

# Abstracts from the #2 Heart Surgery Forum Meeting: Challenges and Solutions in Modern Cardiac Surgery

Split, Croatia

## SESSION I

Chairmen: M. Levinson, W. Novick, Z. Sutlic

### FACULTY LECTURES

#### 1.1

##### **BLUE BABIES, BOMBS AND BAD PLACES: 20 YEARS OF HUMANITARIAN PEDIATRIC CARDIAC ASSISTANCE DEVELOPMENT**

William Novick

International Children's Heart Foundation; University of Tennessee Health Sciences Center, Memphis, TN, USA

**Objective:** Pediatric cardiac assistance development is required in a number of countries around the world. The political situation in a number of these countries is less than stable when compared to United States or other developed countries. Safety risks to the team are rarely discussed, this will be the focus of this report.

**Methods:** The records of the International Children's Heart Foundation were searched for all countries where the foundation provided assistance. The dates of assistance were determined and search for civil unrest, military incursion or general political instability was made utilizing United States Government Travel Warning Site, wire services and internet sites. Threats either direct or indirect to team safety were determined by site and date.

**Results:** Between April 1993 and March 29, 2014 a total

of 372 trips were made to 32 different countries. Civil unrest, military action or political instability was present at the time of trips in 14/32 (44%) countries. All countries (14/14) at the time of trips were listed by the US State Department as Travel warning sites. Actual incidents during team trips occurred in 8/14 (57%) of the issue countries visited. Team or personnel evacuation occurred only in 3 instances (Honduras, Libya, Serbia) which represents 0.8% of all trips (3/372). Team member injury occurred to 1 person on 1 trip (mugging, Honduras).

**Conclusions:** Providing pediatric cardiac humanitarian services in unstable countries is not without risk, but this risk is low in our experience if reasonable precautions are maintained.

#### 1.2

##### **STENTLESS AORTIC VALVES – CURRENT STATE**

Zeljko Sutlic

University Hospital Dubrava, Zagreb, Croatia

Abstract not available at the moment.

#### 1.3

##### **UNUSUAL, NON-INFECTIOUS CAUSES OF ACUTE AORTIC REGURGITATION**

Mark Levinson, John Rowles

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Endocarditis or Ascending Aortic Dissection are the expected causes identified in patients with acute regurgitation of the aortic valve. Endocarditis causes destruction of the leaflets and annulus from infection while Type A (Ascending Dissection) tears the commissures away from the aortic wall

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with leaflet prolapse and acute valvular regurgitation. Sudden leakage under systolic pressure is poorly tolerated leading the rapid onset of LV strain, dilation and congestive heart failure. We report 2 cases of acute, sudden, and life threatening aortic regurgitation requiring emergency, life-saving AVR. In both cases, the underlying cause was a non-infectious, non-dissection disruption of the valve mechanism. In case #1, the right-non coronary commissure tore loose from the aorta in a 35 year old male. About 1 year after AVR, the patient died from occlusion of the internal carotid artery. The cause of both events was never proven but presumed to be a vasculitis. In case #2, an infiltrative auto-immune aortitis caused massive acute AR and MR requiring emergency rescue AVR after cardiac arrest. The cause was Cogans' syndrome, a rare autoimmune disorder. Echocardiographic findings showed thickening and malcoaptation of both valves. The mitral responded to conventional ring annuloplasty while the aortic valve was replaced with excellent clinical outcome. Acute AR is not always due to infection or dissection as shown by these two cases, but emergency AVR is still the treatment of choice.

## 1.4

### **CARDIAC SURGERY IN PATIENTS WITH INFECTIVE ENDOCARDITIS COMPLICATED WITH SEVERE SEPSIS AND SEPTIC SHOCK**

Vladimir Krajinović

*Clinical Hospital for Infectious Diseases, Zagreb, Croatia*

Abstract not available at the moment.

## 1.5

### **WHEN YOU THINK YOU'RE OFF THE HOOK: PROSTHETIC VALVE ENDOCARDITIS AFTER A NEAR-HIT-MISS**

Daniel Unic

*University Hospital Dubrava, Zagreb, Croatia*

We present a 65 year-old female patient admitted for aortic valve endocarditis (*S. epidermidis*) with the development of membranous VSD and LV-RA shunt. Comorbidities included diabetes and COPD. Initial surgery (AVR + patch closure of VSD) was complicated with visceral venous stasis (ascites, anuria, bowel stasis) due to IVC cannula inadvertently slipping deep into IVC. She had a delayed sternal closure and subsequent pericardial drainage for effusion. Due to bowel distension and venous stasis antibiotics were started after the procedure prophylactically. The only positive culture in the postoperative period was *Enterococcus* sp from bronchial aspirate. She had an episode of rectal bleeding requiring transfusion on POD #30 but no source was detected.

Six months after initial surgery she presented with fever and chills and was diagnosed with prosthetic valve endocarditis caused by *Enterococcus fecalis*. abdominal CT scan revealed splenic abscess and she underwent splenectomy followed by re-do root replacement and subsequently died of right heart failure.

## SELECTED ABSTRACTS

## 1.6

### **PROSTHETIC AORTIC VALVE ENDOCARDITIS AFTER LIVER TRANSPLANTATION**

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

*University Hospital Dubrava, Zagreb, Croatia*

A 50-year-old male patient with history of hepatitis B and known symptomatic severe bicuspid aortic valve stenosis and ascending aortic aneurysm was admitted at our hospital for preoperative check-up. Liver cirrhosis stage B (Child-Pugh score 7) of unknown etiology was diagnosed with preserved liver synthetic function. Indication was made to preform cardiac surgery before any further decision about liver transplant. Stenotic bicuspid aortic valve was replaced with Medtronic Mosaic A23 bioprosthesis and ascending aorta was replaced with interpositum graft. Early postoperatively hemodynamic instability occurred with low systemic pressure and ECG changes so emergent re-sternotomy was done without any obvious sign of bleeding or aortic dissection with good contractility and very low peripheral vascular resistance. Postoperative echocardiography showed preserved left ventricular function and normally functioning bioprosthesis aortic valve. During postoperative course patient had high fever without proven pathogen and renal insufficiency along with further liver function deterioration. After initial stabilization he was placed on Eurotransplant list for liver transplantation. Two months after cardiac procedure a suitable liver donor was found and liver transplant was done in another local hospital with liver transplant program. For following 10 months his course was uneventful until he suffered cerebrovascular accident (CVA) with left-sided hemiparesis. After clinical and echocardiographic suspicion was made of bioprosthesis valve endocarditis and *S. epidermidis* being isolated from blood cultures patient was again referred to our department. No valve vegetations were found and after antibiotic treatment patient was afebrile and in good overall condition. During neurological rehabilitation procedure, two months after he had suffered CVA he developed third degree AV block with progression to asistoly which prompted cardiopulmonary resuscitation and implantation of permanent pacemaker (PM). A month after PM implantation the patient was hospitalized in our hospital due to worsening dyspnea. Transesophageal echocardiography revealed endocarditis of bioprosthesis aortic valve and aortic root with severe aortic stenosis and paravalvular leak. He was again transferred to our department and indication was made for urgent reoperation. Before planned redo he

became hemodynamically unstable with anuria and required hemodialysis and transfer to intensive care unit. Four days after clinical stabilization and a year after initial cardiac procedure Bentall operation was preformed and implantation of DDD pacemaker with epicardial electrodes was done. *K. pneumoniae* and *S. epidermidis* were isolated from explanted prosthetic heart valve and adequate antibiotic treatment was continued. Postoperative echocardiography showed moderately reduced left ventricular function. Patient was clinically stable and was discharged to home in a stable condition.

## 1.7

### **SORIN FREEM SOLO VALVE VERSUS ST. JUDE REGENT VALVE: EFFECTS ON LEFT VENTRICLE FUNCTION AFTER SURGICAL AORTIC VALVE REPLACEMENT. EARLY AND MIDTERM RESULTS**

Alen Karic

*University Clinical Center Tuzla, Clinic for cardiovascular disease, Tuzla, Bosnia and Herzegovina*

**Introduction:** Stentless valve have larger effective orifice area (EOA) resulting with better recovery of Left Ventricle (LV) function.

**Aim:** Analyze early and late results after Aortic Valve Replacement (AVR) with St. Jude Regent mechanical valve and Sorin Freedom Solo Stentless biovalve.

**Patients and Methods:** Three Groups were created, each including 50 patients. Groups were arranged into two subGroups of 25 patients. Follow up was done for two, one year and six months respectively (Group 1, 2, 3).

