

Abstracts of the 61st Annual Conference of IACTS, February 2015

Conservative versus surgical intervention in management of postoperative venous ulcers

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Background: The aim of the study is to compare the surgical versus conservative intervention in the management of postoperative venous ulcers.

Methods: The purpose of the study is to compare which method hastens the healing process in management of postoperative venous ulcers. Observations: Patients having postoperative venous ulcers were included in the study. Patients were treated conservatively with limb elevation, regular dressing, antibiotics, compression therapy, sclerotherapy, passive exercises, and active exercises and surgically with perforator ligation and subendoscopic perforator ligation. Forty cases were studied. Out of which, 24 cases were managed conservatively and 16 cases were treated with surgical therapy. The outcomes in both groups were observed. The clinical parameters were studied such as size of the ulcer, margins of the ulcer, discharge from the ulcer, and nature of the ulcer for 6 months with 1, 3, and 6 months follow-up.

Results: Out of the 24 cases managed conservatively, only 6 cases showed signs of improvement in terms of reduction in ulcer size and amount of discharge from the ulcer and increased granulation tissue over ulcer, and in 11 (46 %) cases, ulcers remained the same, while in 9 (37.5 %) cases, ulcers deteriorated. Sixteen cases were treated with surgical management, ten (62 %) cases showed improvement with complete healing of wounds noted, and out of the remaining six cases, wounds remained the same in two (12.5 %) and deteriorated in four (25 %).

Conclusions: Our study demonstrates that surgical management of ulcers with perforator ligation results in better wound healing than conservative management.

Retrospective study on management of mitral regurgitation in patients undergoing CABG

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Background: This study includes short-term evaluation of clinical and echocardiographic outcome in patients with

ischemic magnetic resonance (MR) undergoing concomitant coronary artery bypass grafting (CABG) with mitral valve surgery compared with those undergoing CABG alone.

Methods: We performed retrospective study on 86 patients with MR who underwent CABG from Jan 2012 to Dec 2013. Preoperative NYHA class, jet area, EF, and atrial fibrillation were assessed and compared with postoperative values.

Results: Patients with moderate MR who had annular enlargement, myocardial scarring, and ruptured chordae or papillary muscles were treated with mitral valve ring annuloplasty or replacement with concomitant CABG (group A=28). Patients with moderate MR who did not have the above features were treated only with CABG (group B=58). Mean age was 60 ± 5 years. Group A had significant decrease in residual MR (mean preop jet velocity of 6.6 ± 0.93 vs postop of 2.7 ± 1.83 , $P=0.002$), whereas there was lesser reduction of jet velocity in group B (preop of 6.39 ± 1.0 vs postop of 5.9 ± 1.09 , $P<0.0001$) postoperatively. Both groups showed improved ejection fraction postoperatively (group A, 39.2 ± 7.5 vs 41.7 ± 7.8 , $P<0.0001$; group B, 41.4 ± 7.4 vs 43.8 ± 7.1 , $P<0.0001$). There was no significant difference in mortality in both groups ($P=0.4$).

Conclusions: In patients with moderate MR concomitant valve repair or replacement along with CABG would be a better choice in relation to residual MR; however, the decision to address mitral valve should be individualized according to the patient.

Ten years of heart transplantation at Frontier Lifeline hospital

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Introduction: This study aims to review the experience of heart transplantation at Frontier Lifeline Hospital over the past 10 years.

Methods: A retrospective study was done in patients who underwent heart transplantation at Frontier Lifeline Hospital, Chennai from January 2004 to December 2013. The survival rate, clinical profile, and the cause of mortality in patients undergoing heart transplantation were analyzed.

Results: There were 40 isolated heart transplants performed in our center. There were 32 male and 8 female patients. The age of the patients ranged from 2 to 56 years (mean, $35.3 \pm$

15.5 years). The most common diagnosis was dilated cardiomyopathy in 25 patients (62.5 %) followed by ischemic cardiomyopathy. Bicaval technique was used in all cases. The perioperative mortality was 33.3 %, and the most common cause of early mortality was primary graft dysfunction and acute rejection. The crude survival rate at 1 month, 1 year, and 3 years was 66, 47, and 36 %.

Conclusions: Heart transplant in India is an emerging specialty. Our results although encouraging, lags behind the west. Continuing improvement in results will come with increasing experience of the transplant team in managing these complex patients

Intramural hematoma: does it need special attention

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Background: Intramural hematoma defined by hematoma within the aortic wall. Cause of IMH still not well defined as it can be caused by bleed with in aortic wall to even it can be due to clotted blood with in false lumen of dissection or may be due to sealed entry point. Presentation varies from asymptomatic, diagnosed by CT or as recurrent embolism, pain or pericardial effusion.

Methods: Total 7 cases were operated at our centre. Since December 2009. All were treated on emergency basis as Acute type A aortic Dissection. We followed them up. We did supracoronary replacement of ascending aorta (4 cases) with hemi arch . Bentall's procedure if there is aortic regurgitation (3 cases) and these patients more likely to present with pain or pericardial collection . These patients were followed up varies from 3 months to 4 years.

Results: All the cases are done well with 100 % survival at discharge. One case was presented with cerebral stroke. Which improved later on while one case developed thorco abdominal aneurysm which we have operated. One case died after 1 year due to non cardiac cause.

Conclusions: Intramural hematoma should be treated like acute type A aortic dissection, and results are comparable with the results of acute type A aortic dissection.

Paediatric postoperative complications in cardiac surgery and their outcomes

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Background: This study aims to evaluate the efficacy of risk-adjusted classification for congenital heart surgery (RACHS)

scoring system and other risk factors in predicting complications in paediatric patients undergoing cardiac surgery.

Methods: This is a retrospective observational study done from January 2013 through July 2014. Cardiac and extracardiac complications were studied. RACHS score, demography, cardiopulmonary bypass, and cross-clamp times were studied as risk factors. Outcomes were evaluated, and their association with the complications was established. Statistical analysis was done using Student's *t* test, and variables were compared.

Results: A total of 723 patients were evaluated; 645 with cardiopulmonary bypass (CPB; 89.21 %) and 78 without CPB (10.78 %). Three hundred ten (42.87 %) developed complications. Mortality was observed in 41 patients (5.67 %). Low cardiac output syndrome, renal failure and sepsis were recognised as major complications. RACHS score, weight and CPB time were statistically not significant in predicting single and multiple complications ($p=0.28$, 0.08 and 0.22 , respectively). Duration of cross-clamp time was statistically significant between the patients with complications and mortality ($p=0.03$). Hospital and ICU stay were prolonged in cases with multiple complications ($p=0.05$ and $p=0.021$). In all cases without CPB, the influence of risk factors on the complications and outcomes did not achieve statistical significance. Increased RACHS score was associated with increased rate of complications but did not predict its number or type.

Conclusions: Postoperative complications were encountered in 42.87 % of cases. RACHS score predicted complications but did not differentiate between single and multiple complications. It showed trend towards predicting mortality.

Incidence of atrial fibrillation after isolated coronary artery bypass grafting

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Background: Worldwide incidence of postoperative atrial fibrillation (POAF) is 20–30 % in patients undergoing isolated coronary artery bypass grafting (CABG). There is no published data for Indian population. The objective is to analyse any difference in our Indian population.

Methods: This is an observational study of patients undergoing isolated CABG between August 2013 and April 2014 at Frontier Lifeline Hospital, Chennai. Data has been collected from the patients' medical records, and the relative clinical variables were analysed.

Results: Two hundred twenty-seven patients were studied (191 males, 36 females). The mean age was 58.7 ± 7.9 years (37 to 80 years). The overall incidence of POAF was 6.14 %. Forty-five patients were >65 years and 13.33 % were with AF versus 4.39 % in patients age <65 years ($p<0.05$). Incidence

of POAF in patients with normal, mild, moderate, and severe left ventricular dysfunction are 6.12, 4.84, 5.88, and 11.36 %, respectively. Patients with preoperative beta blocker showed 3.1 % incidence of AF while the rest showed 13.23 % ($p < 0.05$). AF in CABG with arrested heart, pump-assisted beating CABG, and off-pump CABG were 2.89, 9.75, and 6.25 %, respectively, and was found not significant ($p > 0.05$).

Conclusions: The incidence of postoperative atrial fibrillation in Indian patients is less than the western population. Advanced age and left ventricular dysfunction increases the risk. The type of surgical technique used does not affect the outcome of the surgery. Preoperative beta-blocker therapy significantly reduces the occurrence of POAF.

Midterm Results and Analysis of MICS Coronary Artery Bypass Grafting—Beginners experience

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Background: Minimally invasive coronary artery bypass grafting is safe and widely applicable and may be associated with fewer transfusions and infections.

Methods: In this single-centre study, 96 patients from 2009 to 2012 were prospectively studied for minimally invasive coronary artery bypass grafting via a 4- to 7-cm left thoracotomy approach. In the left internal thoracic artery, all coronary targets were directly accessed without endoscopic or robotic assistance. Parameters like sex, age, type of vessel disease, repeat revascularisation, hybrid procedure, conversion, reexploration and difficulties in learning curve were studied.

Results: The mean age of patients was 57.39 years, the mean ejection fraction was 50.43 % and there were 15 female patients in the study. Surgeries were performed entirely off-pump in 95 patients. In all cases, only the left internal mammary artery (LIMA) to the left anterior descending artery (LAD) was done. There was no perioperative mortality, two conversion to sternotomy and one reopenings for bleeding. Seven patients were TVD, six DVD and the rest has single vessel disease. Sixteen patients were of LAD in-stent restenosis. Eight patients underwent hybrid procedure. The median length of hospital stay was 5 days, and average follow-up of all patients was 48 months, with one mortality and no major adverse cardiovascular events in follow-up. Reintervention for LIMA to LAD was one and for other vessels six. The rest of the patients has undergone TMT at 6 and 12 months.

Conclusions: MICS CABG is a safe and easily adoptable procedure for beginners with good results. It also opens up new areas for treating patients, with giving competitive edge over PCI.

Pain management in minimally invasive thoracic surgery: early use of opiate transdermal patch

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Background: Postoperative care of thoracic surgical patients is a very important part of patient recovery and can be very challenging. Pain management is of paramount importance postoperatively as it is essential for patients to comply for chest physiotherapy and ambulation, and they will be unable to do so if they have severe pain. There are various ways by which pain is managed. They include epidural catheters pre-operatively, paravertebral methods pre- or intraoperatively, or intravenous patient-controlled analgesia.

Methods: We present our experience in the use of opiate transdermal patch in all patients who underwent major resection, decortications, and pleurectomy by video-assisted thoracoscopic surgery (VATS)/robotics. From 2012 Jan to 2014 Oct, 485 approximately underwent major VATS/robotic surgeries. One hundred sixty-six patients had the use of opiate transdermal patch RUSAN. Early postoperatively, patients who were admitted in ICU were not included in this study

Results: All the patients were out of bed on post-op day 2, were ambulated, were able to do good physiotherapy. Majority of the patients were discharged on day 3 and 4. Maximum use of patch continued for 2 week. Majority gave up after a week. 12 patients had complications associated with opiate transdermal patch. On PAIN SCALE 1–10. Majority had pain between 2 and 3 on postop day 2.

Conclusions: Use of opiate transdermal patch has definitely decreased intra venous use of analgesia. Early recovery, better physiotherapy, availability at the patients bed side, early discharge and greater patient satisfaction.

Descending thoracic aorto bifemoral artery bypass for Aortoiliac occlusive disease via anterior subcutaneous tunnel approach

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Background: The infrarenal abdominal aorta and the iliac arteries are among the most common sites of chronic occlusive atherosclerosis in patients with symptomatic occlusive disease of the lower extremities, most commonly located at aortic bifurcation. Descending thoracic aortobifemoral bypass via anterior subcutaneous tunnel approach is a good alternative to transabdominal aortobifemoral bypass graft. The objective of this study was to evaluate the efficacy and safety of above approach with thoracic aorta as an inflow source for aortoiliac revascularization in cases of aortoiliac diseases.

Methods: In our study, 41 patients were evaluated and treated with the above approach in a period from Jan 2010 to Aug 2014 at the Dept. of CTVS, S.M.S. medical college, Jaipur. Indications for this approach were infrarenal aortic block with no site for infrarenal aortic clamping (22 cases), calcified infrarenal aorta (15 cases) and history of laparotomy (4 cases).

Results: Average duration of surgery was 1.5–3 h, and blood loss was 300–1000 ml. There was mortality in three patients. Reexploration due to bleeding was done in three patients, and three patients required prolonged ventilatory support for 2 days. Follow-up of 35 patients, had patent grafts in 31 and blocked grafts with no symptoms in 4 patients. Three patients were lost to follow-up.

Conclusions: This approach is recommended in selected patients where conventional approach to the abdominal aorta is not feasible, who are having calcified infrarenal aorta, previous laparotomy, potential sepsis, radiation therapy, presence of abdominal stoma, technically difficult cases in which aorta is totally occluded to a juxtarenal level.

Video-assisted thoracoscopic and robotic-assisted thoracoscopic resection of mediastinal ectopic parathyroid adenoma

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Background: Ectopic mediastinal parathyroid adenomas are rare causes of hyperparathyroidism. Surgery offers potential cure, which conventionally involves a sternotomy. We share our experience of resection of mediastinal parathyroid adenomas by video-assisted thoracoscopic surgery (VATS) and robotic-assisted thoracoscopic surgery (RATS).

Methods: A total of 13 patients of primary hyperparathyroidism, with a mean age group of 44.6 years, between June 2011 and September 2014, were diagnosed to have a mediastinal ectopic parathyroid adenoma on the basis of sestamibi scan. Intravenous methylene blue was used intraoperatively to highlight the adenoma within the mediastinal tissue. Ten patients underwent resection of adenoma by VATS and three by RATS.

Results: Intraoperative parathormone (PTH) level fall >50 % of preoperative level was considered a successful resection of adenoma. One patient of RATS required conversion to open due to haemorrhage. Mean postoperative serum calcium level on postoperative day (POD)1 was 9.5 mg/dl, and PTH level was 27.9 pg/ml. Chest drain was removed on POD1 in eight patients and on POD2 in two patients.

Conclusions: Ectopic mediastinal parathyroid gland can be safely resected using VATS and RATS due to excellent intraoperative visualisation, minimal surgical morbidity, short hospital stay and good cosmetic results. Intraoperative use of

intravenous methylene blue helps to accurately highlight the ectopic parathyroid tissue.

General thoracic outcome and efficacy of VATS in empyema thoracis

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Background: Empyema thoracis is a clinical problem encountered frequently and video-assisted thoracoscopic surgery (VATS) is one of treatment options. The aim of this study was to study the outcome and efficacy of this modality.

Methods: A retrospective study of adult patients operated on between 2008 and 2014 was conducted. Data included demographic data, clinical and laboratory data, operation details, postoperative course, follow-up, and complications.

Results: A total of 72 patients underwent VATS. Their mean age was 32 years (22–70). Fifty patients required preoperative drainage (tube thoracostomy). Forty-six patients had stage II empyema which required VATS debridement, and 26 patients had stage III empyema which required VATS decortication. The mean postoperative time for ICD removal was 5 days (3–15), and the mean postoperative hospital stay was 12.2 days (7–40). Mean follow-up was 9 months. The postoperative complications that were seen were persistent pleural space in nine patients, persistent air leak in five patients, recurrent infection in four patients, and wound infection in three patients.

Conclusions: There were no perioperative mortalities. VATS is a safe and effective treatment option in the treatment of empyema thoracis.

On-table extubation in paediatric patients following congenital cardiac surgery—an institutional experience

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Background: Early extubation after cardiac surgery is an important aspect of fast tracking. The concept of fast tracking has been around since the 1960s. However, early extubation in paediatric population following cardiac surgery is a recent trend, with on-table extubation being a novel prospect. The concept was studied at our centre with an aim to validate the importance and safety of on-table extubation in pediatric population, following congenital cardiac surgery, with evidence.

Methods: A total of 32 patients, including male and female aged 6 months to 12 years belonging to risk adjustment for congenital heart surgery-1 (RACHS-1) categories 1, 2, and 3 were included in this study. The study was carried out over a span of 8 months (Apr 14–Nov 14). All patients were

anesthetized by the same anaesthetist with a standardized technique and surgery performed by the same surgeon. At the end of operation, the included patients were assessed for on-table extubation, and standard extubation criteria were used for decision making.

Results: Of the total 32 patients included in the study, all were extubated in the operating room. Hence, overall success rate was 100 %. There was no reintubation in any of the cases.

Conclusions: On the basis of the current study results, the concept of on-table extubation, in pediatric CHD surgical patients, is a safe and promising concept, requiring perseverance.

Transhiatal versus transthoracic esophagectomy for esophageal carcinoma: a 15-year experience at Sheri Kashmir Institute of Medical Sciences, Srinagar, Jammu and Kashmir
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Background: The best surgical modality for carcinoma esophagus is still debatable. The aim of our study was to evaluate an optimal surgical approach with limited complications for carcinoma esophagus.

Methods: In this retrospective study, 1677 patients with carcinoma of mid- to distal esophagus underwent transhiatal and transthoracic esophagectomy. Early morbidity and mortality were compared. Principle endpoints were disease-free survival (DFS) and overall survival (OS).

Results: A total of 910 patients underwent transhiatal esophagectomy (THE), and 767 patients were operated on via transthoracic (TTE) approach. Demographic characteristics and characteristics of the tumor were similar in the two groups. Perioperative and postoperative morbidities were lower after THE. In-hospital mortality was also lower after THE. The median follow-up was 4.3 years. Estimated 3-year DFS rates were 44.63 and 40.26 %, whereas the 3-year OS rates were 57.76 and 49.48 % for the THE and TEE groups, respectively (statistically insignificant). The estimated 5-year DFS rates were 26.55 and 21.46 %, whereas the 5-year OS rates were 32.76 and 30.24 % for the THE and TEE groups, respectively (statistically insignificant).

Conclusions: THE was associated with lower perioperative and postoperative morbidities and in-hospital mortality than TTE. The DFS and OS were higher in the THE than TEE group but were statistically insignificant.

Challenges in setting up a VATS lobectomy program
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Background: Video-assisted thoracic surgery (VATS) was first performed in our unit in 2010. We adopted the technique primarily because of patient awareness and better surgical outcome. Patients even have the advantage of early chest tube removal, lesser pain, decreased immune response, and a lesser hospital stay.

Methods and Results: While starting the program, we had a problem of underexposure to laparoscopy. Handling of VATS instrument was always there because of routine use in cases like pleural biopsy, lung biopsy, and bullectomy. We developed a habit of thoracoscopic inspection prior to open lobectomy. Gradually looping around pulmonary artery and veins looked feasible in nonadherent fields. During the first 2 years of our program, we had a very high conversion rate. The issues varied from difficulty in port placement, impatience as open surgery was much faster, uncertainty of anatomical structure, inability to separate along the fissures, and injury to vessels. As our conversion rate is getting lesser, we are assuming to be getting better.

Conclusions: VATS lobectomy with anatomic dissection can be safely done with less morbidity and mortality. But before going for a full-fledged VATS, our experience should be loaded with multiple observerships, wet lab workshops, and simulation programs. Our learning curve was much steeper as our technique was self improvised.

Endoscopic vein harvesting for coronary artery bypass grafting: our experience
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Background: Open long saphenous vein harvest (OVH) is often associated with significant wound pain, morbidity, and prolonged postoperative period in some patients. Endoscopic vein harvest (EVH) attempts to reduce this morbidity and improve patient satisfaction with no compromise in outcome.

Methods: From September 2012 to November 2012, a total of 44 saphenous vein harvests were performed which were analyzed retrospectively and assigned to EVH ($n=20$) or OVH ($n=24$) group. Endpoints included impaired wound healing, operative and harvest time, vein quality, outcome, and postoperative pain. Follow-up was as long as 2 years.

Results: The groups were well matched demographically. Wound healing was significantly impaired in the OVH group compared with the EVH group. There was no increase in the overall operative time. Postoperative pain was less in the EVH group. OVH group had more wound-related morbidity.

Conclusions: These data demonstrate that endoscopic vein harvest results in reduced wound complications and reduced postoperative pain, and it does not prolong the operative time significantly nor compromise the vein quality.

Coronary artery bypass grafting in young patients under 45 years of age

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Background: Although myocardial infarction (MI) occurs in patients older than 45, young men or women can suffer MI. Fortunately, its incidence is not common in patients younger than 45 years. However, the disease carries a significant morbidity, psychological effects, and financial constraints for the family.

Objective: This study aims to determine the prevalence of risk factors and severity of coronary disease among young patients aged ≤ 45 years undergoing coronary artery bypass grafting (CABG). In addition, this study aims to determine outcome of CABG in younger patients in terms of morbidity and mortality.

Methods: This retrospective analytical study was conducted at a tertiary care hospital between Jan 2009 and Jan 2014. One hundred sixty-three patients aged ≤ 45 years were analyzed for risk factors like hypertension, smoking, diabetes, hypercholesterolemia, obesity, and MI. The clinical, operative, and postoperative data were analyzed.

Results: In this study, majority were males (140) with male-to-female ratio of 6:1. Smoking (50.3 %) and hypertension (46.62 %) were the most common risk factors with history of previous MI in 132 (80.98 %) patients. Most of them had triple vessel disease (58.89 %); in isolated single-vessel disease, LAD was commonly involved. Only 16 patients had morbidity in terms of CVA (6) and nephropathy (10), and 13 (7.97 %) patients died due to delayed presentation, severe LV dysfunction, and associated ischemic VSD.

Conclusions: Most significant risk factors for CAD in young patients were smoking and hypertension. The disease in young is aggressive but carries less mortality and less potential for perioperative complications

CABG-challenging cases in Apollo Hospitals Dhaka, a decade of experience

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Background: This study aims to show outcome of challenging cases of coronary artery bypass grafting (CABG).

Methods: This is a retrospective study done in Apollo Hospitals Dhaka from 2nd May 2005 to 13th December 2014. A total of 1892 CABG cases were reviewed—emergency, 22; off pump, 1257; arrested heart, 554; on-pump beating heart, 81; and MIDCAB, 2 cases (213 (11.25 %) females, 1679 (88.74 %) males). Age range in years include 60–65–367 (19.39 %), 66–70–132 (6.97 %), 71–75–68 (3.59 %), 76–

80–13 (0.68 %), 81–85–6 (%), and 1 patient at 86 years. Associated comorbidities include peripheral vascular disease, 19; COPD, 78; on dialysis, 17; ventricular septal ruptures, 10; carotid occlusive disease, 88; old stroke, 58; permanent pacemaker, 4; preoperative ventilator, 29; left ventricular aneurysm, 58; severe mitral regurgitation, 5; and EF 31–50 %, 260, 21–30 %, 147, and 15–20 %, 8. Associated procedures include left ventricular aneurysm repair, 42; mitral valve replacement, 30; aortic valve replacement, 25; double valve replacement, 2; RA myxoma removal, 1; LV aneurysm repair with mitral valve procedure, 4; LV aneurysm repair with ventricular septal rupture repair, 1; ventricular septal rupture repair, 10; aorto-femoral bypass, 3; ileo femoral bypass, 1; left aorto-axillary bypass, 1; Bentall procedure with brachiocephalic artery reimplantation, 1; aorto-bifemoral biopliteal bypass, 1; redo-CABG, 7; and IABP preoperatively, 12.

Results: Overall mortality rate was 2.12 % (39 cases), emergency was 9.09 % (2 cases) mortality, and routine mortality was 1.97 % (37 cases).

Conclusions: Challenging cases of CABG can be done with acceptable morbidity and mortality with good long-term outcome.

Anomalous origin of left coronary artery from pulmonary artery (ALCAPA)—surgical repair in 20 patients

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Background: This study includes results of repair of anomalous origin of left coronary artery from pulmonary artery (ALCAPA) by establishing a dual coronary system.

Methods: From January 2013 to November 2014, a total of 20 patients underwent surgery for ALCAPA in our center. Eleven patients were female and nine male, with an age range of 23 days to 9 years (mean of 12.2 months) and with an average weight of 6.48 kg (range of 2.4 to 26 kg). All the patients were given a dual coronary system by re-implantation of the left coronary artery (LCA) to the aorta. The LCA was taken anteriorly along with a cuff of the main pulmonary artery (MPA) wall, and a fuse is made from it. The fuse is implanted into the aortic root after making a lateral incision. MPA is reconstructed using autologous pericardial patch like in arterial switch operation.

Results: The mean aortic cross-clamp time was 179.84 min. The mean duration of ventilation postoperatively was 62 h. Three deaths were recorded, one was due to severe pneumonia and respiratory failure and the other two developed severe LV dysfunction and biventricular failure. The rest of the patients had good LV function and had an uneventful postoperative course. All the patients are on regular follow-up and are asymptomatic.

Conclusion: Surgical repair of ALCAPA using the abovementioned technique has good results, and we have developed a few modifications of our own to improvise the outcomes.

Minimally invasive aortic valve replacement: our experience

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Background: This study aims to review the results of minimally invasive aortic valve replacement (AVR) through a right anterior minithoracotomy

Methods: From July 2011 to January 2014, a total of 84 patients with isolated aortic valve disease (rheumatic in 62 patients, degenerative in 14 patients, congenital in 8 patients) underwent AVR through a right anterior minithoracotomy approach in the third intercostal space with a groin incision for femoral cannulation.

Results: The mean age was 41.4 years (ranging from 19 to 74 years). Fifty-eight patients were male. Mean duration of cardiopulmonary bypass time and aortic cross-clamp time was 82 ± 23 and 53 ± 16 min, respectively. Follow-up was performed in all patients for a period of 15 ± 6 months postoperatively. A good recovery was obtained in all patients.

Conclusions: Minimally invasive aortic valve replacement through the right anterior minithoracotomy approach is safe and feasible with reduced postoperative recovery time.

Institutional experience of perioperative management of TAPVC Repair

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Background: TAPVC repair has been associated with poor outcomes due to varied reasons, most importantly severe pulmonary arterial hypertension. We report our institutional experience of perioperative management of total anomalous pulmonary venous connection (TAPVC) repair at the Military Hospital Cardiothoracic Centre.

Methods: Thirty-one cases of TAPVC were presented to this centre over a period of 5 years. All underwent surgery. A detailed study of the variables that affected the surgical outcome was done, based on which institutional protocols were established.

Results: Out of 2 cases of TAPVC, 19 were males and 12 were females, 16 were supracardiac, 6 mixed, 4 infracardiac, and 5 cardiac TAPVC. Mortality reduced significantly from 30 % in the first year to 10 % in the last year of the study.

Conclusions: The variables which significantly affected the surgical outcome included establishment of a dedicated pediatric

cardiac surgical and intensive care unit, formulation of strict protocols, routine use of sildenafil, oral preoperatively and intravenous per- and postoperatively, and continuous infusion of muscle relaxants during intra- and postoperative periods.

Video-assisted midaxillary minithoracotomy for atrial septal defect closure

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Background: The use of minithoracotomy (anterolateral or posterolateral) has now gained prominence among the cardiothoracic fraternity, especially for the repair of relatively simple or uncomplicated conditions. As opposed to a median sternotomy, a minithoracotomy is less invasive, causes significantly less morbidity, and is cosmetically more acceptable. Our experience of using a video-assisted midaxillary minithoracotomy for the repair of atrial septal defect is being presented.

Methods: Between June 2011 and January 2014, 90 patients (72 females, 18 males) between 3 and 60 years with a mean age of 18.06 years underwent atrial septal defect repair via a video-assisted midaxillary minithoracotomy. Depending upon patients weight, the bypass method used varied from central to femoro-femoral peripheral cannulation. We used cardioplegic arrest, with a mean CPB time of 86.34 min and a mean cross-clamp time of 44.43 min.

Results: There were no deaths. Effective atrial septal defect closure assessed by postoperative echocardiography was achieved in all patients. Central neurologic complications were completely absent. There were no cases with complicated wound healing. Only eight patients needed prolonged ICD for air leak, and all were managed conservatively. Most patients were discharged on day 3/4 (mean, 5.08 days) ranging from days 2 to 15.

Conclusions: Midaxillary minithoracotomy is a safe procedure for atrial septal defect closure with good cosmetic results. This approach does not affect growing breast tissue making it more appropriate for young females.

Midterm results after vein patch angioplasty and left internal mammary artery (LIMA) grafting of diffusely diseased left anterior descending (LAD) coronary artery on beating heart (OPCAB)

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Background: This study aims to analyze the midterm results of vein patch angioplasty of the left anterior descending (LAD) with or without endarterectomy (EA) associated with

left internal mammary artery (LIMA) grafting onto patch on beating heart (OPCAB).

