New challenges in cardio-thoracic surgery

The Professional Challenges sessions are just some of the highlights of Monday’s sessions during this year’s meeting. Today begins with two Acquired Cardiac Disease sessions examining the mitral valve, whilst the Thoracic, Congenital and Vascular Domains will concentrate on oncology, aortic valve and aortic arch interventions, respectively.

Today will also witness this year’s Presidential Address by Paul Van Schil, entitled “The versatile beauty of the hand: mysterious, powerful and ingenious.” In addition, there will also be a chance to hear the latest data from on-going clinical trials (Gate Breakers I and New nutraceuticals from late-breaking clinical trials), the opportunity to try an endoscopic port-access mitral valve repair droneby using high-fidelity simulator (da Vinci room), the challenges cardiovascular surgeons face in emerging economies and in the southern hemispheres, as well as the current challenges and opportunities in atrial fibrillation.

Elsewhere, theشwill be a focus on small incisions and sutureless valves, left ventricular assist devices, extracorporeal support, the technical aspects of CABG, and a session discussing conduits and myocardial ischaemia.

Additional sessions will concentrate on the clinical and surgical anatomy of the right ventricle, mediastinum, concomitant atrial fibrillation ablation, high risk surgery, and rapid deployment aortic valve replacement and whether it makes a difference. There will also be a debate session looking at repair or replacement in ischaemic mitral regurgitation, the pros and cons of aneurysm resection and left ventricular reconstruction, and hybrid repair of aortic aneurysms vs. conventional repair of aortic aneurysm.

As ever, Monday also offers attendees the first opportunity to listen to all the latest papers from around the world, as delegates present their research in the Abstract Sessions.
Endoscopic vein harvesting is associated with increased endothelial microparticle sequestration – A randomised ex-vivo analysis

Bhuvaneswari Krishnamoorthy
University Hospital of South Manchester, UK

Endoscopic vein harvesting (EVH) has seen revolutionised conduit retrieval since its introduction, with well documented improvements in cosmetic outcome, postoperative pain and the incidence of wound infection. However, doubts have also been raised regarding long-term patency rates, which have led to many centres avoiding the use of this technique. Previous studies have postulated that EVH causes damage to the endothelial lining of the vessel, potentially leading to de novo restenosis, which could contribute to a predisposition to occlusion and ultimately vein graft failure. Importantly, neither the effect of EVH on vessel wall integrity nor the effect of endothelial denudation on long-term clinical outcomes has been properly investigated. In this study, we aimed to determine whether EVH is associated with elevated endothelial microparticle release compared with traditional open vein harvesting. Endothelial microparticles are released during endocardial cell activation and apoptosis and provide a sensitive marker of endothelial cell injury. Our study utilised conduits obtained by either traditional open vein harvesting (n=10) or EVH (n=5). Two metal clips were placed 2cm apart at the distal end of the conduit, which ensured that heparinised patient blood was retained within the sample. These conduits were then gently flushed with 0.5ml phosphate buffered saline and these samples were subsequently microcentrifuged to deplete platelets. The supernatants from these samples were then analysed using flow cytometry to enumerate both apoptotic microparticles and apoptotic endothelial microparticles (CD31+). Our findings indicate that EVH is associated with a significant increase in the release of total apoptotic microparticles (mean 4.558± vs 1.238±, p=0.007) and apoptotic microparticles of endothelial origin (4.0± vs 8.5±, p=0.001). This increase in apoptotic endothelial microparticle release is indicative of significantly greater endothelial damage induced by the EVH technique compared with the traditional open technique. However, a subsequent follow-up analysis of these patients demonstrated that even if EVH is associated with increased endothelial microparticle release, it does not appear to have a detrimental effect on the conduit outcome. In conclusion, EVH appears to be a safe and feasible technique for harvesting conduits.
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Cardiac – Abstract session

Inhibition of restenosis of the vein graft with degradable PLAGA vascular external sheaths with slow-release bosentan

Tianshuang Gu
China Medical University, Shenyang, China

Saphenous vein is one of the main vessels conduits to revascularize the myocardium. A well set-up of using saphenous vein graft as a conduit is its low patency rate. Short-term (30 days to two years post CABG) failures are attributed to the benefit of external hyperplasia. Using the biodegradable material poly(lactic-co-glycolic acid) PLGA and fibrin, a high-porosity external sheath carrying bosentan with a stratified internal spiral structure was made by grouping mould extraction and low-temperature deposition techniques. In a rabbit model of carotid bypass with saphenous vein graft, the novel sheath was found to prevent the restenosis of vein grafts and improved the patency significantly in addition, by combination of slow-release bosentan to the novel designed external sheath, the beneficial effects against restenosis were further enhanced. As PLGA is biodegradable, the external sheath was absorbed 9 weeks after intervention. Therefore, the sheath would initially support the graft against over-dilation and confer the benefits of external stentless. While the graft arterializes and adapts to new pressures and flows, the stent leaves the arterialized vein graft with a thin intima. The special internal spiral structure let the external sheath possess the specialties both of the tight stent and the loose stent and may be much more beneficial. Other drugs rather than bosentan may be also carried to the sheath with a slow-release manner to further improve the therapeutic effects. We believe that our novel designed external sheath possesses a potential clinical value in prevention of the restenosis of the vein grafts in coronary artery bypass grafting.

Cardiac – Abstract rapid response session

Off-pump coronary artery bypass reduces early stroke in Octogenarians

A meta-analysis of 18,000 patients

Seih Altaharabish and Sall Deo
Queen Alia Heart Institute, Amman, Jordan

Data comparing results of off-pump and conventional surgery in Octogenarians is very limited. Thus we chose to compare early adverse events between off-pump (OPCABG) and on-pump coronary artery bypass grafting (ONCABG) in patients above 80 years. A systematic review of multiple databases was done to select studies fulfilling search criteria. Endpoints viz. early mortality, stroke, respiratory failure, arterial fibrillation and myocardial infarction were compared between the two coronary surgery methods. Mantel Haenzel analysis was performed using the trim-fit adjustment where necessary. Results are presented as risk ratios (95% confidence interval, p<0.05 is considered statistically significant. Sixteen retrospective studies (9744 ONCABG, 68556 OPCABG) patients) were included in the systematic review. OPCABG patients had significantly lower mortality (2.54 +/- 0.16) as compared to ONCABG (3.22 +/- 0.41). Early mortality was comparable at 4.6% and 5.2% in OPCABG and ONCABG respectively (RR: 0.910, 95% CI: 0.64 – 1.28); p = 0.598. Stroke rates (5566 ONCABG, 9744 ONCABG) were higher with conventional surgery (RR: 0.850, 95% CI: 0.80 – 0.90, p<0.05). New onset atrial fibrillation (p=0.27) and myocardial infarction (p=0.99) were comparable.

Off-pump coronary artery bypass in octogenarians can be performed with low early mortality. Number of grafts is lesser in the OPCABG cohort. While stroke rates are higher with conventional surgery, all other adverse events are comparable. Future randomized trials are needed to define the role of off-pump surgery in this high-risk cohort.

We think that this material is important input in the current era we are see more advances in the coronary artery bypass surgery, especially in the elderly group of patients who are prone to develop more complications after surgery owing to their comorbidities.

Somalution Launches Flagship Product – DuraGraft® Vascular Conduit Solution

DuraGraft is the first Endothelial Linemental Damage Inhibitor (EDLI), developed to address the pivotal step of vascular conduit handling and storage in bypass and vascular surgeries. Despite advances in medical management and surgical techniques, there has been little improvement in bypass outcomes. Vein graft failure (VGF) remains one of the leading causes of poor in-hospital and long-term outcomes after CABG and Peripheral bypass surgeries, with 12-month VGF rates of 46%. These failures most often lead to additional surgeries, further interventions or increased medical management, resulting in increased morbidity and high healthcare costs.

Preserving the structure and function of the endothelium is critical for optimal outcomes of CABG and Peripheral bypass procedures, and the prevention of long-term vascular complications. Unlike traditional, clini-cal/unknown and unapproved solutions that are currently in use, DuraGraft uniquely protects vascular endothelium and its associated ‘architecture’ from oxidative and other damages that are markers of improved long-term vascular graft patency including mortality, MI, and repeat revascularization. Researchers from Duke Clinical Research Institute performed a sub-analysis of data from the proposed Prevent-IVT trial which included over 3,000 patients, a one year angiographic evaluation and 5-year clinical outcomes and determined that patients whose grafts were preserved in a buf-feted-saline solution, similar to DuraGraft, had lower VGF rates and better clinical outcomes that trended towards being better compared to outcomes of patients whose grafts were preserved in saline. Authors believe that the one year scheduled angiographic follow-up VGF rates were reduced by as much as 40% in favor of DuraGraft. The authors also think that the 5-year clinical revascularization was reduced by about 37% in patients who received grafts preserved in a buffered solution. Similarly, a review of pa-tients undergoing CABG demonstrated that DuraGraft improved clinical outcomes of revascularization by nearly 50% up to 5 years post-surgery. Additional improvements were shown in reduced mycardial infarction, mortality and MI, which may lead to improved quality of life for these patients.

There are currently more than 1.5 million bypass procedures performed in Europe and the United States alone that require viable vein grafts.
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Thoracic non-ontology 1

Anast 8

08:15
Recurrent primary spontaneous pneumothorax is more common than previously reported
Wenke Glatz

08:30
Risk factors for postoperative recurrence of spontaneous pneumothorax treated by video-assisted thoracoscopic surgery
Andrea Imperiale

08:45
Current status of pneumothorax. An institutional report and review
Thakur Khin

09:00
Postoperative air leak management with intrapulmonary instillation of fresh frozen plasma
Konstantinos Psychides

09:15
Digital versus analog chest tube drainage in patients without a contraindication to a cuffed chest tube
Marie Likourelis

09:30
The predictive role of pleuroscopy in heterogeneity in the outcome of lung volume reduction surgery
Sara Tonino

Professional Challenge

Cardiac – Abstract rapid response session

 Remarkable differences in bioprosthetic valve durability set off a new high standard for bio-prosthetic aortic valve replacement

Per Nielsen
Aarhus University Hospital, Denmark

In a single centre study from Aarhus University Hospital, Denmark, we examined the durability of the two major pericardial bioprostheses, we have used for aortic valve replacement from 1999 until now. In the year 2003-07 we had a general preference to implant the Mitroflow bioprosthesis in the smaller aortic annuli (label size 19 and 21) and employed a total of 440 Mitroflow bioprostheses. Risk of reoperation due to structural valve deterioration (SVD) was 2.7% at 10 years after the implantation of these valves. In contrast, only two patients of a total of 1953 CE Perimount bioprostheses were reoperated due to SVD giving an incidence at 10 years after surgery as low as 0.1%. None of 647 CE Perimount bioprostheses of valve size 19 or 21 were reoperated because of SVD.

The incidence rate of reoperation of any cause was 3.9% for Mitroflow and 1.0% for CE Perimount.

The actual ten-year freedom from explant due to SVD was higher for CE Perimount than for Mitroflow (99.5% vs 95.1%, P < 0.001). (See figure 1)

There was a tendency towards better survival at 10 years for CE Perimount (42.7%) than for Mitroflow (32.9%).

Conclusion: The midterm durability of the Mitroflow bioprosthesis is in accordance with previous observations by Yannsh, Jameson, Minami and others. It is contrasted by the remarkable low risk of SVD of the CE Perimount bioprosthesis that propose the CE Perimount bioprostheses as a new high standard for bioprosthetic durability.

Cardiac – Abstract session

European multicenter experience with sutureless percutal valve: clinical and hemodynamic outcomes up to five years in over 700 patients

Malak Shrestha
on the behalf of three European multi-center Personal Tree group

Methods

From 2007 to 2012, 731 consecutive patients (mean age 78.9 years) underwent percutal aortic valve replacement using the Perceval valve (n = 255), the Perimount valve (n = 255) or the Mitroflow valve (n = 220). The Mitroflow valve was used in Europe and the Perimount valve in the United States. The follow-up was completed in all cases.

The objective of this report is to summarize the five-year clinical and haemodynamic data from three prospective, European multicentre trials with the Percutal sutureless aortic valve.

Results

The incidence rate of neurological complications during the procedure is 0.3% (38). The incidence rate of myocardial infarction is 7.1% (51). The incidence rate of stroke or TIA is 0.4% (3).

Conclusions

These multicentre studies with large cohort of patients with sutureless valves till date, prove excellent clinical and haemodynamic results that remain stable even up to five-year follow-up. Even in this elderly patient cohort with 40% octogenarians, both early and late mortality were very low. There were no valve migrations, structural valve degeneration and valve thrombosis in follow-up.

The sutureless technique is a promising alternative to biological AVR.

Figure 1. Kaplan-Meier Survival curve

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The E-vita OPEN PLUS Hybrid Stent Graft System allows optimized Frozen Elephant Trunk Procedure to treat complex lesions of the thoracic aorta. The combination of surgical and endovascular treatment allows a one-stage aortic reconstruction, where two surgical procedures would otherwise be required. The current design of stent-graft provides secure fixation and serves as a link to the classical vascular reconstruction of the aortic arch.

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These innovations in combination with the already proved features like the positioning aid, which guarantees precise stent graft placement and the blood tight polyester graft material, which guarantees perfect handling, make the E-vita OPEN PLUS the state of the art device and the No.1 product, when it comes to Frozen Elephant Trunk Procedure.

The international E-vita OPEN PLUS Registry with over 400 patients testifies to the excellent therapeutic success that has been achieved in this study. Worldwide, over 3,000 patients have been successfully treated to date with E-vita OPEN PLUS.

Since December 2013 the use of E-vita OPEN PLUS has been recommended by the UK agency NICE (National Institute for Health and Care Excellence) for the treatment of complex thoracic lesions of the aorta. Especially the long term cost effectiveness of the Frozen Elephant Trunk Procedure has been carried out. Savings of up to 35,000 € ten years after the procedure compared to current two-stage repair are estimated.
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The proven hybrid stent graft system that combines surgical reconstruction with aortic stenting for successful single-stage repair of complex disease of the thoracic aorta.

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Monday, 13th October 2014, 12:45 – 14:00h, Amber Room 8

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after pulmonary vein isolation concomitant with aortic valve replacement and/or coronary artery bypass grafting.

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**Congenital – Professional challenges**

Biventricular repair for common atrioventricular canal defect with paracheat left atrioventricular valve

Patrick Myers
Genkens University Hospitals, Genkens, Sweden

Complete common atrioventricular canal (C AVC) defect is a complex congenital lesion spanning the spectrum from simple forms, to unbalanced forms with hydrosyphaly or hypoplasia of the papillary muscles. Simple forms can be repaired with excellent long-term results. Unbalanced CAVC can also benefit from biventricular repair or conversion, although some patients must still be palliated to a single ventricle Fontan circulation. When the left AV valve leaflets are supported by a single papillary muscle, or closely spaced papillary muscles, closure of the anterior leaflet creates a paradoxical left AV valve, with increased mitral insufficiency and subvalvular stenosis. Biventricular repair in these patients is thus often avoided. The (avv)-natural history and long-term consequences of Fontan physiology in general, as well as within this specific patient population, is now being experienced by most centres. Twenty-four patients with parachute or frusto-parachute left AV valve underwent biventricular repair at our institution from 2001 to 2012 (10% of CAVC repairs). This was a complex group of patients with unbalanced CAVC in 67%, associated cardiac lesions in 46% and prior operations in 54%. The left AV valve opening was assessed, and an attempt at clcf closure was made starting at the base and extending towards the sinus V. In all approaches, the clcf was left open in 13%, closed partly in 54% and completely 33%, and 25% had splitting of the papillary muscle. There were 6 early deaths (4%). During a median follow-up of 3.7 years, there were two late deaths (8%), 25% of patients presented significant left AV valve stenosis and 8% required valve replacement. Complete clcf closure was associated with a more late left AV valve stenosis (38% with complete closure, 23% with partial closure and 0% with no closure, P = 0.55), while incomplete clcf closure wasn’t associated with a more significant regurgitation (25% with complete closure, 31% with partial, 33% without closure, P < 0.99).

Sharma et al. previously reported the Mayo Clinic 33-year experience in 28 patients with partial and complete CAVC and parachute left AV valve. The overall mortality was similar, although they had more late valve replacements (25%), all due to regurgitation. With our more aggressive approach to clcf closure and fewer patients without clcf closure, our results differed 10% of reoperation of late AV valve stenosis or mixed disease, and we were able re-operations on all but one patient (re-operation rate 8%).

In summary, biventricular repair in paracheat left AV valve and CAVC is feasible with acceptable mortality and freedom from stenosis. The decision of reoperation on the left AV valve remains significant, although a majority of patients could undergo repair and avoided valve replacement. Single ventricle management can be avoided in the vast majority of these patients, and the long-term consequence of this approach remain to be determined.