**Results:** Patients in all subGroups with SFS valve were older. In the Group 1 CardioPulmonary Bypass (CPB) time and Cross clamp time was significantly shorter for SFS subGroup of patients (CPB: St. Jude Regnet vs SFS: Group 1:  $95.88 \pm 27.68$  versus  $81.48 \pm 20.08$ ,  $P = 0.041^*$ ; Cross clamp: Group 1:  $73 \pm 21.33$  versus  $61.88 \pm 14.36$ ,  $P = 0.032^*$ ). There was no difference in early and late mortality among subGroups. Significant pressure gradient reduction was revealed in all subGroups of patients for all three Groups comparing preoperative and postoperative measures of pressure gradient across aortic valve ( $P < 0001$ ). Interventricular Septum thickness was significantly reduced for patient who received St. Jude Regnet valve in Group 2 (one year after surgery) ( St. Jude Regent preOp/postOP/ Follow UP IVS:  $1.90 \pm 0.25$  versus  $1.90 \pm 0.25$  versus  $1.68 \pm 0.20$ , Anova  $P = 0.0006^*$ , post Hoc  $P = 0.017^*$ , post Hoc  $P = 0.017^*$ ). Statistically significant increase of EF was noticed in Group 2 for subGroup of patients with Sorin Freedom Solo valve (Sorin Freedom Solo preOp/postOP/Follow UP EF:  $54.23 \pm 11.84$  versus  $59.88 \pm 11.74$  versus  $63.04 \pm 8.81$ , Anova  $P = 0.021^*$ , post Hoc  $P = 0.024^*$ , post Hoc  $P = 0.605$ ).

**Conclusions:** Sorin Freedom Solo valve is excellent prosthesis for patients with AS regardless of high operative risk and old age. Effects on LV parameters in the end was equivalent

to the results of AVR with St. Jude Regent valve patients.

**Key Words:** Aortic stenosis, surgical aortic valve replacement, mechanical St. Jude Regent valve, biological Sorin Freedom Solo stentless valve, early results, late results

## 1.8

### **THREE YEARS OF A SINGLE CENTER TAVI PROGRAMME: EXPERIENCES, CHALLENGES AND PROSPECTS**

Daniel Unic

*University Hospital Dubrava, Zagreb, Croatia*

**Aim:** To present a 3-year single-center experience with transcatheter aortic valve implantation (TAVI).

**Methods:** From March 2011 to April 2014, 41 patients (25 male) underwent TAVI procedure. All patients were evaluated for the procedure by a heart-team. Mean age was  $80 \pm 5$  years. Mean logEuroSCORE was  $18 \pm 14\%$  and mean STS score  $21 \pm 14\%$ . Mean gradient was  $89 \pm 56$  mmHg. Preoperative NYHA status was 3. Seven patients (17%) had previous cardiac surgery. Transfemoral access was used in 36 (97%) and transaortic in 1 (3%) patient. Arterial closure device was used in 20 (54%) of patients. Medtronic CoreValve was used in 23 (62%) and Edwards Sapien in 18 (38%).

**Results:** There were no in-hospital deaths. Procedural success was 93% (38/41). Mean postoperative gradient was  $8 \pm 5$  mmHg ( $P < 0.001$  vs preoperative). Median postoperative NYHA status was 1. Four patients (11%) required postoperative pacemaker insertion. One patient (3%) suffered a stroke and 1 (3%) a non-fatal pulmonary embolism. There were 2 (5%) valve embolizations one of which was treated surgically. There was one annular rupture treated by AVR. Five patients (12%) died during a 3-year follow up (1-MOF, 1-pneumonia, 3-sudden death).

**Conclusions:** Initial results of TAVI are encouraging. Procedure is complex with a significant potential for complications. Patient choice by a heart team as well as procedure planning warrant good outcome.

## 1.9

### **SIGNIFICANCE OF HYBRID SURGICAL THEATRE DURING TAVI**

Michael Markin, Daniel Unic, Zeljko Sutlic, Davor Baric, Igor Rudez

*University Hospital Dubrava, Zagreb, Croatia*

**Introduction:** Aortic stenosis is the most common valve disease, and the considerable increase in the incidence is foreseen for the coming decades because of the progressive aging of the population. Transcatheter aortic valve implantation (TAVI) represents an accepted alternative

method of intervention with a cardiovascular and all-cause mortality similar to operative replacement at early and long-term follow-up in high risk population. Iatrogenic damage of different structures of the aortic root in the region of the device landing zone may occur during TAVI. (1% of all patient who undergo TAVI). A Hybrid surgical theatre allows quick conversion from a catheter-based intervention to an open-heart if the need arises.

**Case report:** We present a case of an 81 year old female who was diagnosed with severe aortic stenosis and went through severe intraprocedural complications during TAVI, aortic annulus rupture, requiring immediate open heart surgery.

An 80-year-old female patient underwent transfemoral TAVI with a 26-mm Edwards-Sapien valve. The diameter of the native aortic annulus ranged 21 to 23 mm. Annular rupture was encountered after deployment of a 26-mm Edwards-Sapien XT valve, which was immediately recognized by sudden hypotension and echocardiography showed signs of cardiac tamponade. An emergency median sternotomy was performed. The patient

underwent conventional aortic valve replacement with a biological prosthesis (Carpentier-Edwards Magna Perimount A 19) using standard cannulation for cardiopulmonary bypass. The ruptured native aortic annulus was repaired with goretex patch. The early postoperative course was uneventful and the patient was discharged from the hospital.

**Conclusion:** An interdisciplinary approach to TAVI facilitated bailout procedures accomplishing acceptable outcome, a potentially fatal but treatable complication. It is crucial to have the possibility to perform immediate conversion to conventional surgery when necessary. The answer lies in use of hybrid surgical theatre that requires interdisciplinary heart team effort, including cardiac surgeons, perfusionists, interventional cardiologists and cardiac anesthesiologists. All together, they create a surgical and interventional safety net, as we showed in our case report. Despite recommendations and potentially fatal intraoperative complications, the use of hybrid surgical theatre during TAVI procedure is not comprehensively adopted by all centres.

**SESSION 2**

*Chairmen: B. Bidstrup, D. Harris, G. Rescigno*

*FACULTY LECTURES***2.1****APROTININ, HAS THE BABY BEEN THROWN OUT WITH THE WATER?**

Benjamin Bidstrup

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Following the release of an observational study in January 2006, which was accompanied by unprecedented publicity[1], concerns were raised about the safety of aprotinin (Trasylo). Another study released at the same time raised concerns regarding renal function[2]. Worldwide, drug agencies, particularly the FDA, examined these reports closely. Mangano, the lead author of the article published in 2006[1], was initially not prepared to provide his data, derived from the McSPI database, to the FDA for independent evaluation. There were major concerns regarding many of the analyses [3]. One example related to the apparent excessive rate of renal dysfunction in the aprotinin group when compared with the 'control' group and those receiving Amicar (6- epsilon amino caproic acid) or Cyclokapron (tranexamic acid (TA)). It was not noted the rate of renal dysfunction in the 'control group, a low risk group, was much lower than most reported studies from large databases including Duke University [4] and an earlier report from the McSPI database[5]. Further, neither the timing nor the persistence of the defined renal dysfunction was given. In a paper from the same group which reported on renal dysfunction in cardiac surgery patients some 12 months later[6], the use of aprotinin (and any of the other drugs) was not noted as a risk factor for renal dysfunction after CABG. Karkouti, at the same time reported on a single centre observational study, suggesting aprotinin was associated with an increased risk of renal dysfunction compared with tranexamic acid[2].

Some 4 years later, a further report came from Karkouti in Toronto. In this matched analysis, it was observed that aprotinin was used in very high risk cases when compared with TA[7]. Only renal dysfunction was noted to be increased in aprotinin treated patients. It was also noted that the benefits of aprotinin were seen in high risk cases as distinct from those treated with TA.

Sander recently reported on the relative lack of efficacy of TA vs aprotinin in high risk cases and raised concerns re the safety profile of TA [8].

The notification that the BART study was stopped

prematurely to an apparent high mortality in the aprotinin group created further confusion.

Anecdotally, many surgeons around the world have raised concerns regarding the absence of aprotinin. Some units have reported increased stroke rates, others an increase in massive transfusion and return to the OR. Several stated 'Aortic dissection repair has changed from a 3 hour operation with minimal fuss, to a 3 hour operation and 3 hours to achieve haemostasis.'

The status of aprotinin has been re-evaluated by several regulatory agencies. As I originally envisaged, its restriction to high risk cases is likely to show important benefits for patient outcomes, at a favourable risk-benefit ratio[9]. This raises the question of whether the initial withdrawal was premature and has resulted in many patients missing the benefits of reduction in bleeding and stroke in high risk cardiac surgery.

**2.2****REDO CABG BY THE OFF PUMP THORACOTOMY APPROACH**

David Harris

*Kuils River private Hospital, Cape Town, South Africa*

Abstract not available at the moment.

