

Supplement

Volume 23, Jan- Mar 2007

Abstracts of the 53rd Annual Conference of IACTS, Feb 2007
Author Index

Post CABG transfusion associated graft versus host disease- A fatal complication

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Background: Transfusion associated graft versus host disease (TA-GVHD) following cardiac surgery is a rare, possibly under-reported and rapidly fatal complication of blood transfusion. It has not been reported from South-East Asia and so far has never been reported following off pump CABG.

Method: A 72-year old man presented with unstable angina. His angiography revealed critical TVD. He continued to be unstable and was taken up for emergency OPCABG X 3. He required fresh blood transfusion from a first degree relative as he was on antiplatelets, was anemic and had a rare blood group. He was discharged on the 5th postoperative day. He came back on the 21st day with a high grade fever, skin rash, nausea, vomiting and diarrhea. Investigations revealed severe leucopenia which rapidly worsened. He was started on antibiotics, blood products, gammaglobulins and growth colony stimulating factor. Bone marrow biopsy showed aplastic marrow and skin biopsy showed features consistent with GVHD (apoptosis, lymphocytic exocytosis and keratinocyte necrosis).

Results: The patient had a rapidly downhill course and died on the 24th post op day. Permission for autopsy was not given and HLA typing of the patient and donor blood could not be done.

Conclusions: The most important method of preventing TA-GVHD is to avoid blood transfusion. Where this is not possible (preop anemia, antiplatelet therapy etc) then transfusion from related donors should be avoided, and if unavoidable (rare blood group) then the risk-benefit ratio must be kept in mind and the blood ideally should be irradiated. The most important step in early diagnosis is to think of it !!! – in a clinical setting similar to our patient. No specific treatment modality has been uniformly successful. The aim of this case report is to create awareness about this entity and to attempt to establish the true incidence in our sub-continent so that a cost-benefit analysis can be done and guidelines on the irradiation of blood products be set.

Malaria in the setting of critical CAD – another absolute indication for off pump surgery

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Background: Malaria is still endemic in various parts of Asia. It may not be uncommon to come across a patient with active malaria needing urgent surgery due to unstable coronary anatomy. As it is basically the red cells which get damaged they would be very susceptible to hemolysis if CPB were employed.

Method: A 72-year old man presented with post MI unstable angina with preceding fever with chills and rigors. On investigation he was diagnosed to have P falciparum malaria with critical left main stenosis with TVD and moderate LV dysfunction. He was started on antimalarials and his fever was controlled with antipyretics. However he continued to be grossly unstable with ischemic changes in the antero-lateral leads. In view of this emergency CABG was planned. In active malaria it is well known that the RBC are invaded, damaged and altered so that they are more easily destroyed and also have a tendency to cyto-adherence with rosette formation. CPB with its known adverse effects on the hematological system would have been disastrous in the presence of the active malarial pathology.

Results: A triple OPCABG was successfully performed. The patient was extubated within 4 hours and oral antimalarials continued. Blood products were not used. He had no fever postop, his parasitemia

cleared and he was discharged on the 5th postop day on continued malarial chemoprophylaxis.

Conclusions: Malaria or any active RBC infection with an attendant pathology warranting emergency CABG is an absolute indication for off pump CABG.

Reoperation for recurrence of angina after primary coronary artery bypass grafting-MMM experience

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Background: As the incidence of coronary artery disease is becoming high in our country, reoperation in these groups are also increasing. The aim of this study was to analyze the data of patients who underwent reoperation for recurrence of angina due to progressive native disease and or graft occlusion.

Methods: From 1996 to 2005, we performed 89 coronary reoperations in our institution. 83 patients were male and 6 females. Average age was 59 years. The mean interval of presentation following primary CABG was 8.7 years (ranging from 1 month to 24 years). All reoperations were done under CPB.

Results: These 89 patients received total of 257 grafts during primary surgery of which 205 grafts were occluded when presented with symptoms. A total of 250 grafts were revised during redo CABG. LIMA was used in 44 cases during primary CABG. LIMA was used in 34 cases only during redo CABG. LAD graft was occluded in all but 2 patients. LAD grafting could not be done in 2 patients. Early mortality was 5.6% (5 out of 89 patients). 3 patients had preoperative MI. One patient was explored for excessive drainage and developed ARDS and later MOFS. One patient developed sternal wound dehiscence requiring debridement and flap cover. 2 patients developed recurrence of symptoms.

Conclusion: Considering the complexity of this surgical condition, the patient survival and mortality in our series were comparable to international standards.

Gastro-intestinal complications following coronary artery bypass graft surgery- a retrospective study

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Background: Gastro-intestinal complications following coronary surgery are less common but high morbidity and mortality- the incidence, pattern and outcome of this complication were evaluated.

Methods: We revived retrospectively 2310 consecutive patients undergoing coronary revascularization between January 2003 to June 2006. Gastro-intestinal complications were evaluated clinically, biochemical parameters, and diagnostic interventions by endoscopy, laparoscopy and laparotomy and various patients parateters, preoperative morbidities, cardiopulmonary bypass and aortic cross-clamp time and IABP support were taken into consideration. Screening of preoperative morbid factors like systemic disorders were evaluated.

Results: Analysis showed 4.84% of patients had gastro-intestinal bleed within a month of surgery. Out of these 76 patients were on aspirin. 31 patients had major gastro-intestinal complication of which 26 had severe upper gastro-intestinal haemorrhage, 2 each suffered

from pancreatitis and bowel infarction and one had peptic perforation. 7 of 31 patients underwent laparotomy. There was mortality of 8 patients. Risk factors analysis showed increased incidence of gastro-intestinal haemorrhage in patients with low cardiac output requiring prolonged mechanical ventilation. Other contributory factors are elderly, past history of gastro-intestinal ulceration and NSAID intake and patients on pump.

Conclusion: Gastro-intestinal bleeding following isolated coronary artery bypass grafting surgery requires extreme clinical vigilance and timely active intervention for better outcome. Early diagnosis and timely therapeutic interventions appear to be the most effective means for improving the poor outcome of gastro-intestinal complications.

Surgical revascularisation for acute myocardial infarction in a 11 year old child

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Background: Coronary artery bypass grafting in the paediatric age group is a rarity and to the best of our knowledge it is sparsely reported in literature.

Methods: In the setting of a tertiary referral centre of cardiac care in eastern India. Herein we report an unusual and rare case of a 11-year-old girl admitted with severe chest pain and an episode of black out. Preliminary echocardiography revealed decreased ejection fraction with the suspicion of a coronary artery abnormality. ECG and blood reports were indicative of severe myocardial damage. After initial stabilization, coronary artery angiogram, revealed a diseased left main coronary artery with 90% blockade. Screening for possible systemic disorders were inconclusive. The following day, she underwent a coronary artery bypass grafting surgery and supported on mechanical ventilation and inotropes, which were decreased gradually.

Results: She recuperated gradually in the ITU and was shifted to the ward later. Her cardiac function and exercise capacity has improved markedly.

Conclusion: Coronary artery bypass grafting in a setting of acute myocardial infarction with ongoing myocardial damage is an extremely risky procedure and demands a high level of competence from the surgical and the medical point of view. The importance of this case lies in the fact that a proper diagnosis of such a rare entity was made in time and dealt actively on a fast track basis.

Results of free right gastroepiploic artery T grafts

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Background: To determine the safety and effectiveness of the free RGEA conduit for coronary artery bypass grafting with a proximal T anastomosis.

Methods: All patient data were obtained from prospectively collected data and the medical records reviewed. Follow up was undertaken by telephone questionnaire to cardiologists and local doctors.

Results: Between November 1996 and July 2004, 19 patients underwent coronary artery bypass surgery without concomitant valve surgery using a free RGEA T graft. There were 17 males and 2 females and the mean age was 54 years. The mean LV ejection fraction was

46%. Three patients had renal transplants, seven patients underwent redo surgery and 3 patients required coronary endarterectomy for severe disease. In 12 patients the radial artery was considered unsuitable for use. There were no perioperative deaths. At the time of follow up (mean 50 months), there had been 3 late deaths and 4 patients had undergone repeat coronary angiography for investigation of angina. The RGEA was widely patent in 3 patients and exhibited a string sign in the fourth.

Conclusion: Free RGEA T grafts appear safe and reasonably effective in a high risk subgroup of young patients.

Left ventriculoplasty with septal exclusion to preserve left ventricular geometry in patients of anteroseptal dyskinesia

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Background: Extensive myocardial infarction leads to adverse remodeling of left ventricle and subsequent heart failure. Surgical intervention by excluding the dyskinetic septum and part of anterior wall with a patch may halt the process and even reverse it by restoring the shape of the ventricle and improving remodeling forces. We have adopted this procedure since 2003 and have been encouraged with the initial experience.

Methods: 49 patients with anteroseptal dyskinesia following myocardial infarction underwent left ventriculoplasty by septal exclusion with a patch and associated coronary artery bypass grafting between Feb 2003 and June 2006. The patch excludes the healthy myocardium from scarred tissue and leads to remodeling of the ventricle subsequently improving the overall contractile forces of the myocardium.

Results: The average age of the patients was 60 years. The ejection fraction varied from 20-45% (mean 29.3). Majority (89.8%) of patients were male. 18.4% presented with CHF. 35% of patients presented in NYHA class III/IV. 12% patients required preoperative IABP for hemodynamic instability of CHF. Average ICU & hospital stay was 5 and 11 days respectively. In hospital mortality was 10%. Follow up was from 1 to 36 months. EF improved to 35% from 28.5%. Most of the patients (93%) improved to NYHA class I/II. 4% required readmission for CHF and AICD implantation. One patient was lost because of ventricular fibrillation at three months.

Conclusion: Ventriculoplasty by septal exclusion primarily results in remodeling of the compromised ventricle and subsequently improves the ventricular contractile forces thereby improving the clinical and hemodynamic presentation of the patient with acceptable morbidity and mortality. However, this is a novel procedure with gratifying results and requires acceptance by larger group of surgeons.

Primary and reoperative off pump CABG via alternative approaches without sternotomy: 11 year experience

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Background: Off-pump coronary artery bypass is commonly performed through a full median sternotomy, however the tendency to reduce surgical trauma has prompted cardiac surgeons to use less invasive technique. Conventional coronary bypass surgery is associated with substantial morbidity caused by cardiopulmonary bypass (CPB) and median sternotomy. We report here 602 consecutive

patients who underwent complete myocardial revascularisation on beating heart through alternative approaches without sternotomy.

Methods: From January 1995 to July 2006, 602 patients (75.7% male, mean age 58±10 years) underwent complete revascularisation using alternative approaches without sternotomy. Total 544 (90.4%) cases were from primary CABG and 58 (9.6%) for redo CABG. 56 (9.3%) patients had low ejection fraction, 346 (57.5%) previous myocardial infarct. Approach which we have used is Mini thoracotomy in 592 (98.3%) cases, posterolateral thoracotomy in 9 (1.5%) cases & combined approach (subxiphoid and ant. Thoracotomy in one case). We used posterolateral thoracotomy for obtuse marginal artery grafting.

Results: Complete revascularisation was achieved in all patients (mean number of graft 1.3±1). There were only 3 (.5%) mortality, 2 due to renal failure and one due to gallstone induced pancreatitis. We did not observe any instance of stroke, wound complication or perioperative myocardial infarction. Morbidity included reoperation for bleeding 5 (.8%) cases, atrial fibrillation 32 (5.3%) cases, prolonged ventilation 23 (3.8%) cases. On table assessment of coronary anastomoses was done and all grafts were patent. Robotic system (Davinci) was used to harvest bilateral Internal Mammary artery in 45 (7.5%) cases. There was no conversion to CPB. 448 (74.4%) patients were discharged on 6th day.

Conclusion: Complete revascularisation on beating heart through various approaches is safe and offers good result. Total arterial revascularisation is possible by using both Internal Mammary artery harvested with help of Robotic system (Davinci)

Total arterial revascularization for reoperative coronary artery bypass grafting: Is there any advantage?

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Background: Total Arterial Revascularization (TAR) during primary coronary artery bypass grafting (CABG) has better mid to long term results than venous conduits. We sought to evaluate the technical feasibility and results of TAR during reoperative CABG.

Methods: From October 1999 to June 2006, 148 consecutive patients underwent Redo CABG. Of these 114 (77%) patients had TAR. Venous conduits were needed in 34 patients due to lack of suitable arterial conduits. However, since January 2005, all redo CABG's have had TAR.

Results: The overall 30-day mortality was 2.7% (4/148). All patients were done off pump and there were no conversions to on pump. Intra-aortic balloon pump was inserted intraoperatively in 3 patients (2%). Other complications noted were: stroke in 1 patient (0.67%); renal dysfunction in 3 patients (2%) of which 1 patient needed temporary dialysis; and atrial fibrillation in 15 (10.1%). One patient (0.67%) was re-explored for bleeding. The mean length of ICU stay was 3 days and mean length of hospital stay was 8 days.

Conclusion: Redo CABG can be performed safely using TAR using standardized off pump technique. Early results are encouraging and it is anticipated that these patients will have improved mid to long term survival.

OPCAB in septu and Octogenarians

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Background: Onpump GABG is associated with a high incidence of neurocognitive, embolic and renal complications apart from the coagulation abnormalities, especially in the geriatric patients. OPCAB has been found to have a lesser incidence of these complications in various studies.

Methods: Retrospective analysis of 352 patients who underwent OPCAB between January 2001 and June 2006 was done. The male – female ratio was 8.8:1 and the age group ranged from 71 to 92 years (71 years to 80 years 334 pts, >80 years-18pts). In all patients, octopus tissue stabilizer and intra-coronary shunt were used for construction of distal anastomosis. The average number of grafts was 3.3 and it ranged from one to six. LIMA was used in 76% of cases.

Results: There was no mortality. 2 patients had stroke, 4 had renal failure (all had preoperative elevated renal parameters) and 2 required prolonged ventilatory support in the postoperative period. 2 patients required re-exploration for bleeding. The mean ICU stay was 3 days and the mean hospital stay was 10 days.

Conclusion: In elderly patients who have limited organ reserve, avoiding CPB with its direct and indirect physiological insults, lesser incidence of various subsystem complications and the prospect of improved clinical outcomes makes OPCAB the obvious choice in this subset of patients. The partial clamping of aorta for the construction of proximal anastomosis is a cause for concern.

Coronary stent removal in patients with in-stent restenosis

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Background: In-stent restenosis (ISR) remains the major limitation of coronary stent implantation. Controversies exist regarding optional treatment for ISR. Recently, we developed aggressive surgical options, stent removal, with or without coronary endarterectomy in this complex setting.

Methods: Between April 2004 and Sep 2006, 14 patients who had angiographically proven severe ISR were treated with stent removal and additional procedures. 5 patients underwent OPCAB with stent removal. 9 patients underwent surgical ventricular restoration with coronary bypass grafting and stent removal. There were 13 men and 1 woman. The age ranged from 38 to 75 years. In the OPCAB group, one patient had LAD, RCA and LCX stent removal, two patients had LAD and LCX stent removal, and two patients had LAD stent removal. In the SVR group all patients had LAD stent removal with CABG.

Results: In the OPCAB group LIMA was used for LAD and SVG for other vessels. In SVR group LIMA, SVG composite graft was used for LAD in young patients and SVG for others. Stent removal and grafting was done in arrested heart and SVR in empty beating heart. Five patients had thrombus and nine fibrous tissue inside the stent. There was no mortality. The mean ICU and hospital stays were comparable to nonstent removal patients.

Conclusion: Coronary stent removal with or without endarterectomy and additional procedures is a safe and effective technique used in patients with ISR.

Beating heart coronary bypass in patients with pulmonary hypertension

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Background: Coronary revascularization has always been an extremely challenging operation in patients in cardiogenic shock and/or raised pulmonary pressures. Earlier, the operation was deferred for 3-4 weeks in patients with acute infarcts to stabilize hemodynamics, but with unsatisfactory results. In patients with low ejection fractions and pulmonary hypertension, surgery was usually denied. With beating heart surgery, a new possibility has opened to treat this group of patients. To study the mortality and morbidity of on pump beating heart CABG in patients having acute myocardial infarction and or pulmonary hypertension due to low ejection fraction.

Methods: The study included 54 patients who presented over a period of 58 months with acute myocardial infarction and or low ejection fraction and pulmonary hypertension. All the patients had refractory angina at rest with STT changes. Coronary angiography revealed triple vessel disease (95%), left main disease (4%) and double vessel disease (1%) not amenable to stenting. Six (17%) patients were on an IABP preoperatively. All 54 patients had pre induction systolic pulmonary artery pressures above 50 mm hg. These patients had their CABG on CPB with normothermia or more recently off pump. All patients had LIMA grafts. Radial arterial grafts were done on 27 (50%), while the rest had vein grafts. These patients were weaned off CPB with high inotropic support with an IABP.

Results: There was no intra-operative mortality. All patients were electively ventilated for 48 hours. Eight patients (14%) required ventilation between 2-6 days and 6 patients (11%) required prolonged ventilation (>7 days). Mild to moderate renal dysfunction was seen in 16 (30%) and three patients needed hemodialysis. The overall mortality rate was 7/54 (13%).

Conclusion: Beating heart CABG is a safe & effective option for patients in cardiogenic shock after AMI with refractory rest angina and in patients with low ejection fractions and pulmonary hypertension.

Do angiographic results from symptom-directed studies reflect true graft patency?

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Background: Coronary artery graft patency results have been obtained from repeat angiograms in patients who presented with evidence of ischemia. The purpose of this study is to compare protocol-directed angiographic results from a randomized clinical trial with symptom-directed angiography in nontrial patients.

Methods: Repeat angiography after primary isolated coronary artery bypass grafting was performed in 337 of 2,259 patients between July 1996 and September 2004. Patients were divided into two groups: 596 graft angiograms in 192 trial patients were compared with 389 graft angiograms in 142 nontrial patients. The mean interval from surgery was 1,306±800 days versus 1,119±777 days, respectively. Grafting techniques were similar in both groups except that the right internal thoracic artery was used almost exclusively as a free graft in the trial patients. Angiographic outcomes were defined as patent (stenosis <80%) or failure (stenosis ≥ 80%, occlusion, or the string sign). Comparisons of trial versus nontrial grafts were made using a generalized mixed model. Five year estimates of graft patency were made using survival analyses accounting for interval censoring.

Results: The odds ratio for graft failure for nontrial compared with trial patient grafts was 2.6(95% confidence interval, 1.6 to 4.3; $p<0.001$). Cumulative patency estimates for all grafts at 5 years were trial 91% versus nontrial 83%, $p=0.004$. Five-year estimates for individual conduits were left internal thoracic artery, 99% versus 92%, $p=0.002$; right internal thoracic artery, 86% versus 87%, $p=0.8$; radial artery, 87% versus 86%, $p=0.6$; and saphenous vein, 86% versus 56%, $p=0.003$.

Conclusions: Graft patency rates were superior in the trial compared with nontrial patients. Symptom-directed graft failure rates were approximately double those of trial patients.

Characteristics of patients younger than 40 years of age and the results of coronary artery bypass grafting

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Background: An increasing number of young adults (< 40 years) are affected by coronary artery disease representing an interaction between modern lifestyle, stress, co-morbidities & of course genetics. We report our experience of coronary artery bypass surgery in young adults.

Methods: Between Jan 2000 to June 2006, 146 patients <40 years of age underwent coronary artery bypass grafting. The demographic, clinical, angiographic and operative data was analyzed. Study included 145 men and 1 woman. Mean age was 37 years with a range of 24 to 39 years. Risk factors were essential hypertension in 67 (45.9%), cigarette smoking & tobacco consumption 85(58.2%), dyslipidemia 50(34.2%), obesity (BMI>27%) in 41 (28.1), diabetes 26 (17.8%) and family history in 28 patients (19.2%). There was history of previous MI in 21(14.3%) and recent (<3 weeks) MI in 60 (41.1%). A total of 128 patients (87.6%) had presented with acute coronary syndrome (ACS). Coronary artery angiography revealed left main disease in 7 (4.7%), triple vessel disease (TVD) in 81 (55.5%), double vessel disease (DVD) in 41 (28.1%) and single vessel disease (SVD) in 24(16.4%). Arterial conduits were obvious choice in this subset of patients.

Results: Left internal mammary artery (LIMA) was used in 144 (98.6%) of the patients, bilateral IMA in 6 patients. Other preferred conduits were radial artery in 114(78.1%), bilateral radial artery in 18 patients, right gastroepiploic artery (RGEA) in 5 (3.4%) & reversed saphenous vein graft (RSVG) in 24 (16.4%). Total arterial revascularisation (TAR) was performed in 122(83.5%) patients. The average numbers of grafts were 3.2/patient. IABP support was required in 5 patients. Five patients had deep wound infection & 8 had minor pulmonary complication. The hospital stay of the patient ranged from 6-14 days with mean of 6.5 days. There was no hospital mortality. Follow up was complete for 128(87.6%) of the patients for duration of 8 to 48 months. There was recurrence of symptoms in three patients but no late mortality.

Conclusion: Coronary artery disease in young is essentially a disease of male sex and the commonest presentation is ACS. Use of arterial grafts and Off Pump TAR is recommended with no detrimental influence on early post operative mortality or morbidity.

Post infarct VSD

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Background: Post infarct VSD results in an operative mortality of 25-40%. Early surgery significantly improves survival. We present 7 cases operated at Asian Heart Institute.

Methods: Between January 2004 and September 2006, 7 patients were operated at Asian Heart Institute with Post Infarction VSD. One of these was for Residual VSD from a previous operation. During surgery revascularization was done off pump and VSD closure on CPB in all patients.

Results: There was 1 mortality (14.28%). The ICU stay varied between 5 and 15 (Average 8 days). All patients required IABP support. All patient required inotropic support.

Conclusion: Post infarct VSD operated on early, before haemodynamic compromise and subsystem results in good survival. A judicious use of Off pump and on Pump surgery decreases morbidity and mortality.

Early and late results of on pump CABG in postinfarction period

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Background: Indications and results of CABG after acute myocardial infarction

Methods: Retrospective analysis of short term and late results in 19 patients after on pump CABG for acute myocardial infarction (Troponin-T elevation above 99th percentile of normal, ECG changes) was performed. All the patients were initially thrombolysed and were on antiplatelet therapy. There were 15 male and 4 female patients in the age group of 41 to 75. Surgery was done in 24 hrs (n4), 24-96 hrs (n8) and 4 days to 14 days (n7) postinfarction. Indication was hemodynamic instability in 7, unstable angina in 8, Recurrent ventricular tachycardia in 3 and Ventricular septal rupture in 1. IABP was used in 8 patients and Aprotinin in 12. 17 patients had triple vessel disease (7 left main), all had LAD involvement. 18 patients received 1 arterial conduit (LIMA to LAD). There were 4.5±1.02 distal grafts. Average Pre-op LV size was 54 mm systolic (23-59) and 38.5 diastolic (34-45)

Results: Postoperative stay was 3-6 days and IABP was removed 16 to 28 hrs. Average Blood loss was 340 ml (230-450) in Aprotinin group against 960 ml (640-1300) in the rest. There was 1 (Sepsis, LV rupture) early and 2 (LV aneurysm, DCM) late mortality. On regular out patient follow-up (30 days to 16 months) the rest are in NYHA class 1(7), Class 2 DOE(9) with no angina. LV size showed reduction in size in 13 patients after 9 months follow-up.

Conclusion: CABG during early postinfarction period should be for definite indications. Aggressive use of Aprotinin and IABP is recommended.

Early results of CABG in women-experience at a rural centre

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Background: With the increasing incidence of coronary artery disease in women proportionately CABG is also on rise among them

It has been always contested that the surgical results are worse in females as compared to males.

Methods: We conducted a study on our patients undergoing CABG between the periods of February 2004 to May 2006. 357 patients were operated for CABG, 314 of these patients were males and 43 were females. Average age for the female patients was 62.63 years, which was significantly higher than their male counterparts (59.17 years). Male population had more diabetes 92.35% (290/314) as compared to the females 76.74% (33/43). Incidence of hypertension was also less in female patients. Incidence of angina was more in male where as incidence of MI was more in females.

Result: Operative parameters were almost similar in both the groups. Early hospital mortality was higher in females 6.97% and 3.5% respectively. Two of three female patients which expired were because of mediastinitis. ICU stay was similar in both groups (2.34/2.41 days). But hospital stay was prolonged in female patients (8.45 days/7.37 days). All the female patients who underwent endarterectomy developed Atrial fibrillation postoperatively (5/5) whereas only 57.69% of male patients had Atrial fibrillation after endarterectomy.

Conclusion: From our study we observed that female patients coming for CABG are more aged than male. Angina was less frequent in females but incidence of MI was more. Hospital stay is prolonged and incidence of mediastinitis is higher in females.

CABG in elderly – Our experience

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Background: We have been working in a rural set-up in Kerala, where average life expectancy is about 74 years; hence the number of patient coming for CABG above 70 years of age is also increasing. It has always been argued that this elderly population has more complication rates as compared to its younger counterparts.

Methods: We had 357 CABG (Group A) patients from February 2004 to May 2006 out of which 31 (Group B) of patients were of age 70 years or more. Average age in group A was 59.2 years, whereas in Group B it was 72.9 years. 43 (13.7%) patients were females in Group A in which 14.9% female were in elderly age group. In both the groups, majority of the patients had angina. Dyspnoea was present in 14.5% (52/357) and 45.2% (14/31) patients. Moderate to severe LV dysfunction was present in 5 elderly patients (16.1%) as compared to 30 patients in overall patient population which constitutes 8.1 of the total patients taken for CABG 83.9% (26) patients of group B had triple vessel disease as compared to 221 patients (61.9%) of group A. 5 patients (16.1%) underwent endarterectomy in group B whereas 31 patients (8%) had endarterectomy in group A. Recovery period in ICU and hospital stay were about similar in both the groups. Average ventilation period was also similar (12.35/12.85 hrs) in both the groups. 9 patients (29%) of group B developed Atrial fibrillation as compared to 69 patients (16.5%) in group A. No one expired in group B as compared to 14 patients (3.9%) in group A.

Conclusion: We observed that elderly patients over age of 70 years do have almost same morbidity and complication except Atrial fibrillation, incidence of which is significantly higher in septagenarians.

Coronary artery surgery in a rural set-up

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Background: Our centre is one of the very few tertiary cardiac care centers working from a rural area. Performing open heart surgery in a rural set up has been quite challenging but interesting. we have seen that the patients here are more healthy even in their seventies and eighties.

Methods: Since its inception in February 2004 till May 2006 we have operated 587 patients for various types of heart diseases. 357 were operated for coronary artery diseases whereas 66 valve operations and 64 operations for congenital heart diseases have been performed. We operated 31 patients for CABG above the age of 70 years; percentage of female patients for CABG was only 12.1%. Majority of the patients had Triple vessel disease (221/357). 128 patients had recent MI whereas 93 patients had history of MI. Mean number of grafts was 3.34 with 106 patients received 5 or more grafts. Cross clamp time and CPB time 57.54 min and 112.5 min respectively.

Result: Moderate inotropic support was required for 86 patients and 8 patients required IABP support. ICU stay was an average of 2.35 days and the mean hospital stay was 7.2 days. Early mortality was 3.9% (14) which included 3 deaths for mediastinitis.

Conclusion: We can very well conclude that open heart surgeries are possible in rural set up with equally good results as at any centre in cities. Although the difficulties faced by medical and paramedical staff in terms of logistic support and infrastructure still remain a bottleneck.

Coronary endarterectomy: Does it increase the morbidity and mortality when compared with coronary artery bypass grafting

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Background: There is a common belief that endarterectomy associated with coronary artery bypass surgery has a high morbidity and mortality. Most surgeons are reluctant to do endarterectomy even in indicated cases and hence accept incomplete revascularization and risk of persisting symptoms after CABG. We aimed to examine the impact of Coronary Endarterectomy (CE) performed in association with CABG compared with CABG alone in our unit.

Methods: A total of 357 patients underwent CABG between February 2004 to August 2006. Among those 31 patients (8.68%) underwent Coronary Endarterectomy. Out of 31 patients 27 were male (87.09%) and 4 were female (12.91%). 25 patients had single vessel endarterectomy (80.6%), 5 patients had double vessel endarterectomy (16.12%) and one patient had triple vessel endarterectomy (3.22%). Two methods of endarterectomy were used depending upon the circumstances. One method was conventional (Pull through method) pull out atheroma after making a small arteriotomy and other method was endarterectomy with long arteriotomy and onlay patch bypass grafting (Open Method). Methods of CPB and bypass grafting were standard in both the groups.

Results: We had three early postoperative mortality due to low cardiac output in two and massive bleeding diathesis (DIS) in one. All three were females. Atrial Fibrillation was observed as most common complication associated with endarterectomy. ICU and hospital stay in both the groups were almost same.

Conclusion: Despite the presence of diffuse coronary artery disease, CABG with Coronary Endarterectomy offers excellent results with low hospital mortality and morbidity and offers complete revascularization.

Grafts used for coronary artery bypass and their mechanical behaviour

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Background: This experimental study compares the mechanical behaviour of different blood vessels used for myocardial revascularization and their clinical implications on graft success.

Methods: Segments of internal mammary artery (n=2), radial artery (n=4) and saphenous vein (n=4) were obtained from healthy multiorgan donors (age=23.7±13.4 years) after systemic heparinization. The in-vivo length of each vessel was made before excision. Tubular segments 50 mm long were cut out and maintained in saline serum solution at 4°C. Mechanical tests were performed within 24 hours after excision. In vitro pressure-diameter tests in physiological conditions (in vivo length and 37°C) were carried out to characterize their mechanical properties. Histological analysis were performed on 5mm edge portions of the vessels to control their structure and condition.

Results: Pressure-diameter curves of arteries and veins display a remarkable increase in stiffness for pressures over their corresponding physiological range (60-120 mmHg for mammary and radial arteries, and ~20mmHg for saphenous vein). This fact allows arterial-type grafts for coronary revascularization to be compliant enough during the cardiac cycle since their operating pressures are similar. On the other hand, the low transition pressure for saphenous grafts results in a stiffer response when used as a substitute for coronary arteries, and usually the vessel tend to bend if unrestrained.

Conclusions: From a mechanical point of view, the behavior of mammary and radial grafts matches closely the working conditions of coronary arteries. On the contrary, at these pressure levels saphenous veins behave as stiff conduits, rendering suboptimal results.

Beating heart surgery (no aortic cross clamp) on cardiopulmonary bypass – Comparison with arrested heart surgery

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Background: Commonly Open heart surgery on CP Bypass is done on arrested heart using potassium cardioplegia after aortic cross clamp. It provides good exposure and blood less operative area (relatively). But aortic cross clamp and cardioplegia has major disadvantages like myocardial ischemia and reperfusion injury. Longer the cross clamp time higher the mortality and morbidity in open heart surgery. Beating heart surgery without aorta cross clamp avoids these problems.

Methods: Between Sept. 2005 to Oct 2006, 100 patients between age of 2 years to 50 years undergoing open heart surgery for Congenital heart disease (ASD & VSD) and Rheumatic valvular heart surgery (Mitral & Tricuspid) were divided into two groups. In Gp I heart was kept beating during CP Bypass, aorta was not cross clamped and no cardioplegia was used, patient's temp was kept around 35°C. In Gp.II after CP Bypass was started patient's temp was lowered to 28-30 C, aorta was cross clamped and pot. cardioplegia was given.

Results: CK-MB, +ve Trop T test and lactate levels in coronary sinus were lower in Gr I (beating heart). CPB time, Inotropic requirement, PO blood loss, PO ventilation time was less in Gp I. Myocardial O₂ extraction ratio was better in Gp I indicating better myocardial performance. Mortality was higher in Gr II (arrested heart) 4% versus nil in Gr I (beating heart). No air embolism happened in any group.

Conclusion: Beating heart open heart surgery on CP Bypass has number of advantages and is more physiological to the heart and patient. It avoids myocardial ischemia and reperfusion injury thereby reducing the post operative mortality and other systemic complications.

Off-pump coronary artery bypass grafting in patients with significant left ventricular dysfunction

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Background: Patients presenting with severe left ventricular dysfunction undergoing coronary artery bypass grafting are at higher risk of postoperative morbidity and mortality following CABG. Off-pump CABG is known to preserve left ventricular function better than conventional CABG. This study was carried out to investigate the safety, feasibility and efficacy of off-pump coronary artery bypass grafting (OPCAB) in patients with significant left ventricular dysfunction.

Methods: Three hundred and thirty nine consecutive patients with preoperative left ventricular ejection fraction $\leq 39\%$ who underwent CABG by our team between February 2000-October 2006 were included in this retrospective study. One hundred and seventy one patients were operated by off-pump technique (group I) were compared to 169 patients who were operated by on-pump technique (CCABG) (group II). Data on patient demographics, preoperative risk factors, postoperative outcomes were collected on all patients. Age ranged from 32-84 years (mean 53.16 ± 12.48 yrs). Of these, 174 (53%) patients were diabetics, 311 (92%) patients had documented prior myocardial infarction, 280 (82%) patients were in CCS class III and 41 (12%) patients were in class IV, significant LMCA stenosis was present in 48 (14%) patients.

Results: Number of grafts per patient in group I was 3.2 ± 0.8 vs group II 3.4 ± 0.7 ($P < 0.05$), but index of completeness of revascularization was 1.00 ± 0.02 (OPCB) vs 1.02 ± 0.07 CCABG ($p = 0.60$) LIMA was anastomosed to LAD in 98% of patients Operative mortality was 1.75% (3 deaths) following OPCAB vs 3.55% (6 deaths) following CCABG (p=ns). Postoperative usage of IABP support was higher in CCABG group (12 patients vs 4 patients: $P < 0.05$) and usage of moderate doses of inotropic support was higher in CCABG ($P < 0.001$). Lower incidence of postoperative renal insufficiency ($P < 0.001$) and atrial fibrillation ($P < 0.01$) was observed in off-pump group.

Conclusion: Off-pump coronary artery bypass grafting is feasible and safe in patients with depressed left ventricular function and the postoperative morbidity and mortality is less compared to on-pump group.

Intraoperative autotransfusion in OPCAB surgery using an indigenous circuit – A comparative analysis using a control group

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Background: The aim of this study was to ascertain whether a new indigenous system of intra operative shed blood salvage and autotransfusion during off pump CABG is associated with a significant reduction in the use of homologous blood, a clinically significant derangement of postoperative clotting profiles and decreased post operative blood loss.

Methods: This was a prospective study of 123 consecutive patients undergoing Off Pump CABG at Jehangir Hospital, Pune between 1st March 2006 and 15th Oct 2006. Intraoperative autotransfusion was used in 58 (47%) cases. The rest were used as a control group. Pre, intra and post operative hematological and renal parameters were studied in all. Intra and post operative homologous blood transfusion requirements and post operative chest tube drainage in both the groups were compared.

Results: There was no statistical difference in either group in terms of demographics, comorbidity, risk stratification, or operative details. Mean volume of blood autotransfused was 550 ± 113 mL. Patients in the autotransfusion group were significantly less likely to receive a homologous blood transfusion as compared with controls (odds ratio 0.04, 95% confidence interval [CI] 0.22-0.71) and received significantly fewer units of blood per patient compared with controls (0.43 ± 1.5 vs 0.90 ± 0.0 U, $p = 0.02$). There was significant reduction of postoperative blood loss in the autotransfusion group ($p = 0.05$). There was no difference in other blood product requirements, or in the incidence of adverse clinical events ($p = NS$ X^2). Intraoperative autotransfusion improved and maintained the haematocrit and platelet count as compared to control group.

Conclusion: This new indigenous method of blood salvage is cost effective, safe and has reduced homologous blood usage.

Towards total off pump multi vessel arterial coronary artery bypass grafting: A review of our experience with 1586 patients

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Aim: To study the long term results of off pump CABG in Indian private practice setting.

Methods: This was a prospective study of 1586 patients who underwent off pump multi vessel arterial revascularisation between January 1998 to October 2006. All patients had left internal mammary grafts and sequential grafts for the lateral/posterior wall with the radial artery as the second conduit in most of the patients. If the radial artery was unusable, a RIMA, gastroepiploic/IEA was used. All vessels were grafted with intracoronary shunts in place and flows were checked with a flowmeter in the last 256 cases. Patients were followed up at intervals of 3 months in the first year & annually thereafter.

Results: The overall mortality rate was 1.4% (25/1586). Endarterectomies were required in 14 patients (0.8%), 5 patients (0.3%) required conversion to CPB after 1-2 grafts and perioperative MI (CPKMB > 50) was seen in 42 cases (2.6%). At 6 months, 1190 (74%) were subjected to a TMT. Of these patients 1071 (67%) patients had a negative stress test. Of the 119 (7.5%) positives 101 (85%) had the test positive at moderate/high workloads & 18 (15%) had it positive at low workloads. The patients in the last category had a repeat angiogram, of which 3 required stenting, 1 required a redo CABG, while the rest were managed medically due to diffuse disease. 222 (14%) patients were lost to follow up.

Conclusion: Total off pump multi vessel arterial coronary revascularisation can be safely performed with good long term results.

Off pump or on pump beating heart CABG: Surgeon's choice

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Background: The performance of coronary bypass surgery without cardiopulmonary bypass ("off pump") may reduce perioperative morbidity and cost.