References


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**Use of a bioprosthetic valve for mitral valve replacement: very long-term outcomes in different age groups**

Thierry Bourguignon
Tourcoing University Hospital, Tourcoing, France

The use of bioprosthetic valves has considerably increased in the past decade and is now a substantial part of a reduction in mechanical valve implantations. This trend might be justified by an increasing number of studies reporting the improved long-term durability of the most recent tissue valve models.

However, when mitral valve repair is not possible, which type of prosthesis should be selected for mitral valve replacement according to the patient’s age remains a controversial issue.

The current European Society of Cardiology guidelines, revised in 2012, and the American College of Cardiology and American Heart Association guidelines, revised in 2014, indicate that bioprostheses are reasonable for mitral valve replacement in patients older than 70 years (Class IIa), and either a bioprosthetic or mechanical valve is reasonable in patients between 65 and 70 years of age.

Indeed, due to a lack of empirical long-term follow-up data, it largely remains unclear as to exactly how long a mitral bioprostheses may last in a patient operated in their 50’s or 60’s. Undoubtedly, accurate information concerning structural valve deterioration (SVD) and the risk of reoperation is just as important for patients who present for valve replacement surgery at a young age, as for the physicians who treat them.

We recently reported our 25-year experience with the Carpenter-Edwards PERIMOUNT pericardial mitral bioprosthesis implanted in 404 consecutive patients between August 1984 and March 2011. The mitral bioprosthesis was considered to have deteriorated on strict echocardiographic assessment when severe regurgitation or stenosis was observed, even if the patient was asymptomatic.

Results from our study revealed an overall actuarial freedom from SVD of 83.9 ± 2.7% at 10 years and 23.7 ± 6.9% at 20 years. Expected valve durability remained satisfactory long-term with a median survival time (MST) of 16.6 years (95% CI: [4.1-15.9-19.1]) before valve deterioration. For the specific 50 to 60 years old patient group, the expected valve durability remained above 15 years (15.7). Freedom from reoperation due to SVD was 86 ± 2.5% at 10 years and 40.5 ± 8.0% at 20 years with a MST of 19.0 years.

Using competing risk regression analysis, an attempt was made to present the patient’s point of view: depending on age at surgery, we estimated the risk and the number of years before a need of a reoperation due to SVD. (Table)

Finally, when comparing expected valve durability with sample life expectancy after mitral valve replacement for different age groups, we were able to demonstrate that the expected valve durability was higher, at least for 90% of the cohort (patients older than 55 years at implantation).

In terms of recommendations for the use of mitral bioprosthetic valves, these long-term outcomes appear to support their use in patients at least from the age of 60. Regardless of any consensus at this point though it was one of the primary goals of our study to evaluate the empirical data and present it in a form usable by the physician and patient to make a fully informed decision.


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Thoracic – Abstract

The prognostic impact of lymph-node dissection on pulmonary metastasectomy

Satoshi Shiono, Noriyuki Matsutani, Sekei Okumura, Jun Nakajima, Ninohashi Haro, Mitsutomo Kisho, Norihiko Ikada, Masafumi Kawamura

The Metastatic Lung Tumor Study Group of Japan

Background

Pulmonary metastasectomy has an important role in the treatment of early thoracic pulmonary metastasis and is generally recognized as a mainstay of therapy for selected patients. The addition of lymph-node dissection to the procedure, however, remains controversial. According to a survey of members of the European Society of Thoracic Surgeons (ESTS), 55.5% of surgeons perform mediastinal lymph-node sampling at the time of pulmonary metastasectomy, and 13% perform a complete mediastinal lymph-node dissection. The prevalence and characteristics of lymph-node metastasis have not been thoroughly investigated in patients with pulmonary metastases from various primary neoplasms. To investigate the prevalence of lymph-node metastasis and its associated outcomes, we conducted a review of patients who underwent lobectomy for pulmonary metastasis. The aim of this study is to investigate the prevalence and characteristics of lymph-node metastasis in patients with pulmonary metastasis and to evaluate the impact of lymph-node dissection with pulmonary metastasectomy.

Method

We retrospectively reviewed the database of the Metastatic Lung Tumor Study Group of Japan. Between November 1980 and June 2013, 4,563 patients underwent resection of pulmonary metastasis. After selecting for patients who underwent lobectomy, 683 patients (15.7%) were analysed. The presence of lymph-node metastasis, outcomes, and prognoses were investigated.

Results

The primary tumour site was colorectal in 350 patients, head and neck in 73 patients, kidney in 41 patients, uterus in 41 patients, and bronchof传授sh knife in 31 patients. The overall five-year survival rate after pulmonary metastasectomy was 58.5%. The 10-year survival rate was 50.4%. lymph-node metastasis was more frequently found in uterine (26.8%) and head and neck cancers (29.2%). Five-year survival rates were 53.8% in patients without lymph-node metastasis, 39.4% in patients with isolated lymph-node metastasis, and 30.8% in patients with mediastinal lymph-node metastasis (Figure 1). The extent of lymph-node dissection was not related to survival (Figure 2). Univariate analysis revealed that tumour size, the presence of lymph-node metastasis, the presence of multiple lesions, a disease-free interval of 24 months or less and incomplete resection were significant predictors of poor prognosis. Multivariate analysis confirmed these prognostic factors. Since tumour number and the presence of lymph-node metastasis were significant prognostic factors, we divided patients into four groups based on these factors. Overall survival was different between groups. The five-year survival of patients with solitary tumours and without lymph-node metastasis was significantly better than that seen in the other groups (88.5%). Patients with multiple pulmonary metastases and lymph-node metastasectomy demonstrated poor five-year survival (29.3%).

Conclusions

Retrospective analysis of lobectomy for pulmonary metastasectomy demonstrated that lymph-node metastasis is a significant prognostic factor predicting poor outcome. lymph-node sampling or dissection is therefore warranted to predict patient prognosis.

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Indicated to treat patients with aneurysm and/or dissection in the ascending thoracic aorta, aortic arch and descending thoracic aorta, Thoraflex™ Hybrid consists of a Gelweave™ proximal multi-branch aortic arch Siena Plexus graft pre-sewn to a distal stent graft. The Gelweave™ material is made from woven polyester sealed with gelatin. The multi-branch aortic arch Gelweave™ Siena Plexus graft, designed for fast arch vessel reconstruction and arterial cannulation, has been demonstrated to reduce ischaemia times, time to rewarming and overall operating times.

The multiple independent ring stents of the distal stent graft allow excellent anatomical conformability, as they allow it to be shaped to cater for varying patient anatomies: radiopaque markers aid in vivo visualisation to confirm accurate deployment. The compact intuitive delivery system is designed to provide controlled, accurate deployment. The Gelweave™ Siena collateral at the junction between the aortic arch Plexus™ graft and distal stent graft facilitates the anastomosis.

Since Thoraflex™ Hybrid was launched there have been over 400 implants in 20 countries worldwide.

Professor Roberto Di Bartolomeo, Università di Bologna, Italy, commented: The “Frozen Elephant Trunk” procedure...offers a secure landing zone for an eventual secondary endovascular procedure...and the Thoraflex™ Hybrid device facilitates the distal anastomosis and allows separate supra-aortic vessel re-implantation. One of the main advantages of the device is that, once the distal anastomosis is performed, it allows an immediate lower body re-perfusion through the cannulation of the [Ante-Flo] branch of the graft. 1 & 2. For a full product demonstration please visit Vascutek’s booth, no. 120. Product availability subject to local regulatory approval.

For more information on Thoraflex™ Hybrid, please attend the Vascutek Symposium on Monday 13th October 2014, 12.45 – 14.00hrs in Amber Room 1 & 2. For a full product demonstration please visit Vascutek’s booth, no. 120. Product availability subject to local regulatory approval.

For further details, go to www.vascutek.com/thoraflex-hybrid.html
Our unique design reduces operating times\(^{1,2}\)

Thoraflex\(^{\text{TM}}\) Hybrid combines the benefits of the “Frozen Elephant Trunk” procedure with the Gelweave\(^{\text{TM}}\) Plexus graft to reduce myocardial ischaemia, re-warming and operating times.\(^{1,2}\)

For more information visit: www.vascutek.com/thoraflex-hybrid

References:
4. Design history file CAS.

Delivery system designed for intuitive and accurate deployment\(^{3,4}\)

Aortic Arch Plexus - facilitates individual arch vessel reconstruction\(^{3,5}\)

Reduced ischaemia, re-warming and operating time\(^{1,2}\)

Product availability subject to local regulatory approval.
EBUS-TBNA: a highly sensitive method to evaluate patients who should not undergo pulmonary metastasectomy.

Jane Ekeste Odense University Hospital, Denmark

The surgical approach and preoperative work-up can vary from country to country and even hospital to hospital and the results from retrospective series are coming up with divergent conclusions. This abstract is one of the publications from a trial where patients with pulmonary metastases were evaluated with PFT1C and endobronchial ultrasound-guided tranbronchial needle aspiration (EBUS-TBNA) before surgery to exclude the patients with disseminated disease. In a previous publication from this trial we demonstrated that video-assisted thoracoscopic surgery is an inferior approach for detection of all pulmonary metastases but when not or not this has any impact on survival remains unknown. Surgeons in general agree that pulmonary metastasectomy is an effective treatment in selected patients with primary extra-pulmonary cancer and oligometastatic disease in the lung. We know that the presence of mediastinal lymph node metastases reduce survival significantly in such patients but the mediastinum is rarely evaluated before metastasectomy. In this trial we prospectively evaluated if EBUS-TBNA could identify patients with mediastinal node metastases prior to pulmonary metastasectomy.

All patients with a primary extra-pulmonary cancer and oligometastatic disease confined to the lungs on positron emission tomography (PET-CT), who were considered eligible for pulmonary metastasectomy, routinely underwent EBUS-TBNA of the mediastinal lymph nodes. If no malignant cells were found by EBUS-TBNA, the patient later underwent open pulmonary metastasectomy with systematic sampling of mediastinal lymph nodes and histologic evaluation. One hundred-three patients with oligometastatic pulmonary metastases were referred for EBUS-TBNA during a four-year period. We sampled 248 lymph nodes and adequate cytology was obtained in 93 patients (90%). We found lymph node metastases in 17 patients (16.5%) with EBUS-TBNA, and during subsequent pulmonary metastasectomy a thoracoscopic EBUS-TBNA of the mediastinal lymph nodes in patients one (1%) had a lymph node metastasis. The sensitivity, specificity, NPV and PPV of EBUS-TBNA for diagnosis of mediastinal lymph node metastases were 94.4%, 100%, 98.8%, and 100%, respectively. In conclusion EBUS-TBNA is a highly sensitive minimal invasive modality for evaluation of mediastinal lymph node metastases in patients with oligometastatic pulmonary disease, which allows surgeons to select patients who will not benefit from pulmonary metastasectomy.

Extended pulmonary metastasectomy: is it worthwhile?

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In the past, pulmonary metastasectomy (PM) were considered fatal in less than two years, and had no indication for surgical treatment. Since 1997, when David described the first intentional lung metastasectomy, many studies have shown that surgical resection of lung metastases could improve survival in selected patients. Even if the recent surgical trend for lung metastasectomy is “sparing” surgical resection, major resections could still be reserved for highly selected patients. As already demonstrated in the literature, the complete resection of primary cancer and pulmonary metastasectomy is the most important prognostic factor in terms of survival and because surgery should be offered with a prospect of cure, it seems obvious to consider extended resection a therapeutic option to achieve long-term survival. In 1989, Putnam and colleagues were the first to establish that resections of multiple PM or PM involving more than lung parenchyma were very similar to resections for locally advanced non-small cell lung cancer, and they were the first to define extended resection (ER) as pneumonectomy or pulmonary resection with en bloc resection of the chest wall or other major structures (diaphragm, pericardium, superior vena cava). Unfortunately, the role of ER for lung metastases is still unclear, and little information is available in the literature. Our study was performed to analyse the outcomes and feasibility of extended resections for pulmonary metastasectomy. From 1999 to 2014, 127 consecutive patients at the European Institute of Oncology (Milan, Italy) underwent lung metastasectomy procedures. Survival (28.1%) had “bad” histology as the most frequent pneumonectomy or pulmonary resection with en bloc resection of the chest wall or other major structures (diaphragm, pericardium, superior vena cava). The five-year survival rate was 42%, higher than that of other literature reports. All our 29 patients had a complete surgical resection, sufficient pulmonary reserve, controlled primary disease, and no evidence of other metastatic disease showing the importance of selection criteria to improve survival. Our survival rate was surprising considering both the type of surgery and previous literature data. We believe that this survival rate was the result of better patient selection because of a small but homogeneous database and the use of modern staging systems (ICT scan and PET/CT), which allowed us to check all patients preoperatively and eventually exclude them from surgery if extrathoracic or other tumor localizations were found. Patients with non-epithelial primary tumors undergoing ER had no survival advantage, and there was no systematic benefit related to the extent of surgery (pneumonectomy vs lobectomy) either in patients who underwent pneumonectomy compared to 33% morbidity in the other patients who underwent lobar or sublobar resections. Extended resections represent the only chance of cure for these patients, and selection becomes essential to obtain a complete surgical resection, offering them the best possible long-term survival rate with the lowest possible morbidity. In conclusion, extended resection could be proposed as a treatment for pulmonary metastasectomy in highly selected patients, in the remaining 24 hours, and in 79 patients (27.5%), within 48 hours, following resumption of the procedure. In the remaining two patients air leak ceased 14 and 19 days later, respectively. There was neither morbidity or mortality associated with the procedure nor relapse of air leak after patients discharge or at follow up, one and three months later.

Intraoperative infusion of fresh frozen plasma for persistent postoperative air leak: a safe, inexpensive, and remarkably effective method in ceasing postoperative air leak, resulting in prompt patients relief and reduction of hospitalization.

Postoperative air leak management with intrapulmonary instillation of fresh frozen plasma

Frode Konstantinou1, Konstantinos Potar4, K. N. Sypoth2, Panos Tzaplikas2, Oiklando Karpathoulas2, and Merkus Konstantinou
3. Internal Medicine Clinic of Athens University

Air leak following thoracic surgery is a common complication often leading to prolonged hospitalization. We aimed to evaluate the efficacy of intra-pulmonary instillation of fresh frozen plasma on postoperative air leak management. Between June 2008 and June 2013, we retrospectively reviewed 81 patients who underwent lobectomy for lung cancer, and postoperatively developed prolonged air leak treated with intrapulmonary instillation of fresh frozen plasma. The study identified 75 men and six women, with a median age of 66 years (range 48-76 years), with persistent postoperative air leak, presumed to originate from the interface between the native lung tissue and the chest tube, was successful in stopping air leaks in 74 patients (91.9%), within 24 hours, and in 79 patients (27.5%), within 48 hours, following resumption of the procedure. In the remaining two patients air leak ceased 14 and 19 days later, respectively. There was neither morbidity or mortality associated with the procedure nor relapse of air leak after patients discharge or at follow up, one and three months later.

Intraoperative infusion of fresh frozen plasma for persistent postoperative air leak: a safe, inexpensive, and remarkably effective method in ceasing postoperative air leak, resulting in prompt patients relief and reduction of hospitalization.
Vascutek Symposium at EACTS 2014

Meeting the Challenges of Aortic Surgery

Chairman: Professor Duke Cameron, USA

12:50 - 12:55
Introduction by Professor Duke Cameron, USA

12:55 - 13:05
Professor Joseph Coselli, USA
The Challenges of Aortic Surgery in the Coming Decade: Patient Expectations and Outcomes

13:25 - 13:35
Professor Malaik Shrestha, Germany
Thoraflex Hybrid: From Concept to Reality


Professor Joseph Bavaria, USA
Professor Eric Rosell, USA
Professor Ruggero De Paulis, Italy
Professor Roberto Di Bartolomeo, Italy

14:00 Close
### Cardiac – Professional challenges

**Prosthesis-patient mismatch due to small ring annuloplasty in patients with degenerative mitral insufficiency**

Naonori Kawamoto and Tomoyuki Fujita
National Cerebral and Cardiovascular Centre, Osaka, Japan

Prosthesis-patient mismatch (PPM) after aortic valve replacement is currently a hot topic. Several studies have investigated the need for aortic valve replacement, but PPM after mitral valve repair still requires further discussion. Down-sizer ring annuloplasty is recommended for ischemic mitral regurgitation, but is not suitable for ring annuloplasty concomitant with valve repair for degenerative mitral insufficiency. This study investigated ring annuloplasty using a small ring or band that caused postoperative functional mitral stenosis, which can prevent left atrial remodeling. This may lead to adverse cardiac events such as new onset of atrial fibrillation.