**2.3****REMOTE ISCHEMIC PRECONDITIONING – FROM STUDIES TO CLINICAL PRACTICE**

Davor Baric

*University Hospital Dubrava, Zagreb, Croatia*

Remote ischemic preconditioning (RIPC) is a preconditioning of a non-cardiac organ or tissue that can increase myocardial tolerance to ischemic-reperfusion injury during the subsequent prolonged ischemia. Several studies have shown promising results of RIPC usage in cardiac surgery, but a lot of controversies remain. Our randomized controlled trial includes 50 patients scheduled for elective surgical aortic valve replacement. Ischemic-reperfusion injury is assessed by measurement of biochemical markers of myocardial injury. Hemodynamical parameters are analyzed to evaluate influence of RIPC on postischemic heart function. Correlation between RIPC and systemic inflammatory response is evaluated by comparison of ischemic and inflammatory markers. Preliminary results will be presented.

## 2.4

### SAPHENOUS VEIN GRAFTS WRAPPING BY NITINOL MESH: A WORD OF CAUTION

Giuseppe Rescigno

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**Background:** Despite the proven better patency of arterial grafts in coronary revascularization, saphenous vein conduits are still used in a large proportion of patients. A recently commercialized nitinol mesh demonstrated to improve venous graft patency in experimental and early clinical studies. The aim of the study was to control nitinol mesh vein graft patency in a consistent series of isolated CABG patients by means of serial CT scans.

**Patients and methods:** 25 patients (mean age:  $61.0 \pm 9.65$ ; Male/Female 24/1) were operated on for isolated coronary artery bypass grafting. In 17 pts (70.8%) both thoracic arteries were used. The eSVS nitinol mesh (Kips Bay Medical Inc., Minneapolis, MN) was used to wrap one vein in each patient. Mean number of grafts was  $2.88 \pm 0.65$ . Nitinol mesh vein grafts was used to revascularize the right coronary artery (4 pts; 16%), the posterior descending artery (18 pts; 72%) and the obtuse marginal artery (3 pts; 12%). Mesh size was 3.5 and 4.00 mm in 16 and 9 patients, respectively. CT coronary angiography were performed at 1, 6 and 12 months.

**Results:** The procedure was uneventful in all the patients. Mean peak flow was  $65.3 \pm 45.2$  mL/min; mean pulsatility index was  $1.9 \pm 1.2$ . Follow-up was completed in 24 patients (96%). No deaths or angina recurrences were recorded at follow-up. CT controls showed a 91.3%, 50.0% and 30% at 1, 6 and 12 months, respectively. Patients with graft occlusion underwent stress testing which was mildly positive in two cases. One of them underwent a percutaneous revascularization.

**Conclusions:** Despite promising early results, use of nitinol mesh support for saphenous vein grafts was deceiving in our experience. A further refinement of vein preparation or indications is probably needed.

#### SELECTED ABSTRACTS

## 2.5

### THROMBENDARTERECTOMY OF CORONARY BLOOD VESSELS – OUR EXPERIENCE

Goran Duzel, Ivica Brizic, Mate Cavar, Ante Bosnjak, Tomislav Cvitkovic

University Clinical Hospital, Mostar, Bosnia and Herzegovina

**Introduction:** Many patients who underwent surgical bypass operation of the coronary vessels had diffuse coronary disease, and required a coronary endarterectomy in order to revascularise the myocardium. Presented here is our experience, using open coronary endarterectomy method.

**Methods:** A retrospective research on patients who have had open heart operations at the cardiac surgical ward in SKB Mostar during period of January 2012 to January 2014 was conducted. Additional medical information were made available at our disposal by the courtesy of cardiac ward SKB Mostar. All information were collected from the medical histories.

**Results:** A total number of patients who underwent coronary endarterectomy were 45 patients. (26,4 % of all bypass operations). Of these 38 (84,4%) were male, and 7 (15,6%) were female.

In addition to the general operative risk were various disease states as mentioned below: these include arterial hypertension (20 patient, 44,4%) dyslipidemia (16 patients, 35,65%) diabetes mellitus (9 patients 19,9%). The numbers of diseased coronary vessels were as follows: 3 (34 patients), 2 (7 patients), 4 (4 patients). The numbers of endarterectomies of the vessels were 1 vessel (41 patients), 2 vessels (3 patients), 3 vessels (1 patient). One patient died during operation. The follow up of our patients lasted for one year from day of the operation. 13 patients underwent control angiography because of repeated chest pain. In 7 patients we found stenosis of the coronary artery distal from the point of endarterectomy.

**Conclusion:** Coronary endarterectomy is a surgical method used to keep viable the occluded coronary vessel. This enables better perfusion of the heart muscle, especially when used in conjunction with grafting of coronary vessels. This method had no bearing on the lethal outcome of the patients.

## 2.6

### SURGICAL REPAIR OF RIGHT CORONARY ARTERY PERFORATION DURING PERCUTANEOUS CORONARY STENT IMPLANTATION

Igor Medved, Aleksandra Ljubacev, Marin Ostric, Salem Osman

Department of Cardiac Surgery, University Hospital Center, Rijeka, Croatia

**Background:** Perforation of coronary artery during percutaneous intervention is rare, but potentially life threatening complication. Ellis and associates classify coronary perforation in three types depending of the severity of perforation.

**Case Report:** A 62-year old male patient underwent elective percutaneous coronary intervention which complicated with perforation of right coronary artery during stent placement. Cardiac tamponade and cardiopulmonary arrest followed. Cardiac surgeon and cardiac anesthesiologist were urgently called for. Emergency sternotomy and open heart massage were made in the cath lab, and after successful resuscitation the patient was transferred to operating room. Operative findings were right coronary artery perforation for the complete length of implanted stent and massive right ventricular haematoma. The site of perforation was sutured, and an anastomosis was created distally with a left internal

mammary artery as a free graft. The chest was temporarily left open and was closed in the second procedure. After 42 days in the Intensive care unit the patient was transferred to Cardiology department. Postoperative echocardiography shows akinesia of mildly enlarged right ventricle, with normal systolic function of the left ventricle and an ejection fraction of 55%. Patient is in full contact, oriented, with no major neurologic deficit, and a normal postoperative brain MSCT. Physical rehabilitation is in progress.

**Conclusion:** In a patient with coronary artery perforation it is important to maintain stable hemodynamic and control with echocardiography a potential formation of pericardial effusion and/or cardiac tamponade and perform pericardiocentesis if necessary. Emergent surgical procedure is indicated in hemodynamically unstable patients and those with a severe coronary perforation that cannot be treated conservatively. Early diagnosis and fast intervention in the treatment of this rare but serious complication of percutaneous intervention are the most important for successful outcome.

## 2.7

### HOW TO DIAGNOSE AND MANAGE ASPIRIN RESISTANCE IN DIABETIC PATIENTS UNDERGOING CORONARY ARTERY BYPASS SURGERY?

Martina Zrno, Mate Petricevic, Bojan Biocina, Ante Lekic

*University Hospital Center Rebro, Zagreb, Croatia*

Residual platelet reactivity (RPR) following coronary artery bypass grafting might be related to thrombotic complications and major ischemic cardiac events. The management of antiplatelet therapy resistance currently lacks clear outlines. There is evidence that diabetic patients are more frequently resistant to aspirin comparing to non-diabetic patients. Recently, we evaluated perioperative prevalence of aspirin resistance using multiple electrode aggregometry among patients undergoing coronary artery surgery. Preoperatively, we detected 31 of 99 (31.3%) patients with RPR (ASPI > 30 AUC). In comparison with preoperative results, we detected higher values of ASPI test postoperatively ( $P = 0.04$ ), with 46 of 99 (46.5%) patients having RPR despite a higher dose of 300 mg aspirin being administered. Postoperatively, diabetic patients had higher ASPI test values ( $P = 0.01$ ), and a higher proportion of patients with RPR compared with the nondiabetic subgroup (58.5 vs 38%,  $P = 0.04$ ). It remains unclear whether aspirin resistance among diabetic patients is due to insufficient gluco-regulation. If, so high HBA1c could be predictive of aspirin resistance, and platelet function testing should be inevitably performed. Multiple-electrode aggregometry can recognize patients with RPR. In this subgroup of patients addition of clopidogrel should be considered. Platelet inhibitory response to clopidogrel therapy should be assessed, and if RPR on clopidogrel therapy persists, more potent antiplatelet drugs such as prasugrel and

ticagrelor should be considered. Huge variability in platelet inhibitory response to antiplatelet therapy exists, and special focus on diabetic patients is warranted as there is evidence that they have higher prevalence of high "on-treatment" platelet reactivity.