Methods: The symptoms and angiograms of all the patients (n=178) scheduled for coronary artery bypass grafting (CABG) were analyzed. The final decision was taken to perform the off pump CABG or on pump beating heart CABG by different surgeons mainly based of inspection of coronary vessels and their comfort level of the 178 patients included, 93 were operated on pump and 85 underwent off pump CABG. All the demographic, operative and postoperative data were prospectively collected & analyzed.

Results: All the preoperative variables were similar in both the groups. In operative details we found that the use of arterial grafts, saphenous venous grafts, average number of grafts per patients or duration of surgery was not influenced by the techniques. In 4 cases off pump was converted to on pump procedures due to haemodynamic instability. In postoperative variables, there were no major difference in duration of ventilation, inotrope usage, renal dysfunction and neurological problems, mortality between off and on-pump beating heart CABG, but bleeding complications, use of blood products, ICU stays, hospital stays, mediastinal infection is slightly more in on-pump beating heart CABG than off pump CABG.

Conclusion: Both the off pump and on pump beating heart CABG procedures usually result in excellent outcomes and neither should be judged to be inferior to the other. The choice of procedure should depend on the comfort level of the surgeon performing the procedure, seems equally effective.

Benefits of immediate off pump revascularization in patients with critical coronary occlusion

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Background: Immediate revascularization in patients with critical occlusion of coronaries not suitable for PTCA, prevents infarction in hibernating myocardium. We present our results with off pump revascularization in patients needing immediate intervention for on going angina, hemodynamic instability or intractable arrhythmias.

Methods: Between December 2004 to September 2006, 189 patients (Age range 31-86 years) with acute coronary occlusion had immediate off pump surgical revascularization (within three hours of coronary angiogram). 17 patients (9%) presented in 8 hours of onset of symptoms, 61 (32.3%) in 8 to 48 hours, 73 (38.6%) in 48 to 72 hours and 38 (20.1%) within 1 week. 76 patients (40.2%) were in NYHA Class III with associated, co-morbidities: diabetes 100 (52.9%), hypertension 101 (53.4%) significant carotid occlusion 46 (24.3%), COAD 30 (15.9%) and Left Main disease 18(9.5%).

Results: IABP was inserted in 11(5.8%) and mean no. of grafts was 2.91±1.6. Mean duration of surgery was 4.1±0.87 hours, drainage 388.37±45.84ml, mean ventilation time 14.1±0.94 hours and ICU stay 3.97±0.24 days. Perioperative arrhythmias, renal failure and IABP use was more in patients with high troponin I levels (>25mg/ml) and low EF. Improvement in LVEF after 7 days was 10.4±3.6%. Mortality were

7 (cause: renal failure-4, multiorgan failure-1, septicemia-1 and intractable ventricular arrhythmias-1).

Conclusion: Immediate off pump revascularization in acute critical coronary occlusion is safe. This salvages hibernating myocardium, improves LV function and is life saving in hemodynamically unstable patients.

Ischemic heart failure-Does off pump revascularisation improve outcome

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Background: Coronary artery disease is leading cause of heart failure. Options of transplant/ventricular assist devices are beyond our reach. Ventricular restoration and valve repair have high morbidity. We present outcome with off pump revascularisation of hibernating myocardium in such patients.

Methods: Between January 2005 to August 2006, among 1420 patients having off pump revascularisation, 217 had LVEF <35% (<25% n=33(Group-A), 26-35% n=184 (Group-B)). Majority were NYHA Class III (Group-A 75.8%, Group-B 78.8%) had associated hypertension (Group-A 40.3%, Group-B 53.3%), Diabetes (Group-A 30.3%, Group-B 50%), COAD (Group-A 9.1%, Group-B 1.9%), triple vessel disease 93.3% (Group-A) and 77.7% (Group-B). Mechanical stabilization, intracoronary shunts and starfish elevator was used to facilitate anastomosis. LITA was used in 27% in Group-A and 45% in Group-B apart from Saphenous vein grafts.

Results: Mean no. of grafts was 2.77±0.76 (Group-A) and 2.7±0.67 (Group-B). IABP was required in 31 patients. Mean surgical duration and ventilation time were comparable in both groups but ICU stay longer (5.4±2.7 vs 4.6±2.4 days) and ventricular arrhythmias more frequent (4.9% vs 2.1%) in Group-A. Renal dysfunction occurred in 13 patients, 3 required hemodialysis. Mortality were 2, in Group-A (6.1%) and 4 in Group-B (2.3%). Majority were NYHA Class II in follow up and improvement in LVEF was 8.6±2.4%.

Conclusion: Off pump revascularization provides symptomatic relief to avoid transplant/VAD in ischemic heart failure. Although morbidity and mortality is more when LVEF < 25% but is not alarming.

Bilateral internal thoracic artery harvesting- Anatomical variations to be considered

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Background: Predictable intrathoracic course, anatomical proximity to heart and long-term patency has made ITA a conduit of choice in CABG. Its frequent bilateral use has necessitated the need to have a comparative knowledge of surgical anatomy of ITA on both sides.

Methods: A random study was conducted on 100 adult human cadavers. Sternocostal wall was removed and fixed in 10% formalin and dissected for detailed anatomy of ITA. All observations were expressed as mean±2SD and appropriate statistical analysis conducted.

Results: ITA originated in common trunk with other branches of subclavian artery in 12% on right side and 4% on left. Mean length of right ITA was 20.15±1.22 cm, left 19.83±1.66 cm in 28% of cases where bilateral ITA terminated in 6th ICS. On pattern of origin of sternal branches from ITA 3 groups were observed. Group-I- some sternal branches arising from common of ITA on both sides (24%), Group-II- some sternal branches arising from common branch of ITA on one

sides (54%), Group-III—all sternal branches arising directly from ITA on both sides (22%). Phrenic nerve crossed anterior to ITA on both sides in 52%, posteriorly in 14% and in remaining it crossed anteriorly on one side and posteriorly on other.

Conclusion: Variations in relations to phrenic nerve, level of bifurcation and sternal blood supply must be kept in mind while harvesting bilateral ITA. Risk of sternal dehiscence can be assessed and decreased by preserving the sternal blood supply from common trunk.

Off pump revascularization in diabetics with diffuse coronary disease

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Background: Diabetics have more diffusely involved coronaries, higher incidence of prior MI and LVE. On pump revascularization has high incidence of neuro-cognitive dysfunction and renal impairment. Smaller vessels and diffuse disease makes off pump revascularization a challenging proposition, we present here our results.

Methods: Between January 2005 to August 2006 off pump revascularisation was performed in 488 diabetic patients with diffuse disease. Mean age was 60.9±16.6 years (M:F- 390:98), 67.8% had NYHA Class II symptoms and remaining Class III and 67.2% were hypertensive. Triple vessel disease was present in 85.6% and 5 had Redo-surgery. Ejection fraction was >50% in 152, 35-50% in 240, 26-35% in 87 and less than 25% in 9. Preoperative serum creatinine was >1.5mg/dl in 11.7% and > 2 in 4%. Insulin infusion was used for meticulous control of blood sugar. Parasternal wires were used prophylactically whenever indicated to prevent sternal dehiscence.

Results: Pre-operative IABP was inserted in 13 (2.7%) and per-operative in 34 (7.1%). Mean grafts were 2.92±0.69 and ITA to LAD was preferred. Mean ventilation time was 11.17±6.17 hours, ICU stay 2.8±1.6 days and drainage 341.45±30.11ml. Incidence of supraventricular arrhythmias was 7.6% and ventricular 1.2% Low cardiac output occurred in 2.3%, pneumonias in 0.4% and mortality 1.1%. One had sternal dehiscence and 17 superficial wound infection.

Conclusion: Although diabetics have smaller vessel calibre, diffuse disease and multiple lesions, complete off pump revascularisation can be performed safely to avoid CPB related morbidity.

Management of peripheral vascular disease in presence of coronary artery disease

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Background: Incidence of coronary disease in association with peripheral vascular disease is high and prognosis is worse. Combined revascularization is essential in patients with ischemic symptoms though it further prolongs treatment. We present outcome of combined cardiac and peripheral vascular procedures performed by us.

Methods: Between July 2001 to August 2006, 75 patients with peripheral vascular disease and associated coronary disease had surgery. Cardiac evaluation was done including coronary angiogram in all elective cases. Except for in those patients requiring emergency peripheral vascular procedures, coronary revascularization was done prior to the peripheral intervention. CABG was done in 32 patients, PTCA in 21 and in remaining patients only peripheral vascular procedure was performed while coronary disease was managed medically.

Results: CABG was combined with carotid endarterectomy in 7 patients, femoro- popliteal bypass (2), femoro -femoral bypass (4), femoral pseudoaneurysm repair (4) and renal angioplasty (6). Femoro -popliteal bypass alone was done in 11, and along with carotid to subclavian bypass in 1. Axillo- bifemoral bypass was done in 2 while 14 had only femoral/ popliteal embolectomy. There was no mortality, morbidity was low in all patients, though hospital stay was prolonged 5.2±1.8 days in patients who required CABG. All had successful outcome of the peripheral vascular intervention irrespective of any added cardiac intervention.

Conclusion: Proper cardiac evaluation and appropriate combined treatment should be performed in patients with peripheral disease. This helps in lowering the cardiac morbidity associated with peripheral vascular interventions without any adverse effects.

Off pump CABG in severe left ventricular dysfunction patients

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Background: Coronary Artery disease with poor Left Ventricular function requiring ON PUMP CABG has always been a challenging task. These subset of patients have a poor prognosis when treated medically and they do much better when surgery has been done. Off Pump CABG techniques is known avoid the harmful effects of CPB and reduce organ dysfunction.

Methods: We at our center did a retrospective study and analysed the patients undergoing Off Pump CABG from Jan 2006 to June 2006. During this period 406 patients underwent CABG out of which 40 were with severe LV dysfunction., other risk factors like Diabetes, Systemic Hypertension, history of CVA etc. were not taken into consideration. Most of them had a bout of LV failure or else were NYHA CI IV symptomatic under treatment. Significant Mitral regurgitation was present in 25% of these patients which was left untreated in view of the increased morbidity and mortality and occasionally financial restrictions.

Results: Hospital morbidity and mortality rates were significantly lower. During their post-operative follow up these patients did fairly better with better exercise tolerance and nearly normal work capacity. Though presence of severe MR restrains physical activity.

Conclusion: These retrospective analysis of patients undergoing off pump CABG with Severe LV Dysfunction supports the belief that off pump CABG is effective method to reduce post operative morbidity and organ dysfunction with harmful effects of CPB and cardioplegic arrest. The contributions of reduce blood loss and better fluid management cannot be undermined. All along with other benefits of off pump CABG.

Early outcome after surgical revascularization in patients with severe left ventricular dysfunction

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Background: Medical therapy is associated with poor results in patients with coronary artery disease and severe left ventricular dysfunction. Coronary artery bypass grafting is associated with improved long term survival; however severe ventricular dysfunction is a predictor of mortality in these patients.

Methods: All patients with coronary artery disease and severe left ventricular dysfunction who underwent isolated coronary artery bypass grafting at our institution were included in the analysis. Severe

LV dysfunction was defined as ejection fraction less than 35%. Associated valve and ventricular remodeling procedures were exclusion criteria. A total of 92 patients operated between February 2004 and June 2006 were included in the analysis. Mean age of the patients was 55.9 (range-28-73), there were only five female patients in the entire series.

Results: Mean number of grafts was 3.3 ± 0.937 , 11 patients (11.9%) underwent OPCAB, while the rest underwent conventional surgical revascularization with cardioplegic arrest. There were four hospital deaths (4.3%) all due to low cardiac output and multiorgan failure. 18 patients required IABP support in the immediate postoperative period and three patients were re-explored for bleeding. Hospital and ICU stay was marginally increased in comparison with patients with higher ejection fractions

Conclusion: Complete surgical revascularization with conventional techniques can be achieved in patients with severe left ventricular dysfunction with acceptable mortality and morbidity with judicious use of inotropes, antiarrhythmics and intraortic balloon pump.

Does clopidogrel need to be stopped five days before elective coronary artery bypass grafting?

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Background: It has been conventional to stop Clopidogrel at least five days prior to elective coronary artery bypass grafting. The scientific basis of this practice is however controversial. We analyzed data of patients in whom clopidogrel was stopped less than five days before elective CABG.

Methods: Among patients who underwent CABG at our centre from April 2006 till September 2006, 30 patients were identified who had stopped Clopidogrel for less than five days before surgery (Group I). Another thirty patients who had stopped Clopidogrel for more than five days prior to surgery were randomly selected for comparison (Group II). Data was retrospectively collected from medical records.

Results: Both groups had similar preoperative profiles except that Group I had more patients with left main stem disease (3 vs. 18, $p < 0.05$). The median duration for which Clopidogrel was stopped was 3 days in Group I and 6 days in Group II. Postoperative bleeding and re exploration rates (1 vs. 2, $p = 0.1$) were not significantly different between both the groups. More blood products were transfused in patients in Group II but the difference was not statistically significant. There were no significant differences in the incidence of postoperative MI, wound complications or mortality.

Conclusion: It is safe to perform elective CABG on patients who have stopped Clopidogrel for less than five days.

Profile of coronary artery disease and CABG outcomes in premenopausal females

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Background: Although CAD occurs mostly in people >45 yrs, an increasing number of young women do suffer from CAD warranting CABG both as elective & emergency procedure. To study the disease profile including risk factor prevalence, revascularization strategy & post operative outcomes in these patients.

Methods: Of the total 2238 CABGs done between January 1999 &

August 2006 at SCTIMST, 278 were females. Study cohort included 25 (9%) of 278 female patients. Mean age-40 yrs (3-45yrs) All patients underwent CABG on CPB with majority having LIMA and SVG (84% (21/25)) to target vessels. 16% (4/25) had venous grafts alone. Follow-up period ranged from 3 months - 7 years & included Clinical examination, ECG, Echocardiography and TMT in selected patients.

Results: Risk factors identified were Hypertension 12/25(48%), Diabetes Mellitus 10/25(40%), Familial preponderance 5/25(20%), Aortoarteritis 4/25(16%) & hyperlipidemia 11/25(44%). 32%(8/25) were in NYHA FC2 & 32%(10/25) in NYHA FC3. Coronary involvement-TVD - 32%(8/25), DVD - 28%(7/25) & SVD - 20% (5/25). LMCA disease - 5/25(20) had 3 grafts, 28% (7/25) 4 grafts, 20% (5/25) had 2 grafts & 12% (3/25) had single graft. Functional Class improvement & better effort tolerance was seen in 76% (19/25). 1 patient was lost to follow-up & 2 on antianginal medications.

Inferences: Risk factors are different in these patients and they should be worked up for other comorbid diseases like aortoarteritis, hypothyroidism, hypoestrogenism & hypercoagulability states. Body Mass Index was not identified as an independent risk factor. Post operative bleeding and need for allogenic blood transfusion were lower. Outcome as regards survival is not adversely affected by choice of bypassing conduit.

Simultaneous use of positioners and stabilizers gives better outcomes in off-pump CABG

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Background: The use of positioner (Starfish, Urchin) and stabilizers gives tremendous ease for performing anastomosis in off pump CABG.

Methods: We have performed 490 CABG on beating heart surgery. In group I, 210 patients underwent off pump CABG with the use of stabilizers (Octopus) only. In group II, 222 patient underwent off pump CABG with stabilizers and positioners. Continuous Cardiac output was monitored in all the patients. The results of clinical and laboratory data in both the groups was analysed and compared.

Discussion: In group II patients there was excellent haemodynamic stability. The cardiac output was very well maintained. The ease of anastomosis was much better and the post operative renal parameters were very encouraging.

Conclusion: The simultaneous use of positioners and stabilizers gives better outcomes in off pump CABG.

Surgical revascularisation in recent myocardial infarction

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Background: Surgical revascularization in recent myocardial infarction (MI less than one week) carries high mortality and morbidity. In the presence of ongoing ischaemia, mechanical complications or lesions unsuitable for percutaneous transluminal angioplasty (PTCA) surgical intervention is indicated.

Methods: We retrospectively analysed out data in 108 consecutive patients with recent MI who underwent surgical revascularization at our institute during the period Dec 2004 to Sep 2006. Indications for surgery were post infarction angina (61%), cardiogenic shock (15%)

and failed PTCA (8%). 25 (22.7%) patients were on preoperative inotropic support, 18 (16.7%) required IABP support. 12(11.1%) patients had significant left main disease. 65 (60.2%) patients had off pump coronary artery bypass grafting (OPCAB) and 43 (39.8%) underwent conventional CABG (CPB group). The decision to operate on CPB was based on haemodynamic stability and the coronary anatomy.

Results: The patients in the OPCAB group had lesser number of total grafts as compared to the CPB group (2.8±1.2 vs. 3.2±0.8). There were no significant differences in the mortality rate, re-explorations, neurological complications, deep sternal wound infection or renal failure. However, the average ventilation time, ICU stay, blood usage was lesser in the OPCAB group compared to the CPB group (9.34 hrs, 4.0 days, 65.9% vs .8 hrs, 6.2 days, 84.9% 56.7%) respectively. The follow up period ranged from 3 to 24 months. Five patients died during this period. Independent predictors for intermediate mortality were age more than 70 years, renal failure and preoperative cardiogenic shock. OPCAB or CPB did not influence the intermediate outcome.

Conclusion: Myocardial revascularization can be performed in patients who had recent infection whenever indicated off pump opting is feasible and could achieve desired results with lesser morbidity.

CABG in severe left ventricular dysfunction

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Background: CABG in patients with severe left ventricular dysfunction (LVEF ≤ 30%) carries high mortality and morbidity. This study aims to review our results of CABG in patients with coronary artery disease (CAD) and severe left ventricular dysfunction and identifying predictors of operative and late mortality.

Methods: From Dec 2004 to June 2006 sixty six patients with CAD and severe LV dysfunction underwent CABG in our institution. Of these 9 were female and 58 males, age ranging from 41-88 years with a mean of 60.3±12.8 years. The follow up ranged from 4–20 months. Follow up evaluation included history, physical examination and echocardiography. Thirty patients underwent OPCAB and 29 patients underwent conventional CABG (on CPB). One patient had Bentall's operation, two had LV aneurysm repair and mitral valve replacement was done in 4 patients as an additional procedure.

Results: Sixty one patients were discharged in a stable condition. The operative mortality was 7.1% (5 patients). Amongst the survivors five patients died during follow up. Remaining 56 patients were symptom free with 16 patients in NYHA class II and 40 patients in NYHA class I leading normal lives. Follow up echo revealed improvement in 49 patients, no improvement in 7 patients and deterioration in 5 patients.

Conclusions: Patients of CAD with severe LV dysfunction can be operated with acceptable morbidity and mortality. A significant number of patients show improvement in symptoms and LVEF.

Off Pump Coronary Artery Bypass Surgery (OPCAB) is beneficial in renal dysfunction

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Background: Off pump coronary artery bypass grafting has been reported to be beneficial in renal dysfunction patients. The purpose of the article is to study the effects of OPCAB on renal function and

analyse the predictors of Post operative surgical outcomes, morbidity and mortality.

Methods: We performed retrospective analyses of 511 patients undergoing CABG during the period Dec 2004 to Sept 2006. A total of 156 patients had renal dysfunction (defined as serum creatinine level ≥1.3 mg/dl). 105 patients underwent OPCAB and 51 had conventional CABG. The decision to operate on CPB was based on the pre-operative with diffuse CAD underwent elective CABG on CPB. The demographic and CAD risk profile and incidence of recent MI was similar in both the groups. The incidence of pre-operative CHF was higher in the CPB group. (17.6%vs 7.6%).

Results: The patients in OPCAB group were inclined to have lesser number of total grafts when compared to the CPB group (2.99±0.47 vs. 3.5±0.6), although the arterial grafts were same (80.4%). The average ventilation time, blood usage, ICU stay, IABP requirement was higher in the CPB group as compared to the OPCAB group (15.56±6.54hrs, 3.38±2.6 unit, and 6.18±5.7days, 27.5% vs.13.09±6.1 hrs. 1.66±1.29 units, and 4.03±2.6, days, 17.1% respectively). The incidence of post op haemodialysis was slightly less in the OPCAB but comparable (2.85% vs. 3.9%). The mortality rate was comparable in both the groups (1.9%).

Conclusions: Patients may achieve excellent outcome in either group, however, patients, in the OPCAB group tend to experience less blood loss, ventilation time, ICU stay and morbidity.

"Extended length" endoscopic harvest of Great Saphenous Vein for Coronary Artery Bypass Grafting: Our experience

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Background: The endoscopically harvested vein from thigh usually falls short by half to one length in cases requiring multiple conduits. Increased risk of complications precludes routine endoscopic vein harvest from the leg and an extra incision for open technique is often required thereby nullifying the sole purpose of the former. We employed the endoscope to harvest: this extra length of vein from the upper half of the leg with little or no extra risk.

Methods: From January 2006 to September 2006 we endoscopically harvested the vein in thigh as well as the leg using the same entry point incision over the medical epicondyle in 40 cases. The only exclusion criterion for the study was a superficial location and subcutaneous visibility of the vein in the leg. We made 3 incisions in each patient of average size 2.5 cm.

Results: 5 cases required conversion to the open technique. The average harvest time was 59 minutes. Average length of the conduit was 48 cms. Complications included 1 minor wound infection, 1 case of superficial wound dehiscence, 1 haematoma requiring aspiration and minor erythema at the incision site in 2 cases. Most common complication observed was ecchymosis in 6 patients (5 thigh; 3 leg). None of the patients developed lymphoedema and none required re-hospitalization for vein harvest related wound complications.

Conclusions: "Extended endoscopic vein harvest" and avoidance of the open incision was possible in most cases with no additional risk and that the procedure could be routinely employed in cases requiring multiple conduits.

Ventriculoseptoplasty with liner repair in cases of akinetic/dyskinetic anteroseptal left ventricular wall in ischaemic cardiomyopathy—Study of 28 cases

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Background: Left ventricular (LV) aneurysm is a complication of an acute myocardial infarction (AMI). Occlusion of proximal LAD causes a large septal infarct with moderate involvement of the LV anterior wall. In such cases DOR procedure cannot address both the problem of shape and size of the LV and cannot completely exclude the Septal Akinetic or dyskinetic scar. The aim of procedure should not only be LV volume reduction but should also preserve the shape. This is achieved by excluding the IVS as high as possible maintaining an oblique direction towards neo-apex.

Methods: From June 2005 to August 2006 we have studied prospectively 28 cases of Septoplasty and linear repair. All patients were of anteroseptal infarct, with proximal LAD occlusion. LV was opened parallel to LAD from apex to about 4-5cm; A haemaseal patch was sutured from the highest point of transition zone on the septum and directed obliquely to the anterior wall towards the new apex, excluding the large infarcted akinetic or dyskinetic septum. After sizing the LV cavity (mannequin Device) anterior wall was closed in liner fashion. CABG was done in all the cases simultaneously.

Results: The average EF of the patients was 24 ± 6 , with all patients being in NYHA class 2 and beyond. The thirty day mortality was 7.14% (n=2). The average follow up of these patients was 14 months. This procedure has provided good short and mid-term results. There was improvement in NYHA class from 2.3 ± 0.6 to 1.5 ± 0.5 ($P < 0.001$). Left ventricle (end-diastolic and end-systolic) volume, reduced significantly. Ejection fraction increased to 32 ± 4 . Mitral regurgitation reduced significantly from 2.5 to 0.6. Most importantly LV resumed a more conical shape.

Conclusions: For anteroseptal infarct involving the large area of septum, DOR procedure is technically not possible as it would lead to box shape heart and reduced LV volume. In such cases, septoplasty and linear repair of LV using mannequin gives more predictable shape and size. This procedure can also be performed in moderately dilated LV. No enlargement of the basal dimension was seen postoperatively, as seen in few cases of DOR procedure.

Mid term results of overlapping cardiac volume reduction surgery (OLCVR)—Geometric and clinical outcomes

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Background: The study was aimed to correlate midterm geometric with clinical outcomes of overlapping cardiac volume reduction using ventricular mannequin in patients having dilated cardiomyopathy.

Methods: Overlapping cardiac volume reduction using ventricular mannequin (Chase Medical) was performed. 16 patients with dilated cardiomyopathy [left ventricular (LV) systolic volume $> 100 \text{ mL/m}^2$]—13 with ischemic and 3 with idiopathic dilated cardiomyopathy, were operated on the surgical procedure from September 2004 to January 2006. 12 patients were in New York Heart Association (NYHA) class

III, 4 in class IV with moderate to severe mitral regurgitation. Concomitant procedures included coronary artery bypass grafting in 13 patients, mitral annuloplasty in 2, papillary muscle plication in 4.

Results: On average follow-up of 9 ± 2.8 months, all 11 alive patients are in NYHA functional class I-II. Global LV contractility was significantly improved as depicted by significant ($P < 0.05$) improvement in LV ejection fraction (from $19.2 \pm 4.3\%$ to $28.6 \pm 6.1\%$) with corresponding significant reduction in LV end systolic volume (from 146.69 ± 47.82 to $93.8 \pm 40.7 \text{ mL}$). Further, there was significantly correlated reduction in LV end diastolic dimensions (from 62.6 ± 4.6 to 55.8 ± 5.5). Significant reduction in apicobasal length (from 91.1 ± 6.7 to 69.3 ± 10.0) and in diameter at mid, apex and base by $19.4 \pm 8.9 \text{ mm}$, $21.1 \pm 5.5 \text{ mm}$ and $16.7 \pm 4.4 \text{ mm}$ respectively was also found. Early postoperatively mortality was found in 2 patients due to intractable arrhythmias and late follow-up mortality was reported in 3 patients.

Conclusions: Overlapping cardiac volume reduction, without ventriculectomy or prosthetic patch, offers encouraging geometric outcomes in restoration of overall LV shape, size along with significant clinical improvement. Long term follow-up for better understanding the mortality benefit is awaited.

Is simultaneous coronary and peripheral revascularization a safe option for the patient?

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Background: To report the feasibility and safety of simultaneous coronary and peripheral revascularisation.

Methods: A retrospective review of data over a three year period (2002-2005) was done. A total of 7 patients underwent a CABG+peripheral revascularisation at the same sitting during this period. Patients undergoing CABG+CEA and those undergoing Bentall's procedure were excluded from this analysis. The age range of patients was between 44-65 years with an average of 54.4 years. The M: F was 2.5:1. We had 4 diabetics, 5 hypertensives, in this study group. All 7 patients underwent an off-pump CABG with peripheral revascularisation, as an elective procedure. The peripheral bypasses included - 3 aorto-biliac, 2 fem-fem cross overs and 2 femoro-above knee popliteal grafts.

Results: There was no 30 days mortality in this group and the operating time ranged from 158-210 minutes, with a mean of 163 minutes. The blood requirements ranged from 3-6 units of whole blood or packed cells, including the first postoperative day. The use of products such as FFP and platelets was very selective, they were needed in only 2 out of the 7 patients. The duration of stay for these patients ranged from 7-16 days, within an average of 10.1 days.

Conclusion: Although this is a small series, we conclude that simultaneous CABG with peripheral revascularisation can be done without subjecting the patients to unduly prolonged operating time, hospital stay and excessive use of blood and blood products.

Combining off pump coronary artery bypass with mitral replacement

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Background: Conventional approach to combined coronary artery bypass grafting (CABG) and mitral valve replacement (MVR) is associated with longer cardiopulmonary bypass (CPB) and aortic cross clamp (ACC) time leading to high operative risk.

Methods: We conducted a retrospective review of nine consecutive patients undergoing CABG/MVR combining the off pump technique with cardioplegic arrest. Elective intra aortic balloon pump (IABP) support was instituted in all cases. CABG was first done in all cases without CPB support. MVR was then done using conventional CPB and cardioplegic arrest using the superior septal approach.

Results: Nine consecutive patients underwent CABG with MVR including three patients with acute myocardial infarction. Preoperative echocardiogram revealed a mean ejection fraction (EF) of $38.4 \pm 6.0\%$. IABP was inserted in all patients preoperatively. The average number of grafts were 3.0 ± 0.7 . Eight patients received bioprosthetic valve while one patient received mechanical prosthesis. The average length of stay in intensive care unit was 3.3 ± 0.5 days. There was no mortality. One patient had superficial wound infection.

Conclusions: The data suggest that the combined technique (off pump CABG and conventional MVR) is a safe method to perform CABG/MVR with minimal morbidity and mortality.

Troponin-I release after cardiac surgery with different surgical techniques and post-operative neurological outcome

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Background: Cerebral hypoperfusion during cardiopulmonary bypass surgery has been thought to be a factor in the aetiology of brain damage with evidence of post-operative neurological deficits. Cardiac-specific biomarkers such as troponin-I and CK-MB have been used extensively to predict myocardial injury and ischaemia. This prospective study investigated the troponin-I release in both off-pump and CPB-technique CABG surgery, as well as postulated a relationship of troponin and post-operative neurological outcome.

Methods: A total of 44 adult patients undergoing coronary artery bypass graft (CABG) were enrolled into either an off-pump or on-pump groups, with 22 patients participating in each. Group A (on-pump) underwent myocardial revascularisation with CPB and cardioplegic arrest, while Group B (off pump) underwent beating heart surgery. The measurement of troponin-I is a 1-step enzyme immunoassay method, with specificity and sensitivity set a $0.4 \mu\text{g}/\text{mL}$. Neurological assessment was done using the NIH Stroke Scale, and neuropsychologic assessment was assessed on cognitive function using modified Weschler Memory Scale.

Results: Although each independent technique showed a marked rise of troponin-I from baseline to 6 hours post-operatively, the difference in troponin release was insignificant between the 2 groups at specified time intervals ($p=0.124$). None of the patients in either group showed any neurological or cognitive deficits presenting at day 3 and day 7 post-operatively.

Conclusions: The findings of this study demonstrate a significant correlation of troponin-I release with the number of grafts used, irrespective of the type of grafts or surgical technique. There is however no significant short-term cognitive or neurological dysfunctions post-operatively, as indicated by troponin-I release in assessing the severity of myocardial injury.

Intra aortic balloon pump in high risk off pump coronary artery bypass operations- Pre-operatively is the best

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Background: Manipulation of heart required for exposure and construction of distal anastomoses often produces haemodynamic instability when performing coronary artery revascularization sans cardiopulmonary bypass. This is particularly more in hearts which are energy depleted and severely ischaemic. As a result short term circulatory support with Intra Aortic Balloon Pump (IABP) may be required. We report our experience of IABP use in these high risk Off pump coronary artery bypasses (OPCABs)

Methods: It is retrospective study from July 2001 to June 2006. 174 high risk coronary artery disease (CAD) patients in whom IABP was used were included. These were grouped into Group A (98 patients): where IABP was put pre-operatively and Group B (76 patients): where IABP was put either intra-operatively (58 patient) or post-operatively (18 patients). Their clinical profile, intraoperative data, morbidity and mortality data was analysed. The male to female ratio was 4.1: 1 and 3.7: 1 in group A and B respectively with age range from 38 to 81 years. Risk factors and clinical profile taken into consideration were LV dysfunction, diffuse CAD, Cardiogenic shock, Acute MI, redo CABG, Left main coronary artery stenosis, Diabetes mellitus and systemic hypertension.

Results: All patients had sheathless insertion of IABP via femoral artery. Cardiac Index was measured periodically. Group B had more vascular complication, inotropic requirement and mortality. Cardiac Index did not improve in group B as compared to group A signifying some occult myocardial stunning or damage during the period of haemodynamic instability during which IABP was inserted.

Conclusion: We conclude that IABP should be used liberally in high risk group undergoing OPCAB surgery to avoid dangerous haemodynamic instability that otherwise often occurs. Further we emphasise that preoperative IABP offers best results in this subset of patients.

Endoscopic great saphenous vein harvesting- Lessons from initial experience

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Background: Minimally invasive procedure have been associated with improved cosmetic outcome, lesser pain and hence better patient satisfaction. We evaluated our results of minimally invasive great saphenous vein harvesting for coronary artery bypass grafting (CABG).

Methods: Since October 2005 till September 2006, 132 (120 males, 12 females) patients underwent endoscopic vein harvesting with VasoView system (Version 6 Guidant Inc) in our institution. Data was collected prospectively from February and retrospectively prior to that. All patients underwent conventional CABG.

Results: The mean age of the patients was 53.9 years (SD-9.35). The average number of grafts was 3.67 (SD-0.52, range 2-5). The mean duration of the procedure from skin incision to delivering the vein was 46 min. An average of 34.6 cm length of vein was harvested. Shift to conventional vein harvesting was required in 9 patients. The reasons for conversion were for technical reasons ($n=2$), difficulty in exposing the vein ($n=5$) and thin walled vein in thin patients ($n=2$). Complications of the procedure were wound infection ($n=1$), vein track

hematoma (n=1) and ecchymoses (n=7). One case of DVT was also encountered.

Conclusions: Endoscopic vein harvesting is a safe, rapid and effective method of harvesting the great saphenous vein. It is associated with a low incidence of wound complications. However increase in costs and learning curve for the procedure are deterrents to its use.

Coronary artery bypass grafting in young adults

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Background: Coronary artery disease (CAD) manifestation is rare in young population. Aim of this study is to find out risk factors, disease severity and early outcome in this group of patients.

Methods: We retrospectively analyzed patients who underwent CABG below 35 years of age (range 15-35) from 1997-2006. A total of 17 patients were operated. Male: female - 15:2. 15 had atherosclerotic CAD while 2 had aortoarteritis (both females). The prevalent risk factors were smoking (11), body mass index >25 (7), hypertension (6), family history of CAD (5), diabetes (2) dyslipidemia (2). Presenting features were angina in all patients while h/o previous MI in 9 patients. Disease severity: LMCA/TVD (9pts), DVD (7), SVD (1). A total of 27 RSVG, 13 LIMA, 3 RIMA and 4 Radial grafts were used. One patient of aortoarteritis did not receive arterial grafts.

Results: Follow up duration was 36±26 months. One patient lost to follow up. Five presented with atypical symptoms out of which one had positive TMT and one presented with ACS. 3 patients underwent CAG- check angiogram for aortoarteritis, ACS and positive TMT. RIMA was patent in aortoarteritis patient, TMT positive patient had ostial SVG stenosis, patient who presented with ACS had blocked saphenous vein and radial grafts but RIMA and LIMA were patent.

Conclusion: Young patients undergoing CABG have smoking as predominant risk factor Risk factor modification needs to be stressed upon. Young females with CAD should be ideally screened for aortoarteritis. Arterial conduits should be preferable in this subset of patients.

Preoperative assessment and perioperative strategy help in the management of patients with left ventricular dysfunction

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Background: Surgery for coronary artery disease with severe LV dysfunction and associated complications like mitral regurgitation, LV dilatation and LV aneurysm carry an ominous prognosis with high perioperative mortality and morbidity. In the present study we analyzed 42 consecutive patients with moderate to severe LV dysfunction operated in our unit.

Methods: Data on 42 consecutive patients operated between July 2004 to October 2006 was analyzed. The age ranged from 40 to 65 years (mean=59.16 years). Majority were males (n=38). Preoperatively 26.19% had angina, 16.66% had dyspnea, 45.23% patients had both and 11.92% patients had symptoms like syncope and palpitation. LV ejection fraction was <35% in 11 patients (26.19%) and between 35-45% in 31 patient (73.81%). On evaluation 20 patients had only Mitral

Regurgitation and 7 patients had mitral regurgitation with LV dilatation. They were evaluated with cardiac MRI (n=5). Myocardial perfusion scan (n=11), Pre and intra op. TEE (n=19) and PA Catheter (n=16).

Results: Twenty five patients (59.53%) were operated under cardiopulmonary bypass and 17 patients (40.48%) were operated off pump. Mean no. of grafts was 3.02 (range 1-5) per patient. Four patients (9.52%) required IABP. Thirty three patients (78.57%) had only CABG, 6 patients (14.29%) had CABG with Surgical Ventricular Restoration, 2 patients (4.76%) had CABG with MVR and 1 patient (2.38%) had CABG with SVR with Mitral Valve Repair. There were two (4.76%) early postoperative deaths in this high risk group and one (2.38%) late post operative death. Eight patients (19.04%) had post operative complications like arrhythmia (n=3), acute renal failure (n=3), low cardiac output syndrome (n=2) and sternal wound infection (n=1).

Conclusion: The preoperative assessment of ventricular function, mitral regurgitation and LV dilatation by detailed study with useful tools like cardiac MRI, TEE and PA catheter ensure good results in patients with LV dysfunction.

Results of concomitant valve replacement and coronary artery bypass grafting—risk factors and early results

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Background: Concomitant valve replacement and coronary artery bypass grafting (CABG) is an established risk factor for diminished postoperative survival. Results of 47 patients who underwent concomitant CABG and valve surgery were reviewed in order to determine factors influencing early survival and morbidity.

Methods: Between 2002 and 2006, a total of 47 patients underwent concomitant valve surgery with CABG at our institute. Of these patients, 29 (62%; mean age 40.6 years) had combined MVR and CABG and 18(38%; mean age 52.7) had AVR and CABG. Surgical indications were primarily valve pathology (group A: n=28; 68%), primarily coronary artery disease (CAD) (group B: n=10; 22%), and both severe valvular and coronary disease (group C: n=9; 10%). In total, 17 patients (71%) received a bioprosthesis, and 72 (29%) received a mechanical valve. Risk factors were noted and Short-term outcomes were explored.