In this retrospective reviewed 227 patients with symptomatic severe mitral insufficiency (MI) who underwent mitral valve repair for degenerative MI (graded 0 to 4) using an Edwards ring or band (Cosgrove, n = 146; Physio, n = 49; Physio II, n = 32) between 2003 and 2012. Prostheses were selected by measuring the inter-trigone distance. The prostheses sizes used were 26mm (n = 71), 28mm (n = 87), 30mm (n = 57), and 32mm (n = 12). The main outcome was freedom from major adverse cardiac events was 91% at 10 years. The postoperative MI grade was not significantly different between different sizes of prostheses (26mm, 0.67 ± 0.8; 28mm, 0.73 ± 0.9; 30mm, 0.85 ± 0.9; 32mm, 0.3 ± 0.6). Left atrial diameter (LAD) and tricuspid regurgitant pressure gradient (TRPG) were both significantly lower at follow-up for each size of prosthesis (all P < 0.05). Although patients with a smaller BSA received a higher mean trans-mitral pressure gradient, and may inhibit reverse remodeling of the left atrium. Our findings suggest that it is best to avoid using a small prosthesis for mitral annuloplasty for degenerative mitral insufficiency.

### Thoracic – Abstract session

**Juvenile catemalian pneumothorax: An institutional report and review**

Takashi Inoue
Okayama Medical University, Okayama, Japan

C atemalian pneumothorax (CP) is an entity of idiopathic, spontaneous pneumothorax. Several theories have been proposed to explain the development of thoracic emphysema including coelomic metaplasia, lymphatic or hemangiomatic embolization, or an endocardial cluster, and retrograde menstruation with subsequent transdiaphragmatic migration of air through the pleural tissue. However, none of those can adequately explain all of the clinical manifestations of CP, whereas CP is a unilateral or right-sided in nearly all cases, with diaphragmatic abnormalities such as perforation or endocardial deposits of tendinous portions common findings, indicating that transdiaphragmatic migration occurs in most affected individuals.

CP occurs in women during the reproductive years, mostly between 30 and 40 years old, while occurrence in females younger than 20 is rare. Based on our experience with a case of CP in a teenager, who had left heart pneumothorax without diaphragmatic lesion, we speculated that the mechanism of CP in younger individuals is different from that in older CP cases in regards to transdiaphragmatic migration. Therefore, for the present study we defined CP occurring in patients younger than 20 years of age (CP) and retrospectively analyzed case records and also conducted a search of relevant literature.

A total 465 CPs, 451 found in our literature search and 14 treated at our institution, were investigated. Among those, 22 were cases of ICMP (29 in literature search, one treated at our institution). Left-sided pneumothorax was more often observed in younger patients, therefore ICMP cases showed significantly less laterality as compared to usual CP (p<0.0001). Fewer diaphragmatic lesions were observed in younger patients and ICMP had a significantly lower incidence of diaphragmatic abnormalities as compared to usual CP (p<0.0001). Nosocomial pneumonia (less likelihood and fewer diaphragmatic lesions) was observed in patients in their 20s, the mechanism of CP in younger individuals may be mainly related to hematogenous embolization of endometrial tissue, while high mortality related to transdiaphragmatic migration. Interestingly, the peak incidence of pelvic endometriosis occurred between 24 and 29 years of age, whereas that of thoracic endometriosis occurred approximately five years later. The difference may explain the time necessary for migration of endometrial tissue through the right diaphragm.

In conclusion, ICMP cases showed characteristics different from those of usual CP. Hematogenous embolization is likely related to ICMP, while usual CP might be explained by transdiaphragmatic migration.

### Surgical treatment of posterior mitral valve prolapse: towards 100 percent repair

Pedro M Correia
University Hospital Coimbra, Coimbra, Portugal

P osterior leaflet prolapse (PLP) is the most common form of presentation in degenerative mitral valve regurgitation and the most amenable and easy to repair. So much so, that there is a current trend to operate on asymptomatic patients with severe regurgitation. Nonetheless, many such patients are operated on by probably the majority of surgeons around the world. In our presentation entitled ‘Surgical treatment of posterior mitral valve prolapse: Towards one hundred percent repair’, we evaluated the immediate and long-term results of surgical treatment of isolated posterior mitral valve leaflet prolapse. From January 1998 to December 2012, 932 consecutive patients were submitted to first-time mitral surgery for degenerative regurgitation in our department. Among these, 492 (52.6%) had isolated posterior leaflet prolapse with a mean age 61±12.1 years (13–86). More than half of the patients (58.3%) were asymptomatic or mildly symptomatic. Mitral valve repair was achieved in 484 (46.4%) (88.8%). Leaflet resection was performed in 419 (85.2%) and artificial chordae implantation (EPTE) were the basic technique to correct areas of prolapse was used in 40 cases (8.1%). Additional techniques were used, mainly chordal shortening, chordal transfer, commissural closure, papillary muscle shortening, leaflet plication and decalcification. The repair was completed by an annuloplasty procedure in 99.2% of the repaired cases, the great majority with a prosthetic ring (90.1% of repairs).

Concomitant procedures were done in 513 (51.2%), aortic valve surgery in 34 (6.6%) and CABG in 64 (6.8%). Death occurred during the first 30 days (0.2%). The main causes of hospital morbidity were stroke (1.2%), acute renal failure (6.7%), mostly transient, and need for permanent pacemaker in 2%. Overall survival at 5, 10 and 15 years was 97.9±6.2%, 97.4±4.1% and 97.4±4.1%, respectively. We concluded that mitral valve repair in isolated posterior leaflet prolapse can be done in virtually all cases with very low operative risk and excellent long-term survival, comparable to that of the general population, and with a high durability of repair. Surgery should address all lesions found intra-operatively (leaflets, chordae and annulus), using a vast armamentarium, hence those patients should be preferably referred to centres with large and good experience in mitral valve repair.

Patients with atrial fibrillation or large left ventricle are associated with a poor prognosis, which emphasizes the importance of early surgery. The results obtained in this series of patients undergoing mitral valve repair by conventional surgical approach, confirming most of other works published, should be viewed as the standard to which minimal invasive or robotic approaches, and, more recently, percutaneous techniques must be compared.
In occasion of the 28th EACTS Annual Meeting Sorin Group has the pleasure of inviting you to attend the Lunch Symposium:

INNOVATION TO IMPROVE PATIENT OUTCOMES

Chairmen: B. Gersak, Slovenia - J. Dillon, Malaysia - M. Laskar, France

PROGRAM

The impact of perfusion on outcomes in cardiac surgery
M. Ranucci, Italy

Advanced treatment in AVR: which are the key benefits of sutureless technology vs stented valves?
B. Meuris, Belgium

Is there space for innovation in MV repair?
S. F. Bolling, USA

“Valve in Valve” Interventions: which is the appropriate patient to select and how to tailor the treatment?
V. Bapat, UK
Size Matters

Obesity paradox or parallax for cardiac surgery patients?

Analysis of 3,977 patients and review of the literature
Mohamed Zeinah, Hamsa El Nosi, Dumbor Ngaya
Belfast, UK

Obesity is a growing public health problem worldwide. Improvement of socioeconomic conditions has led to an expansion of the overweight population over recent decades. Obesity is well known to be a risk factor for the development of diabetes mellitus (DM), hypertension, and coronary artery disease. The prevalence of obesity among cardiac patients will be expected to be high. Obesity is commonly thought to be a risk factor for morbidity and mortality after cardiac surgery however the relationship between obesity and cardiac surgery outcomes, including the reported obesity paradox, remains controversial. A clear understanding of the impact of the varying severity of obesity on operative outcomes is still lacking. The enhanced survival of the obese patients is referred to as the obesity paradox, and this same phenomenon was observed in studies evaluating the effect of BMI on coronary artery revascularization outcomes. However, this is not a routine observation, and other studies have demonstrated increased or no association with poor outcomes in patients with elevated BMI. The objective of our study is to determine the influence of obesity defined by different BMI categories according to WHO on cardiac operative morbidity and mortality.

We concluded that most cardiac patients are overweight or obese. Underweight and morbidly obese patients experienced higher morbidity and mortality rates, while ideal BMI patients had the lowest mortality after adjusting for EuroScore. Underweight and morbid obesity associated with increased mortality were risk factors for operative mortality. The cardiac literature does not support the obesity paradox. Perhaps the different obesity definitions used in studies account for the paradox, not the parallax.

Cardiac – Abstract session

Precessional and intraoperative PDT therapy in locally advanced central NSCLC
Andrej Akopov
Pavlov First State Medical University

It is over 30 years since Photodynamic therapy (PDT) was first used bronchoscopically to treat a patient with lung cancer. Few people are aware of the extent of the research and clinical work which is undertaken in Saint Petersburg on PDT. This may be, unfortunately, to lack of publications in any of the common languages of communication of research and clinical papers amongst some of the scientists and clinicians in Russia. Group of surgeons, endoscopists and oncologists from Pavlov First State Medical University, led by Professor Andrej Akopov, present a study “Precessional and intraoperative photodynamic therapy in locally advanced central non-small cell lung cancer”.

There is limited information in literature that PDT represents an attractive additional modality to achieve preoperative downgrading of the locally advanced tumor with the aim to facilitate its resectability. The patient was marginally resectable. Patients with locally advanced lung cancer may be treated with PDT to enhance resectability or to reduce the required resection extent. In these cases intraoperative PDT of resection margins facilitating additional cancer cell death may be indicated. This study is the first randomized one evaluating PDT effectiveness of neoadjuvant PDT and chemotherapy followed by resection and intraoperative PDT of resection margins for locally advanced NSCLC. The authors hope that this work will provide physicians with relevant evidence-based information and enhance interest to PDT as a treatment modality for lung cancer and cancer disease in general.
Cardiac patients look for durable and trustworthy prostheses. Sorin Group addresses these patient needs by offering integrated solutions for the younger and the older patients.

In younger patients requiring aortic valve replacement, the ideal prosthetic valve is a bioprosthetic valve: a bioprosthetic valve represents a convenient compromise that provides patients with good hemodynamics and reliable durability, while relieving them from a lifelong oral anticoagulation therapy. CROWN PRT is the latest advancement in stented aortic bioprosthetic technology, featuring state of the art performance and friendly design.

Built upon Sorin’s 45 years-long experience in heart valve design – and recent technological advances – CROWN PRT enhances hemodynamic performance by maximizing the orifice area available to the blood flow, reducing gradients and the risk of patient prosthesis mismatch. The CARBOMEDICS TOP HAT and BICARBON OVERLINE design has shown good hemodynamics and reliable durability, allowing for improved X-ray visualization through placement through visible markers, as well as improved ease of valve orientation and suture integration solutions for the younger and the older patients.

Patient outcomes and to result in durable, bioprosthetic valve represents a convenient compromise that provides patients with good hemodynamics and reliable durability, while relieving them from a lifelong oral anticoagulation therapy. CROWN PRT is the latest advancement in stented aortic bioprosthetic technology, featuring state of the art performance and friendly design.

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For further information, please come and see us at the Sorin Group booth # 112

CROWN PRT is CE Marked, Not available for sale in USA, Japan and Canada

References

Vascular – Professional challenges

Subclavian artery cannulation without side graft

Diana Roser
University of Zürich, Zürich, Switzerland

There is still ongoing debate about the "ideal" cannulation technique for the subclavian artery: with or without side graft. At our institution we perform cannulation without a side graft in all cases except for very small or dissected vessels. Surgical exposure is performed in the usual way through an infracostal muscular splitting incision. The subclavian artery is circumferentially dissected and secured with a vessel loop. Thereafter, a purse-string suture is placed on the anterior surface of the artery and secured with a tourniquet. It is important that the purse-string does not have too large a diameter and is not circular but rather longitudinal in order to reduce the risk of postoperative subclavian stenosis. After heparin administration and proper exposition cannulation is carried out using the Seldinger technique. The punctured vessel is gradually dilated along the wire with increasing sized dilators. Depending on the size of the subclavian artery we normally use a 16 or 18 French Fem-Flex femoral cannula which always provides adequate flow. It is safely secured with the purse-string suture and the tourniquet which prevents blood loss during the procedure. After connection to the arterial line of the heart-lung machine the cannula is sutured on the skin in order to avoid accidental dislodgement. An arterial line is placed in advance into the right radial artery in order to be able to react to any kind of hyperperfusion of the right upper extremity. In this case we would secure the vessel loop already in place. At the end of the operation the Fem-Flex cannula is removed and the purse-string suture is tied. Normally there is no need for an additional stitch. The longitudinal suture allows the preservation of the anatomy of the artery and reduces the risk of subclavian stenosis even in smaller vessels. The postoperative blood pressure of the right arm is consistent with the preoperative moint.

We are convinced that the subclavian cannulation without side graft using the Seldinger Technique is advantageous because it can be performed rapidly especially in an emergency setting, excessive blood loss during the operation is prevented, the anatomy of the vessel is preserved and there is no foreign material left behind that could potentially irritate the brachial plexus.
Long-term outcome with pericardial patch augmentation for redo left atrioventricular valve repair in atrophicventricular septal defect

Kathie Suphimson, Yves D'Udekem, Igor E. Konstantinov, Christian Biszard
The Royal Children's Hospital Melbourne, Australia

A
tro-ventricular septal defect (AVSD) occurs in 5.3 per 10,000 births according to European research. All patients with AVSD need a surgical correction of the septal defect and some will also need a repair of the left atrioventricular valve (LAVV) regurgitation pre-existing the repair or atrioventricular septal defect. Recurrence of the LAVV regurgitation is common; the severity of LAVV regurgitation may increase even after the AVSD repair. Regeneration rate for LAVV regurgitation has been reported to be as high as 6–18%. While various techniques have been reported, the surgical management of the recurrent LAVV regurgitation remains technically demanding, the mid-term to long-term result of any techniques has not been well clarified. In our institution, a new approach, cleft patch augmentation of the cleft area and the creation of a coaptation seal in front of the tip of the left lateral leaflet in normal papillary muscles (Figure 2), and restoration of coaptation in simple papillary muscle anatomy were applied since 1998. The efficacy of these techniques and long-term result for the redo LAVV repair is evaluated. From November 1991 to July 2008, 42 patients who underwent reoperation for LAVV regurgitation after AVSD repair were included in the study. Age at the primary valve repair was 18.4±25 months and the duration to the reoperation was 8.4 months (5–148 months). Age at the first reoperation was 111.9 months. Median follow-up after the reoperation was 89 months. With regard to the AVSD morphology, there were partial AVSD in 12, complete AVSD in 30. Three patients died in the follow-up period. Freedom from second reoperation at 10 years was 68.0% (95% CI: 55.5–80.4). Of 37 patients with normal papillary muscles, freedom from reoperation at 10 years was 58.6% in left atrial closure group, while the cleft patch augmentation group was 88.3% (p=0.045). Comparison between the cleft patch augmentation and other techniques for the second redo LAVV repair showed insignificant difference. Among five patients with simple papillary muscle after the first redo repair, three patients received the second redo surgery: one repair and two replacements (One and 12 years after the first redo), followed by one case of third redo surgery. Five patients required valve replacement eventually. In conclusion, surgical results in combination according to the morphological features. The recurrent left AV valve regurgitation in the simple papillary muscle anatomy remains a difficult challenge, but repair may delay replacement significantly.

Figure 2: A. Cleft patch augmentation for adequate left lateral leaflet with normal papillary muscles. Thickened edges of the leaflet are resected carefully. B. Glutaraldehyde treated autologous pericardium was trimmed and sutured to the repair. Sutures are extended to adjacent marginal chordae. C. Intra-operative picture. Autologous pericardial patch is placed between the anterior and posterior bridging leaflets. D. Intra-operative picture after the repair. Good coaptation is gained.

C}
Congenital – Professional challenges


d.jpg

Yoshitaka Shimada
Tokyo Medical University, Japan

Summary

Round-glass opacity (GGO) lesions on chest CT are often detected as multiple lesions, and the incidence of multiple primary lung cancers with GGOs has recently increased. We reviewed the medical record of a series of patients with synchronous multiple lung cancers, in an attempt to identify the optimal treatment strategy for multiple GGOs. From January 2004 through December 2010, a total of 1,223 patients underwent complete resection of non-small cell lung cancer at our hospital. Among these, 67 patients (5.5%) with multiple mixed or pure GGO lesions had a predominant lesion (PL) and at least one lesion proven or suspected of secondary cancer (non-PL), and were included in the study. These patients were classified into two groups; the GGO-group (PL showing GGO-predominant lesion: consolidation/tumor ratio (CTR) on thin-section CT 0.5 or less) and the GSO-group (PL showing solid-predominant lesion: CTR more than 0.5). In the patients who underwent reaction for all lung tumors, they were classified with multiple lung cancer if they met the modified criteria of Mantini and Malamed. In patients with multiple lung lesions, the surgical procedure was determined according to site of lesion, CT findings, estimated postoperative respiratory function, and the presence or absence of preoperative comorbidities. Median follow-up time of this study was 53.4 months. There were 24 patients in the GGO-group (96%) and 43 patients in the GSO-group (64%), and the five-year OS proportions were 99.7% and 64.0%, respectively (p=0.031). Surgical resections included 11 sublobar resections (51), 3 lobectomies, 19 lobectomy + SIs, and four bilobectomies. There were 39 patients with a total of 118 unresected GGOs after the initial surgery. Among them, the frequency of growth was 7.6% on a par- nodule basis (nine GGOs), and the median doubling time was 137 days. New GGOs emerged in 15 patients (23%). Multivariate analysis demonstrated that possessing a PL >25mm, 68 years old or younger, and the GSO-group were significantly associated with poor prognosis, whereas number of lesions, growth of the residual GGOs, the development of new GGOs, or whether or not all GGOs were treated did not significantly affect OS. All seven patients with multifocal pure GGOs survived for five years without recurrence. In conclusion, there appears to be a difference in the biology between multifocal GGO-dominant tumors and solid-dominant tumors. We found that the survival of patients with synchronous multifocal GGOs is strongly affected by radiological CT findings of the PL. A clinical strategy of thorough local control of PLs and easily accessible non-PLs by limited resection or SBRT, and close monitoring of the residual GGOs during longer period could be most important.