Methods: Between September 2007 to October 2012 among 2887 off-pump CABG, 66 (2.3 %) patients, 52 males (79 %) with a mean age of 59 ± 4 (range, 45–69 years) underwent the abovementioned procedure. Fifty-four of them were having unstable angina, and 89 % of patients had triple vessel disease. Mean preoperative ejection fraction was 44 ± 9 %, and 56 % of patients were diabetic. Mean number of anastomosis per patient was 3 ± 0.8 . Mean length of vein patch was 3.5 ± 1.1 cm. Thirty-nine patients required LAD endarterectomy.

Results: There was no hospital death. Two patients had perioperative MI and one was in LAD region (LAD-EA) who required intraoperative IABP. All patients were followed-up for 2 years. There were two readmissions for intervention (PTCA to nongrafted vessel). One patient was admitted for recurrent LVF, and two were admitted with recurrent angina. All patients were subjected to CT coronary angiography and echocardiography at 2 years after procedure. Ejection fraction was maintained in 90.9 % of patients. CT angiography revealed patent LIMA to LAD on vein patch in 89.7 % in LAD endarterectomy patients and 92.5 % in non-EA patients. **Conclusions:** Vein patch angioplasty of LAD with or without endarterectomy along with LIMA grafting to vein patch can be done on beating heart (OPCAB) in unfavorable anatomical situations with satisfactory midterm patency and freedom from angina with preserved LV function.

Tricuspid annuloplasty—a single-centre experience of 102 cases

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Background: The objectives of this study was to evaluate the indications for surgery, procedures undertaken, and changes in right heart parameters and to assess postoperative functional status after surgery

Methods: This study was conducted over a 4-year time period, from January 2011 to December 2014 and included patients undergoing tricuspid valve surgeries. One hundred and two patients were included in the study. The exclusion criteria consisted of patients below the age of 12 years. It was a retrospective study, and data was obtained through an extensive review of the patients' hospital records and data from the echocardiography databases.

Results: Of 102 patients who underwent tricuspid annuloplasty, females were predominant (61.18 %). Most of them were in their fourth decade of life. Twenty-eight patients (27.45 %) underwent a Carpentier Edwards ring annuloplasty, and 74 patients (72.54 %) underwent a MC3 ring annuloplasty. Three patients underwent tricuspid commissurotomy in the study group. The TR grade decreased by 1 in 28.43 % of the patients

and by 2 in 64.7 % of the patients. It remained unchanged in 0.065 % of the patients. In the immediate postoperative period of patients undergoing annuloplasty, right ventricular dimensions decreased significantly. The functional class improves significantly postoperatively.

Conclusions: Tricuspid annuloplasty is probably required in moderate tricuspid regurgitation as well as with smaller annular diameters than the recommended cut off of 40 mm.

Cardiac Surgery in the SAARC Countries: how it all began

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Background: The eight countries of South Asian Association of Regional Cooperation (SAARC) cover 2.96 % of land area of the World and host approximately 23.4 % of the population today. Cardiac surgical facilities exist in six of these countries. These nations have their own unique interesting stories of commencing cardiac surgery. The objective of the study is to find out the interesting pieces of history with a view to honoring the old heroes and inspiring regional cooperation in cardiac surgery.

Methods: As many of the pioneers are no longer alive, the main method of investigation has been exploring the secondary sources like journals, records, and archives. In some cases, it has been possible to interview the pioneers. Electronic search engines have been used along with personal effort of individual investigators.

Results: The first recorded heart surgery in the SAARC region dates back in 1950. Open-heart procedures began in India in 1961, followed by Sri Lanka and Pakistan. The first open-heart surgery of undivided Pakistan was performed in 1970 and that of Bangladesh in 1981 with one individual being the key member of both the pioneering teams. Nepalese and Afghan surgeons began open-heart surgeries in 1997 and 2008, respectively.

Conclusions: Behind the commencement in each country, there is a fascinating story. The compilation and comparison of inaugural pictures of six different countries depict a vivid landscape of evolution of cardiac surgery in the SAARC region. This would pave the pathway of better regional cooperation among the surgeons of Southern Asia.

Analysis of cardiac indices (CO, CI, SV) during OPCAB and its relation to mean arterial pressure, central venous pressure

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Background: Analysis of cardiac indices (CO, CI, SV) during off-pump coronary artery bypass (OPCAB) and its relation to mean arterial pressure and central venous pressure.

Materials and methods: This is a prospective and observational study conducted in the Department of CTVS Medical College and Hospital Kolkata. Forty patients (33 males, 7 females) underwent off-pump coronary artery bypass grafting. The haemodynamic variables (CO, CI, SV, MAP, CVP) were measured 10 min after induction of anaesthesia and during anastomosis of LAD, OM, PDA—just before putting packs to measure basal state and after placing the packs and octopus before starting anastomosis.

Result: During the heart displacement, cardiac indices (CO, CI, SV) were found to be reduced maximally during OM, followed by PDA while there is less or no change during LAD anastomosis.

Conclusions: The decrease in CO, CI, SV is due to compression of both RV and LV by pack and octopus reducing their diastolic filling though this is not reflected in MAP. So, handling of the heart and careful placement of octopus is very essential for a good outcome in OPCAB.

Surgical management of prosthetic valve obstruction—our experience

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Background: The objective of this research is to study the factors related to prosthetic valve obstruction and analyse the results of surgically managed patients.

Methods: Thirty-eight consecutive patients presenting with prosthetic valve obstruction (from January 2011 to September 2014) were analysed, and potential causes were studied. Also, results of 33 surgically managed patients were analysed in terms of mortality and morbidity and uneventful outcome.

Results: Prosthetic valve obstruction was mostly seen in female patients, mitral position. Most of the patients had normal/near-normal coagulation profile and had a valve size of 25 or less. Majority of intra-operative findings were obstruction predominantly due to pannus with or without clot. Out of 38 patients presenting with prosthetic valve obstruction, 33 were surgically managed. Thrombectomy, debridement, thrombectomy with debridement, and re-replacement were the surgical procedures done. Major morbidity in terms of embolic, peripheral vascular complications (cerebral stroke and b/l femoral thromboembolism requiring embolectomy) was observed in two patients who underwent thrombolysis and in one patient (cerebral stroke) who underwent debridement. Mortality was 3 out of 5 patients (60 %) undergoing thrombolysis and 4 out of 32 (13 %) patients undergoing surgical procedure.

Conclusions: Pannus-induced (with or without) prosthetic valve obstruction is more common than that of clot as a primary cause. Females in a premenopausal age group are most commonly affected. Valve size of 25 or less is prone for prosthetic valve obstruction. Redo surgery for prosthetic valve obstruction is safe with acceptable mortality.

Urgent carotid endarterectomy for stroke in evolution

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Background: Carotid endarterectomy (CEA) is well established as the elective treatment for moderate or severe symptomatic carotid stenoses. In contrast, the merits of CEA performed in emergency in patients with acute stroke or fluctuating neurological deficit remain controversial.

Methods: CEA was performed in emergency on 16 patients within 4 to 24 h after the onset of symptoms. Patients selected for urgent surgery fulfilled the following criteria: acute onset of fluctuating hemispheric neurological symptoms, significant carotid pathology, absence of cerebral hemorrhage, uncompromised vigilance, and stable cardiopulmonary conditions. Selected patients presented with a crescendo-TIA ($n=7$) or evolving (stuttering) stroke ($n=3$) or fluctuating neurological deficits ($n=6$) corresponding to a contralateral carotid stenosis.

Results: Following CEA, the neurological deficits improved instantaneously to complete recovery in ten patients. The symptoms of four patients improved to non-disabling deficits, remained unchanged in one, and worsened in one patient; 14/16 patients were discharged within 8 days after admission. The neurologic status after discharge did not deteriorate in any of the patients during follow-up but improved in four of the patients.

Conclusions: Rescue CEA may be beneficial for selected patients with stroke in evolution and fluctuating neurological deficits. Careful adherence to selection criteria, judicious intraoperative shunting, intensive care postsurgery surveillance, and an experienced team are recommended.

Single-stage transdiaphragmatic approach to lung and liver hydatid cysts

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Background: Hydatid cysts are a clinical problem in our country. The purpose of this study is to present lung and liver hydatid cysts that underwent the transdiaphragmatic surgical approach.

Methods: The study retrospectively evaluated 25 consecutive patients with lung and liver hydatid cysts who underwent transdiaphragmatic surgical treatment at SSKM and IPGME and R between August 2012 and December 2014.

Results: Seventeen (68 %) patients were male and eight (32 %) were female. The average age of the patients was 34 ± 21 (3–72). Twenty-two of the patients underwent thoracotomies, two laparotomies, and one a median sternotomy. Excessive biliary drainage occurred in four patients postoperatively; fistula from the drain path placed in a liver cyst was evident in 1 patient and pleural effusion occurred in 3 patients. There was no hospital mortality. The average hospital stay was 9.4 ± 3.8 (5–23) days.

Conclusions: The single-staged transdiaphragmatic approach to lung and liver hydatid cysts is a safe and effective treatment method.

Immediate graft patency in on- and off-pump coronary artery bypass grafting—prospective nonrandomized study at a single institute

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Background: The objective of this research is to study the immediate graft patency in on- and off-pump coronary artery bypass grafting (CABG).

Methods: Sixty patients undergoing CABG during the study period from September 2013 to October 2014 were subjected to conventional coronary angiography on second or third postoperative day, and the graft patency was studied. The cohort was divided into on-pump CABG and off-pump CABG group, and immediate graft patency was compared between the groups.

Results: Out of 60 patients, on-pump CABG was done in 35 patients and off-pump CABG was done in 25 patients. The average number of grafts in the on-pump group was three per patient and in the off-pump group was 2.5. Left internal mammary artery and saphenous vein grafts were used in all of the patients in the on-pump group while total arterial grafting was done in ten patients in the off-pump group. Out of 105 grafts studied in the on-pump group, 100 grafts were patent, while in the off-pump group, 60 were patent out of 63 grafts.

Conclusions: Immediate graft patency rate in the on- and off-pump groups is similar although the number of grafts received in the off-pump group is slightly less than the on-pump group.

A prospective study to determine the incidence of various coronary artery patterns in patients undergoing arterial switch surgery for dextro transposition of great arteries

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Background: Understanding the coronary artery anatomy in dextro transposition of great arteries (dTGA) is necessary for a successful outcome of arterial switch operation. The study aims to observe the anatomic diversity of the coronary artery in patients undergoing arterial switch operation and determine the commonest pattern seen in India.

Methods: The study was carried out in a single center from January 2012 until October 2014. Forty-seven consecutive switch operations carried out during this period were included in the study. We used the Yacoub and Radley-Smith patterns in order to classify the different coronary distributions (A, B, C, D, and E). We also compared the coronary pattern established by echocardiography with the surgical findings.

Results: The commonest coronary pattern seen in our study was type A 23 out of 47 (48.93 %). Interestingly, 23.4 % of our patients had a type D coronary pattern, which is extremely unusual. This was followed by type E (14.89 %) and type B (12.7 %). Type C was not observed in any of the patients. Sensitivity of preoperative echo in accurately predicting the coronary anatomy was 0.021; 95 % CI (0.001–0.127). On univariate analysis, we found that of all the subtypes, type D was also associated with the most favorable outcome.

Conclusions: In Indian population, almost a quarter of the patients present with type D coronary pattern, which is different from patients in other parts of the world. Also, of all the variants, type D carries the most favorable outcome. Echocardiography, in our study, did not appear to be very sensitive in predicting the coronary pattern.

Early results of mitral valve repair in predominantly rheumatic population

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Background: The objective of this study is to assess early results of mitral valve repair.

Methods: Sixty-three patients underwent mitral valve repair between June 2010 and August 2014. The mean age was 29.20 ± 14.48 years (range from 4 to 68 years); 12 patients were ≤ 15 years. The cause of mitral regurgitation was rheumatic in 49 (78 %) patients, congenital in 6, myxomatous in 2, infective in 2, and ischemic in 4. Fifty-four (85.7 %) had pure mitral regurgitation (MR) while 9 (14.3 %) had mixed multiple sclerosis (MS) and MR. All patients were in NYHA functional class III or IV. Twelve (19 %) had atrial fibrillation. The reparative procedures included ring annuloplasty, commissurotomy, cuspal thinning, neo-chordae reconstruction, chordal transfer, chordal shortening, and leaflet augmentation.

Results: Mean aortic cross-clamp (ACC) time was 82.6 ± 27.51 min, and mean cardio-pulmonary bypass (CPB) time

was 127.21 ± 47.29 min. Mean hospital stay after surgery was 4.77 ± 2.86 days. There was one in-hospital mortality following low cardiac output and sepsis. Mean follow-up was 15.26 ± 10.66 months and 78 % complete. No MR or mild MR was present in 29 (70 %) patients, 3 (7.1 %) have severe MR, 7 (16.6 %) have moderate MR, and 2 (4.7 %) have moderate MS. 88 % patients were in NYHA functional class I. One patient had embolic cerebral infarct event and one had intracranial bleed. There was one late death. One patient underwent re-operation for severe MR.

Conclusions: Mitral valve repair is a feasible option in rheumatic heart disease; however, the results are inferior to the ones having myxomatous or congenital heart disease.

Pericardiectomy for chronic constrictive pericarditis

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Background: This study includes an experience of 20 years (January 1993 to June 2013). We performed this study to find out the role of early pericardiectomy and determine predictors of survival and functional outcome in surgical treatment of different types of constrictive pericarditis.

Methods: In the past 20 years, we have operated on 256 patients, 204 males and 52 females with age ranging from 04 to 58 years operated on between January 1993 to June 2013. Almost all patients underwent left anterolateral and thoracotomy, and only five patients had midsternotomy approach. Patients presented with dyspnoea, B/L pleural effusion, ascites, and hepatosplenomegaly. Few patients presented with cardiac tamponade followed by aspiration and early pericardiectomy. Basic workup was done in all patients.

Results: Patients had excellent outcome and long-term survival with good functioning capacity. Only 11 patients died in the series postoperatively secondary to low cardiac output, disease induced toxemia, and myocardial infarction; 20 patients were electively ventilated. Average ICU stay was 3 ± 1 day and hospital stay was 10 days. Advanced age, atrial fibrillation, inotropic support, low cardiac output syndrome, and associated diseases like malignancy were significant negative predictors of survival. Actuarial survival at 5 years was 89.1 %.

Conclusions: Pericardiectomy should preferably be done the earliest possible to minimize morbidity. Meticulous postoperative care is mandatory to achieve good results. Control of infection and watch over myocardial infarction is important followed by regular medical treatment of disease.

Posttraumatic diaphragmatic hernia

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Background: This study includes an experience of 22 years—review of 530 cases. Any bullet traversing between the nipple and the twelfth rib and knife wound in this zone may cause diaphragmatic laceration. Blunt trauma dramatically increases intra-abdominal pressure and may cause rupture of the central tendon of diaphragm. Rupture occurs in 0.8–1.6 % of patients with blunt trauma and is mostly recognized on the left side.

Methods: We have operated 530 cases, 492 males and 38 females with age ranging from 05 to 70 years, operated on from June 1992 to March 2014. One hundred ten have penetrating trauma and 420 have blunt injury chest and associated abdomen injury (80 cases). Among these, 20 cases were detected late. Patients presented with shock, pain, respiratory distress/dyspnoea, and pus discharging sinus. X-ray of the chest, CT scan of the chest, X-ray of the chest with Ryles tube in position, and ultrasound of the abdomen was done. Diaphragmatic hernia needs to be operated on to prevent future complications, e.g., abdominal viscera herniation with strangulation. Patients were operated on via antero-lateral thoractomy mostly, and eight cases required abdominal exploration.

Results: Patients had excellent outcome. Only five patients died of injuries, three in penetrating, and two in blunt trauma group, landing into septicemia. Seven cases required partial resection of stomach with repair as it was necrosed segmentally.

Conclusions: Early diagnosis and resuscitation is life saving with reduction of herniated abdominal viscera without malrotation.

Current spectrum of ascending aortic aneurysms and its surgical options

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Background: Ascending aorta is the second most common site of aneurysm next to the abdominal aorta with varied aetiology and surgical options. The objective of this study was to retrospectively analyze the spectrum and outcomes of 41 cases of ascending aortic aneurysms operated in our institute.

Methods: Forty-one patients were operated on for ascending aortic aneurysm between January 2009 and June 2014. Patients were grouped into four, based on the procedure performed, group I—aortic root replacement using modified Bentall's technique; group II—interposition tube graft placement; group III—patch repair; and group IV—aortic valve sparing root replacement using David's technique. Preoperative patient characteristics, intraoperative

data, and immediate and late postoperative outcomes between these groups were retrospectively analyzed in this study.

Results: The average age of the patient in this study was 44.14 years, with a male-to-female ratio of 3:1. Aetiologies included Marfan's syndrome (12), bicuspid aortic valve (9), atherosclerosis (7), postsurgical false aneurysm (5), syphilis (4), and chronic aortic dissection (4). Times for operation, extracorporeal circulation and aortic cross-clamping differed significantly between groups. Follow-up period was between 6 months to 5 years. There was one early and two late postoperative deaths. Thirty-day mortality was 2.43 %. Age, NYHA class, preoperative creatinine, and chronic obstructive pulmonary disease were found to be risk factors for morbidity and mortality.

Conclusions: The current risk for ascending aortic aneurysm surgery is low with an acceptable mortality and morbidity regardless of aetiology.

Immediate open pulmonary embolectomy: our departmental experience.

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Background: This study aims to examine operative outcomes after emergency pulmonary embolectomy.

Methods: We report six consecutive patients who underwent open pulmonary embolectomy from March 2013 to October 2014. Operations were performed mostly on normothermic cardiopulmonary bypass ($n=5$, 83.3 %) and a beating heart. Embolectomy was performed via separate incisions in the left and right pulmonary arteries (PAs). Only one patient had evidence of deep venous thrombosis.

Results: Of the six patients identified (4 males and 2 females), the mean age was 53.3 years. The preoperative diagnosis was established by echocardiography (2 days echo) and contrast-enhanced computed tomography (CECT). Indications for pulmonary embolectomy included persistent symptoms (NYHA class II and class III) and severe right ventricular dysfunction as shown by echocardiography. There was no operative mortality. Right ventricular functions improved in all patients and were asymptomatic at 6 months of follow-up. A follow-up CT scan revealed no evidence of thrombus in five of the six patients. However, one patient scan showed evidence of residual thrombus in the subsegmental branches of the right PA.

Conclusions: Emergency pulmonary embolectomy is safe, and the results are encouraging in this small subset of patients. Further large-scale prospective trials and long-term follow-up is required to comment on clear indications and exclusion criteria for emergency pulmonary embolectomy.

Endovenous laser treatment for varicose veins (EVLV)—single-center experience

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Background: EVLT is a new modality of nonsurgical management of varicose veins.

Methods: From November 2012 to November 2014, 110 cases were treated. Ten cases were excluded for insufficiency of record. This study includes patients aged 19–74 years (73 males and 27 females).

Clinical profile: Maximum patients were in CEAP classes 4 and 6. Forty-four patients had bilateral disease. Five patients presented with bleeding from varices, six had recanalized deep vein thrombosis (DVT), and seven had undergone surgery for varicose veins previously. Exclusion criteria include very large varices of >10 mm, extensive thrombosis of superficial veins, non-recanalized DVT. The following procedure was observed: initial anaesthesia, 2 cases under spinal anaesthesia and the rest (98) under LA; diode laser machine used, 95 patients at 980 nm and 5 patients at 1470 nm; 95 patients, single limb (LLL-55 and RLL-40); 5 both limbs treated; GSV, 14 W; for other varices and perforators, 12 W of power was used; average energy per centimeter, 80 J; GSV and perforators ablated in 76, and GSV and SSV combination in 26. Foam sclerotherapy with polidocanol was added in 33 patients for residual varices. Compression stockings were applied (discharged after 4 h).

Results: Fifty asymptomatic patients (30 had pain of 1/10; 15 had pain of 3/10; and 5 had pain of 8/10 on a pain scale of 1–10) responded to NSAID. Two patients had parasthesia in saphenous nerve area, while three had recurrence within 3 months—to be discussed.

Conclusions: Excellent results were obtained with EVLT in short-term follow-up.

Prevalence of significant coronary artery disease in patients who undergo heart valve surgery in a superspecialized cardiac center in Bangladesh

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Background: The presence of significant atherosclerotic coronary artery disease (CAD) in patients with valvular heart disease is an important predictor of perioperative mortality.

Methods: A total of 1500 patients (1000 males, 500 females; mean age, 52.5 ± 12.9 years) who underwent coronary angiography before valvular surgery between August 2003 and June 2012 was enrolled retrospectively. Single- and multiple-valve involvements were present in 43 and 56 % of patients, respectively. Patients with ischemic mitral regurgitation were

excluded from the study. Significant CAD was defined as the presence of ≥ 50 % diameter stenosis in any of the coronary arteries. The presence of angina pectoris and of risk factors (e.g., hypertension, smoking, diabetes mellitus (DM), hyperlipidemia, family history of CAD) was sought in all patients.

Results: Significant CAD was present in 16 % of patients (24 % males, 9 % females) ($p < 0.001$); the highest prevalence was in those with aortic stenosis ($p < 0.05$). CAD was not seen in young patients (aged < 45 years) with none of the above-mentioned risk factors. The highest correlation between CAD and risk factors was family history of CAD, followed by DM, hyperlipidemia, hypertension, and smoking, in decreasing order.

Conclusions: The study results showed that CAD in patients with valvular heart disease was less prevalent in our population. The incidence of coronary lesions rises notably from the age of 50 years in both males and females. Coronary angiography before valvular heart surgery could be omitted in young patients (age < 45 years) with none of the coronary risk factors or without angina.

Carotid body tumors and their clinical profile

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Background: Carotid body tumors are rare but highly vascular neoplasms originating in the paraganglionic cells of the carotid bifurcation. The treatment is surgical excision. This research aims to study clinical profile, surgical outcome, and postoperative complications.

Methods: A total of 46 patients of carotid body tumor were studied prospectively and retrospectively. Histopathological examination of specimens was done and the tumor confirmed. The diagnostic tool was FNAC of lesion, magnetic resonance angiography (MRA)/computed tomography angiography (CT).

Results: Majority of the patients were females 36 (78.26 %) and 10 (21.73 %) males, with the commonest age being from 50 to 59 years. All patients had visible neck swelling. Forty-two patients (91.30 %) had unilateral and 4 (8.69 %) patients had bilateral lesions. Pain was seen in 10 (21.73 %) and dysphagia in 4 (8.69 %) patients. CT angiography was done in 33 (71.73 %) patients, MRA in 9 (19.56 %) and both CTA and MRA in 4 (8.69 %) patients. Complete surgical excision was performed in 46 (100 %) patients. Mean operating time was 3.552 ± 1.03 h. Eleven patients (23.91 %) had Shamblin grade 1, 30 patients (65.21 %) grade 2, and 5 patients (10.86 %) shamblin grade 3. External carotid artery (ECA) repair (anastomosis) was done in five (10.86 %) patients, ICA repair with interposition of vascular graft in three patients (6.52 %), and ECA ligation in three patients (6.52 %). Of 46, 2 went for RT in view of malignant and extensive nature of tumor with suspicion of residual tissue.

Conclusion: Meticulous subadventitial dissection and excision is key to achieving complete excision with minimal morbidity. These highly vascular tumors although rare should be operated on by experienced vascular surgeons only to minimize complications.

Institutional experience in surgery for pleuro-pulmonary tuberculosis

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Background: The emergence of multi-drug-resistant (MDR) and extensively drug-resistant (XDR) mycobacterium tuberculosis (TB) strains, the growing indigent population, and population migration are serious reasons for TB recrudescence. The role of surgery in the management of pleuro-pulmonary TB has evolved from managing complications to treating MDR TB and medical failure cases. We present our experience over a 10-year period. The aim of this study was to assess the efficacy of the various procedures performed, as well as their morbidity and mortality.

Methods: This study is a retrospective audit of a closed population undergoing surgery for pleuro-pulmonary tuberculosis and the attendant complications. The documents of 120 people aged 9–65 years, with an established diagnosis of pleuro-pulmonary TB on ATT, over a period of 10 years, who underwent surgery, were analyzed. Procedures performed include the following: lobectomies (including bilobectomies, wedge resections, nonanatomical resections; 45), empyemectomies with decortications (64), Ppneumonectomies (6), and physiological lung exclusions (5).

Results: Variables assessed were period of initial referral, ICU stay, over all hospital stay, morbidity factors (hemorrhage, SSIs, persistent air leaks, pneumothorax, requirement for a second procedure), and in-hospital mortality. We had mortality in two patients (1.66 %).

Conclusions: Surgery is a valuable adjunct to medical therapy when addressing tuberculosis. Multiple ranges of procedures can be performed with acceptable morbidity and mortality. However, early referral of such patients for surgical consideration is warranted.

Utility of AKIN and RIFLE classifications of acute kidney injury in adult Indian patients undergoing cardiac surgery

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Background: Acute renal failure occurs in up to 30 % of patients who undergo cardiac surgery. Acute kidney injury network (AKIN) and risk, injury, failure, loss, end-stage (RIFLE) staging scores become the standard for classifying the acute kidney injury (AKI). This study aims to assess the incidence of AKI after cardiac surgery as per AKIN and RIFLE classification and to evaluate preoperative risk factor that can predict AKI in postoperative period.

Methods: A retrospective study was made of patients who underwent cardiac surgery at the “Frontier Lifeline Hospital” Chennai from January to June 2013. Incidence of AKI was analyzed as per AKIN/RIFLE classification guidelines, and known risk factors were evaluated.

Results: A total of 270 patients were included in the study. The mean age was 56.8 years, 217 (80.37 %) are male and 53 patients (19.63 %) are female; 22 (8.15 %) patients underwent CABG, 32 (11.85 %) had valve replacement, 12 (4.4 %) had CABG with valve replacement. AKI occurred postoperatively in 84 (31.1 %) out of 270 patients, and out of which, stage I AKI developed in 75 (89.28 %) patients, stage II AKI in 8 (9.52 %) patients, and only 3 (1.19 %) patients developed stage III AKI. Only three out of 84 (3.54 %) patients required short-term hemodialysis as modality of treatment. The risk factors for developing AKI were age >60 years, moderate to severe LV dysfunction, angiogram 48 h before surgery, diabetes, and nephrotoxic drug intake. MSPCI and Thacker score were used as risk predictor score of developing AKI postoperatively.

Conclusions: This is the first study of the incidence AKI in cardiac surgical patients based on internationally accepted classification of acute kidney injury.

Off-pump anteroapical aneurysm plication following left ventricular postinfarction aneurysm: effect on cardiac function, clinical status, and survival

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Background: In patients with coronary disease and aneurysm, ventricular reconstruction with revascularization is a surgical option. Details of patient selection and optimal surgical technique are still debated. We report our results with off-pump aneurysm plication after ventricular aneurysm with relative wall thinning.

Methods: We retrospectively reviewed the records of 24 patients who had an operation for postinfarction left ventricular aneurysm over a period of 10 years. Reconstruction was accomplished by off-pump anteroapical aneurysm plication. The following variables were recorded: preoperative clinical, angiographic, and echocardiographic findings and operative

procedures. Outcomes were early mortality, long-term survival, and poor 5-year result, defined as repeated hospitalization for congestive heart failure. Risk factors were pinpointed using the *t* test and survival curves. Independent risk factors were identified using linear regression methods.

Results: Hospital mortality was low (<1.0 %). Mean follow-up was 5 years (standard deviation (SD), 3). Actuarial survival at 5 years was 81 %. Among the 20 survivors, 18 were in functional class I or II, and the average increase in ejection fraction was 15.0 %. As determined by multivariable analysis, factors predicting poor outcome were advanced age, ejection fraction of less than 35, end-systolic volume index greater than 80 ml/m², advanced New York Heart Association functional class, and congestive heart failure.

Conclusions: Using wall thinning as a criterion for patient selection, the technique of off-pump anteroapical aneurysm plication can be performed with low operative mortality and provides good symptomatic relief and long-term survival.

Incidence of acute kidney injury in off-pump vs on-pump CABG

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Background: One of the most controversial risk factors of acute kidney injury is cardiopulmonary bypass. OPCAB obviously removes the bypass circuit but can be associated with greater hemodynamic instability secondary to ventricular compression during manipulation to access the coronary arteries. This comparison allows separation of the risk factors specifically associated with the bypass procedure itself from other peri-, intra-, and postoperative factors. This study aims to assess the incidence of acute kidney injury (AKI) after OPCAB and on-pump coronary artery bypass grafting (CABG) as per acute kidney injury network (AKIN) and risk, injury, failure, loss, end-stage (RIFLE) classifications.