## 2.8

### HOW TO MANAGE EXCESSIVE BLEEDING IN CARDIAC SURGERY?

Mate Petricevic, Bojan Biocina, Martina Zrno

*University Hospital Center Rebro, Zagreb, Croatia*

Excessive bleeding after cardiopulmonary bypass is risk factor for adverse outcomes after cardiac surgery. Excessive bleeding becomes more apparent with growing proportion of patients undergoing surgery with potent antiplatelet agents being administered in close proximity to surgery. Differentiating between patients who bleed due to surgical issues and those whose excessive chest tube output is due to coagulopathy, remains challenging. Bedside suitable tests to identify hemostatic disturbances and predict excessive bleeding are therefore desirable. However, the question "How to predict, prevent and treat excessive bleeding using point-of-care hemostatic tests?" remains challenging. Herein we present our algorithm for perioperative bleeding management using point-of-care devices. Perioperative hemostatic management should be consisted of bundle of protective strategies to prevent and treat excessive bleeding. Preoperative bleeding risk assessment using platelet function testing is important as it may detect patients who have pronounced "on treatment" platelet inhibition. If clinical condition allows, those patients may benefit from surgery delay. Otherwise, intraoperative optimization of viscoelastic blood properties should be performed using thromboelastometry guided transfusion management. In contrast to, if patients have high "on treatment" platelet reactivity, antiplatelet drugs should be continued up to day of surgery in order to avoid ischemic events associated with possible rebound phenomenon following antiplatelets discontinuation in such a subgroup of patients. Our experience showed that platelet function testing as well as thromboelastometry are useful methods for prediction of excessive bleeding after cardiac surgery. Furthermore, thromboelastometry guided transfusion of procoagulant blood components may reduce transfusion requirements by providing transfusion of procoagulant blood components targeted after thromboelastometry findings in cases of hemostatic disorders. If thromboelastometry findings suggest adequate hemostatic properties of blood clot, hemostatic measures should be directed towards surgical causes of bleeding. Hemostatic management requires comprehensive approach due to multicausality of excessive bleeding. Adequate preoperative antiplatelet drugs management targeted after platelet function testing, along with intraoperative thromboelastometry guided transfusion

management may provide more favorable outcomes by reducing bleeding amount and transfusion requirements at the same time.

## 2.9

### IS PREOPERATIVE MECHANICAL BOWEL PREPARATION NECESSARY IN PATIENTS UNDERGOING CORONARY ARTERY BYPASS GRAFTING SURGERY

Atike Tekeli Knunt,<sup>1</sup> Cagri Duzyol,<sup>1</sup> Canan Balci,<sup>1</sup> Cevdet Kocogullari,<sup>2</sup> Ufuk Aydin<sup>3</sup>

<sup>1</sup>Kocaeli Derince Education and Research Hospital Department of Cardiovascular Surgery Derince, Kocaeli, Turkey; <sup>2</sup>Dr. Siyami Ersek Education and Research Hospital, Istanbul, Turkey; <sup>3</sup>Bursa Yuksek Ihtisas Education and Research Hospital, Bursa, Turkey

**Aim:** Gastrointestinal (GI) complications after cardiac surgery, although rare, result in increased morbidity and mortality. The main cause of GI complications is suggested to be the systemic inflammatory response syndrome that is mediated by endotoxins. Mechanical bowel preparation

minimizes the translocation of commercial organisms and also endotoxemia. We investigated the effect of preoperative mechanical bowel preparation on GI complications seen after cardiac surgery.

**Methods:** We retrospectively analysed 200 patients who underwent isolated coronary artery bypass grafting (CABG) with cardiopulmonary bypass. The patients were divided into two groups as Group I (n = 100) who received self administrated single dose sodium phosphate enema the day before surgery through rectal route and Group II (n = 100) who did not have preoperative bowel preparation. The clinical data of any abdominal complication and mortality was analysed between the two groups.

**Results:** Postoperative GI complications occurred in 1 patient in Group I and 3 patients in Group II (1% vs 3%;  $P = 0.315$ ). There were 2 instances of postoperative ileus and 1 case of GI bleeding in non-prepped group whereas there was only 1 case of GI bleeding in Group I who recovered with conservative therapy. There were no occurrences of mesenteric ischemia, pancreatitis, cholecystitis or diverticulitis in either group. Overall 30-day mortality was 2% and none of the deaths were due to abdominal complications.

**Conclusions:** Preoperative mechanical bowel preparation prior to CABG does not have a significant advantage in GI complications.

**SESSION 3**

**3.1**

**EVIDENCE IN THE 21<sup>ST</sup> CENTURY:  
INFORMATION IN BIOLOGICAL SYSTEMS**

Tea Acuff

*The Texas Heart Hospital Baylor Plano, Denton, Texas, USA*

Author will describe a variety of observations in biology as related to use of information in biological systems including the use of extracellular matrix (ECM) in reconstruction of cardiac tissue. These findings require a re-examination the concept of evidence and suggests rules that biological systems follow in use of information. Advances in understanding of modern cellular biology likely will require changes in the way surgeons use information if they wish to track the findings of modern biology into novel applications of modern biotechnology.

**3.2**

**INTENSIVE CARE – WHO BEST TO RUN IT?**

Benjamin Bidstrup

*Holy Spirit Northside Hospital, Chermside Queensland, Australia*

Patient outcomes after surgery are in the main determined by events in the operating room. Intensive care, often dedicated to cardiac surgery, used to be managed by the cardiac surgical team. Many centres are moving to a model where intensive care specialists manage the patient after cardiac surgery. This will examine the various models and offer a view to that which offers the best patient outcome.

**3.3**

**PATIENT SAFETY AND TEAM BUILDING  
IN CARDIAC SURGERY: THE NEXT STEP IN  
IMPROVED OUTCOMES**

Michael Firstenberg

*Akron City Hospital - Summa Health System, OH, USA*

Improvements in patient outcomes can come from a variety of initiatives. There is more and more data to support that failures in communication and teamwork result in a growing percentage of major, and often fatal, problems in patients hospitalized for all conditions. These findings are most dramatic in patients undergoing cardiac surgery and the focus of the lecture (~1 hour) is to review the foundation, data, experiences, and opportunities for improvements in those factors that contribute to a highly-functioning and successful, safe Team.

**3.4**

**THE BIG DATA: A REVOLUTION FOR  
INNOVATION**

Faisal Cheema

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Abstract not available at the moment.

## SESSION 4

Chairmen: D. Baric, B. Biocina, M. Firstenberg

### FACULTY LECTURES

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#### 4.1

##### HOW TO RUN A MCS PROGRAM IN THE COUNTRY WITH SCARCE RESOURCES

Bojan Biocina

University Hospital Center Rebro, Zagreb, Croatia

In the paper methods of setting up the comprehensive treatment of terminal heart failure has been discussed. Various options how to optimize resources have been described.

#### 4.2

##### IMPACT OF ECMO ON ACUTE END-ORGAN FAILURE: ARE WE HELPING OR HURTING THE BODY?

Michael Firstenberg

Akron City Hospital - Summa Health System, OH, USA

ECMO is an established therapy for acute cardio-pulmonary failure. While end-organ failure is a risk factor for poor outcome and often may assist in guiding therapy, the purpose of this lecture is to review some of the current data on whether ECMO can prevent, limited, or even restore end-organ failure.

#### 4.3

##### IS IT THE TIMING OF INITIATION OF ECMO SUPPORT OR THE CLINICAL STATUS THAT DETERMINES SURVIVAL

Michael Firstenberg

Akron City Hospital - Summa Health System, OH, USA

Historical data suggests that prolonged respiratory failure and the duration of ventilator therapy directly correlate with inability to wean from ECMO support and poor outcomes. However, it is unclear if these poor outcomes are more a function of a delay in therapy or clinical status of the patient at the time of therapy. In retrospectively review the outcomes of >250 patients supported on ECMO for respiratory therapy secondary to Influence H1N1 (2009, 2010, and 2011) we will explore this question with the goal of trying to assist in determining the patients who most likely will benefit from ECMO for respiratory failure.

#### 4.4

##### ROLE OF ECMO FOR NON-POST-CARDIOTOMY CARDIOGENIC SHOCK

Michael Firstenberg

Akron City Hospital - Summa Health System, OH, USA

Traditionally, ECMO has been used for patients in for profound respiratory failure and in the operation room in cases of cardiogenic shock associated with difficulties in weaning from cardiopulmonary bypass. However, with growing experiences, technology, and better outcomes the indications for cardiogenic shock support in unusual circumstances (i.e. trauma) and in support of high-risk PCI. Recent experiences that, beyond case reports, and with a dedicated Team that ECMO for such cases can result in significant improvements in patient outcomes and survival.