Figure 1: Regurgitation jet due to lack of coaptation after the primary cleft closure.
Cardiac – Abstract session

**Worth the effort?**

Concomitant surgical ablation for atrial fibrillation (AF) in patients with significant atrial dilation >55mm

Simon Pecha
University Heart Center, Hamburg, Germany

**Background and methods:**
Concomitant Surgical AF ablation is an established procedure, recommended in guidelines. However, many surgeons are reluctant to perform AF ablation in patients with significantly enlarged left atrium. We therefore analyzed outcomes of patients with left-atrial diameter >55mm undergoing concomitant AF ablation. Between 05/2003 and 12/2012 124 patients with significantly enlarged left-atrium >55mm underwent concomitant surgical AF ablation. Rhythm monitoring was accomplished by implantable loop recorder (ILR) interrogation (n=54), or 24-h Holter-ECG (n=70). Successful ablation was defined as AF Burden <0.5% in ILR interrogation or absence of AF episode >30sec in 24-h Holter-ECG. Primary endpoint of the study was sinus rhythm (SR) at 12-months follow-up.

**Results:**
Mean patient’s age was 65.7±9.6 years, 69.4% were male. No major ablation or ILR related complications occurred. Mean LA diameter was 60.7±4.4mm. Survival rate at one-year follow up was 94.4%. 11 (8.2%) patients received additional catheter-based ablation, while 23 (18.5%) had an electrical cardioversion during follow-up period. Freedom from AF after one-year follow-up was 64.4% and 59.4% off antiarrhythmic drugs respectively. Logistic regression analysis identified preoperative paroxysmal AF, duration of AF and LA diameter >70mm as predictors for rhythm outcome at 12 months follow-up.

**Conclusion:**
In this patient cohort with significantly enlarged LA diameter, concomitant surgical AF ablation provided freedom from AF rate of 64.4% after one-year follow-up. However, in this patient population, an accurate postoperative care with interventions like medical on-electrical cardioversion and additional catheter based ablation is necessary to achieve satisfactory results.

**Thoracic – Abstract**

Risk factors for postoperative recurrence of spontaneous pneumothorax treated by VATS

Andrea Imperatori, Nicola Rotolo, Marco Spagnuolotti, Luigi Fossi, Fabio Beretta, Davide Di Natale, Elisa Nardocci, Lorenzo Daminin
University of Insubria, Varese, Italy

Primary spontaneous pneumothorax (SP), an infrequent health problem, predominantly occurs in healthy, young, tall and thin males. After the first episode, the estimated recurrence rate is 20-50% and it increases up to 60% after further episodes. The optimal treatment of SP is VATS both at first episode and at recurrence, has been a matter of debate. Surgical treatment is needed in 25-50% of all patients. Nowadays video-assisted thoracoscopic (VATS) blebectomy and pleurectomy is widely accepted as a reliable option for treatment of recurrent PSP. Recurrence rate after VATS treatment has been reported from 5% to 11%. Identified risk factors of postoperative recurrence include active smoking habit, comorbidities, prolonged postoperative air leakage, missed or incomplete blebectomy.

In this retrospective study, carried out in patients <40 years of age, treated by VATS blebectomy and partial pleurectomy for PSP, we aimed to estimate the postoperative recurrence rate, and to identify related risk factors. As secondary objective we evaluated the long-term outcome of VATS treatment in terms of chest wall chronic pain and dyspnoea.

We evaluated 134 young patients (110 men, 24 women, mean age, 25 years) undergoing VATS blebectomy and partial pleurectomy for PSP at the Center for Thoracic Surgery, University of Insubria, Varese, Italy between 1997 and 2010. Patients were followed-up for at least 36 months after discharge.

Overall, no relevant complications were recorded intraoperatively and there were no cases converted into thoracotomy. The postoperative course was uneventful in 102 patients (76.1%). The most frequent complication was air leakage lasting longer than 7 days (17.2%). In two patients a re-VATS procedure was necessary on postoperative day 1 to control bleeding. Moreover, one patient required re-operation for persistent air leak. Mortality rate at 90 days was nil. Median hospital stay was 8 days. The median follow-up was 79 months (range: 36–187). The postoperative recurrence rate of ipsilateral pneumothorax was 6.0% (8/134 cases), with a median interval of 43 months. In detail, two cases recurred early (on postoperative day 38 and 40). The other six recurrences occurred late (at 23, 32, 54, 58, 59 and 71 months). Of the eight patients with recurrent pneumothorax, three showed only a partial failure of pleurectomy and underwent conservative treatment. In the five patients (5.7%) with significant failure of pleurectomy a redo-VATS procedure was carried out with talc poudrage (four cases), and with extended partial pleurectomy (one case). None of these 8 patients presented a further episode of ipsilateral pneumothorax with a 68 months median time of follow-up.

Multivariate regression analysis showed that postoperative recurrence was correlated with prolonged postoperative air leaks (p<0.037) and with female gender (p=0.045). In our study 3 out of 4 women with postoperative recurrence presented pelvic endometriosis and in 2 of these we observed small diaphragmatic “fenestrations” during VATS inspection. Chronic chest pain (analogic scale >4 points) was reported in three patients (2.2%), but only one used analgesics more than once a month. Moreover, in 13 patients (9.7%) chest wall dyspnoea was recorded, only three reported an analogic score >6 and complained of a significantly compromised quality of life.

In conclusion, our findings confirm that VATS blebectomy with pleurectomy for pneumothorax is a safe and effective procedure for treatment of spontaneous pneumothorax in young patients. Postoperative recurrence significantly correlates with female gender and with prolonged air leakage after surgery. Further efforts should be made aiming to improve postoperative air leak control. Moreover, in young women catamenial pneumothorax should be always considered and a careful exploring of the pleural cavity and of the diaphragm should be performed.
**Vascular – Professional challenges**

### Complex reparative aortic surgery after TEVAR

**Eduard Quintana** & Albert Prochownik

1 University of Barcelona, Spain; 2 Mayo Clinic, Rochester, USA

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**Abstract**

Proximal thoracic aortic aneurysms: Transitions on a theme

**Introduction**

Valve repair with neochordae

2010 Daily Focus Session

**Methods**

Predicting the aortic valve in patients with aortic regurgitation with focus on the functional analysis of aortic root

**Results**

Four-dimensional magnetic resonance imaging-derived ascending aortic flow eccentricity and flow compression are linked to aneurysm formation

**Conclusions**

Aortic thoracic aneurysm wall thickening analysis using patient-specific finite element modeling of in vivo magnetic resonance imaging

**Discussion**

Decision making in aortic root surgery in Marfan syndrome: Bleeding, thoracoabdominal aorta and risk of reinfection after valve-sparing or mechanical aortic root replacement

**Conclusion**

Root replacement in acute type A dissection: Does valve sparing operation increase surgical risk?

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**Focus Session**

Basic Science 2

16.00

Update on decellularized aortic allografts

Francisco De Coss

16.15

What stem cells do we need for aortic engineering?

Gosia Stehoch

16.30

Whole heart tissue engineering

Alexander Weymann

16.45

Antegrade miniopeveal arterial bypass

Mariano Drumm

17.00

Summary, conclusions

Pascal D’Hoore

---

**Arterial cannulation for aortic surgery: more confusion or more clarity?**

Jean Bachet

Nantes, France

For several decades the question of arterial cannulation has been considered as totally resolved.

Cannulation of the ascending aorta for the valvular, coronary and congenital procedures on the one hand and of the femoral artery for all other procedures, including aortic ones, on the other hand, was systematic.

Only less than two decades ago, it became obvious that this apparently second-order issue could be of some importance, in particular for aortic procedures and that other modes of arterial cannulation could significantly influence the surgical results. In particular the choice of arterial cannulation appeared to be of major importance during surgery of the aortic arch and even more important during surgery of type A acute dissection.

In this matter many different approaches and techniques have been described. They consist in possible cannulation of:

- the femoral artery (two sites)
- the right auxiliary artery (two techniques)
- the right brachial artery
- the left auxiliary artery
- the innominate artery
- the common carotid arteries (two sites)
- the ascending aorta (two techniques)
- the apex of the left ventricle

The left trans-atrial approach, for a total of 11 sites and six techniques of arterial access.

The discussions are numerous and the best approach never comes out.

Most of those described sites and techniques have advantages and disadvantages. That’s why each one has its strong supporters and, similarly, strong opponents.

However all those techniques are not equivalent and cannot be indiscriminately used in all patients and in whatever circumstances.

It seems, indeed, largely demonstrated that some advantages and some disadvantages are of paramount importance that might override the usefulness of other techniques rather than others.

So, there is no doubt that, when discussing the mode of cannulation to be used, the surgical, anaesthesiology and perfusion team may first take into account the pathologic and clinical condition of the patient, the circumstances of the surgery, the local as well as the general anatomical and physiological conditions and all other important determinants and risk-factors.

The specific choice combines all advantages with no drawbacks.

Therefore it seems important that the surgical team be aware of the various technical methods and decide the most convenient and less harmful type of arterial access for each case according to the patient’s condition as well as their experience, feel and local possibilities.

No technique should be considered as the one and only.

During what we hope to be a complete survey of the various methods so far described, we shall try to assess their advantages and drawbacks and try to decide which is the most appropriate for each patient. Hopefully some clarity will be brought to this matter.

This is the real core of the debate.
Predictive factors of myasthenic crisis after extended thyromectomy for patients with myasthenia gravis

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Extended thyromectomy is the standard therapeutic option for myasthenia gravis (MG) patients and has good results. Although postoperative myasthenic crisis (POMC) is a serious issue when considering surgery, to date only a few studies have assessed possible risk factors for POMC. The purpose of this study was to determine predictive factors for POMC occurrence and its impact on the surgical outcomes.

We reviewed the records of 155 patients who underwent extended thyromectomy at Koto University Hospital between January 2000 and December 2013. Preoperative and surgical records and postoperative neurological outcomes were retrospectively reviewed and analyzed on the basis of the occurrence of POMC. POMC was defined as the requirement of prolonged ventilatory support of >24 hours after surgery or repeated ventilatory support (including noninvasive ventilation) after extubation before postoperative day 30. The preoperative Myasthenia Gravis Foundation of America stage was I, II-A, and IV in 24, 22, 8, and 1 patients, respectively. Ten patients (18.2%) developed POMC; six required prolonged intubation over 24 h and four required re-ventilatory support. All patients were weaned after 5.6 (2–28) days of ventilator support and were discharged. Univariate analysis revealed a correlation with a high preoperative anti-acetylcholine receptor antibody titre (p = 0.009), history of MG (p < 0.001), and unstable after preoperative medical therapy (p = 0.003). Multivariate logistic regression analysis showed that history of MG (Odds ratio, 10.49; 95% confidence interval, 1.09–264; p = 0.041) and unstable after preoperative medical therapy (Odds ratio, 30.68; 95% confidence interval, 2.051–1104; p = 0.012) independently predicted POMC. The surgical response rate was not significantly different between the two groups (66.7% with POMC, 85.4% without POMC; p = 0.334). Our multivariate analysis showed that a history of MG and unstable after preoperative medical therapy were predictive factors for POMC, whereas preoperative severity was not.

principle, after a diagnosis of MG is made, an extended thyromectomy is performed following preoperative medical therapy. Based on the results of this study, we suggest that the preoperative medical therapy outcome could affect the occurrence of POMC.

In addition, an improvement rate in the AchRAb titre (preoperative/pretreatment AchRAb titre) was not associated with POMC occurrence in spite of significant reductions in postoperative AchRAb titres compared to pretreatment titres. It is suggested from this result that patients with uncontrolled symptoms at the time of operation are still at substantial risk of POMC even if the AchRAb titres improve after preoperative medical therapies.

Unstable or a history of preoperative MG tends to cause POMC. Keeping preoperative medical therapy under control with appropriate preoperative medical therapies can reduce POMC occurrence. Because postoperative neurological outcomes can be expected, even in patients with POMC, surgery is indicated even if POMC is assumed to occur at a high rate.

Cardiac – Abstract session

Validation of a new method for trial analysis: applying the win ratio to analyze PCI versus CABG for complex CAD

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For any randomized trial, the sample size calculation is a critical determinant of the overall success of the trial and the interpretation of the findings. Due to this fact, composite endpoints are widely used in cardiovascular disease trials, leading to higher event rates and more statistical power; thus requiring smaller sample sizes and shorter follow-up. Conventional analyses calculate composite in direction that each component of the composite as equally important. It provokes often criticism that results of the study may be driven primarily by the subcomponent with lesser clinical significance.

The win ratio methodology is a new approach for the analyses of composite endpoints. In contrast to the conventional analyses, this methodology takes Hierarchical weighting of events and puts emphasis on events with greater clinical importance, which provides greater statistical power and gives insightful meanings of the results.

The objective of this re-analysis was to compare PCI with CABG, accounting for the severity of the individual components in the composite of MACCE and prioritizing these using the win ratio approach. Moreover, this study, for the first time, applies the win ratio and evaluates its impact on trial design in comparison with conventional analysis.

The win ratio methodology was applied across the SYNTAX trial. Win ratio analyses were performed for MACCE and all-cause death, and compared with conventional Cox proportional hazard analyses. For the primary outcome of MACCE, the win ratio favored CABG and was 1.61 (95% CI 1.34–1.96; P=0.001) using the matched approach, 1.49 (95% CI 1.23–1.73) using the unmatched approach, and smallest using a conventional hazard ratio: 1.43 (95% CI 1.21–1.70). The win ratio for death was 1.39 (95% CI 1.04–1.86; P=0.021), in both cases in favor of CABG treatment. The results in other subgroups show similar trends of pronounced change in favor of the CABG treatment, especially in the subgroups of three vessel diseases, the intermediate SYNTAX Score and the low SYNTAX Score, where the win ratio for MACCE was 1.38 (95% CI 0.98–1.87; P=0.064), compared with conventional hazard ratio: 1.13 (95% CI 0.83–1.53 P=0.43). This results leads to the conclusion that the benefit of CABG over PCI is not driven primarily by repeat revascularization, but this re-analysis suggest that the most important benefit of CABG treatment is the reduction in hard clinical events, based on the win ratio approach to hierarchically prioritize events in the composite of MACCE. This approach is easily and effectively applicable to clinical trial data. It provides a larger treatment effect estimate than conventional analyses; based on these and additional advantages, future trials adopting this approach can expect to maintain similar statistical power with smaller sample sizes, and lower trial costs.
Pulmonary artery sling repair
Single centre experience with analysis of risk factors
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Aortic valve sparing operations in aortic root aneurysms: remodeling, reimplanting: is the debate closed?

Cardiac – Abstract session

Aortic valve sparing operations in aortic root aneurysms: remodeling, reimplanting: is the debate closed?

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In the late ’80s and early ’90s an intense debate was present among the two renowned surgeons, Mågdi Yacoub and Trone David who had conceived the two types of valve sparing operations better known as remodeling or reimplantation procedure. The former was considered easier to perform and more physiological because it allowed a proper reconstruction of the sinuses of Valsalva although with an intrinsic higher risk for bleeding. The latter, although apparently more complex from a technical point of view was considered safer while at the same time guaranteeing an optimal stabilization of the annulus.

However, the lack of sinuses of Valsalva was seen as a serious drawback when considering the long-term durability of the valve. As the time passed and the patients data became available, it was evident that progressive annular dilation was the Achilles’ heel of the remodeling procedure while an altered leaflet dynamics was instantly present in patients with reimplanted valve potentially at the base for an accelerated cusp deterioration.

In the following years a series of technical modification were introduced with the aim of improving both procedures. An annuloplasty ring or an annuloplasty sutures were added to the remodeling procedure to stabilize the annulus and preventing the progressive annular dilatation, on the other the reimplantation procedure was improved either by a series of surgical modification of the original technique or by the use of specifically modified vascular prostheses incorporating pseudo-sinuses of Valsalva.