Methods: A retrospective study was made of patients who underwent CABG (both on-pump and off-pump) at “Frontier Lifeline Hospital” Chennai from January to June 2013. Incidence of AKI was analyzed as per AKIN/RIFLE classification guidelines, and known risk factors were evaluated.

Results: A total of 226 patients were included in the study. The mean age was 58.6 years, 192 (84.95 %) are males and 34 (15.05 %) are females; all patients underwent CABG. AKI occurred postoperatively in 64 (28.31 %) out of 226 patients, and out of which, stage I AKI developed in 20 patients (18.11 % of off-pump) vs 36 patients (31.03 % on-pump CABG), stage II AKI in 2 patients (1.81 % of OPCAB) vs 5 patients (4.31 % of on-pump CABG), and no patient

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developed stage III AKI. Only 2 out of 64 (3.12 %) patients required short-term hemodialysis as modality of treatment.

Conclusions: On-pump CABG is associated with a significantly increased risk for AKI. Our data support a lower risk for AKI in patients who undergo OPCAB.

Perfusion strategy for ascending aortic and aortic arch surgery—an institutional experience

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Background: Ascending aortic and aortic arch surgeries are associated with transient/permanent neurological deficit(s). It is critical to select the appropriate strategy for cerebral protection. While DHCA is associated with ischemic injury, antegrade cerebral perfusion (ACP) can cause embolic events. We present the perfusion strategy practiced at MH (CTC).

Methods: Nineteen cases of ascending aortic and aortic arch surgeries, with or without associated surgical procedures were studied. CDFi of bilateral carotid arteries was performed preoperatively as a routine. Initial CPB establishment with femoral arterial and right atrial cannulation was done. Moderate hypothermia with ACP through axillary/innominate/bilateral carotid artery cannulation was done in cases with normal carotids. Up to 45 min of DHCA was performed in cases with diseased carotid arteries and those which required extension of cardioplegia time for associated procedures or otherwise. Continuous monitoring of cerebral perfusion with NIRS was carried out intraoperatively. Postoperative neurological deficit was clinically assessed.

Results: Perfusion strategies adopted with ACP were through axillary artery in three cases, innominate artery in one case, bilateral carotids in one case, distal ascending aorta in nine cases, exclusive DHCA in three cases, and DHCA+ACP in two cases. Postoperative neurological deficit was less dense and more transient if ACP was maintained. DHCA of 45 min duration showed comparable results.

Conclusion: Moderate hypothermia with ACP is our choice of perfusion strategy in patients.

Profile of aortic surgery in Dubai, history and evolution

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Background: History of adult cardiac surgery continues to be written and will continue to evolve as long as acquired heart disease shortens lives. Disruptive technologies are innovations that are quickly adopted and that change long-established practices. One example is emerging percutaneous aortic valve insertion benefiting

patients who would not be able to undergo open-heart surgery for valve replacement.

Methods: We have reviewed our database for aortic surgery in Dubai heart center over the last 20 years. We classified the cases to aortic valve surgery, ascending aorta surgery, descending aortic surgery, and combined valve surgery. We studied patient's demographics, clinical assessment, and diagnosis, and type of intervention whether surgical or endovascular. Results and prognosis are based on long-term follow-up.

Results: Out of 4000 open-heart cases, 25 % were valve cases. Aortic surgery constitute 45 %: 30 % aortic valve replacement (AVR), 10 % ascending aortic surgery, and 5 % descending aortic surgery; aortic valve replacement: 75 % isolated AVR, 20 % combined AVR, and associated coronary bypass; combined ascending aorta and aortic valve replacement constitute 5 %: Bentall at 90 % and Ross at 10 %. Isolated aortic valve replacement cases comprised 95 % surgical replacement, out of which 5 % were TAVI. Overall hospital mortality was 5 % with morbidities in 15 %.

Conclusions: The history of cardiac surgery is only a prelude; the moving finger writes and having written moves on to a bright, exciting future. Current endovascular techniques in aortic surgery are evolving in our center and giving better results in high-risk group of patients.

Surgical management of partial anomalous pulmonary venous connection—our experience

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Background: Partial anomalous pulmonary venous connection (PAPVC) is a congenital pulmonary venous anomaly that involves drainage of one to three pulmonary veins into the right-sided circulation. We explore early results after surgical management of PAPVC at our institution.

Methods: Ninety-six patients who underwent surgery for PAPVC between 2007 and 2013 were included in the study. Patients were in the age group of 3 to 17 years. Clinical and echocardiographic follow-up was obtained.

Results: PAPVC was right-sided in all cases. In four of these patients, both the right superior and inferior pulmonary veins were draining into the right atrium; 92 % of right-sided PAPVC was associated with sinus-venous atrial septal defect. Surgical management included rerouting of PAPVC using glutaraldehyde-treated pericardium, ten of these cases also needed SVC augmentation. There was no early or late mortality. In three cases, there was minimal residual leak across the patch which did not require any surgical intervention.

Conclusion: Surgical management of PAPVC is associated with excellent outcomes.

Cardiac surgery postoperative arrest and resuscitation (CaSPAR)

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Background: The incidence of cardiac arrest after cardiac surgery has been reported to be around 0.7–2.9 %. The survival rate to discharge after a cardiac arrest in a patient in the intensive care unit is reported to be as low as 7–79 %. The markers for survival with cardiac arrest following heart surgery are unknown. We analyze the success rate of cardiopulmonary resuscitation (CPR) in which closed and open-chest CPR was employed at an early stage of the resuscitation effort.

Methods: This study comprised a retrospective analysis of resuscitation methodology among postcardiac surgery patients with witnessed cardiac arrest done at Sri Satya Sai Institute of Higher Medical Sciences, Whitefield, Bangalore. In 2013, 1250 patients were operated on, which included CABG in 393 (31.5 %), valve surgery in 136 (10.8 %), congenital surgery in 601 (48.08), and miscellaneous in 120 (9.6 %), while 1353 patients were operated on in 2014, which included 382 (28.2 %) CABG, 202 (14.9 %) valve surgeries, 667 (49.2 %) congenital surgeries, and 102 (7.5 %) miscellaneous procedures. The data was analyzed to determine the survival-to-hospital discharge rate, re-sternotomy rates, and the trend in these endpoints over time.

Results: One hundred four patients survived to discharge. Among which, a total of 158 patients had cardiac arrest. CPR consisted of conventional closed-chest CPR initially and was followed by, if needed, by open-chest CPR.

Conclusions: The cardiac arrest following cardiac surgery is sometimes preceded by a period of progressive deterioration in which the patient deviates from the expected postoperative course, potentially providing a “window of opportunity” to act preemptively. ACLS-guided resuscitation among postcardiac surgery arrest patients serves as only a guideline for reviving the patient. However, this may not be entirely apt to be followed in postcardiac surgical patients. Open/closed CPR techniques, usage of pressors, and cardioversion form a critical role and need to be used judiciously.

Mini-AVR: a surgeon and institutional learning curve

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Background: Upper hemisternotomy and right anterior thoracotomy have become the predominant approaches for minimally invasive aortic valve replacement. Clinical studies have documented equivalent operative mortality, less bleeding, and reduced intensive care/hospital stay compared with conventional sternotomy despite longer procedure times. We present the initial results with a single surgeon in our institution.

Methods: From May 2012 to October 2014, 56 aortic valve replacement (AVR) procedures were performed through upper partial hemisternotomy by a single surgeon. The sternotomy was done in inverted Y-shape in seven of them early in the series and J-shaped sternotomy in the rest of them. There were three conversions to full sternotomy (two due to poor access to aorta and one due to bleeding from epicardial pacing wire).

Results: The median CPB time and cross-clamp time were 103.5 min (79–218 min) and 81.5 min (67–187 min), respectively, with length of operating time being 4.5 h (3–7.5 h). The median blood loss was 300 ml (100–2800 ml). There was excess bleeding in 11 patients with 5 re-explorations. There were no mortality with 5 % morbidity due to AF and respiratory problems. The median length of ICU stay and hospital stay were 1 day (1–35 days) and 6 days (1–45 days), respectively, brought about by the major change in the practice with regards to early mobilization and without sternal precautions in these patients.

Conclusions: Mini-sternotomy AVR is technically challenging, but with increasing surgical experience, it offers results comparable with those achieved with conventional AVR with acceptable cosmetic results and is as safe as the standard procedure.

Hybrid arch procedure

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Background: Traditional aortic arch surgery is highly complex and entails establishing profound hypothermia and total circulatory arrest with significant morbidity and mortality. Two main hybrid procedures that are performed are frozen elephant trunk and arch de-branching approach. Hybrid arch is an emerging technique with promising results. We present our experience of hybrid arch procedure over a period of 6 years.

Methods: A total of 28 patients were enrolled with mean age of 67 years. Three methods for debranching were undertaken: nonsternotomy through cervical neck vessel bypass, or through sternotomy with total circulatory arrest, or through sternotomy without TCA. Two patients underwent elephant

trunk procedure, seven patients with arch vessel bypass, while ascending aorta replacement was done in eight patients.

Results: Mean ventilation period was 48 h, and mean ICU stay was 5.5 days. Major stroke (3) and in-hospital death (3), endoleak (1), and renal failure (2) were major postprocedure complications.

Conclusions: Hybrid arch technique is a relatively safe procedure with lower incidence of complications in old age and higher comorbidity index.

Complex thoracic surgery using Da Vinci robotic system

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Background: We present our early results of complex thoracic surgery using the Da Vinci robotics.

Method: Between January 2013 to January 2014, 106 patients underwent complex thoracic surgery using the Da Vinci four-arm robot. Patient and surgeon's satisfaction questionnaires were evaluated. Results were compared with case-matched group of 100 patients undergoing VATS.

Results: The surgeries performed using the Da Vinci HDSi system were robotic thymectomy for thymoma, myasthenia, lobectomy for lung cancer, aspergilloma, post-tubercular bronchiectasis, segmentectomy, sleeve lobectomy, pneumonectomy, resection of ectopic parathyroid adenoma, metastatectomy, mediastinal, chest wall and thoracic outlet cysts and tumors, plication of diaphragm, and ligation of thoracic duct. The mean hospital stay was 3 days (range, 3–7), with ten conversions to VATS and four to open. One tension pneumothorax required urgent undocking of robot, and two bleeding patients needed control with VATS. The advantages of robotics included better 3-day visualization, higher dexterity of the robotic arm, lesser pain, and equal cosmesis. The ability to suture with robotics was superior. No major wound infection was reported in both the groups. Drain dwell time was equal (mean, 1 day). No difference in air leak between the two groups, and no significant difference in mean hospital stay (mean, 3 days).

Conclusions: Robotic thoracic surgery offers similar clinical results as VATS but with added benefits of better visualization, dexterity, and ability to suture. Cosmetics, early hospital discharge, and reduced pain continue to be strengths of both types of procedures.

Tucker's repair: an alternative surgical repair method for supra-cardiac total anomalous venous connection

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Background: There are different surgical techniques employed in re-routing of supra-cardiac total anomalous pulmonary venous connection (TAPVC) with varying degrees of good outcomes. This study was designed to demonstrate an alternative approach for the management of supra-cardiac TAPVC and its potential advantages.

Methods: The clinical records of patients who underwent Tucker's repair from September 2012 to November 2014 were reviewed retrospectively. Tucker's repair involves anastomosis between the roof of the left atrial appendage and the common venous chamber on cardiopulmonary bypass without cardiac displacement.

Results: Out of 51 patients who presented with TAPVC, 33 (64.7 %) had supra-cardiac TAPVC and 7 (13.7 %) had mixed TAPVC with supra-cardiac component. Of these combined group, 40 (78.4 %) underwent the Tucker's repair. The mean duration of intensive care unit (ICU) stay was 7 days. The postoperative complications were left diaphragmatic paresis in two patients, and one of them had diaphragmatic plication. In immediate postoperative period, one patient developed refractory ventricular fibrillation, which was managed with amiodarone. Other complications were chylothorax, haemorrhage, and pulmonary venous obstructions needing revision in one patient each. There were three deaths (7.7 %) resulting from pulmonary hypertensive crisis in one patient and sepsis in two.

Conclusions: In Tucker's repair, no cardiac displacement is required, thus anastomotic misalignment or kink is avoided and with probable low incidence of arrhythmias. Our results have also demonstrated that Tucker's repair is an effective alternative approach with low morbidity and mortality.

Early outcomes after various tricuspid valve procedures

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Background: Tricuspid valve surgery is usually performed as a concomitant reconstruction procedure in addition to the correction of other pathologies. Early outcomes after various tricuspid procedures and results of the different surgical techniques employed were studied.

Methods: Eighty-four patients who underwent tricuspid procedures from 2002 to 2014 were retrospectively analyzed; 52 were males and 32 were females. Fifty-six patients were in NYHA classes 3 and 4. Valves were purely regurgitant in 74 %, stenotic and regurgitant in 23 %, and purely stenotic in 3 % of the patients. Seventy-six patients (88 %) had associated mitral valve or aortic valve surgery, and six patients had redo tricuspid valve surgery. The tricuspid valve was repaired in 76 patients and replaced in 8 patients; 65 % of the patients had severe pulmonary artery hypertension. The surgical techniques

used were tricuspid valve ring annuloplasty in 76 patients, bicuspidization in 5, and de Vega annuloplasty in 17.

Results: There were no in-hospital deaths. Patients were kept on the ventilator for 26 ± 3 h. ICU stay was 71 ± 2 h. Three months follow-up echo showed that 78 patients had mild tricuspid regurgitation with acceptable gradients.

Conclusions: Tricuspid valve procedures can be safely performed with excellent early outcomes.

Early results following heart transplantation—a single-center experience

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Background: Cardiac transplantation has emerged as a viable therapeutic strategy for select patients with end-stage heart disease, offering extended survival and improved quality of life. Approximately 4000 heart transplantation procedures are performed annually worldwide. With increasing success in heart transplantation, more centers have developed or are contemplating the initiation of a program. Prior to implementation of such a program, a number of issues need to be addressed, including state authorization, an expeditious method for donor organ retrieval, protocols for recipient selection and evaluation, and perioperative and follow-up care of the transplant recipient. We started our program 18 months ago and present our early results.

Methods: Eleven orthotopic heart transplants were done at this center from May 2013 till November 2014 on ten patients. One was a retransplantation for severe tricuspid regurgitation, right heart failure, and subsequent cardiac arrest. All transplants were done in the same standard biatrial technique and by the same surgeon. Standard immunosuppression regimens were followed using RATG, tacrolimus, mycophenolate mofetil (MMF), and prednisolone.

Results: The overall mortality was two. Three patients have completed 1 year after transplant, two have completed 6 months, and two have crossed 3 months. The retransplant candidate has completed 9 months now.

Conclusions These initial encouraging outcomes are a result of careful planning, institutional commitment and adequate resources and, most importantly, a dedicated team effort.

Evaluation of incidence, risk factors, and management protocols for early postoperative arrhythmias after pediatric cardiac surgery

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Background: This prospective study proposed to determine the incidence, risk factors, and management protocols for

early postoperative arrhythmias with focus on outcomes using a uniform protocol and also to see if children operated on at a later age have different issues from those operated on earlier.

Methods: Two hundred twenty-four consecutive pediatric patients underwent cardiac surgery during the study period from September 2013 to July 2014. Twenty-four patients were excluded as their procedures were performed without cardiopulmonary bypass (CPB).

Results: The median age was 24 months (mean, 50.07 ± 62.38 ; range, 0.50 to 216 months). Most common arrhythmia was junctional ectopic tachycardia (JET; $n=7$, 46.6 %) followed by supraventricular tachycardia ($n=5$, 33.33 %). All JET occurred within 24 h of intensive care unit (ICU) admission. In seven patients with JET, five patients responded to conventional measures and two patients required amiodarone infusion. There was a statistically significant difference between CPB time of patients having arrhythmia than those not having arrhythmia.

Conclusions: We observed a very low incidence of arrhythmias particularly JET after open-heart surgery in children. Other than a higher CPB time, no specific predictors were identified. It appears that the causation of arrhythmias following pediatric cardiac surgery is multifactorial and needs large studies.

Study of predictors of perioperative myasthenia crisis along with outcomes after thymectomy in myasthenia gravis

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Background: Thymectomy is considered to be an effective treatment in patients with myasthenia gravis. This study is intended to know about the predictors of perioperative myasthenia crisis along with outcomes after thymectomy.

Methods: Forty-five patients with myasthenia gravis who underwent thymectomy were studied retrospectively and prospectively for a total duration of 4 years. The following predictors were analyzed and studied accordingly in relation to myasthenia crisis occurrence: presence of thymoma, pulmonary function test, AChR antibodies, preoperative crisis, intraoperative complications, postoperative crisis, requirement of plasmapheresis/intravenous immunoglobulins, duration of hospital stay, and pre- and postoperative drug dosage modification.

Results: Thymoma was seen in 26 patients. PFT was deranged in 23 patients. In 14 patients, AChR antibodies were positive, preoperative crisis was seen in ten patients, postoperative crisis was seen in three patients, plasmapheresis was done for ten patients, and intravenous immunoglobulins were administered for three patients. However, the doses of prednisone and azathioprine were significantly reduced. Out of 13

patients with myasthenic crisis, thymoma was seen in 10, AChR antibodies were seen in 7, and poor pulmonary function was seen in 11 patients showing that these factors are closely associated with perioperative crisis.

Conclusions: Presence of thymoma, positive AChR antibodies, and moderate to severe airway disease are significant predictors of perioperative crisis. Prior adequate optimization with plasmapheresis and or immunoglobulins is of utmost importance to prevent postoperative myasthenia crisis. Also, there is a significant decrease in the dosage administration of steroids and azathioprine following thymectomy postoperatively.

Innate superior than innovate

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Background: Surgery for valvular heart disease is being extensively performed in many cardiac centers worldwide. Various surgical techniques were innovated to address the valvular pathology of the heart. The current trend to tackle this problem is the valve repair rather than replacement. We share our experience of valve repair in our center.

Methods: A total of 136 repairs were done from 2009 to 2013. There were 90 males and 46 females. The mean age group was 38 years. Valve repair contributed to around 27 % of all valve surgeries performed in our center (136/501 cases). Mitral valve repair was done in 114 cases (83.8 %), tricuspid valve repair in 16 cases (11.7 %), aortic valve repair in six cases (4.4 %), and combined in five cases (3.6 %).

Results: The postoperative follow-up was 100 %. The median follow-up is 24 months. The postoperative mortality was 0.73 % (one patient) and late mortality was 1.48 % (two cases) due to LV dysfunction (one case) and hemolysis (one case). There was no reoperation. Three patients (2.6 %) had recurrent mitral regurgitation >2+; 89 % of the patients are free from anticoagulation. Five patients were converted to replacement after an attempt to repair failed during this period.

Conclusions: Valve repair can be a better alternative to replacement and avoid the problem of anticoagulation provided it is performed by an expert. The operating surgeon should always have a strong mindset in repairing a valve to the best of his efforts.

TOF with absent pulmonary valve—conduit vs transannular patch

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Background: Tetralogy of Fallot (TOF) with absent pulmonary valve (APV) represents a different pathologic subset compared with the TOF with pulmonary stenosis (PS). Absent ductus is a constant feature and VSD is necessary to decompress the right ventricle for survival during fetal development. We present our experience in managing this condition.

Methods: Six patients (three males and three females) with TOF APV underwent corrective repair from 2012 to 2014. Three underwent repair with conduit made from bovine jugular vein, and three transannular patches with bicuspid PTFE valves. The decision was based on the degree of pulmonary artery dilatation, pulmonary annulus size, and appearance of RV on echo and intraoperatively. Patients with very aneurysmal pulmonary arteries, larger annulus, and dilated RV were implanted with conduit. All patients had extensive tailoring of the branch PA's consisting anterior excision with posterior in situ plication.

Results: In all patients extubated on day 1, there was no mortality or prolonged hospital stay. The maximum follow-up was 3 years and minimum was 4 months. Those who had transannular patches with bicuspid valve have moderate PR with no symptoms and have been on follow-up; the patients with conduit have mild to no pulmonary regurgitation. All patients had class I symptoms.

Conclusions: Patients with APV and dilated PA secondary to severe PAH in the absence of decompressing PDA are likely for normal pulmonary annulus and dysfunctional RV; these people would benefit from conduit. Those with very narrow annulus without valve and free regurgitation managed with transannular patch. This is in contrast to decision making in the usual TOF where the opposite applies.

Management of grown-up congenital heart (GUCH)—our 5-year experience

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Background: With the success of pediatric cardiology and cardiac surgery over the last three decades, it is expected that shortly there will be more adults with congenital heart disease. The “new population” of patients with congenital heart disease no longer fits within the traditional divisions of training and practice, which have separated adult and pediatric cardiac surgery. An organized system is not yet in place. To present our case series of grown-up congenital heart (GUCH) in the last 5 years and the protocols, we have set in management of grown-up congenital hearts.

Methods: A total of 84 cases (32 males, 52 females) of GUCH were operated on between 2009 and 2014. The case records were reviewed and the data analyzed.

Results: Cases included atrial septal defect, Ebsteins anomaly, ventricular septal defects, coarctation of aorta, tetralogy of

Fallot, pulmonary stenosis, subaortic stenosis, patent ductus arteriosus, Marfan's syndrome, and redo surgeries of congenital heart. Management strategy and statistical data on outcomes will be discussed.

Conclusions: Adolescents and adults with congenital heart disease who require surgery fall into three categories: (1) those who have not previously undergone operation, (2) those who have had palliative surgery, and (3) those who have had reparative surgery. In each category, there are several considerations, which make surgery, in this population, different from other types of cardiac surgery. Surgery can be performed safely only by teams who have extensive experience in the management of congenital heart defects in infants and children as well as knowledge of the principles of conventional adult cardiac surgery.

Mitral valve repair in ischaemic mitral regurgitation—our experience

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Background: Coronary artery bypass grafting (CABG) will not correct ischaemic mitral regurgitation (IMR) related to scar and annular enlargement: annuloplasty by using undersized annular ring almost always corrects severe mitral regurgitation (MR), improves functional capacity, and left ventricle (LV) remodeling. This study aims to compare the benefits of mitral repair with CABG in patients presenting with ischaemic mitral regurgitation as a consequence of coronary artery disease than doing a CABG alone. LV end systolic dimension, functional capacity, and severity of MR are presented.

Methods: In our experience from 2008 till date, we have had 186 patients of which 152 patients underwent CABG with mitral valve (MV) repair and 34 patients underwent CABG with MV replacement. Of patients, 88 % were males and 12 % females; 84 patients had EF in the range of 30–40 %, 55 patients in the range of 40–50 %, 24 patients in the range of 20–30 %, and 23 patients more than 50 %.

Results: The result of postoperative MR for MV repair (152 patients) includes the following: trivial MR, 112; mild MR, 26; moderate MR, 12; and severe MR, 2. The predictors of high mortality are LV dysfunction >35 %, moderate–severe MR thinned and enlarged, and dyskinetic segments of LV. Outcomes include the following: mortality, 10/186 (5.4 %); MV repair, 7/152 (4.6 %); and MV repair, 3/34 (8.8 %). Severe MR frequently observed in CAD patients is a bad prognostic sign. New-generation rigid complete IMR rings are superior.

Conclusions: Reduction annuloplasty with CABG is best suited for patients with severe IMR and has low operative mortality.

Aortic valve repair in children

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Background: Aortic regurgitation in children can be part of any other cardiac anomalies. Valve replacement is not an option for most either because of age or annulus size. We review our experience with aortic valve repairs in children.

Methods: Twelve with moderate to severe aortic regurgitation underwent repair, with the youngest being at 2 years and the oldest at 14 years (mean age, 5 years). Pathologies were perimembranos ventricular septal defect (VSD), 5; doubly committed, 2; truncus arteriosus, 2; subaortic membrane, 2; and RHD with MS and AR, 1. In VSD with aortic valve prolapse, repair was done if preoperative echo showed moderate to severe regurgitation or if antegrade cardioplegia is unable to deliver. Technique was tailored to the anatomy and used in combination of—free margin leaflet plication—central or peripheral, commissuroplasty, annuoplasty, free margin extension, and fibrosis release under cusp. Aortic transection with commissural stays and Trusler's stitch at center of cusps were used to plan repairs mimicking distended root and assess coaptation.

Results: One mortality in truncus arteriosus child on day 5 was due to PHT crises though valve repair was satisfactory. No regurgitation (4), trivial (5), and mild regurgitation (3) at discharge time were observed and maintained similarly during follow-up. One with VSD developed moderate regurgitation and awaiting aortic valve replacement. The mean follow-up is 18 months and maximum is 3 years. Overall results appear satisfactory in ten (84 %) patients.

Conclusions: Aortic valve repair is possible with satisfactory results; proper valve assessment with exposure using aortic transection, commissural stays, and Trusler's stitch is key.

Rheumatic mitral valve repair in children

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Background: Children with RHD represent a unique challenge as valve replacement substitutes one problem with other sets of problems. We present our experience in managing rheumatic mitral disease in children <16 years age.

Methods: Of the 35 children who underwent various mitral valve repair procedures, 30 present rheumatic etiology (16 females and 14 males). The predominant was regurgitation in 23, with 2 having stenosis and 5 having both. The repair technique consisted of commissurotomy, posterior leaflet augmentation in 28 (93 %), anterior leaflet augmentation in 4 (14 %), and artificial chords in 18 patients (63 %) using 4–0

or 5–0 Goretex sutures. Four patients had complete ring, and the rest had posterior collar annuloplasty using 0.6 mm hand-made Goretex ring or band.

Results: Of patients, 93 % had successful repair consisting of no to trivial to mild regurgitation both intraoperatively and predischarge echo. The maximum follow-up is 3 years, and the mean duration is 18 months. Two (7 %) patients have moderate to severe regurgitation during follow-up and are awaiting redo surgery. Two patients had commercial ring which had to be replaced due to hemolysis. The pathology was posterior leaflet retraction with apparent or actual anterior leaflet prolapse. No hemolysis following switching over to 0.6 mm Goretex ring.

Conclusions: The leaflet augmentation and artificial chords has made procedure easy and reproducible; 0.6 mm Goretex band proved alternative to commercial rings. We feel that using this mitral valve repair is safer, easy, and cost-effective for our pediatric population.

Tracheostomy in children following pediatric cardiac surgery

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Background: Tracheostomy may be required following congenital cardiac surgery in children who require prolonged ventilation. There could be airway, cardiac, or infection issues or combination of these resulting in long ventilation. The timing of tracheostomy is controversial. We review our experience in children who underwent tracheostomy following cardiac surgery.

Methods: Twelve patients out of 1450 postcardiac surgery patients underwent tracheostomy. The diagnosis were left coronary artery from pulmonary artery (ALCAPA), 2; TGA, 2; ventricular septal defect (VSD) with severe pulmonary arterial hypertension (PAH), 2; tetralogy of Fallot (TOF) with multiple VSDs and TOF with pulmonary atresia, 2, Glenn surgery, 2; VSD with arch interruption, 1; and Shone's complex with severe MS post-modified Konno's procedure, 1. The mean duration from the time of surgery to tracheostomy was 10 days ranging from 5 to 15 days.

Results: Three were discharged home on tracheostomy, and two were decannulated after a period of 1 month and 1 year. Eight were decannulated before discharge. There was one early (30 days) mortality in TOF with multiple VSDs. One child with Down's syndrome and subglottic stenosis and severe PAH is on tracheostomy and doing well. All the discharged patients and those decannulated later are doing well.

Conclusions: Reasonably, early tracheostomy in our opinion helped avoid the complications of prolonged oral/nasal endotracheal intubation. In children with severe LV dysfunction

with ALCAPA, the procedure has smoothed the weaning process. With trained care givers, some of them may be discharged home, reducing medical costs to the family.

CT angiogram: a useful diagnostic tool in pediatric cardiac surgery

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Background: With the improvement in the echocardiography technology, most cardiac defects can be safely taken for surgery based only on echo findings. We reviewed our experience with computed tomography (CT) angiogram for congenital cardiac defects and indications and whether it influenced the outcome and decision making.

Methods: Between 2012 and 2014, 44 CT angiograms were taken for various congenital cardiac defect of 1490 patients operated on during this period. The indications were total anomalous pulmonary venous connection (TAPVC) with heterotaxy, 4; tetralogy of Fallot (TOF) with suspicion of major aortopulmonary collaterals (MAPCAs) or coronary crossing the right ventricular outflow tract (RVOT), to define pulmonary artery anatomy, 20; Scimitar syndrome, 4; complex reoperations, 6; coarctation, 5; Taussig Bing anomaly, 1, and suspicion of airway or pulmonary pathology, 4.

