P10 - Posters - Cardiac Surgery

1 **Post-sternectomy Severe Chest Wall Instability and Abdominal Herniation: Repair With Polypropylene Mesh**
E. Altman, A. Shturman, J. Lemer, A. Eitan
Nahariya

2 **Rewarming Rate and Aortic Cannula Length During Mild Hypothermic Cardiopulmonary Bypass**
S.Y. Ishay, G. Verchovski, L. Ruderman, J. Assaly, D. Mozalbat, A. Ganiel, D. Abramov, M. Matsa, G. Sahar
Beer Sheva

3 **The Efficacy and Safety of Micro-dose Aprotonin in Primary Coronary Artery Bypass Grafting**
A. Ganiel, L. Tiosano, D. Abramov, M. Matsa, L. Ruderman, J. Assala, Y. Yishai, G. Sahar
Beer Sheva

4 **Reduced Transfusion Requirements with a Low Prime Volume Oxygenator**
Y. Schwartz, S. Liphshitz, R. Haizler, C. Drookman, A. Kogan, S. Preisman, P. Ghosh, E. Raanani
Ramat Gan

5 **An Effortless Method for Reducing Blood Transfusions Following Cardiac Surgery**
V. Rubchevsky, J. Gurevich, D. Aravot
Haifa

6 **Double Inflow Back-Up System for Arterial Revascularization – 6 Year Follow Up**
D. Aravot, Y. Peisachovitch, J. Gurevitch
Haifa

7 **Preoperative Hemoglobin A1C as a Predictor of Mortality after a CABG Operation**
Y. Ben-Shahar, O. Cohen, Z. Adler, V. Kertsman, S. Diab, Y. Barak, G. Bolotin
Haifa

8 **The Influence of Preoperative Hemoglobin A1C Level on Postoperative Anti-Diabetic Treatment in Patients Undergoing CABG Surgery**
Y. Ben-Shahar, O. Cohen, Z. Adler, V. Kertsman, S. Diab, Y. Barak, G. Bolotin
Haifa

9 **Midterm Outcome of Aortic Valve Replacement (AVR) with Stentless Valves**
A. Kramer [1], S. Silberman [2], B. Medalion [3], R. Mohr [1], D. Fink [2], D. Bitran [2], G. Uretzky [1]
[1] Tel Aviv, [2] Jerusalem, [3] Petach Tikva

P10 - Posters - Cardiac Surgery (Cont.)

10 **Aortic Valve Preservation Surgery**

B. Sheick-Yousif, A. Shinfeild, S. Tager, D. Loberman, S. Priesman, A. Kogan, E. Raanani
Ramat Gan

11 **Quality of Mitral Valve Repair: Median Sternotomy versus Port-Access Approach**

D. Spiegelstein [1], A. Shinfeld [1], A.K. Smolinsky [2], Y. Moshkovitz [2], A. Malachy [1], D. Loberman [1], B. Sheick-Yousif [1], S. Preisman [1], V. Koman [1], E. Raanani [1]
[1] Ramat Gan, [2] Petach Tikva

Post-sternectomy Severe Chest Wall Instability and Abdominal Herniation: Repair With Polypropylene Mesh

Edvard Altman [1], Alexander Shturman [2], Joseph Lemer [1], Arie Eitan [1]

[1] Surgery, [2] Cardiology, Western Galilee Hospital, Nahariya, Israel

Background: Osteomyelitis of the sternum after median sternotomy is a serious complication. Aggressive debridement and sternectomy, with closure of the defect by pectoralis muscles or omentum is the accepted repair of choice. It is known that in some patients, this operation may lead to thoracic instability of varying degrees, limiting a patients quality of life. We present a simplified technique for repair of unstable anterior chest wall and abdominal herniation following sternectomy and aggressive debridement.