We are now at the point where both procedures can offer at the same time a good root reconstruction and a proper stabilization of the annulus with increased chance of optimal durability of the spared valve. It goes without saying that in the case of remodeling the annuloplasty should be complete, robust and at the proper level along the whole annulus circumference; and in case of the reimplantation the root reconstruction should achieve sinuses of appropriate anatomical shape and dimension. However, in both cases similar attention should be paid not to alter the normal spatial geometry of the commissures and at the same time avoiding any distortion of the valve.

Nevertheless, from our personal experience we continue to favour the reimplantation procedure for its ability of being well reproducible, for offering an optimal support of the aortic wall especially useful in case of thin, fragile and dissected commissures, and for greatly reducing multivariate analysis. In spite of these, the long-term results are very satisfactory with a very low mortality and reinvention risk following surgical correction.
LIB – to suture or not to suture: a simplified reimplantation technique

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Composite replacement has been the standard surgical procedure for the treatment of combined aortic dilatation and aortic regurgitation. Nevertheless this intervention exposes patients to long-term risks associated with the presence of biological or mechanical prostheses, including bleeding, thrombembolic and infective events. In this context, valve sparing and repair interventions, associated with low mortality, acceptable durability and low risk valve-related events, have received increasing interest.

Sarsam and Yacoub proposed the « remodeling of the aortic root » procedure, which preserves physiological motion of the leaflets with a better stress distribution as compared with the David’s procedure. Because all three aortic sinuses are excised but leaving approximately 5mm of arterial wall attached to the aortic annulus, the remodeling technique may be inappropriate in patients with Marfan Syndrome or annuloaortic ectasia. In some patients it failed to stabilize the aortic annulus and led to progressive annular and remnant aortic wall dilatation and valve incompetence.

David and Feindel proposed a procedure (David I) described as « the reimplantation technique » which provided external support of the entire aortic root complex as well as better hemostasis. The original procedure consists in reimplanting the aortic valve within a Dacron tube graft.

The ideal sparing surgery aimed at building the most physiologic aortic root as possible by preserving the functional anatomy of the aortic root and valve complex. This includes the preservation of the geometry of the sinuses of valsalva and the ratio of different components of the aortic root. Da Faval introduced a modified Dacron conduit with preformed neosinuses. This conduit used in David I procedure, allows in theory to enhance leaflet closure at the end of the distal and protects leaflets from the prosthetic wall traumas during systole.

Unfortunately in-conduit suturing of the aortic valve annulus and a small rim of remnant sinuses to the graft is time consuming, and may lead to bleeding, and distortion of the native valve in the prosthetic root. In addition, crimping the valsalva graft may result in its theoretical advantage loss. We here describe a modification of the previous techniques to facilitate reimplantation, using a single commissure suspension of the aortic native valve in addition to a continuous in-flow suture line to facilitate in-conduit valve reimplantation. This technique showed to be effective and easy to realize.

Combining graft flow measurements with epicardial imaging

Checking graft patency using TTFM is standard of care in most European countries and Japan. It is also increasingly becoming the routine in many US hospitals. The procedure is endorsed by the EACTS/ESC Guidelines on Myocardial Revascularization, as well as the UK’s National Institute for Health and Care Excellence (NICE).

Even with the growing adoption of TTFM (transit time flow measurement) technology, the incidence of early postoperative stroke and MACE is still too high, and the surgical community continues to look for ways to improve clinical outcomes.

TTFM will provide quantitative information from the real-time flow curve and derived measures of flow volume, pulsatility index (PI) and diastolic filling percentage, which has been shown to be predictive of graft patency.

Before deciding to redo a potentially suboptimal anastomosis, a surgeon wants to be absolutely sure it will be worthwhile the effort and that the final result will be an improvement.

Pioneers in the field are currently testing the combination of graft flow measurements and high-frequency epicardial imaging. Epicardial imaging provides a qualitative, morphological assessment that enables the surgeon to stop guessing and instead visually assess whether there is a problem.

In addition to providing information on graft and anastomosis quality and identify possible sources of compromised blood flow, epicardial imaging can also provide important information about localization, degree and shape of the coronary stenosis and better inform the graft placement strategy.

Medistim delivers TTFM and high-frequency ultrasound imaging for epicardial and epicardial use, both from their VeriQ™ and their newest MiraQ™ platforms. The 15-18 MHz imaging probe was specifically developed for these applications. The probe is plasma sterilizable and approved for direct contact on the heart without the need for any sterile cover.

“Medistim keeps a close dialogue with many leading cardiac surgeons, and the interest in combining TTFM with epicardial and epicardial imaging is increasing”, says Medistim President and CEO, Kari E. Krogstad. “As a company, we are devoted to enabling improved quality in coronary revascularization surgery, and we will continue to invest in the technology and new, user-friendly solutions. As always, we will continue to do clinical work together with the leaders in the field, to test out new ideas and ways to improve surgical strategy. At the end of the day, improved quality and patent grafts are imperative for better clinical outcomes and patient health.”

About Medistim

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Direct aortic implantation of CoreValve system leads to favorable outcomes
The ADVANCE Direct Aortic Study

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Transcatheter aortic valve implantation (TAVI) is rapidly becoming the standard of care for aortic stenosis patients at increased risk for surgical aortic valve replacement. There are several options for access, the first choice being the transfemoral route when anatomical and clinical conditions are optimal. A number of aortic stenosis patients have limitations which make them ineligible for a transfemeral procedure, including calcification, narrowing, or tortuosity of the femoral tree. For them, the direct aortic (DA) approach is an alternative. Positive results from case studies have been described in the literature, as have key outcomes from a multicentre European DA registry. However, no rigorous clinical study has been done to demonstrate the clinical efficacy of this approach and understand its impact on patient status and quality of life. The ADVANCE DA study was conducted specifically for this purpose.

From September 2012 to February 2014, 100 patients were enrolled at nine centres in Europe in this prospective, single-arm study. Prior to the procedures, multislice computed tomography (MCT) was used to evaluate the anatomy of the aortic annulus and select an appropriately sized CoreValve. TAVI was then performed with the patient under general anaesthesia.

The patients were elderly with an average age of 82.6 years and a mean STS score of 6 ± 3%. Most had significant comorbidities including peripheral vascular disease (51%), diabetes (38%), and UFE at 45% (32%), as well as a history of PCI (33%) and CABG (15%). Ninety-two of the enrolled patients underwent implant. By post-TAVI day 30, four patients had died, and one patient had a stroke which was classified as non-disabling.

In the patients with echocardiograms available at hospital discharge, only one had moderate paravalvular leak (PVL), leaving the remaining 98.7% of patients free from moderate or severe PVL. This is the lowest rate of clinically-relevant PVL reported with the Medtronic CoreValve System (MCS). One possible reason for this outcome may also have impacted the permanent percutaneous implantation rate, which was 14.5%, again among the lowest reported with the MCS.

The invasiveness of the direct aortic approach elicits concern about its potential impact on patient health status and quality of life. The ADVANCE DA study implemented quality of life instruments to help understand this issue. The mean change in the Kansas City Cardiomyopathy Questionnaire overall summary score was 18 ± 28 points between baseline and 30-days, which was both statistically and clinically significant. In addition, 74% of patients derived substantial symptom relief as shown by improved NYHA class.

In summary, the results of the ADVANCE DA study show that TAVI through direct aortic access with the MCS is associated with low complication and mortality rates at 30 days, and provides substantial improvement in patient health status and quality of life. This procedure is an excellent alternative for patients with aortic stenosis and prohibitive iliofemoral anatomy.

References

Cardiac – Focus session

Transcatheter aortic valve implantation with self-expandable valve vs surgical AVR (CoreValve US Pivotal High Risk Study)

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Transcatheter aortic valve implantation (TAVI) has replaced surgical aortic valve replacement (SAVR) in patients with severe, symptomatic aortic stenosis considered unsuitable for open heart surgery, and has now been shown to be superior to SAVR in patients considered to be at high surgical risk. The randomized CoreValve US Pivotal High Risk Study examined 747 implanted patients (390 TAVI, 357 SAVR) enrolled at 45 centres. All patients were selected for participation in the trial after rigorous review of their medical profiles by a multidisciplinary Heart Team. We looked closely at patient factors, e.g., frailty, disabilities, and comorbidities not included in the STS assessment when determining patient risk.

The primary endpoint was all-cause mortality at one year with prespecified non-inferiority and superiority testing.

Overall 52.7 % of patients were men, most (86.2%) had New York Heart Association class II or III symptoms at baseline and the mean age was 82.3 years. As expected, baseline characteristics were similar between treatment groups with the exception that more patients with diabetes (45.4% vs 34.9%, P = 0.003) were randomized to the SAVR group, although this difference was not present in patients requiring insulin.

All-cause mortality was 14.3% in the TAVI group and 19.1% in the SAVR group at one year (P=0.001 for noninferiority, P=0.04 for superiority) (Figure 1). We also reported no differences in mortality in nine different subgroups, including patients with an STS PROM ≤ 7% vs ≥ 7%.

Figure 1. The High Risk Cohort Primary End Point of All-Cause Mortality. The Kaplan-Meier rate of all-cause mortality 1 year for TAVI vs SAVR for the overall cohort, and for subgroups (P=0.012 for superiority). From The Heart, Lung and Blood Institute. The New England Journal of Medicine, Adams DH, et al. Transcatheter aortic valve replacement with a self-expanding prosthesis, Volume 370, Page 77.

Cardiac – Abstract session

Thoracic – Abstract session

Accuracy of transthoracic ultrasound for the prediction of chest wall infiltration by lung cancer and of lung infiltration by chest wall tumors

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The purpose of this work starts from two common problematic preoperatives. Often thoracic surgeons face peripheral lung cancers with the doubt of chest wall infiltration and chest wall tumors abutting on the pleural cavity with the doubt of lung infiltration. This happens when preoperative CT scan or MR lack of clear signs of infiltration. In these cases, the only option is a surgical biopsy, with a high rate of understaging and moderate sensitivity and specificity for both CT scan and MRI, varying from 43% to 80%. In recent years, ultrasound (US) has gained more and more spread. In 2011 at the 25th EACTS annual meeting in Lisbon, my colleague Dr. Casanelli presented our work dealing with the value of TUS on the preoperative detection of pleural adhesions. We found a sensitivity and specificity of 80.6 and 96%, respectively. Starting from the same technical aspect, the ‘sliding sign’, we wanted to evaluate TUS accuracy in the detection of chest wall infiltration by lung cancer and of lung infiltration by chest wall tumors.

Assuming that sliding sign is the ecographic manifestation of the movement of the lung over the parietal pleural or of the pleural layers on each other, its absence corresponds to the presence of adhesions between these two layers. From an anatomical point of view this happens in case of pleural fibrous adhesions, but also in case of neoplastic infiltration coming from both side of the pleural space. Chest wall tumors can cross parietal pleura and infiltrate visceral pleura and the underlying lung. In a specular way, lung cancer can cross visceral pleura layer and infiltrate parietal costal pleura and the overlying chest wall.

We prospectively collected 23 patients from January 2012 to February 2014 affected by peripheral lung cancer suspect for chest wall infiltration (14) or chest wall tumor (nine) scheduled for surgical intervention. CT scan was expected for lung infiltration.

They underwent preoperative TUS. Sensitivity and specificity of TUS in predicting infiltration were 88.89% and 100%, respectively. Positive and negative predictive values were 100% and 93.3%, respectively. Accuracy result 95.7%. The maximum value of sensitivity and specificity 100% and 57% respectively, corresponded to tumor size value of 4.5cm, found using the ‘Youden-index’.

This study demonstrated that transthoracic ultrasound is a very accurate instrument to predict chest wall infiltration by lung cancer or lung infiltration by chest wall tumors. In case of suspect infiltration at CTscan, TUS should be a fundamental part of the preoperative management to plan the best surgical approach.
Total arch replacement vs. more conservative management in type A acute aortic dissection

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In type A acute aortic dissection (TA-AAD) how to manage the dissected aortic arch is controversial. While some surgeons advocate a conservative, tear-oriented approach (most commonly involving hernia replacement) to minimize post-operative mortality and morbidity, others more aggressively propose a systematic total arch replacement (TAR) with liberal use of elephant trunk techniques (classic and frozen) to enhance distal aortic remodelling and improve patients’ long-term prognosis. However, due to the technical challenges involved and the increased operative times from TAR over conservative management, TAR has not been widespread and remains an important point of debate.

Our study addressed this controversy by comparing short and long-term outcomes of TAR interventions vs. more conservative arch management (CAM) in TA-AAD surgery. Between 1997 and 2012, 270 patients underwent TA-AAD surgery in our institution; 53 (19.6%) received TAR and 217 (80.4%) CAM. Compared to CAM patients, those undergoing TAR had more extensive aortic dissection (p=0.012), were younger (0.1 vs. 64.7, p=0.002) and were less likely to present with cardiogenic shock (15.7% vs. 3.8%, p=0.02). Distal site of intimal tear (arch or descending aorta) was predictive of TAR management (OR: 9.2, p=0.001). These data confirmed in our institution the decision to perform TAR in TA-AAD is based on patient (lower risk) and aortic lesion characteristics.

Following these concepts, hospital outcomes were similar in the groups, and TAR management did not affect hospital mortality (23% vs. 22.6%; p=n.s) (propensity score (PS) adjusted odds-ratio: 1.14, p=0.73). Independent predictors of hospital death were age (OR:1.045, p=0.009) and cardiopulmonary bypass time (OR:1.006; p=0.54) (logistic regression = 0.7). Based on these data, TAR appears as a reasonable option of treatment for TA-AAD patients with distal arch tears and a favourable pre-operative risk profile.

On Kaplan-Meier analysis, 7-years survival (TAR: 52.1±0.9% vs. CA: 47.2±4.8%, log-rank p=0.801) and freedom from aortic re-intervention (TAR: 71.6±3.3% vs. CA: 86.7±3.5%, log-rank p=0.221) were similar in the two groups. In addition, PS-adjusted Cox regression showed no relationship between type of arch management and follow-up mortality (HR:1.1; p=0.801) or need for re-intervention (HR:1.3; p=0.542). Age at the end of the study was 64.7 (p=0.018) and freedom from aortic re-intervention was also independent of mortality (HR:1.7; p=0.023) and diabetes (HR=6.2; p=0.018) emerged as an independent predictor of death. Cox regression failed to identify any independent predictors for aortic re-intervention during follow up. Our long-term data eventually confirm that the successful resection of the primary aortic tear and a thoughtful patient selection for different arch interventions may eventually equal long-term mortality and freedom from re-intervention after TAR and CAM.

In conclusion, our strategy in TA-AAD patients involves a tear-oriented resection with extended TAR in patients with severe distal aortic arch compromise by the dissecting process and sufficient physical conditions to undergo major arch replacement. Based on aortic and patient’s characteristics, this approach has shown to translate into satisfactory results and equivalent short and long-term outcomes after TAR and CAM operations.
Cardiac – Professional challenges

Safety and feasibility of a novel, adjustable mitral annuloplasty ring: A multicentre European experience

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Recurrent mitral regurgitation is a significant problem after mitral valve repair in patients with functional valve disease. The optimal surgical treatment of mitral regurgitation in these patients is still a matter of debate.

A novel, adjustable mitral ring was developed by MiCardia (MiCardia Corp, Irvine, CA, USA) to allow minimally invasive correction of recurrent mitral regurgitation. Langer et al. published the encouraging results of the first generation, which could be activated during the initial surgery. The second generation, which is described in this paper, has a subcutaneous lead and can be adjusted at any time point after the initial surgery. The lead is accessed through a small incision and connected to the generator for adjustment (Figure 1A). A temperature increase induces a change in shape towards a decreased antero- posterior diameter (Figure 1B). This is believed to improve leaflet coaptation and decrease mitral regurgitation.

We report the results of a multicentre, non-randomized, observational registry with this device. Ninety-four patients (89±10 years) undergoing surgical mitral valve repair with the MiCardia EnCor™ Mitral Valve Repair system were evaluated in five centres. The EuroCORE II was 6.8±4.3. The majority had a functional mitral valve disease (48% ischemic mitral regurgitation and 37% dilated cardiomyopathy).

Operative mortality was 1% and the one- year survival was 95%. Twelve patients required ring adjustment due to recurrent mitral regurgitation at a mean interval of 9.6± months after surgery (Figure 2). The adjustment failed for technical reasons in three of these patients due to a defect in the implanted wire connected to the temperature probe in the ring. This defect could later be solved with a new external connection wire and did not occur thereafter.

In one patient, mitral regurgitation was reduced two grades, in two patients mitral regurgitation was reduced one grade, and in six patients, mitral regurgitation did not change significantly. The mean grade of mitral regurgitation changed from 2.9±0.9 to 2.1±0.7 (p=0.03). A follow-up of 56 months was available for only two patients after adjustment and their grade of mitral regurgitation remained stable. Five patients were reoperated after 11.8 months (ring dehiscence: 2, failed adjustment: 3).