Results: Two of the four patients with heterotaxy were considered inoperable, based on the size of the pulmonary veins and common chamber; five of the TOF with MAPCAs were also not offered surgery in view of the size of native pulmonary arteries. Conduit was used in two patients with coronary crossing RVOT; four patients for redo had peripheral cannulation in view of the aorta or other cardiac structure adhering to the sternum. Two patients with Scimitar had thoracotomy in view of the dextroposition of the heart. One patient with airway narrowing had successful balloon dilatation of the narrowed subglottic area.

Conclusions: CT angiogram is an excellent diagnostic tool and supplementary role to echo and angiogram in identifying extracardiac anomalies and planning surgical approach and also deciding who should not be operated.

Bilateral internal mammary artery (BIMA) as a conduit for coronary artery bypass grafting (CABG): an experience of 33 cases

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Background: Coronary artery bypass grafting (CABG) is a commonly done procedure in the world, with saphenous vein, internal mammary artery (IMA), radial artery, etc., as bypass

conduits. Studies have shown increased longevity in patients receiving BIMA as conduits because of increased long-term patency of IMA. The aim of this study is to show results in patients receiving BIMA as conduits.

Methods: This research includes 33 cases studied retrospectively from the 1st November 2013 to 1st November 2014 of age group 45–75 years (27 males and 6 females; 25 diabetics). All underwent off-pump CABG in which RIMA anastomosed to LIMA in Y fashion except one in whom RIMA was used as a pedicled form, LIMA anastomosed to the left anterior descending artery and RIMA anastomosed sequentially to obtuse marginal and posterior descending artery, and conversion to bypass needed in seven cases because of hemodynamic instability.

Results: Out of 33 cases operated, mortality occurred in three cases; in two cases, mortality was intraoperative because of diffuse disease of LAD resulting in arrhythmia and cardiac arrest, and in one it was postoperative because of low cardiac output. Sternal wound dehiscence occurred in one nondiabetic patient. Mean ICU stay was 3 days, with patients discharged on average of 5 days. At 6 months follow-up, 16 patients underwent coronary angiography which shows that both IMA were patent.

Conclusions: CABG using BIMA resulted in symptomatic improvement with advantage of being free from peripheral scarring, swelling and numbness of legs. At 6 months follow-up, BIMA shows excellent patency with further follow-up necessary to account for patency of BIMA in the future.

A 20-year review of pectus surgery at Birmingham Heartlands Hospital

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Background: Pectus is the most common congenital disorder affecting 1 in 1000 people. Perception among primary care physicians is that surgery is high risk and prohibitively morbid. Thus, we studied the results of a single institution over two decades.

Methods: Adolescent and adult patients that underwent primary modified Ravitch or Nuss pectus repair between 1994 and 2014 were identified. Demographic information, postoperative complications, and patient centric outcomes were collected.

Results: Two hundred ninety-seven patients were included (262 males, 35 females), with a mean age of 19.8 years (range, 9 to 45). Mean length of hospital stay was 4.7 days (range, 1 to 21). One hundred sixty-three patients had surgery for pectus excavatum, 97 for carinatum, 6 for mixed deformity, and 1 acquired deformity. Pectus correction was solely performed

with modified Ravitch with and without bar insertion until 2008. Two hundred forty-four patients received a modified Ravitch (83 without a bar) and 53 patients underwent Nuss repair. Seventy-nine patients had their bars removed, on an average of 20 months after surgery (range, 0.1 to 120 months). The main complications were wound infection (3%), postoperative bleeding or hematoma requiring return to theatre (2.3%), seroma formation (1.6%), bar migration (1.6%), wound dehiscence (1%), significant post-operative pneumothorax (1%), keloid scar, granuloma (1%), and wound dehiscence (1%). The pectus recurrence rate was 9.4% (28/297). Patient satisfaction after pectus surgery was assessed with the Brompton questionnaire. The majority of patients reported improved health, better exercise capacity, and satisfaction.

Conclusions: Pectus surgery can be performed with low morbidity and complications with good patient reported outcomes.

Management of superficial and deep sternal wound infections with the help of vacuum-assisted closure device: our experience from 2012 to 2014

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Background: Preoperative risk factors for sternal wound infections include diabetes mellitus, chronic obstructive airway disease, obesity, and smoking. Postoperative risk factors include blood transfusions, surgical chest exploration, prolonged postoperative ventilation, and longer stay in the intensive care unit. Sternal wound infections after cardiac surgery is a concerning complication, increasing morbidity and mortality. Approximately 0.3–5.0% of median sternotomy surgical approaches result in infection. Mortality rates range in the literature between 14 and 47%. Vacuum-assisted closure is a good treatment option in comparison with conventional dressing in management of sternal wound infection.

Methods: Twenty-eight patients developed sternal wound infections after cardiac surgeries at our institution from 2012 to 2014. Data was gathered regarding patient comorbidities, treatment method, and outcome.

Results: This study presents the use of vacuum-assisted closure (VAC) therapy as a definitive closure strategy, where it allows to perform wound debridement repeatedly under brief general anesthesia and avoidance of dependency on regional flap and flap-related morbidity. Age, sex, comorbid conditions, type of cardiac procedure, time interval of wound infection, type of VAC therapy, number of dressing changes, the final outcome, cost, and length of hospital stay were considered in this study.

Conclusions: Vacuum-assisted closure as definitive treatment modality is a successful, first-line therapy for local superficial

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sternal wound infections. When deep infections occur, VAC as bridge-to-flap coverage is recommended over attempted secondary healing with VAC.

Heart–lung transplantation for idiopathic pulmonary fibrosis with severe cor pulmonale

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Background: Bilateral lung transplantation remains the procedure of choice for end-stage interstitial lung disease (ILD). We describe three patients with ILD and severe cor pulmonale who underwent heart and double lung transplantation in view of their severe right ventricular (RV) dysfunction.

Methods: All three patients were males aged 34, 54, and 68 years. All patients were on long-term oxygen therapy, with very limited mobility and virtually bed ridden. All patients had severe RV dysfunction on echo with TAPSE of less than 12 mm and EF ranging from 20 to 30 %. The oldest patient was admitted to ICU with chest infection, desaturation, rapid AF, and hypotension requiring ventilation, antibiotics, and inotropes. On availability of a suitable donor, he underwent salvage heart and lung transplantation. The other two patients were admitted to hospital on availability of suitable organs.

Results: Two patients (66.6 %) have survived and are now in NYHA class I after 14 and 9 months, respectively. One patient suffered a cardiac arrest on induction and required emergency institution of cardiopulmonary bypass. Following implantation of the heart–lung block, he eventually succumbed to bleeding due to severe coagulopathy.

Conclusions: Heart–lung transplantation can be safely performed. However, patients with end-stage lung disease are referred very late for operation which adversely affects survival and outcome. Early referral would prevent problems secondary to poor mobility such as muscle weakness and its attendant complications such as prolonged ventilation and increased risk of infections in immunosuppressed patients.

Benchmarking and outcome analysis in cardiac surgery—the impact of electronic health records

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Background: Cardiac surgery lends itself to accurate analysis because the end points are precise and accurately calculable. Historically, cardiac surgeons were the first to present their outcome data and publish benchmarks and league tables. The advancements of information technology (IT) has resulted in electronic health records (EHR), which, when properly made use of, allows robust outcome analysis.

Methods: One thousand five hundred twenty-three consecutive patients who underwent CABG from 2012 to 2014 by the last author (MRG) were analyzed. All the patient details have been captured prospectively in his own EHR system since 2012. These data were then easily analyzed, and variable life adjusted display (VLAD) plots were constructed to analyze outcomes.

Results: Easy retrieval of demographic and other statistical data was possible from the EHR system. The predicted operative risk score was done using Logisite EuroSCORE II, and these were used to construct VLAD plots.

Conclusions: VLAD plots offer robust assessments of a surgeon's performance and may be used as a quality monitor to benchmark performances. Despite increasing use of IT by cardiac surgeons and the majority being at ease with the use of computers and hand-held devices, the fact remains that EHR is used very little by our cardiac surgical fraternity—and even that—grudgingly. This report demonstrates the ease of data retrieval and hopes to encourage more surgeons to adopt EHR in their practices.

Mechanical complications of myocardial infarction: a descriptive study

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Background: Left ventricular aneurysm, interventricular septal defect, and acute mitral valve incompetence due to papillary muscle damage are three mechanical complications which cause intractable heart failure following myocardial infarction. In each case, surgical intervention can result in dramatic improvement of congestive heart failure. Our goal was to determine clinical predictors and outcomes of these complications in the present era.

Methods: Study design includes a record-based analytical study. This study was conducted in Nizam's Institute of Medical Sciences from Jan 2009 to Dec 2013. Sample size involves 61 patients.

Results: A total of 61 patients were identified as having confirmed interventricular septal defect, left ventricular (LV) aneurysm, and ischemic mitral regurgitation in 33 (54.09 %), 10 (16.39 %), and 18 (29.50 %), respectively. Male-to-female ratio was 3.6:1, and most of the study subjects were in the age group of 45 to 60 years. Angiographically, the infarct artery was more often the left anterior descending and more likely to be totally occluded in patients who developed ventricular septal defect (VSD) and LV aneurysm. Mortality at 30 days was higher in patients with early operated ischemic VSD (54.54 %) than in other groups.

Conclusions: Whereas intractable heart failure following myocardial infarction is usually due to diffuse myocardial disease, in some cases a lesion of limited extent may be

responsible for a profound disturbance in cardiac mechanics. In these cases, properly timed surgical intervention may dramatically relieve congestive heart failure.

Heart transplantation—mid- and long-term results

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Background: Our unit performed the third heart transplantation in India in 1995, who is one of the longest Indian heart transplant survivor having lived for 14 years until 2009. We have so far performed 27 isolated heart transplantations. This report describes our mid- and long-term outcomes.

Methods: A retrospective chart review was performed. Ages ranged from 13 to 64 years. Indications were ischaemic cardiomyopathy (22/27) and dilated cardiomyopathy (5/27). Previous interventions (CABG, PCI, or CRT-d) were done in 15 patients. Bridge to transplant was done in two patients (after LVAD and ECMO). Routine pre-discharge endomyocardial biopsies are done, and subsequent biopsies are done as per protocol.

Results: Thirty-day mortality (2/27) is 7.4 %. One-year survival (23/27) is 85.1 %. There were three episodes of grade 2R rejection in two patients which responded to pulsed steroid therapy.

Conclusions: Heart transplantation still remains the gold standard for end-stage heart failure. We have results at par with ISHLT database. However, still, a large number of patients are referred too late when irreversible pulmonary hypertension and other organ failure sets in. This adversely impacts the outcome and survival of heart failure patients.

Surgical treatment of pulmonary aspergilloma: a descriptive study

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Background: Pulmonary aspergilloma, the so-called fungus ball or mycetoma, is a clinical syndrome of worldwide presence and represents one of the many manifestations of human disease due to the fungus *Aspergillus*. Pulmonary aspergilloma is the only surgically relevant manifestation of *Aspergillus* infection and though known for a century-and-a-half now, controversy still surrounds its optimal management. The objective of this study was to evaluate the immediate and long-term result of resectional surgery in pulmonary aspergilloma. In this paper, we are presenting a series of 56 cases of pulmonary aspergilloma treated surgically at our center over the last 5 years.

Methods: This is a retrospective clinicopathological study conducted in our tertiary teaching institute, on 56 patients who had confirmed pulmonary aspergilloma between Jan 2009 and Jun 2014. Epidemic, clinical, pathological, and follow-up data are collected and evaluated.

Results: The common age group of our patients was 20 to 29 years, with a male-to-female ratio of 3:1. Haemoptysis and cough were the commonest presenting symptoms. Forty-seven patients (83.9 %) had lobectomy, seven patients (12.5 %) had bilobectomy, and two patients had pneumonectomy. Follow-up ranging from 3 months to 5 years showed minimal complications such as air leak in three patients and pulmonary edema in one patient which could be managed conservatively.

Conclusions: Surgery offers definitive and long-term symptom-free survival in cases of pulmonary aspergilloma at a negligible risk; though almost one third of those undergoing surgery develop some complications, these are easily manageable.

LMCA stenosis: where surgeons stand?

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Background: Recently, there is lots of interest in percutaneous intervention in LMCA stenosis, which traditionally has been a surgeon's domain. With technological upgradation, more lesions are within cardiologist's reach. Single-center results in the left main coronary artery (LMCA) stenosis are presented to show what is currently achievable by surgery.

Methods: We retrospectively analyzed prospectively collected surgery data of all patients between Nov. 2002 and Nov. 2014 operated for LMCA stenosis >50 %. Relevant demographic data, preoperative risk factors, operative details, and surgery results were collected. Current status of percutaneous interventions from recent literature is reviewed.

Results: Over the study period, a total of 1460 patients were operated on for LMCA stenosis >50 %. Eleven percent had tight (>90 %) stenosis, mean age was 61.9 years, 16.5 % females, 49.8 % diabetics, 51.4 % hypertensives, and 14.6 % were smokers. 2D echocardiography showed severe (<35 %) and moderate (35–45 %) LV dysfunction in 18.1 and 17.9 %, respectively. Fourteen patients had combined procedure, 64 had redo and the remaining had isolated first bypass surgery. The average no. of grafts and arterial grafts/patient was 4.2 and 3.8. Total arterial revascularization was achieved in 93.4 %. Average hospital stay was 8.9 days. IABP was used in 5.2 %. AF was 12.3 %, ventricular arrhythmias were 2.4 %, perioperative MI was 2.73 %, neurological complications

were 0.55 %, and re-exploration rate was 0.3 %. In-hospital mortality was 0.38 %.

Conclusions: Over the years, with technological advancements, the differences in results between surgical and percutaneous treatment are narrowing, but surgery continues to be the gold standard for LMCA stenosis. Having said that, there exist situations where percutaneous interventions may be preferred.

Effect of pranayama as cardiac rehabilitation in post-CABG patients: a prospective study

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Background: Rehabilitation of post-coronary artery bypass grafting (CABG) patients is very important to improve the quality of life and preventing the progress of coronary artery disease. Pranayama is a yogic breathing exercise. This study is designed to study the effect of pranayama on lung parameters in post-CABG patients.

Methods: This is a prospective case control study performed among post-CABG patients. The period of study was from April 2011 to Aug 2014. Patients admitted for CABG were divided into two groups of 30 each. One group practiced anuloma viloma pranayama and the other group remained as control. Room air Po₂ and pulmonary function test was performed before surgery and after 3 months of surgery.

Result: All patients in the study group performed pranayama. All were male patients. Age range was from 36 to 66 years with a mean of 51.4±8.36 years. Hypertension was in 22 patients, diabetes mellitus in 15, and myocardial infraction in 19. Mean room air Po₂ was 82.35±11.14 mmHg and 89.75±9.41 before and after pranayama with *P* value 0.003. There was statistical significant improvement in pulmonary function tests in pranayama group after 3 months. FEV improved from 1.79±0.73 to 2.46±0.55 (*P*<0.00), FVC from 1.87±87 to 2.61±0.53 (*P*<0.00), FEV₁/FVC ratio from 88.83±6.94 to 92.97±6.42 (*P*<0.02), and PFFR from 4.8±3.06 to 9±1.83 (*P*<0.00). There was no improvement in the control group.

Conclusions: There was significant improvement in all lung parameters and room air Po₂ in patients who performed pranayama postoperatively. So, pranayama should be a part of cardiac rehabilitation for post-CABG patients.

Supravalvar aortic stenosis: three sinus repair, pitfalls, and techniques

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Background: Supravalvar aortic stenosis accounts 5 % of aortic outflow anomalies. Maximal narrowing occurs at sinotubular junction, involvement be diffuse involving arch vessels and coronary ostia as well. Multiple-sinus augmentation was the preferred approach (Brom's aortoplasty). We present our experience using this approach.

Methods: This study includes six patients (two females and four males) with the youngest being 11 months and the oldest 12 years. All had preoperative angiography. All had three sinus augmentations using glutaraldehyde-treated autologous pericardium. In two, there was coronary ostial involvement requiring excision of the overhanging ridge

Results: The mean preoperative gradient at 110 mmHg was reduced to 20 mmHg after the procedure. There was no mortality in this group. One had recurrent VF while coming off bypass, following two patch techniques which reverted after three sinus augmentation. One child had aortic regurgitation (AR), which was reduced by transverse plication at the sinotubular junction. One required arch augmentation. One child was on AV dissociation with very good ventricular escape rate and is on follow-up without implantation of a pacemaker.

Conclusions: In our small series, we learnt that three sinus augmentation is better, the sinotubular augmentation width of which should approximately equal the length of the leaflet of that sinus to prevent AR. If AR is evident while coming off, it can be controlled by plicating transversely under TEE guidance at ST junction level. If there is a residual gradient, the thickened intima over the coronary ostia and in the aortic lumen may need attention.

Retrospective analysis to evaluate surgery for severe aortic stenosis and poor left ventricular function

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Background: The optimal management of patients with severe aortic stenosis and severe left ventricular dysfunction is not well documented. Although these patients form 5 % of patients with aortic stenosis, they also represent the most controversial subset as to whether they will benefit from aortic valve replacement.

Methods: Between October 2010 and October 2014, 20 patients with left ventricular ejection fraction (EF) ranging from 20 to 35 % and severe aortic stenosis underwent aortic valve replacement at the Safdarjung Hospital, New Delhi. Simultaneous coronary artery grafting was done in five patients.

Results: Perioperative mortality was 5 %. Advanced age and small aortic prostheses size were significant predictors of hospital mortality. The aortic prostheses size implanted ranged from 19 to 25 mm in survivors and 19 mm in the patient who died

perioperatively; 75 % patients were severely symptomatic and were in NYHA class III or IV, out of which 20 % were receiving inotropic support preoperatively. All the survivors were symptomatically better postoperatively. At 6 months follow-up of the survivors, the echocardiography revealed an increase in left ventricular ejection fraction ranging from 5 to 20 %.

Conclusions: Aortic valve replacement in severe aortic stenosis with severe left ventricular dysfunction resulted in improved functional status. Postoperative survival was related to younger patient age and larger aortic prosthesis size.

Is BIMA as safe as SIMA? Experience from our hospital

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Background: Internal thoracic artery (ITA) grafts provide better long-term patency than SV grafts. B/L ITA grafting has demonstrated better long- and short-term results than unilateral ITA. However, its role in diabetes, elderly patient, and with severe LV dysfunction remains controversial. The objective of this study was to compare short-term mortality and morbidity between patients undergoing primary coronary artery bypass grafting (CABG) with bilateral internal mammary artery (BIMA) or single internal mammary artery (SIMA) graft at our institution.

Methods: Between January 2008 and November 2014, a total of 904 patients underwent primary isolated CABG BIMA or SIMA. Patients were analyzed for mortality, sternal wound infection, ICU stay, and no. of grafts. Prospective recorded clinical data were screened for the data.

Result: For BIMA and SIMA, the total no. is 163 and 741, male–female ratio is 156:7 and 576:165, DM is 99 (60.73 %) and 66.26 %, HTN is 115 and 546, age is 56 and 59.13, low EF is 18 and 13 %, the no. of grafts is 4.04 and 3.06, stay is 7.8 and 7.7, ICU stay is 2.65 and 2.59, perioperative mortality is 1.22 and 4.62, sternal wound infection is 1.22 and 1.59, and ee-exploration is 1.22 and 2.69, respectively.

Conclusions: No one should be denied of total arterial revascularization using BIMA. Proper preoperative planning can graft any target vessel. Sternal wound infection can be minimized by careful selection and harvesting techniques. Operative time can be decreased with experience.

Root enlargement for small aortic root: intermediate and long-term results

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Background: Aortic valve replacement in patients with small aortic root is a surgical challenge, and to avoid prosthesis

patient mismatch, the root enlargement is necessary. The aim of our study is to analyze early postoperative, intermediate, and long-term results in Indian population.

Methods: During the period April 2004 to September 2012, 289 patients underwent aortic valve replacement (AVR). Forty-nine patients (49/289; 17 %) between age group 12 and 79 years old (mean age, 52.6 years) of which 28 were women of aortic stenosis, underwent AVR with enlargement of the small aortic annulus with an effective aortic valve area of $0.5 \pm 0.2 \text{ cm}^2$. In addition, concomitant procedure was done in four patients. We used autologous pericardium in eight patients and bovine pericardium in 41 patients. The follow-up period was 14–120 months.

Results: There was no operative or hospital mortality. The length of CPB and aortic cross-clamping was increased by $35 \pm 12 \text{ min}$, but the duration of mechanical ventilation and hospital stay remains unchanged. Serial follow-up transthoracic echoes have shown statistically significant improvements in peak gradient ($95 \pm 10 \text{ mmHg}$ vs. $42 \pm 7 \text{ mmHg}$, $P < 0.001$) and in mean gradient ($64 \pm 8 \text{ mmHg}$ vs. $20 \pm 6 \text{ mmHg}$, $P < 0.001$). Left ventricular (LV) mass/g (360 ± 32 vs. 310 ± 28 , $P < 0.01$). The functional aortic valve orifice postoperatively was $1.8 \pm 0.4 \text{ cm}$. The ejection fraction (EF) was unchanged. Left ventricular–intraventricular septum thickness (LVIVSs; $14.5 \pm 1.1 \text{ mm}$ vs. $12.3 \pm 1.6 \text{ mm}$, $P < 0.01$), left ventricular posterior wall thickness (LVPWs; $16.1 \pm 1.2 \text{ mm}$ vs. $14.8 \pm 1.7 \text{ mm}$, $P < 0.01$).

Conclusions: Immediate postoperative, intermediate, and long-term results suggest the safety of the procedure and the significant functional and anatomical improvement of the left ventricle.

Midterm outcome of open surgery for acute type A aortic dissection in the Indian population

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Background: Outcomes of surgery for acute aortic dissection in the Indian population is not well established. The mid-term results of surgery for type A aortic dissection in our institution over a period of 5 years were analyzed.

Methods: This is a retrospective analysis of all patients who underwent open surgical repair at our institution from January 2010 to November 2014 for acute type A aortic dissection.

Results: Twenty patients underwent surgery for acute type A aortic dissection during the study period. Preoperative risk factors included hypertension (in 55 % patients), prior cardiac surgery (25 %), smoking (15 %), and bicuspid aortic valve (10 %). Five patients (25 %) had renal dysfunction, four patients (20 %) had coronary artery disease, and two patients (10 %) had focal neurological deficits prior to surgery. Eight

patients (40 %) had NYHA class III and seven patients (35 %) had class II symptoms. Twelve patients (60 %) had severe aortic regurgitation (AR), and three patients (15 %) had moderate AR. Three patients (15 %) presented with cardiac tamponade. Seven patients (35 %) underwent valve sparing surgery. Eight patients (40 %) required hypothermic circulatory arrest. Out of 20 patients, 2 had in-hospital mortality. The mean ICU and hospital stay were 5.3 and 14.4 days, respectively. There was no mortality or morbidity in the follow-up period.

Conclusions: Patients with type A dissection had varied presentation. However, surgery can be safely performed and our results are on par with international standards.

Midterm outcomes of bioprosthetic heart valve replacement: an Indian scenario

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Background: The goal of this study is to evaluate the midterm outcomes of bioprosthetic heart valve replacement in term survival, valve-related events, quality of life, and economic aspects of treatment in population age of 45 years and above in females and 48 years in males and their comparison with mechanical valve recipients.

Method: The patient population is randomly divided in two groups, one receiving bioprosthetic valves and the other receiving mechanical valves. Patients were followed up, and data is analyzed.

Results: A total of 2995 patients were studied over an extended period of 10 years, and out of these, 295 patients received bioprosthetic heart valves. The overall survival is better in patients receiving bioprosthetic heart valve with early mortality of around 3.6 vs 6.8 % with mechanical valves. Bleeding leading to re-explorations is seen in about 1.2 % patients with bioprosthetic valve group vs. 3.2 % in mechanical valve. About 1.9 % of patients with tissue valves have episodes of thromboembolism vs. 8.1 % patients with mechanical valves. Reoperation rates were high in mechanical valve (3.3 vs. 1.3 %). Based on a questionnaire, the quality of life is also better in patients with bioprosthetic valves as with economic aspects of treatment.

Conclusions: Bioprosthetic heart valves seems to be more beneficial in Indian scenario as compared with mechanical valves as they have low incidence of mortality and valve-related events and better quality of life and economic aspects of treatment.

Mid-term outcomes of patients undergoing adjustable pulmonary artery banding

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Background: The adjustable pulmonary artery band (PAB) has been demonstrated by us earlier to be superior to the conventional PAB in terms of reduced early morbidity and mortality. In this study, we assessed the adequacy of the band and its complications over the mid-term.

Methods: Between 2002 and 2012, 72 patients underwent adjustable PAB, and their operative and follow-up data were collected and analyzed.

Results: There were three early deaths. Out of 72 patients, 44 (61 %) underwent definitive repair and 10 (13 %) were awaiting definitive repair. Fourteen (19 %) were lost to follow-up. Fifty-four (75 %) of the patients had desirable fall in pulmonary artery (PA) pressures. Only three (4 %) patients did not have significant fall in PA pressures. Only major PA distortion or stenosis was absent in the majority. One (4 %) patient had pseudoaneurysm of the MPA with sternal sinus infection and required surgical reconstruction. One patient had infective endocarditis of the pulmonary valve managed medically. Band migration was not encountered. There were two deaths after definitive repair; the rest recovered uneventfully.

Conclusions: Patients undergoing adjustable PAB fulfilled the desired objectives of the PAB with minimum PA complications in the mid-term. This added to the early postoperative benefits, making the adjustable PAB an attractive alternative to the conventional PAB.

Mitral valve annuloplasty devices: does size really matter?

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Background: A review of the dimensions of mitral valve annuloplasty devices was undertaken. Dimensions commonly used to assign label size were reviewed for variations between devices.

Methods: Manufacturer specifications were sought for commonly used mitral valve annuloplasty devices through a search of publicly available manufacturer specifications. Rings specifically designed for ischemic heart disease or dilated cardiomyopathies were omitted.

Results: The product specifications for 15 rings and 8 bands were identified. Parameters used to assign label size were diameter into core of ring/band (9), transverse inner diameter (6), intertrigonal dimension (3), intertrigonal circumference (2), and intercommisural dimension (2). No parameter corresponds directly to label size (1). The most commonly provided dimensions were inner and external diameters (19/23), orifice area (12/23), antero-posterior inner dimension (7/23), and diameter into core of device (8/23).

Conclusions: Large variations were found in the key dimensions for different devices of the same label size; most notable among these was the orifice area, which showed large

variations particularly at the extremes of size. Five different parameters are used as label size of the devices reviewed. Interestingly, we were unable to identify any parameter directly corresponding to label size for one product. Given these findings, there is a need to further understand the true meaning of the prosthesis label size. With the evolution of mitral valve repair and an increasing choice of devices, we believe that a better understanding of specific prosthesis dimensions may lead to improved prosthesis-annulus matching.

Our experience with minimally invasive surgery in a tertiary care center over the last 1 year

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Background: Cardiac surgery involves significant surgical insult in order to perform the required structural repairs primarily related to invasion necessary to enter and leave the chest. The minimally invasive surgical strategies have focused on reducing or eliminating surgical trauma while making surgical repairs. Typically, the incision is 2 to 4 in. as opposed to traditional median sternotomy approach.

Method: This study includes a retrospectively gathered database of patients operated on in the Department of Cardiothoracic Surgery, Government Medical College, Kottayam, Kerala.

Results: Of the 1000 cardiac cases performed over 1 year, we had 33 cases of minimally invasive surgeries which include 1 CABG, 12 ASD closure (mini-sternotomy, 6, mini-thoracotomy, 6), 14 AVR (ministernotomy), 6 mitral valve procedure±TV repair. All patients had better acceptability for the procedure as they had less pain and were symptom free by the time of the first review, i.e., at 2 weeks. Patients could be discharged by POD4 as compared with POD7 in regular cases except for two patients who stayed longer due to hematoma and one who had to be readmitted for pericardial effusion. One had conversion to open procedure due to excessive drain. Complications included one case of pleural and pericardial effusion, one case of CHB, two cases of hematoma (one femoral region, one mediastinal around SVC), no respiratory complication, and no wound infection.

Conclusions: Minimally invasive heart surgery is of particular importance because smaller and less invasive techniques translate into smaller incisions, smaller scars, less complications, less pain, and shorter hospitalization time.

Hoarseness of voice following cardiac surgery—2 years clinical study

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Background: The aim of the study was to determine the incidence and severity of hoarseness of voice and its causes in patients undergoing cardiac surgery.

Methods: This study involved prospective evaluation of 500 adult patients who underwent open-heart surgery during October 2012 to October 2014 and who had hoarseness of voice following surgery. Patients aged less than 16 years were excluded.