Results: Overall operative mortality was 6.4%; mortality for groups A, B and C was 3.5%, 0%, and 22.2% respectively. On multivariable analysis, significant factors associated with early-phase mortality were NYHA class IV, diabetes, and combined severe valvular and coronary disease. One year survival for groups A, B and C was 93%, 90% and 66%, respectively. significant associated factors for early morbidity were the presence of preoperative peripheral vascular disease (PVD), use of mechanical valve and cerebrovascular disease (CVD). Factors such as age, poor ejection fraction, no of grafted coronary arteries, and severity of valvular stenosis had no significant effect on outcome.

Conclusion: Combined valve surgery with CABG is a marker for decreased survival. Pre-existing factors such as diabetes, PVD and CVD, as well as poor preoperative NYHA functional status, affected survival. Further investigation is needed to assess the impact of CAD on survival.

Coronary artery bypass grafting in a post renal transplant patient-special aspect of perioperative management

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Background: The success of allogenic renal transplant in patients with end stage renal disease and the high incidence of coronary artery disease in them has given rise to a new subset of patients for complete revascularization with coronary artery bypass grafting. The optimum perioperative management protocol for these patients is yet to be established. Through this case report we are highlighting the special aspect of perioperative management require for a successful outcome of coronary artery bypass grafting in these patients.

Case report: A-64-year-old male who had renal transplant seven years ago for end stage renal disease developed angina on exertion for last six months. Coronary angiogram revealed severe triple vessel disease. He was planned for coronary artery bypass grafting. Preoperatively, immunosuppressive agents were reduced to minimum. Cyclosporine was stopped. Hemoglobin was build up by haematinics. Adequate hydration the night prior to surgery ensured. Inj. Hydrocortisone 100 milligram given in the morning of surgery. Nephrotoxic drugs were avoided. Prior to induction Dopamine infusion started at rate of 3 microgram/kg/min. He was revascularised on cardiopulmonary bypass with LIMA to LAD and Venous grafts to diagonal, OM and RCA. Perfusion pressure of over 80 mm/Hg, haematocrit of 30 and urine output of 1.5 ml/kg/min were maintained throughout the procedure as nephroprotective strategy. Low dose dopamine (3Mcg/kg/min) was continued for 24 hours postoperatively. Recovery was uneventful. Predischarge serum creatinine level was same as preoperative (1.9mg/dl). Discharged on 8th postoperative day.

Conclusion: Adequate nephroprotective strategies, optimal hemodynamic management and total revascularization are essential for a safe and successful coronary artery bypass grafting in these patients.

Evidence based strategies of preventing renal dysfunction in adult cardiac surgery

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Background: Acute renal dysfunction is a common serious complication of cardiac surgery. Although a diversity of mechanisms exist by which the kidney can be damaged during cardiac surgery, Atheroembolism, ischaemia-reperfusion and inflammation are believed to be primary contributors to perioperative renal insult. The high metabolic demands of active tubular reabsorption and the oxygen diffusion shunt characteristic of renal circulation make the kidney particularly vulnerable to ischaemic injury.

Methods: In this study we analysed pharmacological and non pharmacological ways of minimizing renal dysfunction in 240 patients undergoing coronary bypass or valve replacement for Jan 2005 to July 2006. Non pharmacologic preventive strategies include procedure planning that is based on risk stratification, avoidance of nephrotoxins and meticulous perioperative clinical care including optimizing intravascular volume and attentions to modifiable risk factors such as minimizing haemodilution. In pharmacologic preventive strategy role of antioxidants eg. Allopurinol, N-acetylcysteine, and perioperative low dose dopamine, Frusemide infusion, and preoperative Sodabarbonate were studied.

Conclusion: Haematocrit above 26 was an independent predictor, Though allopurinol, N-acetylcysteine and pre operative sodabarbonate prevented further renal dysfunction even with pre operative renal dysfunction, however failed to demonstrate any beneficial effect in emergency setting and once the renal dysfunction has set in following surgery.

Off pump CABG in left main- Our experience

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Background: Routinely CABG's are performed on beating heart in many centres. This technique of beating surgery is now a days extending to all types of CABGs including left main disease, severe triple vessel disease, LV dysfunction etc. We analyse our results of beating heart surgery in Left Main Disease

Methods: Retrospective analysis of beating heart (Off pump) surgery for CABG in left main disease was undertaken at our KLES hospital JN Medical College, Belgaum by a single surgeon between the period of January 2001 to September- 2006. During this time, a total of 2621 CABGs were performed of which 2289 (87.3%) were off pump. A total of 229 (8.79%) were Left Main Disease. There were operated Off Pump. Age range from 35 to 80 years with a mean of (55.8). The 42 (18.34%) cases were in the 3rd decade with maximum 118 (51.1%) cases in 6 and 7th decade. There were 108 (47.16) cases left main aortic stenosis and 121 (52.40%) cases of left main equivalents. The grafts range from 1 to 5 with majority of them i.e. 79% receiving 3-4 grafts.

Results: The Sephanous vein only was used in 42 (13.4%) cases. LIMA with vein grafts was used in 81 (35.4%) cases. LIMA with RIMA or RADIAL "Y" graft was used in 104 (45.2%) cases. 2 Patients required Mitral valve replacement in addition to CABG. Diabetes was found in 44 (19.2%) cases, Hypertension was found in 48 (20.9% in 26 cases (11.35%). Pulmonary disease in the form of chronic bronchitis and emphysema was seen in 28 (12.2%) cases. Ejection fraction less than 35% was seen in 21 (9.17%) cases. Post operative complications causing mortality in 5 (2.18%) cases with septicemia 1 (0.4%), Arrhythmias on IABP with low Ejection Fraction, Multi Organ failure in 2 (0.8%) cases, acute renal failure in 2 cases (0.87%), There was 100% follow up at one month, 3 months, 1 year after surgery. All patients were symptom free & were in NVMA Cl. I. on Aspirin, Clopidogrel and Statins with 118 (51.1%) cases on minimal dose of Beta-blockers & coronary dilations.

Conclusions: Off Pump CABG can be safely done in patients with left Main Disease.

Does LESS procedure score over traditional bypass surgery?

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Background: Lower end sternal split (LESS procedure) has been used as one of the minimally invasive approaches for coronary artery bypass grafting. Its advantage over conventional minimally invasive direct coronary artery bypass (MIDCAB) is the ability to perform multi vessel grafting (LAD, diagonals, ramus, and PDA). An added advantage apart from cosmesis is the minimal postoperative pain and early functional recovery. We evaluated our experience with the LESS procedure and report the early results.

Methods: From January 2005 to October 2006, 68 patients underwent LESS procedure at our institute. The skin incision was 2.5-3 inches long with the sternum split only in the lower half. The manubrium was left intact and the left side of sterno-manubrial junction usually dislocated for additional exposure. The vessels grafted were: only LAD in 18 patients, LAD and diagonal in 46, LAD, diagonal and ramus grafting in 2 cases and 1 patients had grafting of LAD, diagonal and RCA using both ITA's. The mean age was 55 years (range 17 to 72 years) and mean LVEF was 45%.

Results: There were no hospital mortalities. Blood transfusion was required in 13 patients. Thirty patients were extubated in the operating room. The mean ICU stay was 18 hours and mean hospital stay was 5 days. One patient had a superficial sternal wound infection and none new had any sternal dehiscence. All patients are doing well after a mean follow-up of 10 months.

Conclusion: It is technically feasible for grafting the LAD, diagonals, ramus and even the RCA by LESS procedure. Its advantages are early extubation less ICU stay, early discharge, less transfusion, less requirement of painkillers and better cosmesis. We feel with more experience this technique can be used more frequently for multi vessel grafting.

"The tentacles heart positioner" for off pump CABG- Initial experience

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Background: The tentacles heart positioner (Sumitomo Bakelite Co. Ltd. Higashi shinagawaku, Tokyo, Japan) has been recently introduced as another addition to the "off pump" CAPB surgeon's armamentarium. This article summarises our initial experience of its use.

Methods: The tentacles system was used in 8 patients to evaluate its performance. It consists of three separate suction cups, connected to a single tube, which is then connected to a suction source (-250 mmHg). The suction cups were applied to the appropriate surface of the heart- its anterior, lateral or basal surface to facilitate exposure of the target artery. Using the traction strings, the heart was pulled into the most suitable position for maximal exposure. A stabiliser such as Octopus 4.3 (Octopus, Medtronic Inc, USA) was then easily applied to the target artery and the coronary anastomoses were performed.

Results: The device enabled safe and excellent exposure of all target arteries. After deployment it was much less obstructive to the surgeon compared to other apical suction devices. It allowed more positioning options for maximising exposure as the three individual suction cups could be applied virtually anywhere, and the heart could be pulled in any direction. Its costs was 55%-60% less than other more popular apical suction devices. It could also be reused after ETO sterilisation with no reduction in performance.

Conclusions: The tentacles heart positioner enables comfortable, unobstructive and safe access to all target vessels during OPCAB surgery. It costs much less than other suction devices and is reusable after ETO sterilization.

Experience with novare anastomotic device in beating heart CABG

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Background: The use of sidebitting clamp on the ascending aorta poses problems of atheroembolic episodes. As also this damp causes a resistance to the LV contraction. The object of this study was to

evaluate the benefits of this device.

Methods: In a period of 9 months 62 anastomosis were performed using this device on 40 patients (32 males and 8 females). In 3 patients the proximal anastomosis was done on cardiopulmonary bypass, due to very disease aorta. In all the above 40 patients there was no fall in the cardiac output.

Results: There was technical ease for anastomosis. The average time of anastomosis was 7 min. There was no complication due to device. No patient had any thromboembolic episode.

Conclusions: Novare enclosure proximal anastomotic device is safe, technically simple and especially beneficial in diseased aortas.

Study of the cytochrome C oxidase subunit II (COII or MTCO2) gene in patients undergoing coronary artery bypass surgery

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Background: Cytochrome c oxidase (Complex IV) of electron transport chain consists of 13 subunits, of which 3 are encoded by the mitochondrial DNA. Subunit II (MTCO2) is the catalytic center of complex IV, with a molecular weight of 25.5 kD. It catalyses the transfer of electrons from ferrocycytochrome b to cytochrome a and finally the generation of ATP. Mitochondrial DNA (mt DNA) deletions have been shown to increase with ischemia and have been suggested to contribute to myocardial dysfunction. The purpose of this study was to determine the prevalence of MTCO2 mutations in coronary artery bypass patients (CABG).

Methods: Specimens of peripheral blood and right atrial tissue were collected along with relevant clinical data from 30 unrelated Indian proband (age 40-69yrs) who underwent CABG. DNA was extracted from both blood and tissue. Single-strand conformation polymorphism gel analysis of the polymerase chain reaction-amplified products using specific primers was performed on 10% polyacrylamide gel to assess mutations in MTCO2 gene.

Results: Analysis showed 3/30 (10%) patients having a shift in mobility only in the tissue samples, indicating a mutation.

Conclusion: Our results revealed a high percentage of mutation in the MTCO2 gene in a substantial numbers of patients. Since it is one of the catalytic subunits of complex IV, crucial for electrons transport function suggesting that this may be affecting the oxidative phosphorylation and ATP generation resulting in energy insufficiency and cardiac dysfunction.

High risk CABG in severe LV dysfunction: Risk factors and early outcome

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Background: Patients presenting with severe left ventricular (LV) dysfunction undergoing coronary artery surgery are at increased risk of perioperative morbidity and mortality. The present study investigated the risk factors and early outcome in a consecutive series of patients with severe LV dysfunction and compared them with a similar cohort of patients with normal ejection fraction.

Methods: We retrospectively reviewed the case records of 52 patients with severe left ventricular dysfunction (ejection fraction <30%) who underwent off pump coronary artery bypass grafting at Metro group of Hospitals between Jan 2006 and October 2006. We compared them with a similar group of 52 patients with

normal ejection function, analyzed the risk factors and compared the results.

Results: Two groups with preoperative ejection fraction classified as poor GR A (10%-30%; $n=52$) or normal GR B (45%-65%; $n = 52$) were compared. The mean ejection fractions were $26\% \pm 1\%$ and $63\% \pm 1\%$ respectively, $p < 0.000001$. In both groups significant co morbid factors included hypertension (93%), diabetes mellitus (85%), and hypercholesterolemia (49%). The number of grafts used ranged from 1 to 4. In the poor LV group there was no difference between the groups as regard to number of graft (2.4 vs 2.6), extubation time (6.2 vs 5), 30 days mortality (2 vs 1) However stastically significant were the need for inotropes > 48 hrs (16 vs 5), icu stay in days (3.2 vs 1.5), use of labp (10 vs 1) and hospital stay in days (7.9 vs 4.1) days. The need for conversion to the pump was higher in the poor LV group (6 vs. nil)

Conclusion: Despite higher hospital morbidity in patients presenting with severe LV dysfunction compared to normal LV subset of patients a favourable early clinical outcome is encouraging and seems to justify surgical revascularization for this high-risk group of patients. An early conversion to the pump is always favorable rather than waiting for patient to crash must be the dictum in high risk cases.

What is the minimum effective dose of protamine for heparin reversal in off pump coronary artery bypass graft surgery – A prospective randomised double blind single center study

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Background: Several clinical studies have reported that avoiding cardiopulmonary bypass (CPB) reduces postoperative bleeding after coronary artery bypass surgery (CABG). Hemostasis is better preserved after "Off pump" CABG compared to conventional CABG done using CPB. However, according to some recent literature, this preserved hemostasis after off pump CABG may actually result in a procoagulant state which may predispose to graft thrombosis. This study aims to determine the minimum effective dose of protamine sulphate which is just enough to neutralise the anticoagulant effect of heparin without predisposing to a procoagulant state after "off pump" CABG.

Methods: Ninety consecutive patients undergoing off pump CABG were prospectively randomized into three groups. Group A received 0.5mg of protamine for every 100 IU of heparin, Group B received 0.75 mg of protamine for every 100 IU of heparin and group C received 1 mg for every 100 IU of heparin.

Results: There were no statistically significant difference between groups A B and C in the amount of drainage in the first 24 hours after surgery and also in the transfusion requirement in the immediate postoperative period. Three patients had unexplained ST elevation in the immediate postoperative period in group C.

Conclusion: Heparin, in patients undergoing off pump CABG needs to be reversed with only 0.5 mg of protamine sulphate for every 100 units of heparin. A higher dose of protamine does not reduce bleeding any further and may predispose to graft thrombosis possibly due to a procoagulant activity.

A prospective randomized study to evaluate changes in cardiac troponin-I as a marker of myocardial necrosis in patients undergoing coronary revascularization with and without cardiopulmonary bypass.

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Background: Myocardial damage in patients undergoing coronary artery bypass grafting (CABG) is an important cause of postoperative morbidity and mortality. A whole body response to cardiopulmonary bypass (CPB) can cause such damage. We examined this hypothesis using cardiac Troponin-I (cTnI) in patients undergoing CABG with and without CPB (OPCAB). Further more rises in cTnI have been shown to have short and long term prognostic value.

Methods: Forty patients were randomized to either CABG with CPB (ONCAB) ($n=20$) or OPCAB ($n=20$). Blood samples were collected from the radial artery into ethylenediaminetetraacetic acid (EDTA)-containing glass tubes shortly after anaesthetic induction, at the end of operation and 4,8,12 hours postoperatively. The samples were immediately centrifuged in a refrigerated centrifuge to separate the plasma, which was subsequently frozen and stored at -70°C until assayed.

Results: There was a statistically significant increase in cTnI in the ONCAB group compared to the OPCAB group immediately post operatively ($p < 0.001$), 4 hours ($p < 0.001$), 8 hours ($p < 0.001$) and 12 hours ($p = 0.002$).

Conclusion: Patients undergoing CABG with CPB suffered greater myocardial damage as detected by changes in cTnI. The ONCAB group had larger and earlier rises in cTnI than the OPCAB group. This suggests that OPCAB provides better myocardial protection than ONCAB.

A prospective randomized study to evaluate changes in surfactant protein-D as a marker of pulmonary dysfunction in patients undergoing coronary revascularization with and without cardiopulmonary bypass

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Background: Pulmonary dysfunction is a recognized complication of cardiopulmonary bypass (CPB). Pulmonary surfactants are important for normal lung function, and surfactant alterations have been implicated in the patho-physiology of acute respiratory distress syndrome (ARDS). Lung secretory proteins move passively across the epithelial barrier into serum where they serve as peripheral indicators of epithelium damage. Surfactant protein-d (SP-D) has been identified as a valuable serum biomarker for patients with ARDS. We examined the changes in serum SP-D levels in patients undergoing coronary artery bypass grafting (CABG) with and without CPB (OPCAB).

Methods: Forty patients were randomized to either CABG with CPB (ONCAB) ($n=20$) or OPCAB ($n=20$). Blood samples were collected from the radial artery into ethylenediaminetetraacetic acid (EDTA)-containing glass tubes shortly after anaesthetic induction, at the end of operation and 4,8,12 hours postoperatively. The samples were immediately centrifuged in a refrigerated centrifuge to separate the plasma, which was subsequently frozen and stored at -70°C until assayed.

Results: There were no statistically significant differences between the two groups

Conclusion: The elimination of CPB alone did not significantly affect alveolar capillary membrane integrity in patients undergoing isolated CABG. Further randomized studies are required to validate these findings.

A prospective randomized study to evaluate changes in bactericidal permeability increasing (BPI) protein as a surrogate marker of gram-negative bacteraemia in patients undergoing coronary revascularization with and without cardiopulmonary bypass

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Background: Cardiopulmonary bypass is (CPB) known to cause gastrointestinal dysfunction that can lead to endotoxemia secondary to permeation by gram-negative bacteria (GNB). We examined the changes in bactericidal permeability protein which is a potent host defense in the response to invading organisms in patients undergoing coronary artery bypass grafting (CABG) with and without CPB (OPCAB). BPI binding to GNB initiates first sub-lethal, then lethal bacterial injury. BPI also binds unmodified endotoxin aggregates.

Methods: Forty patients were randomized to either CABG with CPB (ONCAB) (n=20) or OPCAB (n=20). Blood samples were collected from the radial artery into ethylenediaminetetraacetic acid (EDTA)-containing glass tubes shortly after anaesthetic induction, at the end of operation and 4,8,12 hours postoperatively. The samples were immediately centrifuged in a refrigerated centrifuge to separate the plasma, which was subsequently frozen and stored at -70°C until assayed.

Results: There was a statistically significant increase in BPI levels immediately post operatively (p=0.0243) in favour of the OPCAB group. However, the OPCAB group did worse than the ONCAB group with greater release of BPI at 4 hours (p=0.05) and at 8 hours postoperatively (p=0.007). The differences had normalized by 12 hours.

Conclusions: BPI has been used as a surrogate marker of gram-negative bacteremia. OPCAB does not offer superior gastrointestinal protection than ONCAB. Only the temporal pattern of bacterial permeation is altered. Further more there is a greater more sustained release of BPI in the OPCAB group as suggested by the area under the curve which suggests greater occult damage in the OPCAB group.

A prospective randomized study to evaluate changes in alpha-GST as a novel marker of hepatocellular necrosis in patients at high-risk of renal injury undergoing coronary revascularization with and without cardiopulmonary bypass

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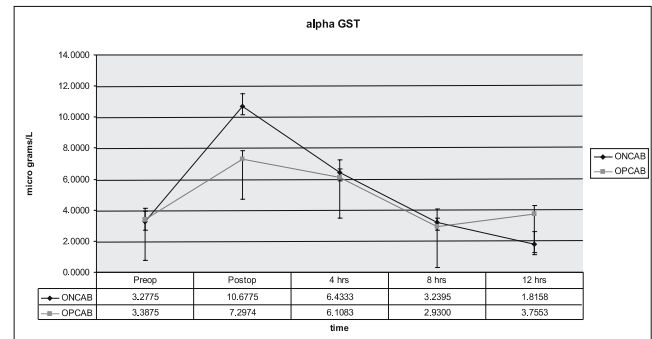
Background: The pathogenesis of liver dysfunction after cardiac surgery is multi-factorial. Whilst studies of gut perfusion suggest that alterations in splanchnic blood flow to be a major factor it has also been theorized that features peculiar to CPB pose an additional risk. We examined this hypothesis using a novel marker termed alpha glutathione-s-transferase (a-GST) a 26 KD protein that is rapidly released from hepatocytes following injury in patients undergoing

coronary artery bypass grafting (CABG) with and without CPB (OPCAB).

Methods: Forty patients undergoing first time CABG were randomized to either CPB (n=20) or OPCAB (n=20). Blood samples were collected from the radial artery into ethylenediaminetetraacetic acid (EDTA)-containing glass tubes shortly after anaesthetic induction, at the end of operation and 4,8,12 hours postoperatively. The samples were immediately centrifuged in a refrigerated centrifuge to separate the plasma, which was subsequently frozen and stored at -70°C until assayed.

Results: There were no significant differences between the two groups.

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Conclusion: Both OPCAB and ONCAB induced similar levels of release of alpha GST. Possible explanations for this include our routine use of aprotinin to attenuate inflammatory response, use of pulsatile flow and the fact that OPCAB causes severe transient multiple episodes of systemic hypotension.

A prospective randomized study to evaluate changes in I-FABP as a novel marker of intestinal necrosis in patients undergoing coronary revascularization with and without cardiopulmonary bypass

Varghese D, Varghese B, Pelters M, Kelley K, Hanson M, Wood P, Hett D, Velissaris T, Ohri SK

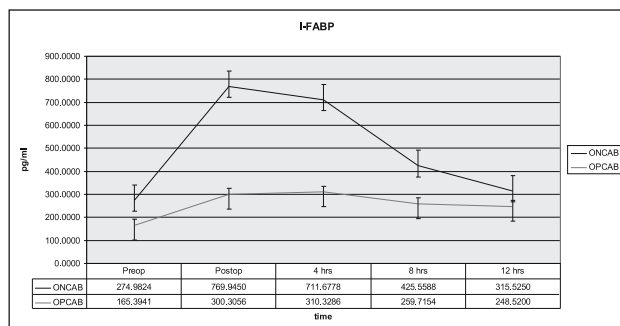
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Background: Many studies have suggested that the gut is the motor of the inflammatory cascade associated with cardiopulmonary bypass (CPB). CPB induced vasoconstriction causes a drop in splanchnic blood flow during the operative and postoperative period leading to intestinal injury and thus facilitating bacterial permeation. We examined this hypothesis using a novel marker termed Intestinal - type fatty acid binding protein (I-FABP) in patients undergoing CABG with and without CPB (OPCAB). When intestinal ischemia is limited to a period less than 2 hours only the villi are affected and there is rapid recovery of function. I-FABP is mainly expressed in the villi making it an excellent marker of intestinal ischemia

Methods: Forty patients were randomized to either CPB (n=20) or OPCAB (n=20). Blood samples were collected from the radial artery into ethylenediaminetetraacetic acid (EDTA)-containing glass tubes shortly after anaesthetic induction, at the end of operation and 4,8,12 hours postoperatively. The samples were immediately centrifuged in a refrigerated centrifuge to separate the plasma, which was subsequently frozen and stored at -70°C until assayed.

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Results: There was a significant increase in I-FABP levels immediately postoperatively (p=0.0021) and at 4 hours (p=0.0089). There after no statistical differences were noted between the two groups up to 12 hours postoperatively.

Conclusion: To our knowledge this is the first study to document changes in I-FABP in this patient group. It adds further weight to the theory that CPB induced changes in the splanchnic circulation causes occult damage of the intestinal villi and is responsible for initiation of the systemic inflammatory response.

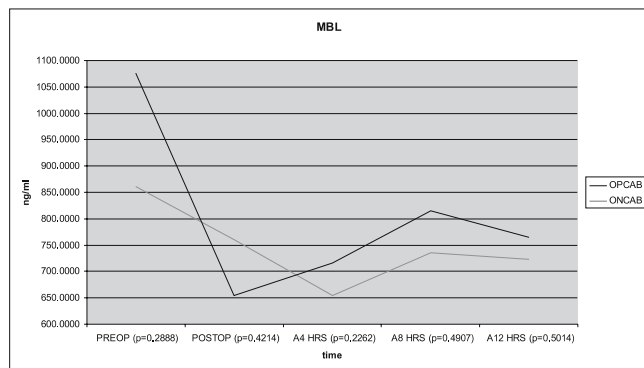
A prospective randomized study to evaluate changes in mannose binding lectin (MBL) as a marker of complement activation in patients undergoing coronary revascularization with and without cardiopulmonary bypass

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Background: Cardiopulmonary bypass (CPB) is a potent activator of the complement pathway and that patients undergoing coronary artery bypass grafting (CABG) with CPB have greater activation of the complement pathway than those without (OPCAB). MBL is involved in the recognition of a wide range of microorganisms and triggers the most ancient pathway of complement activation. We examined the role of MBL as a surrogate marker of complement activation by a third pathway.

Methods: Forty patients were randomized to either CPB (n=20) or OPCAB (n=20). Blood samples were collected from the radial artery into ethylenediaminetetraacetic acid (EDTA)-containing glass tubes shortly after anaesthetic induction, at the end of operation and 4,8,12 hours postoperatively. The samples were immediately centrifuged in a refrigerated centrifuge to separate the plasma, which was subsequently frozen and stored at -70°C until assayed.

Results: There were no statistical differences between the 2 groups.



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Conclusion: This data suggests that the Complement pathway continues to be activated via the third pathway to a similar degree in both groups. However the area under the curve over the 12 hour period is less with OPCAB.

A prospective randomized study to evaluate changes in H-FABP as a novel marker of myocardial necrosis in patients undergoing coronary revascularization with and without cardiopulmonary bypass.

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Background: Myocardial damage in patients undergoing coronary artery bypass grafting (CABG) is an important cause of postoperative morbidity and mortality. A whole body response to cardiopulmonary bypass (CPB) can cause such damage. We examined this hypothesis using a novel marker termed heart type fatty acid binding protein (H-FABP) in patients undergoing CABG with and without CPB (OPCAB). H-FABP is a 15 KDa cytosolic protein that is abundant in the heart. It appears in the blood as early as 1.5 hours after infarction peaks around 6 hours and returns to baseline values in 24 hours.

Methods: Forty patients were randomized to either CABG with CPB (ONCAB) (n=20) or OPCAB (n=20). Blood samples were collected from the radial artery into ethylenediaminetetraacetic acid (EDTA)-containing glass tubes shortly after anaesthetic induction, at the end of operation and 4,8,12 hours postoperatively. The samples were immediately centrifuged in a refrigerated centrifuge to separate the plasma, which was subsequently frozen and stored at -70°C until assayed.

Results: There was a statistically significant increase in H-FABP immediately post operatively in the CPB group post operatively (p<0.001), 4 hours (p<0.0266), 12 hours (p<0.0319).

Conclusion: Patients undergoing CABG with CPB suffered greater myocardial damage as detected by changes in H-FABP. Further randomised studies are required to validate the role of H-FABP in this patient group.

A prospective randomized study to evaluate changes in B-FABP as novel marker of neurological injury in patients undergoing coronary revascularization with and without cardiopulmonary bypass – Preliminary results

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Background: The institution, maintenance and discontinuation of cardiopulmonary bypass (CPB) is associated with considerable neurological morbidity. Postoperative neurological deficits occur in 0.8- /5.2% of patients, whereas neuropsychological disorders occur in 26-79% of patients. The aim of this study was to assess the relative contribution of CPB in patients under going coronary artery bypass grafting (CABG) with and without CPB (OPCAB).

Methods: Thus far 27 patients have been randomized to either CABG with CPB (ONCAB) (n=12) or OPCAB (n=15). Blood samples were collected from the radial artery into ethylenediaminetetraacetic acid (EDTA)-containing glass tubes shortly after anaesthetic induction, at the end of operation and 4,8,12 hours postoperatively. The samples were immediately centrifuged in a refrigerated centrifuge to separate

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the plasma, which was subsequently frozen and stored at -70°C until assayed.

Results: There was no statistically significant change in B-FABP levels at any of the specified time points. Further more there was no correlation with either H-FABP or S100 beta levels.

Conclusions: The frontal lobe has the highest concentrations of B-FABP. B-FABP is not detectable in plasma or serum in healthy individuals. In mild traumatic brain injury, serum concentrations of B-FABP were elevated in 68%. In electroconvulsive therapy, B-FABP in serum was elevated in 6% of all samples. The concentrations of brain markers in plasma have to be evaluated with care to prevent a mix up of changes in blood-brain barrier permeability and real brain tissue injury. The fact that we can detect B-FABP suggests that both OPCAB and ONCAB cause similar levels of neurological injury.

Offpump coronary revascularisation - Are the gender paradoxes beginning to vanish?

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Background: Women have been associated with a high prevalence of perioperative morbidity and mortality in coronary artery bypass grafting. We retrospectively studied our cases done over last two years to see whether the increasing performance of off pump coronary bypass grafting has improved the outcomes in women.

Methods: We retrospectively compared 752 women with 4870 men who underwent off pump coronary bypass grafting from July 2004 to June 2006 at our institute. Women were older (64.26±8.09 vs 60.16±9.42) but has similar incidence of diabetes, hypertension and preoperative myocardial infarction. They are more likely to present with emergency status (63% vs 56%) although they have better preserved left ventricular function (62% vs 56.9% with normal & 8.5% vs 12.7% with <30% ejection fraction) compared with men.

Results: The extent of coronary artery disease was same as shown by angiography. Mean number of grafts women received were less (2.73±0.82 vs 2.85±0.82) and were less likely to receive internal mammary grafts (83.5% vs 70%). The mean ICU stay (3.7±1.5 vs 2.3±1.2) and hospital stay (9.5±6.5 vs 8.7±5.2) were longer. The preoperative mortality was 1.6% in women compared to 0.8% in men.

Conclusion: Off pump coronary bypass grafting has low perioperative morbidity and mortality in women. Although, better and acceptable, the morbidity & mortality is still higher compared with men.

Aortic homografts: experience of two techniques in Tasmania, Australia

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Background: Implantation technique is one of the potential mechanisms of aortic homograft failure.

Methods: We did retrospective review to evaluate the early and long term outcomes of patients undergoing homograft implantation with either freehand or aortic root replacement technique. From January 1992 through October 2006, 28 Patients have undergone cryopreserved homograft aortic valve replacement at our institution. From January 1992 to 1998, free hand technique was used since then root replacement. Early results were accessed with intraoperative transesophageal echocardiography while recent surface

echocardiograms of all hospital survivors provided long term follow-up. Critical analysis of failed homografts was done.

Results: All patients survived the operation. In the freehand AVR group of 14 patients, 1 lost to follow-up and 2 died of cardiac causes. In the homograft aortic root replacement group of 14 patients, 2 lost to follow-up and 1 died of cardiac cause. In freehand group, 2 patients had early reoperations and 4 patients had late reoperations because of homograft failure. 7 out of 14 patients developed more than moderate aortic incompetence in the long term follow up in freehand AVR group. Though no early reoperations were required in root replacement group, 1 patient did not survive emergency coronary artery bypass grafting done 6 months after his homograft surgery. All survivors are free from thromboembolism and infective endocarditis.

Conclusion: There was no early mortality in both groups. However, freehand group had significant early and late homograft failure necessitating reoperation compared to none in root replacement group. We conclude that root replacement is near ideal aortic homograft implantation technique with least risk of homograft failure.

Complete ring mitral annuloplasty in children with mitral regurgitation

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Background: To demonstrate ring annuloplasty in, 65 cases (35 males and 31 females) for repair of the mitral valve, for mitral regurgitations due to annular dilatations.

Methods: Mean age of patients 52.15 years (range 4-60 years). Technique using Gortex-Ring cut from Gortex aortic tube graft is cheap, embedded around Annulus using 3-0 prolene sutures, to advance the posterior annulus, anteriorly for better coaptation to reduce MR. Irrespective of the size of annulus, size of Gortex tube graft, for ring is selected according to Normogram's of Rowlatt J. F et al (1963) using Body surface area. Operative technique was successfully used in 65 young children and adults aged (4-10 yr-15 pts; 11 to 15 yr 29pts; rest adults (>15yr) with history of rheumatic heart disease 16 cases. The 4 cases in NYHA class IV, 26 cases, in class III and 31 cases in class II and on decongestive drugs rest in NYHA CI-I. 2D Eco confirmed central jet of MR annular dilatation, good pliability of leaflets, Minimal fibrosis and Subvalvular fusion without calcification LV dilatation or Pulmonary hypertension. (Maximum LVIDD 5 cm 8 pts with normal ejection fraction). Six patients needed concomitant aortic valve replacement. Ring annuloplasty repair was associated with commissurotomy in 7 cases, AML cleft repair 3 cases; chordae shortening 15 cases. Patients pre-op 2D Echo, TEE on operations, repeat on 10th day before discharge and repeat echo after 3 mo/6mo/1 yr/3yr were done showed minimal or trivial MR with NYHA-CII and drugs with 100% follow up.

Results: All patients remain in NYHA class I with minimal decongestive drugs penicillin prophylaxis and no anti coagulants which was stopped after 3 months. Only one patient, who had commissurotomy associated with ring annuloplasty, developed mitral re-stenosis after 36 months. She was treated with Balloon Mitral Valvotomy. There has been no early or late death. The mean duration of follow up is 60.2±5.3 months (12 to 120 months).

Conclusion: It is easily reproducible technique with good results.

Aortic root enlargement by manougian technique- Early experience

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Background: Managing severe aortic stenosis with small aortic root is a surgical challenge. A small subset of patients require root enlargement for implantation of appropriate sized valve to avoid long-term complications due to patients-prosthesis mismatch. Aortic root enlargement using manougian technique allows placement of atleast adequate sized prosthesis in patients without much patient-prosthesis mismatch. Present study involved placement of adequate size prosthesis by manougian technique using glutaraldehyde treated pericardial patch. Decreased trans-valvular gradients and improvements in functional class were the outcomes assessed.

Methods: Patients with aortic stenosis undergoing aortic valve replacement with intra operative inability to place 19 mm valve sizer after excision of valve leaflets underwent manougian technique.

Results: 7 (2.4%) of 288 patients required aortic root enlargement by manougian technique using glutaraldehyde treated pericardial patch. 2 (28.57%) patients were in NYHA class II, 3 (42.86%) were in NYHA class III and 2(28.57%) were in NYHA class IV. IV 6 (85.71%) patients had uneventful outcome. One (14.29%) death occurred in NYHA class IV patient. Statically significant reduction from 108.16 ± 30.5 mmhg to 18.5 ± 9.01 mmhg ($t_s = 13.874$, $df=10$, $p < 0.000005$) was observed in peak systolic gradients. The mean systolic gradients reduced from 59.33 ± 17.6 mmhg to 10.38 ± 5.85 mmhg ($t_a = 12.81$, $df=10$, $p < 0.000001$)

Conclusion: Manougian technique is safe, effective and reproducible. This allowed placement of appropriate sized valve in patients. Studies assessing long-term outcome with emphasis on regression of LV hypertrophy and exercise tolerance are recommended.

Left ventricular rupture complicating mitral valve replacement- Technique of repair and surgical results

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Background: This study was aimed to review our experience with left ventricular Rupture (LVR) complicating mitral valve replacement (MVR).

Methods: Analysis of patients with documented LVR after MVR at GKNM Hospital between January 1997 and October 2006.

Results: The incidence of LVR was five among 717 MVRs (0.7%) and one among 225 aortic and mitral valve replacements (0.4%). Age ranged from 45 to 65 years. Five had calcific mitral stenosis. One had mitral regurgitation. Both mitral leaflets were excised in all six. Ball in cage prosthesis was used in three, stented porcine valve in one and bovine pericardial prosthesis in two. Two had posterior leaflet excision to accommodate a larger prosthesis. One had extensive decalcification of posterior annulus. Three had atriotric ventricular disruption (type I LVR). Three had midventricular rupture (type III LVR). None had type II LVR at papillary muscle base. Repair was by re-institution of cardiopulmonary bypass, cardioplegic arrest, teflon felt and 3/0 polypropylene sutures. Three out of four survived when LVR recognized in operating room (OR). One of two survived when LVR recognized in intensive care unit (ICU). On follow-up two patients have preserved left ventricular function and two have mild to moderate left ventricular dysfunction. One has left ventricular pseudo aneurysm. There is no paravalvular leak or late mortality.

Conclusion: LVR is a rare but dreaded complication following MVR. Survival is better if recognized in the OR. Preservation of posterior leaflet in preference to a larger prosthesis may avoid this complication.

Long term follow up of combined chordoplasty for correction of anterior mitral leaflet prolapse during mitral valve repair

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Background: Anterior mitral leaflet prolapse has been corrected by using chordal shortening / transfer and Goretex neochordal construction. We have used a technique of combined chordal shortening (troughless) and goretex neochordal construction which has allowed easy correction of extensive anterior mitral leaflet prolapse. We wanted to evaluate the stability of this method of repair.

Methods: Between Sept 1997 to Sept 2000, 104 cases of mitral valve disease which had significant mitral valve prolapse and had received combined chordoplasty for the anterior leaflet were successfully repaired. These cases which were repaired were followed up with serial echocardiograms. Significant MR due to recurrent anterior leaflet prolapse / chordal tears or findings at reoperation was noted on follow up.

