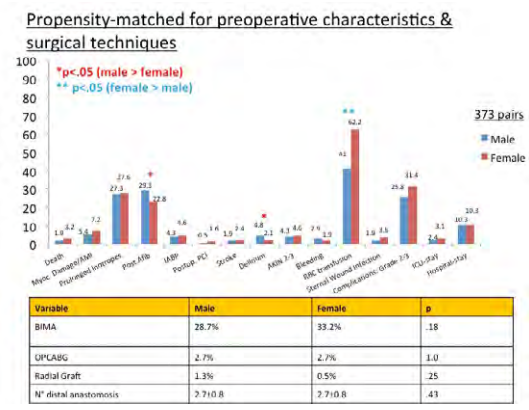


Figure 1. Thirty-day outcome stratified by gender in 3788 consecutive CABG at 16 study sites



Variable	Male	Female	p
BIMA	39.1%	32.8%	.02
OPCABG	16.3%	22.9%	.03
Radial Graft	1.3%	0.4%	.09
N° distal anastomosis	2.7±0.9	2.5±0.8	.01

Figure 2. Thirty-day outcome in a comparable population of female and male CABG-patients after propensity-matching for preoperative characteristics. Differences in surgical factors still persisted.

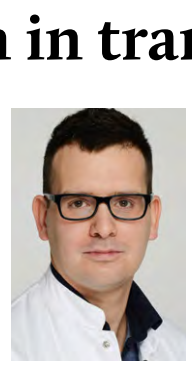


Variable	Male	Female	p
BIMA	28.7%	33.2%	.18
OPCABG	2.7%	2.7%	1.0
Radial Graft	1.3%	0.5%	.25
N° distal anastomosis	2.7±0.8	2.7±0.8	.43

Figure 3. Thirty-day outcome in a comparable population of female and male CABG-patients after propensity-matching for preoperative characteristics and surgical factors.

Cardiac | Abstract | Risk score

EuroSCORE II and STS score are more accurate in transapical TAVI than in transfemoral TAVI



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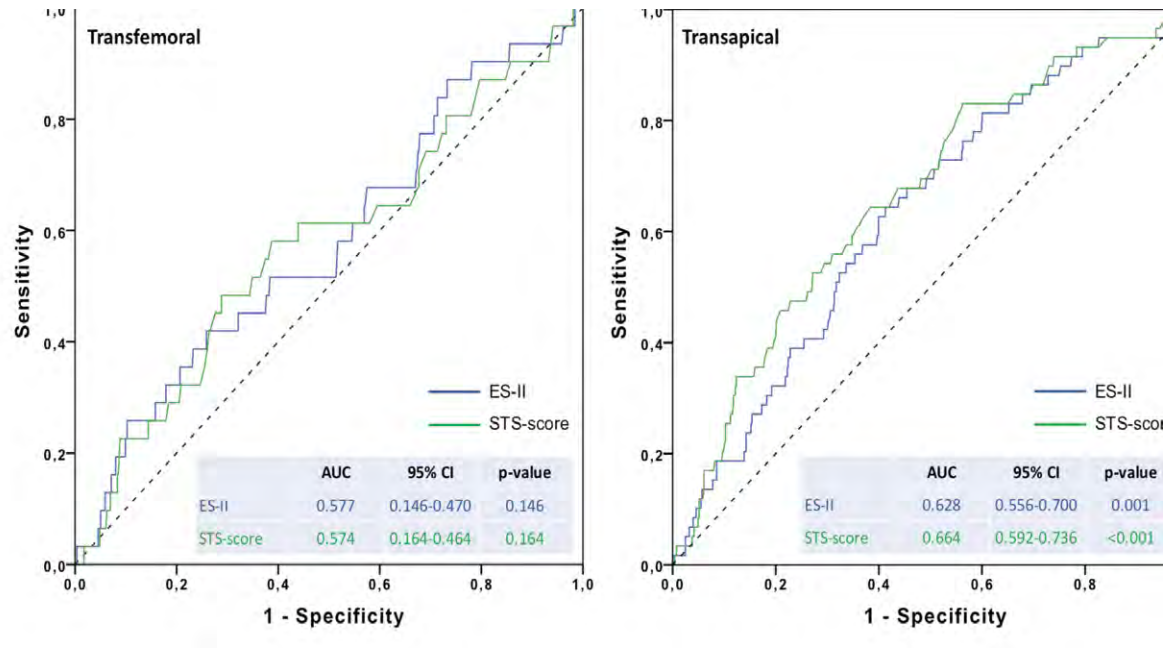