Result: Thirty-three patients developed hoarseness of voice in 0–7 days (1.53 ± 3) postoperatively. Stridor was associated in 12 patients and aspiration in 7 patients. Prevalence of hoarseness was high in patients undergoing aortic arch surgery and patients requiring longer mechanical ventilation. Hoarseness of voice resolved in 20 patients while persisted in 13 patients which required further evaluation. One patient developed very rare Tapia's syndrome following mitral valve repair and required 13 weeks for complete recovery. Vocal cord paralysis was seen in 22 patients (12 on the right side, 6 on the left side, and bilateral in four cases). Thirteen patients required i.v. steroids and speech therapy and two required gelfoam injection. Two patients with aortic surgery are having persistent hoarseness of voice on follow-up.

Conclusions: Although hoarseness is a trivial complication after open-heart surgery, it can be a disturbing complication. Usually, hoarseness of voice after cardiac surgery is a self-limiting symptom but requires further management based on severity and duration. We also report a rare Tapia's syndrome in our study.

Outcome of surgical repair of isolated total anomalous pulmonary venous connection in a single center

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Background: This study aims to analyze the outcome of surgical repair of isolated total anomalous pulmonary venous connection in a single institution in Indian scenario.

Methods: We performed a retrospective analysis of 49 patients who underwent surgical repair of isolated total anomalous pulmonary venous connection (from January 2011 to November 2014): supra-cardiac ($n=18$), cardiac ($n=17$), infra-cardiac ($n=6$), and mixed ($n=8$). We analyzed baseline preoperative characteristics, surgical techniques employed, and postoperative course with emphasis on postoperative pulmonary venous obstruction and mortality.

Results: The mean age group at repair was 7.4 ± 24.6 months; the mean weight was 5.3 ± 6.8 kg. Out of 49 patients (supra-cardiac, 37%; cardiac, 35%; infra-cardiac, 12%; and mixed, 16%), who underwent total anomalous pulmonary venous connection surgical repair, 9 (18%) patients had hospital mortality (supra-cardiac, 6%; infra-cardiac, 2%; cardiac, 4%;

mixed cardiac, 6 %). Pulmonary venous obstruction was identified postoperatively in four (8 %) patients. Out of the four, three patients required a surgical correction (supra-cardiac, 1; infra-cardiac, 2) and one patient required balloon dilatation of pulmonary veins (infra-cardiac).

Conclusions: Accurate preoperative diagnosis, preoperative severity of pulmonary vein obstruction, and good surgical anastomosis can all affect the mortality. Timing and method of reoperation for pulmonary vein restenosis should also be given importance.

Pulmonary valve sparing and leaflet enhancement in TOF repair based on morphology of pulmonary valve

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Background: To avoid pulmonary regurgitation in tetralogy of Fallot (TOF) repair, we opted to preserve the pulmonary valve function and annulus aggressively. If the leaflets are supple and pliable and amenable to commissurotomy, the annulus was preserved. If a trans-annular patch is needed in case of a small annulus and dysplastic pulmonary valve, we have chosen to augment the native valve with reconstruction using de-cellularized bioscaffold matrix (CorMatrix patch) to provide a competent pulmonary valve.

Methods: From March 2013 to August 2014, we did primary repair of TOF in 94 patients. The age ranged from 5 months to 6 years (median, 20 months) and the weight from 5.6 to 14 kg (median, 9.5 kg). In 60 patients, the annulus could be preserved. Thirty-four patients required a trans-annular incision and RVOT reconstruction with CorMatrix patch.

Results: There was no mortality. During intermediate follow-up, all patients were clinically doing well. The RV dimensions were preserved. There was mild pulmonary regurgitation in six patients of the CorMatrix group, but the 2D echo in all of them showed good leaflet mobility. In all the remaining patients, there was no pulmonary regurgitation.

Conclusions: Preservation of the annulus and native pulmonary valve function in repair of TOF is possible if the valve is not dysplastic even in the presence of a borderline annulus size. The pliable nature of CorMatrix makes it a suitable substitute for reconstruction of RVOT. However, long-term follow-up is required to assess the growth and function of the reconstructed valve.

Posterior post-MI VSD repair through the right ventricle—single-patch technique

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Background: Post-infarction ventricular septal defect (VSD) repair remains a surgically challenging procedure with a high risk of mortality and morbidity. Particularly in posterior VSD, it is a challenge to repair with minimum left ventricular myocardial loss and minimizing the damage to the left papillary muscle. We present a method of repairing the VSD through the right ventricle with septal exclusion technique.

Methods: From 2010 to 2014, we have repaired seven patients of posterior–post-MI VSD at our center with septal exclusion technique through the right ventricle, without opening the left ventricle. All patients were operated on in emergency with and without CABG. In all cases, incision was made parallel to PDA artery, but in the right ventricle through the infarcted myocardium. ePTFE patch is sutured to the VSD defect using 5–0 prolene-interrupted sutures. Placements of sutures are done as done in septal exclusion technique, with pledgett on the RV side.

Results: Of seven patients, there were two in-hospital mortality. On follow-up, the rest of all patients are doing well. One patient has small residual VSD. All alive patients are in NYHA class 1–2. No patient has significant tricuspid regurgitation in follow-up. Left ventricular ejection fraction is preserved.

Conclusions: With the present technique, left ventricular myocardium is preserved to the maximum; secondly, chances of damage to the left-sided papillary muscle is reduced significantly. Long-term results are awaited.

Bidirectional Glenn procedure: technique of open anastomosis on cardiopulmonary bypass

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Background: Conventionally, the bidirectional Glenn procedure (BDG) is performed on cardiopulmonary bypass (CPB) using aortobicaval cannulation. This study discusses the procedural details of open anastomosis technique of the BDG and outcomes.

Methods: Between September 2013 and November 2014, 15 patients (age, 49±47.9 months; weight, 14.1±10.3 kg) underwent BDG using the open technique (OT). CPB was instituted by aortic cannulation and a single venous cannula in the right atrium. Superior vena cava (SVC) was not cannulated, and all the venous return from it was returned via a cardiectomy sucker. This facilitated an open anastomosis (video). Parameters studied were CPB time, Glenn pressure, SVC clamp time, neurocognitive score, near-infrared spectrometry (NIRS), inotropic score, Spo₂, intensive care unit (ICU) stay, hospital stay, and immediate complications.

Results: Saturation increased from pre-operative 64 to 87 % after operation. Postoperative Glenn pressure was 15 ± 3.8 mmHg. CPB time was 28.6 ± 17.4 min, inotropic score was 8.0 ± 2.5 , duration of ventilator support was 8.8 ± 3.6 h, ICU stay was 20.8 ± 8.8 h, and hospital stay was 4.4 ± 0.5 days. There was progressive increase of the neurocognitive function postoperatively. NIRS monitoring showed no significant drop in values from base-line level in the OT group suggesting adequate cerebral perfusion. There were no deaths or major morbidity.

Conclusions: Our results suggest that the bidirectional Glenn procedure can be performed quickly and safely with open anastomosis technique on CPB.

Rate of mitral valve repair in rheumatic heart disease through mini-right anterolateral thoracotomy

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Background: Mitral valve repair is a challenging one in rheumatic heart disease, and literature is sparse on the use of minimally invasive approach for mitral valve repair in rheumatic heart disease. This randomized prospective case–control study was designed to evaluate the feasibility, safety, and rate of mitral valve repair through limited right anterolateral thoracotomy approach.

Methods: From January 2013 to July 2014, fifty consecutive patients with rheumatic mitral valve disease were prospectively randomized to undergo either minimally invasive mitral valve repair (group I, $n=25$) or conventional mitral valve repair through median sternotomy (group II, $n=25$). The procedure was performed through limited right anterolateral thoracotomy with peripheral femoral arterial cannulation in group I. The patients in group II were operated through median sternotomy.

Results: Age and gender distribution in two groups was comparable. Mitral valve repair was achieved in 84 % of patients in group I and 88 % of patients in group II. There are equivalent and good operative and functional outcome in terms of NYHA class (1.28 ± 0.613 vs 1.08 ± 0.276 ; p value=0.144), postoperative mitral valve area (2.43 ± 0.891 vs 2.82 ± 0.662 ; p value=0.090), incidence of more than mild MR (0), and mean pressure gradient across mitral valve (4.98 ± 3.33 vs 4.23 ± 1.5 ; p value=0.07) in groups I and II. Follow-up was complete (13.60 ± 5.42 vs 12.12 ± 6.67 months) and comparable in two groups.

Conclusions: Mitral valve repair through mini-right anterolateral thoracotomy is feasible and safe with equivalent results. It provides cosmetic advantage especially to young unmarried females.

Should left atrial appendage (LAA) be closed in all patients undergoing mitral valve surgery?

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Background: Persistent atrial fibrillation is associated with rheumatic mitral valve disease in majority of patients. About 90 % of clots in the left atrium originate in the left atrial appendage (LAA), which results into embolic stroke. It has been proposed that LAA should be closed to prevent stroke. We present our experience on various techniques of the left atrial appendage closure and its safety in patients undergoing mitral valve surgery with or without atrial fibrillation (AF).

Methods: From January 2008 to September 2014, 430 patients underwent mitral valve surgery for rheumatic heart disease. Concomitant LAA was closed by various techniques. TEE was done to evaluate status of LAA. The patients were followed up, and data collected retrospectively for incidence of stroke.

Results: The associated permanent AF was present in 180 (41.8 %) of patients. Concomitant AF ablation procedure was done in 99 patients. LAA closure was performed in 416 (96.7 %) of patients. Ligation was done in 70 (16.2 %). Excision and suture closure was done in 95 (22 %). External LAA exclusion was done in 120 (28.84 %). Internal LAA exclusion was done in 131 (31.49 %) patients. There was no complications associated with left atrial appendage closure. Postoperative stroke occurred in four patients, three of which were having mechanical mitral valve prosthesis.

Conclusions: LAA closer is safe and should be done in patients undergoing mitral valve surgery for prevention of stroke. It is a simple procedure without any associated complication. The exclusion is preferred than excision to preserve endocrine function of LAA.

Early follow-up and continuous surveillance postcoronary artery bypass graft surgery—a hospital-to-home healthcare initiative

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Background: With the growing number of high-risk patients undergoing coronary artery bypass graft (CABG), the need for postsurgery preventive strategies has increased. The objective of the hospital-to-home (H2H) follow-up visit, a first of its kind program, was initiated to improve patient care.

Methods: Since July 2012, a total of 2507 CABG were undertaken at a tertiary-care hospital. Trained healthcare personnel initiated H2H visits on 809 (32.26 %) patients following CABG discharge. Of these, 48.1 % were

diabetic and 54.6 % were hypertensive. A cohort of 1698 (67.73 %) patients did not undergo H2H visit. Based on distance, the visits were categorized as A ($n=303$, less than 70 km), B ($n=308$, 70–600 km), C ($n=164$, 600–1000 km), and D ($n=34$, >1000 km).

Results: At 5 days, post-discharge H2H visits depicted (236 (29.17 %)) medical complications like wound infection (5.97 %), poor dressing conditions (3.98 %), inappropriate chest belts (6.80 %), and poor hygiene (2.22 %) besides chest pain, palpitation, and breathlessness. Adverse drug reactions were reported in 34 patients of whom 18 were resolved. Prescription non-adherence and ordered lab tests was rectified in 324 (40 %) and 18 (2.2 %) patients, respectively. Ninety-eight patients were advised diabetic control following glucose test. Majority of patients (89 %) revealed a satisfaction score >8/10 with 29.2 % reporting excellent quality of life. At 30 days, 1.12 % readmissions occurred. H2H visits reduced readmission by 15 % and complications by 8 % as compared with non-H2H data.

Conclusions: H2H visits reduce healthcare costs by reducing complications/readmissions, improving medication compliance, patient satisfaction, and rehabilitation, and promoting self-care and activation.

Redo mitral valve surgery—analysis of risk factors determining outcome

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Background: The aim of this study is to determine the risk factors for hospital mortality and outcome of adult patients in redo mitral valve replacement at our institution.

Methods: An analysis was performed on 37 patients coming from rural areas of Andhra Pradesh who underwent redo MVR from 2009 to 2014, and the following factors were analyzed—age, sex, NYHA class on presentation, number of operation, duration since previous implantation, type of operation, type and size of valve used first time, degree of urgency of operation, cardiac rhythm, creatinine level, LV EF, LV systolic and diastolic diameter on presentation, PTINR, APTT and platelet count, cardiopulmonary bypass time, aortic cross-clamp time, type and size of valve used in redo surgery, position of valve, type of procedure and associated procedure, and perioperative bleeding volume diagnostic modality—TEE, TTE, and cath study in selective case mode of valve dysfunction—prosthetic valve thrombus, pannus formation, structural deterioration, paravalvular leak, and infective endocarditis.

Results: The overall hospital mortality was 18.9 %, seven patients died postoperatively out of which six are women. Advanced NYHA class on presentation, urgency of surgery, LVEF <50 %, mode of valve dysfunction especially pannus

formation, and thrombosed valve, and female sex were the consistent independent predictors of hospital mortality. Whereas other risk factors studied did not contribute much towards early mortality.

Conclusions: This highlights the need for early identification and intervention and educating the patients on strict anticoagulation therapy in patients with MV prosthesis in developing countries with low female literacy rate.

Management and outcomes of double aortic arch repair in 50 patients—a single-center study

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Background: Double aortic arch is a common form of complete vascular ring, encircling both the trachea and esophagus, resulting in noncardiac morbidity. We sought to describe management and outcomes in a large single institution clinical series.

Methods: We reviewed the medical charts of all of the patients diagnosed with double aortic arch at age <10 years. Data regarding clinical presentation, anatomy, management, and outcomes were abstracted.

Results: We identified 50 patients (67 % males) presenting at a median age of 5 months (range, birth to 10.3 years). Respiratory symptoms were present in 91 % including stridor in 77 %. Gastrointestinal symptoms were present in 40 %, with choking with feeds being most common. The dominant branch of the double aortic arch was right in 72 %. Associated cardiac anomalies were present in 18 %, with noncardiac anomalies in 7 %. Repair was performed in 50 patients at a median age of 6 months. There were two deaths after surgical repair with no late deaths, with Kaplan–Meier survival estimates of 96 % at 2 years. Postoperative complications included chylothorax in 9 %. Only one patient required reoperation. The most common symptoms at most recent follow-up were respiratory (54 %) followed by gastrointestinal symptoms (6 %). Postoperative tracheal stenosis was documented in 14 %, with tracheomalacia in 7 %. There were no late reoperations and no evidence of arch obstruction.

Conclusions: Outcomes are excellent after repair of double aortic arch although persistent respiratory symptoms are frequent and probably associated with previous compression-related maldevelopment of the trachea and major airways.

End-to-side repair from thoracotomy in coarctation of aorta with arch hypoplasia in neonates and infants

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Background: In coarctation of aorta associated with arch hypoplasia, the conventional extended end-to-end anastomosis (from thoracotomy) would end up with a residual gradient between the origins of the innominate and left common carotid arteries. To eliminate this, we modified our surgical approach in this group of patients.

Methods: Between February 2012 and October 2014, we have done repair of coarctation of aorta from thoracotomy in 27 neonates and infants. The age ranged from 24 days to 2 years (median, 2 months) and the weight from 2.8 to 8.0 kg (median 4 kg). Among them, six had significant hypoplasia of the arch between the origins of the innominate and the left common carotid arteries. In this group, the descending aorta was anastomosed to the side of the ascending aorta and base of the innominate artery in an end-to-side fashion after placing a C-clamp on the innominate-ascending aorta junction to allow 50 % of blood flow into the brain. During this, the neck vessels were temporarily occluded with vessel loops without causing constraint of space.

Results: There was no mortality. In all patients, there was no significant residual gradient. There were no airway issues related to extensive mobilization and the descending aorta was anastomosed to the side of the ascending aorta.

Conclusions: End-to-side anastomosis of the descending aorta to the side of the ascending aorta is possible from thoracotomy and can be achieved with good outcome in neonates and infants with arch hypoplasia.

Simultaneous bilateral carotid endarterectomy (with a vein patch) and off-pump coronary artery bypass grafting—our experience

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Background: This study includes a report on simultaneous bilateral carotid endarterectomy and off-pump coronary artery bypass grafting.

Methods: From January 1999 till date, 233 patients with coronary artery disease have undergone carotid endarterectomy, out of which 14 patients had bilateral carotid artery disease. All had symptomatic carotid artery disease with multi-vessel coronary artery disease requiring coronary artery bypass. All patients evaluated with carotid doppler, CT carotid angiogram, and coronary angiogram. All underwent bilateral carotid endarterectomy (sephanous patch technique) and off-pump coronary artery bypass grafting with prior informed consent for high epidural thoracic analgesia. Shunts were not used and cerebral monitoring techniques were used. Carotid endarterectomy was followed by off-pump coronary artery surgery. The average number of graft per patient was three.

Results: The average carotid clamp time was 13.4 min, average operative time, 250 min; ICU stay, 2 days; hospital stay, 8 days, postoperative stroke, nil; and mortality, nil

Conclusions: Fresh autologous vein patch technique for carotid endarterectomy is safe and is not associated with side effects of prosthetic materials. Simultaneous combined bilateral carotid endarterectomy with coronary artery bypass grafting can be performed safely in patients with significant bilateral carotid and coronary artery disease. There are obvious cost-effective benefits of the combined procedure.

Single-stage repair of aortic arch and associated cardiac defects with antegrade cerebral perfusion using direct innominate artery cannulation in neonates and infants

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Background: Selective cerebral perfusion avoids deep hypothermic circulatory arrest in single-stage repair of aortic arch and associated cardiac defects in neonates and infants. Direct innominate artery cannulation is accepted as a safe technique to obtain this objective.

Methods: From February 2012 to September 2014, 21 patients underwent one-stage repair of aortic arch anomalies associated with intra-cardiac defects. The age ranged from 16 days to 1 year (median age, 2 months). There were six neonates. The weight ranged from 2.4 to 8 kg (median weight, 3.5 kg). Two infants had coarctation with diffuse aortic arch hypoplasia, without any associated intra-cardiac defect. The rest had significant intra-cardiac defects, which were corrected along with arch repair. Cardiopulmonary bypass was initiated with direct arterial return through the base of the innominate artery and routine venous cannulation. All patients were cooled to 24°. The arch repair was done using selective cerebral perfusion through the innominate artery with a flow rate of 40 ml kg⁻¹ min⁻¹. After the arch repair, normal bypass was re-established and intra-cardiac defects were repaired.

Results: There was no mortality. There was no evidence of obvious neurologic injury. All patients had unobstructed flow in the arch repair during intermediate follow-up.

Conclusions: Selective cerebral perfusion with direct innominate artery cannulation for arch repair extends the safety of arch repair. The major advantage of this technique is the feasibility to perform a wide end-to-side anastomosis without space constraint and ability to repair associated cardiac lesions.

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Early and intermediate outcome of Norwood stage 1 procedure

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Background: The advances in pediatric heart care have resulted in critically ill children being referred for Norwood procedure. The Norwood procedure consists of three palliative operations. Especially, the first stage is associated with the high mortality rates in pediatric cardiac surgery (up to 25 %). During surgery, the aorta is reconstructed and a systemic-to-pulmonary shunt is applied. We reviewed the feasibility of performing stage 1 Norwood operation in our setup.

Methods: All neonates who underwent Norwood stage I palliation at our institute from October 2010 until October 2014 were included in this retrospective analysis.

Results: A total of 14 neonates were reviewed, and the median age at surgery was 10.5 days. The median cardiopulmonary bypass (CPB) time was 247 min, and aortic cross-clamp time was 115.5 min. A modified Blalock-Taussig (BT) shunt was used in 12 cases and central shunt in 2 to provide pulmonary blood flow. The median duration of mechanical ventilation was 117 h, and the median intensive care unit (ICU) stay was 12 days. Median hospital stay was 30 days. There were five deaths, two in the early postoperative period (<30 days of surgery), and one in the early second-stage procedure postoperatively. These patients developed sepsis. Eight patients reached 2nd stage, and one patient is waiting for Glenn shunt.

Conclusions: Stage 1 Norwood is feasible with an experienced and dedicated postoperative management in our setup. Preoperative optimization and prevention of infection helps in shortening the postoperative recovery.

Pneumonectomy for inflammatory diseases—a study of 126 consecutive cases

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Background: The pneumonectomy for inflammatory conditions is higher in India as compared with the west.

Methods: All patients who undergo pneumonectomy in our institution are routinely analyzed and the patients followed up. The data collected since 2005 were studied.

Results: One hundred twenty-six adults underwent pneumonectomy over the last 9 years. The peak incidence was in the 4th decade with a male predominance. The overall left-to-right ratio was 1.5:1, but among the inflammatory lesions, it was 3: 1. The

most common indication being destroyed lung due to post-tuberculous sequelae. Patients with poor spirometry results underwent a 6-min walk test. All patients were routinely digitalized and extubated on the table. Three patients were explored for post-operative bleeding. Five patients had empyema. Three underwent thoracoplasty and omentoplasty, and two had modified Eloesser flap procedure done. There was one mortality. All the patients were followed up for a period of 1 year.

Conclusions: In India, the pneumonectomies are done mainly for inflammatory lesions. The left-to-right ratio here is skewed in favor of the left side due to the higher number of inflammatory diseases. Poor preoperative pulmonary function test does not always preclude a pneumonectomy for inflammatory diseases. For similar reasons, the immediate and late post-operative results are good in our patients.

Left ventricular mass regression following implantation of St. Jude Medical Trifecta aortic bioprosthesis

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Background: The St. Jude Medical Trifecta aortic supra-annular bioprosthesis is regarded as the next generation in pericardial stented tissue valves. The unique design of tissue leaflets attached to the exterior of the valve stent provides unrivalled in vivo mean gradients and hemodynamics. The aim of this prospective study was to evaluate midterm left ventricular (LV) mass regression following implantation for aortic stenosis.

Methods: One hundred and seventy-two consecutive patients undergoing aortic valve replacement using the St. Jude Medical Trifecta valve at a single UK center over a 48-month period were included in this study. Patients undergoing concomitant cardiac procedures were included. All implanted valves were 19, 21, 23, 25, 27, and 29 mm in size. Patients underwent both pre- and postoperative transthoracic echocardiography. Two-dimensional (2D) measurements of the left ventricle were used to calculate LV mass using the Devereux equation.

Results: Thirty patients had the adequate two-dimensional left ventricular measurements recorded to calculate both pre- and postoperative left ventricular mass. Valve sizes were 21 mm ($n=7$), 23 mm ($n=15$), 25 mm ($n=6$), and 27 mm ($n=2$). Overall absolute left ventricular mass regression was 18.1 ± 23.8 %. Mean preoperative LV mass was 247.8 ± 102.5 g and mean postoperative LV mass was 200.7 ± 74.1 g. Regression of LV mass index was -30.66 g/m².

Conclusions: By utilizing available 2D measurements in this group, we observe regression of LV mass and LV mass index post-aortic valve replacement with the Trifecta bioprosthetic valve. However, further consistent 2D measurements are required across the cohort to establish this relationship.

Midterm follow-up of hemodynamic performance of the St. Jude Medical Trifecta aortic bioprosthesis

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Background: The St. Jude Medical Trifecta aortic supra-annular bioprosthesis is regarded as the next generation in pericardial stented tissue valves. The unique design of tissue leaflets attached to the exterior of the valve stent provides unrivalled in vivo mean gradients and hemodynamics. The aim of this prospective study was to evaluate midterm hemodynamic performance.

Methods: One hundred and seventy-two consecutive patients undergoing aortic valve replacement using the St. Jude Medical Trifecta valve at a single UK center over a 48-month period were included in this study. Patients undergoing concomitant cardiac procedures were included. All implanted valves were 19, 21, 23, 25, 27, and 29 mm in size. Assessment of hemodynamic function was carried out using transthoracic echocardiography preoperatively and at follow-up, as well as transoesophageal echocardiography intraoperatively.

Results: The study population consisted of 172 patients (105 males, 67 females). Mean age was 71.63 ± 11.45 years. Implanted valve sizes were 19 mm ($n=12$), 21 mm ($n=49$), 23 mm ($n=72$), 25 mm ($n=30$), 27 mm ($n=8$), and 29 mm ($n=1$). Overall mean postoperative pressure gradients were 9.26 ± 4.1 mmHg (mean) and 17.7 ± 7.6 mmHg (peak). Subgroup mean postoperative pressure gradients were 11.1 ± 3.4 , 10.6 ± 5.3 , 9.1 ± 3.4 , 8.6 ± 4.3 , 6.2 ± 2.7 , and 6.86 ± 0 mmHg, for the 19-, 21-, 23-, 25-, 27-, and 29-mm cohort, respectively. Overall mean postoperative left ventricular ejection fraction was 55.6 ± 10.1 %. Overall mean effective orifice area was 1.66 ± 0.49 cm².

Conclusions: The results of our experience demonstrate excellent hemodynamic performance of the Trifecta bioprosthetic valve.

Coronary artery anomalies with surgical management of coronary AV fistula—long-term results of surgical correction

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Background: The surgical treatment of coronary artery anomalies continues to evolve. The most common coronary artery anomalies requiring surgical intervention include coronary artery fistulae, anomalous pulmonary origins of the coronary arteries, and anomalous aortic origins of the coronary arteries

Methods: We reviewed the surgical treatment of 50 patients during the period from 2002 to 2012 at our center. Patients aged ranged from 3 to 15 years (27 males 27, 23 females).

Results: All the patients operated on were followed up at least once. Ten patients were lost to follow-up.

Conclusions: The choice of surgical intervention for each type of coronary anomaly depends on several anatomic, physiologic, and patient-dependent variables. In summary, techniques for patients undergoing surgical intervention for coronary artery fistulae, anomalous pulmonary origins of the coronaries, and anomalous aortic origins of the coronaries have progressed over time. Although the specific procedures used to correct each type of anomaly will vary for each patient, our experience shows that certain guidelines can be applied to optimize outcomes.

Impact of concomitant pulmonary valve reconstruction on outcome of total correction of tetralogy of Fallot

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Objective: The trans-annular patch (TAP) used to relieve right ventricular outflow tract (RVOT) obstruction in patients with tetralogy of Fallot (TOF) during total correction may result in pulmonary regurgitation (PR). This study was therefore designed to see whether then use of pulmonary valve (PV) reconstruction either with monocusp or native leaflet augmentation along with TAP, reduce PR and improve early outcome.

Methods: This is a quasi-experimental study involving 60 patients undergoing total correction of TOF with TAP from January 2011 to December 2011. Non-randomly selected patients treated with TAP along with PV reconstruction (group A; $n=30$) and without PV reconstruction (group B; $n=30$) were respectively divided into two groups, and early outcomes were compared.

Results: The median McGoon ratios (1.9 vs. 1.7; $p=0.24$) were similar. The median ischaemic time (72 vs. 68.50 min; $p=0.399$) did not differ. Low cardiac output and re-intubation were less in group A ($p=0.012$ and $p=0.039$). Echocardiograms demonstrated on discharge, after 1 month follow-up and 3 months follow-up moderate to severe PR, which were significantly less in group A ($p<0.001$). At 3-month follow-up, mild to moderate right ventricular dysfunction was more in group B ($p=0.023$).

Conclusions: The group with reconstructed pulmonary valve had better early outcome than trans-annular patch-only group.

Single ventricle physiology: spectrum of management from birth to surgery

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Background: The vast majority of neonates with single ventricle physiology require some form of surgical intervention to realize long-term survival.

Methods: In a single-center review of 200 patients undergoing univentricular palliation from 2002 to 2012 which included modified Blalock Taussig shunts ($n=75$), PA banding ($n=60$), bidirectional cavopulmonary (Glenn) shunts ($n=80$), completion Fontan operations ($n=94$).

Results: The population comprised more patients with dominant right ventricle (66 vs. 36 %). Median age at bidirectional cavopulmonary shunt (BCPS) decreased from 15 months before 2006 to 6 months thereafter. Survival rates at 1, 5, and 10 years were respectively 82, 74, and 71 %. Throughout the study, atrioventricular valve regurgitation, not having transposition and heterotaxia were predictors of mortality.

Conclusions: The most common approach to palliation in the infant with single ventricle is to intervene surgically in a manner that ultimately culminates in an effective, successful fontan. This typically requires a staged approach of successive operations which optimally preserve pulmonary vasculature and ventricular function while providing a milieu of adequate oxygenation to allow for normal growth and development of the infant.

The challenge of multiple VSDs to a surgeon

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Background: To eliminate the left to right shunt completely during intracardiac repair of multiple VSD is a surgical challenge. We opted for primary complete intra-cardiac repair and avoided to do a pulmonary artery band as a staged procedure.