### SELECTED ABSTRACTS

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#### 4.5

##### THREE PERIODS OF CIRCULATORY ARREST DURING ONE HOSPITALIZATION

Hrvoje Gasparovic, Bojan Biocina

University Hospital Center Rebro, Zagreb, Croatia

We present a 36-year old woman referred for surgical correction of her severe AS and ascending aortic aneurysm extending into the proximal arch. She underwent an aortic valve commissurotomy at the age of 13. Her exercise intolerance mirrored her worsening AS. Presently, she underwent an AVR coupled with a supracoronary ascending aortic replacement extending into the proximal arch. The "hemiarch" replacement required an 11-minute period of DHCA with bilateral cerebral perfusion. Her initial postoperative recovery had been unremarkable, and she was transferred to a step-down unit on postoperative day (POD) 1. However, preceding her scheduled discharge she became febrile. This prompted a complete work-up, which revealed blood cultures positive for Enterobacter ESBL. A chest CT showed a purulent effusion surrounding the aortic graft. No signs of endocarditis were found on echocardiography. After an attempt at conservative management with i.v. antibiotics coupled with a mediastinal washout yielded no clinical improvement, we pursued a radical surgical solution of her clinically suspect endocarditis. The strategy included excision of all previously placed foreign material (graft+aortic valve prosthesis). This was followed by placement of a new mechanical prosthesis and two homografts in series in order to completely cover the defect in aortic continuity. Again, the arch anastomosis, which was now technically more challenging, was performed during DHCA with bilateral

cerebral perfusion (29 min). Approximately 12 hours after a seemingly uneventful recovery from her second major operation, she became acutely hemodynamically unstable while her chest tubes rapidly filled with fresh blood. An immediate, rescue sternotomy was performed in the ICU. The bleeding was related to a spontaneous rupture of her distal homograft 2 cm proximal to the arch anastomosis, which was manually controlled while the patient was emergently placed on CPB. She was cooled again and a third period of DHCA (11-min) was warranted for surgical control of the rupture. Despite her ordeal, she was discharged after completion of a 6-week i.v. antibiotic course, and remains well on her last follow-up, having resumed her daily activities and returned to work.

## 4.6

### SURGICAL EMBOLCTOMY – TREATMENT OF ACUTE PULMONARY EMBOLISM

Goran Duzel, Michael Markin, Ante Bosnjak, Mate Cavar, Ivica Brizic

University Clinical Hospital, Mostar, Bosnia and Herzegovina

**Introduction:** Surgical embolectomy was reserved in the past for patients who were hemodynamically extremely unstable because of high intraoperative lethal outcome.

The aim of our work is to present our experience in operating patients who were hemodynamically unstable and suffering from acute pulmonary embolism at the cardiac surgical ward in SKB Mostar.

**Methods:** A retrospective examination of medical documents of all patients who were admitted to the cardiac surgical ward in SKB Mostar was conducted. Patients were followed up from the time when discharged from hospital. The main diagnostic method used before and after operation was MSCT angiography of pulmonary arteries.

**Results:** In the period of January 2011 to March 2014 seven patients in our ward have been operated on for embolectomy of the pulmonary artery (1,4 % of all surgical interventions during this period in our ward). Of the 7 patients four were men and three women. There was one lethal outcome on the fifth postoperative day in the intensive ward. An increasing operative risk factor in these patients was hypotension with very large thrombus in the right atrium (1 patient), an earlier operation (2 patients), and malignant disease (1 patient), thrombosed vena cava inferior (1 patient).

Control MSCT angiography showed normal state in 5 patients as well as recanalisation of the vena cava inferior in the aforementioned patient. Vena cava filter were implanted in two patients. 6 patients were discharged home totally fit.

## 4.7

### PERFORMANCE OF CYSTATIN C AND NEUTROPHIL GELATINASE-ASSOCIATED LIPOCALIN (NGAL) FOR MONITORING AFTER CARDIAC SURGERY

Jurij Matija Kalisnik,<sup>1</sup> Alenka Hrastovec,<sup>1</sup> Milan Skitek,<sup>2</sup> Ales Jerin, Borut Gersak<sup>1</sup>

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<sup>2</sup>Institute Of Clinical Chemistry And Biochemistry, Ljubljana, Slovenia

**Background:** Acute kidney injury (AKI) occurs frequently after cardiac surgery using cardiopulmonary bypass (CPB). Conventional markers of kidney function like creatinine and potassium concentration are unreliable indicators during acute changes in kidney function and demonstrate injury late in the clinical course. Therefore, in the search of more sensitive biomarkers for monitoring AKI following cardiac surgery we tested if cystatin C and neutrophil gelatinase-associated lipocalin (NGAL) measured after surgery would characterize AKI early after CPB.

**Methods:** Forty-four patients enrolled in the study met inclusion criteria. Serum and urinary NGAL, serum cystatin C and serum creatinine were determined on 5 time points pre-, peri- and postoperatively. Patients were divided into two groups- AKI group and non-AKI, depending on the increase in serum creatinine following surgery (based on AKIN [Acute Kidney Injury Network] classification AKI was defined as  $\geq 50\%$  or  $\geq 0,3\text{mg/dL}$  rise in creatinine). Results were compared between these two groups.  $P < 0,05$  was considered significant.

**Results:** Nineteen patients (42%) developed postoperative AKI. The increase of serum cystatin C and serum creatinine in comparison to preoperative values was in majority of patients observed on the 1st day after surgery. Immediately after separating from CPB serum creatinine levels and serum cystatin C levels were lower than preoperative levels in both groups (AKI and non-AKI group). The difference between serum cystatin C levels on the 1st day after CPB between AKI and non-AKI group was considered significant (serum cystatin C: AKI:  $1694 \pm 743 \mu\text{g/L}$ ; non-AKI:  $1048 \pm 302 \mu\text{g/L}$ ;  $P = 0,01$ ; Independent-Sample Median test). The difference between urinary and serum NGAL levels after CPB between AKI and non-AKI group was not significant.

**Conclusions:** An increase of post-CPB serum cystatin C is associated with AKI after cardiac surgery. Serum cystatin C has better potential to be used as a diagnostic biomarker for AKI following cardiac surgery as serum and urinary NGAL. The increase in serum cystatin C levels postoperatively occurred around the same time as increase in serum creatinine. The newly available kit for plasma NGAL determination might further enhance the diagnostic potential of NGAL.

**SESSION 5**

*Chairmen: T. Asai, D. Harris*

*FACULTY LECTURES*

**5.1**

**AORTIC ARCH REPLACEMENT WITH SELECTIVE CEREBRAL PERFUSION AND MILD HYPOTHERMIC LOWER BODY CIRCULATORY ARREST**

Tohru Asai

*Division of Cardiovascular Surgery, Department of Surgery, Shiga University of Medical Science, Otsu, Japan*

Abstract not available at the moment.

**5.2**

**HYBRID PROCEDURES ON THE AORTIC ARCH**

David Harris

*Kuils River private Hospital, Cape Town, South Africa*

Abstract not available at the moment.

**5.3**

**IS THERE ANY REASON NOT TO OPERATE ON PATIENTS WITH ACUTE TYPE A AORTIC DISSECTION**

Davor Baric

*University Hospital Dubrava, Zagreb, Croatia*

The outcome of surgical treatment of patients with an acute type A aortic dissection (AADA) has dramatically improved in last decades, mostly due to early referral of the patient for surgery, improved surgical experience and intra-operative management. In most series, in-hospital mortality of operated patients is reported in the range of 10-25% which compares favorably to 60% of mortality of medically treated patients. However, in high-risk patients, risk-benefit ratio is much higher and harder to assess preoperatively. The results of surgery for AADA on octagenarians, patients with brain injury, mesenteric malperfusion and acute renal injury are compiled and discussed.

*SELECTED ABSTRACTS*

**5.4**

**GIANT UTERINE LEIOMYOMA WITH INTRAVASCULAR AND INTRACARDIAC EXTENSION**

Jose Lucas Ramirez Gil,<sup>1</sup> Alexander Rodriguez,<sup>2</sup> Mauricio Valencia Aguilar,<sup>2</sup> Omar Ali<sup>3</sup>

<sup>1</sup>*Clinica CardioVID; <sup>2</sup>Hospital Pablo Tobon Uribe; <sup>3</sup>Department of Surgery, Facultad de Medicina, Universidad de Antioquia, Medellin, Colombia*

**Introduction:** Uterine leiomyomas tend to be tumors of very benign behavior, however, they can extend into surrounding structures.

**Methods:** We describe the case of a twenty eight year old lady wich was operated in other hospital one year before admision because of a right atrial tumor, with no follow up. She was referred to our center with signs and symptoms of an inferior vena caval obstruction. At computed tomography a giant uterine mass with extension into the inferior vena cava and the right atrium.

