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ABSTRACT BOOK

TUESDAY, SEPTEMBER 7, 2010

Distinguished Faculty Lecture

"CORDAE 1959-2009"

R. W. M. Frater

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I started as a Fellow in General Surgery at the Mayo Clinic in Oct 1955. The Mayo Clinic's program of open heart surgery had just begun and I switched my plans immediately. My advisor Bunky Ellis gave me a thesis project: Develop a Mitral Valve Prosthesis. So began a hobby that has lasted more than 50 years. This talk describes the evolution of knowledge of the mitral valve anatomy and function and the development of artificial chordae. The disciplines involved included: Gross and microscopic and ultramicroscopic anatomy. Comparative anatomy. In vivo and in vitro functional/dynamic anatomy. Simultaneous observation of dynamic pressures, flows, motion and dimension change of leaflets, chordae and myocardium. Flow visualization and mathematical computer produced flow simulations. Strength/Strain properties of valve /chordal tissues. Pathology. Chordal and leaflet pathology in humans. Chordal elongation and rupture. Rheumatic and nonrheumatic. Diastole. Just before the end of isometric ventricular relaxation the upstream parts of the coapted leaflets begin to separate. At the instant of ventriculoatrial pressure crossover the uncoiling of the ventricular muscle produces active suction with the intraventricular pressure dropping below zero. This action is accompanied by rapid acceleration of flow. Leaflet separation occurs simultaneously but the 2nd order /load bearing chordae remain under some tension and stay in a straight line. Simultaneously the annulus is widening, the mid-ventricular, annular-apical length and annular-papillary base lengths are increasing while the papillary muscles shorten a little. The left and right chordal papillary origins move apart, backwards and towards the apex. While forward flow is still accelerating the leaflets begin to move together. This is because of lift generated on the atrial surface of the leaflets by the rapid flow of blood over them, together with vortex formation on their ventricular surfaces. This occurs because the leaflets are restrained by the tension in the chordae. Without chordal restraint the leaflets would move all the way over to the septal and posterior ventricular walls. As diastole progresses the forward flow falls until the atrium contracts producing a brief acceleration in forward flow and a temporary reopening of the leaflets ("the atrial kick"). Once again fluid dynamic forces acting on the leaflets brings them together as the "atrial kick" fades. Very shortly after the isometric phase of left ventricular systole starts the leaflets snap closed with virtually no regurgitation. During systole the longitudinal and radial dimensions of the ventricle shorten. The papillary muscles move forwards, towards each other and towards the annulus. The annulus shortens and the ventricular cavity shrinks. At maximum systole, the D-shaped area of the systolic annulus is about the same as the area of the D-shaped anterior leaflet. The

shortening of the annulus brings the adjacent scallops of the posterior leaflet into contact with one another compressing them into a shelf as the interscallop clefts are closed. The rise in pressure in the leftventricular outflow tract pushes the intervalvar trigone at the base of the anterior leaflet towards the posterior annulus. The anterior and posterior leaflets are brought towards each other by the active muscular shortening of the mural annulus and the effect of pressure on the fibrous base of the anterior leaflet. The effect is coaptation between about half the area of the posterior leaflet and a third of the area of the anterior leaflet. The anatomy of the mitral-valve has fingerprint variability. Within this irregularity there are constants: If, from the midpoint of the straight base of the anterior leaflet radii are directed through the posterior leaflet they will intersect multiple meeting points of the free edges of anterior and posterior leaflets. At each of these meeting points the free edges will be parallel despite the variability of anterior and posterior leaflet depth. This is because the chordae, despite the differences in their length from origin to insertion are of precisely the right length to keep opposing free edges parallel wherever they meet. The coaptation zones of the atrial surfaces correspond to the rough zones on the aventricular leaflet surfaces. The plane of closure is at or a little below the "plane" of the atrioventricular junction. Anatomy, fluid dynamic forces, contraction and relaxation of the cardiac muscular structures to which the laeaflets and chordae function together in a superbly integrated fashion. The consequence of interruption of this sequence is easily seen with modest changes in normal function. During an abnormally long diastolic period atrial and ventricular pressures equilibrate and trans valvular flow ceases. The leaflets drift apart and when a new systole starts they are not ready to close so that there is clearly detectable regurgitation at the beginning of systole. While the way the mitral valve works was under study, the healing of the host to a wide variety of repair materials was also investigated. Autograft, allograft and variously treated xenografts, and a wide variety of polymers were tested in many different cardiovascular locations and applications. None was entirely suitable for chordal replacement. Commercial arterial grafts made of extruded polytetrafluorethylene (ePTFE or Goretex) were examined at the anastomotic junction with a host artery. While the body of the graft did not acquire any host derived tissue, the first 2mm displayed fibrous and intimal healing. Electron microscopy revealed gaps in the teflon structure of the ePTFE graft; the so-called "internodal spaces" It was these spaces that seemed to give attachment to fibrocytes growing on the inner surface of the graft. This finding led us to the hope that a length of Goretex suture with the same internodal spaces, used as a chordal replacement, could become covered by the host between the leaflet and papillary attachments. Dr. Herbert Vetter performed the first operation and 5 months later, on March 5, 1985 called me to the lab to see the autopsy on this first sheep. He had inserted two CV2 sutures between the left papillary muscle and the anterior leaflet. This was one of those very rare moments in research when the hoped for result is achieved at the first experiment. The sheep had grown a new chorda over the template we had provided. All subsequent experiments confirmed the first observation. It was important that the host covering was a thin layer that did not grow in thickness as time went by. If CV2 goretex was used, the covered new chorda was stiffer than a natural chorda. If CV5 was used the flexibility was similar to a natural chorda of similar thickness (Claudio Zussa). The uncovered strength of a CV5 was

substantially greater than the maximum force experienced by natural chordae (Guangfu Gong). From the time of the first presentation at a meeting in London in 1985, the use of GoreTex chordae in clinical mitral valve repair spread rapidly around the world. As a tool in the hands of surgeons the subsequent history of the use of GoreTex for chordal replacement followed an unusual course for a surgical replacement technique. There was no sponsorship of any kind. There were no formal workshops, no advertising, no promotion. No patients were taken out. Before large numbers of publications appeared, surgeons interested in mitral repair exchanged information and started trying its use around the world. The use of GoreTex as a chordal substitute has been a monument to the ingenuity and enterprise of individual cardiac surgeons. Dr. Zussa began to build a clinical series soon after returning to Italy and produced the definitive textbook on the subject in 1994. The GoreTex company, observing this spontaneous off label use of its product, finally organized a 10th anniversary conference on GoreTex cords in 1996 and obtained FDA 510k approval for the use of its suture for chordal replacement. The issues that the surgeons had to deal with were: 1) Judging length 2) Tying secure knots with a slippery suture 3) Integrating chordal replacement with existing approaches to mitral valve repair and even replacement. 4) Confirming long term durability of neo-chordae. Many surgeons throughout the world contributed to this adventure. Surgeons developed and used their own chordal replacement methods as they reached for the goal of repairing almost all incompetent valves. I thank them all for turning an idea into the modern reality of mitral valve repair.

SESSION 1 Faculty Lecture

FROM ENDOSCOPIC TO INTERVENTIONAL MITRAL VALVE REPAIR – A SURGEONS PERSPECTIVE

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Traditionally, surgical mitral valve repair (MVR) is considered the reference treatment for degenerative disease. In elective patients, it can be carried out with perioperative mortality rates of close to 0% and extremely low complication rates. If performed in a timely fashion, successful valve repair restores both life expectancy and quality of life back to normal. Furthermore, at specialized centers a minimally-invasive videoendoscopic approach via a right-anterior minithoracotomy has been established as the standard of care, offering additional benefits in terms of postoperative convalescence, transfusion requirements or cosmesis.

In functional mitral regurgitation (MR) however, the pathophysiology is more complex and the benefits of surgery more ambiguous. Dilated cardiomyopathy of a given origin causes the morphologically normal valve to leak and correction of secondary MR will not cure the underlying ventricular disease. Surgery for functional MR mostly in ischemic cardiomyopathy has proven beneficial to

some extent, eg, improvement of NYHA functional class or quality of life, but proof of survival benefit is pending. Also, operative risk is elevated as compared to MVR for degenerative MR. It is for this growing population of high risk patients that less invasive treatment alternatives have been explored, leading to the development and clinical implementation of transcatheter MVR including leaflet repair strategies such as performed with the MitraClip™ device. The MitraClip™ is a catheter-based extension of the surgical Alfieri technique. At our center, well over 170 patients have been treated to date, representing the world's largest single-center experience. Most of these patients presented with functional MR and myopathic ventricles or had degenerative disease in the presence of severe comorbidities making them unfit as surgical candidates. Preliminary data demonstrate safety and feasibility of the technique in this high-risk patient population. Even though long-term follow-up data are pending, interim analysis of patients suggests substantial remodelling of dilated ventricles following MitraClip therapy. In the future, transcatheter MVR may evolve to become the standard of care for patients at prohibitively high surgical risk. However, until data from randomized clinical trials become available all new transcatheter techniques will have to bear comparison to established conventional or minimally-invasive surgical MVR.