Results: Mean follow up is 7.9 years. In 104 cases 92 were rheumatic in pathology and the remaining 12 were myxomatous valves. 1 patients died due to fungal endocarditis 4 patients were reoperated (all rheumatic) and intraoperatively the recurrence was found to be due to progression of rheumatic activity with posterior leaflet retraction. The combined chordoplasty was intact and there was no recurrent anterior leaflet prolapse. 4 cases have had progression of MR due to recurrent rheumatic activity and Echoes have shown further PML scarring to be the etiology with no AML prolapse. None of the myxomatous valves had recurrent MR.

Conclusion: Combined chordoplasty is a stable method of correction of extensive anterior mitral prolapse during mitral valve repair.

Early anticoagulation therapy after valve replacement and its related complications

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Background: Anticoagulation is started early after mechanical valve replacement but there is no consensus on optimal therapy to prevent early thrombotic complications without risk of post-operative hemorrhagic events. We present a retrospective analysis of various anticoagulation protocols from our institute.

Methods: Between July 2001 to September 2006, 453 patients had valve replacement were divided into three comparable groups depending on anticoagulation regime, Group-A (201 patients) received only oral anticoagulation from first post-operative day, Group-B (142) were initiated LMW Heparin in addition and group-C (110 patients) unfractionated Heparin, twelve hours after surgery. INR was performed daily and dose of anticoagulation titrated to reach target levels. After discharge patients repeated INR and informed telephonically apart from regular follow up.

Results: Mean post-operative drainage after 48 hours was 514.08 ± 202 (Group A), 783.36 ± 369.67 (Group B) and 718.39 ± 305.46 (Group C). 2 Patients in Group A, 10 in Group B and 6 in Group C required reinsertion of intercostal/pericardial drain for collection. Five patients had tamponade (Group B-3, Group C-2) and 7 required re-

exploration more than 48 hours after surgery (Group B-5, Group C-2). Incidence of valve thrombosis within first six months was three (one in each group). Two had suboptimal INR third had INR>5 with congestive hepatic failure. All three were successfully thrombolised and recovered after initial ventilatory and inotropic support. Incidence of stroke was low in all groups.

Conclusions: Early oral anticoagulation alone is associated with minimum complications. Early supplementation with Heparin increasing risk of hemorrhagic complication without any decrease in thromboembolic events.

The use of right angled chest drain through midline vs conventional chest drain through lateral chest wall following open heart surgery

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Background: To investigate differences between amount of pain and early clinical outcome associated with the use of right angled chest drains through midline, as compared with the conventional chest tube after undergoing open heart surgery. A prospective analysis of data on the no. of days drainage, amount of pain (Visual analog scale), requirement of analgesics, post operative ventilatory support, length of post operative stay & need for further drainage from either the pleural or pericardial spaces was performed.

Methods: One hundred patients undergoing open heart surgery received right angled drains through midline while 100 patients had conventional lateral drains at our institution between Aug 1st 2005 and Aug 1st 2006.

Results: In patients in the right angled drain group, no of days of drainage was 3.5 days, amount of pain by visual analog scale (grade 0 i.e. no pain to grade III mild pain), analgesic requirement for 1.5 days, post operative ventilatory support 6-8 hours, length of post operative stay was 8.5 days, and the need for further drainage from pleural space was noted in 4 patients. While in the conventional chest drain group, no of days drainage was 3 days, amount of pain by visual analog scale (grade V to grade VII), analgesic requirement for 2.5 days, post operative ventilatory support 8-10 hours, length of post op stay was 9.5 days and the need for further drainage from pleural space was observed in 2 patients. There was no significant difference in the number of days of drainage, duration of post operative ventilation and post operative stay in both groups. There was more amount of pain & requirement of analgesics in conventional chest drainage group.

Conclusion: Right angled drains inserted through midline are equally effective as the conventional chest tubes with less amount of pain & less requirement of analgesics with no statically significant difference in the post operative ventilatory support, extubation & hospital stay.

Study of mitral valve replacement in rheumatic patients with previous CMV/BMV intervention

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Background: We reviewed our experience in rheumatic patients who had undergone mitral valve replacement (MVR) with previous history of closed mitral valvotomy (CMV) or balloon mitral valvotomy (BMV) for mitral stenosis and assessed the risk factors affecting the mortality, morbidity and late survival.

Methods: We retrospectively reviewed 126 rheumatic heart disease patients who underwent MVR between January 1987 and December 2004 with prior history of CMV or BMV intervention. Of 126 patients, 101 patients (80.2%) had underwent prior CMV and 25 patients (19.8%) had underwent only BMV as prior intervention.

Results: There were 5 early deaths (4.0%). Mean follow-up duration was 52.38±42.99 months (range: 2 months to 202 months). 8 patients had late mortality. 11 patients had a thromboembolic complication (4.32 events per 100 patients-years), 36 patients were re-admitted for congestive heart failure (11.64 events per 100 patient-years), 1 patients had prosthetic valve endocarditis (0.24 events per 100 patients-years), 2 patients had bleeding events (gastrointestinal bleeding) 0.36 events per 100 patients-years). The mean cardiopulmonary bypass time, perioperative blood loss and duration of post-operative hospital stay was significantly higher ($P<0.05$) in the post-CMV group in comparison with post-BMV group.

Conclusion: Advanced preoperative NYHA class, preoperative atrial fibrillation, giant left atrium (≥ 60 mm), left ventricular dysfunction (LVEF<50%), calcified mitral leaflet and type of mitral valve lesion (predominant mitral regurgitation) were significantly associated with lower survival and greater late morbidity rates, respectively. The post-CMV group had higher perioperative complications than the post-BMV group.

Experience of mitral valve repair in young rheumatic – Our institutional data

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Background: Long term results of repairs in rheumatic hearts are not as good as in those in degenerative valve disease. However, in the young patients with rheumatic mitral regurgitation repair allows excellent quality of life by avoiding anticoagulation and prosthetic valve related complication.

Methods: From Jun 2001 to Aug 2006, 595 mitral valve surgeries were performed, of which 112 had preeminantly regurgitation. Amongst them, the valve could be repaired in only 44 patients (7.39%). Pure MR was present in 42 patients and mixed lesion in 2. All patients were operated by a single surgeon, using standard cardiopulmonary bypass and cold blood cardioplegia. Operative procedure included chordal shortening in 12 patients, commissurotomy in 2 and rigid carpentier ring annuloplasty in all patients. Additional procedures include Aortic valve repair-1, aortic valve replacement 1, and modified maze procedure in 7. Mean follow-up duration was 26.8 months. Patients were followed up, besides clinical examination, with Cxr, ECG, and 2D echos.

Results: Out of 44 patients, 42 had none or trivial MR in immediate postoperative period and were discharged on 10th day. Two patients lost to follow up; of remaining 42 patients, two developed moderate MR on 12 months' followup. We had two early mortalities (within 2 months of surgery) due to infective endocarditis. On pre and post op 2D echo-La size (mm) 53.13 ±11.06 vs 41.10±10.8 LVID(s) (mm)-40.24±6.94 vs 32.18±6.81, LVID(d) (mm) 60.29±9.05 vs 45.86 ±7.64 LVES (ml) 47.81±11.9 vs 39.26±10.5, LVED (ml) 112.86±27.2 vs 72.14±17.4, PASP (mmHg) 45.1±16.7 vs 16.08±16.1.

Conclusion: Results of repair are encouraging in midterm follow up for predominantly regurgitant rheumatic mitral valve.

Randomized, prospective, single blind study comparing posterior versus complete chordal preservation during mitral valve replacement

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Background: The early and late hemodynamic benefits of preserving the annulopapillary continuity during mitral valve replacement has been demonstrated retrospectively, however few prospective studies have been done in this regard.

Methods: Forty patients (mean age 28.9) with mitral regurgitation were randomized to undergo either partial or total chordal preservation. The echocardiographically measured LA size, EDV, ESV, EF, LVFS, LVID (s) LVID (d) and LVM values were recorded preoperatively, at discharge and at three months. Between groups comparison was made using unpaired student t test. Within group comparison was made using repeated measure of ANOVA followed by Turkey HSD tests were carried at 5% significance.

Results: Echocardiogram done at discharge showed decrease in the LA size, ESV, EDV, LVID (d) in both groups but it continued to fall at three months only in the TCP group. The EF and LVFS decreased at discharge with PCP and continued to be low at three months whereas in TCP group it fell initially following which there was significant improvement at three months. The LV mass reduction was noted in both the groups at time of discharge and at three months. The reduction was however much greater in the TCP group. ($P < 0.01$).

Conclusion: TCP results in reduced LV chamber size and improved EF compared to PCP. Furthermore LVEF continues to improve as a result of improved remodeling. Therefore when MVR is necessary attempts to preserve all chordal structure should be made to optimize early and late LV systolic function.

Early results after mitral valve repair

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Background: Mitral valve repair many advantages over mitral valve replacement, in terms of lower rate of thrombo-embolism, infective endocarditis and better preservation of left ventricular function. We present early results after mitral valve repair in our patients.

Methods: From March 2005 to September 2006, twenty one consecutive patients had mitral valve repair as an isolated ($n=12$; 57.14%) or combined procedure ($n=9$; 42.85%). The age range was 8 years to 78 years with mean age of 41.76 (+20.7) years. There were 5 (23.8%) females and 16 (76.2%) males. The mean left ventricular ejection fraction was 47.5 (+16.4%). The valve disease was rheumatic in 10 (36.2%), ischaemic in 6 (28.6%), mitral valve prolapse in 2 (9.5%), congenital in 2 (9.5%) and degenerative in 1 (4.7%) patients. Surgical techniques included P2 quadrangular resection ($n=3$; 14.3%), triangular resection of anterior mitral leaflet ($n=2$; 9.5%), commissurotomy ($n=5$; 23.8%), annuloplasty alone ($n=1$; 4.7%), division tertiary chordae ($n=7$; 33.3%), and splitting of the papillary muscle ($n=5$; 23.8%).

Results: There was no operative mortality. Immediate post-operative echocardiography showed, no or trivial mitral regurgitation in all patients. The mean cardiopulmonary bypass time and aortic cross clamp time were 79.9 (+34.4) and 62.7 (+38.6) minutes, respectively. The mean blood loss was 120 ml and there were no re-explorations. There were no significant complications related to central system, respiratory and renal systems. The mean ICU stay was 3.7 (+2.1) days and the mean hospital stay was 5.0 (+2.3) days.

Conclusion: The preliminary experience provided promising early

results. We found mitral valve repair is safe and effective with simultaneous preservation of left ventricular ejection fraction.

Is bental procedure possible without operative mortality

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Background: Composite valve graft replacement (CGR) is currently the treatment of choice for a wide variety of lesions of the aortic root and ascending aorta. Operative mortality after CGR has been high in most studies and prolonged stay at the intensive care unit is common. We report results following CGR at our institute.

Methods: Between December 2004 and September 2006, sixteen patients (15 males, 1 female) with a mean age of 47.4±18.8 years underwent CGR using button technique. Three patients (18.7%) had annuloaortic ectasia and thirteen (81.3%) had aortic dissection.

Results: There was no operative mortality. Mean postoperative intensive care unit (ICU) stay was 7.6±8.8 days. Two patients had prolonged ICU stay because of mesenteric artery ischemia in one patient and dissection of distal aorta in the other patient.

Conclusions: CGR can be performed with low operative mortality and morbidity. The button technique offers some advantages and should be used whenever possible.

Late re-operation due to patient prosthesis mismatch in aortic position is unlikely in rheumatic patients

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Background: Rheumatic heart disease (RHD) and congenital heart disease (CHD) remains the two most common cause of aortic valve replacement (AVR) in children. Implanting adequate size prosthesis is important to avoid patient prosthesis mismatch and re-operation. Annular enlargement may be required for implanting adequate size prosthesis.

Methods: From January 2001 till July 2006. 41 patients underwent AVR with St. Jude medical regent mechanical heart valve prosthesis using standard cardiopulmonary bypass technique. 22 patients had associated mitral valve replacement. 36 patients were operated for RHD and 5 for CHD. In group A, 33 patients had predominantly regurgitant lesion (AR) and only 3 patients had pure stenosis along with severe mitral regurgitation (MR). All patients in-group B had bicuspid aortic stenosis. Two of them had previous balloon aortic valvotomy.

Results: Patients with CHD needed early intervention than RHD group (10±4.12 years Vs 15.53±2.59 mm). The mean size of valve implanted in RHD group was significantly larger (21.33±2.59 mm Vs 17±0 mm, $p < 0.005$) than CHD group. As a result, the mean indexed effective orifice area was significantly larger (1.87±0.29 mm²/m² Vs 1.47±0.54 mm²/m², $p < 0.05$) in RHD group. Only one patient with RHD (2.7%) needed aortic annular enlargement. Where as in CHD group, 3 patients (60%) had annular enlargement.

Conclusion: In our study aortic valve replacement in children with RHD is predominantly due to AR. Implantation of relatively bigger size prosthesis with significantly larger orifice area was possible with very low incidence of annular enlargement compared to patients with CHD. Therefore late re-operation due to patient prosthesis mismatch is unlikely in rheumatic patients.

Mitral valve replacement in restenotic patients after CMV—Our experience

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Background: Patients with Rheumatic Mitral Stenosis after under going closed mitral valvotomy develops restenosis. They usually presents after 8-10 years with complaints of BOE, Palpitation & TEE. Intraoperatively, Surgeons encounter difficulty in adhesionolysis and deairing. Aim of this study was to consider intra operative problems and post operative results.

Methods: Between July 200-June 2006, 156 such cases of restenosis underwent MVR and were reviewed retrospectively. LA approach was used in 124 cases while 32 cases were done through RA approach. Starr Edward valve was used in 96 cases, St. Jude in 21 cases, Midrtonic in 27 cases & Carbomedics in 12 cases. Limited adhesionolysis over part over RV, RA and LA was done. In patients operated through LA approach, Interatrial groove dissection was done to facilitate MVR. Deairing was done by making valve incompetent using foleys catheter no. 8.

Results: Intraoperatively valve replacement was difficult due to limited adhesionolysis. Out of 156 cases there was an over all mortality of 17 cases. Early mortality due to massive haemorrhage was seen in 3 cases, Irreversible myocardial failure was seen in 4 cases (3 cases had pre op inotrope support) while 10 cases died of sepsis with multiorgan failure. There was no incidence of stuck valve or post operative cerebrovascular accident.

Conclusion: Limited Adhesionolysis makes valve replacement difficult since it is difficult to pull out valve but avoids problem of cardiac injury and hemorrhage. Inter atrial groove dissection helps in valve replacement through LA approach. Retrograde deairing by making valve incompetent using foleys catheter no. 8 reduced cerebrovascular accidents.

Five year follow up of TTK chitra valve in victims of Bhopal gas tragedy

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Background: Between January 2001 and March 2006 total to 429 patients, all victims of the Bhopal Gas tragedy underwent single or double valve replacements with TTK Chitra valve. This prospective study was aimed at determining the incidence of valve related events and assess valve performance up to five years.

Methods: A total of 269 patients underwent mitral valve replacement with either partial or total preservation of chordal apparatus using TTK Chitra valve. Aortic valve replacement was done in 80 patients and double valve replacement in 79. Data collection was conducted by detailed formatted data entry sheets, by patient questionnaire, echocardiographic evaluation at 3 months and at each follow up visit. Follow up was 90% complete.

Results: The overall operative mortality was 3.4% with no valve related deaths. In 1094 patient years of follow up there were additional 40 deaths. 25 deaths were valve related: 11 were neuroembolic, 5 from endocarditis and 9 from bleeding events. Late valve related complications (> 30 days) included 16 episodes of major bleeding, 9 permanent neuroembolic events, 27 transient neuroembolic, 8 peripheral emboli, 15 valve thrombosis, 6 infective endocarditis (2 MVR, 3 AVR and 1 DVR) and 4 paravalvular leaks. All paravalvular leaks occurred in patients with endocarditis. Reoperation for endocarditis was required in 6 patients.

Conclusion: These results indicate that intermediate term with the TTK Chitra valve are excellent in this group of patients making it a viable low cost option in situations where cost is a decisive factor, though long term follow up is warranted.

Choice of prosthetic valve—Is there a change in the outlook in the indian subcontinent

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Background: Choice of valve is mechanical in young and tissue in older patients. Incidence of valvular heart disease is common among lower strata and anticoagulation-related complications high. Literature describes anticoagulation-related hemorrhage around 30% at 10 years, 1/3 being fatal. Compliance with anticoagulation and standardization of prothrombin test in remote areas is unsatisfactory.

Methods: We retrospectively analysed the proportionate usage and age-wise distribution of prosthetic valves (Mechanical and Bio-prosthesis) implanted in our institute between January 2000 and June 2005.

Results: 1175 patients underwent valve replacement during this period. 1383 valves were implanted, 651 patients underwent mitral valve replacement, 316 patients underwent aortic valve replacement and 208 patients underwent mitral and aortic valve replacement. Bio-prosthesis usage increased from 7% in 2000 to 44% in 2005. There was increase in usage of bio-prosthesis in all age groups with significant increase in age group 40 to 60 years. Percentage of bio-prosthesis used in 41 to 50 years age group rose from 2% to 74% and in age group of 51 to 60 years rose from 4% to 86%. The lower age limit for bio-prosthesis implantation had significantly come down.

Conclusion: There was liberal use of bio-prosthesis in all age groups. We believe that an elective redo surgery is much safer than implanting a mechanical valve and subjecting the patient to life long oral anticoagulants and its complications, when the compliance and follow-up are questionable. Though degeneration of bio-prosthesis is a limiting factor, newer models with better preservation techniques will give increased durability.

Aortic valve replacement with the carbomedics supra-annular top hat valve: Midterm results and impact on patient prosthesis mismatch

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Background: Superior haemodynamic performance by supra-annular valve (SAV) enables greater effective orifice areas (EOA). We analysed peri-operative and mid-term survival in patients undergoing aortic valve replacement (AVR) ± coronary artery revascularisation (CABG) in our unit from 1997 to 2006 with Carbomedics SAV or non-SAV.

Methods: Prospectively collected data on consecutive patients undergoing AVR (±CABG) with Carbomedics SAV or non-SAV was analysed. Projected EOA was evaluated from in vitro data. Values were indexed to body surface area (cm²m²). Patient prosthesis mismatch (PPM) was defined as projected EOAI < 0.6 cm²m⁻². Mismatch incidence was compared to cohort undergoing AVR with non-SAV valve. Long-term survival data obtained from British Institute of National Statistics.

Results: 230 patients had AVR with Carbomedics SAV with 4 in hospital deaths (1.7%). There were 2 deaths in 166 patients who

underwent lone AVR with SAV valves (1.2%). There were 2 deaths in 64 patients who underwent concomitant CABG (3.1%). 8-year survival data was available (Median 3.3 years). There were 22 late deaths. 5-year survival was 91%. Implanted valve sizes were 19 mm (5), 21 mm (40), 23 mm (95), 25 mm (74) and 27 mm (15). The mean EOAi was 0.92 ± 0.14 . Projected PPM did not occur and no root enlargement procedures were required. 355 patients had non SAV AVR during this period with 6 predicted to have an EOAi < 0.6 (1.7%) and 3 requiring root enlargement procedures.

Conclusion: Carbomedics Top Hat SAV resulted in satisfactory hospital and mid term survival. Haemodynamic performance is improved, with reduced risk of PPM without need for root surgery.

Geoform ring annuloplasty for mitral regurgitation in ischaemic dilated cardiomyopathy—Study of 16 cases

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Background: MR in patients with ischemic and dilated cardiomyopathy results from LV distortion. Long term results of mitral valve repairs in patients with ventricular remodelling secondary to CHF are dismal and need to be combined with ventricular restoration procedure. The study aims to demonstrate MV repair using Geoform ring in 3 cases of Ischemic Cardiomyopathy with functional Mitral Regurgitation with or without SVR (Surgical Ventricular Restoration).

Methods: 16 ischemic cardiomyopathy patients were included in the study. There was Grade III MR due to LV distortion-apical displacement and annular dilations, with LVIDd of 68 ± 8 mm, LVEDV were 200 ± 20 ml. A 26/28 mm Geoform ring was used in these patients. In 14 patients had Geoform ring annuloplasty with CABG, 2 patients had associated SVR.

Results: Mean age of patients was 64 ± 8 years with mean NYHA class 3.4 ± 0.4 . There were 2 deaths in first 30 days (patients with associated SVR). Early echocardiograms showed favorable changes in LV geometry such as decrease in LV volumes, sphericity and improvement in LVEF and NYHA functional class. Patients were further followed up for a period of 9 ± 2 months which demonstrated clinical improvement with no residual MR, no systolic Anterior Motion/Mitral Stenosis was noticed.

Conclusion: Mitral valve repair with Geoform ring improves MR and also reverses the remodeling associated with CHF. These short term results show excellent outcome with Geoform ring directed at reforming LV geometry along with the annulus. However when combined with SVR the early mortality was high. Long term follow-up is mandatory to identify and deleterious effect of this procedure.

Clinical and hemodynamic evaluation of mitral valve surgery in children aged 16 years and below

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Background: Rheumatic heart disease continues to affect mitral valve in children especially in the developing countries. Mitral valve surgery aims at restoring correct hemodynamics.

Methods: One hundred and thirty six patients aged 16 years and below underwent mitral valve operation between July 1994 and

September 2006. The surgeries performed were CMV (9), OMV (12), MVRs (94) and DVR (21). The concomitant procedures included aortic valvotomy (1), AV repair (2), AVR (1), Tricuspid annuloplasty (12) and ASD closure (10).

Results: There were 5 hospital deaths (3.6%) (4 MVRs, 1 MVR AVR). One patient died late at the mean a follow up of 68.9 months. Two patients who underwent CMV required MVR at a mean follow up of 53.5 months for mitral restenosis. One of these patient is awaiting re-intervention for somatic outgrowth. Starr Edwards valve was the prosthesis used in mitral position. The mean preoperative and postoperative follow up MV orifice areas (cm^2) were as follows:

	CMV	OMV	MVR	MVR AVR
Preop	0.7 ± 0.41	0.7 ± 0.51	2.17 ± 0.81	2.26 ± 0.84
Postop	2.1 ± 0.93	2.5 ± 1.83	2.7 ± 1.92	2.5 ± 1.2

There was significant reduction in LVEDD and LVESD after surgery. At follow up all patients were in NYHA I. There was no instance of structural valve dysfunction or endocarditis. 5 patients (3.65) had anticoagulation related bleed and 3 (2.2%) patients had cerebrovascular accident.

Conclusion: Valve surgery, more so prosthetic valve replacement in the paediatric age group remains challenging. Starr Edwards valve has a physiological advantage and can be safely used in young patients with severe rheumatic valve disease.

Aortic valve surgery in patients with patent internal mammary graft

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Background: Redo Aortic valve replacement (AVR) after previous CABG in patients with patent Internal mammary pedicled grafts (IMA) poses a high risk because of the dual nature of the underlying ischaemia and Valvular heart disease. The surgery is challenging because of the extensive IMA dissection required which can result in a small but significant risk to injury to the graft resulting in high mortality. Aortic cross clamping in AVR, unlike in mitral valve surgery, requires mandatory aortic cross clamping unless deep hypothermia and circulatory arrest is used. Various techniques are now being described to perform such high risk surgeries without IMA dissection.

Case report: Two cases who had undergone CABG with LIMA to LAD as one of the grafts presented subsequently for AVR for calcific aortic stenosis. In both the cases IMA was patent and it was decided to place the patients on CPB with axillary artery cannulation as femoral arteries in these cases were not suitable for cannulation and the ascending aorta was heavily calcified. No attempt was made to dissect the IMA and patients were cooled to 20°C. The aorta was cross clamped and cardioplegia delivered by antegrade and retrograde route to arrest the heart with hyperkalaemic state and AVR carried out. Further cardioplegia was given at frequent intervals depending on the electrical activity.

Conclusion: The traditional approach to redo AVR after previous CABG with patent IMA grafts has been to dissect the IMA and clamp the artery during the period of aortic cross clamping which can cause damage to the artery. To avoid IMA dissection various techniques have been described including continuous ante/retrograde coronary perfusion during AVR or deep hypothermia with circulatory arrest. We have performed surgery on two such patients using the technique of deep hypothermia, avoiding dissection of IMA and delivering cardioplegia by ante/retrograde technique. Both the patients made an uneventful recovery.

Aortic root replacement

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Introduction: Aortic Root Replacement with or without aortic valve replacement, though a major surgical undertaking gives good long term results.

Methods: Between March 2004 and May 2006, 13 patients were operated at Asian Heart Institute. Aortic Valve and Root replacement was done in 7 patients. Aortic valve conservation and Root replacement in 2. Other associated procedures were done in 4 patients.

Results: There was no operative mortality All patients were operated on using Retrograde Cardioplegia and Total Circulatory Arrest with Retro grade cerebral perfusion. BIS was monitored in all patients. Though the operating time was long (average 10 hrs 35 mins), Results were gratifying. The average length of ICU stay was 6.75 days.

Conclusion: The procedure gives good survival and early results. It can safely be combined with other procedures.

Re-do mitral valve surgery-Five years experience of 100 cases.

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Background: Given the good outcome in valve diseases with procedures like CMC, BMV & OMV, many patients are under going these procedures and ending up with re-do surgeries owing to on going disease process. Our study has tried to bring out the various problems faced and post operative outcomes.

Methods: From January 2002 till date we have done 100 re-do cases. Of 100 cases, females (62%) and males (38%), in the age group between 19 years- 65 years (36 years). Post CMC (68%), post BMV (22%), post OMV (10%). Most of the cases turned up after 5-10 years of previous procedure

Results: All cases were operated under CPB, approach was median sternotomy in all cases. Both mechanical (72%) and tissue valves (28%) were used. Average cross clamp 20-50 min (40 min) and average CPB time 60-95 min (80 min). Problem faced was mostly during dissection for adhesions. Dissection was done initially on right side and the left side after going on bypass. Average blood loss was 300-800 ml (450 ml), average ICU stay 24-48 hrs. (26 hrs), average hospital stay 7-25 days (10 days). Apart from the complications seen in fresh cases no further complications were faced but for blood loss which was more in re-do cases. Mortality rate was identical to fresh cases. Follow-up: average 1 month-4 years.

Conclusion: Re-do mitral valve surgeries are quiet effective, safe and without any added complications.

Surgery for tricuspid valve endocarditis

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Background: Tricuspid Valve endocarditis (TVE) is a uncommon condition nearly always confined to habitual drug abusers, long term IV catheters or with implantable defibrillators and pacemakers. Commonest organisms are staph Aureus, strept viruidans and rarely fungal. The surgical treatment of right sided endocarditis remains an issue of debate but fortunately most of these infections can be successfully treated with antibiotics. Vegetectomy, valvectomy with or without valve repair is ideal as replacement is fraught with

recurrence of infection in the small number of cases where surgery is indicated for continued sepsis or heart failure.

Case report: Two cases of TVE were operated because of continued sepsis and failure to respond to antibiotics and antifungals. The first case was a young healthy adult male. a non IV drug abuser who developed fever with haemoptysis. He was placed on ATT initially however after hospitalisation was found to have bilateral pleural effusion with multiple cavity lesions on x-ray and CT chest and echo revealed multiple vegetations on TV leaflets. He was in septicaemia with multiple septic embolisation to lungs and since there was no response to medical therapy he was taken up for surgery. The anterior and posterior TV leaflets were found to be destroyed by vegetations which had to be excised, septal leaflet was preserved and a de-vega TVA was carried out with uneventful recovery. The second case was a 06 years old boy who had undergone bone marrow transplantation (BMT) successfully in our institution for Thalassaemia Major. However 12 weeks post transplant he developed prolonged fever and the Hickman catheter which was in situ was removed, the tip of catheter and blood culture was negative. Echo showed vegetations in the TV which was progressively increasing in size. He was taken up for surgery as he was in intractable septicaemia. There was a large vegetation on the anterior leaflet of TV which was excised. Vegetations grew Enterobacter Aerogenes and he was treated with Impipenem. He remained afebrile with echo showing no vegetations till 06 weeks later when fever recurred and repeat echo showed recurrence of vegetations. Since there was no response to medical therapy he had to be taken up for a re-do open heart surgery. There was a large vegetation on the septal leaflet extending to the chordae, a quadrangular resection was carried out with repair of the leaflet with 5/0 prolene. HPE with culture revealed endocarditis due to Pseudomonas Aerogenes. Recovery was uneventful and child was discharged after 12 weeks of the second surgery with echo showing no vegetations and moderate TR.

Conclusion: Most of the cases of TVE are usually treated with antibiotics and antifungals however a small percentage require surgery for continued sepsis, heart failure and multiple septic emboli. Although a simple operation it carries a mortality of 10-15% with 20% cases requiring TV replacement over a period of 5-15 years. Both the cases reported here were not related to IV drug abuse and surgery was carried out successfully in these high risk patients. This is the first report on successful open heart surgery in a case of Thalassaemia Major who had under gone bone marrow plantation.

Repair of rheumatic mitral valve: Midterm results

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Background: We present our experience as a single team, in the repair of mitral valve starting 2003.

Methods: In the preceding three years 144 patients underwent mitral valve repair at our institution. There were 82 (56.9%) female patients. Mean age of was 27.03±13.11 years. The mean NYHA class was 2.7 with most in NYHA class III & IV. The majority of the patients (93; 63.6%) had regurgitant mitral lesion. 47(32.6%) required concomitant Aortic valve surgery. The most frequent presenting complaints were shortness of breath and palpitation on exertion (107; 733%), Other concomitant pathologies were PDA (3), ASD (2), treated infective endocarditis (3), rheumatoid arthritis (1), CVA (2) and systemic hypertension (2). The Mean Cardiac dimensions were LVIDd 6.12±1.4 cm; LVIDs 4.41±1.21 cm; LA 5.5±1.36 cm. The mean ejection fraction was 62.81±10.23%. The repair process combined several

techniques to obtain a good annular level coaptation of the mitral leaflets.

Results: 90 patients received a mitral annuloplasty ring. The mitral valve was assessed on table with Trans-esophageal echocardiography after the patients was weaned from CPB, only those with mild or lesser degree of regurgitation were accepted. The mean Cardiopulmonary bypass time was 79.15 ± 30 min with aortic cross clamp time of 57.66 ± 24.79 min. 15 patients required revision of repair with good outcome. 122 patients completed at least three month's follow-up. 108 (88.53%) patients were found to be in NYHA class II or less, with mean NYHA class of 1.39 ± 0.59 . 88 (72%) patients had mitral regurgitation of mild or lesser degree, while 29 (23.7%) had moderate to severe degree of mitral regurgitation. The average cardiac dimensions had decreased to LVIDd 5.01 ± 0.94 cm, LVIDs 3.67 ± 0.82 cm, LA 4.62 ± 1.17 cm & EF 58.46 ± 12.69 %. 52 patients completed twelve month's follow-up. 40 were in NYHA I, 1 in NYHA IV. 34 were in sinus rhythm, the cardiac dimensions were LVIDd 5.09 ± 1.03 cm, LVIDs 3.53 ± 1.09 cm, LA 4.70 ± 1.11 cm. The mean EF was 64.58 ± 9.15 %. 33 (63.47%) patients had mild or less degree of mitral regurgitation. one patient had Moderate AR, one patient needed revision of repair in the immediate post-operative period. One patient had hemolytic jaundice, managed conservatively. One patient with Teflon felt posterior collar, required mitral replacement. One patient, with severe mitral regurgitation, succumbed at thirteen months, while another succumbed to massive systemic embolization (Mortality 1.4%).

Conclusion: Mitral repair in post-rheumatic mitral valve is an arduous task which, when carried out in the right patient can yield a very satisfying result, but otherwise works only as a temporizing maneuver for a later valve replacement.

Mitral valve replacement using continuous suturing technique—Ten years experience of 1000 cases.

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Background: Conventional mitral valve replacement is done using multiple interrupted sutures. Our technique of using single suture in continuous fashion has helped us in reducing cross-clamp time with no added complications and excellent results.

Methods: From January 1996 till date we have performed over 1000 cases. In all single suture (Prolene 2-0, 25 mm needle) was used in continuous manner. Of 1000, 62.1% females and 37.9% males, in age group 7 years- 72 years (30 years). All cases were diagnosed as RHD with MS (37%), MR (20%), MS with MR (19.5%) and Re-do cases (23.5%). All patients were operated under CPB.

Results: Approach median sternotomy in 97.4% and rest via right lateral thoracotomy. Average cross-clamp time 25-50 min (40 min.), average CPB time 50-90 min. (70 min.). Both mechanical (71.5%) and tissue valve (28.5%) were used. Average blood loss ~ 250ml – 750 ml (300 ml). Average ICU stay 24-48 hrs (36 hrs). Average hospital stay 7-25 days (10 days). Early complications (<24 hrs): conduction disturbance in 17.2% cases (mostly subsided with medical treatment, 12 patients died). Blood loss requiring re-exploration in 0.63% of cases. Late complications (>24 hrs): haemolysis (0.4%), wound infection (0.5%), infective endocarditis (0.2%), paravalvular leak (0.2%), anticoagulation related (0.4%). Mortality seen in 46 cases. Follow-up average 1 month – 10 years.

Conclusion: MVR using continuous single suture technique has given us good results with no increased complication compared to standard techniques described. It has helped us to decrease cross-clamp time and surgery time.

Third mitral valve replacement: A 24-year results

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Background: Reiterative mitral valve replacement due to prosthetic valve dysfunction entails a high perioperative risk but the long-term follow-up is unknown

Methods: Between 1974 and 2005 a total of 1535 isolated mitral valve replacement were performed and out of those patients 369 required a first reoperation and 77 a second reoperation (third mitral valve replacement). There were 43 women and 34 men with a mean age of 59.8 ± 11.4 years. Indication for reoperations was structural deterioration in 58 patients (67.5%), paravalvular leak in 16 (20%), prosthetic valve endocarditis in 5 (6.3%) and valve thrombosis in 1 (1.2%). Aortic valve replacement was associated in 16 pts (20%).

Results: Hospital mortality was 16.9%. (13 patients). Mean follow-up was 13.8 years (range: 6 months-24 years). Follow-up was complete in 99.2%. Late mortality was 38 patients (49.4%) with an actuarial survival curve of 12.1 ± 7.0 % at 24 years. During the follow-up 21 patients required another reoperation with an actuarial curve free from valve reoperation of 39.1 ± 13.0 % at 20 years.

Conclusion: Reiterative mitral valve replacement due to prosthetic dysfunction has a high hospital and late mortality. Whether to indicate reiterative mitral valve operation or not should be carefully and individually evaluated due to the high associated risk.

Total chordal preservation in pediatric mitral valve replacement

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Background: The aim of this study is to investigate the feasibility of chordal preservation in rheumatic mitral valve in pediatric patients and to assess the effect of this procedure on left ventricular function.

Methods: Between Jan 2001 to Dec 2005, one hundred forty four pediatric patients, age 18 and under, underwent valve replacement of which 56 had preservation of both mitral leaflets with techniques of Mikki repair. The youngest patient was 8 years old weighing 15 Kg. 46 patients underwent mitral valve replacement and 10 double valve replacements. Medtronic Hall and TTK Chitra valves were implanted in 20 patients each. Starr Edward valve in 10 and St. Jude valve in 6 patients. The smallest size of the valve used was #25 mm in 2 patients; however majority (71.4%) received good size of prosthetic valve (ie# 27 or #29 mm or #3M prosthesis) in spite of chordal preservation.

Results: All patients with chordal preservation demonstrated significant improvement in LV function in immediate post op echo and late follow up. There was statistically significant reduction in LV end systolic and end diastolic volume and dimension with an improvement in LV ejection fraction and fractional shortening in chordal preservation group ($p < 0.05$). No patient had obstructed disc or ball movement and LVOT obstruction. There is one mortality and two anticoagulant related haemorrhage.

Conclusion: In younger patients with suitable valve, Mikki repair preserves the LV geometry and hence maintains good LV function without compromising the size of the prosthesis and LVOT obstruction. We have identified few parameters for Mikki repair in pediatric patient.

A study of two dosage regimen of tranexamic acid for blood conservation in patients undergoing cardiopulmonary bypass for valvular heart surgery: A prospective study

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Background: Several studies have reported a beneficial effect of tranexamic acid on Post-operative bleeding with or without a reduction in transfusion of ABP's. In this prospective randomized double blinded and comparative study, we have compared two-dosage regimen of tranexamic acid use for blood conservation in patients undergoing valvular heart surgery under cardiopulmonary bypass. Both the drug regimen do not differ in the use of blood and blood products in post-operative period. Blood and blood products use in peri-operative is related to pre-operative hematocrit.

Methods: The study was a prospective, randomized, double blinded, comparative study of 100 patients undergoing cardiopulmonary bypass for elective cardiac surgery for single valvular heart disease. The patients were divided into two groups of 50 patients each.

Results: In group A (bolus)-> TA 10 ml/kg iv was given 3 times In group B (infusion)-> TA 10 mg/kg i.v. was given at pre incision followed by infusion of 4 mg/kg/hr till the end of the surgery

Conclusion: In conclusion, we found that although peri-operative blood loss was significantly more in 'infusion' regimen, no significant difference in the use of blood and blood products in peri-operative period were found. In consideration of all these findings, we believe that bolus is better than 'infusion' regimen in the control of peri-operative blood loss in patients undergoing cardio pulmonary bypass for valvular heart surgery.

Radiofrequency ablation in patients with AF: Surgical experience in patients undergoing cardiac surgery for rheumatic valvular heart disease

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Background: Atrial fibrillation (AF) in most rheumatic valvular disease cases persists even after correction of the primary abnormality. Maze procedure using radiofrequency ablation is an effective way of eliminating atrial fibrillation.