Materials and method: Two patients (ages 72 and 75 years old) were admitted to our hospital with severe instability of the anterior chest wall and upper abdominal herniation. Both of them had a history of cardiac surgery through median sternotomy, complicated by deep infection of the sternum. This complication was treated in the usual manner by total sternectomy. In the first patient, the defect after sternectomy was closed by omentum, and in the second patient pectoralis muscle flaps were used. Postoperative healing of both wounds were uneventful but thoracic instability and upper abdominal herniation developed. One of the patient s used a special chest corset with abdominal support. The other patient employed the handle of a hammer for counter pressure against the chest during coughing or physical exertion. Extensive cardiac evaluation including echocardiogram was done before and after operation.Both patients underwent repair using the following technique. Under general anesthesia, an incision was made along the previous sternectomy scar. The skin flaps were then dissected. Polypropylene mesh (4 layers) was trimmed according to the size of the anterior chest wall and upper abdominal defects. Holes were drilled into the rib stumps and the mesh was placed on the anterior chest wall and abdominal defects for suturing. The mesh was then fixed to the rib stumps by interrupted sutures, and to the margins of aponeurosis by running sutures. A 16 FR drainage tube was then inserted under the mesh. Finally, the skin flaps were sewn to each other in the midline with resorbable suture material.

Results: In both our patients, we received good stabilization of the anterior chest wall defect and resolution of upper abdominal herniation at 2-year follow up.

Conclusion: Polypropylene mesh was a suitable alternative for stabilization of post-sternectomy anterior chest wall large defect combined with abdominal herniation.

Rewarming Rate and Aortic Cannula Length During Mild Hypothermic Cardiopulmonary Bypass

Shlomo Yaron Ishay, Guy Verchovski, Leonid Ruderman, Jaffer Assaly, David Mozalbat, Amir Ganiel, Dan Abramov, Menachem Matsa, Gideon Sahar

Cardiothoracic Surgery, Surgery, Soroka Univrsity Medical Center, Beer Sheva, Israel

Objective: Brain hyperthermia during the rewarming phase of cardiopulmonary bypass may lead to neurological injury. Rewarming rate has been directly related to jugular bulb (SjvO2) desaturation which in turn has been associated with poorer neurological outcomes. Nasopharyngeal (NP) temperature monitoring reflects accurately deep brain temperature. Our prospective study tested the hypothesis that use of long aortic cannula which extended beyond the left common carotid artery, can decelerate the rewarming rate and hence avoid brain hyperthermia.

Methods: 108 patients underwent elective ON pump cardiac surgery were studied. Group1 (N=54) using long aortic cannula, Group2 (N=54) using short aortic cannula. During rewarming 4^0-6^0C difference between nasopharyngeal – CBP perfusate were maintained in both groups until maximal rewarm temperature (37^0C). Groups were compared for Rewarming rate – Δ Temperature / Time from start rewarming to maximal rewarm temperature. Other factor that could influence the rewarming rate were also compared – BMI (Body Mass Index), Diabetes mellitus, Oxigenator type.

Results: Mean rewarming rate was 0.296±0.121 in group 1 and 0.307±0.147 in group 2 (p=0.31). There was no different in rewarming rate between Diabetes and non diabetes (0.297±0.114; 0.303± 0.147; P=0.194); BMI ≥ 30 and BMI<30 (P=0.261) and Oxygenator type (P=0.449).

Conclusions: Use of long aortic cannula which extended beyond the left common carotid artery during on pump cardiac surgery do not influence the rewarming rate and hence do not reduce brain hyperthermia.

The Efficacy and Safety of Micro-dose Aprotonin in Primary Coronary Artery Bypass Grafting

Amir Ganiel, Liran Tiosano, Dan Abramov, Menachem Matsa, Leonid Ruderman, Jaffar Assala, Yaron Yishai, Gideon Sahar

Cardiothoracic Surgery, Soroka University Medical Center, Beer Sheva, Israel

Since it was first approved for use during cardiac surgery, there has been controversy surrounding aprotonin. Several meta-analyses have found a significant reduction in peri-operative blood loss. Others have shown an increase in mortality, myocardial infarction and acute kidney injury attributed to the use of aprotonin.

There have been several works comparing the full dose recommended by the manufacturer, and a smaller dose administered only through the cardio-pulmonary circuit. At our instituition a third regimen is used – the recommended test dose (100,000 units) only.

In light of the recent FDA warning regarding the safety of aprotonin, and the manufacturer's decision to suspend marketing, we reviewed the results of the three different dosing regimens at our center.