Faculty Lecture

MINIMALLY INVASIVE MITRAL VALVE REPAIR: THE COLUMBIA TECHNIQUE

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This video demonstrates the Columbia University technique for minimally invasive mitral valve repair. This technique features a 6 cm minithoracotomy, direct aortic and superior vena cava cannulation, standard antegrade and retrograde cardioplegia administration, and a left atrial approach to the valve. The specific repair shown involves quadrangular resection of the posterior leaflet, rotational sliding plasty, and band annuloplasty. [Note: Video is ~ 7 min in duration]

MANAGEMENT OF MITRAL VALVE REGURGITATION IN PATIENTS WITH FORMER CABG – EXPERIENCES AND RESULTS USING AN ENDOSCOPIC APPROACH

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Aim: Patients (pts) with coronary artery disease and former CABG show a relevant mitral valve regurgitation with an indication

for valve repair typically month and years after the primary operation. Main goal in these often high risk redo-cases is to save both the bypass and the ventricular function and to avoid perioperative myocardial infarctions.

Methods: Between 02/2004 and 4/2010 an endoscopic mitral valve repair as a redo-procedure after CABG was performed in 37 pts. All operations were carried out under cardiac fibrillation without any cardioplegia or aortic cross clamping. The main data of the patients are shown in the table. Mean follow-up time was 38 ± 11.7 month. Parameter data Age 64 ± 8.4 years Male 31/37 (83.8%) Mitral valve regurgitation 3.2 ± 0.7 LVEF $44.5 \pm 12.4\%$ LVEF $> 40\%$ 21/37 (56.8%) pulmonary hypertension 26/37 (70.3%) mean time between CABG and MV-redo 17.4 ± 10.2 month former stroke 12/37 (32.3%) COPD 21/37 (56.8%) Diab. mell. 26/37 (70.3%).

Results: The mitral valve regurgitation decreases to 0.9 ± 0.4 . No in-hospital death, perioperative stroke or wound healing disturbance was seen. Stay at ICU and in-hospital stay were 1.3 ± 0.6 and 9.4 ± 1.5 days, respectively. The 6 month, 1 year, 2 and 3 years cumulative survival rate that excluded non-cardiac deaths was 96.9%, 96.5%, 91.3% and 88.2%, respectively. In pts with a preoperative LVEF $> 40\%$ the LVEF increased from $48.4 \pm 6.2\%$ to $54.2 \pm 7.3\%$ ($P < .05$). In all other pts the LVEF decreased from $42.8 \pm 9.3\%$ to $39.4 \pm 11.3\%$ (ns).

Conclusion: The endoscopic technique to perform a mitral valve repair in patients with former CABG is safe and successful in spite of the preoperative risk factors. It allows to minimize the risk of bypass damaging and perioperative myocardial infarction.

IS MITRAL VALVE REPAIR FEASIBLE IN MAJOR PAPILLARY MUSCLE RUPTURE?

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Papillary muscle rupture (PMR) following acute myocardial infarction has been a catastrophic condition requiring an emergency operation. PMR causes sudden-onset severe MR in addition to myocardial damage due to AMI. Although mitral repair is generally considered to be superior to mitral replacement with regard to cardiac function, mitral valve repair in this setting is considered highly demanding because of following reasons; deteriorated general condition, myocardial dysfunction after infarction, difficult mitral valve exposure due to small LA, and limited reliable reparative techniques. A 70-year-old female presented with cardiogenic shock requiring endotracheal intubation and IABP institution after PCI for AMI. Acute onset severe mitral regurgitation was demonstrated. We were referred and operated the patient for this condition. I will present the video of the procedure, and demonstrate the early result and the most recent (surprising!) follow-up outcome. Papillary muscle rupture is a serious event and has been a challenge to cardiac surgeons. Mitral valve repair for this condition certainly need proper understanding of the disease and anatomy, good protection, exposure, and secure techniques. With those prerequisites, we should be able to perform successful repair operation with excellent early and late outcome.

PSEUDOANEURYSM OF THE MITRAL-AORTIC INTERVAL-VULAR FIBROSA: COMPLEX SURGERY FOR RARE LESIONS

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Pseudoaneurysms of mitral-aortic intervalvular fibrosa are uncommon complication of aortic valve surgery, endocarditis or blunt chest trauma. The avascular nature of aorto-mitral continuity makes it particularly susceptible to infection and abscess formation that can complicate both native valves and prosthetic aortic endocarditis. We describe an interesting case of 61-year-old man with dyspnea, without previous blunt chest trauma or signs of endocarditis. CT-scan with contrast medium and transesophageal echocardiography showed a huge pseudo-aneurysm of mitral-aortic fibrosa. The patient was submitted to surgical pseudoaneurysm exclusion through a trans-aortic approach. A pericardial patch was sutured on aneurysm's neck and a Carpentier Edwards Perimount aortic prostheses n° 23 was implanted. The patient recovered well and was discharged on postoperative day 21 in good hemodynamic condition. Four months after surgery, the patient was in good clinical conditions. Trans-thoracic echocardiography showed good aortic prosthesis function, and no relapse of pseudoaneurysm. Surgical correction of intervalvular pseudoaneurysms is recommended in most of patients even if asymptomatic for preventing risk of possible rupture. Resection of pseudoaneurysm results technically complex because often it is a redo surgery, and because frequently are required associated surgical procedures if aortic root, coronary arteries, aortic or mitral valve are involved.

SESSION 2 Faculty Lecture

SUBXYPHOID CRYOMAZE – A MINIMALLY INVASIVE ALTERNATIVE

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A full Cox-Maze III is the gold standard for surgical cure of all variants of persistent A fib. Ligation of the LA appendage is an advantage of surgery compared with catheter ablation. Ideally, a Maze III with appendage ligation can be performed without sternotomy or bilateral thoracotomy. We investigated the subxiphoid approach through a 10 cm vertical midline incision with sternal lifting (double Rultracts) and normothermic femoral-femoral bypass with caval isolation to decompress the cardiac chambers. A full 12 lesion Maze IV procedure was performed in all cases using the ATS Medical flexible Surgi-Frost Argon cryo-probe. Epicardial lesions were placed in the same locations as described by Cox for 1 to 3 minutes depending on tissue thickness. For the mitral isthmus lesion, the probe was formed into a circle and pressed deeply into the AV groove to compress the coronary sinus

wall up against the annular tissues while the lesion was applied. Four cases were performed with no conversions. One patient had a single vessel CABG performed concomitantly, while 3 were lone AF cases. There no deaths and all 4 patients went into NSR at various time intervals after surgery. Two patients converted spontaneously in the OR during the mitral isthmus lesion. There were not major complications but 3 patients required permanent pacing early and the fourth patient at 1 year postop. The vertical SVC-IVC lesion is no longer being performed for this reason.

Faculty Lecture

HYBRID OPERATING THEATRE: BASIC CONCEPT AND INITIAL RESULTS

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Objective: With the development of alternative and minimally invasive treatments in cardiovascular surgery, hybrid operating theatres have emerged as an optimal working environment for combined "hybrid" procedures. Their setup represents an architectonic, equipment and financial challenge for healthcare providers. It also requires some time in getting the personnel used to a new environment and equipment as well as acquiring new skills by surgeons.

Methods: Since its opening in 2007, hybrid operating theatre at Dubrava University Hospital has been utilized in several hundred procedures requiring X-ray support: permanent pacemaker implantations, myocardial biopsies, aortic stenting, peripheral vascular diagnostics + hybrid revascularization, hybrid myocardial revascularization (MIDCAB+stent). One significant subgroup of patients treated in hybrid operating theatre are unstable postoperative CABG patients. Three patients were taken back to hybrid OR for diagnostics and were treated by surgical re-do of bypass grafts (in 2 patients) and graft PCI and stenting (in one patient) with successful result and resolution of symptoms.

Conclusion: Hybrid operating theaters are modern facilities designed and equipped to enable work in rapidly expanding field of endovascular procedures as well as in "reinventing" previously complex aortic surgery, minimally invasive aortic valve implantation or coronary hybrid revascularization. They also provide diagnostic and therapeutic "bailout" possibilities after procedural mishaps after CABG.

Faculty Lecture

A SCREENING UNIT FOR TAVI. RESULTS AFTER TWO YEARS

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Background: Aortic valve replacement (AVR) for aortic stenosis represents the most frequently performed cardiac valve operation. Despite the proven benefits of aortic valve replacement many elderly patients with comorbidities do not undergo surgery. Conventional AVR by means of sternotomy and cardiopulmonary-bypass it has been the only option till recent years when development of transcatheter aortic valve implantation (TAVI) has introduced a new alternative treatment, particularly indicated in high risk patients or with contraindications to conventional surgery.