The European System for Cardiac Operative Risk Evaluation II (ES-II) and the Society of Thoracic Surgeons (STS) score are currently considered by the heart team to estimate periprocedural risk following transcatheter aortic valve replacement (TAVI), and to shift high-risk patients – which were planned for surgical aortic valve replacement – to the transcatheter route[1,2]. Results regarding the value of surgical scores in predicting periprocedural outcome following TAVI are conflicting and inconclusive[3,4]. Furthermore, the individual predictive ability of both the ES-II and the STS-score considering different access sites has never been investigated in a large, adequately powered, consecutive cohort. Therefore, we aimed to investigate the value of ES-II and STS-score in predicting perioperative mortality according to access site in a large two-centre population.

We prospectively included 1192 consecutive patients undergoing transfemoral (TF) or transapical (TA) TAVI at two centres between 2008 and 2016. The primary study endpoint was 30-day all-cause mortality. Odds ratios (OR) with 95% confidence intervals (CI) were calculated for outcome analysis. To identify predictors of 30-day all-cause mortality univariable and multivariable regression analysis was performed. Predictive discrimination for 30-day all-cause mortality (C-statistic) of ES-II and STS-score were measured by the quantification of ROC curves integral (area under the curve; AUC).

TF access site was used in 51% (n = 607), TA access in 49% (n = 585). The median ES-II and the median STS-score were significantly lower in TF patients compared to TA patients (ES-II TF: 6.0 [4.3-8.6] vs TA: 8.7 [5.8-13.8]; p < 0.001), (STS-score TF: 5.8 [4.4-8.3]; TA: 7.5 [5.4-10.8]; p < 0.001). In TA

TAVI, ES-II (OR: 1.038; 95% CI [1.009-1.068]; p = 0.010) and STS-score (OR: 1.063; 95% CI [1.025-1.102]; p = 0.001) were the only independent predictors of 30-day mortality. In TF TAVI, neither the ES-II (OR: 1.046; 95% CI [0.992-1.103]; p = 0.096) nor the STS-score (OR: 1.035; 95% CI [0.969-1.104]; p = 0.305) revealed to be associated with 30-day mortality. On the basis of ROC-analysis, the AUC for 30-day mortality of ES-II (AUC = 0.577; p = 0.146) and STS-score (AUC = 0.574; p = 0.164) were lower in TF patients compared to TA patients (ES-II: AUC = 0.628; p = 0.001; STS-score: AUC = 0.664; p < 0.001).

By providing a superior value of ES-II and STS score in prediction of mortality in TA TAVI, our data may improve risk stratification for patients at particular high risk.

Our study is limited by the fact that although we performed multivariable regression analyses including numerous key risk factors, with a large sample size and a high event rate, we are not able to incorporate novel, important variables like quality of life measures or variables gained from imaging studies in our analysis. In the same context, frailty was recently shown to be a valuable predictor of postoperative outcome in patients undergoing TAVI. Due to the long timeframe of prospective patient inclusion, the availability of such novel variables is inconsistent, precluding the consideration in our analysis[5,6].

In conclusion, we provide – for the first time – evidence of the superior prognostic value of ES-II and STS-score in patients scheduled for TA TAVI, by revealing a significant association with 30-day mortality and better discrimination compared to TF TAVI.