**Results:** The patient was operated by a multidisciplinary team (Cardiac surgery, Oncologic Gynecology, and General surgery) via a combined transternal and transperitoneal approach with cardiopulmonary bypass. The resection was complete and the patient is free of residual disease at one year follow-up.

**Discussion:** Primary cardiac tumors are infrequent, and cardiac spreading of benign tumors are an even rarer entity. It is advisable to be aware of these rare tumors in order to try to solve the problem at once, erradicating the primary tumor and avoiding more risky combined approaches in the setting of a cardiac reoperation.

**5.5**

**MYOFIBROBLASTOMA PRESENTING AS AORTIC INTRAMURAL HEMATHOMA**

Mislav Planinc, Robert Blazekovic, Davor Baric, Zeljko Sutlic, Igor Rudez

*University Hospital Dubrava, Zagreb, Croatia*

A 48-year-old otherwise healthy male patient was admitted to local hospital after echocardiographic suspicion of intramural hematoma of ascending aorta was made in outpatient clinic. He complained on chest pain and discomfort lasting two previous weeks. Echocardiography revealed thickened aortic root and ascending part of the aorta, with mild aortic regurgitation, circular pericardial effusion up to 1 cm and preserved systolic function. Multisliced computed-tomography (MSCT) was performed showing intramural hematoma of ascending aorta in length of 26 mm with width

of the aorta around 38 mm without signs of aortic dissection. He was referred to our center for urgent surgical procedure. Additional transthoracic echo and MSCT was done with same findings as in referring hospital. With such findings indication to proceed with surgery was made and Bentall operation was planned. After axillary artery cannulation median sternotomy and pericardiotomy were performed in standard fashion. Inspection and palpation revealed extremely firm aortic root and dense white wax-like layer on ascending aorta. Following cannulation of right atrium and placing patient on CPB, aorta was cross-clamped and opened higher than usually but direct antegrade cardioplegia could not be delivered so retrograde cardioplegia was used to arrest the heart. After standard removal of aortic valve leaflets very thickened aortic root was dissected. Both coronary ostia were very fragile and firmly adherent to surrounding tissue so buttons couldn't be made. At that point saphenous vein grafts were harvested and coronary artery bypass was made to LAD, RCA and ACx territories. After aortic cross clamp was released intraoperative echocardiography showed global hypokinesis of the heart. Thereafter two unsuccessful attempts to wean the patient from CPB were made and V-A ECMO was implanted. Even with that support low cardiac output syndrome occurred and patient succumbed during the procedure. Pathohistological analysis of specimens of ascending aorta and right atrium found inflamed myofibroblastoma of the heart to be the cause of aortic thickening and tissue covering aortic root and right atrium.

## 5.6

### PRIMARY INTIMAL SARCOMA OF THE PULMONARY VEIN WITH EXPANSION TO THE LEFT ATRIUM

Aleksandar Radovic, Ana Kalezic, Aleksandar Nikolic, Dubravka Dzankic-Barovic

*Clinical Center Of Montenegro-Center Of Cardiac Surgery, Podgorica, Montenegro*

We have recently treated a patient with pulmonary vein sarcoma. It is a 65 year old patient who was admitted to the hospital because of the chest pain with propagations down her right arm, followed by suffocation and coughing out content with traces of blood and febrility  $>38^{\circ}$  C. The primarily suspected pulmonary embolism was ruled out after the diagnostic heart CT scan and transthoracic and transesophageal echocardiogram which verified the existing of a tumor mass in the left atrium. The patient underwent an urgent surgery and the tumor mass was removed surgically from the upper right pulmonary vein. The pathohistological diagnosis revealed pulmonary vein intimal sarcoma. Pulmonary vein intimal sarcoma is one of the rarest sarcoma subtypes. To our knowledge, there is only one published case of such pathology in the literature.

## 5.7

### STENTED ELEPHANT TRUNK WITH E-VITA: OUR EXPERIENCE

Josip Varvodic, Daniel Unic, Davor Baric, Robert Blazekovic, Igor Rudez

*University Hospital Dubrava, Zagreb, Croatia*

**Introduction:** Frozen elephant trunk is still the golden standard in treating complex aortic pathologies, even though patients require second surgery via thoracotomy. With implementation of stented elephant trunk, such procedures can be done without need for second operation. We present our initial results of E-vita stented elephant trunk.

**Patients and methods:** From July 2011 to December 2013 we used this procedure in eleven patients, five female, six male. Average age was  $63 \pm 7$  years with median logistic EuroSCORE I of 11 (5,47-26,02), with EuroSCORE I of 11 in chronic setting, and 11,28 in acute setting. We routinely used right axillary cannulation for cardiopulmonary bypass and bilateral antegrade cerebral perfusion with the left common carotid artery. When target temperature was achieved the stent was deployed and the graft sutured to the proximal aorta with reimplantation of the supraaortic branches starting from the left subclavian artery to the brachiocephalic trunk respectively.

**Results:** Eight patients (73%) were operated due to aortic dissection, six of them in acute setting, and two in chronic setting, and the other three (27%) were operated because of aortic aneurysm. Six (55%) of the patients underwent isolated E-vita implantation, and five patients underwent concomitant aortic valve or aortic root surgery. Median CPB time was 158 min (110-537), with 101 min (59-244) of cross clamp, and 57 min (44-225) of circulatory arrest. Median cooling temp was  $25^{\circ}$ C ( $18^{\circ}$ C- $28^{\circ}$ C). We mostly used graft size 24, although the range was from 24 to 36. Four patients (36%) underwent revision due to bleeding, one of who also had TEA of left subclavian artery due to occlusion of the graft. One patient was reoperated for sternal wound infection. One patient had CVI with long term complications, and one with short term complications, also damage of the recurrent nerve was observed in three patients (27%), and resolved in two of these. One patient died in the ICU with presents a perioperative mortality of 9% and two patients died during long term follow.

**Conclusion:** The stented elephant trunk with E-vita is a good alternative for treatment of complex cases of aortic pathology with acceptable surgical risks and satisfactory results.

## SESSION 6

*Chairmen: T. Asai, B. Biocina, M. Levinson*

### FACULTY LECTURES

## 6.1

### CROSS CHORDOPEXY – A NOVEL TECHNIQUE IN MITRAL VALVE REPAIR

Bojan Biocina

*University Hospital Center Rebro, Zagreb, Croatia*

A brief description of novel technique in mitral valve repair is shown, with possible indications and applications in mitral valve surgery.

## 6.2

### A NEW TECHNIQUE TO ELIMINATE SAM DURING MYECTOMY FOR IHSS

Mark Levinson, Justin Miller

*Department Of Cardiothoracic Surgery Hutchinson Regional Medical Center, Hutchinson, KS, USA*

Idiopathic Hypertrophic Subaortic Stenosis (IHSS) is often associated with severe mitral regurgitation. The mechanisms of mitral valve dysfunction are uncertain, but the most commonly proposed theory is entrapment of the mitral chordae in the LVOT venturi, causing paradoxical movement of the chords and anterior leaflet towards the enlarged septum. Myectomy reduces the outflow tract gradient, but does not always cure the associated mitral regurgitation. Conventional ring annuloplasty increases the movement of the mitral valve mechanism into the ventricle and LVOT, making SAM more likely. A recently reported technique to prevent SAM during conventional mitral repair was adapted in 3 cases of IHSS associated with mitral regurgitation and SAM. This new concept involved placing a Gore-tex Neochordae between the posterior-papillary muscle and the ventricular aspect of the mid-anterior leaflet. When the ventricle is filled with volume, tension on this Neochordae prevents the anterior leaflet from tipping towards the septum. In 2 of 3 cases the SAM was eliminated. In 1 case, the SAM persisted probably because the Neochordae was short enough. The advantage of this technique is that it can be done quickly through the aortic root without opening the left atrium or

replacing the mitral valve. The disadvantage is uncertainty in the length of the proposed Neochordae. Video of the technique is presented.

## 6.3

### BUTTERFLY RESECTION IS A REASONABLE STANDARD MITRAL VALVE REPAIR METHOD FOR DEGENERATIVE MR

Tohru Asai

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Abstract not available at the moment.