Methods: In our Department we have created a specific screening unit committed to evaluate TAVI candidates and choose the optimal treatment for every single patient. This is composed by two senior surgeons, two interventional cardiologists and one clinical cardiologist. Since January 2008 to May 2010, 69 patients were screened as potential TAVI candidates. Screening was performed by means of clinical assessment and transthoracic and/or transesophageal echocardiography, angiography, and total body computed tomography scan (CT-scan) if necessary. Mean age was 82 ± 3 years; there were 25 men. Mean additive and logistic Euroscores were 10 and 20.9%, respectively. Sixteen patients (23.2%) were potential redo operations. Indication to TAVI was mainly driven by advanced age, severe comorbidities, severe calcification of ascending aorta or high risk redo.

Results: Four patients (5.8%) refused the work-up program at different stages for personal choice. In one patient accurate echo assessment revealed a moderate aortic valve stenosis only and she was therefore excluded from further evaluation. Of the remaining 64 patients, 33 patients (51.6%) were considered good candidates for TAVI. Of these 30 finally underwent a TAVI procedure (25 transfemoral, 2 transaxillary, 3 transapical). Three patients originally directed to TAVI died while awaiting the procedure. Twelve patients (18.8%) were considered good candidates for conventional AVR and were all operated on. Nine patients (14%) were excluded from any interventional or surgical treatment because of extremely severe general condition. Ten patients (15.6%) are still under screening. There were no periprocedural deaths either in TAVI and AVR groups. During early follow-up (FU), two patients died in the TAVI group and three in the AVR group; NYHA class was I or II in the AVR group; in TAVI group two patients were in NYHA class III.

Conclusions: Our screening unit has allowed a very accurate analysis of the best treatment option for each single patient. Our results are encouraging despite the small number of TAVI

performed. Some patients initially considered unfit for AVR on the basis of comorbidities or risk scoring systems, underwent surgical treatment. Considering the small number of patients of our study, we noticed that patients of AVR group had a higher postoperative mortality but a better NYHA class than TAVI group at FU. Nevertheless there are still a significant number of patients for whom we are unable to offer a viable treatment option.

COMPARISON OF TRANSFEMORAL AND TRANSAPICAL APPROACH FOR TRANSCATHETER AORTIC VALVE IMPLANTATION (TAVI)

R. Raffoul, R. Richard, N. Al Attar, L. Lepage, D. Himbert, E. Brochet, P. Nataf, A. Vahanian

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Background: choice of either transfemoral (TF) or transapical (TA) approach in a TAVI procedure is often determined by local preference. We evaluate outcomes according a predetermined strategy.

Methods: Fifty patients with severe symptomatic aortic stenosis for whom conventional surgery was contraindicated or associated with high risk underwent TAVI with the Edwards Sapien bioprosthesis. The TF approach was considered in first intention. Whenever it was not feasible (severe peripheral arterial, extensive aortic disease or small femoro-iliac vessels), patients were referred for TA TAVI. The procedure was performed under echocardiographic and fluoroscopic control in either case. Mean age was 84 (53-93) years. Mean Logistic EuroScore and STS score were 29.5% (11.1-59%) and 22% (7.6-41%) respectively. Mean NYHA class was 3.2.

Results: The procedure was attempted through the TA approach in 15 patients (30%) and through the TF approach in 35 patients (70%). Mean EuroScore was 30.1 in the TA group compared to 25.7 in the TF group. TA TAVI had a lower incidence of per-procedure complications compared to TF approach; stroke 0 versus 5%; arterial access injury 7% versus 20% and death 0 versus 3%, respectively. The valve was successfully implanted in all the TA patients and in 30 (85.7%) patients of the TF group. Overall in-hospital death was 14% (n = 7). TF TAVI was associated with superior survival. MACCE and mortality rates according to each approach are described in the table. At follow up, 87% of surviving patients were in NYHA class I or II.

Conclusions: TA TAVI offers a direct and rapid approach to patients at high risk for conventional surgery. However, when the TA approach is reserved as a last intention procedure in extremely high risk patients for whom every other approach is contraindicated; it is associated with poorer outcome.

TRANSCATHETER VSD CLOSURE AFTER CARDIAC SURGERY IN PATIENT WITH SY EISENMENGER – A CASE REPORT

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Background: forty-one-year-old male in end-stage heart failure; congenital malformation of mitral and tricuspid valve, ventricular septum defect (VSD); severe pulmonary hypertension. He was cyanotic (O₂Sat.56, Hb-16,Htc-45). Using transoesophageal echocardiography VSD, pulmonary artery (38mm),severe mitral

and tricuspid regurgitation have been visualized (EF = 15%, EDV = 265mL, ESV = 202mL).

Method: After mild cardioplegia, mitral and tricuspid annuli reconstruction,pulmonary artery (PA) was banded on 24mm to increase right-to-left shunt and decrease aortic saturation, with consequent decrease in PA saturation.Lowered PA saturation results with decreasing of pulmonary resistance,opening closed capillary pulmonary net improving O₂ diffusion in pulmonary veinO₂Sat. in patient was increased on 82 from 56 (without O₂), and Hb was kept on 14 with Htc on 45-50,postoperatively.Hemodynamic measurements during first 5days showed that PA pressure was 50% of systemic pressure. After 2 years due relaps of mitral insufficiency patient got mechanical mitral valve with closure of membranous VSD with pericardial patch. Implantation of permanent pace maker was performed due registrated AV block IIIrd degree. After 6months control ultrasound examination showed big VSD muscular part ofseptum. Patient was prepared for VSD device closure, which was last separate intervention.

Conclusion: Hybrid technique of VSD transcatheter closure in patients after previous cardiacsurgery intervention can be preferred approach, less invasive for the patient with good clinical outcome.

AVR+MVR VIA RE-RESTERNOTOMY DUE TO SEVERE POSTOPERATIVE AORTIC AND MITRAL PARAVALVULAR LEAKAGE

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The case we report on presents a 19-year-old boy with chronic aortic and early postoperative mitral paravalvular leakage. The boy was first treated with balloon valvuloplasty due to severe congenital aortic stenosis when he was 5-month-old. He was symptoms free until the age of 12 when he was hospitalized due to syncopal crisis. High aortic transvalvular gradient was found and the boy was operated on. Aortic valve replacement associated with an aortic root and ascending aorta enlarging procedure has been performed through median sternotomy. Four months after this procedure an mitral valve repair surgery was done because of severe mitral insufficiency through median resternotomy. Another reoperation was done at the age of 19 due to repetitive mitral insufficiency. Mitral valve replacement was done through right thoracotomy. Postoperative TEE showed severe aortic and mitral insufficiency / paravalvular leakage three weeks after last operation. An urgent successeful AVR + MVR was done via median rere-sternotomy.

SESSION 3

Faculty Lecture

INABILITY TO WEAN FROM CARDIOPULMONARY BYPASS – PAINFUL LESSONS LEARNT USING THE NEAR HIT MISS CONCEPT

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The near hit miss concept is used in aviation industry to identify and highlight mistakes enabling pilots to take remedial and preventive action.

This can help in changing management strategies and provides a realistic check on performance. In the paper the presenter will discuss two specific instances where deaths and high inotropic use in patients led to alteration of management with resolution of bad outcomes. The cases discussed will be high gradient aortic stenosis with LV hypertrophy with a higher than expected mortality and morbidity. The myocardial management of these patients changed based on clinical observation of inadequate muscle relaxation probably leading to ineffective subendocardial perfusion. The second set of cases discuss the identification of preoperative hepatic dysfunction as a risk factor for morbidity and mortality in the unit and the development of intraaortic vasodilator therapy to negate this as a risk factor.

Faculty Lecture

IS THERE A ROLE FOR TEMPORARY MECHANICAL CIRCULATORY SUPPORT (ECMO) IN PATIENTS WITH OVERWHELMING SEPTIC SHOCK?

M.S. Firstenberg, J.A. Mangino, D. Blais, E. Abel, T. Papadimos, L.B. Louis, W. Yenn, N. Ali, B. Sun

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Advances in extracorporeal membrane oxygenator (ECMO) has improved survival in patients with respiratory or cardiac failure, however, the role in overwhelming sepsis is unclear.

Methods: We reviewed our experience with ECMO as salvage therapy for severe sepsis. Those weaned versus not weaned from ECMO were compared.

Results: During 2009, 14 patients required ECMO (5 veno-arterial, 9 veno-veno) for severe shock secondary to Influenza H1N1 (n = 8), necrotizing fasciitis (n = 2), bacteremia (n = 4). Pre-ECMO SAPS-II predicted mortality was 61±26%. Four died on ECMO

due to futility, 2 weaned patients died from pre-existing comorbidities. Those weaned were younger (30.2 ± 9.3 versus 41.9 ± 10.1 years, $P = .04$), had ECMO initiated earlier after mechanical ventilation (0.9 ± 1.3 versus 8.5 ± 5.9 days).