Methods: We employed radiofrequency energy to create lines of conduction block during valve surgery. Total of 34 patients with AF undergoing valve surgery (32 MVR, 2 DVR) underwent radiofrequency ablation procedure with Medtronic Cardioablate system (monopolar 32, Bipolar 2 cases). Patients were examined for rhythm status with electrocardiograms at 1.6 and 12 months postoperatively. Follow up was 100% complete.

Results: The additional cross clamp time required for ablation was 11±4 minutes. The overall 12-months survival was 85.29% (n=29) and freedom from atrial fibrillation among survivors was 65.5% (n=19). Immediate reversion to sinus rhythm was 70.58% (n=24). All patients received Amiodarone intra and postoperatively. Temporary pacing was required in 14 patients. Postoperative atrial arrhythmias peaked at 1 month, 25% (n=8) and declined to 18.75% (n=6) at 6 months. At 1 year 34.5% (n=10) survivors had ablation failure. Giant LA (>70 mm) and presence of LA clots were recognized as causative factors in failure of the ablative procedure.

Conclusion: Radiofrequency modified maze, as an adjunctive

procedure is safe, time sparing and effective in eliminating atrial fibrillation.

Coapsys mitral valve repair for chronic ischemic functional mitral regurgitation in patients undergoing coronary bypass grafting

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Background: Untreated ischemic functional mitral regurgitation (MR) leads to reduce survival in patients undergoing coronary artery bypass grafting (CABG) and is an ongoing impetus to the progression of heart failure. The Myocor Coapsys Annuloplasty System was designed to reduce the risks associated with mitral repair and replacement, facilitating MR reduction and positive left ventricular (LV) remodeling on a beating heart without the use of atriotomy or cardiopulmonary bypass, thereby improving therapeutic effect on the LV.

Methods: Patients referred for CABG with preoperative grade 2 or greater ischemic functional MR were included in this study (n=31). Patients with structural valve defects were excluded. Coapsys consists of two epicardial pads connected by a flexible chord passed across the LV. The system was size to reduce critical valve dimensions and MR. Clinical and echocardiographic data were collected out to 1 year.

Results: Mean age was 58.2±8.20 years and mean ejection fraction 35.6±7.04%. From baseline to 1-year follow up, effect on MR grade, NYHA class, and LV end-diastolic diameter (cm) were, respectively: 2.9±0.59 to 1.2±1.19, 2.6±0.65 and 5.3±0.63 to 4.6±0.56 (all p<0.05 vs. baseline). Reduction were also seen in several measures of mitral annular, subvalvular and ventricular geometry. During follow-up, there were no Coapsys device failures or reoperations for valve surgery

Conclusion: The Coapsys annuloplasty system is effective in reducing functional ischemic MR and improving NYHA class. The implant contributes to acute reshaping and continued positive LV remodeling. These data suggest that the device is safe and benefits are sustained at 1 year.

BD glenn shunt-Without CPB via thoracotomy-Simple and reproducible

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Background: Bidirectional Glenn Shunt provides excellent palliation-mode of treatment for patient with functionally univentricular heart. Conventionally glenn shunt is performed via mid sternotomy. We report our experience of glenn shunt performed via thoracotomy without cardio. Pulmonary. Bypass.

Methods: At J. N. Medical College Karnataka, 21 patient from (Jan 2002 to Sep 2006) age ranged 3 to 180 months (Mean-30 months) 12 males, 9 females underwent glenn shunt via right thoracotomy (14 cases, left thoracotomy 1 case and Mid sternotomy 6 cases) 8 Patients had undergone earlier. Modified BT Shunt & one had undergone PA Banding. Reason for mid sternotomy was presence of PDA with LPA stenosis (2 cases); presence of right & left SVC requiring anastomosis with RPA-LPA 4 cases (One case being dextro cordia with complete AV canal with pulmonary atresia & other being AV canal with pulmonary atresia). 2D Echo revealed, DORV, VSD severe PS in 5 cases, Tricuspid Atresia with severe to atretic pulmonary stenosis 11 cases (with TGA one case), univentricular heart 3 cases; Dextro cordia with posterior atretic pulmonary artery 1 cases and complete AV canal

with PS 1 cases. In 3 cases cardiac cath revealed (AV canal with PS-2 cases, pulmonary stenosis with TGA-1 case). Six patients required cardio pulmonary bypass where 3 patients during operation could not tolerate B.T. shunt clamping other 3 cases had complicated anatomy (TGA posterior pulmonary artery-1, single ventricle with pulmonary atresia-2).

Results: The O₂ saturation improved from pre operative values ranged 63 to 83% (mean 66.12 ± 4.34) improved 84 to 93% (mean 88.62±3.07). Three cases (17.6%) expired, due to secondary problem in intensive care (renal failure 1, septicemia 2 cases). In our hands the SVC & PRA anastomosis takes 8 to 11.5 minutes with mean of 9 min of SVC clamping. All 18 cases discharged; had no neurological and psychiatric problems.

Conclusion: Easily reproducible technique of operation.

Double chambered ventricles: A retrospective clinicopathological study

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Background: Double chambered ventricle is a rare congenital cardiac anomaly, where the ventricular chamber is wholly or partially partitioned usually by abnormal muscular ridges. Double Chamber right ventricle (DCRV) is more common than double chamber left ventricle. (DCLV)

Methods: A retrospective observational morphological study of 31 autopsied heart during a 16 year period highlighted the varied clinical presentations of this pathology and the associated peroperative problems.

Results: DCRV may exist alone with simple cardiac pathologies such as ventricular septal defect, and tetralogy of fallot or more complex pathologies such as transposition of great arteries, double outlet right ventricle, left atrial isomerism, etc. Double chambered left ventricle in our series was an associated asymptomatic anomaly.

Conclusions: Closure of the ventricular septal defect may result in isolated DCRV causing proximal right ventricular (RV) hypertension. Postoperative RV dysfunction may compound the ill effects of missed DCRV, RV hypertension and pulmonary hypertension, if any. Double chambered left ventricle may present as an associated asymptomatic anomaly.

Should we not really give up use of simple transannular patch in right ventricular outflow tract obstructin?

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Background: The use of PTFE monocusp (0.1mm) in right ventricular outflow tract (RVOT) in patient with small pulmonary regurgitation (PR).

Methods: From January to November 2005 total of 34 cases were studied. 11 patients had RVO reconstruction using autologous pericardial transannular patch (Group A) and 23 patients has PTP monocusp reconstruction (Group B). Mean age of patients was 12.82±7.82 and 7.74±6.67 respectively. The clinical outcomes of two Groups were compared and followed up ranging from 7 to 18 months.

Results: During surgery, cardio-pulmonary bypass (CPB) time (182.64±57.42 Vs 214.35±44.54), aortic cro clamp (ACC) time

123.36±54.14 Vs 154.88±33.48 and right and right and left pressure ratio (PRV/LV) (0.63±0.22 vs. 0.78±1.4) were not significantly different. Post operatively ventilation time in hours (28.87±18.22 Vs.39.77±14.69), ICU stay in days (3.49±1.2 Vs 5.45±1.91 P<.005) and hospital stay in days (11.64±4.08 Vs. 16.41±11.35) were favorable for Group B patients. One patient expired in Group A due to post operative severe right ventricular failure. Follow up shows 2 patients in Group A are in NYHA Class II and rest 9 are NYHA Class I. All patients in Group B are in Class I. Four out of 11 patients in Group A had moderate P and the rest have free PR. Whereas in Group B only two patients has moderate PR and one patients has RVO gradient of 40 mm of Hg. Rest all have trivial to mild PR and no significant RVOT obstruction. Monocusp seen working well in all such patients. There is no late mortality in either group.

Conclusion: Patients with monocusp in RVOT has better post operative recovery and is a viable alternative to simple transannular patch. Monocusp does not produce RVOT obstruction and absence of free PR in the patients with certainly help in long-term results by preventing right ventricular dysfunction at least for mid-term period.

Right anterolateral thoractomy is cosmetically acceptable for atrial septal defect closure in females

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Background: This study was aimed to find whether right anterolateral thoractomy is cosmetically acceptable as a modality for atrial septal defect (ASD) closure in young females.

Methods: All females who underwent ASD closure by right thoractomy (n=95) between 1996-2000 in our institution were included. Postal communication was sent to review them. Thirty two (33.7%) responded. Size, symmetry of breasts, position of the scar, keloid, paraesthesia, scoliosis if any and the patient satisfaction with the scar were recorded. Echocardiography was done.

Results: 17 patients were ≤12 years at the time of operation. Age ranged from 2-22 years (Mean 11.9 years; Median 11 years). Thirty patients had Ostium Secundum ASD. Two had Sinus Venosus ASD. Mean bypass time and cross-clamp time were 38 and 21 minutes. There was no mortality. 21 patients had equal sized breasts. Right breast was smaller than left in eleven (0.5 -4.0 cm). Six patients had paraesthesia at the site of incision. Thirty patients were satisfied with the cosmetic result. Two who had keloid were not satisfied with the cosmetic result. There was no scoliosis observed. Echocardiography showed no residual defects in twenty nine and small haemodynamically insignificant residual defects in three.

Conclusion: Right anterolateral thoractomy is a cosmetically acceptable approach for ASD closure in young females. Majority of females show no difference in breast development and are happy with their scars.

Management of concomitant persistent ductus arteriosus during Intracardiac repair of left to right shunts under cardiopulmonary bypass

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Background: PDA associated with an intracardiac anomaly poses a number of problems. It requires immediate and prompt closure or else it would lead to perfusion of a functionless pulmonary

circulation, with massive return in the operative field along with difficulty in maintaining the perfusion pressure. The aim of this prospective study was 1) To evaluate the strategies to manage PDA during cardiopulmonary bypass. 2) To study effectiveness of early elective pulmonary artery exploration in patients with left to right shunts and severe pulmonary hypertension with suspected PDA.

Methods: 35 patients of various age groups with various intracardiac left to right shunts and concomitant PDA underwent intracardiac repair under cardiopulmonary bypass during January 2000 to October 2005 at KEM Hospital. Based on the techniques employed to correct PDA patients fell into two groups namely intra pericardial extra pulmonary ligation and transpulmonary closure of PDA (both under cardiopulmonary bypass).

Results: More than 75% (26/35) of patients were under 5 years of age with mean age of 3.5 years and M:F ratio of 3:2. The most common intracardiac pathology associated with PDA was VSD. In 9 patients PDA was not diagnosed preoperatively. Extra pulmonary dissection and closure of PDA was done in 20 out of 35 patients while in remaining patients intrapulmonary closure was done. Among patients managed by extra pulmonary ligation PDA was detected preoperatively in majority of them (18/20), while in those patients in whom PDA required intrapulmonary closure 8 out of 15 remained undiagnosed preoperatively. In majority of patients (24/35) among the 2 groups PDA could be closed without much reduction in the perfusion flow rates. However in certain cases with severe pulmonary hypertension and tense and fragile PDA (11/35) reduced flow rates with moderate hypothermia was used. There was a significant difference between the 2 groups of patients who underwent closure under normal flows and temperature (extra pulmonary 7 v/s intrapulmonary 0; $p=0.031$) and also between those who underwent closure at temperatures ranging from 22-27 degree centigrade. (extra pulmonary 1 v/s intrapulmonary 9 $p=0.008$). In 2 cases heart fibrillated during extra pulmonary dissection of PDA. There was no statically significant difference among the 2 groups in terms of mortality or morbidity.

Conclusion: The strategies for the management of PDA during intracardiac repair would be 1) Extra pulmonary dissection and ligation if it is diagnosed preoperatively, small and there is no significant pulmonary hypertension. 2) Trans pulmonary closure of PDA should be done if it is suspected after initiation of CPB, large in size, associated with severe pulmonary hypertension or if there is any undesirable event during extra pulmonary dissection.

Pericardial patch closure of ventricular septal defects

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Background: Ventricular Septal Defect is a common congenital heart disease. VSD closure either by device closure or surgically is an ideal choice. So for one or the other prosthetic patch (PTFE or Dacron) has been used to close the defect surgically. Use of gluteraldehyde treated autologous pericardial patch for VSD closure has not been very common. The fear of postoperative complication in the form of patch dehiscence or aneurysm formation has always been in the mind of cardiac surgeons. To find out the safety and feasibility of Gluteraldehyde treated autologous pericardial patch for VSD closure.

Methods: We are presenting our initial experience with gluteraldehyde treated autologous pericardial patch closure of VSD in 19 patients operated in last one year, from August 2005 to July 2006. The pericardium was treated with 0.6% gluteraldehyde solution

for 10 minute. There were 10 male and 9 female children with age range between 9 months to 14 years and the size of VSD ranged from 6 mm to 25 mm.

Results: These patients were evaluated at 1 postop day, 3 months and at 6 months by echocardiography. No patients were found to have any problem with the patch in this follow-up echo study.

Conclusion: We feel that use of gluteraldehyde treated autologous pericardial patch for closure of VSD is a safe and economical option.

Short term result of PTFE monocusp valve patch enlargement of RVOT

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Background: Transannular pericardial patch enlargement of RVOT in Tetralogy correction is associated with severe pulmonary regurgitation. Moreover it may affect the hemodynamics adversely in immediate postoperative period which may lead to high inotropic drug requirement, prolonged ventilation and long hospital-stay. The present study was aimed to see the beneficial effect of PTFE monocusp valve patch for RVOT enlargement after Tetralogy correction and to evaluate the competency of the valve cusp by serial postoperative echo study. We also want to know that how long PTFE monocusp valve maintains its-function.

Methods: 8 children of Tetralogy of Fallots who underwent ICR between Jan 2006 and July 2006 were selected for the study. 0.1 mm thick PTFE patch was used to make the monocusp. The gluteraldehyde treated pericardial patch was used to enlarge the pulmonary artery and RVOT. In all these 8 patients inotropic requirements, duration of ventilation and hemodynamic parameters were recorded and compared with control. The monocusp valve function was assessed by transthoracic echo on 1st postop day, before discharge, at 1 month, 3 months and at 6 months.

Results: All patients who received PTFE monocusp had smooth postoperative recovery with less inotropic drug requirement, shorter duration of ventilation and better RV function. The follow-up echo study of monocusp revealed good functioning of valve cusp at least up to 6 months.

Conclusion: We conclude that PTFE monocusp valve patch enlargement of RVOT is a safe and effective technique in Tetralogy correction. It reduces the inotropic drug requirements, shortens the ventilation time and reduces the postoperative morbidity and mortality in short term follow-up the valve was found to functioning well.

Atrial septal defect closure by posterolateral Thoracotomy our experience

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Background: Operation for atrial septal defect is considered a low risk procedure, the cosmetic result has become an important issue. Median sternotomy has a high rate of development of keloid especially in our population. For cosmetic reasons, posterolateral thoracotomy is a frequently used option.

Methods: We present our experience with 149 patients (57m/92f) in whom 132 cases underwent a median sternotomy and 17 cases underwent a right posterolateral thoracotomy. Mean age at operation for median sternotomy was 20.6 years (range 3.5-63 years) and for posterolateral thoracotomy was 10.3 years (range-3.5-9 years). Defects

repaired included ostium secundum defects and sinus venosus defects.

Results: Average cardiopulmonary bypass time was 57 mins (range 30-128mins) for median sternotomy and 52.8mins (range 34-107 mins) for thoracotomy. The average cross clamp time was 23.9 mins (range 9-57mins) and 24.5 mins (range 13-44 mins) respectively. There was no operative or late mortality. Postoperative bleeding was average 90ml in thoracotomy and 230 ml in sternotomy. Postoperative pain was found more in thoracotomy cases. Postoperative stay was 9±2 days in both groups.

Conclusions: Atrial septal defects can be safely repaired through a right posterolateral thoracotomy approach. This approach offers the benefit of a total absence of scarring and cosmetic disfigurement of the anterior chest wall especially in our population where the incidence of keloid formation is common.

Closure of ASD under hypothermia and inflow occlusion- Revival of history

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Background: First direct vision ASD closure (first open heart) was done in 1952 using surface hypothermia and inflow occlusion by F John Lewis in USA. With introduction of CP Bypass the trend slowly shifted to close majority of ASDs on bypass. Hypothermia and inflow occlusion became historical event. Due to its simplicity and low cost we started using this method and report here.

Methods: 35 patients between age of 2-29 yrs over a period of 12 months having isolated secundum ASD were selected for this technique. 2 D Echo confirmed diagnosis and ruled out SVC defect, Primun ASD or any other cardiac defect. After anesthesia patient was cooled by surface cooling. At 30 C midsternotomy done and pericardium opened. Tapes were passed around SVC and IVC. At 28 C circulation was stopped by snaring the tapes. RA was opened and ASD inspected. If it was suitable for direct closure, it was closed with 3 or 4 O Prolene in two layers. No suction was done in LA and lungs were ventilated before tying the suture line to remove air from LA. Rt atriotomy was controlled with a large clamp and circulation was restarted by opening the snares. Rt atriotomy was closed. CP Bypass was kept as stand by Pt. was rewarmed to normal.

Results: ASD could be closed directly in all patients and Conversion to CP Bypass was not required. There was no neurological complication. Pt was extubated after few hrs. Post operative drainage was less than 200 ml. Repeat Echo after 7-10 days did not show residual shunt in any patient. There was marked reduction in cost of operation (60-70%).

Conclusion: Closure of simple secundum ASD under hypothermia and inflow occlusion is a safe, simple and cost saving technique. It avoids side effects of CP Bypass. Minimal blood transfusion is required. This technique should be used more frequently and is a good alternative to device closure which is quite costly.

A rare case of anomalous origin and course of the left coronary artery

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Background: An abnormal origin and course of the left coronary artery in living individuals has rarely been reported and it is a potentially fatal condition. We herein describe the treatment and management of a patient who was diagnosed with this ailment.

Methods: A 50 year old gentleman presented to us with complains of angina and dyspnoea on exertion since 6 months. Clinical examination and routine investigations were essentially normal. Suspecting an abnormal origin of the left coronary artery on an echocardiogram, a CT angio was done which showed an abnormal origin and course of the left coronary artery. The left main had its origin from the right coronary sinus and coursed in the inter ventricular septum between the aorta and pulmonary artery before dividing into the left anterior descending and circumflex. We took him up for a coronary artery bypass grafting when a left internal mammary artery to left anterior descending and saphenous vein graft to obtuse marginal 1 grafting were done.

Results: He had an uneventful post operative period and is doing well.

Conclusion: Various coronary artery anomalies have been described. This particular anomalous aortic origin and course of the left coronary artery is not innocuous. Its adverse effects especially during exercise should be considered if the diagnosis is made during the patient's life. Coronary artery bypass grafting remains the treatment of choice to reduce the risk of sudden death.

Nutritional support in pediatric patients who required prolonged intubation after cardiac surgery

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Background: Early nutritional support in patients requiring more than 2 days of mechanical ventilation is important to limit the extent of body protein catabolism.

Methods: Of the 15 patients (9 ventricular septal defects, 4 pulmonary atresias, 1 truncus arteriosus, 1 AP Window) studied, 11 were less than 6 months of age. Total parenteral nutrition (TPN) was utilized for all children and was started 48 hrs after surgery. Extubated patients received enteral feeding after 2 days. The duration of TPN depended on these patients' hemodynamic condition. Nutritional assessment was done by records of serum proteins assay, fluid intake-output, serum electrolytes and weight of patients.

Results: Hyperglycemia was noticed in 6 (40%), pre-renal azotemia in 1 patient and mild cholestatic jaundice in 3 patients. Three patients (20%) developed diarrhea. None of these patients had wound infection or developed septicemia. Two patients expired due to biventricular failure. All other patients were discharged.

Conclusion: Early postoperative parenteral nutritional support has very low complication rate and is safe.

Single stage repair of arch anomalies with intracardiac repair

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Background: Arch anomalies in the form of hypoplastic arch, coarctation and interruption, can occur with associated intracardiac defects. We review our experience with single stage management of arch anomalies with intracardiac repair.

Methods: We retrospectively collected data of 9 children operated between May 2005-October 2006 who underwent arch repair along with intracardiac repair. The mean age was 4 months. The mean weight of the children was 3.2 kg. The primary diagnosis was VSD in

5, dTGA, VSD in 2, VSD with supravalvar stenosis in 1, Truncus arteriosus in 1. The repair was accomplished under a period circulatory arrest (25 min [15-32 min]) by using end to end anastomosis in 2 patients, Glutaraldehyde treated autologous pericardial patch in 2, PTFE patch in 2, Bovine pericardium patch in 3 patients.

Results: There was 2 early mortality. The mean duration of ventilation was 5 days. The mean duration of ICU stay was 7 days. In 4 children the sternum was left open with delayed closure. The mean follow up period is 8 months. There was 1 late death at 2 months. One child who had Glutaraldehyde treated autologous pericardial patch developed recurrent obstruction with a gradient of 60 mmHg a 6 month follow up. He underwent successful balloon dilatation. The mean residual gradient in other children is 15 mm Hg.

Conclusion: Single stage repair of arch repair with associated intracardiac anomalies can be accomplished with acceptable morbidity and mortality. Careful preoperative evaluation is necessary to rule out additional levels of obstruction. Onlay patching can be used to reduce circulatory arrest period. Bovine pericardium and PTFE can be used for patching with acceptable results. Our current patch of choice is bovine pericardium. Longer period of followup is necessary to study the incidence of recoarctation and aneurysm formation in these patients.

Late pulmonary valve replacement following intra-cardiac repair

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Background: Trans annular patch frequently used in correction of congenital cardiac defects often results in pulmonary regurgitation, right ventricular dilatation and dysfunction. This can be accelerated in patients with residual obstructive lesions. They often require a competent valve in the RVOT. We review our experience with this group of patients.

Methods: Sixteen patients underwent PVR for pulmonary regurgitation following intracardiac repair between Apr 2004 and October 2006. The mean age was 16 years, the mean duration between the initial and subsequent surgery was 8 years. All patients were in functional class III with restriction of physical activity. Echo showed RV dilation and dysfunction in all the patients. A bioprosthetic valve was inserted in the RVOT in these patients along with correction of residual defects. 8 patients required PA plasty, 2 patients tricuspid annuloplasty, 2 patients residual VSD closure and 5 patients infundibular resection. One patient each needed RPA stent explanation and RA reduction.

Results: There was no operative mortality. At follow-up (mean of 16 months) 3 patients showed mild valvular regurgitation, mean gradient across the RVOT was 20 mmHg. All patients are in functional class I-II with significant reduction of RV dimensions and improvement in RV function.

Conclusion: Pulmonary valve replacement following RVOT reconstruction can be done with low morbidity leading to significant improvement in functional class and RV dimensions. We conclude that early intervention, competent valve in RVOT, and addressing the residual lesions are the key to preservation of RV function.

Primary pulmonary valve replacement during intra-cardiac repair-Report of 3 cases

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Background: Pulmonary regurgitation after intra-cardiac repair is one of the important reasons for progressive right ventricular

dilatation and dysfunction. These patients might eventually need pulmonary valve replacement the timing of which is controversial. We report our experience with PVR during intra-cardiac repair in patients with right ventricular dilatation and dysfunction at presentation.

Methods: Three patients aged 12,41,42 years underwent pulmonary valve replacement during ICR. Two patients had severe PS, one patient had absent pulmonary valve with severe PR. All patients had evidence of RV dilatation and dysfunction at presentation and had class III symptoms. A 21 or 23 mm bioprosthetic valve was inserted in the RVOT at the time of the ICR. All 3 patients underwent trans-annular pericardial patch augmentation. Continuous suturing technique was used for the PVR.

Results: There was no operative mortality. At follow-up (mean 1 year) all patients are in NYHA class I or II. There is no residual regurgitation, the mean gradient across the RVOT is 20 mmHg. There is significant reduction in right ventricular dilatation and improvement in right ventricular function.

Conclusion: PVR during intra-cardiac repair especially in adult patients tends to reverse the right ventricular dilatation and dysfunction. PVR can be done easily with no additional morbidity. We recommend an aggressive approach in adult patients needing reconstruction of RVOT.

Surgery for adults with complex cyanotic congenital heart disease

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Background: An increasing number of infants and children with complex cyanotic congenital heart disease are surviving to adulthood. This group of patient presents unique problems as they have usually undergone multiple previous surgeries and are at risk for increased morbidity and mortality due long standing hypoxic milieu.

Methods: All patients above the age of 16 years, operated on for complex cyanotic congenital heart disease between February 2004 and February 2006 are included in the analysis. A total of 36 patients underwent surgical treatment, men age was 20.6+/- 5.4 years. Male to female ration was 1.7:1.55% had undergone previous surgery, while 12/36 (33%) had a single ventricle repair. 24/36 (66%) a biventricular repair.

Results: Four patients (11%) died in immediate postoperative period. Two patients were reexplored for bleeding, average blood and blood product usage was 10.2 units. Two patients required prolonged ventilatory and inotropic support for low cardiac output and five patients required pleurodesis for recurrent pleural effusions. Mean intensive care unit stay was 2.8±0.9 days and mean hospital stay was 9.3±2.5 days.

Conclusion: Adults with congenital heart disease are unique set of patients requiring specialized surgical care for their distinctive anatomical and physiological problems. Surgery can be performed with acceptable morbidity and mortality in specialized centers.

Removal of stents during surgical repair of congenital heart defects

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Background: Stents are increasingly being used in the management of children with congenital heart defects. We review our experience with removal of these stents in patients undergoing surgical correction following previous stent placement.

Methods: 4 patients underwent surgical correction who had stent placed previously for various reasons. Two patients had pulmonary artery stents both the patients had undergone previous intracardiac repair for tetralogy of fallot with right and left pulmonary artery stenosis. They underwent pulmonary valve replacement for severe pulmonary regurgitation with pulmonary artery stenosis. One patient had ductal stenting in the palliation of single ventricle with blocked BT shunt with duct dependent pulmonary circulation. One patient had stenting of RV-PA conduit used in Norwood stage I palliation of HLHS which had developed stenosis in the early postoperative period.

Results: Stent removal could be accomplished in all patients. In 2 patients in the stent used for PDA and RV-PA Gore-Tex conduit stenting was jutting into the pulmonary artery and had to be removed during performance of Glenn Shunt. In two patients in whom the stent was used in pulmonary artery the stent had to be removed piecemeal, which resulted in intimal irregularity. Some of the stent struts which were embedded in the intima, had to be left in situ.

Conclusion: When dealing with patients who have stents in the vascular system, we consider it be advisable to leave the stent in situ when removal is not warranted. The stent struts get incorporated into the intima and complete removal may be impossible. We consider it might be advisable to place these patients on aspirin to allow for the period of intimal regrowth.

Retro aortic innominate vein: Embryological and clinical significance

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Background: Retroaortic innominate vein is seen in about 0.2% of congenital cardiac defects. It is usually considered as a benign anomaly. We review our experience with 14 patients who had this anomaly.

Methods: We retrospectively studied 14 patients who had this anomaly which was recognized intraoperatively. In 8 of these patients, the diagnosis was suspected preoperatively. The mean age of the patients was 5 years. The mean weight of the patients was 9.5 kg. 12 patients had TOF with pulmonary stenosis or pulmonary atresia, 2 patients had tricuspid atresia with pulmonary stenosis. 10 patients had right aortic arch. 3 patients had LSVC draining into the coronary sinus. 1 patient had normal innominate vein in addition to retroaortic innominate vein. 8 patients underwent two ventricle repair. 2 patients underwent unifocalisation with central shunt. 1 patient underwent pulmonary artery plasty using the retroaortic vein and bidirectional Glenn anastomosis.

Results: There were no early mortality in these patients. Retroaortic innominate vein initially takes the course as the LSVC, it then courses under the arch and travels close to the left pulmonary artery parallel to the pulmonary artery bifurcation and inserts into the superior vena cava low down just above its entrance into the atrium. Embryology helps in understanding its association with right aortic arch and decreased pulmonary blood flow.

Conclusion: Retroaortic innominate vein needs to be echocardiographically distinguished from PDA and pulmonary artery. Care has to be taken while looping the RSVC, and to ensure that the vein is not compressed by the aorta in its retroaortic course. The parallel course of the vein can be used while performing PA plasty and fashioning a wide cavopulmonary anastomosis.

Demystifying the transannular patch for TOF repair- A follow up study

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Background: The right ventricular function determines the long term result of tetralogy of fallot patients who need transannular patch for intracardiac repair. This study plans to evaluate the functional status of the right ventricle in patients who needed transannular patch during intracardiac repair for tetralogy of fallot and investigate whether valve repair contributes in preserving right ventricular function.

Methods: All 35 patients who needed transannular patch for intracardiac repair, from 1997 to 2005 were called in for follow up. They were subjected to clinical evaluation; X-ray chest and Doppler scan to evaluate the parameters of right ventricular function. Same cardiologist who was unaware of who underwent valve repair did the Doppler scan. The results obtained were compared after dividing the patients into three groups- those with transannular patch alone, those with pericardial flap valve and those with repair of valve. Analysis of variance was applied and wherever significance was seen, the techniques were compared using averages and coefficient of variation.

Results: Of the 35 patients 2 of them died in the immediate postoperative period. Of the remaining 33 only 16 had turned up for the study, 5 patients had no intervention for valve, 4 had a pericardial flap valve and 7 patients had their valve repaired. Of the seven criteria's compared significant difference between techniques was seen only in RV dimensions (0.06 systolic and 0.08 diastolic) and cardiothoracic ratio (0.05). Comparing the techniques for these two parameters valve intervention was found to have better result than TAP alone. Not much difference as seen in pulmonary regurgitation and RV ejection fractions.

Conclusion: Though it is accepted that pulmonary regurgitation can affect long term result, this study shows not much deterioration of RV functions between techniques, due to it. This points to the possibility of extent of muscle resection and fibrosis having an impact in long term result.

Early results of off pump glenn

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Background: To analyse our early results of off pump Glenn Shunt. Off pump Glenn shunt is well accepted technique for the single ventricle repair. We are presenting our early results of off pump Glenn shunt.

Methods: 25 patients underwent BDG shunt at our institute in past 8 months of the 25 patients, 14 underwent off pump Glenn shunt. The only criteria for off pump was the presence of non restrictive ASD. 5 patients had TA, VSD, PS, 4 had DORV, VSD, PS single ventricle morphology, 3 patients had d TGA, VSD, PS of these 3 patients 1 had IVC Interruption, 1 patient had previous classical BT shunt. 2 patients had single ventricle PS. After dissecting SVC & RPA under partial heparinization (1mg/kg) the SVC is divided between the clamps. The upper end of SVC was anastomosed to cephalad surface of RPA.

Results: 12 patients who underwent off pump Glenn shunt did well in immediate post operative period & got extubated within 24 hours of surgery. 1 patient needed diaphragmatic placcation in post op period. 1 patient had minor shock while weaning from ventilator from which she had completely recovered. 14 patients who underwent

off pump glenn shunt at our institute had mean follow up 6 months.

Conclusion: With our early experience with off pump glenn shunt we would like to conclude that off pump glenn is very safe & acceptable method in treatment of single ventricles.

Congenital coronary artery fistula: A case report

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Background: Coronary artery fistula is a rare congenital anomaly, the reported incidence being 0.2% to 0.5% of all congenital cardiac disease. Majority of the fistulas arise from right coronary artery and terminate in, pulmonary artery, right ventricle or right atrium. We present a case of a fourteen year old girl who underwent successful surgical treatment of left circumflex coronary artery – right atrial fistula for its rarity.

Case Report: A fourteen year old girl presented with complains of dyspnoea on exertion of grade II of six months' duration. A continuous murmur was heard in the precordium. Twelve lead standard electrocardiogram did not show any abnormality. Chest roentgenogram was essentially normal except for prominent right heart border. Trans-thoracic echocardiography revealed dilated left main coronary artery (LMCA) and left circumflex artery (LCx) with left circumflex artery was draining into right atrium with left to right shunt. The Qp: Qs was 1.44, there was no pulmonary hypertension and ejection fraction being 65%. Coronary angiogram confirmed the dilated, ecstatic & tortuous LMCA & LCx and the LCx was draining into right atrium after giving origin to a large obtuse marginal. Median sternotomy was performed and SVC-right atrial junction was aneurysmally dilated with thrill. The left main coronary artery was ecstatic. Cardiopulmonary bypass was established using standard aortic & bicaval (high SVC) cannulation and normothermic CPB was maintained. The fistulous LCx was traced to course horizontally under the ascending aorta, over the roof of left atrium and entering the SVC-RA junction. Trial clamping of 15 minutes did not result in ischemia or arrhythmia. Hence the tract was ligated and was also transfixed, on beating heart, under CPB. Patient was weaned off CPB without intorpes and the further course was uneventful.

Results: Post-operative echo study at the time of discharge demonstrated absent flow across the fistula and normal LV function. Electrocardiogram was within normal limits with no signs of ischemia. Follow – up ECG & echocardiography studies at 3 months were also normal.

Conclusion: Coronary artery fistula involving the left circumflex system is a rare occurrence. Surgery is advised in all symptomatic patients and also in asymptomatic patients with dilated arteries to prevent future complications such as aneurysm, intimal ulceration, intimal rupture mural thrombosis.

Congenital vascular ring- A case report of neonatal stridor

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Background: Though rare, vascular ring is a life threatening cause for tracheal obstruction which can be cured if detected in time. Vascular rings of different types like double aortic arch, right arch with left ductus, left aortic arch with aberrant right subclavian artery and truncus arteriosus, and pulmonary artery sling are a cause of tracheo-oesophageal obstruction syndromes.

Case Report: A 3 day baby, who had stridor from day one of birth, which did not subside on second day, was referred to our hospital, patient had stridor, no definite feeding problems. Echo revealed a patent ductus, which was closing off. Chest X-ray was normal. MRI suggested and done on the suspicion of Vascular ring. Type 4 vascular ring right arch and patent ductus arteriosus was found which was causing tracheal narrowing. PDA division was done on the same day (27-1-2006). The patient had a long ICU stay and prolonged ventilation for the respiratory distress due to tracheomalacia. Improved over a period of 14 days. Repeat MRA showed no vascular ring and mild tracheal compression only. Patient is on regular follow-up and doing well.

Conclusion: Although rare, vascular ring should be considered as a cause for neonatal stridor. MRA is useful in defining the lesion. Early diagnosis and prompt surgical intervention gives good result.

A review of 45 cases of ASD (OS) closure under hypothermia- A forgotten procedure

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Background: The usual cost of ASD closure under CPB is around Rs. 45000 in a Govt. hospital but about Rs. 5000/- under hypothermia and inflow occlusion. The vast majority of patients in our country can barely afford the cost of CPB even with Govt. and other funds. With proper patient selection many of these ASD (OS) closure can be done with under hypothermia and inflow occlusion for a few minutes. This is a review of 45 such cases done by us over the past 8 years.

Methods: 45 patients from 5 to 45 years had been operated in our institution from 1997 to 2006 M:F ratio 2.3 age ranged from 3 years to 55 years, ASD (OS) size ranged from 10 to 23 mm PAP(systolic) ranged from 30 to 70 mmHg. CTR varied from 0.65 to 0.7. After a single mortality (in a case found to harbour TAPVC) after first 15 cases, all cases were re-evaluated by a single echocardiologist and those cases with premium defect or PAPVC or TAPVC or some major cardiac defect (reported elsewhere as ASD OS only) were discharged and scheduled for repair under CPB.

Results: Patients were anaesthetized and cooled to 33 degree Celsius by immersing in ice cold water in a bath tub. They were then shifted to the OT table. After median sternotomy, aorta, SVC and IVC were taped. By the time temperature dropped to 30 degree, heparinisation (1mg/Kg) was done, inflow occlusion was achieved by snugging down SVC and IVC and after a few beats, aorta was cross clamped. Rt. Atrium was opened and ASD was closed by direct suture by 3-0 polypropylene in 2 layers. The whole procedure took 5 to 7 minutes. RA incision line was occluded with a clamp and x clamp released after de-airing. RA was next closed. In 36 cases heart resumed beating after releasing X-clamp while 9 needed defibrillation. Patients were warmed with heat exchanges through water circulating mattress and hot bags and extubated when temperature reached 37 degree. Recoveries were uneventful in 44 cases except one with TAPVC missed by earlier echocardiograph. None of the patients had any neurodeficit. Post op echo did not reveal any residual defect. All patients are leading an active life. Wound infections were rare.

Conclusion: ASD repair under hypothermia is a safe and cost effective method. It still has a place in the surgical armamentarium especially in a poor country like ours like TV & MC for mitral stenosis, OPCAB for CAD. But proper case selection, experience and preoperative planning of minute details and strategies before operation under hypothermia will lead to success.

Sternal closure by using absorbable suture in children

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Background: Sternal closure after open heart surgery by stainless steal wire is a common practice even in children. Though it provides a perfect and stable sternal approximation. It is associated with some long term complications in about 5% of patients in the form of sinus formation, projection of wire or wire knot through the skin causing pain and discomfort etc. The aim of present study was to reduce the long term complications associated with stainless steal wire by using absorbable suture for sternal approximation in children upto 15 kg weight.

Methods: 43 children of various cardiac problems (cyanotic and acyanotic) up to the weight of 15 kg were selected for sternal closure using No. 1 Vicryl after open heart procedures. The age ranged from 6 months to 5 years. There were 27 female and 16 male children.