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ISMICS

ISMICS – the International Society for Minimally Invasive Cardiothoracic Surgery

Are you an Innovator and Early Adopter? Want to discuss what's new in CT/CV surgery in an open and open-minded forum rather than review the same old studies with slightly different cohorts of patients? Are you looking for a place where healthy debate on issues is embraced and the atmosphere is inclusive? Then you should be a part of ISMICS.

How often have you attended a scientific meeting and listened to presentations and thought – I've heard this before, I've seen this before. Where can I learn about what's new? What's cool? What is the next thing in innovative cardiac, thoracic and cardiovascular surgery? If you want to be part of the Society that embraces what's new, what's cool, and wants to have open and healthy debate on everything that's innovative in our specialty – then you should be a part of ISMICS.

ISMICS was created over 20 years ago by a group of first adopters, pioneers in minimally invasive cardiac surgery, literally the "cowboys" of their era in the new frontier of innovative and minimally invasive surgery. Many who watched ISMICS' birth believed that the innovation would fade and the traditional ways would triumph, or that ISMICS would eventually be swallowed up by larger organizations. That has not happened – ISMICS has not only lasted, but has grown, and embraces an international membership around the world, welcoming innovators and early adopters in cardiac, thoracic and cardiovascular surgery. ISMICS remains the true forum for the latest, the newest, and the "out there on the edge" of what is happening, always willing to ask "what's next?" in our specialty.

The ISMICS Annual Scientific Meeting in Rome in June celebrated our 20th Anniversary, and had record-breaking attendance. Our largest meeting to date featured a keynote address about "Creativity Principles: How to Challenge the State of the Art" presented by Professor Giovanni E. Corazza of Bologna and the Kit Arom Lecture was given by Dr. Alan B. Lumsden of Houston, Texas on "What Cardiothoracic Surgeons Can Learn from Vascular Surgery: Experience from Development of Endovascular Techniques by Surgeons – for Surgeons". Dr. Lumsden congratulated ISMICS on having the foresight and open-mindedness to have a vascular surgeon present a keynote lecture. The Rome Annual Meeting also featured an outstanding Presidential Address by Dr. Johannes Bonatti, who spoke on "Pathways to Innovation in Cardiothoracic Surgery." The ISMICS tradition of honoring innovation was expanded in Rome with the first ever awarding of the Subramanian Innovation Award, supported by a generous grant from ISMICS Past President Dr. Valavanur A. Subramanian. The 2017 recipient was Dr. Muralidhar Padala of Emory University in Atlanta. Dr. Padala was selected through a detailed application process, which culminated in three finalists presenting their work in Rome, and being judged by a panel of innovators, as well as a live audience vote.

ISMICS embraces its partnership with industry in seeking the newest technologies and treatments. ISMICS is an inclusive society – welcoming members from all areas of the world and inviting them to attend our Annual Meetings, as well as our Winter Workshops, and to publish their work in our indexed and citable journal, INNOVATIONS.

ISMICS 2018 will be held 13 to 16 June 2018 at the Westin Bayshore in Vancouver, Canada. The Abstract Submission site, including award categories and instructions, is open now. Submit your work, come to Vancouver and be part of the society that embraces innovation, and continues to push the envelope forward in a welcoming and inclusive atmosphere.

ISMICS will be at EACTS! Please visit us at Booth 22 – and learn more about this young, growing, and dynamic society that continues to shape the future of cardiac, thoracic and cardiovascular surgery. Don't miss being a part of your surgical specialty's future. Join ISMICS today!