SEVERE UNRESPONSIVE VASOPLEGIA FOLLOWING OPEN HEART SURGERY

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78-year-old patient diagnosed with severe mitral and tricuspid regurgitation, severe pulmonary hypertension, coronary three-vessel-disease and reduced left ventricular function underwent open heart surgery with cold blood cardioplegia. In the history, he underwent mitral valve repair, carotid obliteration and aortic surgery for abdominal aneurysm. We replaced the mitral valve, performed tricuspid anuloplasty, mini-maze procedure and CABG. The weaning from ECC was uneventful. On ICU, the patient developed severe vasoplegia unresponsive to conventional therapy, was implanted with ECMO, and died on the 2nd postoperative day due to MOF. We attempted to identify the predictive factors, and discuss the possible therapeutic options.

HEART FAILURE RECOVERY AFTER AN ACUTE NON-FULMINANT MYOCARDITIS: A BRIDGE TOO FAR?

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Severe heart failure due to acute myocarditis has been traditionally regarded as an indication for mechanical cardiac support which in this setting offers a chance for bridge to recovery. Determining which group of patients will recover and which will require transplantation or long-term mechanical support remains a challenge. In addition, device selection, weaning and explantation procedures remain poorly defined. In this report we present a case of 41-year-old patient with severe postmyocarditic cardiomyopathy, to whom a paracorporeal left ventricle assist device (LVAD) was implanted and explanted after signs of recovery 4 months afterwards. Four months later, patient died due to the combination of septic complications and relapsing heart failure. We will review indications for support, recovery confirmation protocol, weaning and explantation process and follow-up.

DISORDERS OF HEMOSTASIS IN ALCOHOLIC LIVER DISEASE AFTER CARDIAC SURGERY – A CASE REPORT

A. Nikolic, M. Mirocevic, S. Radovic, A. Radovic, A. Kalezic

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A 60-year-old man was admitted to Center for Cardiac surgery of Clinical centre in Montenegro for the surgery of mitral and tricuspidal valve insufficiency. In his history he has chronic alcoholism and no other significant pathology. The reconstruction of both valves was done with no preoperative and intraoperative complications.

On postoperative day 0, 9, 13, and 17 re-sternotomy and detamponada cordis were done. Coagulopathy induced by liver insufficiency has been recognized as the cause of frequent cardiac tamponads. On 27th postoperative day iatrogenic puncture of left ventricle occurred during the puncture of left pleural effusion and reintervention was done again. Three days after operation left sided hemiparesis has been found with no significant findings on contrast enhanced multislice CT of endocranium. Bilateral pleural effusions, massive atelectasis and ventilation assisted pneumonia caused the onset of respiratory insufficiency and tracheostomy had to be done on 44th postoperative day. After three months and five days the patient was discharged with stable respiratory status, requiring no supplemental oxygen, without hemiparesis, echocardiography showed no pericardial effusion and good function of repaired valves with no residual regurgitation.

CRYPTOGENIC JAUNDICE AFTER MVR-CABG

M. Levinson

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A 64-year-old obese female (BMI 35.3) underwent CABG x 4 with double endarterectomy (OM & PDA) and concomitant MVR for rheumatic mitral stenosis/regurgitation. CPB time was 291 minutes due to 2 endarterectomies and 2 initial attempts at valve repair. After CPB, systolic BP and C.I. were stable (100 mmHg and 2.5/m²) on Dobut 5 and Epinephrine 3. In ICU, patient extubated on POD #1 but was confused, with immediate, steep bilirubin increase reaching 18.9 by POD #9. Hepatic enzymes were barely above normal except for a transient 1 day spike in alkaline phosphatase but only after the bilirubin was already over 15. Workup for viral hepatitis, extrahepatic biliary obstruction, pancreatitis, and other causes was repeatedly negative. ECHO confirmed normal EF and valve function. The patient developed multiple complications, including sternal wound dehiscence responding to wound VAC and prolonged respiratory failure (tracheostomy, gastrostomy), but the cause of jaundice was never explained.

CARDIOGENIC SHOCK, PULMONARY EMBOLISM, AND THE DELIVERING MOTHER: A MULTI-DISCIPLINARY APPROACH TO AVOIDING CATASTROPHE

M.S. Firstenberg, K. Turner, M. Halim-Armanios, G. Dimitrova, D. Cohn, E. Abel, D. Blais, P. Samuels

The Ohio State University Medical Center, Columbus, Ohio, USA

Few cardiovascular catastrophes are as dramatic as those occurring in healthy women giving birth. Our recent case illustrates the role of multi-disciplinary resources collaborating in averting disaster. Our patient, a 36-year-old who 40 weeks pregnant was scheduled for Cesarean section secondary to polyhydramnios. After uncomplicated epidural catheter placement for painful contractions, she arrested. She was taken for an emergency Cesarean section. As the baby was being delivered, cardiopulmonary resuscitation continued. Transesophageal echocardiography showed a massive pulmonary embolism. Despite the severe coagulopathy (INR > 15), the uterus and incision were closed as preparations were made for surgical embolectomy. With intermittent chest

compressions a sternotomy was performed. Cardiopulmonary bypass was initiated to support the physiology (Initial pH = 7.0). The pulmonary arteries were explored for a presumed thrombus/amniotic embolism. While on bypass, abdominal re-exploration was required for intra-abdominal hemorrhage. Once the physiology and coagulopathy was corrected, she was weaned from bypass, the incisions were closed and she was transferred to the ICU. Despite a massive transfusion (>100 blood products), she was extubated within 4 days and discharged within 3 weeks. Now 4 months post-op, both mom and baby are normal. Catastrophic problems can occur at anytime. Success can be accomplished with effective cooperation and communication.

Faculty Lecture

MORPHOLOGICAL CONSIDERATIONS IN SURGICAL THERAPY FOR ISCHEMIC CARDIOMYOPATHY

T. Acuff

Heart Hospital of Baylor Plano, Denton, Texas, USA

Patients with ischemic cardiomyopathy present to the surgeon as a clinically high risk surgical group. Part of the reason for this difficulty is the heterogeneous morphology in this "class" of pathology. Comparison of the results of these patients by short-hand understandings of ventricular morphology and its resultant function classified by ejection fraction fail to point out meaningful differences in this heterogeneous population. A few specific cases will point morphological characteristics that may provide insight to the effectiveness of possible surgical manipulations.

SESSION 4 Faculty Lecture

SKELETONIZED GASTROEPIDIPLOIC ARTERY IN MULTI-ARTERIAL OPCAB

T. Asai

Shiga University of Medical Science, Otsu, Shiga, Japan

The gastroepiploic artery (GEA) has been introduced as a coronary artery bypass (CAB) conduit for over 20 years. It has been found better prepared by skeletonization for 10 years. We report our experience of OPCAB with aggressive use of the ultrasonically skeletonized GEA grafts together with skeletonized bilateral ITA. Between January 2002 and December 2009, we have operated 760 consecutive isolated CAB predominantly in off-pump fashion. Among them, GEA were used in 40%. GEA was strictly used for greater than 90% stenosis in RCA territory. All were skeletonized

and used in-situ fashion. There was no CPB conversion, hospital mortality 1, stroke 1, mediastinitis 2 and prolonged ventilation 1. Although there were 5 GEA with plaques abandoned, there was no GEA with small caliber (less than 2 mm) with our skeletonized technique. I will demonstrate the tips and techniques for harvest skeletonized GEA in video. In long term follow-up, our interim result of MDCT A patency of GEA is 94%. Kaplan-meyer 5-year survival: 86.6% from all cause death, 94.8% from cardiac death and 78.7% from MACCE.

Conclusion: The use of skeletonized GEA in multi-arterial OPCAB is not only safe in early result, but provides excellent long term outcome.

Faculty Lecture

LIGATION OF LEFT MAIN CORONARY ARTERY TO RIGHT PULMONARY ARTERY FISTULA BY ROBOTIC ENDOSCOPIC APPROACH

F.H. Cheema, O. Siddiqui, Z. Ashraf, M.B. Pervez, Zarrish S. Khan, H.G. Roberts Jr

Aegis Cardiovascular Research Foundation, Florida, USA; Holy Cross Hospital, Florida, USA; College of Physicians and Surgeons of Columbia University, New York, USA

A 72-year-old gentleman presented with angina on minimal exertion. On cardiac catheterization (A) ejection-fraction was found to be 40% despite a widely patent former percutaneous coronary intervention of the proximal left-anterior descending coronary branch. A highly tortuous fistula was identified between the left main coronary artery (LMCA) and the right pulmonary artery. On evaluation of computed tomography angiography (B) it was decided that a robotic endoscopic ligation of the coronary-artery-to-pulmonary-artery fistula would be feasible. Abnormal blood flow was confirmed from the LMCA to the right pulmonary artery (White arrow) by Color-flow Doppler on transesophageal echocardiography (TEE) (C) along with turbulent pulmonary trunk flow (Black arrow). Using right chest ports ranging from 8 to 18 mm as well as right femoral cardiopulmonary bypass, surgical division of the fistula was performed employing the da Vinci® surgical system (Intuitive Surgical, Sunnyvale, CA). With the heart warm and beating on cardiopulmonary bypass, the fistula was identified and divided in the transverse sinus as it coursed between the posterior aorta and the superior border of the right pulmonary artery. The patient tolerated the procedure well and a postoperative TEE evaluation confirmed the closure with an improved ejection fraction of 60%.