The case records of all first time, non-emergent, coronary artery bypass grafting patients between March 1, 2006 and March 1, 2008 were reviewed. A comparison was made between those receiving a test (micro) dose of 100,000 units only (Group 1), those receiving 2,000,000 units in the cardio-pulmonary circuit (Group 2), and those administered the full dose as recommended by the manufacturer (Group 3).

There was no significant difference in age, kidney function, or prevalence of diabetes, hypertension and dyslipidemia between the three groups. Pre-operative Hemoglobin, Hematocrit and coagulation studies also showed no significant difference.

24-hour chest tube output, total chest tube output, re-operations for bleeding, transfusion requirements, change in kidney function and mortality were compared.

No significant p-values were found.

In summary – the use of a micro dose of aprotonin was found to be as effective in reducing peri-operative blood loss with no increase in adverse effects.

Reduced Transfusion Requirements with a Low Prime Volume Oxygenator

Yaron Schwartz [1], Shifra Liphshitz [1], Rami Haizler [1], Costa Drookman [1], Alexander Kogan [1], Sergey Preisman [2], Probal Ghosh [1], Ehud Raanani [1]

[1] Department of Cardiac Surgery, [2] Department of Anesthesilogy, Sheba Medical Center, Ramat Gan, Israel

Background. Despite advances in surgical techniques, up to 80% of patients undergoing open heart operations require allogeneic blood transfusions. Low hematocrit (Hct < 20) during cardiopulmonary bypass (CPB) is associated with higher mortality and other adverse outcomes. More frequently, blood transfusion and low Hct is encountered in patients with small body size and women patients. This prompted us to take an aggressive approach in our care of these patients.

Methods. The aim of this study was to evaluate the effect of the new low prime volume oxygenator on perioperative hemodilution and blood transfusions. We use of a low prime volume oxygenator (LPVO) (Group I) for adult patients with a body surface area (BSA) < 1.7 m(2) and use of standard prime volume oxygenator (SPVO) (Group II) for adult patients with a body surface area (BSA) > 1.7 m(2).
In a case-matched retrospective study, 40 patients undergoing coronary artery bypass surgery with using of LPVO were compared with 40 patients on SPVO.

Results. In the LPVO group, the prime volume was significantly reduced, resulting in less hemodilution and transfusion requirements during and after extracorporeal circulation: only 10% of patients needed transfusions vs. 35% in the SPVO group, with an average perioperative transfusion need of 0.16 vs. 1.25 units. During the hospitalization patient in LPVO group needed 1.8 vs 2.5 units in the SPVO group. No adverse effects were observed in both groups

Conlusion. The low prime volume oxygenator was considered safe and effective for open heart surgery.

An Effortless Method for Reducing Blood Transfusions Following Cardiac Surgery

Victor Rubchevsky, Jacob Gurevich, Dan Aravot

Cardithoracic, Cardiac surgery, Carmel Hospital, Haifa, Israel

Background: Blood transfusion following open heart operations may be, at times, vital, but at the same time may be associated with possible complications ranging from anaphylactic reactions to transmission of various infectious agents such as Hepatitis B and C, and HIV viruses. The current worldwide medical approach is to avoid or reduce the need for blood transfusion as much as possible by reducing blood loss, autotransfusion, injecting erythropoietin before elective operations, using Cell Savers, etc.

Method: We have recently implemented a splendidly simple and cheap method allowing significant reduction of blood transfusions following open heart surgery, as well as effectively using patient's own blood.

At the end of cardio-pulmonary bypass, pump technician transfuses all remaining blood in the reservoir. At that stage another 500 cc of saline are added to the empty reservoir. The added solution "pushes" the rest of the patient's blood towards the patient, thus saving the remaining blood from the bottom of the oxygenator and aortic line.

Two groups of 20 patients each – one with "blood saving" (group I) and one without (group II) were compared. There were no significant differences in sex, gender and preoperative characteristics.