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Satellite Symposia @ the 31st EACTS Annual Meeting

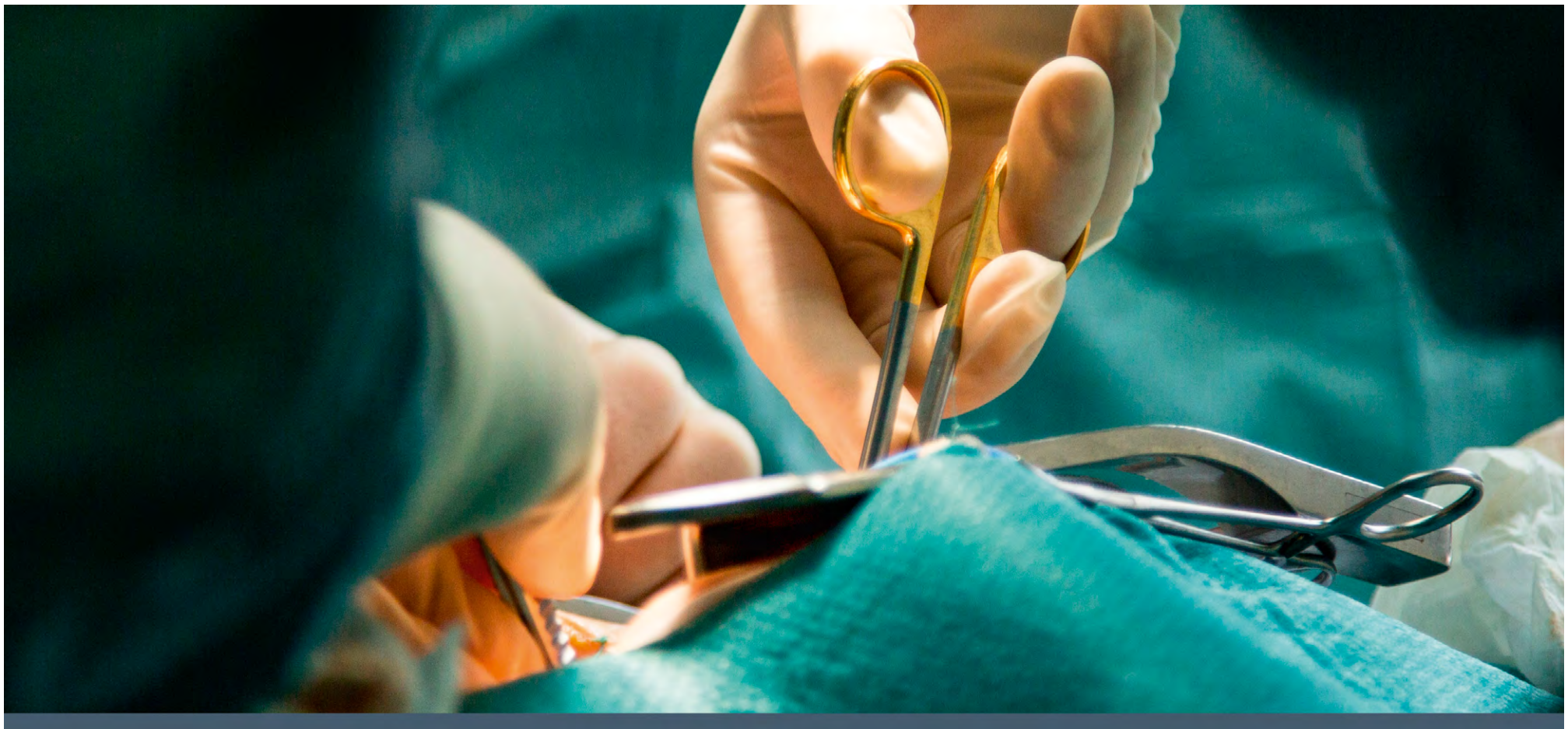
Company	Room	Time	Title
Saturday 7 October			
European Board of Cardiovascular Perfusionists (EBCP)	E1	08.30–17.30	17th European Conference on Perfusion Education and Training
Monday 9 October			
Abbott	K2	12:45–14:00	40 years of partnership in Cardiac Surgery: from valves to NEW ABBOTT structural heart portfolio
AtriCure	0.31/0.32	12:45–14:00	Surgical ablation: Why, when and how in the face of an epidemic
Auto Tissue	-2.31	12:45–14:00	5 years experience with the decellularized Matrix Patch
Boston Scientific International	0.15	12:45–14:00	ACURATE neo TA: Unique low-profile, self-expanding transapical TAVI system
Edwards Lifesciences	E1	12:45–14:00	The New Inspiris Resilia Aortic Valve: Current Evidence and its Early Clinical Application
Getinge	0.49/0.50	12:45–14:00	Circulatory Support in Heart Failure Patients – Review of Current Clinical Evidence and Guidelines in Cardiac Surgery
JOTEC	-2.47/-2.48	12:45–14:00	Catching a glimpse of Frozen Elephant Trunk specialties
LivaNova	K1	12:45–14:00	That's Why Innovation Matters
Medtronic	G1	12:45–14:00	Learning The Technique: Concomitant Mitral Therapy
Medtronic	G2	12:45–14:00	The Next Revolution: New Interventions for Advanced Chronic Heart Failure
Nordic Pharma	-2.32/-2.33	12:45–14:00	Patient Blood Management in Cardiac Surgery: past, present, future
Vascular Graft Solutions	0.11/0.12	12:45–14:00	CABG: Back to the Future
Vascutek	F2	12:45–14:00	Aortic arch surgery – what should we be doing? Treatment options and practicalities
Tuesday 10 October			
Abbott	K2	12:45–14:00	Improving your outcomes with the HeartMate 3™ LVAD
Edwards Lifesciences	E1	12:45–14:00	Contemporary TAVI and SAVR indications and future perspectives
Medtronic	F2	12:45–14:00	Aortic Complex Cases: Current Options & Outcomes