Results: Sternal closure by absorbable suture provided good sternal approximation. There was no case with unstable sternum in short term follow up. There has been no incidence of projection of suture knot through the skin, sinus formation and persisting pain after the suture got absorbed.

Conclusion: Sternal closure by absorbable suture in small children is a safe alternative. It provides as good approximation as achieved by stainless steal wire but devoid of all long term possible complications associated with stainless steal wire.

Hybrid VSD device closure

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Background: Ventricular septal defect (VSD) has various management options including surgical repair, transcatheter device closure and perventricular device closure. We are presenting a case of perventricular VSD device closure done at our institute.

Methods: A seven month old, 4.8 Kg female child was admitted with history of recurrent chest infection and failure to thrive. There was cardiomegaly on chest, X-ray, echocardiography showed a large midmuscular VSD of size 8.8 mm with left to right shunt. In view of her low body weight and small size she was taken up for a perventricular device closure (for lack of adequate arterial access a transcatheter closure was not attempted).

Case Report: A median sternotomy was done. The right ventricle was stabilized with Octopus-3 cardiac stabilizer. The location of the VSD was confirmed by epicardial echo. A puncture was made on the RV free wall and a guide wire was passed through it into the LV through the VSD under epicardial echo guidance. The Amplatzer device (10/8) was passed over it and deployed. The position of the device was confirmed and a detailed epicardial echo was done for residual leak, AV valves, aortic and pulmonary valve functions. Routine chest closure was done. Patient was extubated after six hours.

Conclusion: In very small infants and neonates perventricular device closure is a good option. It has an advantage of avoiding cardiopulmonary bypass. However, it has a limitation of suitability of the lesion and expertise.

An unusual variant of left atrium to pulmonary artery fistula

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Background: Left atrium to pulmonary artery fistula is a rare malformation. We report a patient with pulmonary artery to left atrial fistula who had associated pulmonary and cerebral AV malformations and underwent successful closure of the fistula.

Case Report: A 22-year-old lady presented with complaints of dyspnoea and cyanosis on exertion. She had undergone a left lower lobectomy at the age of five for a pulmonary arteriovenous malformation and also gave a history of a cerebrovascular accident involving the right side of the body that had partially recovered. CT scan of the brain showed diffuse cerebral arteriovenous malformations. Cardiac catheterization and pulmonary angiogram revealed a right pulmonary artery to left atrium communication with right to left shunt and normal pulmonary vasculature. On cardiopulmonary bypass the atrial end of the fistula was closed with a PTFE patch. Post operative recovery was uneventful.

Conclusion: Left atrium to pulmonary artery fistula may be a part of generalized arteriovenous malformations. Diagnosis can be made by cardiac catheterization. They can be safely treated by surgery with or without cardiopulmonary bypass depending on the anatomy and morphology of the communication.

Diaphragmatic plication for post cardiac surgery phrenic nerve palsy in children

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Background: Phrenic nerve palsy is a rare but morbid complication following cardiac surgery. We describe our experience in dealing with this condition.

Methods : Since the inception of our center in February 2004 till September 2006, six children out of 1113 (0.5%) who underwent surgery through a median sternotomy for various congenital heart diseases had clinically important phrenic nerve palsy. The surgeries performed were completion of Fontan (extra cardiac) bidirectional Glenn shunt (n=2), intra cardiac repair for Tetralogy of Fallot, pulmonary artery reconstruction and unifocalisation with central shunt.

Results: Three patients had redo sternotomy. Phrenic nerve paralysis was suspected clinically and confirmed by fluoroscopy. Since all children were ventilator dependent, diaphragmatic plication was performed in all patients through a lateral thoracotomy (n=5) or median sternotomy (n=1). Three patients underwent unilateral plication while two patients underwent bilateral staged plication. Five children could be weaned off ventilator within 48 hrs. There was no in-hospital mortality.

Conclusions: Phrenic nerve palsy after cardiac surgery in children is seen most often after redo sternotomy or surgeries requiring hilar dissection. Extreme care should be taken during dissection of the mediastinum in the region of the phrenic nerve. Diagnosis of phrenic nerve palsy requires strong clinical suspicion. Diaphragmatic plication is effective in treating ventilator dependent phrenic nerve palsies and results in improved early outcomes.

Case of coronary artery to pulmonary artery fistula with dual origin-embryological, clinical and surgical significance.

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Background: Coronary artery fistulae are very rare anomalies with fistulous communication to the pulmonary artery constituting 17% among them. We report a case of dual fistula from both the coronaries to the pulmonary artery.

Case Report: A 59-year-old female presented to us with history of dyspnoea on exertion NYHA Class III for the past few months and recent onset palpitations. Physical examination revealed an irregular low volume irregular pulse rate of among 90/min, blood pressure of 100/70 mm Hg. Transthoracic echocardiography confirmed the diagnosis of severe calcific mitral stenosis of rheumatic etiology. The mitral valve area was 0.6 sq cm and she had severe pulmonary artery hypertension. Coronary angiogram which revealed two fistulous communications, one from each of the two main coronary systems to the main pulmonary artery. After replacing the mitral valve, the main pulmonary artery was opened through a transverse incision just above the pulmonary valve. Cardioplegia was administered to identify the internal opening, which was directly obliterated with a pledgetted prolene stitch. Post operative recovery was uneventful and the patient was discharged on the eighth post operative day.

Conclusion: Dual origin of the fistula, as seen in our patient, has not been reported so far. The embryological basis of coronary artery to pulmonary artery fistula can be founded on Hackensellner's involution-persistence hypothesis. During surgery cardioplegia runoff should be prevented by occlusion of the pulmonary artery, pulmonary artery should be opened to identify the internal opening should be identified prior to obliteration.

Congenital double lumen aortic arch with pentology of fallot

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Background: Congenital double lumen aortic arch resulting from the persistence of the fifth aortic arch is an extremely entity. We report an unique case of persistent fifth aortic arch (PFAA) associated with pentology of fallot who underwent successful intra cardiac repair with transannular patch. Persistent fifth aortic arch is a very uncommon association with congenital heart disease. It either forms a systemic to systemic or a systemic to pulmonary connection. Association of PFAA with pulmonary atresia, interrupted aortic arch, tricuspid atresia, VSD, PDA and CoA have been described.

Case Report: One year and nine month old child with a history of spells was admitted for intracardiac repair of pentology of fallots. Clinical findings were consistant with that of falots. Echocardiography revealed features of TOF with a large ASD, normal coronaries, left arch and duplication of the arch beyond the origin of the innominate artery upto the left subclavian artery. Neck vessels were originating from the superior lumen. At surgery, the findings were –OS ASD , large SA VSD, valvar, supravalvar and infundibular PS and a bicuspid pulmonary valve. Direct inspection of the aortic arch revealed a single large structure without evidence of two separate vessels. Aortic cannulation was done at the most proximal portion of the ascending aorta so that it would not perfuse any one lumen selectively. The child underwent successful intracardiac repair with a transannular patch. The post operative period was uneventful.

Conclusion: To our knowledge , this is the first case report of the

association of PFAA with pentology of fallot and where diagnosis has been made solely by echocardiography. It detected preoperatively, careful cannulation techniques employed prior to CPB ensures good outcomes.

Peri – operative blood lactate levels and lactate / pyruvate ratio in children undergoing CPB are predictive of morbidity

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Background: Evaluating serum lactate and serum lactate/ pyruvate ratio in patients undergoing cardiopulmonary bypass and correlating it with perioperative morbidity.

Methods: Fifty consecutive patients who underwent elective surgical correction of congenital cardiac diseases (Atrial Septal Defect, Ventricular Septal Defect, Tetralogy Of Fallot, Atrio- Ventricular canal, Transposition of Great Arteries) were studied. Average age was 6 years, average weight 15 kg, with male: female proportion being 39:11. Arterial blood samples were collected at various stages of surgery and also post operatively. Serum lactate and serum pyruvate levels were estimated.

Results: The mean baseline lactate and lactate/pyruvate ration were 2.24 mmol/L and 24.73 respectively which steadily after institution of CPB and gradually showed a falling trend up from off CPB to 48 hours, if the duration of CPB was less than 1 hour. Both levels remained elevated 24 to 48 hours if CPB was more than 1 hour. Changes in the lactate level >4 mmol/L and lactate/pyruvate ratio >30 off-CPB were associated with post-operative morbidity, mortality & increases inotropic support.

Conclusion: Prolonged CPB was associated with higher levels of lactate and lactate/pyruvate ratio. Also change in lactate levels from baseline & higher lactate/pyruvate ration were predictive of post operative outcome.

Repair of sinus venosus atrial septal defect via minimally invasive open heart surgery using anterolateral thoractomy

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Background: Minimal invasive cardiac surgical techniques recently have been applied in the management of various cardiac lesions. Rt. Thoractomy is a well known alternative for median sternotomy to gain access to the Rt. Atrium. Extra corporeal circulation is instituted by cannulation of common femoral artery in groin and venous return was ensured by cannula inserted into inferior vena cava by Lt. Femoral vein and superior vena cava by Rt. Internal juglar vein and aortic cross clamping through second intercostals space.

Methods: From Jan 1997 to May 2006 35 patients (15 M/20 F) had port access sinus venous ASD repair. Mean age was 23 year (14-32 year). 30 patients presented with breathlessness and 5 patients were asymptomatic. Pericardial patch was used in all cases and to keep SVC obstruction in mind VY plasty was done in 7 cases and patch was used in 28 cases to enlarge RA SVC pathway. Mean aortic cross clamping time was 54 minute and mean perfusion time was 124 minutes.

Results: There was no conversion to sternotomy. Revision for bleeding was required in one case and transient renal dysfunction was present in two cases. No thromboembolic or peripheral ischaemic

complication were noted. Postoperative echocardiography showed no residual leakage in any patients. There was no hospital mortality. Mean hospital stay was 7 days.

Conclusion: Right anterolateral minithoracotomy incision is safe and effective alternative to median sternotomy.

Pulmonary mucormycosis presenting like a carcinoma lung

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Background: Pulmonary mucormycosis is a relatively uncommon infection that occurs mostly in immunocompromised persons. We report a rare case of pulmonary mucormycosis in a post renal transplantation patient which presented unusually as a carcinoma of the lung.

Methods: A 48 year old renal transplant patient on regular immunosuppression therapy present with fever, dyspnoea, haemoptysis and hoarseness of voice since 2 weeks. His clinical examination was unremarkable. Indirect laryngoscopy showed left vocal cord palsy. Chest X-ray and CT scan revealed a left parahilar mass, raised left dome of diaphragm and minimal bilateral pleural effusion. Repeated attempts to obtain a diagnosis under radiological guidance and transbronchially were in vain. He was taken up for a left thoracotomy and biopsy of the mass. Intra operatively there was a 3 cm mass in the left upper lobe adherent to the adjacent mediastinum and chest wall. Trucut biopsies of the mass were taken

Results: The biopsy was reported as consistent with mucormycosis. He was started on Amphotericin B which he received for 3 weeks. He had an uneventful post operative course and he was discharged.

Conclusion: Pulmonary mucormycosis is a potentially fatal disease. Maintaining a high level of suspicion is important in any patient in the right clinical setting with a pneumonic process that fails to respond to antibacterial agents either clinically or radiologically. Adequate treatment requires an aggressive approach medically with amphotericin and probably surgical measures also to affect a cure.

Physiological lung exclusion – A life saving procedure in difficult lung resections

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Background: Pulmonary tuberculosis and bronchiectasis are major causes of massive hemoptysis in developing countries. Lung resection remains the surgical treatment of choice. This may be hazardous in some patients due to dense vascular adhesions between lung and chest wall. This leads to marked blood loss and control of hilar vessels becomes dangerous. In such patients senior author (Prof SRD) devised this life saving operation. and we present our experience with this procedure.

Methods: Between Jan 196 to Sept. 2006, 62 patients (38 males and 24 females) between age of 16-58 years came with massive s(43 and recurrent hemoptysis. 47 had fibro-cavitary tuberculosis and 15 had Bronchiectasis. Medical treatment failed in all requiring life saving surgical intervention. On thoracotomy diseased lung or lobe was found to be very densely adherent to chest wall and apex of chest. There was lot of bleeding on attempted mobilization of lung. It made lung resection technically very difficult making hilar vessels control dangerous. Life threatening hemoptysis was stopped by physiological lung exclusion i.e. by surgical interruption of the bronchus and pulmonary artery of the involved lobe or lung keeping the pulmonary

veins intact (for drainage).

Results: Hemoptysis could be controlled in all these patients without any mortality and significant morbidity. There was no postoperative empyema and recurrence of hemoptysis in any patient on follow up from 3 to 109 months. No patient required anatomical lung resection later on.

Conclusions: Physiological lung exclusion is a safe, life saving and effective method for control of massive hemoptysis in cases where lung resection is technically hazardous or difficult. Every thoracic surgeon should keep this procedure in mind as an alternative to standard lung resection as it can save the patient and the surgeon from a tricky situation.

Single stage surgical procedure for bilateral lung and liver hydatid cysts

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Background: In patients who are having bilateral lung and liver hydatid cysts the usual approach is to do three staged operations- two thoracotomies and a laprotomy for removal of these cysts. These leads to significant morbidity, repeated hospitalization and increased cost to the patient. In order to avoid these problems, senior author (Prof. RSD) devised one stage surgical procedure for bilateral lung and liver hydatid cysts and this paper deals with this experience.

Methods: Between Jan 1988 to Oct 2006 we came across 219 patients of pulmonary hydatid cysts, out of which 36 patients presented with bilateral pulmonary and liver hydatid cysts. There were 20 males and 16 females between age of 14 to 56 yrs. Usual symptoms were dull pain in chest or abdomen, cough, hemoptysis and expectoration of fluid and membrane (in 15) . The pulmonary hydatids were approached through midsternotomy using double lumen endotracheal tube for alternate one lung ventilation. Cysts were removed using Barret's technique. The liver hydatid cysts were removed by opening the diaphragm in 22 patients and in 14 patients a midline laparotomy was done as a continuation of midsternotomy.

Results: There was no mortality. Post operatively there was no hemorrhage, air leakage, BP fistula or empyema in any patient. There was no recurrence of cyst in any patient- follow up ranged from one month to 17 yrs. No sternal complication was seen.

Conclusion: Our approach-single stage removal of bilateral pulmonary hydatid cysts and liver cysts (midsternotomy +transdiaphragmatic removal or laparotomy) is superior to classic three stage approach as it decreases morbidity, mortality, hospital admissions and stay and is economical.

Mediastinal tumours- Experience at PGI Chandigarh

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Background: A retrospective study was done to analyse clinical features, location of tumour, histologic types and epidemiologic profile and to formulate a management protocol.

Methods: 465 patients of mediastinal tumours were managed over a 38 yrs period from Jan 1968 to Oct 2006. The clinical features were myasthenia gravis pain chest, dyspnoea, cough, dysphagia and chance finding on x-ray chest. They were investigated hematologically and radiologically by chest x-ray, ultrasound and CT scan and MRI. FNAC guided by these radiological techniques was done. Then patients underwent surgical exploration and resection or debulking or biopsy

was done depending upon operability of the tumor. Radiotherapy or chemotherapy was considered in inoperable cases.

Results: Incidence of mediastinal tumours was highest in 3rd-4th decades. Anterosuperior tumours were predominant (71%). Thymomas were the most common tumours (46%). Myasthenia gravis was present in 50% of patients. Complete surgical resection was possible in 65% patients.

Conclusions: FNAC (fine needle aspiration cytology) is a very useful and cost effective modality. Based on histology (FNAC) unnecessary major thoracotomy can be avoided in malignant tumours like lymphomas. Most benign mediastinal tumours can be safely resected with good prognosis. Malignant lesions carry a poor prognosis.

Surgery in bronchiectasis with CT evaluation- 18 years review

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Background: 52 patients with bronchiectasis were operated from 1988. Male: Female 31:21. More prevalent in II & III decades. The importance of CT chest in pre and postoperative management of surgery in bronchiectasis is emphasized in this study.

Methods: CT chest and X ray chest were taken for all patients. Initially bronchogram was also done for 11 patients upto 1993. CT scan revolutionized in accurate localization of lesion. In bronchogram false negative and false positive were common. Further in this study complications and surgical outcome were analysed.

Results: Rt lung involved in 12 patients (23%) and, Lt lung involved in 40 cases (77%).

Rt Lung		Lt Lung	
a) Rt lower lobe and middle lobe	4	a) Lower lobe	17
b) Entire Rt lung	3	b) Entire Lt lung	13
c) Middle lobe	2	c) Lt Lung Lower lobe and lingual	6
d) Upper lobe	1	d) Lingula	2
e) Rt Lower lobe	1	e) Lt upper lobe	2
f) Rt middle and upper lobe	1		

Procedures adopted were lobectomy and pneumonectomy. Re-thoracotomy in 1st POD was done for bleeding in two cases. Most of the patients had gone home in good condition. Few patients (20%) developed broncho-pleural fistula and empyema for which they had to stay in hospital for varying duration (1 month to 3 months).

Conclusion: The CT chest is used in all the patients for localizing and confirming the diagnosis of bronchiectasis. Lt lung commonly involved than Rt lung. Lt lung lower lobe was more commonly involved. With accurate localization and careful surgical management all the patients were treated effectively.

Management of hidden problems of corrosive stricture oesophagus: Institutional experience

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Background: Corrosive injuries of oesophagus is not uncommon in India. We discuss the hidden problems found during surgical management of corrosive stricture oesophagus.

Methods: Records of 15 patients who underwent definitive surgery for corrosive stricture oesophagus with some hidden problems found

during perioperative period which was not diagnosed preoperatively by endoscopy and barium swallow in our institution over a 10-year period were reviewed.

Results: All of 15 patients were female with age ranging between 19-40 years. The presenting complaints: vomiting (10 cases), dysphagia (15 cases), significant weight loss. Barium showed complete stricture of the oesophagus. Endoscopy could not be passed. During surgery antero pyloric stricture was revealed in 10 cases, 3 had partial and 2 had total gastric cicatrization. The management of these hidden problems included: colon bypass and feeding jejunostomy in all cases, for antero-pyloric stricture pyloroplasty and gasterjejunostomy were done, for gastric cicatrization augmentation of stomach by jejunum and 'W' shaped jejunal pouch were made. Postoperatively 14 patients had uneven recovery, 1 patient had enterocutaneous fistula and later died due to multiorgan failure. During follow up period barium studies were done in 14 patients and all had adequate size of stomach and doing well.

Conclusion: Corrosive injuries of esophagus is common in females. Even after routine preoperative evaluation some hidden problems were diagnosed only at operation table by the careful examination. These hidden problems like anteropyloric strictures, partial or total involvement of stomach along with complete stricture of oesophagus were managed by appropriate surgical methods with excellent outcomes.

Surgical outcome in thymic tumors with myasthenia gravis after plasmapheresis-A comparative study

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Background: Plasmapheresis has been used widely in the treatment of myasthenia gravis and also in symptomatic thymectomised patients with short-term clinical improvement. But the utility of plasmapheresis in the operative outcome has not been widely studied. The authors analysed its effect in the surgical outcome of thymic tumors with myasthenia gravis & compared that with the results of thymectomy without plasmapheresis.

Methods: The surgical outcome in a total of sixteen patients of thymic tumors with myasthenia gravis were analysed retrospectively with a maximum follow-up of six years who were operated in the period from July, 2000 to June, 2006. Of these sixteen patients, seven patients (group B) received plasmapheresis just prior to surgery. Nine patients (group A) did not receive it. Outcome in the form of requirement of ventilation, symptomatic improvement, hospital stay, appetite & weight gain, working ability, cognitive & social functions and requirement of drugs were assessed and compared between the two groups.

Results: 2 out of 7 patients (28.6%) in group B and all patients (100%) in group A required ventilatory support. Significant and sustained symptomatic improvement was noted in group B as compared with group A ($p < 0.001$). None of the patients in group B required further plasmapheresis in the follow-up period.

Conclusion: Preoperative plasma exchange in the patients of thymic tumors with myasthenia gravis can cause a significant difference in the overall outcome of thymectomy and quality of life & should be an integral part of the management of these cases.

Penetrating cardiac trauma experience at SKIMS

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Background: Trauma in general represents third most common cause of death. Penetrating cardiac injuries are associated with high morbidity and mortality rates. Immediate transfer of patients to the operating room for resuscitation/ exploration is mandatory, though chest CT, echocardiography, may be useful investigations for diagnosing the presence of hemopericardium in stable patients. To present our experience of penetrating cardiac injuries treated at SKIMS Hospital in last 16 years.

Methods: This study was conducted from Jan 1991 to Oct. 2006. A structured diagnostic and management approach was used in our hospital to deal with penetrating cardiac injuries. Mechanism of injury, mode of presentation were recorded. Interventions included thoracotomy, sternotomy or both for resuscitation and definitive repair.

Results: A total of 38 patients sustained penetrating missile cardiac injuries. 16 injuries were gun shot wound 22 were splinter injuries. There were 28 males with mean age of 30 years (20-60 years) and 10 female patients with mean age of 35 (range 23-65 years). Of the 38 patients, 5 had involvement of multiple cardiac chambers. The overall survival was 52.6% survival of gun shot wound victims was 37.5%, splinter wound victims was 68.1%. Emergency thoracotomy was done in 68.4%, sternotomy in 15.7% patients, thoracotomy and sternotomy in 15.9%. Rt. Ventricle was injured in 24 patients, left ventricle in 11 patients, Rt. Atrium in 06 patients, Lt. atrium 2. None of the patients with multiple cardiac chamber injuries survived.

Conclusion: Parameters and prompt management measuring physiologic condition are significant predictor of outcome in penetrating missile cardiac injury. A high index of suspicion for cardiac injury, understanding mode of presentation can lead to rapid diagnosis and good outcome. A prompt decision of operative intervention can make the difference between life & death in such situations and contribute in salvaging more lives than lost.

Lung resection for drug resistant tuberculosis

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Background: The emergence of drug resistant tuberculosis poses a serious challenge to traditional drug therapy. In view of the relapse rate of up to 50% following medical management, there has been renewed interest in the role of surgery for this problem. Mycobacterium tuberculosis continues to be a major cause of morbidity and mortality throughout the world. Complacency by the medical profession and patient has caused new strains of mycobacterium tuberculosis to emerge that is highly resistant to current antibiotics. Optimal therapy for patients infected with drug resistant tuberculosis often requires surgical intervention to eradicate the infection. We report on our experience with lung resection for drug resistant tuberculosis.

Methods: Over a 3 year period resection was performed in 12 patients who were diagnosed with drug resistant tuberculosis and had a minimum of 3 months of medical therapy before surgery.

Results: Pneumonectomy was performed in 9 patients and lobectomy in 3. There was no operative and post operative mortality. Major complication developed in 1 patient who had post pneumonectomy empyema. 7 patients had positive sputum at the time of surgery. The patients were put on appropriate chemotherapy

and followed up for 18 months. The cure rate was 91.66%.

Conclusion: Lung resection can be considered as an important adjunct to medical therapy in carefully selected patients: those who have localized disease with adequate pulmonary reserve, or those who have multiple previous relapses, or whose sputum remains positive after 4-6 months of appropriate medical treatment. Surgery offers high cure rates with acceptable morbidity and mortality.

Spectrum of solitary pulmonary nodules

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Background: Solitary Pulmonary nodules are common entities in clinical practice and mandates workup for accurate diagnosis and optimal management.

Methods: 7 consecutive patients in the period July 2005 to August 2006 who presented with Solitary Pulmonary nodule are included in the study. Demographic details-Male: Female=6:1, Mean age-43 yrs (Range-17 to 77 years). 2 patients were diabetic and 2 were chronic smokers. 2 patients gave history of previous surgery for soft tissue sarcoma. Modes of presentation-Haemoptysis-1, Cough with dyspnoea-4 and 2 lesion were incidentally detected on CXR during routine medical check-up. CXR and Contrast CT were done for all patients apart from routine hematological and biochemical studies. FNAC was done in those cases when deemed feasible. Pulmonary angiography was done in cases of suspected pulmonary AV Malformation.

Results: Wedge resection and tumour excision was done for the benign lesions and lobectomy for the malignant ones. Histopathological studies reports Hamartoma in 2, Bronchogenic Carcinoma in 1 and Metachronous secondary deposits in 2. Coiling of the feeding vessels was done in 2 cases of pulmonary AV malformations. All patients are being followed up and are doing well.

Conclusion: A complex category of benign and malignant lesions manifest as solitary pulmonary nodules. Contrast CT was the mainstay of diagnosis and decision for intervention. Assessment of the Hounsfield number helped in categorizing the lesions.

Solitary fibrous tumor a diagnostic dilemma

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Background: Solitary fibrous tumors are rare neoplasm of mesothelial origin and may occur in both in benign and malignant forms. They arise from the pleura (80% visceral) and least commonly from extra pleural sites including peritoneum, mediastinum, head and neck etc. Most are asymptomatic and are discovered on routine radiographs. Larger tumors are associated with pain, cough and breathlessness. Immunohistochemically all express CD 34 and variably bcl-2, desmin

Case Report: A 58 year old female presented with the complaints of dry cough for four months. General, physical and respiratory system examination was grossly normal. Chest radiograph and CT scan revealed a well defined lobulated mass in the right lower lobe abutting the major fissure. Patient was taken up by excision biopsy via a right postero-lateral thoracotomy. A pedunculated bilobulated mass 5x4 cm arising from the inferior surface of the right middle lobe in the oblique fissure; totally free from the right lower lobe was excised. The gross morphology, cut section and histopathological features were

consistent with diagnosis of solitary fibrous tumor. However markers like desmin, S₁₀₀ and CD 34 were negative.

Conclusion: We present this case for its peculiarity that it is histological benign though arising from interlobar fissure and does not express CD 34. It was symptomatic in spite of being small. This case presented a diagnostic challenge through out its course. Solitary fibrous tumors though rare must be considered in the differential diagnosis of asymptomatic/symptomatic, radiological well demarcated homogenous thoracic masses.

Transhiatal oesophagectomy in the management of CA oesophagus

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Background: Transhiatal oesophagectomy is a safe surgical modality in elderly patients with comorbid factors. Though the technique is not curative but offer excellent palliation by restoring swallowing with fewer complication and morbidity.

Methods: We reported 24 cases of Transhiatal oesophagectomy in 1992. Till August 2006 we have performed 184 cases. 168 cases were males. Mean age was 62 years. 110 cases had chronic cardiorespiratory problems. Cases were diagnosed by Barium swallow oesophagus and upper GI endoscopy with biopsy. All cases had histologically proved CA oesophagus at 30 cm or below.

Results: Average operating time was 2.5 hr. Respiratory complication was seen 56 patients and atrial fibrillation in 36 patients. Anastomotic leak occurred in the neck in 78 (42%) patients but all of them healed subsequently. Anastomotic stricture occurred at pharyngo-gastric anastomosis in 46 (25%) patients and required few dilatations. There were 12 deaths in the entire series.

Conclusion: Transhiatal oesophagectomy is a safe therapeutic option with fewer complications. Anastomotic leak at the neck and pharyngo-gastric anastomotic stricture are frequent, but can be managed easily. Though this is not a curative resection but offers excellent palliation by restoring swallowing.

Pulmonary thromboendarterectomy

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Backgrounds: Chronic pulmonary embolism is a condition, which is most commonly misdiagnosed, and without prompt management it can cause disastrous consequences. Chest CT scan is one of the most useful imaging test and RV dysfunction is seen on echocardiography. Active anti coagulation may not be beneficial in these patients, majority of them do need surgical intervention. The main indication for surgery is ventilatory or haemodynamic impairment at rest or exercise. For successful surgery the clots should be in branch, lobar or proximal segmental arteries. We present 20 cases of chronic pulmonary embolism who underwent thromboendarterectomy at our center from 1st January 2004 till date.

Methods: 20 patients of pulmonary embolism 18 males (90%) and 2 females (10%) age ranging from 28 years to 69 years mean 47 years underwent pulmonary thromboendarterectomy. All the patients had complete blood count, chest x-ray, ECG, Echo and CT scan. 10 patients had deep venous thrombosis. After confirming the diagnosis of pulmonary thromboembolism, they were subjected to pulmonary thromboendarterectomy under total circulatory arrest (TCA). All patients had massive thrombus in the main pulmonary artery and

right and left pulmonary arteries. All of them had RV dysfunction pulmonary artery hypertension (PAH) & tricuspid regurgitation (TR). Hospital stay ranged from 10 days to 24 days mean of 17 days.

Results: Successful pulmonary thromboendarterectomy was achieved in 18 of the 20 patients (80%) 2 succumbed due to pulmonary arterial hypertension (PAH).

Conclusion: We conclude that surgical pulmonary thromboendarterectomy is a safe and effective modality for chronic pulmonary embolism. In all these patient pulmonary arterial hypertension (PAH) & tricuspid regurgitation (TR) came to normal limits. Only one patient had tricuspid valve repair because of calcified mass attached to the chordae.

Protocol with the operative management of myasthenia gravis

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Background: Thymectomy as the primary treatment for generalized myasthenia gravis (MG) results in permanent remission in 30-35% while improvement occurs in 57-80% (Weschler from DUKE University, 1996). Our experience suggests that postoperative outcome depends primarily on the stage of the disease. But proper pre- and post-operative care is of utmost importance for favorable results.

Methods: 34 patients of MG were operated in our unit from 2000 to 2006. All the patients were referred from neurology or medicine department for thymectomy. There were 12 males, 21 females and 1 was an eunuch. Age range was 11 to 58 years. All were on anticholinesterase and steroids for 3 to 36 months, the doses of which varied according to the patients need. 18 patients had thymic hyperplasia and 16 had thymic tumours, 6 had diabetes, 4 had hypertension and one was hypothyroid. 4 patients were in Osserman's group 2A (mildly generalized), 28 were in group 2B (moderately generalized) while 2 were in crisis, group 2C who needed pre-op (and also post-op) ventilatory support. All patients underwent supervised chest physiotherapy programme except the 2 with crisis. 4/34 (11%) patients needed pre-op plasmapheresis due to worsening respiratory status (2 with tumours and 2 with hyperplasias). We have not used 1 Gg.

Results: All were operated under GA using O₂, N₂O, atracurium 0.25/kg and fentanyl 2 ug/kg. IV hydrocortisone 200 mg in 500 ml NS was run during operation. Median sternotomy and total clearance of thymus and fatty tissues from hilum to hilum and suprasternal area to diaphragm was done. Both the pleurae were opened routinely and pericardium was removed with tumour when needed. Tumour bearing areas were marked with LT 100 Ligaclips to facilitate post-op radiotherapy. We attempted VATS thymectomy in one case through 3 ports in Rt chest and 1 in suprasternal area but it had to be converted to median sternotomy. Post operatively IV hydrocortisone was run @ 200 mg 8 hourly. IV neostigmine was used depending on the preoperative requirements of pyridostigmine. Oral feeding was started after 18 to 24 hours when we reverted back to the same pre-operatively doses of pyridostigmine and steroids. Strict vigil was kept for myasthenic and cholinergic crisis. 3 needed post op plasmapheresis. (2 with tumours and 1 with hyperplasia). There was no operative mortality. 28 have been followed up from 3 months to 6 years (15 with hyperplasias and 13 with tumours). In hyperplasia group the doses of pyridostigmine and steroids could be reduced in 7, stopped in 4 and remained the same in 4. In the tumour group doses could be reduced in 9 and unaltered in 4.

Conclusion: Though most of our patients (more than 80%) present at a late stage when most of the motor end plates are destroyed and

myopathy develop, mostly achieved a useful life postoperatively independent of active support. Pre operative chest physiotherapy and judicious use of plasmapheresis in selected cases, wide operative clearance of thymus and fatty tissues and post operative vigil with judicious use of medication yields good results.

Midterm experience with VATS

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Background: VATS has become an essential weapon in the armamentarium of thoracic surgery. Advantage over thoracotomy, short hospital stay and its diagnostic value in certain undiagnosed clinical conditions has made it increasingly useful.

Methods: We reported our initial experience of 320 cases of VATS in 2003. We have completed 825 cases till August 2006.

Results: 580 (70%) cases had diagnostic and rest 245 (30%) cases had therapeutic VATS. Diagnostic procedures were performed for indeterminate pleural effusion in 416 (50%) cases, pulmonary pathology in 132 (16%) cases and mediastinal masses in 32 (4%) cases. Therapeutic procedure were performed for bullectomy 52(6%), Decortication for old clotted haemothorax 54 (6%), decortication for empyema 32 (4%), thymectomy 52 (6%), PDA ligations 16 (2%), Pericardiectomy 14 (2%) , chest trauma 25 (3%). In initial 320 cases (5%) cases required conversion. In rest 505 cases performed after initial learning curve, conversion was required in 17 cases only. Though one case died in earlier series of 320 cases there was no further deaths in next 505 cases.

Conclusion: VATS is an essential and safe option. With increasing experience. Conversion to thoracotomy drops down drastically. Diagnostic VATS for undiagnosed pleural and pulmonary pathology constitute the majorities of cases. Role of VATS in Thymectomy and bullectomy are well established.

Relevance of cervical mediastinoscopy in the era of advanced imaging modalities

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Background: Though cervical mediastinoscopy has become almost a forgotten art but it still has relevance as a valuable diagnostic tool in certain clinical conditions. Even in the era of CT, MRI, PET, virtual bronchoscopy and fusion imaging. Mediastinal lesions need mediastinoscopy for evaluation & planning of therapy.

Methods: We have retrospectively reviewed our experience of 185 mediastinoscopies performed between January 1997 and August 2006.

Results: 70% were males (126) and mean age was 65 years . diagnostic yield was –

Primary bronchogenic CA 60% (111), lymphoma 6% (11), Secondaries 5% (9), Tuberculosis 12% (22), other benign lesion 11% (20), and non specific inflammation 6% (11). 6 patients (11%) had complication pneumothorax in 3 (5%), vascular injury in 2(3%) and hoarseness of voice in 1(1%) cases. Flash negative result was found in 16 (29%) cases. There was no death.

Conclusion: Mediastinoscopy is relevant even in the era of advanced imaging modalities. Complications and false negative rates are acceptable.

Self dilatation of oesophageal stricture is a viable option

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Background: Long segment stricture of oesophagus following muriatic acid ingestion need repeated dilatation. Large number of such patients create huge work burden for public hospital. Self dilatation is suitable and safe alternative for these patients.

Methods: In 1992 we presented a series of 64 cases of oesophageal stricture with gastric outlet obstruction following muriatic acid ingestion. Such cases continued to increase every year. We have analysed a series of 680 cases treated till August 2006. 608 (89%) were females. Median age was 21 years. 635 (93%) were from low socio economic status. In 655 (96%) and ingestion was with suicidal intent.

Results: 584 (85%) cases could be managed with gastric outlet correction (gastrojejunostomy /pyloplasty) along with repeated dilatation. Out of 584 cases, 128 (22%) cases were lost from follow up. 184 (31%) cases required dilatation for one year and thereafter infrequently. Rest 272 cases required frequently dilatation (every 4 to 6 weeks). These cases had long segment and severe oesophageal stricture. These cases were subjected to self dilatation. Patients were trained to dilate their stricture with rigid oesophageal dilators with local anaesthetic gurgling. In 55 (9%) cases result was unsatisfactory. Rest 217 (37%) patients were able to continue self dilatation. These patients were taught to continue self dilatation once a week and to come for follow up every 3 months. These patients could swallow satisfactorily and these were no evidence of perforation.

Conclusion: Self dilatation of stricture oesophagus is safe and viable option. For large number of stricture oesophageal cases attending public hospital, self dilatation cuts down work load remarkably.

Successful management of a case of pure red cell aplasia with thymoma posted for thoracotomy in cardiothoracic operation theatre- A case report

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Background: Pure red cell aplasia (PRCA) describes a condition in which RBC precursors in bone marrow are nearly absent, while megakaryocytes and WBC precursors are usually present at normal levels. Acquired PRCA is often chronic and is associated with underlying disorders such as thymomas and autoimmune diseases. Thymoma is present in 9% of PRCA cases and PRCA in 4% of thymoma cases.

Case Report: A 52-year-old lady presented with generalized fatigue and severe anemia hemoglobin (Hb) 3.1 gm% PRCA was diagnosed by bone marrow examination. Chest X-ray revealed a rounded lesion in right para-cardiac region obscuring the right anterior cardiophrenic angle in chest X-ray. The chest computed tomography displayed a 6.5 cm x 5.6 cm poorly enhancing space occupying lesion located in the anterior mediastinum adjacent to right heart border. Fine needle aspiration cytology did not reveal any malignant cells but was inconclusive. Anaemia was corrected with blood transfusion. And with probable diagnosis of thymoma excision of the anterior mediastinal mass through right thoracotomy was performed. Histopathology report revealed thymoma (mixed type, AB). No malignancy. Postoperative period was uneventful and patient was

discharged on 10 th postoperative day. Patient's Hb increased to 12 gm% and five weeks after the operation and bone marrow report was showing red cell aplasia in recovery stage.

Conclusion: ■Thoracotomy is investigation of choice in diagnosis of thymoma. ■After thymectomy, erythropoiesis returns to normal within 4-8 weeks in 30% -40% cases. ■Patient can withstand the operative stress if the patient is put up for operation after optimizing the compromised situation.