PEROPERATIVE INTRAMYOCARDIAL IMPLANTATION OF AUTOLOGUS BONE MARROW STEM CELLS DURING CORONARY ARTERY BYPASS GRAFTING SURGERY – INITIAL OBSERVATIONS AND EXPERIENCE

Z. Trifunovic, R. Ilic, S. Obradovic, M. Dopudja, V. Mandaric, Z. Markovic, S. Tisma

Military Medical Academy, Belgrade, Serbia

Introduction: In 12 patients with severely impaired myocardial perfusion and low left ventricular ejection fraction/LVEF 30-40%/, due to previous myocardial infarctions (MI), we performed peroperative intramyocardial implantation of autologous bone marrow stem cells in perinfarct zone of left ventricle during coronary artery bypass grafting surgery (CABG).

Aims: Improve perfusion and contractility of impaired regions of left ventricular myocardium in order to reduce or prevent left ventricular remodeling process.

Method: By multiple aspirations from iliac crest we obtain bone marrow in amount of 200ml and process it to final product of 10ml suspension of mononuclear stem cells. After creating of last anastomosis in CABG surgery, when hemodynamic status is stable we implant stem cells by multiple intramyocardial injections in perinfarction region of left ventricular wall impaired by previous MI, visually identifying viable myocardium and avoiding fibrous scar tissue.

Result: Procedure was performed in 12 patients, and follow up period is from 6 months to 4 years. Improvement of perfusion and regional wall motion, prevention in remodeling on g-SPECT, dobutamin stress Echo and MSCT scan after 6 months, and every year after was demonstrated. Improvement in NYHA class is evident for all patients. EFLV rise about 15% average. No periprocedural or postprocedural sideeffects was noted.

Conclusions: Procedure is safe and do not aggravated risk in CABG itself and postoperatively contribute to better perfusion and function of left ventricle.

SURGICAL REVASCULARIZATION IN ACUTE MYOCARDIAL INFARCTION: DO IT ALL OR GET THEM OUT OF HOSPITAL ALIVE?

D.unic, I. Rudez, D. Baric, M. Planinc, Z. Sutlic

Division of Cardiac Surgery, Dubrava University Hospital, Zagreb, Croatia

In the era of invasive cardiology, surgical revascularization in acute MI has very few indications. It is usually reserved for patients not suitable or with failed PCI, in cardiogenic shock with severely depressed cardiac function by the time of intervention. We present a case of a 72-year-old man who suffered acute inferior MI. His RCA was occluded and could not be opened by PCI. He also had 95% left-main stenosis, massive MR and TR, with LVEF of 25%, in cardiogenic shock. After IABP implantation, he was taken to the OR. Asystole occurred after sternotomy. CPB was established and sinus rhythm restored. Two venous grafts were created (LAD, RCA), with partial RCA endarterectomy on the beating heart. CPB weaning was uneventful. IABP was discontinued on postoperative day 2. Discharge ECHO showed improved systolic function with reduction of MR and TR. Two months after surgery patient is in

NYHA status I-II, despite residual MR. In a setting of cardiogenic shock post-MI, CPB supported CABG, on the beating heart might be beneficial in avoiding additional myocardial ischemia.

SURGICAL DRAMA IN FOUR ACTS

D. Cvetkovic, M.J. Kocica, T. Kocica, L.J. Soskic, S. Putnik, B. Nikolic, A. Mikic, M. Velimirovic, P. Djukic, D. Velimirovic, M. Vranes
Clinic for Cardiac Surgery, UC Clinical Centre of Serbia, Belgrade, Serbia

Act One: 76 year old man with cold right leg was admitted for urgent trans-femoral and trans-popliteal embolectomy. Cardiological evaluation revealed serious coronary disease with large anterior scar and floating intracavitary mass.

Act Two: A quadruple CABG and Dor procedure with the extraction peculiarly attached old LV thrombus of was performed.

Act three: After the competition of 3 proximal SVG anastomoses and aortic de-clamping, the "blue curtain" started to fall, indicating the iatrogenic ascending aortic dissection (clamp-injury). Ascending aorta was replaced and SVGs were re-inserted during the short-term circulatory arrest (17 minutes) on 26°C. Postoperative recovery was prolonged due to moderate global cerebral ischemia.

Act Four: Four weeks after cardiac surgery, the sternal instability became evident and was subsequently corrected. Echoes: Patient was discharged hemodynamically stabile, without any residual neurological deficit, with postoperative ECHO showing a significant improvement in LV-EF, with stabile sternum, with palpable pulses on both legs and fasciotomy wound healed per secundam intentionem. Six months after this drama, he is even better (clinically and echocardiographically confirmed) and still improving his capacities.

URGENT CABG AFTER FAILED PCI IN PATIENT WITH CARDIAC ARREST DUE TO LM DISSECTION – A CASE REPORT

Z. Trifunovic, R. Ilic, Z. Markovic, S. Tisma
Military Medical Academy, Belgrade, Serbia

Introduction: Guide catheter-induced left main coronary artery (LMCA) dissection is a rare complication of PCI but carry high periprocedural mortality rate. Emergent coronary CABG is the option for managing this acute complication in settings of severe hemodynamic instability

Aim: Present a case of 67 year old female in a subset of elective PCI for long tubular LAD stenosis with symptoms of de novo angina pectoris after recent anterolateral myocardial infarction prepared for procedure with clopydogrel and aspirin.

Method: After insertion and positioning of guiding catheter EBA 3.5mm on LM ostia, first contrast injection revealed extensive dissection of the left main coronary artery starting from its origin in sinus valsalva with cardiac arrest developed and intubation and chest massage started. Prompt transport to OR and open hart massage continued with canulation and induction of cardiopulmonary by pass. We performed CABG on LAD, D1 and OM coronaries.

Result: After year and half follow up we performed MSCT that reveal patent grafts to LAD and D1. ECG normal with no residual

scar changes. Patient in good condition, symptoms free on standard medicament therapy

Conclusion: The incidence of emergency heart surgery after coronary angioplasty vary from 2% to 5%. The aims of emergency CABG are to re-establish blood flow compromised by dissection, avoid the dissection development course, and preserve ventricular function.

WEDNESDAY, SEPTEMBER 8, 2010

SESSION 5 Faculty Lecture

ANATOMIC LANDMARKS IN AORTIC SURGERY, PARTICULARLY THE HEART CONDUCTION

G. Abuin

Cardiac Anatomy Research Laboratory and Instituto Cardiovascular Rawson, Buenos Aires, Argentina

Lecture Of 20 Minutes In Power Point Presentation: The anatomy of the so called aortic and mitral "annulus" are depicted in the lecture, with special regard to the heart conduction system and its blood supply. Surgery simulations and real surgical cases demonstrates the anatomic landmarks of these not visible structures.

Faculty Lecture

"THE IMPOSSIBLE AORTIC VALVE"

M. Levinson

Promise Regional Medical Center, Hutchinson, Kansas, USA

A full Cox-Maze III is the gold standard for surgical cure of all variants of persistent A fib. Ligation of the LA appendage is an advantage of surgery compared with catheter ablation. Ideally, a Maze III with appendage ligation can be performed without sternotomy or bilateral thoracotomy. We investigated the subxiphoid approach through a 10 cm vertical midline incision with sternal lifting (double Rultracts) and normothermic femoral-femoral bypass with caval isolation to decompress the cardiac chambers. A full 12 lesion Maze IV procedure was performed in all cases using the ATS Medical flexible Surgi-Frost Argon cryo-probe. Epicardial lesions were placed in the same locations as described by Cox for 1 to 3 minutes depending on tissue thickness. For the mitral isthmus lesion, the probe was formed into a circle and pressed deeply into the AV groove to compress the coronary sinus

wall up against the annular tissues while the lesion was applied. Four cases were performed with no conversions. One patient had a single vessel CABG performed concomitantly, while 3 were lone AF cases. There no deaths and all 4 patients went into NSR at various time intervals after surgery. Two patients converted spontaneously in the OR during the mitral isthmus lesion. There were not major complications but 3 patients required permanent pacing early and the 4th patient at 1 year post-op. The vertical SVC-IVC lesion is no longer being performed for this reason.