EACTS
Daily News
The official newspaper of the 31st EACTS Annual Meeting 2017
Issue 1 Saturday 7 October
In this issue
2 A new European VAD perspective
4 Working towards a NOBLE endpoint
5 Implementing guidelines in lone AF
5 Improving patient consent
Welcome to Vienna
The 31st Annual Meeting of the European Association for Cardio-Thoracic Surgery
It is with great pleasure to welcome you to the 31st EACTS Annual Meeting in Vienna, and we are honoured and delighted with your presence at this conference.
The purpose of this event is to facilitate the exchange of knowledge and information for clinicians and researchers. As you will see, this year's programme covers the many different aspects of cardio-thoracic surgery, emphasising areas that are important in our daily clinical work. As ever, we are hoping to create an interactive meeting with the exchange of knowledge and ideas, fostering discussions and debates between delegates.
Honoured Guest Lecture
On Sunday, our honoured guest lecture will be given by health economist Professor Pedro Pita Barros from Lisbon, who will provide his insights on 'Economics meets healthcare: how can it be useful?'
During two competitions rounds on Sunday and Monday, national teams – composed of one cardiac and one general thoracic resident or two cardio-thoracic residents – will test their cognitive skills and compete for a ticket to the next STS Annual Meeting in Fort Lauderdale in January 2018. The winning team will represent Europe and will compete against the American winners for the "World Champion' title. Come to cheer on the teams and try to test your own knowledge!
Gala Dinner
Join us for this year's Gala dinner at the Orangerie Schönbrunn on Tuesday 10 October, located within the grounds of the magnificent Schönbrunn Palace. One of the two largest Baroque orangeries in the world (the other being at Versailles), the building is 189 metres long and 10 metres wide and dates back to 1754. Joseph II was especially fond of arranging banquets in the plant-filled Orangery, emulating those he had

Don't miss ISSUE 2!

EACTS Daily News

AVAILABLE **TOMORROW**



Join the discussion during our lunch symposium
on Monday October 9th, 12:45-14:00

Room 0.31/0.32

SURGICAL ABLATION: WHY, WHEN AND HOW IN THE FACE OF AN EPIDEMIC

It is not a lack of evidence: the rationale to treat AF	Manuel Castellà, MD
Concomitant AF ablation strategies: a matter of decision making?	Timo Weimar, MD
Lessons learned: how to implement technology to improve patients' outcome.	Nicolas Doll, MD
The AF heart team approach to optimize the treatment of AF patients	Mark La Meir, MD

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Contact us at **AFConnect@AtriCure.com** to reserve your spot or learn more about upcoming training opportunities.