Results: Blood samples showed that Hb (hemoglobin), Ht (hematocrit) level in the aortic line at the end of procedure were 4.5 – 5 gm/dl and 20-22%, respectively - about half the Hb level in patient's own blood. Postoperative Ht level was higher in group I patients (36%±2 vs. 33%±2), and the need for blood transfusion in that group was 55% lower.

Conclusion: It was possible to reduce and in several cases to avoid postoperative blood transfusion. We recommend this simple and universally reproducible method to be widely used during open heart surgery.

Double Inflow Back-Up System for Arterial Revascularization – 6 Year Follow Up

Dan Aravot, Yuri Peisachovitch, Jacob Gurevitch
Cardiothoracic Surgery, Carmel Medical Center, Haifa, Israel

Background: The brain blood perfusion is protected by a double inflow "god created" back up system ("Circle of Willis") connecting these vessels. The hands and feet have both double inflow back-up systems with the palmar and plantar arches connecting them. Nevertheless, the heart was not created with such a system nor does the current approach for coronary surgery.

Methods: We applied this evolution principle in 10 patients undergoing surgical revascularization. An in-situ RIMA was anastomosed to the LAD, Radial artery to Diagonal and Ramus branches and then, end to side to the in-situ LIMA, which, in-turn was connected to marginal circumflex coronary arteries, thus creating a double inflow system similar to the palmar and plantar arches. These patients were followed for 6 years and compared to other 10 matched patients who underwent conventional revascularization, using in-situ LIMA and Free RIMA with T or Y graft connections to the left system.

Results: The patients with the "back up" system were all found alive, well and asymptomatic. Extubation time was 6 hours postoperative, ICU stay – 1 day, and hospital stay was 3.5 days. None of the patients required additional revascularization procedure. The patients from the conventional revascularization group were all alive and well and asymptomatic as well. Extubation time was 12 hours, ICU stay – 1.3 days, hospital stay – 4.5 days, no one required additional revascularization procedure.

Conclusion: Our limited experience with the double inflow back up system for arterial revascularization has satisfactory short- and medium- term results comparable to the conventional methods. Long term follow up is required in order to demonstrate advantage of the back up system.

Preoperative Hemoglobin A1C as a Predictor of Mortality after a CABG Operation

Yoav Ben-Shahar, Oved Cohen, Zvi Adler, Victor Kertsman, Sammer Diab, Yaron Barak, Gil Bolotin

Cardiac Surgery, Rambam Health Care Campus and the Bruce Rappaport Faculty of Medicine, The Technion-Israel Institute of Technology, Haifa, Israel

Objectives: Diabetes is a well known risk factor for adverse events post heart surgery. A1C hemoglobin level can give a good perspective concerning the latest three months diabetes patient's status. The purpose of this study was to document the prevalence of uncontrolled diabetes in patients referred for CABG and determine whether a correlation exists between uncontrolled diabetes and post-operative morbidity and mortality.

Methods: One hundred eighty six consecutive patients underwent a CABG operation From July 1, 2007 to July 31, 2008. Patients' files were retrospectively studied. The cohort was divided according to serum A1C hemoglobin level. Patients with A1C hemoglobin level higher than 6.3% were compared with those who had normal A1C hemoglobin levels. Post-operative morbidity in terms of atrial fibrillation, wound infection, renal failure, cerebrovascular events and troponin level as well as mortality were documented.

Results: Out of 186 patients, 86 (46.2%) had A1C Hg higher than 6.3% while 100 patients (53.8%) had normal A1C Hg levels. Mortality was significantly higher among the elevated A1C Hg group (6/86 7%) compared to the normal level group (1/100 1%, p=0.05). Adverse events and postoperative morbidity was not found statistically different between the two groups.

Conclusions: A high percentage of patients who have been referred for a CABG operation have uncontrolled diabetes pre-operatively, as reflected by hemoglobin A1C levels. An elevated hemoglobin A1C level was found to be a predictor of post-operative mortality in patients undergoing a CABG operation.