## 6.4

### MICROSIZING. A NEW TECHNIQUE FOR PREVENTING RESIDUAL LEAKS AFTER MITRAL VALVE ANNULOPLASTY

Mark Levinson, Justin Miller

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Reshaping of the mitral annulus and fixation of the new shape is key to long term success in mitral valve repairs. Application of a suitably sized and shaped ring draws the annulus into a fixed position which increases the zone of coaptation between the two leaflets. Residual leaks are due to coaptation failure at specific points along the orifice. Downsizing the ring may eliminate residual leaks but forward displacement of the anterior leaflet may result in SAM. Traditional annuloplasty sutures are placed on the outside circumference of the prosthetic ring. However, the ring is approximately 3 mm thick. Moving one or more sutures to the inside circumference of the ring can selectively advance portions of the annulus closer to the opposing leaflet. This increases coaptation and eliminates focal leaks without the need to replace or downsize the entire repair. We report a series of 68 consecutive repairs over a period of 10 years. Thirteen patients underwent final adjustment of their annuloplasty by transferring 1 or more sutures to the inside of the ring. Larger rings were implanted (mean 32 vs 29) in the microsized group while the residual regurgitation grade was less (0.15 vs 0.26). There were no cases of SAM in the microsized group. The technique is extremely simple and easy to use in any circumstance and can be applied anytime before closure of the left atrium.

## SELECTED ABSTRACTS

## 6.5

**NOVEL USE OF CYANOACRYLATE AND BOVINE PERICARDIUM TO REPAIR CARDIAC PERFORATIONS**

Victor Schmelzer

*St. Elizabeth Heart and Vascular Institute, St. Elizabeth Healthcare, Edgewood, Kentucky, USA*

Two patients with cardiac perforations were successfully treated with patch repair using cyanoacrylate and bovine pericardium. The first patient had an iatrogenic perforation of the right ventricle by a chest tube 24 hours status post CABG. The second patient presented with cardiogenic shock secondary to a post myocardial infarction related rupture of the inferior wall of the left ventricle. Both patients underwent repair by patching the perforation on the epicardial surface with cyanoacrylate coated bovine pericardium while on cardiopulmonary bypass. Both patients survived and follow up echocardiography revealed no pseudoaneurysm.

## 6.6

**MITRAL VALVE REPAIR USING CORMATRIX TECHNOLOGY**

Igor Medved, Marin Otric, Aleksandra Ljubacev, Salem Osman

*Department of Cardiac Surgery, University Hospital Center, Rijeka, Croatia*

**Objective:** CorMatrix is biological scaffold structure derived from intestine submucosa with possibility that retains specific composition, enables patients own cells to effect repair, also it is resistant to infection (consist of specific peptides with anti-infective properties) and allows rapid revascularization and neoangiogenesis.

Due to these characteristics, we started to use CorMatrix in patients with mitral valve endocarditis.

**Patients And Methods:** From January 2013 until April 2014 we planned to repair mitral valve with acute or subacute endocarditis in 5 patients.

In one patient was not possible to make repair of MV because of the extensive destruction.

In 4 patients we made a patch plastic of the anterior leaflet. In one patient we implanted neo-corde to the free edge of CorMatrix patch, and in one patient we used CorMatrix as material for neo-corde.

In all patients we made annuloplasty with Carpentier-Edwards Physio ring.

In each patients we performed antibiotic treatment depending to the results of antibiogram and in accordance with guidelines.

**Results:** Postoperative in operating room on TEE in one patients was no mitral regurgitation, in 2 patients was trivial and in one mitral regurgitation was one plus.

Follow up was from 3 months to 1 year and there was no change in the degree of mitral insufficiency.

Also there was no recurrent endocarditis.

**Conclusion:** Complex mitral valve repair with CorMatrix patch plastic in endocarditis of MV is feasible procedure. It is possible to implant GoreTex corde on free margin of CorMatrix patch, as the use of CorMatrix material for neo-corde. Initial results in the use of CorMatrix in patients with endocarditis of the mitral valve are encouraging and warrant further usage of the same.

## 6.7

**COMPLICATIONS OF DEVICES FOR THE CLOSURE OF CONGENITAL HEART DEFECTS**

Jose Lucas Ramirez Gil, Jorge Alberto, Juan David Montoya Mejia

*Clinica CardioVID, Medellin, Colombia*

**Introduction:** Percutaneous closure of congenital heart defects is more frequent everyday, and so, its complications are starting to rise.

**Objective:** Describe the different complications of percutaneous correction of heart defects treated in a referral center.

**Methods:** Description of five cases treated by the authors in the emergent setting both in children and adults.

**Results:** The most common complication was dislodgement of the device in four cases and erosion of neighbouring structures in one case.

**Discussion:** Percutaneous closure of congenital cardiac defects has emerged as an important tool for the management of many patients with septal defects and patent ductus arteriosus. Nevertheless, patient and device selection must be cautious in order to prevent severe complications.

## SESSION 7

Chairmen: M. Levinson, I. Rudez

### 7.1

#### THE IMPORTANCE OF CARDIOPULMONARY BYPASS IN BLUNT CARDIOTHORACIC TRAUMA

Rebecca Lynch, Elya Horattas, Shayda Mirhaidari, Eric Espinal, Michael Firstenberg

Akron City Hospital - Summa Health System, OH, USA

**Introduction:** The spectrum and severity of blunt cardiothoracic traumatic injuries (BCTi) is diverse. Many injuries are managed non-operatively and/or by general or trauma surgeons. We present two cases of BCTi whose immediate management was dependent on the availability of cardiopulmonary bypass (CPB) – emphasizing the importance of the availability of this resource at major trauma centers.

**Case Presentation 1:** A 63 year-old male presented hypotensive and tachycardic after a falling >5 meters. FAST scan was positive for pericardial effusion which prompted operative intervention. Pericardial window yielded hemopericardium leading to sternotomy for further exploration. A 1.5 cm left atrial laceration was found adjacent to the right inferior pulmonary vein. Repair required CPB for exposure and de-airing. The patient survived and did well.

**Case Presentation 2:** Following a high-speed motor vehicle accident, a 42 year-old male presented to an outside hospital in hypotensive shock, requiring significant blood products. Outside hospital imaging showed concern for a proximal aortic tear and he was transferred for further management (6 hours post-injury). The patient arrived at institution with signs of tamponade, and he was emergently explored revealing a ruptured ascending aorta. CPB was required for tube graft replacement of his ascending aorta. Following repair, his other injuries were stabilized and despite a good neurologic and physiologic outcome, he died of overwhelming sepsis 12 days post-operatively. Follow-up imaging showed good biventricular function with no effusion, valvular abnormality, residual dissection, or evidence of mediastinitis.

**Discussion:** These patients demonstrate the spectrum of BCTi that require immediate CPB. With the improvement in emergency triage and pre-hospital management, patients who would have previously died are more frequently presenting alive. The “Golden Hour” of rapid diagnosis and treatment is critical to survival. In advanced trauma centers, it is crucial to have immediate full cardiothoracic support resources to treat complex, unstable cardiothoracic injuries.

### 7.2

#### AORTIC VALVE REPLACEMENT THROUGH PARTIAL UPPER STERNOTOMY – MINI AVR. AN INITIAL EXPERIENCE AND MODIFICATIONS

Alen Karic

University Clinical Center Tuzla, Clinic for Cardiovascular Disease, Tuzla, Bosnia and Herzegovina

Minimal invasive approaches are becoming very popular for surgical treatment of critically stenosed aortic valve area or when patient become symptomatic for aortic valve stenosis. Among them is Partial Upper sternotomy - Mini Aortic Valve Replacement. If feasible, after the surgery, patient recovery is faster. Less pain and untouched pleural cavities provide better respiratory function. Decreased bleeding, reduced post operative ventilation time and Intensive Care Unit time made ahospital stay much shorter.

### 7.3

#### NEGATIVE PRESSURE WOUND TREATMENT IN CARDIAC SURGERY

Josip Varvodic, Davor Baric, Daniel Unic, Marko Kusurin, Igor Rudez

University Hospital, Dubrava, Zagreb, Croatia

**Introduction:** Negative pressure wound treatment (NPWT), also known as Vacuum assisted closure (VAC) is a sort of therapy, based on sub-atmospheric pressure, used to aid the process of wound healing, especially in chronic and acute complex wounds. This therapy provides facilitated healing, especially in the early stage (via improved rate of angiogenesis, endothelial proliferation and capillary blood flow, and by decreased interstitial edema and bacterial counts within the wound etc.).

**Methods:** We searched the literature to give the review of the most important research papers, and also gathered experience and results with NPWT at our department.

**Results:** There are a multitude of articles covering the effect and progress of NPWT in general and in cardiac surgery, in various medical journals. The results showed as followed: increased blood flow, increase of granulation tissue formation, decreased oedema, decreased bacterial count, decreased wound size and time to heal. At our department we have treated sternal wound complications as well as safenous vein graft donor site complications effectively with NPWT.

**Conclusion:** Negative-pressure wound therapy has a wide range of acceptance in wound treatment. We can say it changed the way of managing wound treatment at our department as it became a key part of clinical treatment for patients with various conditions.