Management of tracheal strictures

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Background: Alimentary & respiratory are the two systems, that exerts other by their primary responsibility of allowing the external environment to egress into the interior for procurement of power & energy. Obstruction to these natural passages essentially demands restitution to its normality more earnestly than justifying the character of obstruction. Present study concerns tracheal strictures only. Undilatable traumatic strictures & neoplastic strictures of trachea demand resection and primary reconstruction, the early results being comparative in both instances. The reason why neoplastic and non-neoplastic strictures have been clubbed in the same study. Simultaneously attempts have been made to evaluate suitable management for inflammatory strictures.

Methods: In this study, neoplastic & non-neoplastic tracheal strictures have been managed by a single surgeon at different institutes between Jan 2001 and July 2006. Of total 13 pts. Male 8, female 5. Six had post-intubation strictures, 3 had post-tracheostomy strictures, 2 had post-traumatic strictures & 2 had neoplastic strictures.

Results: Nine pts. Underwent periodic dilatation and four pts. Underwent resection and primary reconstruction, without any operative mortality.

Conclusion: Most patients with post-intubation strictures can be managed successfully with periodic dilatation. Results of surgical resection and primary reconstruction are gratifying. Where necessary tracheal release procedure should be done.

Inflammatory pseudotumour of the lung

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Background: Inflammatory pseudotumours of the lungs have rarely been reported. These have been described as rare benign lung tumour of uncertain origin, difficult to distinguish clinically as well as histologically from inflammatory lesions and are often locally invasive requiring extensive pulmonary resection.

Case Report: A 22-year-old male with h/o loss of appetite, loss of weight and lethargy for the last 12 years. He was evaluated and found to have a large soft tissue mass occupying the left hemithorax. A CT scan divulged that there was a sharp interface between the tumour and the lung parenchyma. Fine needle cytology was inconclusive. Patient underwent a left posterolateral thoracotomy. Intra-operative findings included a grey white tumour of 6 cm size with a collapse left lung and the mediastinal shift to the right with highly vascular tumour capsule. Surgery entailed mass excision in toto combined with a left pneumonectomy for tumour clearance. Histopathological features were consistent with inflammatory pseudotumour of the left lung. Post-operatively the patient had uneventful course and on follow up investigation remains free of disease.

Conclusion: Inflammatory pseudotumour is a benign neoplasm

mimicking a malignant neoplasm in clinical and radiological presentation. The differential diagnosis includes non-infectious granuloma of the lung, sarcoma, lymphoma, malignant fibrous histiocytoma, sclerosing hemangioma and fibrosis. The role and effectiveness on radiotherapy and chemotherapy as modalities remains unclear. FNA and frozen section are unremarkable in reaching a diagnosis. Complete resection is mandatory for both a histological confirmation and to prevent recurrence.

Minimally invasive transthoracotomy- Transphrenotomy approach for concurrent hepatic/ pulmonary hydatidosis

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Background: Combined liver and lung hydatid cysts are rare but pose a challenge in terms of accessibility. The objective of this prospective study was to find an alternative approach to conventional two staged posterolateral thoracotomy and laparotomy or single stage extensive thoraco-laparotomy.

Methods: 13.5 percent of 267 patients had concurrent hepatic and pulmonary hydatid cysts. 11 percent of 267 patients with right lung and liver Hydatid disease underwent single stage anterior minithoracotomy and phrenotomy. Primary diagnostic tools were chest radiography, ultrasonography and serology. The preferred mode of management of hydatid cysts was enucleation and partial or total capitonnage.

Results: Among the patients who had anterior minithoracotomy and phrenotomy, the male : female ratio was 2:1-20% of the patients were children of less than 12 years of the age. Mean operating time was 75 minutes. Morbidity was negligible and postoperative recovery was prompt. All the patients survived. The mean hospital stay was 5.2 days. Overall observations were encouraging.

Conclusion: This minimally invasive approach is associated with less morbidity and better cosmesis than conventional procedures. It represents an excellent alternative to other procedures in selected patients.

Emergency surgical procedures for traumatic brachial artery injuries

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Background: Traumatic brachial artery injuries constitute a relatively large percentage of peripheral arterial injuries. We report the results of a retrospective analysis of our strategies for the management of traumatic brachial artery injuries.

Methods: 60 patients with brachial artery injuries underwent surgery between Nov 1995 to July 2006. The age range was 3 years to 72 years. The injuries ranged from fracture humerus, stab wound, window glass injury, industrial accident, roadside accident and gun shot injury. 5 patients had peripheral nerve injury. Brachial-brachial pressure index was used in cases of doubtful artery injury and if doubt still persisted an immediate angiogram was performed. Repair involved end to end anastomosis, reverse saphenous vein graft interposition, PTFE graft or direct repair. Additional venous repair was required in 12 patients. 9 patients needed a fasciotomy. Major orthopedic manipulation was completed before any vascular repair.

Results: The limb could be salvaged in all cases. There were some residual functional disability in 2 of the patients with nerve injury.

Conclusions: Good results can be achieved in brachial artery injury by early diagnosis and surgical repair. Angiographic assessment should not be delayed in cases where the presence of significant injury is in doubt after non-invasive tests.

Recent single surgeon experiences with extra cranial carotid surgery at Sree Chitra Institute

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Background: Extra cranial carotid artery disease poses grave threat to cerebral circulation leading to devastating sequelae, if left untreated.

Methods: From September 1997 to October 2006, 47 patients were operated upon by the vascular surgeon for critical carotid disease- Carotid Endarterectomy for internal carotid stenosis in 31, ascending aorta to carotid bypass for extensive stenosis/ occlusion in 11, repair of carotid artery aneurysm in 4 and repair of ruptured innominate aneurysm in 1. General anaesthesia, Cerebral protection measures, modified greenhalgh technique of stump pressure monitoring, Inahara – Pruitt intraluminal shunt and saphenous vein on lay arterioplasty formed the standard protocol for carotid endarterectomy. Polyester graft reconstruction using median sternotomy was employed for ascending aorta-carotid bypass. Carotid artery aneurysm was repaired using saphenous vein in 2, collagen coated dacron graft in 1 and exclusion of ECA aneurysm in 1. Ruptured innominate artery aneurysm was repaired with the aid of partial femoro-femoral cardiopulmonary bypass.

Results: All patients returned to the ICU except for 1 of ascending aorta- carotid bypass group who died in the OR due to intractable ventricular dysrhythmia. One patient each of ascending aorta carotid graft died of low cardiac output and intracranial haemorrhage on 2nd and 5th day respectively. All patients (31) of endarterectomy group could be discharged without neurological sequelae. One patient in the endarterectomy group with bilateral carotid disease died due to contralateral stroke (documented). 2 patients were lost to followup. 42 patients are on regular followup and are keeping good health.

Conclusion: No major stroke resulted in the carotid endarterectomy group. Cerebral reperfusion sequelae needs to be seriously addressed in management of patients with Takayasu's Carotid Occlusion where long term results are less optimal than atherosclerotic lesions.

Surgical repair of ruptured sinus of valsalva a single center experience

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Background: Ruptured sinus of valsalva continues to be a challenge to any surgical team to which it presents. To analyze the results of treatment and the strategies that should be adopted we reviewed our experience with this condition.

Methods: From January 2000 to May 2006. 20 patients with a ruptured sinus of Valsalva were operated, of which 12 (60%) were males with age ranging from 13 to 60 years. 9 of the 20 patients were in CCF (FC III/IV). Coexisting cardiac anomalies included 7 with ventricular septal defect, 1 ostium secundum atrial septal defect, 2 with severe AR requiring replacement, one each with severe MR and TR. The aneurysm was of 'windsock' deformity in 6 patients. Right

and non- coronary sinus were equally involved (10 each). The sinus had ruptured into RVOT in 9 patients, into RV inflow tract in 2 and in the remainder it had burst into RA. A trans aortic and trans RA approach was preferred, thus avoiding a ventriculotomy.

Results: There was one immediate postoperative death in a patient who had infective endocarditis and aortic root abscess. 3 has residual shunts, out of these, 2 underwent redo patch repair, whereas one patient was not operated, as the shunt was small (1:2:1). One patient underwent a TVR and AVR for RSOV opening into RV inflow.

Conclusions: Long- term survival after surgical treatment of RSOV is excellent. The risk of a residual shunt is minimal in the current era. Late aortic insufficiency is still a risk, especially in right sinus of valsalva-to-right ventricle fistula with associated sub arterial VSD. Repair of RSOV through an aortotomy permits inspection of the aortic root complex and facilitates aortic valve repair; this approach may reduce the incidence of late aortic insufficiency.

Uncommon presentations of the commonest aneurysm in human body

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Background: Majority of infrarenal abdominal aortic aneurysms remain asymptomatic and are detected incidentally. Of the ones that do come to attention, pain and rupture are the principle modes of presentation. However, this is a clinical entity that has numerous 'variations upon the theme'. Uncommon presentations of Infra-renal abdominal aortic aneurysms are presented.

Methods: Rarely encountered presentations of AAA are depicted. Aorto caval fistula, Aorto-enteric fistula, Spontaneous dissection, fully thrombosed aneurysm, multiple aneurysms, Aorto-uniiliac and Aorto-bi-iliac aneurysm. Imaging modalities employed were: Duplex scan, contrast CT scan and digital subtraction angiography.

Results: All these patients underwent open surgical repair making eventual recovery except one patient with primary aorta- enteric fistula who succumbed to duodenal leak on 3rd day, after uneventful aneurysm repair.

Conclusion: Rare presentations of Infra-renal abdominal aortic aneurysm should be sought with a high index of suspicion. This reduces the possibility of intra- op surprises and betters the outcome of the procedures.

Complex arch and ascending aortic repair for acute and chronic thoracic aortic disease

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Background: Despite advances in perfusion technology, protective strategies for the brain, heart and rest of the body and perioperative management, the aneurysms and dissections of thoracic aorta remain a major challenge for the cardiac surgeons. We report the short and mid-term outcome of the surgical management of thoracic aortic dissections and aneurysm from a single center.

Methods: Between October 2002 through October 2006, a total of 29 patients underwent surgery on thoracic aorta for acute/chronic dissection and / or aneurysmal dilatation. Thirteen patients had combined arch and ascending aortic repair (5 patients for aortic dissection of which 3 were chronic dissections, and 8 patients for aneurysms). 13 patients underwent isolated Bentall's procedure, 3 patients has repair of descending thoracic aortic aneurysms. Whenever

aortic arch was involved all patients had arch first approach using elephant-trunk technique under deep hypothermia and total circulatory arrest, and using open distal anastomosis technique. In 4 patients arch vessels were reimplanted using Dacron interposition grafts separately as the dissection was extending to these vessels. All patients except one with ascending aortic and arch pathology needed aortic root replacement with a composite conduit with a mechanical prosthetic valve, in the remaining one patient aortic valve was repaired.

Results: All patients except one survived the surgical procedure. There were three re-explorations for excessive mediastinal bleeding. Two patients developed postoperative acute renal failure requiring dialysis. The patient who died on second post-op day bled continuously from the distal anastomotic site. All other were discharged from the hospital. The mean follow-up period was 21.4 months (range 1 to 48 months). During the follow-up period one patient had sudden death and remaining patients were doing well and were in NYHA Class I.

Conclusion: Complex aortic arch and ascending aortic repairs can be accomplished with reasonable safety and predictable outcomes. Acute dissection is associated with high operative mortality.

Ascending descending aorta bypass with the AID of heart lifting device

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Background: Management of complex recoarctation following previous arch repair poses considerable challenge. A number of options are available to bypass the area of arch narrowing without dissecting around the area of arch. We present our experience with management of a child who had narrowing at the level of arch following previous interrupted arch repair.

Methods: 12-year-old girl presented to us with complaints of headache and claudication. She had undergone 2 stage repair of VSD with interrupted aortic arch at the age of 6 months when she underwent arch repair with PA banding through left thoracotomy and subsequent VSD closure at the age of 18 months. At the time of presentation she had upper body hypertension (180/110), the femoral pulses were not palpable. She had a gradient of 80 mmHg across the arch. Surgery was performed on femoral bypass and redosternotomy was done to expose the ascending aorta. Descending aorta was exposed behind the pericardium. She underwent ascending to descending aorta bypass with 22 goretex conduit with the help of heart lifting device used for off-pump coronary artery bypass surgery.

Results: The graft was positioned lateral to the right atrium in the right pleural space. Postoperatively there was no gradient between the upper and lower limb. She was discharged on the 7th postoperative day following uneventful hospital stay.

Conclusion: Ascending descending aorta bypass using heart lifting device provides excellent exposure of the descending aorta behind the pericardium and helps in freeing the assistant's hand. Doing the surgery on Cardiopulmonary bypass helps by emptying the heart and providing safety during retraction of the hypertrophied ventricle.

Role of preoperative embolisation in carotid body tumors

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Background: Compare the efficacy of pre-operative embolisation in the management of carotid body tumors

Methods : We retrospectively reviewed medical records of all patients who had undergone surgery for cervical paragangliomas in our department over last 18 years. There were 32 paragangliomas of which 26 (81.2%) were carotid body paragangliomas (CPB), 5 (15.7%) were glomus vagale tumors and only 1 (3.1%) was a case of glomus jugulare tumor. The study group consisted of 26 CPB in 25 patients; one patient had a bilateral tumor operated at one-year interval. Mean age of patients was 34.3 years and male to female ratio was 1.1:1.17 (65.4%) tumors were embolised before surgeries while the other 9 (34.6%) tumors were taken up for surgery without preoperative embolisation. Particle used primarily for embolisation was Gelfoam (GF) and Hydrogel (HG) in three each, Polyvinyl Alcohol (PVA) in two tumors and direct injection of the tumor with bucrylate in one case. The extent of devascularisation of the tumor ranged from 70% to 100%. Study groups were divided based on tumor size and Shamblyn types and these were compared for various factors like duration of surgery, need for blood transfusion, postoperative complications, duration of ICU and hospital stay.

Results: There were no statistically difference in the outcome between the embolised and the non-embolised groups.

Conclusions: The results indicate that there is no role for preoperative embolisation in Shamblyn type I & II and tumor size < 5cm. Embolisation in type III and big carotid body tumors may improve outcome but results were not statistically significant.

Infrainguinal bypass grafting- Factors affecting long term patency

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Background: Chronic lower limb ischemia is a common clinical problem in our country Infrainguinal bypass is mandated in a subset of patients with critical limb ischaemia and aneurismal disease and provides immediate limb salvage as well as excellent long term results. Purpose of our retrospective study is to elucidate effect of various known factors on the long term patency of infrainguinal bypass grafts performed in our patient population.

Methods: We reviewed follow up data of 110 patients who had undergone infrainguinal bypass grafting over a period of 10 years. Graft patency rates and factors affecting it over this period were studied and the data statistically analysed. Overall cumulative patency rates were calculated by life table survival method. Patency rates in different subset of patients were calculated and compared using Wilcoxon (Gehan) test & Fisher's exact test to assess the influence of various factors in the long term outcome.

Results: Cumulative patency in terms of graft survival probabilities was 0.84, 0.80 and 0.64 at 30,60 and 90 months respectively. 80% of grafts in patients who had continued to smoke post-operatively had failed when compared with those who did not smoke (P=0.01). Cumulative patency rates of non-diabetics were higher as compared to non-diabetics (0.70 vs 0.44; P=0.04).

Conclusion: Our study shows that smoking and diabetes are the risk factors associated with graft occlusion. Strict avoidance of smoking and optimal control of diabetes are likely to improve graft function and long term patency in our patients undergoing infrainguinal bypass grafting.

Aortic aneurysm

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Background: The purpose of this study is to review our institutional experience with aortic aneurysm.

Methods: Between June 1987 to February 2004, 48 patients were diagnosed to have aortic aneurysm at the Institute of cardiovascular diseases and 45 patients who underwent surgical repair formed the basis of this study. Fourteen patients has (29.16%) had Aneurysm of the ascending aorta, 3 (6.25%) in the arch segment. 1 (2.08%) in the descending thoracic aorta, 6 (12.5%) in the thoraco-abdominal segment and 24 (50%) had an abdominal aortic aneurysm. Emergency surgery was performed in six patients, partial bypass was employed in 13 (27.1%) patients and total cardio-pulmonary bypass was employed in 19 (39.6%) patients. Deep hypothermic circulatory arrest was employed in 7 patients who had aneurysm involving the arch of aorta.

Results: The 30 day hospital mortality was 9 (18.75%) and the late mortality was 2 (4.16%). 3/6 (50%) patients who underwent emergency repair died. Postoperative complications included renal dysfunction in 13 patients (27.1%) requiring hemodialysis in 3 patients, 5 (27.08%) patients had post-operative Gastro-intestinal complications of whom 4 suffered from paralytic ileus and 1 died due to massive GI bleed from duodenal ulcer and 5 patients (11.11%) had neurological deficit post-operatively. 3 had disorientation and delayed recovery of neurological function which recovered gradually, 1 patient had paraplegia, and 1 patient had multiple brain infarcts. The actuarial 16-month survival was 72.9%. 7 (35%) patients presented with complications on follow up of which 2 died.

Conclusion: This clinical experience demonstrates that repair of aortic aneurysm can be accomplished with good results and survival depends upon the location and indication for surgery. Arch aneurysms have higher risk and survival when compared to other locations. Thoracic-abdominal aortic aneurysms are at high risk for neurological complications.

9 Year's single surgeon experience with repair of abdominal aortic aneurysms at Sree Chitra Institute

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Background: Ever since Charles Dubost Performed the first repair of an abdominal aortic aneurysm (AAA) in 1951, advances have spearheaded phenomenal evolution of modern vascular surgery, saving thousands of lives world over.

Methods: A retrospective analysis of 136 patients with AAA who underwent repair in our institute for January 1997 to October 2006 is presented. 105 procedures were elective, 31 were emergent for contained (18) and free (13) rupture. 11 patients were women in this cohort, (age 24-85 years (mean-68 years)). Elective underwent complete work-up including CAG in contrast to an ultrasonogram in all and CT scan abdomen in most emergent cases. Co- morbidities were smoking (78), hypertension (82), diabetes (32), coronary artery disease (15) and renal dysfunction (Sr. creatinine >1.5mg%) 15). Procedures were performed under GA using transperitoneal approach with inclusion straight tube Dacron graft in 101, bifurcated in 33 and inflow occlusion in 2.

Results: 5 patients (5/105=4.76%) in the elective group succumbed to renal failure (2), bleeding (2) and multiple organ failure (1), 9 of 31 patients (29%) in emergent group died - 7 of 13 (53% free) and 2 of 18 in the contained group (11%). During follow up four patients died.

10 patients were lost to follow up. Histopathology revealed atherosclerosis in almost all cases, notable other being aorto-arteritis in 10 patients.

Conclusion: Timely effective repair of AAA as well as emergency procedures for contained rupture are highly rewarding though the outcome for free rupture remains guarded.

Takayasu's arteritis mimicking acute aortic dissection

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Background: Takayasu's arteritis(TA) is a non-specific aorto-arteritis involving the aorta and its branches. The clinical presentation of TA is varied. Aortic dissection as a manifestation of this entity has rarely been reported. We report a case where a young lady was mistakenly diagnosed to have acute aortic dissection with severe aortic regurgitation but was found to have aorto-arteritis on the operating table.

Case Report: A 17-year-old girl presented with a history of dyspnoea on exertion and fever of one-week duration. She was evaluated with transesophageal echocardiography and helical CT scan elsewhere and was diagnosed to have acute type I dissection of the aorta. She was also diagnosed to have severe aortic regurgitation and a suspected aortic root abscess. Emergency surgery was performed. On table, the aorta was grossly thickened to about on centimeter. There was on evidence of aortic dissection. The arch and descending aorta were examined and were found to be free of dissection. Aortic cusps were non-coatping and left coronary ostium was narrowed. Aortic valve was replaced and the left internal mammary artery was grafted to the left anterior descending artery. Histology of the aortic wall confirmed inflammatory pathology. She was placed on peri-operative steroids and made an uneventful recovery.

Conclusion: Aortic dissection is a very rare manifestation of Takayasu's arteritis. Acute aortitis may mimic aortic dissection clinically as well as on imaging modalities like echocardiogram and CT. It is pertinent to be aware of this pitfall as the management of aortitis and dissection differ.

Repair of a choronic pseudoaneurysm involving the celiac axis

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Background: Aneurysms involving the celiac axis are rare. Surgical management of these aneurysms presents several challenges to the surgeon. We present a case of thoracoabdominal aortic aneurysm involving the celiac artery origin.

Case Report: A 46 year old man was diagnosed to have an abdominal aortic aneurysm, when he presented with a one year history of abdominal pain. He underwent a laprotomy for aneurysm repair at another institution and was deemed to be inoperable. A 64-slice CT examination with 3 D reconstruction revealed a large saccular aneurysm involving the origin of the celiac axis, with compression of the origin of the superior mesenteric artery by the overhanging aneurysm. Excellent collateral circulation was demonstrable by the reconstructed images. A thoracoabdominal incision was made through the eight intercostals space up to the m midline. Proximal control was obtained by looping the aorta at the level of the hiatus. The aorta was clamped above and below the aneurysm, aneurysm

was opened at its neck and thrombus evacuated. The defect was closed with a patch of woven Dacron, Postoperative 3 D reconstruction showed an intact repair with adequate collateralization.

Conclusion: Identifying the correct approach to the aneurysm forms the crux of a successful repair. 64-slice CT scan to accurately demonstrates the anatomy, adequacy of collaterals and extent of the aneurysm. Key to successful surgery will include adequate proximal and distal control through appropriate incisions and careful dissection, with identification and preservation of all the collaterals.

Re-operations on the ascending aorta and aortic root with previous cardiac surgery

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Background: First time operations on the ascending aorta are performed with low mortality, few complications and excellent long term results. Re-operations for aortic pathology in patients with previous cardiac surgery is a surgical challenge.

Methods: From March 1996 till September 2006 fifteen patients having previous cardiac surgery presented with aneurysm of the ascending aorta or aortic root. Male-Female ratio was 12 to 3. Ages range from 28 to 64 yrs with a mean age of 52 yrs. The size of the aneurysm ranged from 7 to 15 cms. Three patients underwent CABG earlier, six had aortic valve replacement, one had Double Valve Replacement, three had ascending aortic repair, one had VSD closure and aortic valve repair, and one had ascending aorta to abdominal aortic graft. Coronary angiogram and Aortogram was done in all patients who were stable. All of them were operated through mid line sternotomy done either before or after instituting CP by-pass.

Results: Profound hypothermia and circulatory arrest was used in five patients. Ascending aortic replacement with coronary reimplantation was done in six. Modified Bentall's operation was done in another six. Two patients had aortic replacement alone. Four patients underwent proximal arch replacement along with ascending aorta under circulatory arrest. Temporary renal dysfunction occurred in one patient. There was no operative mortality in this group.

Conclusion: Re-operation on the ascending aorta can be done with good results.

Leaking saccular aneurysm of common iliac artery- A case report

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Background: Isolated common iliac artery (CIA) aneurysms are rare (1%). Mostly they are fusiform true aneurysms in association with aneurysms of infra renal aorta. Eccentric saccular aneurysms are true aneurysms unlike the pseudo aneurysms caused by accidental or iatrogenic injuries which are false. We report the diagnosis and successful management of a leaking large isolated left CIA saccular aneurysm.

Case Report: A 55 year old farmer was brought to our hospital with 4 to 5 days of abdominal and low back pain. He was nondiabetic, smoker, had irregular drug history for hypertension and no history of any trauma. He was anaemic (HB-5.5g%), hypotensive (BP 90/65), and had tachycardia with a pulsating mass in the left iliac fossa, hypogastrum and lower limit was not palpable. Arterial pulses in both lower limbs were normal, USG of the abdomen showed it to be an aneurysm from the lower part of the abdominal aorta with retroperitoneal haematoma and some free fluid in the abdomen

(blood). There was left hydro ureter and mild hydronephrosis. Renal function was normal. A spiral CT scan with 3 D reconstruction was next done. It showed it to be a saccular aneurysm (8cm by 6 cm) arising from the proximal left CIA. Doppler duplex study of the aorta showed no other aneurysm. Preoperatively oral propranolol was started and haematocrit improved with blood transfusion. With a midline ciliotomy the free blood in the abdomen was cleared, and aneurysm confirmed. We isolated and taped the infrarenal aorta and right common iliac arteries. We planned to isolate the neck of the aneurysm. But the whole of the left common and ext iliac arteries were densely adhered to the underlying aneurysm sac. So the left common femoral artery was isolated in the groin and taped. After heparinisation and cross clamping the abdominal aorta and its branches, the retro peritoneal haematoma was entered, clots removed and wall of the true aneurysm was now visible. It was stabbed and entered with some bleeding. Its opening in the left CIA was confirmed. Local repair was not possible as the CIA and EIA were diseased, friable and too weak to hold the sutures. Left common, internal and external iliac arteries were ligated. A 8 mm PTFE graft was anastomosed between the lower part of the abdominal aorta the left common femoral artery in the groin. Post operative recovery was uneventful. The patient is doing well after 8 months of follow up.

Conclusion: Leaking aneurysms of aorta are actually contained rupture along the posterior wall of the aneurysm in the retroperitoneal region. They can have symptoms for days instead of hours as occurs in rupture along the anterior wall. Like aneurysms of abd aorta which are more common, isolated CIA aneurysms have a high risk of rupture with an associated high mortality rate and need to be intervened when the size is more than 5 cm. But reference to such large saccular aneurysm of the CIA are rare.

Innovative hybrid procedure for dissection thoracic aorta in a patient with a previous Bentall Procedure

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Background: Dissections of the thoracic aorta starting from the arch are seen in 5% cases. A 42 year old man with Marfans syndrome, with a previous Bentall procedure, presented with acute chest pain. Investigations revealed a dissection of the aorta, starting just distal to the left common carotid artery to the renal level. A hybrid combination of surgical and endovascular treatment was planned for sealing the dissection.

Methods: A redo sternotomy was performed and under femoro-femoral CPB a short segment of Dacron graft was interposed between the previous Bentall graft and the arch of aorta. On to this graft 2 additional grafts were anastomosed- a 14 X 9mm bifurcated graft, one to the right common carotid and one to the left common carotid- and a 9 mm side arm to facilitate the positioning of the endograft. After coming off CPB a guide wire was manipulated from the femoral artery into the newly anastomosed graft, and snared into the side conduit with a 20 mm Microvena snare. A 32 X 200 mm Zenith stent graft (Cook, USA) was deployed just distal to the bifurcated graft upto T9 level. Surgical ligation of the distal innominate and the proximal left common carotid were done.

Results: Te false lumen was successfully obliterated with a complete recovery and no neurological deficit and both radials well palpated.

Conclusions: Surgical treatment for dissections entails a high morbidity and mortality; we present a hybrid, surgical and endovascular technique which is technically successful with a lower rate of complications.

A simplified method of staged closure of the sternum in the ICU

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Background: Open chest management (OCM) and subsequent delayed sternal closure (DSC) is a valuable tool in the management of patients with post cardiectomy life threatening cardiac compression from sternal closure (1.2-2.8% adult cases post CABG). The major resistance to the use of this technique is the fear of infection and the concern regarding the logistics of shifting a patient with an open chest with an IABP and inotropes from the ICU to the OT. We present a simplified technique which permits a rapid closure in the ICU.

Methods: Once the decision for DSC is made absolute hemostasis is achieved. Sternal wires are passed in a figure of 8 fashion. The ends are left long and are turned into the subcutaneous tissues. The sternal halves are either left apart as such or a paediatric sternal retractor is used to stent the halves apart. A water proof cover is maintained with an iodrape sheet. Once the hemodynamics stabilize in the ICU (inotropes, TEE assessment, normal CI, good urine output and ABG etc) the decision to close the chest is made. The patient is isolated by vacating the adjacent beds, the AC unit is switched to fresh air cycles with a change of 20 cycles /hr, a mobile OT light is brought in and with all personnel going through routine OT scrubbing and draping protocols the wires are tightened and standard closure performed in the ICU.

Results: The technique has been used successfully by us in 3 cases of post CABG myocardial edema who did not tolerate primary sternal closure.

Conclusions: We recommend this simple technique of DSC in the ICU.

Interlocking wiring – A novel technique to prevent sternal dehiscence

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Background: Sternal dehiscence is one of the dreaded complication in CABG patients especially in diabetic population and in subgroup of patient where both internal mammary arteries are used as conduit. The aim of this study is to determine the feasibility of this technique in prevention of sternal dehiscence.

Methods: Between May 2000 to April 2005, a total of 878 patients underwent CABG operation. Mean age was 64.3 ± 7.2 years. In 314 patients sternum was closed with simple wiring (Group I) and in 564 patients interlocking wiring technique was used (group II). The mean age, male to female ration, incidence of diabetes, use of B/LIMA and comorbidity was almost similar in both groups.

Results: Nine patients (2.9%) in group I had sternal dehiscence, who later on underwent rewiring with Rovichek technique. In group II only 3 (0.6%) patients had sternal dehiscence who underwent Rovichek rewiring.

Conclusion: Interlocking wiring is an effective technique to prevent sternal dehiscence especially in CABG patients, older patients and short, fatty, female patients where sternum is weak and friable, diabetic patients and patients with B/LIMA where vascularity of sternum is compromised. Our protocol is to use simple wiring in non CABG patients, or when BMI is <25. In all CABG patients and when BMI is between 25-30, we use interlocking wire and in patients with BMI >30, we electively use Rovichek wiring (This figure is considering Indian patients with comparatively low height and weight).

Surgical management of complications acute myocardial infarction

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Background: Mechanical complications of myocardial infarction constitute a sub group of hemodynamically unstable patients in whom , surgical correction is associated with high morbidity and mortality. The objective of this study was to analyse the outcome in these patients who underwent emergency surgery. Patients with ventricular septal rupture and freewall rupture were included.

Methods: Over the last 8 years, a total of 26 patients (48-62 yrs; VSD 20pts, Free wall rupture 6 pts) underwent surgery for mechanical complications of MI. All patients were operated within 4.46 hours duration (2-10hrs) of the 26 patients, 11 had SVD, 5 had DVD 10 had TVD. Mean ejection fraction prior to surgery was 39% , Surgical closure was done with a combination of the following techniques: PTFE graft, Bovine pericardium , infrectomy and primary closure.

Results: The mean number of grafts used for the patients was 3 . IABP was instituted in 16 patients to stabilize hemodynamics. Mean duration of ventilation was 42 hrs and hospital stay, 14 days. Most patients needed prolonged moderate inotropic support, 3 needed tracheostomy. We have 5 deaths in this series, resulting from low cardiac output , multiorgan dysfunction and uncontrolled bleeding.

Conclusion: Surgery for mechanical complications for myocardial infarction is a challenging exercise. Early surgery is the dictum, unless the patient is extremely stable. A high degree of clinical suspicion, echocardiography (TEE) and coronary angiography confirms the diagnosis.

Clinical review of pyopericardium in a single institution over a period of ten years

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Background: Pyopericardium is accumulation of pus in the pericardial cavity. This condition is uncommon in the era of effective antibiotics. The aim of this study is to review our experience with pyopericardium in 12 patients encountered over a period of 10 years.

Methods: Data related to twelve patients who were treated for pyopericardium between December 1994 and December 2003 were collected from medical records and analysed retrospectively.

Results: In the study, there were 8 males (67%) and 4 females (33%). The age group ranged between 2 months to 20 years (average 8.1 years). The chief presenting symptoms were fever and dyspnoea. Bacteremia constituted the predominant predisposing factor. Chest x-ray and echocardiogram were the important diagnostic tools. Staphylococcus aureus was encountered in 10 patients, streptococcus pneumoniae in 1 patient, both staphylococcus aureus and TB in 1 patient. Prior to surgery , repeated pericardiocentesis was done in 4 patients, pig tail insertion in 2 patients. 11 patients underwent pericardiectomy through midline sternotomy, of which 4 were done on emergency basis and 1 had emergency thoracotomy and pericardiostomy. There was no postoperative death. One patient in septicemia required prolonged ICU stay and another patient required prolonged hospital stay due to multiple site infections. Post pericardiectomy syndrome and sternal wound infection were encountered in 1 patient each. Patients were treated postoperatively with antibiotics for 4 weeks and antifailure drugs for 6 weeks and with ATT for 1 year.

Conclusion: The clinical suspicion of pyopericardium should be early and timely pericardiocentesis relieves the acute symptoms and early pericardiectomy done during the same hospital admission, provides clearance of the focus and prevention of late development of constriction and its sequelae.

Combined cryoablation with endoaneurysmorrhaphy for left ventricular aneurysm with sustained ventricular tachycardia

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Background: In ventricular aneurysm, the transition zone between the scar and viable myocardium is arrhythmogenic. In this study, the efficacy of cryoablation without intraoperative electrophysiologic mapping, along with left ventricular (LV) endoaneurysmorrhaphy was evaluated in patients with postinfarction LV aneurysm and sustained ventricular tachycardia (VT).

Methods: A prospective study was performed on 3 patients who underwent endoaneurysmorrhaphy and cryoablation.

Results: Till date 220 patients have undergone endoaneurysmorrhaphy in our institute. This study included 3 of these patients, 2 males and 1 female, who also had sustained ventricular tachycardia. All three patients had an anterior myocardial wall infarction. Both the male patients had three vessel coronary artery disease. The female patient had a recanalised LAD. One male and the female patient had severe mitral regurgitation. All patients underwent cryoablation at the transition zone of scar and viable tissue and LV remodeling with prosthetic patch. An additional linear cryolesion was placed on the ventricular septum from the mitral annulus to apex. Nitrous oxide and commonly available, inexpensive ophthalmic probe were used for the cryoablation. Associated procedures were CABG in 2 patients and mitral valve reconstruction in 2 patients. Postoperative electrophysiologic study (EPS) revealed freedom from VT induction in all 3 patients. These patients have been followed up till date with no arrhythmias (mean follow up to 12 months).

Conclusions: In patients suffering from ventricular arrhythmias in the presence of a complicated postinfarction LV aneurysm, combined 'blind' cryoablation and endoaneurysmorrhaphy offers excellent arrhythmia control, with no added morbidity and mortality. It is also inexpensive.

Efficacy of EMLA cream for pain relief during removal of chest drainage tubes

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Background: Chest drain removal is a painful experience for majority of patients despite analgesic administration. We wanted to study if the painful experience could be attenuated by using topical eutectic mixture of local anesthetics (EMLA) cream.

Methods: 25 consecutive cases (group A) undergoing cardiac surgeries were enrolled to receive EMLA cream application 30 minutes prior to chest tube drain removal. Adequate amount of the cream (4-5Gms) was applied to the drainage sites and an occlusive dressing was applied. After ½ hour, drains were removed and pain assessment was done using a visual analogue scale (VAS) at 1 minute after pain removal. Simultaneously the maximal BP response and maximal heart rate response to drain removal within 2 minutes of drain removal was also recorded. 25 cases (group B) also undergoing cardiac surgery were also studied as controls and received conventional analgesia

viz Diclofenac injection and Morphine 0.1 mg/Kg. The same parameters were also recorded for these patients. The data were recorded in an Microsoft Excel spread sheet. Data was examined using the students T test with $P < 0.05$ being considered significant.

Results: The mean VAS score for group A was 1.8 SD= 0.5 while that for group B was 4 SD= 0.57 (A significant difference). There was a significant increase in the heart rate and BP in response to drain removal in group B compared to group A.

Conclusion: The use of EMLA cream is an effective method to attenuate pain response both subjectively and objectively during chest drain removal and makes a potentially painful procedure acceptable to patients.

Modified endoaneurysmorrhaphy- Left ventricular reconstruction for left ventricular aneurysm

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Background: Ventricular reconstruction is the active surgical attempt to restore the shape of the pathologically remodeled ventricle to one that is physiologically superior to the shape created in diseased state 95% of the ventricular aneurysms occur after transmural myocardial infarction. 85% of them are on the anterolateral wall of the left ventricle, 5-10% posterolaterally and less than 5% are on the lateral wall. Indications for surgery include patient with chronic cardiomyopathy with worsening LV dysfunction, heart failure, angina pectoris, thromboembolism or ventricular tachycardia. We present 100 patients with left ventricular remodeling (aneurysm repair).

Methods: 100 patients underwent left ventricular remodeling of which 94 males (94%) and 6 females (6%) age ranging from 27-75 years mean age of 51 years. All the patients underwent complete blood count, chest x-ray, E.C.G., ECHO and coronary angiogram. After conforming the diagnosis they were subjected to endoventricular linear repair. All the patients had a haemashield patch to exclude the infarcted area and buttress suturing of the cut edges with Teflon strips. 82 patients (82%) had associated CABG.

Results : We did not have any mortality in this group. Postoperative ECHO showed increase in left ventricular ejection fraction, improvement in symptoms from class III-IV to class I-II.

Conclusion: We conclude that surgical reconstruction of left ventricular aneurysm is a safe and effective modality.

Surgical management of calcific ventricular aneurysms

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Background: Surgical management of calcified ventricular aneurysm is a surgical challenge associated with high mortality and morbidity.

Methods: From Jan 2004 to August 2006, 7 patients underwent surgical ventricular restoration (SVR) for calcified ventricular aneurysm. Age range was 50 to 70 years and all were males. The indication for surgery was cardiac failure in 5, intractable ventricular arrhythmias in two. SVR was combined with CABG with endarterectomy in 4 and was without endarterectomy in 3 patients. CABG was done in arrested heart and SVR in empty beating heart. Calcified aneurysm was dissected out from the ventricle. SVR was done using a PTFE patch to reconstruct the septum and the LV shape. Transventricular mitral valve repair was done in 3 patients.