We conclude that implantation of this device is safe and effective. Minimally invasive late adjustment is feasible, but clinical results in this complex disease were ambiguous. However, this method may reduce the risk of reoperation in patients with recurrent mitral regurgitation.

Additional experience in a larger patient cohort is required to establish the clinical value of this technology.

Cardiac – Abstract session

The way we graft now

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Coronary artery bypass surgery has undergone evolution in three phases, venous grafting, mixed arterial and venous grafting and total arterial bypass surgery.

The use of venous grafting has limited the success of coronary artery bypass grafting by way of early saphenous vein graft failure. The introduction of arterial grafting using internal thoracic artery grafts, has been a marked improvement in survival. Our aim is to evaluate the role of total arterial revascularisation versus the standard operation of a single internal thoracic artery and saphenous vein graft in patients who have three vessel or extensive coronary artery disease.

We compared total arterial grafting using internal thoracic and radial artery grafts in Melbourne commencing in 1995 comparing it with conventional surgery. This observational study was completed in 2010.

This study revealed that the patients with total arterial patients were slightly younger, less likely to have diabetes, cerebrovascular disease and recent myocardial infarctions. The unadjusted patient’s survival was 62% versus 35% when compared with the standard procedure of a 50% and vein grafts. After adjusting for the differences in preoperative morbidities, a propensity score was used to match 184 patient pairs.

The total arterial graft group showed an improved survival at 15 years compared with the conventional CABG group (54% versus 41% with a significant statistical benefit).

This large multicentre study suggests that a strategy of total arterial revascularisation using internal thoracic and radial artery grafts is associated with a long-term improved survival. Total arterial revascularization should be encouraged in patients with a reasonable life expectancy.

Cardiac – Abstract session

Mid-term results of a single centre experience

Mitrilclip therapy and surgical edge-to-edge repair in patients with severe left ventricular dysfunction and secondary mitral regurgitation

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The Mitrilclip system has emerged over the last years as an alternative approach to surgery in patients with functional mitral regurgitation (MR) who are contraindicated or at high surgical risk. The Mitrilclip mimics the surgical edge-to-edge (EE) repair although, unlike surgery, it does not include a concomitant annuloplasty. In our Institution, at San Raffaele University Hospital (Milan, Italy), the EE technique has been used both surgically and percutaneously in patients with functional MR and this offered us the unique opportunity to compare hospital outcome and mid-term results of those two treatment options. In particular we compared patients undergoing Mitrilclip implantation for secondary MR (55 pts) with patients submitted to surgical EE repair combined with annuloplasty (65 pts). As expected, age and logistic scores were higher in the Mitrilclip group. However, the two groups were not significantly different in terms of severity of MR, LV size and function, pulmonary hypertension and prevalence of atrial fibrillation. Such a similarity can be explained by the fact that the surgical patients enrolled in this analysis were treated at a time when the Mitrilclip was not yet available and, therefore, surgery was the only treatment option even for cases at high surgical risk due to severe LV remodeling and dysfunction.

Hospital mortality was similar in the two groups. No hospital deaths occurred in the Mitrilclip group, confirming the safety of the percutaneous EE procedure even in high risk patients. Only two patients died before discharge in the surgical group. Mitrilclip patients had a shorter hospital stay and most of them were discharged home, confirming that the overall impact on the patients of the trans-catheter procedure was substantially lower than surgery. In terms of efficacy, this was significantly higher with the surgical EE repair. Surgical patients had a lower rate of residual MR at discharge and recurrent MR at follow-up. In addition, Mitrilclip was the only independent predictor of residual or recurrent MR in this series. This difference persisted also when only patients with initial optimal result (HFrEx ≤1) after surgery or Mitrilclip were compared. Despite the higher rate of residual and recurrent MR in the Mitrilclip patients, overall survival and freedom from cardiac death at four years was similar between surgery and trans-catheter treatment. No risk factors for cardiac mortality were found in the surgical group whereas LV end-diastolic diameter and SPAP were identified as predictors of larger patient cohort.

The prosthetic leaflets of the Mitrilclip remained available for further intervention if necessary.

Michele De Bonis
Complete resection of the subvalvular apparatus during mitral valve replacement in patients with stenosis- dominant rheumatic valves

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Mitral valve replacement has been an option for the treatment of patients with rheumatic mitral valve for a long time. Many surgical approaches to MVR have been developed, each with its own advantages and disadvantages. Indeed, a general consensus has yet to emerge as to which of the complete or partial preservation versus complete resection constitutes the best technical approach to the subvalvular apparatus during MVR. This study compared the early and midterm results of the preservation versus resection (partial/complete) of the subvalvular apparatus during MVR surgery regarding the left ventricular (LV) geometry and functional indices and changes in pulmonary arterial pressure in rheumatic mitral valve patients with a mixed stenosis and regurgitation pathalogy. Stenosis was the predominant determining factor of the structural and hemodynamic consequences on the LV. Sixty stenosis-dominant rheumatic patients undergoing MVR surgery were prospectively randomized to three groups: in the first group, all the leaflet and papillary muscles were removed, whereas in the second and third groups complete (anterior and posterior) or partial (posterior leaflet) chordal preservation was done. In each group, 20 patients were enrolled. Clinical and echocardiographic work-up was performed one day before surgery and then at two days and six months postoperatively and showed the left ventricular shape (as measured by left ventricular end-systolic and end-diastolic sizes, length, and sphericity index) was significantly better in Group one, who also had more acceptable systolic function (left ventricular ejection fraction) and diastolic function (as measured by lateral E′) and lower pulmonary artery pressure than the other two groups. Briefly our results showed that in case of rheumatic mitral valve with dominant stenosis in patients with small and restricted left ventricles, the total resection of the subvalvular apparatus confers better echocardiographic indices of shape, geometry, and function of the left ventricle as well as pulmonary vascular pressure compared to other approaches.

References


Transaortic approach for TAVI confirms its safety and effectiveness over time

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Three years after its systematic adoption as alternative access route for TAVI in patients with unsuitable peripheral vascular anatomy, significant respiratory disease and poor left ventricular function, the transaortic approach confirms its reliability with both the Edwards XT and CoreValve devices. In our 232 patients series, the largest single centre experience in the world to the best of our knowledge, we obtained very satisfactory procedural and midterm results according to the VARC 2 criteria. In this high risk population receiving both the available TAVI devices with a reverse "T" manubriotomy (69.4% Edwards XT and 30.6% Medtronic CoreValve) the device success rate was 95% with a 30-day mortality of 7.4% and low complications rate. Full sternotomy allowed, in 33 patients with severe coronary artery disease most often involving the left main stem and unsuitable for PCI, elective complete off pump coronary bypass procedures before the transcatheter transaortic device implantation. Emergency conversion to conventional surgery was required in 3.9% of the patients, acute kidney injury occurred in 1.7% and new pacemakers were implanted in 9.9% of the patients, more frequently in the CoreValve recipients. Cerebrovascular accidents (only one disabling and related to atrial fibrillation at one week) happened in 1.3% of the patients. One of the explanations could be the absence of “navigation” with guidewires and catheters in the aortic arch decreasing the risk of distal embolization in patients with aortic dehiscence. Femoral arterial laser grade A2/A4 were found at discharge in 7.3% of the patients. At follow-up (mean 18 months duration) mortality was 16.8% with 88% of the patients living without prosthetic dysfunction in NYHA class I and II.

As already published, the main advantage of the transaortic approach is the surgeon’s familiarity with the access and the cannulation of the ascending aorta which do not require a new specific training thus facilitating and shortening the learning curve. Then, the easy and quick conversion to full sternotomy and conventional cardipulmonary bypass allow a faster treatment of vascular or other complications. From this point of view we consider the transaortic approach potentially safer than the transapical access.

It must also be said that, after the advent of the new Edwards delivery device with rose cone, we did not see any more aortic dissections observed in the very early phase of our experience in three patients (only one died after supraaortic aortic replacement of respiratory failure) and in close relationship with inadequate material. Since then, the procedural success rate rose to 98%.

Finally, this is the only peripheral artery sparing procedure also avoiding the need for vessel closure devices. In conclusion, in our experience the Transaortic approach for TAVI confirms its safety and effectiveness and, compared with other proposed access routes, can be used in the vast majority of patients except, of course, those with a truly porcelain aorta which is a rare entity indeed.

References


Cardiac – Abstract session

Bioreactors for tissue engineering

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Due to the increasing interest in applying the concept of tissue engineering and chondral replacement in the human body, various bioreactors were developed over the last few years. These bioreactors are essential for controlling manufacturing and testing of tissue engineered products for either clinical application or clinical research. Today, there are no specific tools supporting the design, manufacturing and testing of such bioreactors under standardized conditions. Therefore, it was important to establish a working group of scientific and industrial experts that can identify shared problems, identify risk factors and define fundamental common requirements. The technical committee CEN/TC 316 “Medical products utilizing cells, tissues and/or their derivatives” of the European Standardisation Organization (CEN) works on a project towards standardisation of bioreactors and test systems. The presentation will give an overview on the current state-of-the-art technology, provide insight into the current activities for standardization on the European level and describe the potential future challenges in the approval process.

Cardiac – Focus session

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Three years after its systematic adoption as alternative access route for TAVI in patients with unsuitable peripheral vascular anatomy, significant respiratory disease and poor left ventricular function, the transaortic approach confirms its reliability with both the Edwards XT and CoreValve devices. In our 232 patients series, the largest single centre experience in the world to the best of our knowledge, we obtained very satisfactory procedural and midterm results according to the VARC 2 criteria. In this high risk population receiving both the available TAVI devices with a reverse “T” manubriotomy (69.4% Edwards XT and 30.6% Medtronic CoreValve) the device success rate was 95% with a 30-day mortality of 7.4% and low complications rate. Full sternotomy allowed, in 33 patients with severe coronary artery disease most often involving the left main stem and unsuitable for PCI, elective complete off pump coronary bypass procedures before the transcatheter transaortic device implantation. Emergency conversion to conventional surgery was required in 3.9% of the patients, acute kidney injury occurred in 1.7% and new pacemakers were implanted in 9.9% of the patients, more frequently in the CoreValve recipients. Cerebrovascular accidents (only one disabling and related to atrial fibrillation at one week) happened in 1.3% of the patients. One of the explanations could be the absence of “navigation” with guidewires and catheters in the aortic arch decreasing the risk of distal embolization in patients with aortic dehiscence. Femoral arterial laser grade A2/A4 were found at discharge in 7.3% of the patients. At follow-up (mean 18 months duration) mortality was 16.8% with 88% of the patients living without prosthetic dysfunction in NYHA class I and II.

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References

Cardiac – Focus session

The effects of using a radial artery in patients already receiving BIMA during CABG

30-Day outcomes and 14-year survival in a propensity-matched cohort

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Previously we have demonstrated the long-term benefits associated with choosing a BIMA (Bilateral Internal Mammary Artery) over the standard LIMA-SVG (Left Internal Mammary Artery – Saphenous vein Graft) during CABG (Coronary Artery Bypass Grafting). While there have been previous studies on the benefits of incremental use of arteries during CABG, there has been limited research on the effects of adding a radial artery to a BIMA strategy. In our presentation entitled ‘The Effects of Using a Radial Artery in Patients Already Receiving Bilateral Internal Mammary Arteries during Coronary Bypass Grafting: 30-Day Outcomes and 14-Year Survival in a Propensity-Matched Cohort’ we evaluate whether the use of an additional radial artery provides superior long-term outcome in patients receiving BIMA at our institution.

To this end we compared two groups of 183 propensity-matched patients who received either BIMA-radial or BIMA-SVG during CABG between the years 2000-2013. Both patient groups had equivalent pre-operative patient characteristics after propensity matching. After comparing the 30-day outcomes we observed that the BIMA-Radial group had more post-operative atrial fibrillation (24.6% vs. 12.0%, p=0.001) and a longer stay (avain vs. six days, p<0.007) than the BIMA-SVG.

Kaplan-Meier analysis was performed to compare the long-term survival between the groups (Figure 1). This showed that the three-year survival rates of the BIMA-SVG were slightly higher (99% vs 97.3%). At 10 years the survival curves cross, such that at the longest follow-up point there is a trend favoring the BIMA-radial group (91% vs. 83% p=0.025).

Further analysis after splitting the cohort at 10 years showed the BIMA-
radial group has improved survival (99% vs 92%, p=0.06) over BIMA-SVG patients between 10 and 14 years (Figure 2).

The results from this study corroborate previous literature on the benefits of anterolaterization during CABG, demonstrating how the incremental increase in arterial revascularization shows improved long-term survival. This study supports the positive long-term effects of the radial artery as an additional arterial conduit to the BIMA-saphenous vein increase in significant short-term complications. The addition of the radial artery to the BIMAs does not radically increase the procedure’s complexity and could be adopted by most practicing surgeons.

Thoracic – Abstract rapid response session

Suction on chest drains following lung resection: evidence and practice are not aligned

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Much controversy exists regarding the application of low-pressure suction to chest drains following non-
neumothorax lung resection. A recent meta-analysis of randomised controlled trials comparing a policy of suction versus no suction found no evidence in favour of post-operative suction in terms of occurrence of prolonged air leak, air leak duration, chest tube duration or length of stay.012 We sought to determine whether clinical practice is consistent with published evidence by surveying thoracic units nationally.

We performed our own meta-analysis of the eight ‘best evidence’ papers, which included a more recent randomised controlled trials not analysed by previous studies, and generated forest plots using RevMan.

Members of the UK Cardiorthacic Trainers’ Research Collaborative (CTCR) were emailed a survey concerning chest drain management following non-
neumothorax lung resection. The UK CTRC is a nationwide network of trainee cardiothoracic surgeons working together to maximise data availability, resources and research output. A clinical representative from each unit was asked if there was a written unit protocol concerning suction on chest drains and whether suction was routinely applied.

Meta-analysis showed that use of suction made no difference to the occurrence of Prolonged air leak (see Figure 1). Indeed, suction had an adverse effect on air leak duration, Chest tube duration and Length of stay. However, it was associated with a decrease in the incidence of post-
operative pneumothorax.

Our national survey revealed that of 89 surgeons represented, 61 (69%) routinely use suction (see Table 1). Criteria for suction discontinuation and chest drain removal vary widely and are essentially surgeon-specific (see Figure 2). Electronic drains are used in 14 units.

Application of suction to chest drains following non-pneumothorax lung resection is common practice nationally. Suction has an effect in hastening removal of air and fluid in clinical experience. The ‘mechanistic efficacy’ results in a reduced rate of post-operative pneumothorax, which is witnessed first-hand by clinicians caring for the patient. However, this does not translate into the benefits of earlier chest drain removal or shorter hospital stay, which would constitute the ‘clinical effectiveness’ of suction. Therefore, clinical practice is not aligned with level 1 evidence.

This study was born of a trainee-led, nationwide collaboration thoracic units. Development of the UK CTRC drew inspiration from a similar initiative set up by general surgeons in the north of England. The UK CTRC promotes trainee involvement in high-quality research and facilitates the pooling of resources and data from many cardiothoracic centres.

Reference


Figure 1: Kaplan Meier survival comparing conduit groups

Figure 2: Kaplan Meier survival splitting groups at 10 years

Vascular – Abstract session

Root replacement in acute type A aortic dissection

3Does valve preservation increase surgical risk?

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Despite several advantages of valve-sparing root replacement (VSR), there are still controversies in applying VSR in acute type A aortic dissection (AAD), mainly due to the technical complexity and the uncertainty of long-term outcomes.

Dr. Sung and coworkers retrospectively reviewed 53 patients who underwent surgery for AAD and concomitant root replacement between 1998 and 2013 at Samsung Medical Center. Patients were divided into two groups: Bentall (Bentall group, n = 35) and VSR (sparking group, n = 18). The mean follow-up duration was 53.3 ± 45.3 months. Endpoints were all major adverse valve-related events (MAREs) and all-cause death.

Patients in the Bentall group were older than those in the sparing group (Bentall, 48 ± 15 years, p = 0.001). Other preoperative characteristics were similar between the two groups. Aortic cross clamp time was significantly longer in the sparing group (Bentall, 181.31 ± 65.46; sparing, 246.86 ± 43.89 min, P < 0.001). There were no early deaths in the sparing group and two in Bentall group (P = 0.543). There were three reoperations for aortic valve replacement in the sparing group due to progression of aortic regurgitation. Two patients had operations in the early period of VSR (both 2005).

Despite freedom from reoperation for aortic valve was higher in the sparing group than the Bentall group (P = 0.001), MAREs and all-cause mortality did not differ between the two groups (P = 0.544 and 0.119, respectively). In multivariate analysis, the root replacement technique was not a risk factor for major valve-related events.