The Influence of Preoperative Hemoglobin A1C Level on Postoperative Anti-Diabetic Treatment in Patients Undergoing CABG Surgery

Yoav Ben-Shahar, Oved Cohen, Zvi Adler, Victor Kertsman, Sammer Diab, Yaron Barak, Gil Bolotin

Cardiac Surgery, Rambam Health Care Campus and the Bruce Rappaport Faculty of Medicine, The Technion-Israel Institute of Technology, Haifa, Israel

Objective: Diabetes is a well-known risk factor for adverse events post heart surgery. The A1C hemoglobin level provides a good view of the diabetic patient's status in the previous three months. The purpose of this study was to determine whether measuring hemoglobin A1C levels preoperatively in patients undergoing CABG surgery would impact on postoperative anti-diabetic treatment.

Methods: Preoperative serum hemoglobin A1C level was measured in all patients who underwent CABG surgery between July 1, 2007, and July 31, 2008 (known A1C Hg group). This data, along with a known diabetes history and actual glucose level on admission, were factors that helped in determining optimal anti-diabetic treatment. This cohort was compared to another series of patients who underwent CABG surgery two years previously, between July 1, 2005, and July 31, 2006 (unknown A1C Hg group).

Results: The prevalence of patients with a diabetic history was similar in both groups, 48.1% vs 47.8% (p=1). In the known A1C hemoglobin group, 84 (45.1%) patients were discharged with anti-diabetic treatment, compared to 63 (33.7%) patients in the unknown A1C hemoglobin group, (p=0.026). Of 97 patients defined as non-diabetic with a known hemoglobin A1C, 50 (51.5%) were discharged with anti-diabetic treatment, compared to 29 (29.9%) of 97 patients in the unknown A1C hemoglobin group who were defined as non-diabetic (p=0.003).

Conclusions: A1C hemoglobin was found to be an influencing factor on postoperative anti-diabetic treatment, thus providing another tool in the physician's armamentarium for best anti-diabetic treatment.

Midterm Outcome of Aortic Valve Replacement (AVR) with Stentless Valves

Amir Kramer [1], Shuli Silberman [2], Benjamin Medalion [3], Rephael Mohr [1], Daniel Fink [2], Dani Bitran [2], Gideon Uretzky [1]

[1] Cardiothoracic Surgery, Tel Aviv Sourasky Medical Center, Tel Aviv, [2] Cardiothoracic Surgery, Shaare Zedek Medical Center, Jerusalem, [3] Cardiothoracic Surgery, Rabin Medical Center, Petach Tikva, Israel

Background: The presence of stent and sewing ring reduces effective orifice area of bioprosthetic valves. Valves without stents and sewing-ring (stentless valves) were developed in order to overcome this hemodynamic problem.

Methods: From 1996 to 2007, 74 females and 88 males underwent AVR with stentless valves (7 SPV and 155 Freestyle). Mean age was 73±8. Fifty eight (35.8%) of the patients had congestive heart failure (CHF), 16 (9.9%) CRF, 30 (18.5%) had chronic AF, 16 (9.9%) had Aortic Aneurysm and 17 (10.5%) underwent repeat operations. Concomitant Coronary Artery Bypass Grafting (CABG) was performed in 86 (53%). The subcoronary and root replacement techniques were used in 136 (84%) and 26 (16%) patients, respectively.

Results: Early mortality was 6.2% (10 patients). Mortality in primary operations was 4.8% and in reoperations it was 20%. Multivariable logistic regression revealed repeat operation to be the only predictor of early mortality (OR 4.98, 95% CI 1.13-21.73). Mean follow-up was 8.7±0.44 years and eight-year survival (Kaplan Meier) was 69±7%. Survival of patients younger than 65 and older than 80 years was significantly lower than that of patients between 65 and 80 years of age (43±17, 37±15 and 88±5%, $p<0.001$). Age between 65 and 80 had a protective effect (Cox Model) on late survival (HR 0.203, 95% CI 0.086-0.477). Repeat operations were associated with decreased survival (HR 2.96, 95% CI 0.99-8.93).

Conclusion: Midterm results of AVR with stentless valves are good, especially in primary AVR operations in patients between 65 and 80 years of age.