Methods: Between February 2012 and October 2014, we did primary repair of multiple ventricular septal defect (VSD) in 23 patients. The age ranged from 3 months to 12 years (median, 1 year). The weight ranged from 2.7 to 11 kg (median, 4.6 kg). Intraoperatively, we closed the major VSDs with separate pericardial patches and addressed the apical, anterior muscular, and mid-muscular VSDs separately. The apical VSDs which had a single opening on the left ventricle (LV) side and sizeable multiple holes on the right ventricle (RV) side were addressed by double breasting using teflon felts on both the LV and RV side. The RV side of the felt was sutured to

the endocardium. Majority of the apical VSDs and small-sized mid-muscular and anterior muscular VSDs were treated by endothelial suturing using continuous polypropylene sutures.

Results: Intraoperatively, a bubblegram was performed using the LV vent to assess the shunt after repair. In all patients, there was no significant residual shunt. There was no operative mortality. Two patients died in the postoperative period due to respiratory infection.

Conclusions: A combination of surgical techniques is required to optimize the repair of multiple VSD. Endothelial suturing is a useful procedure to prevent compromise of the RV cavity. Double breasting using teflon felts should be reserved to select cases.

Ayurveda, yoga, and minimally invasive thoracic surgery: a strategy for better clinical outcomes in Indian patients

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Background: To quantify the effects of integration of ayurveda and yoga on patients undergoing minimally invasive thoracic surgery

Methods: Three hundred twenty-two patients undergoing VATS and robotic thoracic surgery were introduced to a pre- and postoperative protocol of yoga therapy, mediation, and oil massages. Yoga exercises included pranayam, anulom vilom, and oil massages including uro tarpan. Pre- and postoperative respiratory functions were recorded. Patient satisfaction questionnaire were noted. Statistical comparison was made to control group undergoing minimally invasive thoracic surgery without integrative medicine. Only one patient refused to undergo ayurveda therapy and was deleted from the group.

Results: Acceptability was high among all patients. Preoperative training led to implementation as early as 6 h postsurgery. Pulmonary function test showed significant improvement ($p<0.005$). All patients suggested an improvement in satisfaction score ($p<0.05$). Pain score were less in study patients. Quicker mobilization led to early discharge and drain removal. Chronic pain was prevented in patients having oil massages over the wounds.

Conclusions: Integration of ayurveda, yoga, and minimally invasive thoracic surgery is acceptable to Indian patients and gives better clinical results and higher patient satisfaction.

VATS resection of hydatid cyst

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Background: This study aims to review our practices of VATS resection of hydatid cyst

Methods: Ten cases of hydatid cyst over 4 years were encountered. Two underwent open resection and eight VATS resection. Data was analyzed retrospectively.

Results: Single lung ventilation was achieved in 9/10 cases. One patient needed open surgery due to inadequate isolation. The pleural cavity was washed with betadine and hydrogen peroxide solution for 20 min. Cysts were drained and injected with hypertonic saline. Cysts were excised by wedge resection or enucleation. Capitonage was performed. One patient had a lobectomy for aspergilloma, which was finally reported as a hydatid cyst. One patient had a concurrent liver cyst resected along with VATS for thoracic lesion. Mean hospital stay was 3 days. No wound infection. Albendazole was started preoperatively and continued postoperatively. No recurrences were reported.

Conclusions: VATS resection of hydatid cyst is possible with good clinical outcomes. There is a need to take extra precautions to prevent spillage and contamination. Lung conservation should be the approach of choice.

Incidence and risk factors for acute kidney injury (AKI) in patients undergoing isolated coronary artery bypass grafting (CABG) surgery

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Background: This research aims to study the incidence and risk factors for acute kidney injury (AKI) in patients with normal preoperative renal functions undergoing coronary artery bypass grafting (CABG) in CMC Hospital, Vellore.

Methods: Details of 350 consecutive patients who underwent CABG in May 2013 onwards were retrieved from clinical database. From these groups, all patients who had normal renal function as denoted by the preoperative creatinine and glomerular filtration rate were selected and their records studied. Data would include the demographics, kidney function prior to surgery, details of surgery (number of grafts, bypass time, ischemic period, mean perfusion pressure), and postoperative creatinine values. RIFLE criterion for acute kidney injury was used for the end point.

Results: In our study, 48.2 % of those who developed AKI were >60 years of age. Males were predominant in our study. Diabetes and hypertensives had higher incidence of AKI. We could maintain a mean perfusion pressure (MPP) of 53 mmHg on bypass; 41 % of those who developed AKI were having a MPP of <50 mmHg. On an average, patient stayed for 6 days.

Conclusions: Incidence of AKI in our study is 23.02 %. The incidence of AKI was four times more when MPP was less than 50 mmHg. The incidence was also higher in patients more than 60 years of age, in diabetics, and in hypertensives. Occurrence of AKI in patients undergoing CABG is a serious

complication. It leads to higher hospital stays and thus increases the cost of treatment. Thus, identifying them before irreversible injury has occurred is of paramount importance, improving patient prognosis.

Management of chest wall sarcomas—a multidisciplinary approach

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Background: Wide excision of chest wall tumors ensuring clear resection margins is essential to prevent local recurrence and achieve long-term survival. This results in chest wall defects of varying sizes requiring reconstruction to achieve protective cover and maintain respiratory mechanics. This involves multidisciplinary team effort from radiologist, oncologist, plastic and thoracic surgeon, and nursing and physiotherapy staff.

Methods: One hundred two patients with ages ranging from 21 to 81 years underwent chest wall resection and reconstruction since January 2008. The histological diagnosis included various soft tissue and bony tumors, predominantly sarcomas. The resection involved two to eight ribs, varying extent of sternum, clavicle, and vertebral bodies. The skeletal reconstruction was performed using isolated Marlex mesh, Marlex methylmethacrylate composite graft, and/or titanium bars. This was then covered with a combination of various muscle flaps and omentum. Between one and three muscle flaps were used to achieve complete coverage.

Results: There was no major postoperative morbidity, and average length of stay in the hospital was 8 days (range, 5–14). The resection margins in patients operated with curative intent were microscopically clear of tumor. All muscle flaps showed complete survival. None of the patients developed infection related to prosthesis. On follow-up, 84 patients are alive with an estimated mean survival of 4.74 years (CI, 4.3–5.1).

Conclusions: Management of chest wall sarcomas requires a multidisciplinary approach to achieve radical resection, reconstruction to maintain chest wall stability, and provision of a versatile coverage with eventual good long-term outcome.

Use of energy devices in difficult dissection during VATS surgery

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Background: The high prevalence of pulmonary tuberculosis in Asia was an initial concern when VATS was introduced. Extensive pleural adhesions and difficulty to

dissect calcified lymph nodes associated with history of tuberculosis have not stopped the development of VATS.

Methods: This is a retrospective study by the same surgeon where the two groups were created, standard instrument group (SG, $n=50$) and modified instrument group (MG, $n=40$). Later, groups had sonicision included in their instrument set. The surgeries included in both groups were lobectomy, segmentectomy, mediastinal lymph nodal dissection, and anterior/posterior mediastinal mass resection. The operative time, conversion, and total blood loss were compared.

Results: The use of energy source sonicision in our practice decreased our threshold to convert from VATS to open due to adhesions and decreased blood loss and operative time and lesser use of endostaplers during fissure dissection in the modified group. There were two conversions in the SG group due to bleeding postdense adhesiolysis and densely adhered lymph node close to the vascular structure.

Conclusions: The use of specially designed long instruments and energy sources including, ultrasonic cordless Sonicision® device, have made difficulties associated with VATS pleural adhesiolysis a thing of the past. This will further decrease our learning curve with both multiport and uniportal techniques

Tetralogy of Fallot with pulmonary stenosis— with high RV/LV pressure—our management strategy.

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Background: Management strategy of patients with significant intraoperative high right ventricle to left ventricle ratio in a tetralogy of Fallot (TOF) remains a considerable debate. We sought to analyze the need for revision, early survival and perioperative complications, and morphologic risk factors to determine their effects on outcome.

Methods: Thirty-one patients out of 93 consecutive patients with TOF with pulmonary stenosis operated on between October 2012 and October 2014 with high pressure between RV and LV (PRV/PLV) ratio intraoperatively were chosen for the study. Whether to revise or not was decided on adequacy of RVOTO relief, right ventricle end-diastolic pressure, and patient hemodynamics. Patients with hypoplastic pulmonary annulus (z -score ≤ 4) were excluded.

Results: The median age was 5 years. The median weight was 9 kg. The mean PRV/PLV ratio was ≥ 0.70 (0.70 to 1.0). The mean intraoperative pulmonary annulus z -score was -1.9 (± 0.92). Twelve patients underwent revision and out of which ten required transannular patch. Nineteen patients did not

undergo revision and high ratio was accepted. Two patients re-explored due to bleeding. One patient of transannular patch group expired after 10 days due to sepsis. Three patients developed junctional ectopic tachycardia. Eight patients required longer duration of ICU stay. Mean postoperative peak instantaneous gradient was 23 mmHg which reduced during follow-up. Three patients got readmitted for RV dysfunction. There were no reoperations or late deaths

Conclusions: Pulmonary valve sparing procedure in TOF patients with PRV/PLV ratio of ≥ 0.70 can be accepted with less morbidity and mortality if RVOT resection is adequate; RVEDP is not high which requires less inotropic support and no residual lesions.

Role of pulmonary vasodilators and conventional ultrafiltration in surgical correction of TAPVC—2 years experience

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Background: Repair of total anomalous pulmonary venous connection (TAPVC) is associated with high mortality and morbidity. This research aims to study the results of TAPVC with the use of pulmonary vasodilators and ultrafiltration during CPB.

Methods: All patients who had TAPVC and underwent surgical repair during study period (October 2012 to October 2014) were included. All patients were started with pre- and postoperative sildenafil therapy and use of conventional ultrafiltration during CPB.

Results: In our study period, 23 patients (15 males and 8 females) underwent repair for total anomalous pulmonary venous connection. Ages ranged from 2 to 6 months (mean, 3 months). Weight ranged from 4 to 6.5 kg (mean, 5 kg). The anomalous connection was supracardiac in 15 (65%), cardiac in 3 (13%), and mixed in 5 (22%) patients. Three patients (13%) had obstructed drainage and 18 (78%) had moderate or severe pulmonary arterial hypertension. One patient (4%) had to be operated upon on an emergency basis. Vertical vein was ligated in all patients and primary chest closure was done. Mechanical ventilation ranged from 24 to 40 h (AV, 28 h). Average ICU stay was 5 days and hospital stay was 10 days. Three patients required re-intubation for low cardiac output. One patient of mixed type expired 20 days after surgery due to sepsis. Follow-up ranged from 2 to 23 months, and all patients are doing well.

Conclusions: Repair of TAPVC is associated with high mortality and morbidity which can be reduced by pre- and postoperative use of pulmonary vasodilators and use of ultrafiltration during CPB.

Clinical results of Mosaic porcine bioprosthesis in aortic and mitral position: up to 10 years

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Background: This study evaluated the long-term clinical performance of the Mosaic bioprosthesis after aortic and mitral valve replacements.

Methods: From 2003 to 2014, 31 patients had aortic valve replacement and 25 patients had mitral valve replacement. Mean functional class was 2.6 ± 0.98 in aortic and 2.4 ± 0.98 in mitral. Prosthetic sizes were 21, 23, 25, and 29 mm in aortic and 25, 27, 29, and 31 mm in mitral position. The follow-up period was 225 patient years in aortic and 209 patient years in mitral.

Results: Incidence of cardiac death was 0.5 %/patient year, none being valve related; actuarial survival at 10 years was 96.4 ± 0.0 for aortic and 100 % for mitral. Freedom from thromboembolism was 98.5 ± 4.8 % in aortic and 100 % in mitral. Freedom from re-operation was 95.8 ± 6.8 in aortic and 93 ± 4.8 in mitral. Freedom from endocarditis was 100 % in aortic and 95 % in mitral. Freedom from non-structural valve deterioration was 95.8 ± 6.8 for aortic and 98.4 ± 4.8 in mitral. Freedom from structural valve deterioration was 100 % in aortic and 98.4 ± 4.8 in mitral. Freedom from hemorrhage was 100 % in aortic and 93 ± 4.8 in mitral. The peak and mean gradient at 10 years was 37.5 ± 4.8 and 18.2 ± 3.56 in aortic and 13.6 ± 4.8 and 6.7 ± 4.3 in mitral positions, respectively.

Conclusions: The Mosaic bioprosthesis showed a good overall performance, with low incidence of structural valve deterioration and good hemodynamic stability in the long term. Expected increased durability of this device should be verified at longer follow-up intervals.

Role of partial thoracoplasty in lung lesions—a single institute experience

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Background: Thoracoplasty has been a useful procedure as a last measure to control and cure recalcitrant lung lesions like pulmonary infections and residual pleural spaces after pulmonary resections. Presence of large apical abscess and destruction of the apical pulmonary tissue forming a “dead” space surrounded by the rigid thoracic cage and inferiorly by the rigid floor of the abscess, has been a therapeutic challenge. Partial thoracoplasty was found beneficial for obliteration of residual cavity and displacement of the apical abscess especially when other measures fail.

Methods: Since 2009, 28 patients (mean age, 60 years, age range from 9 to 72 years; with 21 male and 7 female patients; male/female=3:1) were operated on in our institute. Eighteen patients had post-tubercular empyema, seven patients had bronchiectasis, and three patients had neoplastic lung disease. Partial thoracoplasty was done in all these cases in addition to other procedures. Video assistance was utilized as and when necessary.

Results: All these cases had primary wound healing without any wound dehiscence. There were minor wound infection and delayed healing in few cases (3/28). Operative mortality was nil. Mean intraoperative blood loss was 500 to 900 ml. All patients were extubated postoperatively. Prolonged air leaks were not seen.

Conclusions: We conclude that addition of partial thoracoplasty may provide a one-stage cure avoiding the hazards of prolonged infection and debility and avoid unnecessary pneumonectomies. The remaining lung may preserve the respiratory function and resolve the additional space problem.

Immediate and early results of “beating heart mitral valvotomy” (closed mitral valvotomy) in present-day cardiac surgery

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Background: This study aims to analyze perioperative and early results of closed mitral valvotomy (CMV).

Methods: A single-center, prospective study was done from August 2012 to March 2014 and included 98 patients with rheumatic severe mitral stenosis. Diagnosis was confirmed by clinical assessment and transthoracic echocardiogram (TTE). TEE was done for all patients in AF. Wilkins score ranged from 6 to 10. Patient with LA/left atrial appendage (LAA) clot and mitral regurgitation (MR) grade of >2 were not included. Surgery was performed via A-L thoracotomy with purse string taken over LAA. Tubb’s transventricular dilator was used for serial dilatation of stenotic mitral valve up to a maximum of 3.5 cm. Follow-up TTE was done at 48 h, 3 months, and 6 months.

Results: Ninety-six patients underwent successful CMV (two cases were abandoned due to preoperatively undetected LAA clot). Average age was 34.97 ± 9.74 with 56 females (three pregnant). Seventy-eight patients were in NYHA grade 3 (81 %), and 28 patients were in AF. MVA increased from 0.77 ± 0.13 to 2.23 ± 0.26 cm² ($p < 0.001$); mean pressure gradient across MV decreased from 18.3 ± 5.4 to 6.5 ± 2.7 mmHg ($p < 0.001$); DT (ms) decreased from 236.28 ± 24.3 to 168.52 ± 14.32 ($p < 0.01$); E/A ratio reverted to 1.4 ± 0.6 from 0.9 ± 0.3 ($p < 0.001$); Tei Index improved from 0.50 ± 0.03 to 0.39 ± 0.06 ($p < 0.05$); MIPV (cm/s) increased from 44.22 ± 1.7 to 52.65 ± 2.3 ($p < 0.01$). In perioperative period and follow-up, only

three patients had mild MR with no incidence of severe MR. There was no thrombo-embolic incident and zero mortality; 48 % patients were in NYHA G1 and 50 % in G2 at 6 months follow-up.

Conclusions: CMV is very effective, less costly, and an excellent procedure for all suitable patients of rheumatic mitral stenosis.

Low-cost instruments for VATS in Asian setup

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Background: The purpose of this study is to highlight the need for innovation to develop indigenous instruments specifically designed for Asian diseases like tuberculosis to help set up a low-cost video-assisted thoracoscopic surgery (VATS) program in the third world. Also, we aim to share our design with the thoracic community.

Methods: Instruments are designed and constructed according to the needs of local disease like tuberculosis and aspergilloma. Auto-CAD software is used to finalize a design. A local manufacturer with a Lathe machine is used to create prototypes. Instruments are tested in animal wet laboratories and subsequently in real surgery. A mould is prepared to manufacture on a larger scale. Cost is tabulated and calculated carefully.

Results: The use of local materials and manufacturers reduces cost in terms of materials and import duties. The cost of labor is cheaper in Asian setup. Metallic instruments for reuse are cost effective. Practice of endoscopic suturing and ties also decreases the need for costly disposable staplers. We have managed to keep cost down to under Rs 50,000/- for a set of ten VATS instruments.

Conclusions: In Asian countries, innovation is the key to reduce cost. The use of a local manufacturer and materials reduces cost. Setting up a facility for trialing instruments in a Wetlab gives correctional ideas.

Aortopulmonary window: morphology, diagnosis, and long-term results

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Background: Aortopulmonary window (APW) is a rare congenital heart defect. We reviewed our experience with this condition in the last two decades.

Methods: Between September 1993 and December 2013, 61 patients undergoing surgical correction of APW were analyzed in detail. They were divided into two groups based on the surgical era: group I (1993–2002) and group II (2003–2013).

Results: Median age at repair was 6 months. Median weight at repair was 4.6 kg. Patch repair of APW was performed using the sandwich method (transwindow; $n=27$; 43.5 %), transaortic ($n=18$; 29 %) and transpulmonary artery ($n=5$; 8.1 %) approaches; ten patients (16.1 %) underwent double ligation ($n=10$; 16.1 %) and two (3.2 %) underwent division and suturing ($n=2$; 3.2 %). Overall hospital mortality in group I was 19.0 % (13 and 33 % for simple and complex APW, respectively). In group II, it was 7.4 % (3/41), out of which 7.6 % (1/13) was for complex and 7.1 % (2/28) was for simple APW. Duration of follow-up in group I ranged from 0.2 to 6.5 years (mean, 3.3 years) while in group II, it ranged from 2 months to 8.1 years (mean=3.8 years). There were no late deaths or reoperation. All patients were in NYHA class I at last follow-up. We were able to achieve good surgical result even in patients presenting late.

Conclusions: APW can be accurately diagnosed and managed with good results. However, associated anomalies may complicate the repair. Improvements in cardiopulmonary bypass techniques and postoperative care have yielded gratifying results.

Surgical correction of atrial fibrillation concomitant with rheumatic mitral valve surgery: intermediate term results

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Background: Atrial fibrillation is a common accompaniment of mitral valve disease. Untreated atrial fibrillation leads to significant morbidity and mortality; hence, the consensus is to correct it simultaneously with mitral valve surgery. We report intermediate term results in patients undergoing concomitant rheumatic mitral valve surgery and cryomaze procedure.

Methods: From July 2008 to May 2014, patients with rheumatic mitral valve disease with atrial fibrillation who underwent concomitant mitral valve surgery and cryomaze procedure were included in this study. Argon gas-based technology at temperatures of -120 to -1600 °C was used to create either left atrial or biatrial cryomaze lesion sets. Postoperative patients were followed up with electrocardiography and echocardiography, and collected data was analyzed.

Results: The study included 94 patients of rheumatic mitral valve disease with atrial fibrillation (paroxysmal, 4, persistent, 90). There were 55 female and 39 male patients. Mean age was 37.26 years (± 10.89) years. Sixty-two patients underwent left atrial cryomaze procedure, and 32 biatrial cryomaze procedure. Mean follow-up was 46.83 ± 17.16 months and 96.81 % complete. Overall survival was 87.29 %. One patient

had late stroke and one required permanent pacemaker implantation. Overall freedom from AF was 91.13 %.

Conclusions: Intermediate term results of concomitant cryomaze procedure with mitral valve surgery in terms of freedom from atrial fibrillation and avoidance of its consequences demonstrates its efficacy and safety in rheumatic heart disease.

Aortic root replacement with Bentall's procedure using aortic-valved graft conduit: our experience

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Background: Bentall procedure has been used to treat combined disease of the aortic valve and aortic root and ascending aortic disease. The current study examined the outcomes of its surgical technique.

Methods: We retrospectively analyzed 10 years (2004–2014) of experience with the Bentall procedure in patients with aortic valve, aortic root, and ascending aortic diseases. A total of 39 patients underwent the Bentall procedure using aortic-valved graft conduit.

Results: Between 2004 and 2014, we performed 39 Bentall procedures using aortic-valved graft conduit. There were 32 males (82.05 %) and 7 females (17.9 %). The mean age was 43.3 years and ranged from 23 to 84 years. The patients had a preoperative diagnosis of either bicuspid or rheumatic aortic valve disease, aortic regurgitation with aorto-annular ectasia, with aortic dissection in 17 patients (43.5 %). The mean cardiopulmonary bypass time was 159.6 min (range, 106–356 min), and aortic cross-clamp time was 121.7 min (range, 83–193 min). The aortic valve conduit size used varies from 23 to 29 mm (23–10, 25–25, 27–2, 29–2 mm) used. Re-exploration was done in 23.07 % (9 in 39). Sternum was electively not closed in 30.7 % (12 in 39). Thirty-day mortality was 10.2 % (4 in 39). The follow-up rate was 90.4 %.

Conclusions: Bentall procedure is completely safe and reproducible in suitable patients. With the use of newly introduced glue and proper surgical techniques, immediate and long-term results are remarkable.

Concomitant and non-concomitant abdominal surgery following open-heart surgeries on systemic/oral anticoagulation: preliminary risk and cost-efficacy analysis

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Background: Concomitant procedures in patients undergoing open-heart surgeries (OHS) are not performed due to a fear of high risk of mortality and morbidity due to acute gastrointestinal and pelvic complications in the form of acute cholecystitis and luteal hemorrhage (in premenopausal women with systemic or oral anticoagulation). Delayed recognition of these conditions can result into morbidity and mortality. Early and aggressive treatment in such cases is required. The purpose of the study is to determine the impact (in terms of safety and efficacy) of performing OHS synchronous abdominal surgeries using extracorporeal circulation.

Methods: This study is a single-surgeon, retrospective study during 2009 to 2014. Concomitant group A, $n=18$ underwent OHS concomitant surgery ($n=2$ CABG, $n=15$, mechanical MVR, $n=1$ ASD closure). Patients with asymptomatic cholelithiasis ($n=14$) and hemorrhagic ovarian cysts ($n=4$) were diagnosed during the screening of preoperative abdominopelvic ultrasound examination. Non-concomitant group B, $n=6$ patients underwent abdominal procedures during perioperative or during follow-up period on oral anticoagulation ($n=5$ hemorrhagic ovarian cyst and $n=1$ acute cholecystitis).

Results: Intra-abdominal complications or mediastinitis or mortality did not occur in any patient with concomitant surgeries. In group A > group B, total operating time (open-heart procedure+setup and wheel-out time for abdominal surgery) is $6.5 \text{ h} \pm 30 \text{ min}$. and in group B is at $4.5 \text{ h} \pm 30 \text{ min}$; for group A = group B, postoperative recovery time (ventilation and ICU stay); and in group A < group B, morbidity and hospital costs were more in group B vs. group A.

Conclusions: Results indicate the safety and cost-effectiveness of concomitant procedures during concomitant surgeries.

Fontan without cardiopulmonary bypass: early results

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Background: Extracardiac Fontan (ECF) is emerging as the operation of choice in single ventricle palliation. We used off-pump ECF to effectively avoid the harmful sequel of cardiopulmonary bypass (CPB) and report its early results.

Methods: Between February 2012 and November 2014, 59 consecutive patients, aged 22.8 ± 5.05 years underwent single ventricle palliation via ECF without CPB. A brief video is shown.

Results: Intraoperatively, average superior vena cava (SVC) clamp time was 15.06 ± 4.3 min and inferior vena cava (IVC) clamp time was 17.09 ± 3.5 min. Of these, there were two early deaths. One patient required revision of the Fontan circuit due to narrowing at the anastomosis between the graft and the

inferior vena cava that was caused by placement of excessive sutures to control bleeding. No patient required conversion from off CPB to CPB. The inotropic score was 4.47 ± 6.1 , time to extubation was (9.5 ± 3 h), drainage in ICU was 675.43 ± 204.01 ml, and ICU stay was 2.42 ± 3.48 days. The average daily pleural drainage was 154.1 ± 69.2 ml, time to removal of pleural tubes was 15.25 ± 9.3 days, and the total hospital stay was 16.76 ± 9.7 days. In immediate follow-up, all surviving patients were in NYHA class I with saturations $\geq 95\%$ and normal ventricular function on echocardiography. No thrombotic events were reported.

Conclusions: Off-pump ECF is a low-risk procedure, effectively avoiding the harmful effects of CPB and improving early postoperative course. There is a decrease in ICU stay resulting in lesser ICU expenses. Decrease in patient morbidity is seen with lower pleural drainage and shorter hospital stay.

Surgically placed LV-epicardial leads are comparable to endocardially placed permanent pacing leads in resynchronization therapy for severe LV dysfunction

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Background: In patients with severe left ventricle (LV) dysfunction, resynchronisation therapy can be life saving. When endocardial LV-lead placement through coronary sinus is not possible, epicardial LV-lead placement surgically through mini thoracotomy is an alternative. However, it is suggested that epicardial pacing leads are inferior to endocardial leads. Our aim was to compare surgically placed LV-epicardial leads and right ventricle (RV)-endocardial leads placed percutaneously by the cardiologists.

Methods: Between August 2011 and June 2014, six patients with severe LV dysfunction were referred to CT department for LV-epicardial-lead placement. In all patients, endocardial LV-lead placement thorough the coronary sinus failed. These patients underwent a left anterior mini-thoracotomy through the 5th intercostal space in the mid-clavicular line. The pericardium was opened in front of the phrenic nerve and either a monopolar or bipolar epicardial LV lead was sutured using 5–0 prolene. After the parameters were checked, the incision was closed over a single drain.

Results: A total of six patients (5 males (M), 1 female (F)) underwent LV-epicardial lead placement (M/F, 5:1). The mean age was 44 years (14–63). The mean follow-up was 11.4 months. The mean RV endocardial lead threshold was 1.31 at insertion and 0.66 at 11.4 months compared with LV epicardial leads 1.9 and 1.4. There was no difference ($p > 0.99$).

Conclusions: Contrary to the general suggestion that epicardial leads deteriorate early compared with endocardial leads, our study suggests that appropriately placed epicardial leads are a good alternative to endocardial leads.

MEP-guided repair of thoracoabdominal aortic aneurysms: our initial experience

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Background: In the west, monitoring of motor-evoked potentials (MEP) is routine to assess spinal cord integrity during thoraco-abdominal aortic interventions (TAAI). We report our initial experience with MEP-guided TAAI.

Methods: Between May 2014 and December 2014, 22 TAAI were performed for type I thoraco-abdominal aneurysm (TAAA) in eight, type II TAAA in five, type III TAAA in five, coarctation in two, and aortoarteritis with occlusive disease in two patients. In 20 patients, partial cardiopulmonary bypass was used for lower body perfusion. In two patients with coarctation, left heart bypass was used. Cerebrospinal fluid drainage was used in five patients. MEPs were monitored during repair.

Results: MEP signals did not change significantly from baseline in 19 patients. In three patients, signals were MEP guided to take active measures in response to changes in the signal strength. These measures included re-implantation of intercostal arteries in one, adjustment of proximal clamp with optimization of proximal pressure in one, and perfusion of lower limb in the third patient. There was no immediate or delayed neurological deficiency in postoperative period.

Conclusions: Neuro-monitoring using MEP is a useful tool during TAAI. MEP-guided intraoperative interventions results in better restoration of physiological conditions.

Use of digital suction device in VATS decortication for early recovery and shorter hospital stay

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Background: Lung decortication procedures are known for high morbidity and prolonged air leak. We present our experience of how the use of digital suction device changed our practice in postoperative management of VATS/open decortication.

Methods: This is a single-institution retrospective study of 198 patients who underwent VATS/open decortication from July 2010 to July 2014. In our early practice till April 2012, 74 patients underwent VATS decortication for lung empyema for

which postoperatively wall suction device connected to ICD was used. Later from May 2012, in 124 patients of VATS decortication, digital suction device was used.

Results: Seventy-four patients who underwent use of wall suction had average drain dwell time of 5 days, and seven patients had prolonged airleak and were discharged on flutter bag. Average hospital stay was 5 days. In 124 patients where digital suction device was used, average drain dwell time was 3 days, five patients had prolonged airleak and two were discharged on flutter bag. Drain was removed when airleak was less than 25 ml/min for the last 24 h and drain showed less than 200 ml/h for the last 24 h.