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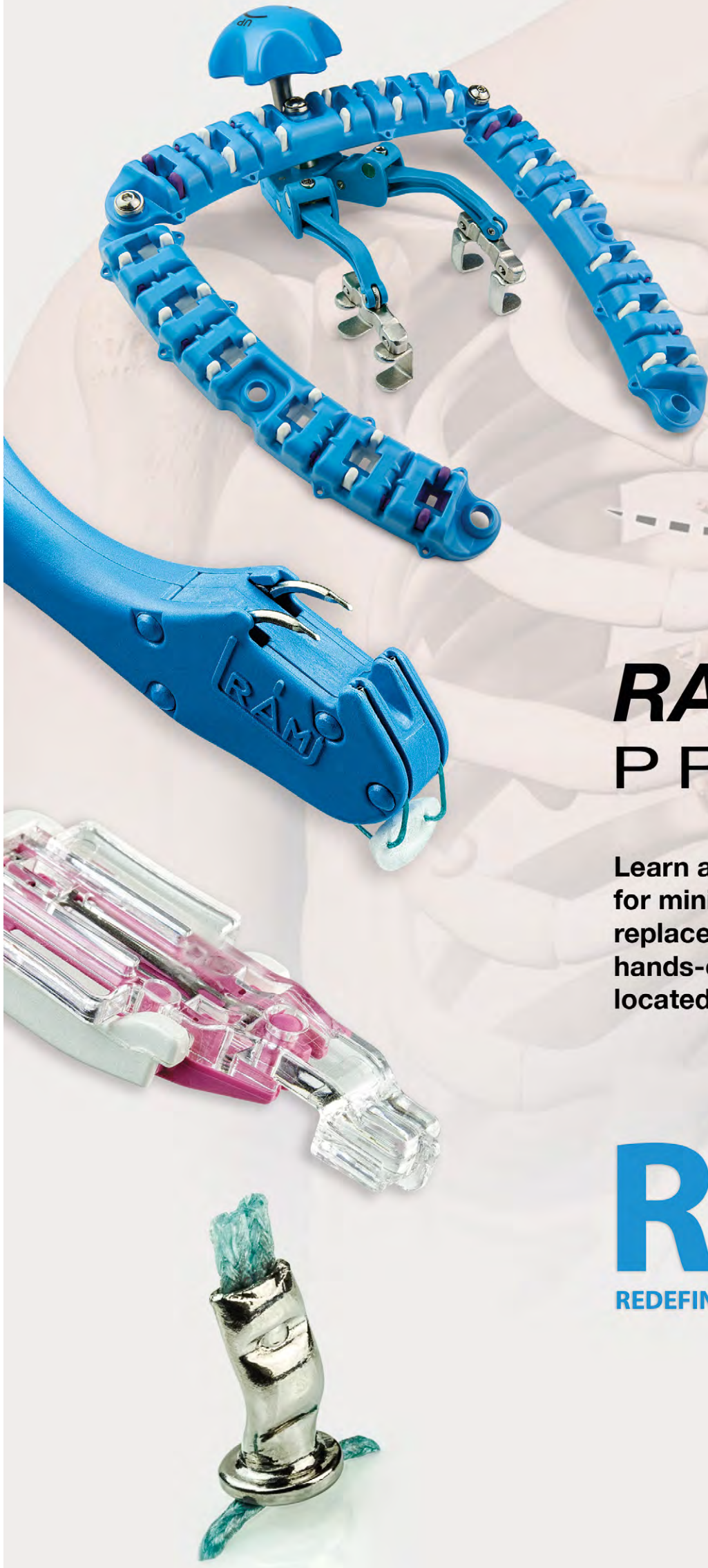

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Learn about LSI's automated instrumentation for minimally invasive aortic and mitral valve replacement at LSI Booth 57 and experience hands-on training in our LSI Innovation Boutique located in the EACTS Training Village.

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