EARLY AORTIC RUPTURE AFTER TEVAR FOR COMPLICATED ACUTE TYPE-B AORTIC DISSECTION

D. Unic, I. Rudez, D. Baric, M. Planinc, Z. Sutlic

Division of Cardiac Surgery, Dubrava University Hospital, Zagreb, Croatia

Aortic rupture represents potentially fatal complication after TEVAR for acute type B dissection. It is either a peripocedural event, or late complication related to endoleaks. We present a patient with previous history of type-A aortic dissection 25 years ago, for which he underwent AVR with mechanical valve and ascending aorta replacement. There was no data on the false lumen after surgery. He presented with acute type-B dissection originating right under the left subclavian ostium. Proximal descending aorta measured 7 cm in diameter with signs of pending rupture with left-sided pleural effusion. Right renal artery originated from the false lumen. Patient underwent TEVAR, with minor endoleak present. Early postoperative course was uneventful and he was planned for control CT-scan on postoperative day 3. Early that day, he suffered sudden strong back pain, loss of consciousness hypotension refractory to any resuscitation and expired in a matter of minutes. Autopsy revealed covered primary entry point of the dissection. Transection of the aorta occurred at a plaque distal to the stent causing massive exsanguination. TEVAR represents a viable option for treatment of complicated type-B dissection. Taking care of endoleaks and proper stent length is important to avoid late complications.

A GIANT STERNUM-ERODING ANEURYSM OF THE ASCENDING AORTA AND AORTIC ARCH IN A YOUNG FEMALE PATIENT

T. Klokocovnik, M. Span

Department of Cardiovascular Surgery, University Medical Center Ljubljana, Slovenia

Giant ascending aortic aneurysms are rare, especially when compression or erosion of the surrounding structures is present and represent a surgical challenge. We present a case of a giant sternum-eroding aneurysm of the ascending aorta and aortic arch in a progressively dyspnoic 34-year-old female and describe a stepwise surgical approach as the optimal treatment.

AORTIC DISSECTION DURING PREGNANCY – A CASE REPORT

S. Putnik, B. Nikolic, M. Kocica, M. Velinovic, A. Mikic, V. Jovicic, A. Djordjevic, D. Cvetkovic, I. Bilbija, D. Markovic

Clinical Center of Serbia, Belgrade, Serbia

Aortic dissection during pregnancy is potentially catastrophic clinical condition and can be lethal to both, mother and fetus. We report a case of acute aortic dissection in a female patient in her age of 30 and in her twenty-sixth week of gestation. A 30-year-old patient in 26th week of gestation experienced severe retrosternal pain and hypotension. At admission, the patient was conscious, dyspneic, pale, with blood pressure 80/40 mmHg. Echocardiogram showed a Stanford type-A aortic dissection, with intimal tear 3 cm above right coronary ostium, mild aortic regurgitation, pericardial effusion and normal left ventricular function. In view of the risk of aortic rupture, immediate operation was indicated. The patient and her family participated in and agreed with the decision. After sternotomy and evacuation of a hemopericardium, cardiopulmonary bypass was established by retrograde perfusion through the left main femoral artery and venous drainage by a single cannula advanced to the right atrium through the femoral vein. Myocardial protection was carried out with cold cardioplegic solution and hypothermia at 34°C. Ascending aorta resection and interposition of 26 mm Dacron graft was carried out using double felt "sandwich" technique on both anastomoses, without circulatory arrest. During cardiopulmonary bypass reperfusion pressure was kept high. After surgery, the patient was maintained on assisted ventilation for 10 hours and remained hemodynamically stable. Echography demonstrated a viable fetus. Postoperative echocardiogram showed mild aortic regurgitation, normal left ventricular function and non significant pericardial effusion. The patient was discharged from the hospital 10 days after her initial admission. At week 34 of gestation, the patient delivered a healthy baby by Caesarean section. Since our patient was hemodynamically unstable, and at twenty-sixth week of gestation, our aim was to perform a simplified surgical procedure, to avoid circulatory arrest and to keep a high perfusion pressure, in order to save patient's life and to decrease potential risk of fetus damage.

SURGICAL TREATMENT OF AORTIC ANEURYSMS IN A PATIENT WITH EHLERS-DANLOS SYNDROME

Z. Mitrev, T. Anguseva, N. Hristov, V. Belostotckij

Special Hospital for Surgery Fillip II, Skopje, Macedonia

Ehlers-Danlos syndrome is a rare inherited disorder of the connective tissue that has been divided into 10 types according to the clinical course and inheritance. In type IV Ehlers-Danlos syndrome extreme fragility of the arteries is associated with multiple aneurysm formation, spontaneous rupture, and dissection. We report on a patient with Ehlers-Danlos syndrome who had enlargement of the sinus of Valsalva, severe aortic and mitral valve regurgitation. Surgery for aneurysm of the aortic root, and mitral valve reconstruction had been performed.

Clinical Summary: A 36-year-old man was admitted to our department for treatment of enlargement of the sinus of Valsalva. His height was 180 cm and weight was 60 kg. There were characteristic findings in the skin and joints, with prognathia and gothic mouth. He had received graft replacement for an ascending aorta

with reconstruction of the aortic root combined with mitral valve reconstruction. Ehlers-Danlos syndrome was diagnosed histopathologically by staining of the resected aortic wall, which showed deficiency of type III collagen. Early postoperatively patient had severe bleeding due to coagulation disorders. Later postoperative period was uneventful, except a enormous thoracic bulla of the right lung, which was treated conservatively with a thoracic drainage. After 20 days patient was discharged at home.

DESCENDING AORTA REPLACEMENT THROUGH MEDIAN STERNOTOMY

Z. Mitrev, T. Anguseva, N. Hristov, V. Belostotckij
Special Hospital for Surgery Philip II, Skopje, Macedonia

Introduction: This paper will present use of median sternotomy for repair of descending aortic aneurysm (DAA).

Material and Methods: 66-year-old male, with chest pain, history of hypertension and previously diagnosed DAA with chronic aortic dissection, was admitted in our center for immediate operative treatment. Surgery was performed through median sternotomy, employing right subclavian artery and right femoral artery for arterial inflow, right atrium for venous cannulation. Complete graft replacement of descending thoracic aorta was performed, cross-clamping proximally between left common carotid and left subclavian artery and distally on the terminal part of thoracic aorta, employing mild hypothermia with antegrade and retrograde arterial perfusion. Proximal anastomosis was performed adjacent with left subclavian artery, while the distal anastomosis was performed with true and false lumen, after resection of dissection membrane as far as possible distally, since the left renal artery originated out of false lumen.

Results: Operation was uneventful. Patient was 10 days on respiratory machine, day 7 he got tracheostoma, with minimal blood loss. His postoperative recovery was prolonged due to transient cerebral oedema. He was discharged home on postoperative day 31.

Conclusion: Median sternotomy is feasible in repair of DAA. It provides good exposure of the thoracic aorta with optimal position for proximal and distal aortic clamping, and it is better tolerated by patients regarding postoperative recovery.

SESSION 6 Faculty Lecture

PRESERVING ACCESS TO CARDIAC SURGERY SKILLS IN THE STENT ERA

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The Oregon Clinic PC, Portland, Oregon, USA

Over the past 30 years, cardiothoracic surgery's success growth and attraction to residents was predicated on the growth of CABG

surgery. With the introduction of coronary stents in 1996, percutaneous coronary intervention (PCI), has rapidly supplanted CABG for patients with coronary artery disease. In 2006, a total of 253,000 CABG procedures and 1,131,000 PCI procedures were performed in the United States, with drug-eluting stents used in 90% of the PCIs. As a consequence of this, one third of United States residencies in CT surgery fill and graduating residents have had difficulty finding positions.

We report our private practice's response to this challenge.

Methods: Beginning in 2004, our group of 4 surgeons developed a strategy to ensure the continued availability of cardiothoracic surgery skills in our institution, along with a model that could attract new surgeons by identifying specific opportunities for growth. The keys were the development of a multi-disciplinary thoracic oncology program in partnership with PHS (Providence Health System) thereby raising the profile of an already recognized general thoracic surgery program, an expansion of existing general vascular surgery skills into such areas as the non-invasive vascular lab, aortic endografts and limb salvage surgery, initiation of a dialysis access surgery program and expansion of active participation in leadership activities within PHS.

Results: In 2007 the group performed 783 surgical procedures, in 2008 904 and in 2009 1000 operations with active participation in multi-disciplinary quality monitoring in all facets of the group's activities. The growth has occurred primarily in thoracic oncology and vascular/dialysis access surgery.

Conclusions: While the decline in cardiac procedures is expected to stabilize, maintenance of cardiothoracic surgery skills in most institutions will require new strategies to ensure viability. We present one such example here for others to adapt to their own unique circumstances.