Conclusions: The use of digital suction device has clearly changed our practice in most difficult cases with patients being discharged early. The scientific use of calculation of airleak has decreased the drain dwell time and early ambulation and discharge.

Management protocols for robotic thoracic surgery for pulmonary aspergilloma

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Background: Minimally, invasive techniques for non-oncologic lung resections especially fungal infections are not widely employed. We wish to share our protocol for management of robotic resection of pulmonary aspergillomas.

Methods: Eighteen patients underwent surgical resection of post-tuberculosis aspergilloma between January 2012 and July 2014 at a single center. A 4-arm DaVinci Robot was used to perform the surgery. A standardized protocol of management was followed for all the patients.

Results: Eleven male and seven female patients in the age group of 35 to 78 years (mean, 48 years) underwent lobectomies. As per our standard protocol, all patients had received antituberculous drugs for at least 6 weeks. Systemic antifungals were given 2 weeks prior and continued for 3 months postoperatively. Extra-long tubings and lines were used during the surgery in all cases. Double lumen intubation in lateral position and use of fogarty catheter helps us to prevent intraoperative spillage of aspergilloma. Our intraoperative protocol is to dissect the adhesions at the apex last as it provides good retraction and keeps the field clean and careful dissection of vascular and bronchial structures. Three robotic cases needed completion by VATS and two needed conversion to open due to bleeding and frozen hilum. One patient died with multi-organ failure and fungal septicaemia on day 25.

Conclusions: Robotic resection of lung is technically possible with good clinical outcomes with minimal morbidity and mortality if we standardize our protocol.

Evaluation of ivabradine, metoprolol, and its combination in management of inappropriate sinus tachycardia in coronary artery bypass graft patients: a comparative safety and efficacy study

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Background: Postoperative inappropriate sinus tachycardia (IST) after coronary artery bypass graft (CABG) surgery requires treatment. The objective of the present study was to establish comparative safety and efficacy of metoprolol, ivabradine, and its combination in postoperative IST following CABG. Ivabradine is the novel drug affecting the SA node only with no other effect.

Methods: A total of 151 patients (October 2012 to March 2013) developed IST following CABG surgery at a tertiary care center. As per cardiac surgeons, discretion were divided into five treatment groups: metoprolol, 12.5 mg (bid, $n=47$); metoprolol, 25 mg (bid, $n=24$); ivabradine, 5 mg+metoprolol, 12.5 mg (bid, $n=34$); ivabradine 5 mg+metoprolol, 25 mg (bid, $n=23$); and ivabradine, 5 mg (bid, $n=23$). Safety and efficacy were compared.

Results: Of these patients (mean age 59 ± 8 years, males 87 %), 41 % were diabetic, 45 % hypertensive, and 67 % had triple vessel disease. Mean preoperative vitals were similar in all groups. “Off-pump” CABG was done in 98 % patients. During surgery, noradrenaline was used in 87 %, dobutamine in 2 % while both in 11 % patients. Average ICU and total hospital stay was 3.7 and 7.3 days, respectively. IST developed post-CABG, averaging a 32 % increase from baseline heart rate (HR).

Conclusions: Significant reduction in heart rate was observed for metoprolol, ivabradine, and its combination. However, combination (ivabradine, 5 mg and metoprolol, 25 mg) stood as a more effective and well-tolerated treatment option; more so in patients with age >70 years or LVEF <35 %. Males responded better to combination treatment as compared to females.

Is it so much beneficial to repair moderate tricuspid regurgitation concomitantly in chronic rheumatic left heart valvular disease? A prospective randomized study

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Background: Several questions continue to daunt the cardiac surgeons and cardiologists relating to functional tricuspid regurgitation. There has been unanimous agreement about the surgical management of severe functional TR concomitantly with mitral valve and/or aortic valve replacement but a lot of

controversies besiege management of functional moderate TR. This study has been an attempt to make even with some of these issues.

Methods: This prospective comparative study was done between Jan 2011 and Oct 2014 on patients who underwent elective left heart valve surgery (MVR, MVR+AVR) concomitantly with or without tricuspid annuloplasty with flexible prosthetic ring for chronic rheumatic heart disease, with functional moderate tricuspid regurgitation.

Results: A total number of 80 patients ($n=80$) were included in this study. Twenty-nine ($n=29$) among them underwent tricuspid annuloplasty and 51 ($n=51$) among them did not. Statistical analysis and results show that 79 patients (98.75 %) came for follow-up. The follow-up period was 10.3 ± 6.3 months. Postoperative functional class improvement was significant in both the groups (57.14 versus 77.10 %; $P=0.067$). Freedom from moderate and severe TR at discharge was 96.6 % in the repair group compared with 83.7 % in the non-repair group ($P=0.085$) which improved further during follow-up. Postoperative survival and event-free survival was better in ring group but with no statistically significant difference.

Conclusions: The strategy of repairing functional moderate grade TR with ring at the time of MV replacement is beneficial in the early postoperative period.

Surgical outcome of tetralogy of Fallot with subarterial ventricular septal defect—the Madras Medical Mission experience

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Background: Tetralogy of Fallot (TOF) with subarterial ventricular septal defect (VSD) is more frequent in Asians when compared with Caucasians. Compared with the regular subaortic VSD, postoperative right ventricular outflow obstruction is more common because of the subpulmonary extension of the defect. The objective of this study is to analyze the outcomes of patients with TOF—subarterial VSD in our institution.

Methods: Seven hundred thirty-four consecutive operated patients with TOF from May 2005 to November 2014 were retrospectively reviewed. Ninety-eight patients had subarterial VSD. Ninety-two of these underwent intracardiac repair.

Results: The median age at surgery was 6 years, and the median weight was 15 kg. The male-to-female ratio was 1.6:1. TOF with subarterial VSD was associated with frequent use of transannular patch (75 %). The early mortality was 2.17 %. Follow-up was 92 % complete. Two patients required reoperation for significant right ventricular outflow tract obstruction (RVOTO) at 1 and 3 years, respectively.

Conclusions: Perioperative mortality and morbidity of intracardiac repair for TOF with subarterial VSD is low. This data represents the largest series of tetralogy of Fallot with subarterial ventricular septal defect in world literature, and our outcomes are comparative to published literature. Transannular patch augmentation of the right ventricular outflow tract (RVOT) is required in a significant proportion of these patients. Precise intra-cardiac repair and lower threshold for a transannular patch placement ensures good early outcome.

Results of Fontan operation in patients with congenitally corrected transposition of great arteries

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Background: The purpose of this study is to examine outcome after Fontan operation in patients with congenitally corrected transposition of great arteries with ventricular septal defect and pulmonary stenosis (ccTGA-VSD-PS).

Methods: Patient and procedure-related variables were analyzed in 18 patients with ccTGA-VSD-PS operated between June 2009 and November 2014.

Results: Mean surgical age was 11.6 years (4 to 23 years) with 77 % patients being male (14/18). Dextrocardia was present in 55 % (10/18) of patients and LSVC was present in 33 % (6/18) of patients. Most patients underwent extracardiac Fontan ($n=17$) while in one patient lateral tunnel Fontan was performed. All patients received PTFE graft of size 18 to 22 mm size for extracardiac Fontan; in five patients, conduits were fenestrated in order to reduce the intraconduit pressure. Mean hospital stay was 17 days (5 to 60 days), and most common cause for prolonged stay was pleural effusion documented in five patients (27.7 %). Conduit thrombosis developed in one patient, intracranial bleed and seizures in one patient, and jaundice developed in one patient. Current follow-up information is available for 16 patients (89 %, mean follow-up of 21.5 months). There were one in hospital death and one mid-term death after 3 years of operation; 85 % (12/14) of patients in follow-up are NYHA class I while two patients are in class II.

Conclusions: In ccTGA-VSD-PS patients with unroutable VSD and in those with difficult options for biventricular repair, the Fontan approach provides satisfactory mid-term palliation.

Our experience with radial artery conduit—Apollo Hospital Hyderabad

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Background: The radial artery graft has been used as an arterial graft in coronary artery bypass graft surgery. The current study examined the outcomes of grafting.

Methods: We retrospectively analyzed 10 years of experience with the radial artery grafting in patients with coronary artery disease, who underwent coronary artery bypass graft surgery. Out of 5499 patients who underwent coronary artery bypass grafting (CABG), 728 (13.23 %) had radial artery as a conduit.

Results: Between 2004 and 2014, we performed 728 CABGs using radial artery as a conduit. There were 456 (62.63 %) males, 272 (37.36 %) females, with age ranging from 28 to 80 years (mean age, 54.76 %). Average conduit used for the patient is 3.55, and out of which, 2.44 arterial grafts was used. Radial artery as a conduit was used for LAD in 10 (1.37 %), D1 in 8 (1.09 %), LAD+D1 seq in 6 (0.82 %), RI in 58 (7.96 %), OM1 in 344 (48.07 %), OM2 in 60 (8.24 %), dist. OM in 70 (9.61 %), OM1+OM2 seq in 36 (4.94 %), OM2+OM3 seq in 4 (0.54 %), OM1+RI seq in 14 (1.92 %), OM2+RI seq in 10 (1.37 %), OM1+OM2+RI seq in 2 (0.27 %), RCA in 40 (5.49 %), PDA in 38 (5.22 %), PLB in 14 (1.92 %), and PDA+PLB seq in 8 (1.09 %), respectively. Postoperative MI was observed in 17 (2.38 %) patients. The mortality within 30 days was observed in four (0.54 %) patients. In late postoperative follow-up, 21 (2.88 %) patients are detected with abnormal TMT. Redo CABG for blocked radial artery was performed in five (0.68 %) patients.

Conclusions: Radial artery grafting is a highly effective revascularization strategy. With the use of technique of harvesting radial artery, intraoperative papaverine dilatation and postoperative vasodilator therapy improved short- and long-term outcomes with remarkable low rates of reintervention.

Modified Nuss and reverse Nuss for correction of pectus deformity: Indian experience

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Background: The study included all cases of pectus excavatum and carinatum repair using a modified Nuss and reverse Nuss procedure from a single center in India. Innovation for safety and bar stabilization were introduced and successfully applied in the cases.

Methods: Cases of pectus excavatum were considered for surgery at 3 years of age and for pectus carinatum after the age of 15 years. The surgical correction technique modified included the use of pectus tunneloscopy for safe bar placement and moon bridge stabilization technique for stable bar correction.

Results: This study includes a total of 31 cases done from February 2012 to June 2014, including 28 cases of pectus excavatum and 3 cases of pectus carinatum. The age group vary from 3 to 51 years with a follow-up of 4 to 32 months. A single bar was used in ten cases and double bar in 21 cases.

Conclusions: The modified Nuss and reverse Nuss procedure improves safety of surgery and patient satisfaction of surgical correction.

Is EuroSCORE applicable to Indian population?

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Background: There is an important role for accurate risk prediction models in current cardiac surgical practice. Such models enable benchmarking and allow surgeons and institutions to compare outcomes in a meaningful way. They can also be useful in the areas of surgical decision-making, preoperative informed consent, quality assurance, and healthcare management. The aim of this study was to assess the performance of the European system for cardiac operative risk evaluation (EuroSCORE) II model in Indian population.

Methods: EuroSCORE II model was applied to all patients undergoing cardiac surgery at Southern Railway Head Quarters Hospital from June 2014 to September 2014. Patients undergoing CABG with or without combined procedure were included in the study. Observed and predicted mortalities were compared. Model discrimination was tested by determining the area under the receiver operating characteristic (ROC) curve. Model calibration was tested by the Hosmer–Lemeshow Chi-square test.

Results: Two hundred patients with complete data were analyzed. The difference in observed mortality and expected mortality was statistically not significant. The EuroSCORE II accurately estimated mortality. Discriminative power of EuroSCORE was very good. Area under the ROC curve was 0.89. Hosmer–Lemeshow Chi-square test returned *P* values more than 0.05.

Conclusions: EuroSCORE II accurately predicts outcomes of cardiac surgery in Indian population. Hence, the use of the EuroSCORE II for risk prediction may be appropriate in India.

Single- and dual-port thoracoscopic decortications for stages 2 and 3 pleural collection

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Background: This retrospective study aims to show the feasibility of single- and dual-port thoracoscopy decortication techniques in stages 2 and 3 pleural effusion. It makes use of the existing thoracostomy drain wound for dual-port thoracoscopy and creation of a single wound for those with crowded rib in stage 3 pleural collection.

Methods: All patients with pleural collection where thoracostomy tube drainage failed to re-expand the lung or remove the multiloculated foci of purulent collection were included in the study. Dual port was considered for those with an existing thoracostomy drain, and single port was done in those with crowded ribs or organized stage 3 pleural collection. The procedure was considered adequate intraoperatively when the lung was fully expanded, fissures opened, all collection drained, and symphysis of diaphragm to chest wall free.

Results: A total of 35 patients were included in the study, and out of which, 27 (77.14 %) patients had dual-port thoracoscopic decortications and 8 (22.85 %) patients underwent single-port thoracoscopic decortications. There was conversion to open thoracotomy in two (7.4 %) patients of dual-port thoracoscopy and one (12.5 %) patient with single port. There was no postoperative mortality or surgical site infection.

Conclusions: Single- and dual-port thoracoscopic decortications for stages 2 and 3 pleural collection is a feasible technique reducing surgical trauma and morbidity in already sick patients.

Review of 291 consecutive cases of mediastinal masses—a single-center experience

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Background: This study aims to analyze the details of mass lesions in the mediastinum operated upon in the Christian Medical College Hospital, Vellore between 2007 and 2014.

Methods: The medical records of all patients who underwent surgery for mediastinal mass lesions over the last 8 years were retrieved. The diagnosis, clinical presentation, technique of diagnosis, surgical intervention done, and the outcomes were studied.

Results: Of the 291 patients who underwent surgery in this period, there were 186 males and 105 females. The mean age was 36.9 years. Chest pain was the chief mode of presentation in 37.4 %. Fifty-eight of the 115 patients with thymomas had myasthenia gravis. The lesion was in the anterior mediastinum in 73.6 %. In 55 % of the patients, the lesion was approached through a midline sternotomy. The common lesions were thymoma (38.4 %), neurogenic tumors (18.7 %), and benign germ cell tumors (11 %). The average postoperative stay was 5 days. There was one intraoperative death; 89 % of the patients were followed up over a mean period of 37.3 months. There were two late deaths.

Conclusions: Mediastinal tumors form 14 % of all thoracic surgical admissions. Anterior mediastinal compartment is more often involved in malignant tumors. Myasthenics with thymoma present earlier as compared

with non-myasthenics. Downstaging of inoperable tumors may be possible with neoadjuvant chemoradiation. There are minimal operative complications, and the immediate and late results are very good.

Decoding and busting of a myth: high-end resources and bigger center/surgeon “a must” for better surgical outcome after congenital heart surgery

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Background: This study aims to compile and analyze the outcomes of the babies who underwent surgeries for congenital and pediatric heart diseases at this center and compared it with the USA’s top-ranked children hospitals and STS’s national database to determine feasibility of comparable outcome even with paltry resources in emerging economies like ours.

Methods: Data of babies who required heart surgery at this center since October 2011 until December 2014 was compiled, and their surgical outcome was analyzed in terms of age and surgery type with special reference to center’s resource assessment, and the same was then compared with the USA’s national STS database and their top-ranked children hospitals.

Results: In total, 619 babies (519 pump cases) underwent surgery. There were five hospital deaths (no death in the last 16 months). Percentage of neonatal and infant surgeries increased 5-fold in 3 years. Our resources in terms of man power, infrastructure, and cost of surgery were found to be 1/10th of the USA’s counterparts. Table: Surgical outcomes and comparison: Category of surgery number of babies number of mortality mortality % at this centre STS National database CHOP children hospital neonates 30 1 3.3 9.8 3 infants 202 2 1 3.1 1.5 children 263 2 0.6 1.2 0.9 VSD 143 0 0 0.7 1.6 TOF 175 0 0 0 1.0 1.5 TGA/AVSD 25 1 4 2.6 0 Fontan/Glenn 45 0 0 2.6 0.6

Conclusions: Quite satisfying and equally comparable surgical outcomes in intermediate term with constrained resources/costs should encourage other colleagues as well about its feasibility.

Video editing: a software skill worth learning for a successful thoracic surgeon

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Background: This study aims to evaluate the need to learn video editing software for thoracic surgeons.

Methods: Adobe Premiere (CS 5), iMovie, and Apple final cut pro were learned over a period of 6 months. Recording of

all cases was performed in the highest resolution possible. Video-editing skills were mastered and applied to previously edited and raw videos. The hospital video editor was requested to reduce the length of the recording to 15 min. The surgeon performed the final editing to highlight the important features of the operation. Stills were used for labeling titles and subtitles.

Results: A large video library of 500 cases was accumulated over a period of time, which helped the juniors in training. It was possible to share our videos with professional bodies and other Websites to help promote thoracic surgery education. A DVD was released and distributed free to all participants of our courses and conferences. A patient education DVD was also created.

Conclusions: Video editing skills have become an essential armamentarium of the modern VATS surgeon. They help in patient education, junior training, as well as complement your presentations in conferences.

Starting a low-cost training center for VATS in India

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Background: This research aims to study and establish a systematic training facility for -assisted thoracoscopic surgery (VATS) in India and to share our experience in setting up an exclusive hands-on training center for VATS.

Methods: Having conducted over 72 VATS workshops, we set out to have a hands-on training center within easy access to road, rail, and air travel. Infrastructure was self-funded and industry sponsored. Modules were created for open and endoscopic knot tying and VATS simulation. Sheep carcass was used to train in VATS. Fourteen candidates from across Asia and Africa were invited for a 7-day training. Hand–eye coordination was graded from 1 to 4 over the period. An exit examination was conducted. Student improvement and satisfaction scores were tabulated. Student/teacher ratio was 2:1.

Results: All candidates did poorly on days 1 and 2, scoring a bare minimum. In day 3 onwards, scores improved. Eventually, 13/14 candidates successfully completed a VATS lobectomy and esophageal mobilization. One candidate dropped out due to ill health. Student satisfaction scored 4/5 and 5/5 in most categories.

Conclusions: Systematic VATS training on sheep model is possible. A minimum of 7-day intensively mentored course is needed for improvement in hand–eye coordination. Intraoperative anatomy can be recreated by using fresh cut sheep carcass with addition of artificial ventilation. Student/teacher ratio of 2:1 is optimal. Financial help can be achieved by integration with industry. Locally procured cameras and endoscopes reduce setup costs.

Prevalance of carotid artery stenosis in patients undergoing coronary artery bypass grafting in LTMGH Sion Mumbai

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Background: This research aims to study the prevalence of nonsignificant and significant carotid artery stenosis in patients undergoing coronary artery bypass grafting (CABG) in our institute.

Methods: The study population consisted of 538 consecutive patients who underwent CABG from January 2010 to October 2014. All patients were subjected to carotid artery Doppler study preoperatively. Significant carotid artery stenosis was defined as greater than 70 % or patients having carotid artery stenosis with past history of ischemic or TIA.

Results: Radiological carotid artery stenosis was observed in 247/538 (45.9 %) patients. Significant carotid artery stenosis was observed in 28 % of patients. Patients with triple vessel disease had higher incidence of significant carotid artery stenosis. This group represents a high group with increased perioperative morbidity.

Conclusions: Prevalance of carotid artery stenosis in patients with multivessel coronary artery disease is significantly high. Screening of carotid artery is recommended in all patients undergoing CABG. Patients with significant carotid artery stenosis need to undergo carotid endarterectomy either as a concomitant procedure with CABG or at a later stage.

Feasibility of OPCAB surgery in octogenarians

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Background: Usually, very old age (octogenarians) is accepted as a contraindication to major surgery including coronary artery bypass grafting (CABG). We report early experience of OPCAB surgery in octogenarian patients.

Methods: From November 2013 to December 2014, 26 patients were underwent off-pump coronary artery bypass (OPCAB) surgery. Age is 83 years old (80–91), and most of them are male ($n=25$; 96 %). EuroSCORE II was 4.2 % (1.5–24.3) and STS morbidity+mortality risk rate was 19.2 % (9.4–37.2). Concomitant noncardiac surgery were conducted in 16 patients (62 %), and their diseases and procedures were PAOD ($n=9$), lung cancer ($n=3$), AAA ($n=2$), mid-aortic syndrome ($n=1$), and esophageal cancer ($n=1$); limb bypass ($n=8$), aorto-limb bypass ($n=2$), EVAR ($n=2$), Ivor Lewis procedure ($n=1$), bi-lobectomy ($n=1$), lobectomy with bronchoplasty ($n=1$), and wedge resection ($n=1$).

Results: Median operative time is 243 min (115–535), and there was one on-pump conversion (4 %). Postoperative

ICU and hospital stay are 3 days (1–19) and 25 days (2–62), respectively. There were eight morbidities (31 %) including pneumonia in three, ARF-needing-CRRT in two, inguinal pseudo-aneurysm due to limb bypass in one, wound problem in one, and stroke in one, respectively. There were two operative mortality patients (8 %). One had undergone MICS OPCAB with bi-lobectomy and expired due to pneumonia at postoperative 29 days. The other was perioperative MI and on-pump conversion but expired at postoperative 2 days. Mean follow-up is 309 days (95 % CI, 254–364), and there were three follow-up mortality patients who had undergone MICS OPCAB with F-P bypasses. They expired at postoperative 52, 89, and 130 days due to delayed pneumonia, delayed ulcer bleeding, and post-BK amputation sepsis, respectively. **Conclusions:** Conducting OPCAB surgery in octogenarian patients is feasible, and its early results are acceptable.

Senning in the era of arterial switch operation

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Background: In cases of late presentations with regressed left ventricle and other contraindications of arterial switch operation, atrial switch operation is still the procedure of choice. The aim of this study is to evaluate immediate and long-term outcomes of Senning procedure by a single surgeon in this subset.

Methods: A retrospective chart review was undertaken to analyze preoperative and operative clinical variables. A prospective analysis of clinical status and investigational follow-up was made.

Results: Fifty-two patients (40 males and 12 females) underwent Senning operation for transposition of great arteries (TGA) between 1989 and 2011 (32 simple and 20 complex TGA). Mean age of surgery was 23.3 ± 34 months (range, 17 days–14 years). Mean weight at the time of surgery was 8.8 ± 7.1 kg. Early mortality was five (9.6 %). There was no late mortality. Seventeen patients were lost to follow-up. We have 30 patients (57.69 %) for long-term follow-up. The mean period of follow-up was 5.8 ± 5.8 years. Among 30 patients available for follow-up, 81 % were asymptomatic and 14 % showed NYHA II symptoms. Follow-up echoes showed 63.3, 20, 6.7, and 6.7 % with good, mild, moderate, and severe right ventricular dysfunction, respectively. Two patients (3.8 %) underwent re-operation for subaortic obstruction and severe baffle leak. Late complications were severe AV valve regurgitation (13.3 %), baffle obstruction (10 %), subaortic obstruction (3.3 %), and severe right ventricular dysfunction (6.6 %). Three patients had early postoperative arrhythmia (two expired

and one lost to follow-up), and three patients (8.5 %) had late onset arrhythmia.

Conclusions: Despite arterial switch being the treatment of choice for TGA, Senning need to be resorted to in setups where late presenting TGA is not uncommon. Immediate as well as long-term follow-up results are acceptable in this subset.

Carotid artery cannulation for antegrade cerebral perfusion during complex aortic surgeries

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Background: Right axillary artery cannulation continues to be the most commonly used route for antegrade cerebral perfusion (ACP). However, the other alternative is carotid artery cannulation. This study aims to assess the safety and efficiency of common carotid artery (CCA) cannulation specially when it is the only means to provide ACP.

Methods: From January 2012 to October 2014, we performed 13 complex aortic procedures where right axillary artery cannulation was either not possible or deemed ineffective to provide ACP due to the complex nature of aortic disease. Either right CCA ($n=11$) or left CCA ($n=2$) was cannulated to establish cardiopulmonary bypass and also to provide ACP during aortic arch procedure. Five patients had aortic dissection (four acute and one chronic) with flap extending into the right axillary artery, five patients had large pseudo-aneurysm or postoperative true aneurysm of distal ascending aorta eroding the sternum, two patients had thrombus in ascending aorta extending into the arch, and one patient with aortic arch aneurysm with aneurysmal dilatation of innominate artery. After opening the arch, four patients required left common carotid artery ostial cannulation.

Results: CCA cannulation could be performed in all patients without any damage to the native vessel. It was sufficient for ACP as well as to provide full pump flows. There was no mortality, no neurological deficits, or any clinical evidence of perioperative cerebral malperfusion.

Conclusions: Carotid artery cannulation is an easy, fast, safe, and efficient means for providing ACP and arterial inflow in complex aortic reconstruction.

Surgical management of bald arch syndrome: lessons learnt

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Background: Takayasu arteritis is a chronic, progressive, autoimmune, idiopathic, large-vessel, inflammatory arteriopathy affecting the aorta and its major branches. Obstructive lesions of all arch vessels (Bald arch syndrome) leading to ischemic brain symptoms is relatively infrequent and require urgent revascularization. We present our experience with 11 such patients.

Methods: Between Jan 2007 to November 2014, 11 patients (age 11–29 years) of Takayasu arteritis with obstructive lesions of all arch vessels (Bald arch syndrome) underwent revascularization. In five patients, three or more extracranial vessels (common carotids, internal carotids, vertebrals, subclavian, axillary) received bypass graft from ascending aorta (group A). In the remaining patients, (group B), only one or two vessels were revascularized. The presenting symptoms were stroke, loss of vision, syncope, and giddiness.

Results: In group A, there were three episodes of intracranial bleeding. A 25-year-old girl who received five bypasses, developed massive intracranial bleed on the 4th day and died. One patient with four grafts developed subarachnoid hemorrhage and was managed conservatively. Another patient developed significant intracerebral bleed requiring evacuation and drainage. In group B, postoperative period was smooth. All survivors had marked improvement in symptoms. Follow-up ranged from 3 to 84 months. One patient in group B was lost to follow-up after 12 months.

Conclusions: Multiple bypass grafting has the risk of hyperperfusion syndrome with intracranial bleeding. Satisfactory palliation can be achieved by one or two vessel revascularization.

Cardiopulmonary bypass strategy and neurological outcome in patients undergoing normothermic aortic arch procedures without hypothermic circulatory arrest

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Background: This study aims to assess the outcome of aortic arch reconstruction performed under normothermia or mild hypothermia with continuous antegrade cerebral perfusion (ACP).

Methods: From January 2010 to October 2014, 102 patients underwent aortic arch surgery for acute type A aortic dissection in 24, chronic type A dissection in 14, aneurysm of ascending aorta with involvement of aortic arch in 52, and aneurysm of ascending aorta, arch, and descending aorta in 3 patients (patients underwent surgery for other indications). Perfusate temperature was maintained at 30–34 °C. During arch reconstruction, continuous ACP was maintained by perfusion of right common carotid artery alone in 58 patients and

along with left common carotid artery perfusion in 44 patients. Cerebral perfusion was monitored by near-infrared spectroscopy.

Results: The surgical procedure performed included Bentall's with arch replacement with elephant trunk in 6, Bentall's with arch replacement and antegrade stent placement in 5, Bentall's with arch replacement in 20, ascending aorta with arch replacement in 10, Bentall's with hemiarch replacement in 52, and others in 9 patients. There were two operative deaths. Mean extubation time was 4 h. There was no new neurological deficiency in any of the patient. Two developed seizures. Detailed neurological examination including minimal status scoring system (MMS) on postoperative day 4 was normal in all the patients.

Conclusions: Aortic arch reconstruction can be safely performed under normothermia or mild hypothermia with continuous ACP with good neurological outcome. The cardiopulmonary bypass strategy is simple and easily reproducible.

Comparison of outcomes of off-pump versus on-pump coronary artery bypass grafting in patients with occult renal disease: a randomised study

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Background: Occult renal disease is defined as glomerular filtration rate (GFR) of $<60 \text{ ml min}^{-1} 1.73 \text{ m}^{-2}$ and serum creatinine of $\leq 1.3 \text{ mg/dl}$. This study aims at comparing early outcomes in coronary artery bypass grafting (CABG) patients with occult renal disease undergoing off- and on-pump surgeries.

Methods: This is a 1:1 randomized study done from April 2011 through December 2013. One hundred twenty CABG patients with occult renal disease were randomized to off-pump (group 1, $n=62$) and on-pump (group 2, $n=58$) procedures. GFR and serum creatinine were measured pre- and postoperatively on days 1 and 5. One month follow-up was done after discharge. Two-sample *t* test was done to compare the variables. Study outcomes were evaluated with Cox regression analysis.