In this study, VSR seems to be equivalent to the Bentall procedure for AAD in terms of overall clinical outcomes. VSR can be considered a viable option, particularly for young patients treated in an experienced centre. The longer-term follow-up on randomised trials would be necessary for possible reoperation.
External chest supports: A lot to win and nothing to lose

Is it time for routine use? Limited research has been done to demonstrate the best method to protect the sternum after a sternotomy. Current clinical practice is often based on anecdotal evidence and expert opinion. There is no consensus on prevention and postoperative care, although peer reviewed publications reach compelling conclusions about post-sternotomy complications. [16-17,26,46,75]

On infections:
- Sternal wound infections (SWI) range from 0.5-9%, and deep sternal wound infections (DSWI) from 0.3-7.3% (90 days follow-up) with a mortality rate of 9-47%. [25-28,32,59,61]
- The STS database shows major sternal infections in 3.51% and DSWI in 0.6% (includes only acute events). [42]

On late onset of infections:
- 50% of SWI and 80% of DSWI are diagnosed after discharge (90 days follow-up). [32,33,81]
- Early discharge to reduce costs could be counterproductive as it leaves patients to deal with wound issues, pain and inefficient breathing without professional assistance. [33,48,50]

On postoperative pain and pulmonary complications:
- Chronic pain affects 17-56% of patients, and pulmonary complications range from 8% to 79%. [2-9,13,16-17,19,20]
- Post-surgical atelectasis and less expansion of lower lung lobes are linked to pain, ineffective breathing, weak coughs, decreased mobility, and a prolonged recovery. [12,17-19]

On coughing:
- Lifting 40 lbs puts less force on the sternum than a cough, which unsupported is the main cause of sternal stress and can lead to sternal instability, wound dehiscence, and mediastinitis. [26,46,71]

On obesity:
- The greater degree of obesity, the higher incidence of sternal dehiscence. Obesity constantly puts forces from increased intra-thoracic pressures during cough and in obese patients. [75,78-84,86]
- Sternal separation and pain are significantly lower with external chest support of the thorax. Compression provides resistance to the lateral forces from increased intra-thoracic pressures during cough and in obese patients. [75,78-84,86]
- An external chest support allows patients to breathe deeper with less pain when the parasternal muscles are complemented, and the torsional forces during mobilization and daily living activities counteracted. When patients have little time to brace themselves for a sneeze, cough or losing one's footing, the additional support is critical. [46,80,83]
- Sternal separation and pain is reduced in patients with chronic sternal instability, as are interruptions to sleep due to excessive sternal motion when patients move in bed. [75,80]

On costs:
- Sternal wound complications accumulate 18-20 additional hospital days and cost up to 3 times more than a complication-free case. [20,22-23,27,31,48]
- Prevention of complications is an important consideration in patient safety initiatives and the implementation of best practice guidelines, and results in substantial cost savings. [24]

On the cause of infections and dehiscence:
- Breakdown of skin sutures followed by seepage of bacteria into the deeper layers of the sternal wound cause sternal wound infections. [59,64]
- Sternal instability and friction between the sternal halves promotes inflammation and effusion resulting in infection. [75,82]
- Sternal wires are the only force holding the sternal together post-operatively, and must withstand the main force leading to sternal dehiscence, which is concurrent strain of the sternum in lateral direction. Higher forces are required in both anterior-posterior and retro-caudal directions. [46,61]

On preventive methods:
- Opening the sternum strictly midline and using tension free wound care to prevent skin breakdown would prevent most post-sternotomy complications and should be basic principles. [26-64]
- Cough and respiratory movements of the thorax loosen the steel wires and require supplementary means, such as chest supports. [84,86]

On external chest supports:
- Sternal complications and pain are significantly lower with external support of the thorax. Compression provides resistance to the lateral forces from increased intra-thoracic pressures during cough and in obese patients. [75,78-84,86]
- An external chest support allows patients to breathe deeper with less pain when the parasternal muscles are complemented, and the torsional forces during mobilization and daily living activities counteracted. When patients have little time to brace themselves for a sneeze, cough or losing one's footing, the additional support is critical. [46,80,83]
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Literature makes a strong case for the routine use of external chest supports to decrease complications and reduce costs. The decision to use a specific device should be based on whether there is adequate in pain and complications and a positive effect on patient function, comfort, ease of breathing, and ease of exercise activities, as well as whether patients will conform with usage for up to 8 weeks. [a,86]

When fulfilling requirements to improve the entire recovery process, there appears to be a lot to win for patients and health care providers and nothing to lose.

For a complete list of references see the white paper publication, “Evaluation of external chest supports bases on the entire recovery plan in improving the hospital to avoid offset costs of long term complications and medications”, [a] on www.qualiteam.com
Virtual prediction of pediatric cardiac surgery

Virtual prediction of surgery provides a novel means to pre-operatively evaluate blood flow characteristics and tailor the surgery to the patient-specific anatomy. This framework has been successfully applied to assist the surgical planning for congenital single-ventricle patients, who need a palliative surgical procedure, i.e., Fontan, involving the total cavopulmonary connection (TCPC) design. Our goal is to provide the clinical team with a series of options that seek to improve the adverse hemodynamics in the connection. A schematic of the virtual prediction of surgery is outlined in Figure 1. The flow starts from obtaining cardiac magnetic resonance (CMR) images. Such images, then, are segmented to create patient-specific vascular models (i.e., bi-directional Glenn or existing TCPC connections, and ventricular volumes) and reconstruct flow information, if available. Furthermore, a specifically designed virtual surgery environment is used to mimic the procedure of interest: baffles placement in Fontan patients. Blood flow simulations using computational fluid dynamics techniques are performed to characterize hemodynamic metrics (i.e., power loss and hepatic flow distribution) to compare therapeutic potential outcomes and provide input to surgical decision-making.

In conclusion, virtual prediction of surgery is an exciting new paradigm for patients with congenital heart defects, and has the potential to deliver patient-specific benefit. Moreover, surgical planning can be helpful in the evaluation of more complex surgical options in order to assess their benefits. Last but not least, the paradigm is now being extended to other congenital heart diseases such as double outlet right ventricle (DORV). With this state-of-the-art technology, we hope to assist the surgical planning efforts of pediatric cardiac surgeons and cardiologists around the world.

References

Congenital – Focus session
Virtual prediction of pediatric cardiac surgery

Cardiac – Focus session
2014 ESC/EACTS Joint Guidelines on Myocardial Revascularization: What are the unanswered questions

Cardiac – Abstract session
Impact of sequential bypass grafting with full skeletonised in-situ arterial grafts

Impact of sequential bypass grafting with full skeletonised in-situ arterial grafts

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The sequential grafting techniques of in-situ arterial grafts for many coronary bypasses have been attempted to perform sequential grafting and have grafted a maximum of six branches using only in-situ skeletonised in-situ arterial grafts. But these attempts to perform sequential grafting and have grafted a maximum of six branches using only in-situ skeletonised in-situ arterial grafts have not been successfully performed and have not been performed in many cases with an unsatisfactory result. Using this technique, dissection of the entire length of in-situ arterial grafts takes a short time. Removal of the surrounding tissue makes serial anastomosis easier. The aim of this study was to clarify the efficacy of sequential grafting of the full skeletonised in-situ arterial grafts using the intra-operative time flow meter technique (ITTM) and the post-operative angiograms. The 630 anastomoses after total arterial revascularization with an off-pump were reviewed. The Mean Flow of sequential grafts at 31.3mmHg was significantly higher than that of individual bypasses at 26.1mmHg (p < 0.005). Whereas, the pulsatibility index (PI) was significantly lower in sequential bypass (2.17) than in individual bypass (2.70) (p<0.03). These outcomes suggested that the flow characteristics of sequential graft were superior to individual grafts on the basis of observations that showed significantly lower vascular resistance and higher flow velocities in the sequential bypass grafts compared with the individual grafts. The 617 (97.9%) graft anastomoses were patent while 13 (2.1%) were occluded. In the sequential bypass grafts 259 (98.9%) graft anastomoses were patent, and in individual bypass 358 (97.3%) anastomoses were patent. The difference in the overall graft patency between sequential bypass and individual bypass was not statistically significant. In the coronary revascularization analysis of the 630 anastomoses, the predictor of occlusion was the use of the right gastroepiploic artery. In sequential bypass grafting, the stenosis range and diameter of the native coronary artery were not considered independent risk factors statistically. We revealed the sequential in-situ arterial grafts had significantly preferable hemodynamic characteristics compared with the individual in-situ arterial grafts without risk of graft occlusion. The sequential grafting technique enables the entire coronary system to be grafted using only in-situ arterial grafts with an excellent patency rate even in patients requiring multiple revascularization. The adequate effect could be expected in the sequential bypass grafting with full skeletonised in-situ arterial grafts.

SYNTAX score ≥2. Conversely, for patients with left main disease and a SYNTAX score >32 percutaneous revascularization is not recommended (class IIb). Unanswerable questions remain for patients with left main disease intermediate SYNTAX scores (IIa, 23-32). A relevant piece of information can come from the ongoing EXCEL trial, which is recruiting 2,600 patients with unprotected left main disease and a SYNTAX Score ≤32 to determine the safety and efficacy of percutaneous revascularization with a new generation drug-eluting stent as compared to coronary artery bypass grafting for the primary endpoint of death, myocardial infarction, and stroke assessed at three years of follow-up. Finally, the selection of patients and revisions for revascularization may be refined. Current techniques rely on coronary angiography and detection of flow-limiting lesions determining ischemia. However, future adverse events are related, at least in part, to non-flow-limiting vulnerable plaques. Identification of vulnerable plaques and appropriate treatment strategies require further development.

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The recently published joint guidelines on Myocardial Revascularization of the EACTS and ESC represent an important update and are based on a constantly expanding body of evidence. Of note, however, 119 out of 314 recommendations (38%) provided by the guidelines have a level of evidence C – which indicates that these recommendations are based on expert opinion. Therefore, there certainly is a number of unanswered questions that will require to be investigated in future clinical trials. On a cardiologist perspective, a number of issues remain unanswered regarding strategies for myocardial revascularization in patients with stable coronary artery disease. First, it remains to be determined whether revascularization by percutaneous coronary interventions not only improves symptoms and quality of life but also prognosis in patients with stable coronary artery disease coronary artery disease. The guidelines Task Force has conducted a systematic review and network meta-analysis of available randomized evidence comparing revascularization strategies and medical therapy in patients with stable coronary artery disease. The findings of this meta-analysis – recently published in the British Medical Journal – confirm a survival advantage of coronary artery bypass surgery over medical therapy. Similarly, it is noteworthy that percutaneous revascularization with new-generation drug-eluting stents is also associated with improved survival as compared to medical therapy, which instead appears not to be the case for earlier percutaneous revascularization strategies (i.e., balloon angioplasty, bare metal stents, and early-generation drug-eluting stents). Certainly the ongoing ISCHEMIA trial will provide a basis for more definite conclusions on this matter. The trial is currently recruiting 8000 patients with stable coronary artery disease who – before coronary angiography and in the presence of objectively determined ischaemia – are randomised to medical therapy or an invasive strategy to detect differences in the composite of death or myocardial infarction.

Second, the role of percutaneous coronary interventions in the treatment of left main disease is increasingly appreciated. Primarily based on the results of the SYNTAX trial, the guidelines are clear in providing a class I recommendation to both surgical and percutaneous revascularization strategies in patients with left main disease and a
Single stage hybrid close chest stand-alone atrial fibrillation ablation

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Historically, the Maze procedure, introduced by Dr. J. Cox, has been the surgical treatment of choice for symptomatic patients with medically refractory atrial fibrillation (AF). This surgical procedure is based upon the principles of critical mass. By subdividing large areas of contiguous tissue, the idea is to eliminate all potential re-entrant circuits that could rotate around the thoracic veins and valve annuli. Improved mapping studies and the knowledge that AF is often initiated from ectopic beats at nodes in the pulmonary veins (PVs), radically changed the interventional options for patients with AF. As a consequence, non-surgical catheter based endocardial techniques evolved rapidly and indications for interventional treatment include paroxysmal as well as chronic AF. Recently it was also introduced as a first-line treatment of paroxysmal AF in patients without heart disease. But, current literature shows that long-term results of endocardial catheter ablation in patient with non-paroxysmal AF are suboptimal, in particular with a single procedure. One of the challenges the electrophysiologists are confronted with: recovery of conduction after complete acute circular isolation of the PVs, the dominant factor for recurrent atrial tachyarrhythmias. This is most probably related to the limitations of energy delivery of the existing endovascular ablation tools. Minimally invasive surgical treatment of AF is not limited by the vascular access and therefore potentially has a better choice of ablation tools.

The challenge with AF surgery is the development of an off-pump thorascopic ablation procedure that can create a transmural lesion set in a reliable and safe manner. Therefore, intra-operative electrophysiological assessment of the triggers and substrates of AF in a step-by-step tailored approach, with verification of conduction block over the ablation lines (and maybe indentability) could improve this success rate. A hybrid endocardial–epicardial approach, whether performed as a single-step or sequential procedure, combines the efficacy of surgical ablation with the knowledge of endocardial mapping and, if necessary, short and focused endocardial ablations. A literature overview of the hybrid treatment of AF showed acceptable complications rates of 4.1%. Only 0.8% of the patients required a conversion to sternotomy and none of the patients reported in the hybrid literature experienced a thromboembolic event. Freedom from AF off antiarrhythmic drugs (AAD) at one-year follow-up ranged from 85.7% to 92% in papers employing bipolar RF and from 36.8% to 88.9% in those utilizing monopolar RF. With specific reference to AAD-free success rate by type of AF, it ranged from 60% to 91.6% in paroxysmal AF, from 52% to 77.7% in persistent AF and from 20% to 100% in LSP-AF. These figures compare favorably either with minimally invasive beating heart surgery or percutaneous catheter ablation.

The hybrid single step or sequential approach for the treatment of AF has the potential to increase success rates and lower complication rates, but is still actively evolving. A multicenter randomized study comparing a hybrid approach to a percutaneous catheter approach is starting and will improve our understanding of this relatively new technique.

Lasso catheter in left superior pulmonary vein during thoracoscopic ablation

Cardiac – Focus session

Tissue engineering: Where are we now?
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Tissue engineering was introduced in the mid 1980s by Vacanti and Langer, exploring the potential of this new technology starting with the famous ‘human ear on the mouse back’. The goal of this technology is to create a substitute, which supplies an individual therapy for patients including regeneration, remodeling and growth potential. The growth potential of these materials, especially in congenital cardiac surgery, repeated surgery or interventions could be avoided. To create a tissue engineered subject these components are needed: namely autologous cells, a scaffold and a bioresorbing material. Initial cell were end-differentiated autologous cells, which have limited potential to grow. New sources, such as stem and pluripotent cells, were explored to increase growth potential, however without losing their unique functionality and full control on growth. The three-dimensional scaffold, which will be seeded on, is another crucial component, providing biological and mechanical integrity, biochemical signals, supporting attachment and migration of cells, allowing dynamic changes of the scaffold’s architecture. The scaffold origin can be of synthetic polymers or biological-based scaffolds. The final component is a bioresorbing material. This can be done in vitro by so-called bioreactors, which are currently standardized in a norm. Unseeded scaffolds, however are also implanted in which the organism itself will be the bioresorbing and neo-veining starts in vivo. In the mid 1990s initial in vivo experimental studies showed that tissue engineered grafts and valves can be successfully implanted. Tissue engineering is a dynamic technology and so the development of these products, which are continuously modified and improved. Today, initial clinical studies are started using tissue engineering tube graft, valves as well as patch material. Most of these studies are performed in the right ventricular outflow tract, however some studies are also performed under systemic circulation conditions. Generally new technologies are unified and so this was also done with tissue engineering and new application forms of heart valves. First studies are initiated in valve intervention by using tissue engineered heart valves with the new transcatheter delivery system, allowing the implantation of valves less invasive. This era has recently started. Simultaneously studies have been started on tissue engineering of so-called whole organs. Also organ transplantation is very restricted due to donor shortage, tissue engineering could overcome this problem. Initial studies of Taylor on whole heart tissue engineering in the rat model are promising, however this size will not be sufficient and therefore these methods need to be optimized to be used in larger models. In the near future many studies will be performed on bio-artificial organs. In the postgraduate basic science session held on October 13, there will be an overview on the current state of the art on this issue of tissue engineering in cardiovascular diseases.
Thoracic – Abstract rapid response session

Patch replacement of left hemidiaphragm in dog by cryopreserved heterograft

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Objective

Replacement of diaphragm by bioprostheses is still a challenging issue. To evaluate the possibility of using diaphragm allograft in human being, we designed a study of patch cryotheroagraft in phase one in canine.