## 7.4

### ELECTROPHYSIOLOGICAL CHARACTERISTICS OF PATIENTS THAT DEVELOP ATRIAL FIBRILLATION AFTER ARRESTED HEART OPERATIONS

Jurij Matija Kalisnik,<sup>1</sup> Alenka Hrastovec,<sup>1</sup> Viktor Avbelj,<sup>2</sup> Borut Gersak<sup>1</sup>

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<sup>2</sup>Department Of Communications And Computer Networks, Jozef Stefan Institute, Ljubljana, Slovenia

**Objectives:** Heart Rate (HR) Variability analyses applying chaos dynamics provide information about derangement of cardiac autonomic modulation predicting ventricular or atrial arrhythmias. Aim of the present study was to determine which ECG and non-linear HR dynamics parameters predispose to development of postoperative atrial fibrillation after surgery on the arrested heart.

**Methods:** 43 consecutive patients, 26 men, mean age 70.3 yrs referred either for isolated aortic valve replacement ± concomitant coronary revascularization or Bentall procedure were enrolled into the study. High-resolution 20-minute ECG recordings were performed one day before operation to determine RR, PQ, QT and QTc interval as well as non-linear HR parameters by Detrended Fluctuation Analysis (DFA) with short-( $\leq 11$  beats,  $\alpha_1$ ) and long-term ( $> 11$  beats,  $\alpha_2$ ) correlation properties of R-R intervals. Statistical analyses included paired-samples t-test, Mann-Whitney or Fischer exact test. Results were reported as mean  $\pm$  SE;  $P < 0.05$  or less was considered significant.

**Results:** Out of 43 patients 17 developed AF after operation (AF group) and 26 did not (noAF group). The two groups had similar demographic and perioperative characteristics. Cardiopulmonary bypass time ( $112 \pm 28$  vs.  $97 \pm 30$  min;  $P = 0.11$ ) and aortic crossclamp time ( $83 \pm 22$  vs.  $76 \pm 27$  min;  $P = 0.15$ ) tended to be longer in AF group. There were no differences in RR, QT or QTc interval between AF and noAF group ( $64 \pm 11$  vs.  $65 \pm 10$ ,  $420 \pm 32$  vs.  $436 \pm 51$  and  $432 \pm 26$  vs.  $452 \pm 55$  ms, respectively;  $P = \text{NS}$ ). DFA parameter  $\alpha_1$  tended to be higher and DFA  $\alpha_2$  proved consistently higher in AF group ( $0.98 \pm 0.36$  vs.  $0.86 \pm 0.28$ ;  $P = 0.26$  and  $0.89 \pm 0.17$  vs.  $0.76 \pm 0.18$ ;  $P = 0.018$ ). In addition, PQ interval was consistently shorter ( $160 \pm 20$  vs.  $184 \pm 44$ ;  $P = 0.033$ ) in AF group.

**Conclusions:** Patients prone to postoperative AF after arrested heart surgery exhibit profoundly altered non-linear Heart Rate dynamics and shorter PQ interval already preoperatively and independently of perioperative factors. In accordance with the results from our previous beating heart studies, parameter DFA  $\alpha_2$  comprehensively indicates higher risk of postoperative atrial fibrillation occurrence. In perspective, cut-off values for the measured parameters might help identify subgroup at patient at highest risk of perioperative AF.

## 7.5

### ULTRASONIC ASSESSMENT OF LEFT VENTRICULAR PERFORMANCE AFTER CORONARY REVASCLARIZATION IN EARLY POSTOPERATIVE PERIOD

Robert Blazekovic, Igor Rudez, Davor Baric, Daniel Unic, Zeljko Sutlic

University Hospital Dubrava, Zagreb, Croatia

**Aim:** To assess performance of the left ventricle after coronary revascularization with (CABG) and without (OPCABG) cardiopulmonary bypass and to express results by conventional doppler indices and by the index of global myocardial performance (MPI).

**Methods:** 60 patients were enrolled: CABG group (32 patients) and OPCABG group (28 patients). Indices were measured in three time intervals: before the operation, after revascularization and two hours after the operation

**Results:** In the CABG group peak velocity of A-wave, D-wave and AR-wave significantly increase, while E/A ratio  $< 1$ . In the OPCAB group A-wave and AR-wave significantly increase, E/A significantly decrease, but ratio is not  $< 1$ . In the CABG group LVEDAI is decreased as a result of reduced compliance of the left ventricle. MPI value did not change during time within the groups, nor between the groups.

**Conclusion:** Myocardial revascularization procedure impairs diastolic function of the left ventricle, particularly CABG procedure. MPI values did not change significantly between the groups.

## 7.6

### REVERSIBLE PULMONARY ARTERY BANDING, AN OLD SURGICAL TECHNIQUE FOR A NEW

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The main feature in dilative cardiomyopathy (DCM) is myocyte death with subsequent myocardial fibrosis and left ventricular dilatation and systolic dysfunction. It is the most common form of cardiomyopathy in children. Common paradigm of irreversible, end stage disease is reflected by the fact that DCM is a second cause for the heart transplantation in the pediatric group of patients. Surprisingly, this heterogenous and severe disease can be improved in a properly selected group of young children referred for a heart transplantation with reversible pulmonary artery banding.

In this report we will present the selection process, surgical technique and the protocol for medical enhancement of the left ventricular regeneration and function.

## 7.7

### THE IMPACT OF DEPRESSION ON THE RISK OF DEATH FROM CORONARY HEART DISEASE AFTER CARDIOSURGICAL REVASCULARIZATION

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**Introduction:** Patients with the coronary heart disease show a tendency of developing depressive mood. On the other hand, compared to the general population, people suffering from depression are more likely to suffer from cardiovascular diseases. Depression is considered to be an independent risk factor for developing a coronary heart disease, just as important as hyperlipidemia, hypertension, obesity, diabetes and smoking are. The depressive disorder multiplies the possibility of developing myocardial infarction and complications that arise later. After the cardio surgical revascularization depression means a greater propensity towards complications after the surgery and therefore longer hospitalization.

**Aim:** To investigate the prevalence of depressive disorder and its impact on coronary heart disease for patients who had undergone cardio surgical operation in Clinical Hospital Mostar. Determine whether cardiac patients with the depressive disorder have greater number of complications during the surgery and the recovery period in a hospital ward, and determine whether they have higher perioperative mortality rate during the cardiac surgery installation of aorto-coronary bypass.

To find out if the patients type of personality affects the number of complications and the mortality rate after the cardiac revascularization.

**Patients and Methods:** The study included patients with coronary artery disease who had undergone coronary artery bypass in CH Mostar during the period from January 2011 until December 2012. The study included 60 patients of both sexes and all ages. All patients who have had, besides coronary heart disease, some other heart disease that may require surgical treatment, have been excluded from this study. All participants completed the Beck's form of assessment of the severity of depression. Their data on the health status were entered into the form and of EuroSCORE (European System for Cardiac Operative Risk Evaluation and European system for risk assessment in cardiac surgery) for preoperative risk assessment of fatal outcome after the cardiac surgery and were analyzed on the basis of that form. All subjects filled out a written questionnaire for A, B, or D type of personality.

(Bortner questionnaire was used for A and B types of

personality, and DS 14 questionnaire was used for the D type of personality.)

**Results:** The study did not show that patients who have coronary heart disease and are waiting to be subjected to cardio surgical revascularization have a greater tendency to develop depressive disorders.

Patients who have had a depressive disorder, regardless of the degree of depression, had significantly more complications than the patients who did not have depressive symptoms. The study showed no increased mortality of patients with depressive symptoms. Personality type does not affect the number of complications and mortality rate of patients regardless of the type of personality.

**Conclusion:** The early detection of depressive disorder within patients with coronary heart disease could contribute to the success of their treatment. The recognition and treatment of depressed patients, among patients with coronary heart disease that are waiting to be subjected to cardio surgical revascularization, can reduce the number of complications and days spent in hospital treatment. In this way, we can reduce the cost of treatment, and at the same time have a positive impact on the comfort of the patient during the hospitalization.

## 7.8

### LIVE *DIROFILARIA IMMITIS* FOUND DURING CORONARY ARTERY BYPASS GRAFTING PROCEDURE

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*D.immitis* is a parasite transmitted by mosquito bites where the most common primary hosts are dogs, cats and some wild animals. Humans become accidental hosts after being bitten by an infected mosquito and number of such infections has rapidly increased during the last decade. We present a patient in which a live *Dirofilaria immitis* has been found during surgical revascularization of myocardium. To the best of our knowledge, live *Dirofilaria immitis* found in substernal area during open heart surgery has never been described before. *D.immitis* in human most often causes pulmonary nodules known as "coin lesions" which are benign and asymptomatic but it is very important for thoracic surgery that they are considered in differential diagnosis of pulmonary nodules. Video assisted thoracic surgery (VATS) has been proven as the best method in diagnosing and treating pulmonary dirofilariasis.