Faculty Lecture

EXPANDING THE HORIZONS OF OUTCOMES RESEARCH BEYOND THE WALLS OF ACADEMIC INSTITUTIONS: AN INNOVATIVE MODEL

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Aegis Cardiovascular Research Foundation, Florida, USA; Holy Cross Hospital, Florida, USA; College of Physicians and Surgeons of Columbia University, New York, USA

Background: A vast majority of cardiac surgery procedures are performed in the private setup. However, most clinical research arises from academic institutions leading to a significant disparity in published outcomes data with a bias towards representing the academic setup. Furthermore, databases that currently exist in the realm of cardiac surgery such as STS, NYS-DOH-CSRS etc. — be they national or regional, mandatory or optional, audited or unaudited — have a major limitation of incomprehensive data capture owing to the challenge of wide coverage and management. We present an applied model designed to strengthen these gaps in outcomes research.

Methods: OpenHeart-ListServ of Heart Surgery Forum (HSF), which is in existence for over a decade, has provided an online discussion forum for ongoing exchange of knowledge and ideas among cardiothoracic specialists. These vibrant discussions culminated in this idea, and rightfully so, which ultimately led 2 of its members to co-found Aegis Cardiovascular Research Foundation (ACVRF) in 2009. ACVRF was established with an intention to provide a common platform to all closely allied cardiovascular surgical practices, which by the virtue of being in the private setting generally lack a formal research infrastructure. ACVRF aimed to advance and promote research and clinical outcomes assessment for patients using a 3-tier approach: Phase-I (proof of concept and development of a center of excellence), Phase-II (nationwide collaborative network) and Phase-III (worldwide collaborations).

Results: During phase-I, ACVRF selected a stand-alone CT Surgeon with a good practice but no academic affiliation and within a record time compiled a comprehensive database of cardiac procedures (including one of the world's largest cohorts for Cox-cryomaze, ETlogix valvuloplasty, as well as MC3 tricuspid valvuloplasty). Extensive collaborations with local hospitals and industry have generated more than a dozen and half abstracts, presentations, manuscripts, and grants (totaling >\$600,000) within a very short span of time. At this stage, the process of collection and storage of clinical information is being totally revamped to an interactive and dynamic central database which will be web-based for global access, HIPAA compliant, fully secured and encrypted with quadrupled back-ups in order to accelerate the pace of research as ACVRF expands. This will help smooth execution of Phase-II and Phase-III, both of which are underway concurrently.

Conclusions: Using this unique model of forming a virtual network of various skillful surgeons from the private practice setting and pooling their knowledge and clinical experience to contribute to the medical literature, ACVRF has a great potential to facilitate the surgeons' ability to deliver state-of-the-art care, utilize and assess cutting-edge surgical techniques, and accelerate innovations — all in order to improve the quality of life of patients. The model will also support existing national and regional databases by establishing an infrastructure that fills in the current void by facilitating contribution from the previously untapped non-academic setting.

Faculty Lecture

ARTIFICIAL COAPTATION SURFACE IN MITRAL VALVE REPAIR

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Mitral valve repair is the current treatment of choice for patients with mitral valve dysfunction and generally preferred over valve replacement due to important patient benefits. The patient benefits of mitral valve repair versus replacement have been well

documented and include reduced operative mortality improved long-term survival, better preservation of left ventricular function, and greater freedom from endocarditis, thromboembolism, and anticoagulant-related hemorrhage. Various techniques have been used to achieve the goal of successful and long lasting mitral valve repair. Vast majority of them are based on artificial ring which supports the natural mitral annulus with or without the implantation of the artificial chordae tendineae which replace or support the natural suspensory apparatus of the mitral valve, and very few techniques deal with the third major functional part of the mitral valve – the coaptation surface. In this paper development of the concept of the artificial coaptation surface has been described. First clinical implantation worldwide of the device that utilized the concept of the artificial coaptation surface and subsequent feasibility study took place in Croatia. From October 2004 to April 2007 27 devices were implanted. More than 100 implants were performed to date worldwide. Medical implications of the concept, potential fields of application, results of the feasibility study with the worldwide implantation statistics are discussed in this paper.

SPONTANEOUS RUPTURE OF LEFT VENTRICULAR TRUE ANEURYSM

Z. Mitrev, T. Anguseva, N. Hristov, V. Belostotkij

Special Hospital for Surgery Philip II, Skopje, Macedonia

Rupture of left ventricle leading to cardiac tamponade is cause of death in 5% to 10%. We report the case of a 52-year-old woman who presented with cardiac tamponade due to ruptured left ventricular aneurysm. She was experiencing sudden onset of severe chest pains, accompanied by nausea, syncope, cold sweating. Blood pressure was 88/50 mm Hg, heart rate was 126 beats/minute, respiratory rate was 32/minute. She appeared to be conscious but drowsy. She exhibited distended neck vein, sinus tachycardia with no murmur, and moist rales breathing sound over bilateral lung base. After intubation emergency transoesophageal ultrasound showed massive pericardial effusion. Operation found bloody pericardial effusion (500 mL), earlier inferior wall infarction with large aneurysm, small leakage hole over center of aneurysm. Aneurysm measured 5.8 cm diameter, was composed of dense scar tissue ranging in thickness from 2 mm-5 mm, included wide opening into left ventricular chamber that involved at least 30% of left ventricle. Left ventricular aneurysmectomy with endoventricular patch plasty was performed. Concomitant coronary artery bypass graft was performed. Patient had uneventful recovery, with long respiratory dependency, need for tracheostoma, mesenteric ischemia — conservatively treated. After 20 days patient had been separated from respiratory machine. She was discharged at home after 40 days. Six month follow-up showed improvement of EF > 40%.

RUPTURE OF THE LEFT VENTRICLE FOLLOWING AORTIC AND MITRAL VALVE REPLACEMENT

R. Blazekovic, R. Ugljen

Clinical Hospital Center, Osijek, Croatia

We report a case of 66-year-old woman who developed rupture of the left ventricle following aortic and mitral valve replacement. The operative procedure was indicated due to multiple rheumatic valve disease. Mitral valve and subvalvular apparatus were heavily calcified. According to classification it was going on type I of the rupture of the left ventricle. Here we also discuss types of ventricular ruptures and modalities of management of this highly lethal complication.

IATROGENIC TYPE B AORTIC DISSECTION DURING FEMORAL CANNULATION IN HEART TRANSPLANT RECIPIENT

Zeljko Sutlic, Igor Rudez, Davor Baric, Daniel Unic, Mislav Planinc

Division of Cardiac Surgery, Dubrava University Hospital, Zagreb, Croatia

Objective: Acute aortic dissection is defined as iatrogenic when it occurred as a consequence of cardiac catheterization, CABG, or other invasive vascular procedures such as femoral cannulation for cardio-pulmonary bypass. In acute type B dissection the most frequent modalities of death are visceral malperfusion and aortic rupture. The acute and subacute phases of type B dissection survive between 70% and 80% of patients treated only with medical management. Surgical treatment is therefore reserved for complications of type B dissection.

Methods: A 59-year-old male patient who was heart transplant candidate for ischaemic cardiomyopathy underwent femoral cannulation because of prior CABG and left ventricle aneurysmopathy. Transthoracic intraoperative echocardiography revealed acute aortic dissection what was lately confirmed on computerized tomography to be type B aortic dissection. He had dissection starting from right femoral artery, arising to the left subclavian artery. All main visceral branches were originating from the true lumen. Due to very high procedure risk, the transplantation was abandoned. A half a year later he was successfully transplanted.

Conclusion: We report a case of acute aortic dissection during femoral cannulation. Our patient was treated only with medical therapy and was discharged uneventfully from hospital 2 weeks after the procedure. Acute aortic dissection is hazardous and potentially lethal complication of femoral arterial cannulation, therefore other site of arterial cannulation must be chosen in such circumstances are possible.

IATROGENIC AORTIC DISSECTION DURING PERCUTANEOUS CORONARY INTERVENTION – A CASE REPORT

M. Mirocevic, A. Nikolic, S. Radovic, S. Drekalovic, A. Popovic

Clinical centre of Montenegro, Podgorica, Montenegro

A 60-year-old nurse was admitted to Center for Cardiology of Clinical center of Montenegro for an urgent coronary arteriography. On February 16, 2010 cardiac catheterization via the right femoral artery was performed and revealed a two vessel

disease (ACX and RCA). After the implantation of a bare metal stent on RCA a dissection of the ostium of the right coronary artery occurred with the extension to the right coronary sinus and ascending aorta. A contrast enhanced multislice CT scan confirmed aortic dissection, the entry site was in the ostium of the right coronary artery extending to the ascending aorta, aortic arch and descending aorta down to the thoracoabdominal level. She was transferred to the Center for Cardiac surgery where on arrival was hemodynamically stable. A transthoracic echo revealed a dissection flap commencing at the base of the right coronary cusps, no aortic regurgitation was found. Initially, the patient was managed conservatively. Five days after the admission in our center she was successfully operated. Graft replacement of ascending aorta with reimplantation of coronary arteries and one aortocoronary bypass were done. The patient made an uneventful recovery.