Aortic Valve Preservation Surgery

Basheer Sheick-Yousif [1], Ami Shinfeild [1], Salis Tager [1], Dan Loberman [1], Sergey Priesman [2], Alexander Kogan [1], Ehud Raanani [1]

[1] Cardiac Surgery Department, [2] Department of Anesthesiology, Chaim Sheba Medical Center, Ramat Gan, Israel

Objective: An overview of our experience and outcomes of patients who underwent aortic valve preserving/sparing procedures for various pathologies associated with ascending aorta and aortic valve diseases, including aortic aneurysm, aortic dissection and bicuspid aortic valve.

Patients and methods: From January 1996 to November 2008 305 patients with a diseased ascending aorta or aortic valve underwent an aortic valve preservation surgery. 146 pts had aortic aneurysm, 131 had type A aortic dissection and 20 pts had bicuspid AV (BAV) pathology. Eight pts had AV regurgitation secondary to other pathologies including SBE (2 pts|) and aortic valve prolapse (6 pts). Mean age was 60 years (range 21-81 years), 70% of the patients were males. Thirty six patients were marfans.

Results: Fifty six pts underwent the reimplantation technique, 111 patients underwent the remodeling technique. Twenty one pts underwent repair of BAV. The remaining (118 pts) underwent other sparing techniques of the aortic root and valve. Overall 30 days mortality was 6.5% (20 pts out of 305). Recurrence of AI more than 2+ occurred in 13 patients. Among Marfan Patients, recurrence of AI more than 2+ occurred in two pts, both underwent remodeling and both had dissection of the ascending aorta involving the sinuses of Valsalva. Reoperation due to Severe AI was needed for 8 pts, all from the remodeling group and all were non marfans.

Conclusions: Excellent early and midterm results can be achieved by aortic root preserving procedures and concurrent aortic valve leaflet repairs when appropriately selected for a diverse class of pathologies.

Quality of Mitral Valve Repair: Median Sternotomy versus Port-Access Approach

Dan Spiegelstein [1], Amihai Shinfeld [1], Aram K Smolinsky [2], Yaron Moshkovitz [2], Ateret Malachy [1], Dan Loberman [1], Basheer Sheick-Yousif [1], Sergey Preisman [3], Vera Koman [3], Ehud Raanani [1]

[1] Department of Cardiac Surgery, Chaim Sheba Medical Center, Affiliated to the Sackler School of medicine - Tel Aviv University, Ramat Gan, [2] Department of Cardiac Surgery, Assuta Medical Center, Petach Tikva, [3] Departments of Anesthesiology and Intensive Care, Chaim Sheba Medical Center, Affiliated to the Sackler School of Medicine - Tel Aviv University, Ramat Gan, Israel

Background

The feasibility and safety of minimally invasive mitral valve repair using Port-access approach was previously demonstrated. We compared early and mid term results of port-access approach versus conventional median sternotomy for simple mitral valve repair.

Methods

From 2000 to 2008, 147 patients underwent mitral valve repair for isolated posterior leaflet prolapse; 58 by port-access and 89 by median sternotomy approach. Patients in port-access group were younger (mean age 54±11 versus 59±12, $p<0.05$). Other characteristics including valve pathology and repair technique were comparable between the groups.

Results

There was no early death. Operative, bypass and clamp time were significantly longer in port-access group. Mean hospital stay was 5.7±2.2 days in port-access group versus 5.3±2.7 days in sternotomy group ($p=0.4$). Early post-operative echocardiography showed most patients in both groups had none or trivial MR and none of the patients had more then grade 2 MR. Follow up was complete with mean of 16±20 months. NYHA class improved from 1.9±0.9 to 1.4±0.6 in port-access group ($p<0.05$) versus 2.3±0.9 to 1.6±0.6 in sternotomy group ($p<0.05$). There were 2 late deaths (2.2%) in the sternotomy group. Freedom from reoperation was 96.6% in port-access group (56/58) and 96.6% in sternotomy group (86/89). Echocardiography revealed that 47(81%) had MR grade 0/1, 9(15.5%) grade 2 and 2(3.5%) grade 3/4 in port-access group. In sternotomy group, 85(95%) had MR grade 0/1, 1(1.1%) grade 2 and 3(3.4%) grade 3/4.

Conclusions

In selected cases quality of mitral valve repair with port-access approach compares with conventional median sternotomy approach.