Results: The inotropic and ventilator support, blood product usage, ICU stay and hospital stay were comparable with patients undergoing SVR for noncalcific aneurysms. There was no perioperative mortality. Two patients were readmitted after one month for pleural effusion which was managed with tapping and optimizing antifailure management. All patients were alive at the end of 6 months and were in NYHA class was II-III. The ejection fraction had improved by 5% and there was no residual MR in patients who had undergone mitral valve repair.

Conclusion: With careful dissection of the calcareous shell in the LV aneurysm, and SVR, the results in calcific aneurysm group are comparable to the noncalcific aneurysm group, establishing the fact that SVR in calcific aneurysms is a safe procedure with gratifying results.

New vascular occlusion clamp

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Background: A variety of micro vascular occlusion devices like the traditional metal bulldog clamps and the plastic alligator clips are used to occlude the conduits during coronary artery bypass grafting (CABG). However these conventional micro vascular devices are expensive and were being lost due to its size and get damaged while washing and autoclaving and may be associated with injury to the delicate vascular conduits. From 1987 we are using a small instrument in the place of bulldog clamp- a hair curl clip made up of aluminum alloy.

Methods: A new CABG occlusion clamp has been designed to overcome the shortcomings of the existing micro vascular clamps and the same has been compared with the currently used micro vascular occlusion clamps—metal bulldog clamp and plastic vascular occlusion clamp.

Results: The study revealed the following occlusion pressures for the various vascular occlusion clamps-metal bulldog 249 mm Hg, plastic vascular occlusion clamp 60 mm Hg and the new CABG vascular occlusion clamp 100 at the tip and 200 at the base. The new CABG vascular occlusion clamp was found to cause lesser micro vascular injury when compare to the conventional micro vascular occlusion clamps.

Conclusion: The new CABG occlusion clamp can be used to exert appropriate occlusion pressure as it has a wide working range of occlusion pressures, causes lesser vascular injury and is convenient for use during CABG both on pump and OPCAB. Hence this new clamp is the next best thing to the surgeon's fingers in occluding the delicate vascular conduits.

Longterm follow up of surgical ventricular restoration patients with echocardiogram

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Background: Though a variety of investigations are available for serial assessment of LV function in those who underwent SVR, we find echo as the choice of investigation because of easy accessibility reliability.

Methods: 526 patients underwent SVR in our unit. We use echocardiogram as one of the patient selection criterias for SVR and for follow up of SVR patients. Apart from wall motion abnormalities, shape and configuration of LV, the aortoseptal angle, apico mitral distance, LVESV, LVEF, MR, the size of LA are studied. The

aortoseptal angle is the angle between the longitudinal axis of aorta with that of the inter-ventricular septum in the longitudinal axis of para-sternal view. The echo assessment was done pre-op, immediate post-op and during follow up visits in 6 months interval.

Results: In the immediate post operative period EF is unchanged but at 6 months follow up 5% increase is noted which further improves by 2-3 years. LV shape and configuration is well maintained in longterm follow up. EDV significantly decreases. Mitral regurgitation downgrades and the aorto septal angle narrows. These parameters correlate with NYHA status improvement. In few patients there is increase in PAH with TR.

Conclusion: Echo is safe, simple, non-invasive and less time consuming and economically feasible investigation for longterm follow up SVR patients. The restoration of the LV shape and configuration is the important factor that determines the post-op outcomes in these patients.

Left ventricular reconstruction in dilated ischemic cardiomyopathy

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Background: Left ventricular reconstruction (LVR) to partially restore ventricular geometry in patients with ischemic cardiomyopathy undergoing coronary artery bypass grafting (CABG) is a surgical option still debated.

Methods: We prospectively collected data in 30 patients undergoing LVR using Endoventricular circular patch plasty (EVCPP-DOR procedure). Preoperatively 25 (83%) patients were in NYHA class III or IV with 22(73%) on diuretic therapy. 12(40%) complained of angina and 10(30%) had evidence of Ventricular ectopy. Ejection fraction ranged from 12-38%. 6(20%) patients had moderate to severe mitral regurgitation. End diastolic volume index (EDVI) was higher than 140ml/m² in 23 (76%) patients. Operative procedure included EVCCP in all patients. 29(97%) underwent CABG with an internal mammary artery graft to LAD in 28 patients and to the obtuse marginal branch in one patient.

Results: There was no intra operative mortality. Intra aortic balloon pump support was required in 19(63%). There were 3 in hospital deaths (10%) on the 4th, 12th and 46th post operative day. Follow up ranges from one month to 52 months with two late deaths occurring 6 and 26 months post operatively. 72% of survivors are in NYHA class I or II with an average increase in ejection fraction of 9 points.

Conclusion: Left ventricular reconstruction can be performed with a reasonable in hospital mortality. It provides excellent symptomatic improvement, restores ventricular geometry and improves ejection fraction.

Spontaneous dissecting aneurysm of abdominal aorta- Report of two cases

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Background: Primary dissecting abdominal aortic aneurysm is an exceedingly rare clinical entity in vascular surgical practice, Herein, we report two cases of a fifty and a forty eight year old male who underwent successful surgery at our centre.

Methods: These patients had abdominal aortic aneurysms delineated by ultrasonography elsewhere, upon evaluation for recent exacerbation of abdominal pain. Computed tomography showed infrarenal abdominal aortic aneurysm with a large partially

thrombosed false sac and an eccentrically placed true lumen with clearly delineated intimal tear and flap. Digital subtraction aortography confirmed an eccentrically placed and compressed small true lumen and large false sac with well-documented intervening intimal flap. Surgery included transperitoneal inclusion graft repair of aneurysm using 16 mm Dacron tube prosthesis along with an extension 8 mm right unifemoral bypass graft on identifying absent femoral pulse at conclusion of procedure. The second patient has a straight tube graft repair.

Results: Both made an uneventful recovery subsequently, with an ankle brachial pressure index of 0.9 at discharge on betablockers. Clonal evaluation as well as CT scan, at three months and three years follow up, confirmed intact repair and a satisfactory graft patency.

Conclusion: Primary dissecting abdominal aortic aneurysm, even though a rare entity, does present as a challenge to the vascular surgeon. Pre op evaluation and a definitive plan, executed with attention to detail, are the cornerstones of successful outcome.

Roller gauze packing for uncontrolled aortic suture line bleed – Application of usual technique in cardiac surgery

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Background: To control bleeding after cardiopulmonary bypass from a well contracting & beating heart has been the greatest challenge for cardiac surgeons since decades. Intra operative & post operative bleeding is the major cause of morbidity & mortality in the field of cardiac surgery. A variety of different suture techniques, materials, tissue sealants & bioglues have been tried but with limited success. Here we describe a basic surgical technique based on basic general surgical principles used successfully in our 10 patients. Application of this simple, cheap & basic surgical technique in cardiac surgery with successful results.

Methods: From July 2004 till date we have come across uncontrollable aortic suture line bleed in our 10 cases. In 7 cases aortic root widening was done for narrow aortic root in severe aortic stenosis. Nicks procedure in 3, Monougan in 2 Konno Rastan in 2 cases. In rest 3 case double valve replacement was done in all cases significant uncontrollable bleeding was there from aortic suture line which could not be stopped applying various techniques (Pledged suture, Pericardium, using surgicell, tissue sealants or biogluue). Apply firm pressure over gauge pieces kept over bleeding aortic suture time at least for 30 min. Keep blood pressure between 90-100 mmHg throughout this period. After 30 min pack this area firmly with roller gauze pack, end of this pack taken out supra-sternally from separate incision. Close the sternum with drains as routine. Keep patient paralyzed & sedated on ventilator for 12 hours keeping BP between 90-100mmHg. Remove pack after 24 hours.

Results: All 10 cases survived no mortality, there was no reexploration. Average post op. drain was about 550 cc patient was extubated next day and pack removed after 24 hours. 2 cases had minor wound infection, no late mediastinitis or infective endocarditis reported till date.

Conclusion: 1. Our technique is relatively cheaper & simple technique with promising results. 2 Such basic general surgical technique can be valuable and life saving. It is simple easily feasible and cost effective technique of achieving hemostasis.

Left atrial sarcoma – Case report

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Background: Left atrial sarcomas are rare cause for mitral stenosis. They have early tendency for cerebral metastasis. To share our experience with a case of LA sarcoma causing mitral stenosis wh had valve replacement. She presented with cerebral metastasis 25 days after surgery.

Methods: 35 year old lady was evaluated for NYHA Class 3 dyspnea, palpitations with no neurological symptoms. She had a left atrial tumor extending across the mitral valve causing critical mitral stenosis. She underwent mitral valve replacement under CPB and trans atrial approach. Per operatively left atrial appendage was hard to feel and the tumor was originating from left atrium, interatrial septum and appendage, going into the anterior papillary muscle on to LV encircling the chordae of AML. Patient had a smooth post operative recovery and was discharged. HPR showed Sarcoma. She was readmitted after 10 days with projectile vomiting and headache, with features of raised intracranial tension. CT scan revealed multiple metastatic lesions.

Results: Patient is on follow up for last 6 months and symptomatically free from mitral stenosis. She is on adjunctant chemotherapy but has severe headache. Anticoagulation was deferred.

Conclusion: Preoperative pathological diagnosis of left atrial sarcomas is not feasible. They may have co existing metastatic disease. Valve obstruction requires valve replacement. Prognosis after diagnosis is poor.

Short term results of endoventricular patch plasty for surgical ventricular restoration of dyskinetic ventricles

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Background: Surgical ventricular restoration (SVR) is an option for patients with coronary artery disease (CAD) and akinetic / dyskinetic ventricles. Endoventricular circular patch plasty (EVCPP) is a well established technique. In this small study we analysed the results of patients who underwent SVR at our center.

Methods: Data were retrospectively analysed. Between February 2003 and August 2006, 13 patients (12 male and 1 female) underwent SVR with EVCPP along with coronary artery bypass grafting (CABG). Mean age was 48 (40-64). Pre-op all were in clinical class III/IV and ejection fraction (EF) ranged from 23%-62% (mean 54%). 7 patients had significant pulmonary hypertension. 2 patients needed concomitant mitral repair for significant mitral regurgitation (MR).

Results: Hospital mortality was 1/13 (7.6%). Preoperative support included intraaortic balloon (IAB) in 1/13 (7.6%) and inotropic drugs in 9/13 (69.23%). Post-op ventilation ranged from 5-72 hours. ICU stay ranged from 2-12 days. Mean hospital stay was 11 days. One patient died suddenly one week after discharge from the hospital. Follow up is complete in 11 survivors. All are in class I with remarkable control of symptoms. Mean post-op EF was 62% (27-28%) with was increase of 8%.

Conclusion: SVR with EVCPP can be safely performed with acceptable mortality. It offers excellent control of symptoms and improvement in clinical class. This is due to reduction in diastolic dimensions. This procedure should be strongly considered for patient with coronary disease undergoing CABG with dyskinetic ventricles.

Jaundice following cardiopulmonary bypass

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Background: Disorder GIT system have been documented following CP Bypass. Its incidence varies from 0.8% to 2% with a mortality of 17-50%. Incidence of P O hyperbilirubinemia has been reported from 10 to 40% in the Western patients. This study was done in Indian patients to find out incidence of post CPB hyper – bilirubinemia and its possible prognostic importance.

Methods: 400 patients of all ages who underwent open heart surgery under CP bypass over 4 year's period were studied prospectively. Patients with diabetes, hypothyroidism and undergoing emergency or redo open heart surgery were excluded.

Results: The overall incidence of postoperative hyperbilirubinemia was 18% (72 out of 400 patients). 56 out of 72 jaundiced cases had valve replacement surgery. Surgical procedures on tricuspid valve – repair or replacement has significant relationship for development of jaundice. Congenital heart diseases was next group to have jaundice after CP bypass. The hyperbilirubinemia was short lived, the highest level of bilirubin was within 3 days after surgery and reaches normal levels by end of 2nd week. The bilirubin was mainly unconjugated. The jaundice was severe in patients with pre-operative serum bilirubin of more than 1.4mg%. Late jaundice (peak by 2nd week) was due to hepatic dysfunction caused by CHF and was associated with higher morbidity and mortality. There were only 4 deaths which were directly related to liver failure.

Conclusion: There was transient hyperbilirubinemia in 18% patients who have undergone open heart surgery under CP Bypass. Preoperative CHF, raised total bilirubin and surgery involving tricuspid valve are possible predictors of postoperative jaundice.

Left ventricular restoration using endoventricular circular patchplasty – Early outcomes

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Background: Endoventricular circular patch plasty (EVCPP) of left ventricle is considered as one of the best surgical procedures for left ventricular aneurysms because of effective restoration of ventricular geometry. We present our experience of ventricular restoration of ventricular restoration using EVCPP (Dor technique).

Methods: We retrospectively analysed 101 consecutive patients who underwent surgery for left ventricular aneurysm by our team between February 2000 through October 2006. Sixty nine patients underwent restoration using EVCPP (Dor technique) (group I) and 32 patients underwent restoration using linear repair (group II). Both patient groups were comparable in terms of age, symptomatic class, risk factor profile and severity of coronary artery disease. A cardiac magnetic resonance imaging (MRI) was done preoperatively in 51 patients. Left internal thoracic artery was grafted to left anterior descending coronary artery in 63 patients in group I and 27 patients in group 2. Concomitant mitral valve repair was done in 6 patients in group I. Early outcomes were evaluated and compared between two groups.

Results: There were two deaths in group I and one death in group II. Mean preoperative left ventricular ejection fraction (LVEF) in group I improved from $39.04 \pm 3.92\%$ to $44.52 \pm 3.74\%$ and mean preoperative LVEF in group II improved from 40.20 ± 3.16 to 41.21 ± 3.51 during mean follow – up period of 26.12 ± 10.4 months (P value < 0.001).

Conclusion: Post infarction left ventricular aneurysms can be repaired with satisfactory early results. Improvement of left ventricular ejection fraction was significant in EVCPP group compared to linear repair group.

Experience in management of cardiac myxomas

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Background: We studied the clinical presentation of cardiac myxomas and the morbidity, mortality and recurrence following surgery at our hospital over a period of 7 years.

Methods: Between January 1999 and August 2006 out of 4100 cardiac operations, 29 patients underwent complete excision of primary or the recurrent intracardiac myxomas. Preoperative diagnosis was established by echocardiography. All patients underwent operation soon after the diagnosis was made. Complete excision with a cuff of inter-atrial septum followed by close inspection and copious saline irrigation of the cardiac chambers was done in each case. All the patients were followed up at regular intervals for recurrence. The mean follow up was 45 months.

Results: Myxomas constituted 0.70% of the total cardiac operations at our hospital. They most commonly occurred in the fourth decade. All of them were left atrial myxomas and were attached to the interatrial septum while in one patient anterior mitral leaflet was involved. Patients with LA Myxoma simulated mitral stenosis clinically. A smaller percentage of the patients presented with embolic and constitutional symptoms. All patients survived the operation. No recurrences were noted, no late deaths were observed in this study.

Conclusion: Myxomas formed a 0.70% of the cardiac operations performed at our hospital. The figure is higher than reported in western literature (0.3%). A high index of suspicion is essential for diagnosis. Immediate surgical treatment is indicated in all patients. Cardiac myxomas can be excised with minimal rate of mortality and morbidity. Our data suggests the need for careful search for the attachment of the pedicle of myxoma where the possibility of mitral valve replacement might be present.

Use of Foley's catheter for controlling aortic bleeding during redosternotomy

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Background: Increasing number of cardiac surgeries involve sternal re-entry which involves significant risk to cardiac structures. Though establishment of femoral bypass before sternotomy, and draining the patient can reduce the risk of cardiac trauma, unexpected complications can still occur. We present our experience in two patients in whom aortic injury during re-sternotomy was successfully managed using Foley's catheter.

Methods: First patient 52 year old gentleman had previous CABG and had developed pseudo aneurysm with graft blockage at the right graft site. Second patient, 11 yr old girl had undergone Rastelli operation for dTGA, VSD, PS and required conduit replacement for conduit stenosis. Both the patient had femoral bypass established before sternotomy. Aortic injury lead to sudden loss of venous return, which could be managed by using a Foley's catheter and applying gentle traction after inflating the balloon.

Results: The blood loss from the injured site could be successfully controlled, allowing further dissection of the sternum from the cardiac structures and the bleeding site could be controlled using pledged sutures after completely separating the sternum. Further surgery could be completed as planned without any untoward events.

Conclusion: Use of Foley's catheter can occasionally prove life saving in managing aortic injury during redosternotomy.

Surgical management of mechanical complications of myocardial infarction

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Background: Major mechanical complications of myocardial infarction (MI) include acute ischemic mitral regurgitation, post MI ventricular septal defect (VSD) and LV aneurysm. Surgical intervention carries a high incidence of mortality and morbidity.

Methods: Thirty patients were treated for mechanical complications of MI at our institute during Dec. 2004 to Sep. 2006. 24 patients were males and 6 were females. Average age being 59.8 ± 15.2 years. The average LVEF was $40.4 \pm 13.8\%$. 10 patients (33.3%) were in NYHA class IV, 8 patients (26.6%) were in CHF requiring stabilization, 10 patients required pre op IABP support. 8 patients (26.6%) had unstable angina.

Results: Four patients had LV aneurysm repair, 4 had POST MI VSD repair, 13 had CABG with mitral valve replacement and 9 patients had CABG with mitral valve repair. The average number of grafts received per patient were 1.96 ± 1.43 grafts, 26.6% had left internal mammary graft. The average ventilation time, ICU stay and blood usage was 24.7 ± 15.9 hours, 6.96 ± 4.15 hours and 4.7 ± 2.6 units respectively. Seven patients (23.3%) remained in post op low cardiac output requiring prolonged inotropic support. 14 patients (46.6%) required preoperative IABP support. There was no mortality in our series.

Conclusion: Mechanical complications of MI can be safely treated surgically with gratifying outcomes.

Transaxillary approach for surgical management of thoracic outlet syndrome

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Background: Thoracic outlet syndrome refers to compression of the subclavian vessels and brachial plexus at the superior aperture of the chest with first rib being the common denominator. This study was done to see the effectiveness of transaxillary approach for surgical management of TOS.

Methods: Between January 1998 to June 2006, 92 patients of TOS were operated through transaxillary approach. Age varied from 14 to 65 years while M:F ratio was 0.54:1.44 patients had neurological symptoms, 26 had vascular symptoms while neurovascular symptoms were seen in 22 patients. In all 92 cases first rib was removed with cervical rib removal depending on presence of cervical rib. In patients with vascular symptoms, Brachial embolectomy/arterioplasty/interposition graft was done.

Results: Out of 92 cases 87 patients had complete symptomatic relief and 2 had partial relief in symptoms. Average blood loss was 50 ml. with no incidence of wound infection. In 17 patients, ICDT had to be done due to accidental pleural opening. 1 patient had right hand paresis due to right lower brachial plexus injury while 1 had frozen shoulder post operatively. 1 patient died of intra cerebral bleed after 72 hrs.

Conclusion: Trans axillary approach for surgical management of TOS easier, safer and provides good exposure of rib, vessels and nerves. There is minimal blood loss and patients have good cosmetic scar with minimal shoulder disability.

Primary cardiac tumors

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Background: Primary cardiac tumours are rare with autopsy incidence of less than 0.1 percent. We present our experience on surgical treatment of such tumours.

Methods: Since 2001, fifteen patients underwent surgical intervention for primary cardiac tumour at our centre. Mean age was 46.5 ± 17.5 years (range 20 to 73 years). There were eight female patients. Thirteen patients had atrial myxoma and the remaining two had primary malignant tumours. Surgical excision of the tumour was done under cardiopulmonary bypass and cardioplegic cardiac arrest.

Results: Complete excision was possible in all benign cardiac tumours where as excision was possible in only one of the two malignant tumours. One patient with suspected angiosarcoma had biopsy take from the heart. There was no operative mortality. All the patients with atrial myxoma were symptom free and free of recurrence on follow-up echocardiography. The patient with suspected angiosarcoma (histopathology was reported as hemanigioma only) presented with disseminated disease and metastasis to thoracic spine with paraplegia three months postoperatively. The other patient with rhabdomyosarcoma who had complete excision of tumour followed by repair of the defect is currently on adjuvant chemotherapy.

Conclusion: Surgical excision of primary benign cardiac tumours is possible with excellent surgical outcome where as outcome is guarded in primary malignant cardiac tumours.

Randomized study comparing indigenous Teflon coated silver wires with commercially available ethicon pacing electrodes for temporary epicardial pacing

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Background: Epicardial pacing wires are routinely placed following open heart surgery as means of temporary pacing and diagnosing arrhythmias. The use of ethicon wires increases the expense by Rs. 1600/ patient whereas the Teflon coated silver wires are available at the cost of Rs. 3/ patient. We compared the two wires by measuring their pacing ability and the depolarization potential.

Methods: Sixty patients in normal sinus rhythm were reanomized to either Teflon coated silver pacing wire group or ethicon pacing wire group. Each patient was implanted with two atrial and two ventricular wires. The stimulation threshold, depolarization potential and minimum current at stimulation voltage of 5 V were recorded daily up to the sixth post-operative day.

Results: 83% atrial and 77% ventricular ethicon wires and 100% atrial and 90% ventricular Teflon coated wires paced till pod 6. 77% atrial and 66% ventricular ethicon and 83% atrial and 66% ventricular Teflon coated silver wires sensed till pod 6. The pacing threshold kept on increasing in both set of wires but the p values were not significant. The minimum current at stimulation voltage of 5 v also kept on increasing in both set of wires but more so in Teflon coated silver wires. The p values were significant.

Conclusion: The resistance in the indigenous wires gradually increased but they continued to pace albeit at a higher threshold. We conclude that the Teflon coated silver wires are not inferior to the commercially available ethicon wires and are a cheaper viable alternative for temporary epicardial pacing in immediate post operative period.

Amoebic cardiac tamponade

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Background: Cardiac tamponade, a life threatening condition commonly occurs due to fluid collection around the heart as sequelae to infection in the pericardium. Amoebic abscess of the liver rupturing across the diaphragm into the pericardium producing cardiac tamponade is uncommon and successful surgical repair is presented herewith

Case Report: 34-yrs-old male with cardiogenic shock admitted in CCU was investigated and found to have purulent collection in pericardial cavity producing tamponade. US abdomen revealed a large left lobe abscess ruptured across the diaphragm into the pericardium with the amoebic pus producing tamponade. Prompt and emergency thoracotomy confirmed the findings of amoebic liver abscess rupturing through diaphragm. Pericardiectomy and evacuation of abscess of liver promptly rallied the patient out of the crisis.

Conclusion: Cardiac tamponade with hepatomegaly and liver abscess especially left lobe should caution the physician the possibility of amoebic cardiac tamponade.

Left cervico- Thoracic sympathectomy for long QT syndrome

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Background: The congenital long- QT syndrome (LQTS) is a familial or idiopathic disorder in which affected individuals have a high incidence of sudden arrhythmic cardiac death. Majority of the patients (nearly 80%) respond to beta blockers. Left cervico-thoracic sympathectomy (also known as Left Cardiac Sympathetic Denervation, LCS D) is considered as the treatment of choice in non-responders.

Case Report: An-eight-year-old deaf and mute boy presented with complaints of syncopal attacks & palpitation with 8 episodes of aborted cardiac arrests in last one year. Three of his older siblings had dies of sudden death and the exact cause of death was not ascertained. Electrocardiogram (ECG) revealed prolonged QT interval. Corrected QT interval (QTc) was 666 milli seconds. Patient was put on propranolol at the dose of 3 mg/Kg/day. However patient continued to have syncopal attacks and 4 episodes of aborted cardiac arrests over a period of 3 months despite adequate dose of propranolol. Hence patient was scheduled for LCS D. Patient was pre-medicated with oral diazepam and induction was carried out with O₂ - sevoflurane. Anaesthesia was maintained with air -O₂ rocuronium & fentanyl with positive pressure ventilation and I: E ratio of 1:2:5. Trans-axillary left cervico-thoracic sympathectomy was performed. Intra-operative period was uneventful without any ECG or hemodynamic disturbances.

Results: Patient had mild transient Horner's syndrome which lasted for 3 days. Post-operative QTc interval was 500 msec and patient was discharged on 5th post-operative day. Beta blocker therapy was continued to prevent tachy-arrhythmias.

Conclusion: Long QT syndrome is nearly fatal if left untreated and is one of the causes of sudden death syndrome. Long-term beta blocker therapy is effective in about 80% of the patients. Surgical anti-adrenergic treatment in the form of LCS D should be considered in all refractory patients of LQTS.

Use of regenerated oxidized cellulose on sternal surface in cardiac surgery: A novel experience

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Background: Regenerated oxidized cellulose decrease sternal surface bleeding. Sternal surface accounts for a considerable amount of postoperative hemorrhage in cardiac surgery. Bone wax is used for this purpose, however infection and delayed wound healing has discouraged its use. Present observations were made with use of regenerated oxidized cellulose for sternal bleeding.

Methods: We observed the haemostatic properties of oxidized cellulose in 110 cases of open-heart surgery during October 2005 to September 2006 (group A). Another 105 cases in which it was not used were taken as control (group B). 24 hours drainage, incidence of reexploration, mediastinitis and sternal instability/dehiscence, wound infections and total blood products used were compared in two groups.

Results: 24 hour post operative drainage was 29^occ in group A as compared to 51 ^occ in group B. Average blood products transfused in group A were 0.6 and 1.9 in group B. Re-explorations attributable to sternal bleeding were 2 in -group A and 5 in group B. Group A had 4 cases of sternal instability not requiring reintervention while group B had 3. The incidence of mediastinitis requiring debridement and rewiring was 0 in group A and 2 in group B. 8 patients in group A and 14 patients in group B had minor wound infections. There was 1 death in group B due to mediastinitis.

Conclusions: Oxidized cellulose is safe, easy to use , cost effective, local haemostatic, which reduces postoperative bleeding and blood product requirement. It is a new approach and goes a step ahead of recommendations made by manufacturer.

Impact of early peritoneal dialysis in-patients with borderline renal function

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Background: Patients undergoing open heart surgery under CPB are at the risk of developing multiorgan dysfunction, mainly affecting kidney, heart and lung, especially when their renal parameters are damaged. The development of renal dysfunction in the postoperative period is associated with high mortality. The aim of study was to analyze the effect of peritoneal dialysis (PD) on fluid balance, renal function and outcome.

Methods: Between January 2001 and December 2005, 156 patients with renal dysfunction (S Creatinin >2 mg/dl) who had PD catheter inserter in the post operative period was analysed. The timing of PD insertion was quite early in comparison to the previous studies. Mean age of PD was 52 years and weight 50.2 kg. We analysed fluid balance hemodynamic parameter, renal parameter and electrolytes.

Results: Out of 126 patients, 18 patients died and were excluded from the study. All patients achieved statistically significant negative net fluid balance from day one. The mean arterial pressure increased significantly (mean of 78 mmHg) in the postoperative period and the CVP decreased significantly (mean of 9.21), inspite of achieving significant negative fluid balance. There was no complication related to PD.

Conclusion: Early peritoneal dialysis is a dialysis as a safe and effective form of fluid management in patients with renal dysfunction. It has to be instituted quite early in the post operative period before the proper renal dysfunction sets in, to achieve a smooth post operative recovery.

Judicious use of residual cardiopulmonary bypass circuit blood

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Background: This prospective study was conducted to analyze the residual cardiopulmonary circuit blood to show that it can be safely and effectively transfused to the patient, thereby reducing the need for homologous blood products in the postoperative period. Efficacy of centrifugation is the crux of this study.

Methods: 50 adult patients were randomized in two groups. Group A (residual Cardiopulmonary bypass blood was collected in a double blood bag and centrifuged, the packed cell were separated and transfused). And group B was the control group. Blood samples were taken at five intervals and analyzed for hemoglobin, blood count, and hepatic parameter, ACT's and the amounts of blood products used were analyzed. Post-operative drainage and the need for re-exploration was also analyzed.

Result: The need for homologous blood products was reduced and the patient parameters were within normal limits. There was no significant increase in bleeding, need for re-exploration.

Conclusion: Auto-transfusion of centrifuged red blood cells from the residual blood of the cardiopulmonary bypass circuit is safe and effective for transfusion.

Effects of hypertonic saline-hydroxethyl starch solution (HS –HES) in cardiac valve surgery on cardiopulmonary bypass

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Background: Hypertonic saline alone or combined with a colloid solution has shown beneficial effects in hypovolemic, traumatic, and cardiogenic shock and in cardiac surgery. CABG valvular dysfunction may be associated with high PCWP, PAH, and ventricular dysfunction. There can be transient LV failure, due to fluid overload with hypertonic saline solution infusion in these patients. We studied the cardiorespiratory effects and tolerance of the HS-HES solution infusion in patients undergoing open heart surgery for valvular heart disease.

Methods: Comparison was done for clinical, laboratory, hemodynamic and respiratory parameters and fluid balance in 50 patients over a 48 hr period in patients undergoing cardiac valve surgery on CPB. 25 patients received 4ml/kg of HS-HES solution infusion over 30 min. before CPB (Gp. I). The control group received same volume of Ringer's lactate solution (Gp II).

Results: Hospital mortality was Zero. Group I patients had a near zero or negative fluid balance compared with positive balance in control group. More number of transfusions were required in Group II due to higher chest drainage. Group I required lesser inotropes and had higher cardiac index. A better PaO₂ /FiO₂ relation was observed postoperatively in Group I and was associated with shorter extubation time. The solution was well tolerated, no patient experienced fluid overload or LV failure. Higher sodium levels were encountered in Group I in the early postoperative period but no neurological complication attributable to this was observed.

Conclusions: The HS-HES solution infusion was well tolerated. Respiratory and hemodynamic functions improved and fluid balance was near zero during the first 48 hrs postoperatively as compared with positive balance in the Ringer's (control) group. HS-HES solution has advantageous in patients undergoing open cardiac valve surgery.

Role of glucose-insulin-potassium (GIK) infusion in patients undergoing open heart surgery

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Background: Glucose insulin potassium (GIK) infusion has shown to reduce mortality and decrease morbidity in patients who had myocardial infarction. It has shown to improve cardiac output and hemodynamics and decrease in inotropic requirement in patients with low cardiac output after open cardiac surgery.

Methods: Between Oct 2004 to October 2006, 90 patients (45 each in GIK and non GIK group) were studied who were subjected to open heart surgery for various cardiac diseases. In GIK group patients received 250-500 ml of 10% dextrose solution with 10-12 units of plain insulin and 20-40 mEq of potassium chloride (depending upon preoperative serum K levels). The non GIK group received only 10% Dextrose solution. Diabetic and renal failure patients were excluded from this study. Hemodynamic parameters (heart rate, B.P., pulmonary artery pressure, pulmonary wedge pressure and cardiac output) and inotropics requirements were recorded and were analyzed.

Results: GIK group patients had significantly reduced inotropic requirements and improved hemodynamics and cardiac index in the immediate post operative period specially in patients with poor LV functions. It improved the outcome in these patients.

Conclusion: GIK can be given safely to cardiac patients undergoing open heart surgery in moderate doses and found to be quite useful in patients with poor LVF. It improves hemodynamics and post operative outcome in these patients.

Peak blood lactate levels during cardiopulmonary bypass and post operative outcome in open heart surgery

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Background: Elevated blood lactate levels during cardiopulmonary bypass (CPB) are associated with tissue hypoperfusion and may contribute to post-operative mortality and morbidity. In this study we evaluated the association between blood lactate levels during CPB and post operative mortality and morbidity in patients undergoing open heart surgery.

Methods: A total of 100 patients who underwent open heart surgery under CPB for coronary bypass surgery and valve replacement were included in this prospective study. Blood lactate levels were measured every 15 mts during CPB, their clinical profile and perioperative events were recorded.

Results: Peak blood lactate levels 4.0 mol/L or higher were present in 16 patients (16%). Postoperative mortality was 50% in this group (8 out of 16 patients) within 30 days of hospitalization. PO morbidity in term of cardiac, neurological, pulmonary, renal and gastrointestinal dysfunction or infection was higher in this group than in patients whose peak blood lactate level was less than 4mol/L during CPB.

Conclusions: Peak blood lactate levels of 4 m.mol/L or higher during CPB are associated with increased risk of postoperative mortality and morbidity in patients undergoing open heart surgery.

Post-operative UTI with ESBLs: Are oral carbapenems a really viable option?

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Background: To evaluate the efficacy of oral carbapenem versus intravenous carbapenem therapy for a ESBL producing gram negative UTI (sensitive only to carbapenem) in a subset of diabetic patients undergoing OPCABG.

Methods: Diabetic patients undergoing OPCABG, who grew only carbapenem sensitive significant ESBL producing growth in urine in the post-operative period were registered. Diabetes was managed using insulin and patients with mean values of blood sugar >150 mg/dl were excluded. Urine was sent for gram stain & C/S on the third post-operative day. Gram stain negative samples were sent for repeat C/S the next day. Symptomatic, febrile patients having a single culture positive or asymptomatic patient having both culture positive were chosen for therapy. Randomisation was done by drawing of cards and patients were divided into group A receiving oral Faropenem and group B receiving intravenous meropenem/imipenem for a period of 5 days. Two post discharge samples were sent for C/S at the end of 1st & 2nd week respectively. Primary end-point studied were patients requiring further antibiotic therapy i.e. symptomatic patients having single culture positive or asymptomatic patients having both cultures positive with a single organism. Secondary end point studied was hospitalization due to severe UTI or Urosepsis.

Results: In group A, 45 patients took oral Faropenem & 11 patients merited repeat antibiotic therapy, and in group B out of 43 patients, 7 patients required a repeat therapy. No patient from any group required repeat hospitalization due to UTI /Urosepsis. The results were analysed statistically and the p value obtained was <0.05, which is not statistically significant.

Conclusion: Oral carbapenem therefore is a cheaper and equally effective option as intravenous carbapenem therapy for ESBL producing Gram negative UTI.

Vasodilatory property of dobutamine on cardiopulmonary bypass

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Background: Dobutamine is a well known inotrope with vasodilatory properties. We wanted to study if this vasodilatory effect could be used to advantage in lowering the systemic vascular resistance during CPB.

Methods: 26 consecutive cases undergoing cardiac surgery under conventional continuous hypothermic cardiopulmonary bypass without circulatory arrest were enrolled in this study. Sodium nitroprusside was used as a systemic vasodilator as dictated by clinical need till 5 minutes before rewarming. At that time no change of any administered vasodilator drug was made. At this time the pump flow and mean arterial pressure (MAP) were recorded and systemic vascular resistance (SVR) was calculated and also indexed to body surface area (SVR). Dobutamine was administered at 3 mic/Kg/min for 5 minutes or till a drop in MAP or fall in the venous reservoir level (in the absence of intraoperative loss) was noted. Flow was accelerated

to reach the previous MAP if possible. MAP and pump flow were now recorded and SVR and SVI were calculated. During this period no change in any other vasodilator was done. The data was tabulated in Microsoft excel spread sheet and data was analyzed using a paired T test.

Results: There was a mean fall of 451 dynes sec cm⁵ in SVR and 554 dynes sec cm⁻⁵ m². SVRI. This fall in SVRI was statistically significant (p=8.78009 E-05)

Conclusion: Low dose dobutamine can cause significant vasodilatation and fall in the systemic vascular resistance over and above that produce by sodium nitroprusside. This can be used to advantage in the rewarming phase of CPB to improve vascular perfusion.

Surgical radiofrequency ablation of both atria for atrial fibrillation: Long term results from Tasmanian cardiothoracic unit, Australia

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Background: The Cox Maze III procedure for atrial fibrillation (AF) is effective but has not been used widely as it is complex long procedure with increased morbidity. Surgical radiofrequency ablation (RFA) has simplified the procedure and made intraoperative correction of AF more accessible and widely performed. We report long-term results of RFA in a prospective study as a part of multicenter trial in Australia and New Zealand. These results are from our unit.

Methods: From 2001 through November 2005, 46 patients (29 males and 17 females patients, mean age, 69.15± 19 years) underwent RFA as an adjunct to conventional cardiac surgery, with a standardized lesion set created with a flexible, 7-electrode temperature-controlled probe (Cobra RF Probe, Boston Scientific). Epicardial biatrial RFA procedure was performed on bypass through median sternotomy in all patients. All were given amiodarone peri operatively. Patient follow-up was conducted by means of questionnaire, telephone interview, physician examination, and electrocardiographic documentation

Results: 39 patients were followed-up (5 died and 2 lost to follow-up). These patient had AF duration of 41 months (range 2-120). Mean left atrial diameter was 5.1 cm (range 3.7-6.6). At a mean follow-up of 2003 days (range 275-1855), 22 (56.41%) patients were in sinus rhythm and 17 (43.6%) patient were in AF. Eight patients required DCR (six remain in sinus rhythm). Four patients required permanent pacemaker insertion (three in sinus/paced rhythm). All surviving patients are free from stroke at the time of follow-up.

Conclusion: Conversion to sinus rhythm is more difficult in patients who have been in AF longer and who have larger left atrial dimension. Sinus conversion rate was only 57% compared to 80-90% with maze III procedure. Long-term follow-up results with RFA in our unit were not encouraging.