NOLI ME TANGERE AORTIC DISSECTION

M. Kocica, D. Cvetkovic, Lj. Soskic, S. Putnik, T. Kocica, B. Nikolic, A. Mikic, M. Velinovic, P. Djukic, D. Velimirovic, M. Ristic, M. Vranes
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A 74-year-old hypertensive female presented with chest discomfort, dyspnea and hoarseness. A large (90mm) ascending aortic and arch aneurysm, with old, thrombosed intramural hematoma in the ascending aorta, mobile flap within the arch and well defined aneurismal “necks” in sino-tubular and isthmic levels were identified by the TT-ECHO and MSCT scans. Aortography revealed “confusing” behavior of contrast media in the ascending aorta and arch. There were no significant coronary stenoses. Preoperative CD scan showed significant kinking of the right internal carotid artery and patient was scheduled for the elective combined carotid and aortic surgery. Cardiac surgical strategy included retrograde arterial perfusion, standard RA cannulation and deep hypothermic circulatory arrest, without aortic cross-clamping and without any cardioplegia administered. The heart was topically cooled and LA vented. Ascending aorta and the arch were simply “un-clampable” because of old type-1 dissection with dilated thrombosed false lumen, and retrograde propagation of type 3 dissection with partially fresh thrombosed false lumen, respectively. Ascending aortic and arch replacement was performed and patient was discharged “alive and kicking”. Post festum, we confirmed our initial assumption that aortic cross-clamping would probably be the fatal mistake in this case.

THURSDAY, SEPTEMBER 9, 2010

SESSION 7 Faculty Lecture

SCIMITAR SYNDROME: REPORT OF A CASE AND ITS SURGICAL TREATMENT

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Scimitar syndrome is a rare congenital anomaly characterized by total or partial anomalous pulmonary venous drainage of the right lung to the inferior vena cava (IVC). We present a fourteen years old girl who was sent to our hospital because of a systolic murmur and the shift of the mediastinal structures to the right on the chest x-ray. Echocardiography showed dilated right ventricle with no clear signs of heart defect. Qp/Qs measured by radionuclide scintigraphy was 1,8/1. Finally, cardiac catheterization revealed an anomalous vein going from the right lung to the inferior vena cava. There was no atrial septal defect. The surgery was done with the use of cardiopulmonary bypass but without hypothermic circulatory arrest although the aberrant vein curved below and behind IVC-atrial junction. IVC cannula was taken out and the blood from IVC was suctioned by the pump suction catheters. A portion of the atrial septum was excised and the autologous pericardial patch was sown to create a baffle between the entrance of the anomalous vein and the defect created in the atrial septum.

Faculty Lecture

OPTIMIZATION OF THE LEFT VENTRICULAR LEAD POSITION DURING THE TRANS-THORACOTOMY IMPLANTATION OF THE CARDIAC RESYNCHRONIZATION THERAPY (CRT) DEVICE

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Cardiac resynchronization therapy (CRT) can offer benefit to patients with chronic heart failure (New York Heart Association Class III or IV), proven LV dyssynchrony (QRS width >120 ms) and with severe left ventricular (LV) systolic dysfunction (LV ejection fraction <35%). Cardiac resynchronization therapy is able to improve survival, enhance functional capacity, reduce the number of hospital admissions, and promote LV reverse remodeling. However, up to 30% of patients do not show symptomatic benefit. Factors associated with a less than optimal outcome

include among other reasons, presence of myocardial scar, and subsequent suboptimal LV lead placement. Cardiac resynchronization therapy (CRT) device implantation via mini anterolateral thoracotomy has been advocated as an alternative approach in case of malpositioning of left ventricular (LV) lead in the coronary sinus, but a little attention has been paid to potential benefits of differential positioning of the lead at the LV. From January 2009 to February 2010 10 patients received CRT device with the LV lead positioning via mini thoracotomy. Using the test LV lead (Medtronic Inc. Minneapolis, MN, USA, pacing was performed in four pre-defined areas of the LV (antero and postero-basal, antero and postero-apical). Standard transesophageal echocardiography (TEE) data were acquired intraoperatively pre- and post-CRT device implantation with a Vivid Six/ Vivid Seven ultrasound scanner equipped with a transesophageal 6 MHz transducer (GE, Horten, Norway). Using the mid-esophageal and transgastric views, standard 2D data, spectral Doppler flows and myocardial velocity data were obtained. The optimal LV pacing site was chosen as the lead position with the lowest measured values of LV end-systolic volume, the smallest amplitude of the septal flash (the early septal fast inward/outward motion), the highest values of noninvasively obtained dP/dt (measured from the continuous wave Doppler traces of mitral regurgitation, where available) and the highest increase in stroke volume/cardiac output. Preliminary data show that optimal results could be achieved with LV lead position which does not necessarily follow the pattern of "optimal" (eg, posterobasal) position, and that the optimal early results can be achieved by "customization" of the LV lead positioning for every single patient. Although further investigation is necessary, we believe that optimization of the LV lead positioning under ECHO guidance could further improve efficiency of this common procedure.

PEDUNCULATED BUTTERFLY-SHAPED THROMBUS IN THE ASCENDING AORTA

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We report the case of the 61-year-old female, with clinical presentation of an acute aortic syndrome. Preoperative clinical and laboratory (echocardiography, contrast CT and catheterization) findings were confounding in respect to the presence of aortic dissection penetrating atherosclerotic aortic ulcer or intramural aortic haematoma. Intraoperative and histological findings confirmed the presence of pedunculated "butterfly-shaped" thrombus in the macroscopically normal ascending aorta. Aortic thrombosis, unrelated to atherosclerosis and aneurismal disease is extremely rare and commonly ascribed to trauma, inflammation or hypercoagulability. Regardless of etiology, urgent surgical removal of the ascending thrombus is mandatory, because of potentially serious and fairly unpredictable embolic complications.

HEART TRANSPLANT CASE: SERIES OF UNFORTUNATE EVENTS

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A 57-year-old male patient underwent CABG with residual post-operative stenocardia and development of ischemic cardiomyopathy because of which an orthotopic bicaval heart transplantation was preformed a year after the first procedure. During second sternotomy innominate vein was injured and ligated. During the preparation of ascending aorta iatrogenic type A aortic dissection occurred and ascending aorta was replaced using deep hypothermic cardiac arrest with selective brain perfusion. After ascending aorta replacement orthotopic bicaval heart transplantation was preformed without complications. Early postoperatively the patient was noted to have distended forehead and neck veins as well as moderate plethora of the head and neck, the central venous pressure, measured through a left subclavian catheter whose tip was in the SVC, was 18 mm Hg. Soon after patient was weaned from mechanical ventilation urgent tracheostomy was preformed due to obstruction of upper respiratory tract from distension and edema of soft neck tissues. On postoperative day 10, MSCT was preformed and demonstrated complete occlusion of the SVC with thrombus extending into the right and left brachiocephalic vein, with the occlusion of left internal jugular vein. Emergent surgery was preformed with removal of the thrombus formation from SVC and creation of atriocaval bypass with interpositum graft (Uni-Graft K DV 15cm/16mm). Patient was afterwards felling well and two months after the operation he was transferred to Cardiology department. He has than developed flu symptoms with cough, fatigue, and febrility. H1N1 virus was confirmed to be present in patient serum with developing of influenza type A which was treated successfully. Six months after the heart transplantation the

patient is doing well. We present a case with series of unfortunate events that have happened in heart transplant recipient with a good outcome.

SURGICAL TREATMENT OF MULTYLOCULAR HYDATID CYST OF THE LEFT VENTRICLE

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Echinococcus cyst in the heart, a life threatening condition, has rare incidence in localization of only 0.5-2%. We have described a case of a 23-year-old patient with echinococcus cyst localized in the myocardium of the left ventricle. At the beginning completely asymptomatic, in a random x-ray examination a pathological formation in the left ventricle was found. Using a transthoracic echocardiography the existence of a multilocular cyst has been confirmed, located at the apex of the left ventricle with a diameter of 8cm. The diagnosis was confirmed with transesophageal echocardiography, computerized tomography and a magnetic resonance imaging. The existence of other noncardiac localizations of the echinococcus was excluded. The coronary angiography was normal. The patient was treated for two years with benzimidazole. Three and a half years later, the patient was enrolled for a surgical treatment. Through medial sternotomy, in extracorporeal circulation with blood cardioplegy, we approached toward complete excision of the cyst. With apical opening, a multylocular cyst with dense coliquated mass was found. Following punctuation and aspiration of the cystic mass with instillation of hypertonic solution, the pericystic sheath was resected down to an intact myocardium. The septal defect was closed with two circular sutures. The operation underwent without any complications, and the patient's functions were stable following the intervention.