Methods

At the end of organ harvesting from donor, left hemidiaphragm was taken and transported to laboratory in PBS solution. The graft was dried and repacked in sterile condition and was frozen at -70 centigrade for one month. Through left thoracotomy in eight intercostal space in six dogs, patch of 10 cm in 7cm of native diaphragm were replaced with cryopreserved human diaphragm. They were followed by vital signs, CXR, sonography and three with CT scan. Three animals were euthanized after six months.

Results

There was no mortality. CT scan showed mild atelectasis and scattered infiltration in left lower lobe with some adhesion and minimal fluid collection under diaphragm (Figure 1). There was no evidence of gross disruption and complete healing of sutures line in necroscope (Figure 2). The transplanted patch has been completely replaced with fibrous tissue. Multiple thick micro thin H&E slides were taken from each formalin fixed specimen after paraffin embedding and tissue processing. The slides were reviewed by a pathologist under light microscope. The transitional zone between skeletal muscle of diaphragm and graft showed mild chronic inflammatory cell reaction. No skeletal muscle was seen in the graft. All

Cardiac – Abstract session

Evidence for neuroprotection

Decreased DNA disruption in the porcine necortex with erythromycin preconditioning during prolonged hypothermic circulatory arrest

Charlene-Paragno-Kostrzynska (right), G.E. Dressman (middle) and E.J. Johnson (far right)

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Despite the apparent deleterious effects of prolonged exposure to cardiopulmonary bypass (CPB) and hypothermic circulatory arrest (HCA) on brain function and structure, neuroprotective strategies remain an issue of debate. We have previously reported that the necortex is selectively vulnerable to injury in an acute porcine model of HCA at 18°C. The brain starts to exhibit neuronal injury shortly after reperfusion via activation of the apoptotic pathway. In regards to recent evidence showing that pharmacologico preconditioning with a single, clinically acceptable dose of Erythromycin lactobionate induces tolerance against transient global cerebral ischemia in rats, we hypothesized that erythromycin would reduce the number of apoptotic neurons in the necortex in an acute porcine model of HCA at 18°C.

Fourteen pigs underwent 75 minutes of HCA at 18°C following reperfusion with erythromycin (25mg/kg iv), Erythromycin pretreatment group (Ery) (n = 8), or vehicle (Normal Saline 0.9%), Vehicle pretreatment group (Veh) (n = 6), applied 12 hours before arrest. Three served as normal controls, Normal control group (Ctl). After gradual rewarming to a temperature of 36°C, treatment animals were sacrificed and brains were perfusion-fixed and cryopreserved. Neuronal apoptosis after HCA was observed morphologically with hematoxylin and eosin staining (H&E), and characterized by in situ DNA fragmentation using terminal deoxynucleotidyltransferase-mediated biotin-dUTP nick end-labeling (TUNEL) histochemistry. The mean duration (±SD) of CPB cooling for animals in groups Ery and Veh was 41.3 ± 7.4 and 42.5 ± 8.9 minutes, respectively. T test, p = 0.57. There was also no difference in the mean duration of CPB rewarming (52.6 ± 4.9 and 55.3 ± 6.1 minutes, respectively).

Figure 1: Photomicrographs showing morphological features of apoptotic cells following HCA for pretreatment with Vehicle.

Figure 2: Photomicrographs showing morphological features with H&E staining of neurons in all three experimental groups.

Figure 3: Photomicrographs of necortex using TUNEL histochemistry in all the three experimental groups.

Cardiac – Abstract session

A 25-year Study of Chordal Replacement with Expanded Polytetrafluoroethylene in Mitral Valve Repair

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Chordal replacement with expanded polytetrafluoroethylene (ePTFE) sutures has been widely adopted as it is considered to increase the probability of successful mitral valve repair. We evaluated the long-term outcomes of mitral valve repair with chordal replacement using ePTFE sutures over the past 25 years, including Histopathological analysis.

From July 1988 to February 2013, 224 consecutive mitral valve surgeries (mean age 56.5 years, 33.9% women) underwent mitral valve repair with chordal replacement using ePTFE sutures. The mean ePTFE chord was 1.0 mm in size. At the time of surgery, the mitral valve leaflet prolapse was observed in 134 patients (59.8%), while isolated posterior leaflet prolapse was observed in 13 patients (5.8%), and bileaflet prolapse was observed in 77 patients (34.4%). Our operative technique was as follows: 4-0 double-armed ePTFE suture with a small Teflon pledget was passed through the fibrous portion of the papillary muscle head without tying, and the ends of the suture were passed twice through the free margin of the prolapsing leaflet separately from the left ventricle to the left atrium. After additional procedures for the mitral leaflet and mitral annuloplasty, which was done mostly with a ring, the length of the artificial chordae was determined by comparing with the adjacent normal leaflet or opposing leaflet during dissection of the left ventricle with saline solution. The ends of the ePTFE sutures were then gently tied on the left atrial side. The number of replaced artificial chordae ranged from 2 to 12 (mean 3.7) per patient. Tricuspid ePTFE chordae were present in 20 cases and there were 5 cases in which the tricuspid ePTFE chordae were not used. The follow-up period ranged from 0.1 to 25.3 years (mean 7.4). There was one death early in the left and late deaths, of which seven were cardiac related. The actuarial survival at 10 and 20 years were 92.4% and 81.0%, respectively. Thirty-three patients (14.7%) developed moderate or severe mitral regurgitation during the follow-up period and 30 patients (13.4%) required reoperation on the mitral valve. Freedom from reoperation and freedom from recurrent moderate or severe mitral regurgitation were 83.7% and 81.6% at 10 years, and 73.7% and 59.1% at 20 years, respectively. Multivariate analysis revealed that the independent predictors of recurrent mitral regurgitation were mitral valve repair without annuloplasty ring and greater than mild postoperative mitral regurgitation; and the independent predictors for mitral reoperation were previous cardiac surgery and greater than mild postoperative mitral regurgitation. Histopathological analysis of the ePTFE sutures removed during reoperation revealed complete endothermalization without calcification or microthrombi.

In conclusion, our 25-year follow-up demonstrated reliable long term outcomes of chordal replacement with ePTFE sutures. Implanted ePTFE chordae could keep flexibility and durability without calcification for a very long-term.

Figure 1: Freedom from reoperation was 83.7% at 10 years and 73.7% at 20 years, respectively.

Figure 2: Pathological analysis of the expanded polytetrafluoroethylene sutures removed during reoperation revealed complete endothermalization without calcification or microthrombi.
the graft parenchyma had been replaced with dense fibrous tissue. No perforation, significant edema or congection were seen. Focal calcification was noticed in every case. Foreign body type of granulomas were clearly seen in all over the grafted tissue. Vascular changes were nil and vasculitis or fibrinoid necrosis of vessel wall was not seen. Inflammatory cells were mainly composed of lymphocytes and macrophages with a few neutrophils (Figure 3).

Discussion. Synthetic material has traditionally been used for tissue reconstruction in thoracic surgery. Diaphragm resection necessitates complete reconstruction. The use of bioprosthetic is an evolving strategy in reconstructing soft tissue. There are good results with bioprosthesis in partial replacement of diaphragm. Engineered bioprosthesis or acellular type are more expensive and require advance technology to prepare. Cryopreservation is a simple technique to prepare a kind of bioprosthesis without allogenic reaction.

Conclusion

Cryopreserved diaphragm is an option for partial replacement of diaphragm. However, further study including total diaphragm replacement, and compared with other bioprosthesis including decellularized diaphragm should be considered. We plan to implant decellularized heterograft diaphragm in phase 2.

Figure 2: Patch before and after replacement

Figure 3: Histology

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Cardiac – Clinical anatomy session

Anatomy of the mitral valve

Horia Muresan
University of Bucharest, Romania

As Horia Muresan states... “Precise knowledge of anatomical details is of utmost importance in complex procedures such as the Ross operation.” (RTH Anderson: Further anatomical insights regarding the Ross procedure. Ann Thorac Surg 2006;81:411-2)

Introduction

The periodical re-evaluation of anatomical details in the clinical and surgical context, the continuous feed-back and comparisons with the newly-developing diagnostic and therapeutic procedures, represents a “sine qua non” for the modern surgeon. This appears even more important for the cardiac surgeon. The clinical anatomy of the heart and of some of its principal elements is presented in the setting of three courses and a lecture, during the EACTS 28th Annual Meeting in Milan by Dr. Horia Muresan MD, PhD, cardiovascualr surgeon and head of the Cardiovascular Department of the University Hospital of Bucharest Romania. Dr. Muresan is an equally well-known anatomiast and specialist in medical photography: he presents unparalleled images of human heart specimens specially prepared in order to reveal the hidden and less known details of such cardiac structures as the mitral valve, the aortic root and valve, the right ventricle, the coronary arteries and veins. And all the particulars envisaged of clinical and surgical applications, and not least, are correspondingly-relevant and important for any specialist involved in the diagnosis of cardiac conditions, including: echocardiographers, CT and MRI specialists. The images presented by Dr. Muresan are particularly relevant being produced and recorded by a cardiovascualr surgeon, anatomist and photographer, who provides new data and particular consistence with the requests of the most complex cardiac surgical procedures nowadays.

Monday 13 October

The mitral valve is presented in the session “Understanding the mitral valve” (Monday 13 October, in Gold Room). The presentation is part of a complex session which associates pathophysiology, diagnostic interrogation and surgical solutions addressing specifically the mitral regurgitation, and particularly the ischemic mitral regurgitation. The mitral valve is described in the largest context of the mitral valve complex, which includes the subvalvar apparatus, the ventricular myocardiun, the coronary circulation (with particular topiology and dominance) - all these particulars being presented in various patterns of mitral regurgitation and different responses to disease also.

“The clinical anatomy of the right ventricle” (Monday 13 October 11:15 AM). There is a growing body of evidence supporting the fact the right ventricle (RV) depicts a different behavior both under normal circumstances as well as in disease, when compared to its left counterpart. Right ventricular dysfunction is directly related to survival, and predicts adverse outcomes in patients with left ventricular (LV) failure, coronary artery disease (with or without RV atrial involvement). The response of the RV to disease is different from that of the LV. The diagnostic approaches and the emergent therapeutic measures are not identical or automatically and equally applicable to the RV and LV.

The differences between the RV and LV can be traced at several levels: embryological, gross anatomical, microscopical, mechanical and biochemical. The thorougt clinical anatomical re-evaluation and manalysis of all the elements characterizing the RV is of utmost importance for understanding this particular element of the heart, and its function under various physiologic circumstances, as well as in disease while trying to offer the most suited diagnostic and therapeutic measures.

Tuesday 14 October

“The clinical anatomy of the cardiac veins, with special emphasis on electrophysiologic and percutaneous procedures” (Tuesday 14 October 11:15 AM). Recent developments in cardiac pacing and trans-coronary vein ablations have demonstrated the increasing value of imaging of the cardiac venous system (CVS), especially computed tomographic (CT) mapping of the coronary veins. In contrast to that for coronary arteries, the literature for coronary veins is scarce. Moreover, a complete, highly efficient, and clinically useful classification of the CVS is not as straightforward as for the coronary arteries. The CVS comprises polymorphic types of venous conduits with notable anatomic variations. Recent anatomic classification divides the cardiac veins into two main groups: tributaries of the greater CVS and tributaries of the lesser CVS, consisting of the Thebesian vessels. The greater CVS is subdivided into two groups: coronary sinus and non-coronary sinus tributaries. The author describes the clinical implications of the different imaging techniques for assessment of the coronary veins, where cardiac CT venous mapping has major advantages. The role of CT in anatomic classification, assessment of anatomic variants, and diagnosis of pathologic changes of the CVS is discussed. The author also underscores the particular role of CT venous mapping for cardiac interventions, especially for left ventricle pacing in cardiac resynchronization therapy and in percutaneous mitral annuloplasty.

“The surgical anatomy of the aortic root” (Tuesday 14 October 11:15 AM). The aortic root, is the centrally-located cardiac structure, establishing anatomical relations with practically all the remainder cardiac elements. Its particular make up renders its description and characterization apparently simple, in spite of the fact that its function is complex and still poorly understood. Beside the well known anatomical elements such as the valve leaflets, annulus, sinutubular junction, commissures, etc., the author underscores the particular structure and role in normal physiology as well as in disease, of the following components of the aortic root: interleaflet triangles, the fibrous and muscular portions of the aortic root (and the difference between these), the nutrient arteries and the nerves of the aortic root and leaflets. A particular attention is focused on the ultrasound measurements and echographic characterization of the aortic root. The main surgical aortic valve sparing techniques and homograft aortic replacement procedures are presented in the framework of the new clinical anatomy data.
Heart Failure
State of the Art and Future Perspectives

On November 2014, the EACTS will host its third Advanced Module: Heart Failure – State of the Art and Future Perspectives course at EACTS House in Windsor, UK. EACTS also talks to one of the course directors, Professor Gino Gerosa (Padua, Italy), about the course.

“In the Third Heart Failure Course we will again try to incorporate all aspects of heart failure from diagnosis and epidemiology, imaging and biomarkers, to advanced therapies such as LVADs, tissue engineering and the total artificial heart,” said Gerosa. “The aim to provide a comprehensive overview of the current status of the available treatments for heart failure patients.”

The course, which is aimed at residents and experienced cardiac surgeons with an interest in the heart failure field, will include a world-class faculty of heart failure experts including cardiac and congenital surgeons, cardiologists and scientists.

The course will begin with two presentations by pathologist Professor Angelo (Padua), who will explain the development of heart failure, why certain diseases lead to heart failure and the diagnosis of the condition. Professor Feltrin (Padua) will then examine the role of biomarkers in heart failure and Dr Ossoi (Bad Oeynhausen, Germany) will then assess the current alternatives to medical therapy such as implantable cardioverter-defibrillator resynchronisation therapy and biventricular pacemakers.

Dr Schulte (New York) will then discuss optimal medical therapy and provide a cardiologist’s point of view by evaluating the current medical therapies available for treating heart failure.

“We will also examine the surgical options for heart failure including mitral valve repair and replacement, as well as myocardial revascularisation,” added Gerosa. “It is important that all the current therapies and treatment options are explained, discussed and understood. Heart failure is a highly complex condition and one that has multiple solutions, choosing the right solution is key.”

Case reports
“We will also be presenting some case reports and asking the group for their opinion, allowing the group to discuss different treatment options and take part in the decision-making process,” explained Gerosa. “The case reports discussions provide delegates with an opportunity to see how treatments options are evaluated depending on the conditions of the heart failure patient. The discussions from this session are always very interesting.”

The course will then discuss heart transplantation and specifically the issues surrounding donor shortage.

In many countries the availability of donor hearts is decreasing as fewer people with healthy hearts are dying early, as a result there is a real concern regarding the shortage of donor hearts, explained Gerosa. One solution could be found in tissue engineering, and during this year’s course the “Organ factory” session will discuss regenerative medicine and the possibilities it can offer the heart failure patient.

“It took almost 40 years from when mankind made the first transatlantic flight to when we took our first step on the moon,” said Professor Gerosa. “Now, almost 40 years on from the first heart transplant, we are close to realising a similar dream – the bioengineered heart.”

Wetlab
The course will also include the ever popular wetlab, sponsored by Thoratec.

Cardiac – Work in progress abstract session

A smartphone/tablet app to assist thoracic endovascular aortic repair

There is a growing number of new stent grafts dedicated for thoracic endovascular aortic repair (TEVAR). Stent grafts and especially its delivery systems design differ enormously. Furthermore, growing number of TEVARs are reinterventions in patients with already implanted one or more stent graft prostheses. The success of TEVAR is based on proper use of stent graft delivery systems, identification and understanding of radiopaque markers and accurate placement of the new stent graft.

Therefore, we decided to design an app for smartphones and tablets, which should assist the user in TEVAR procedures.

This app contains information about all TEVAR devices available between 1990 and today. The following information about TEVAR prostheses and delivery systems will be provided:

- Instruction of use inclusive flowchart, animation, short film clip with stent graft implantation and troubleshooting information
- Size tables: diameters, lengths, catheter outer diameter
- Images of delivery systems and stent grafts inclusive chest x-ray, fluoroscopy and direct view
- Radiopaque localisation, shape and technical relevance and information on MR safety and compatibility.

We think that having a growing number of thoracic aortic stent grafts there is a need to provide TEVAR users with robust, worldwide available information to achieve higher success rate.

The app will provide quick and easy information on currently available stent grafts as well as those, which were implanted earlier, but are now not more available. It will be free and easy to use. Once downloaded on the smartphone/tablet, it will not require internet connection. It will help to plan and prepare for TEVAR without searching for information at different sources. We will present the app design on Monday, October 13, during the Work-in-progress session. We strongly believe, that cooperation with centers having long TEVAR experience will enable us to collect x-ray images of first-generation and currently available devices in a short time.
29th EACTS Annual Meeting
Amsterdam, The Netherlands
3 - 7 October 2015

Abstract deadline 30 April 2015
To find out more or to register for the event visit:
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