Results: There was a rise in serum creatinine levels on the first postoperative day in the on-pump group with a mean of 1.42 ± 10.21 ($p=0.02$) and fall in GFR levels with the mean of 48.45 ± 7.8 ($p=0.007$). There was no difference in the rise of serum creatinine and the fall in GFR on fifth postoperative day between the groups (serum creatine, $p=0.80$; GFR, $p=0.41$). Two patients in the off-pump group developed postoperative renal dysfunction ($p=0.49$). None required dialysis. Two

patients in the off-pump and one in the on-pump suffered postoperative stroke ($p=0.39$). None of the patients developed postoperative myocardial infarction. One mortality was observed in the off-pump group (1.61 %).

Conclusions: There was no significant difference in patients undergoing off- and on-pump CABG with occult renal disease in terms of short-term mortality, myocardial infarction, stroke, or renal failure requiring dialysis.

Does preoperative anemia influence the postoperative outcome in CABG patients?

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Background: Association of low preoperative hematocrit with postoperative mortality and morbidity is not well defined. The aim of this study was to assess if postoperative outcomes, including mortality, which was influenced by a low hematocrit level.

Methods: Between January 2006 and December 2013, in a single institution, 10,811 patients presented for primary isolated CABG. Prospectively collected data was analyzed retrospectively. Patients were assigned to two groups depending on hematocrit below or above 30 %. Preoperative and operative variables were compared along with early mortality and postoperative morbidity.

Results: Of the 10,811 patients, 569 (5.2 %) were found to have a hematocrit <30 %. The group with a haematocrit of >30 % had a significant higher number of patients with recent myocardial infarction (1749 (17.07 %) vs. 73 (12.82 %), $p=0.02$). However, they were well matched for other variables like age (58.8±8.8 vs. 61.8±8.43); concomitant chronic obstructive airway disease (751 (7.33 %) vs. 46 (8.08 %); $p=0.56$); and left ventricular function ($p=0.76$). Mean graft in the two groups were similar (2.8±0.84 vs. 2.78±0.82, $p=0.55$). Both the groups were well matched in terms of the number of patients where the procedure was done on the beating heart (8078 (78.8 %) vs. 437 (85.9 %), $p=0.26$). Despite the two groups being well matched, in-hospital mortality was significantly higher in the group with hematocrit of <30 % (39 (6.85 %) vs. 325 (3.17 %) $p<0.0001$). Sternal wound infection rates, transfusion requirements, and neurological, respiratory, renal, gastro-intestinal, cardiac complications were all higher in the group with hematocrit of <30 % (Table 1). **Conclusions:** Hematocrit of <30 % is associated with significantly increased mortality and adverse postoperative outcomes in patients undergoing coronary artery bypass grafting.

Low body weight—is it still a risk factor for poor outcome following surgical correction of tetralogy of Fallot?

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Background: Surgical results for correction of tetralogy of Fallot have improved in recent times. The aim of this study was to assess if low body weight remains a persistent risk factor for poor outcome.

Methods: We performed this retrospective analysis of data collected prospectively at our institution between January 2011 and 2013. Three hundred fifteen consecutive patients undergoing correction of tetralogy of Fallot were divided into two groups based on a cut-off body weight of 10 k. The groups were compared for baseline characteristics and postoperative outcomes. Independent effects of age and body weight on survival were analyzed.

Results: There were 104 (33 %) children in our study with body weight of less than 10 kg. Apart from significant lower cross-clamp (125.13±27.09 vs. 138.37±38.13; $p=0.0017$) and bypass time (167.18±35.0 vs. 184.92±46.8 min., $p=0.0007$), the two groups were well matched. Overall mortality was 3.17 % ($n=16$). Age, per se, did not appear to be a risk factor in our study. In children with age <1 year, the number of deaths was higher but not significant statistically (4 (11.4 %) vs. 12 (4.2 %), $p=0.08$; odds ratio, 2.88; 95 % CI, 0.87–9.48). Postoperative stay was significantly shorter (9.72±4.05 vs. 10.66±4.80; $p=0.088$). Low body weight (<10 kg) was independently associated with increased mortality (10 (9.6 %) vs. 6 (2.84 %); $p=0.01$; odds ratio, 3.63; 95 % CI, 1.28–10.29).

Conclusions: Despite advancement in correction of tetralogy of Fallot, body weight of less than 10 kg remains a persistent risk factor for mortality. Age, however, does not appear to be a risk factor in our study

Is multi-slice CT angiography adequate as the sole diagnostic criteria to proceed for CABG?

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Background: Coronary angiography (CAG) is today the gold standard for evaluation of the luminal narrowing of coronary arteries. Multi-slice (64 slice) computed tomography (MSCT) has recently emerged as a non-invasive technique. The aim of this prospective clinical trial was to assess the diagnostic accuracy and clinical relevance of MSCT coronary angiography, to compare it with conventional CAG, and to conclude whether MSCT alone is adequate for proceeding for CABG.

Methods: Fifty stable patients with proven severe CAD on CCA for elective CABG underwent MSCT prior to CABG.

The MSCT images were compared with CCA, and the accuracy, sensitivity, and specificity of detecting significant stenosis cross checked. Lesion-by-lesion analysis was made. CAG (for degree of stenosis) and surgical confirmation (for the orientation of the vessels) were used as a reference standard.

Results: An excellent correlation was found between the two modalities. Comparing the maximal percent diameter luminal stenosis by MSCT versus CCA, the Spearman correlation coefficient between the two modalities was 0.99 ($p < 0.0001$). Bland–Altman analysis demonstrated a mean difference in percent stenosis of $0.6 \pm 2.3\%$ (95% confidence interval, 5.1 to -3.9%); 93.4% of the observations were within ± 1.96 standard deviation.

Conclusions: CTA is a valuable tool in the armamentarium of the cardiac scientist. On the basis of our findings, we recommend MSCT as a sole criterion for proceeding for CABG without CCA in selected cases.

A contrarian play: significant resolution of aortic regurgitation following patch extension of prolapsed coronary cusp during aortic valve repair in pediatric population

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Background: This study aims to describe how it helps and to determine efficacy of cusp extension technique of prolapsed coronary cusps in aortic valve repair, contrary to common belief that such large cusps needs only placcation and shortening but not enlargement, in a pediatric population.

Methods: Between 2010 and 2014, 17 consecutive patients underwent aortic valve repair in our institution mainly in the form of cusp extension with treated pericardium in addition to commisuroplasty and plication. Cusp extension is thought to uplift the sagged cuspal margin, weighed down by its big bottom, up to the level of corresponding opposite cusps. Median age at surgery was 9 years, with 30 being younger than age 1.5 year. Associated defects were ventricular septal defects (10), mitral regurgitation (4), and tricuspid regurgitation (4) and were addressed appropriately.

Results: There was no early or late death so far. One patient had to undergo redo aortic valve repair on 2nd postoperative day due to tear in opposite cusp; probably, stay suture was the culprit. Mean hospital stay was 8.5 days. There is a mean follow-up of 2.7 years. Of all patients, 14 has mild aortic regurgitation while two has moderate. One patient's regurgitation is more than moderate and is being closely followed.

Conclusions: Though long-term studies/follow-up are needed to cement its role in coronary cusp's prolapsed induced significant regurgitation but in intermediate term, we have found that cusp extension really helps in reducing

the regurge significantly which was not feasible with other techniques alone.

Good vascular and neuromuscular outcome even in delayed repaired extremities vascular trauma—100 cases experience

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Background: This study aims to determine whether delayed vascular repair is feasible or has good results in delayed presented cases of vascular trauma, even after >48 h with ischemic changes in some cases. General literature says <6 h is appropriate for limbs salvage, but our study says that this time limitation can be extended to a greater extent. We consider these patients for surgery even after delayed presentation as limb loss is emotionally/psychological deterrent as well as economic hardship to the patient. To the best of our knowledge, this is the first report on delayed vascular trauma repair from our region of India.

Methods: Prospective analyses of 100 patients operated for peripheral vascular injuries between August 2011 and April 2014 was done. Diagnosis tools included physical examination, pulse oxymeter, and hand-held Doppler alone or in combination with computed tomography (CT) angiography.

Results: Of the 100 patients, 86 were males (86%) and 14 (14%) were females (14%), and their aged ranged from 5 to 80 years. Mean duration of presentation of our study cases was 56 h after the injury. Final outcome was 77%, had viable and functional limbs, and 15% had viable, but non-functional limbs and amputation after repair was 8%.

Conclusions: Delayed surgery in vascular injuries has a prognostic value for salvaging the extremity/limb and life of the patient. Patients suffering from vascular injuries to the extremities should be transferred to vascular surgery centers as soon as possible and consider the patient for surgery even after delayed presentation.

Impact of targeted blood transfusion protocol on morbidity and mortality in cardiac surgery

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Background: This research aims to study the effect of targeted component transfusion therapy on blood component usage and to study the effect on blood and its component usage on morbidity and mortality in patients undergoing cardiac surgery.

Methods: This study includes adult patients undergoing cardiac surgery without preoperative anemia or any coagulation abnormality included. Patients undergoing redo surgery and emergency surgery were excluded from the study. A routine preoperative workup and a baseline thromboelastography (TEG) was obtained for all the patients. The patients were analyzed based on two groups following surgery: group A ($n=98$): blood product transfusion requirements were guided by protocol (hemoglobin (<7 g/dl) and TEG analysis). Group B ($n=122$): empirical transfusion was done empirically, based on shed blood and clinical judgment. Assessment of morbidity was done in terms of duration of ventilator time, inotropic support, postoperative renal/hepatic dysfunction, systemic inflammatory response, new rhythm disturbances, wound infections, ICU stay, hospital stay, cost analysis, and mortality (death within 1 year) in follow-up period.

Results: Transfusion requirement was significantly low in group A=7 % vs. group B=34 % (0.001). In patients who received blood component transfusion, the average duration of ICU stay were 44 vs. 28 h in those who did not receive transfusion. Detailed data and cost analysis will be discussed and presented.

Conclusions: Protocolled and TEG targeted transfusion than empirical transfusion results in significant benefits in terms of reduced hospital stay, postoperatively.

Extracorporeal life support as a rescue in cardiogenic shock

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Background: Despite vast development in the field of heart failure, cardiogenic shock remains a clinical challenge with high mortality. Extracorporeal life support (ECLS), although considered a last resort in the management of cardiogenic shock, is being used increasingly.

Methods: A retrospective study of patients with cardiogenic shock requiring ECLS between 6.2010 and 2.2014 was performed. A central or peripheral veno-arterial ECMO was implanted. Outcomes in patients were analyzed based on aetiology of cardiogenic shock, viz. acute decompensated heart failure (DHF), post-cardiotomy cardiogenic shock (PCCS), and post-primary coronary intervention (post-PCI).

Results: Out of 68 patients in whom ECLS was attempted, it could be introduced successfully in 59 patients. This cohort of 59 patients (16 females) with mean age of 46 years (range, 16–74) consists of 36 DHF, 16 PCCS, and 7 post-PCI patients. In the DHF group, seven patients died on ECLS, 17 were weaned, and 12 were bridged to a ventricular-assisted device or heart transplantation. Twenty (56 %) patients could be discharged home. In the PCCS group, eight patients died on

ECLS, seven were weaned and one was bridged to a ventricular-assisted device. Seven (44 %) patients could be discharged home. In the post-PCI group, three patients died on ECLS and four were weaned; however, only two (29 %) patients could be discharged home.

Conclusions: ECLS is a rescue in the management of patients with cardiogenic shock. Outcomes of ECLS for cardiogenic shock due to DHF and PCCS are encouraging; however, they remain poor in the post-PCI group. The use of ECLS must be decided depending on individual risk factors.

Emergency department thoracotomy: effect of a credentialing program on the outcomes

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Background: Emergency department thoracotomy (EDT) is usually performed in hemodynamically unstable patients with cardiac tamponade following major chest injuries. We sought to evaluate the impact of a credentialing program on the outcomes of EDT.

Methods: A retrospective review was conducted on 59 patients who underwent EDT from 2001 to 2014.

Results: There were 35 (59 %) males, and the mean age at the time of EDT was 41 years (range, 16 to 91 years). The mean injury severity score was 42 (range, 4 to 75). Focused assessment with sonography in trauma (FAST) scan was used in 52 (88 %) patients and positive in 32 patients. Twenty-six (44 %) patients proceeded to the operating room for further surgical exploration and repair of injuries. Twelve (20 %) patients were discharged home. Survivors had one or more injuries to the following intrathoracic structures: intercostal artery ($n=1$), right ventricle ($n=1$), left internal mammary artery ($n=2$), lung ($n=6$), left ventricle ($n=3$), atria ($n=2$), and left pulmonary artery ($n=1$). There were 12 (20 %) penetrating injuries with 4 survivors (33 % survival) and 47 (80 %) blunt injuries with 8 (17 %) survivors ($p=0.21$). There was no late mortality (mean follow-up 2.8 years). Since the introduction of EDT credentialing and training in 2008, there have been 9 survivors out of 30 patients (30 %). When compared with survival from 2001 to 2007 (10 %; 3/29), there was a trend towards statistical significance ($p=0.06$).

Conclusions: The introduction of standardized EDT training has resulted in a trend towards improved outcomes in patients who undergo EDT.

Outcomes for patients undergoing pulmonary metastasectomy for sarcoma

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Background: The aim of this study is to report the overall survival after pulmonary metastasectomy in patients with metastatic sarcoma and prognostic factors for survival.

Methods: This is a retrospective observational study of consecutive patients having pulmonary metastasectomy for sarcoma over a 5-year period. Survival was calculated by Kaplan–Meier method.

Results: Between August 2007 and January 2014, a total of 80 pulmonary metastasectomy procedures were performed on 66 patients with metastatic sarcoma. There were no postoperative in-hospital deaths. The median age (range) was 51 years (16–79), and 39 (59 %) patients were male. Fourteen patients had bilateral lung operations, and surgical access was by video-assisted thoracoscopic surgery (VATS) in 48 (73 %) cases. The median number of metastases resected (range) was 3 (1–9). The median disease-free interval (range) was 25 months (0–156). Median overall survival (range) was 25.5 months (1–60). At follow-up, 19 patients (29 %) were dead with a median follow-up (range) of 31 months (1–60). There was no significant difference in survival between patients with high-grade versus low-grade tumors ($p=0.13$), histological type (osteosarcoma versus other sarcoma types, $p=0.14$), unilateral versus bilateral lung metastases ($p=0.48$), or lung metastases alone versus lung and other sites of metastases ($p=0.5$) or surgical approach used. The number of metastases resected was not significantly related to survival ($p=0.69$). Univariate analysis for the factors above did not reach statistical significance for survival ($p>0.1$).

Conclusions: In selected patients, pulmonary metastasectomy for sarcoma is safe and may confer a good medium-term survival.

In vitro comparison of dialyser-based hemoconcentrator with cell saver system for perioperative cell salvage

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Background: Cell saver system is the method of choice for red cell salvage from the surgical field. But, cost is a limiting factor. We, at our institute devised a cost-effective version of dialyser-based autotransfusion system. We performed pretransfusion comparison of our autotransfusion system with conventional cell saver system.

Methods: A prospective randomised observational study was performed in 104 consecutive patients with coronary artery disease operated on by off-pump coronary artery bypass grafting. Patients were divided into two groups. In the dialyser group (53 patients), blood from surgical field was salvaged by our dialyser-based system. In the cell saver group (51

patients), blood was salvaged by cell saver. In both groups, 20 ml sample from salvaged blood was analyzed for hemoglobin, platelets, protein and albumin and free haemoglobin, osmotic fragility, and peripheral blood smear examination.

Results: The total hemoglobin salvaged was comparable in both groups (58 vs 50 %). On peripheral smear, red blood cells were swollen but, morphology was preserved. Moreover, normal osmotic fragility suggested absence of any lethal damage to red blood cells in either group. Dialyser-based system was more efficient in salvaging platelets (42.9 vs 5.1 %), proteins (79.2 vs 0 %) and albumin (65 vs 0 %). The total free hemoglobin was three times more in the dialyser groups (366 vs 123mg) but, was well below the recommended limits.

Conclusions: Dialyser-based system is cheaper, equally effective in salvaging red blood cells, and more effective in salvaging platelets and proteins and does not contain significant amount of free hemoglobin. Therefore, salvaged blood can be safely transfused.

Combined single-stage carotid endarterectomy with CABG: our experience

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Background: Surgical treatment of hemodynamically significant carotid artery stenoses has been well documented, especially in the asymptomatic patient. However, in those patients presenting with hemodynamically significant asymptomatic carotid artery disease who are to undergo cardiac surgery, optimal treatment remains controversial. In this study, we analyze our experience with patients who underwent synchronous carotid endarterectomy (CEA) and coronary artery bypass graft procedures (CABG) for hemodynamically significant (>70 %) asymptomatic carotid artery stenosis and coronary artery disease (CAD).

Methods: Demographics and outcomes of all patients undergoing synchronous CEA/CABG for asymptomatic carotid stenosis between 2008 and 2014 were reviewed from our patient charts. We included patients who underwent standard patching of their carotid artery and those undergoing eversion CEA. All neurologic events within the first 30 days that persisted >24 h were considered a stroke. For purposes of comparison, we also reviewed outcomes for patients undergoing synchronous CEA/CABG for symptomatic carotid stenosis.

Results: Asymptomatic carotid artery stenosis (>70 %) was the indication in 145 patients undergoing CEAs. In the asymptomatic group, four patients, of which one succumbed to cardiac dysfunction and one died from a hemorrhagic stroke. Surprisingly, no nonfatal neurologic deficits occurred in this series. The difference in stroke mortality in women compared with men was not significant.

Conclusions: In this experience, patients presenting with hemodynamically significant (>70 %) asymptomatic carotid artery stenosis can undergo synchronous CEA/CABG with low morbidity and mortality.

Review of 12 cases of aortobifemoral bypass surgery

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Background: Patients were reviewed with the objective of post-surgery functional and clinical improvement in long standing b/l chronic limb ischemia.

Methods: All patients were male and operated on between Jan 2010 and June 2014. They have history of smoking, non-healing ulcers in leg, hypertension, and diabetes mellitus. Color Doppler arterial study and CT angio were done. Findings revealed almost total block at infra renal abdominal aorta, involving bifurcation or common iliacs or distal B/L iliac arteries with SFA in patches. Patients were approached by mid-line laparotomy. Transection of aorta above bifurcation with Y-graphed (PTFE) anastomosis was done along with B/L femoral ambolectomies. Average aortic cross clamp time was 40 min. Three patients required simultaneous atherectomy in superficial femoral artery in the adductor canal.

Results: Patients had excellent recovery with good relief in pain. Average ICU stay was 5 days with NTG, anti-hypertensive, and anti-coagulant support. Septicemia was well covered. Healing of ulcers with more than 1 km walk was achieved in 3 months time.

Conclusions: Aortobifemoral bypass is a good curative surgery for atherosclerotic chronic limb ischemia. Regular oral anti-coagulation with maintenance of PT/INR >2 is necessary. Cessation of smoking/tobacco is important for long-term results. and Goretex PTFE is a good conduit with long-term patency

Review of 530 cases of pneumonectomy in the past 22 years

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Background: Study is done with objective of postsurgery—clinical, functional improvement, and cure from tuberculosis (MDR TB). Since the disease is becoming resistant, the role of surgeon becomes important in giving relief to these patients.

Methods: Patients presented with severe hemoptysis, and recurrent chest infections were diagnosed to have destroyed lung syndrome. Clinically, patients with BHT of more than 30 s and BC of more than 60 per breath with sputum AFB negative were preferably selected for surgery (498 cases).

Thirty-two cases were AFB positive (8 preoperative+24 on postoperative biopsy). Fibrocavitary disease was seen in 110 patients and collapse consolidated lung in the rest of 420 cases; 330 were male and 200 were female patients. Six patients required ventilator support for 48 h. Postoperative convalescence was uneventful. Average operative time was 4 h.

Results: Patients had excellent recovery with symptom-free survival. In follow-up, AFB-negative patients were given ATT for 6 months and positive cases were continued for 6 months after they become negative. We have two late deaths in the series. Two patients required reoperation for major air leak. Many young patients are leading a good life.

Conclusions: Pneumonectomy is an age-old curative procedure for tubercular-destroyed lung. Meticulous repair of bronchus, control of septicemia, ventilator support, is important to yield good results. Resection whenever possible in MDR cases is a boon to them.

The place of closed mitral valvotomy procedure in facility-deprived countries in the modern PTMC/PMBV era: 20 years experience at SMS

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Background: The management of mitral stenosis varies depending on availability of expertise and resource; however, in a facility-deprived country with low economic status, closed mitral valvotomy remains the standard palliative treatment. The aim of this study was to evaluate the clinical status of patients with mitral stenosis following closed mitral valvotomy treated at SMS Hospital. These results suggest that there is still a place for closed mitral valvotomy in carefully selected cases.

Methods: Data obtained over a 20-year period from 4341 patients who underwent CMV were analyzed. The analysis was carried out retrospectively from hospital records, with follow-up examinations being conducted mainly at the outpatient clinic. All patients presenting with severe mitral stenosis in absence of calcification in its leaflets and regurgitation were enrolled for the study from August 1994 to August 2014. Excluded were those who do not give consents.

Results: Operative results were satisfactory in most patients, and 44 patients (1 %) were reoperated for mitral regurgitation, 110 (2.5 %) for mitral restenosis, and 5 for mixed mitral valve disease (stenosis and regurgitation). The mean interval between CMV and reoperation was 140 months.

Conclusions: There was an overall highly significant improvement in ventricular function in terms of ejection fraction and increase in mean mitral valve area. When compared with

percutaneous balloon, CMV represents a satisfactory technique in terms of simplicity, high efficacy, and lower cost.

How significant is intraoperative high pRV/LV ratio in case of intra-cardiac repair of pediatric tetralogy of Fallot patients?

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Background: The postoperative behavior of tetralogy of Fallot (TOF) patients depends on many factors. One of the important factors is the ratio of systolic pressure in the right ventricle and left ventricle (pRV/LV). The pRV/LV values of 0.7 or lower are well accepted. To achieve the optimum pRV/LV, techniques to augment right ventricular outflow tract (RVOT) are being employed which lead to increased pulmonary insufficiency, which in turn is associated with complications. This study is being conducted with the purpose of knowing the progression of high pRV/LV.

Methods: This study includes a retrospective analysis of tetralogy of Fallot patients operated at single center in 1 year. Perioperative analysis of pRV/LV was made by direct measurement. In case of high pRV/LV (>0.7), input received from trans-esophageal echocardiography, surgeon's opinion, and hemodynamics of the patients were analyzed to decide for further RVOT augmentation.

Results: A total of 40 TOF were operated on in 2014. There was no mortality. Out of 40 TOF pediatric patients operated on, 15 patients had pRV/LV of more than 0.7. Out of those 15, 4 had TAP (mean pulmonary valve z-score=-2.68), while 11 had annular sparing ICR. (Mean pulmonary valve z-score=-1.8). The pre-discharge echocardiography revealed a mean pRV/LV ratio of 0.5.

Conclusions: The residual shunt, RVOT muscle bundle, and dynamic RVOT obstruction are some of the factors which influence pRV/LV. Careful assessment by the operating surgeon, trans-esophageal echocardiogram, and hemodynamic data can be helpful in avoiding further RVOT augmentation and its complications. High pRV/LV is not an absolute indication for intervention.

Trans-atrial repair of tetralogy of Fallot: midterm results

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Background: We evaluated midterm results of transatrial repair of tetralogy of Fallot (TOF) with a stress on follow-up studies by echocardiography and exercise testing.

Methods: Out of a total of 235 patients undergoing transatrial repair of TOF between January 2001 and January 2011 by a single surgical team, 59 patients consented for this study. Mean follow-up was 6.10 ± 1.86 years (median, -5.50; range, 4.50 to 12.60 years).

Results: One patient had residual VSD and one patient required re-operation for residual right ventricular outflow tract (RVOT) obstruction. Mean RVOT gradient was 13.36 ± 7.99 mmHg. Thirty-three (55.9 %) patients were free of any pulmonary regurgitation. Mean right ventricular myocardial performance index was 0.35 ± 0.06 . Tricuspid annular plane systolic excursion and systolic tricuspid lateral annuli velocity (s') were 16.75 ± 2.57 and 10.82 ± 1.64 , respectively, and were suggestive of normal right ventricular systolic function. The mean maximum oxygen uptake (VO_2) max was 42.35 ± 6.55 , which is higher than previously reported values of patients with repaired TOF.

Conclusions: Transatrial repair for TOF offers good mid- to long-term hemodynamics, preserves the right ventricular systolic and diastolic function, and preserves the exercise tolerance capacity.

Unique experience of homograft valve implantation from multi-organ harvesting aid network (MOHAN) foundation

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Background: Usually, homografts are retrieved from cadavers in autopsy rooms. We present our unique experience of harvesting the homografts in an operating room from the Multi-organ Harvesting Aid Network (MOHAN) Foundation.

Methods: From May 2009 to November 2013, we have harvested homografts from 52 donors. The age of donors ranged from 40 days to 69 years. The sources of organs were from brain-dead patients (36), natural death donors (3) at their home, and transplant recipient hearts (2). None of them was from autopsy. The homograft valve sizes varied from 10 to 36 mm. The homografts were sterilized with antibiotics and preserved under 4 °C.

Results: The homograft implantations were done in 98 children with congenital heart disease. The recipient age ranged from 4 months to 36 years. There were two deaths. None of the valves were discarded because of microbial contamination, and no patient developed bacterial endocarditis after implantation.

Conclusions: MOHAN Foundation is a National Voluntary Organization which was established in 1997. They counsel families of brain-dead patients or deceased persons for organ donation, mainly for transplants. If there is no suitable heart transplant recipient, the hearts are given for harvesting homografts. Homografts harvested from autopsy rooms have microbial contamination. Even after sterile reports, there is a rare chance of endocarditis after implantation.

In our experience, no homograft was discarded and none of the patients had endocarditis. This is due to sterile harvesting technique from Operation Theater.

Video-assisted thoracoscopic surgery in pediatric patients

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Background: This study aims to review our practice and feasibility of video-assisted thoracoscopic surgery (VATS) in pediatric population.

Methods: Patients undergoing VATS surgery from July 2010 to December 2014 were reviewed. Data was collected regarding patient demographics, disease profiling, preoperative, intraoperative, and postoperative and follow-up clinical data in Hospital information clinical database.

Results: Of 1878 patients, 55 were in the pediatric age group (age 1 to 16 years). The disease pathology included: empyema (pyogenic and tuberculosis), mediastinal cysts and tumors, thymectomy for myasthenia, congenital bronchiectasis, cystic malformations, arteriovenous fistulae, thoracic outlet tumours, kartagener's syndrome, aspergilloma, kyphoscoliosis and endobronchial tumors. Single lung isolation was achieved by double lumen intubation in patient upto age 10 (size 26 French). Isolation in younger patients was achieved by using endobronchial blockers and selective intubation of opposite lung. CO₂ insufflation helped deflation. VATS was performed using staplers for ligating vessels and bronchus; 53/55 patients were extubated in OR. All patients were sent overnight to intensive care unit. Mean drain dwell time was 1 day. One patient developed systemic fungaemia requiring prolonged intubation and subsequently passed. No blood transfusion was required. No wound infections were reported. Pain score was 2/10 using intravenous and subsequently oral analgesia. Hospital stay was 4 days.

Conclusions: VATS (thoracoscopy) is a feasible option in pediatric age group with good clinical and cosmetic outcomes. A VATS pediatric program including a trained pediatric anesthetist, intensivists, and thoracic surgeon can ensure good outcomes with low morbidity and mortality.

Early outcomes after surgery for arch repair in interrupted/hypoplastic arch

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Background: Hypoplastic or interrupted aortic arch anomalies are rare and challenging to repair. To analyze retrospectively the early outcomes of single stage repair of arch anomalies with correction of associated cardiac defects.

Methods: We reviewed the records of 51 (2.28 %) patients from January 2010 to November 2014 who underwent arch repair; of these, 39 (76.47 %) had hypoplastic and 12 (23.53 %) had interrupted aortic arch. During the same period, 2233 patients underwent repair of congenital cardiac defects. In the arch hypoplasia group, 20 patients were associated with moderate to severe coarctation of aorta. Both groups were associated with other anatomical defects in which ventricular septal defects were more frequent. Mean age was 106.9 days and weight was 3.67 kg. Of these, 47 (92 %) patients underwent repair through midline sternotomy with CPB and moderate hypothermia, rest of the cases done through thoracotomy and off CPB. Circulatory arrest was not used in any of these patients.

Results: Early mortality was in eight (15.6 %) patients, six had hypoplastic and two had interrupted aortic arch. In all patients, VSD was present as an associated anomaly. Mean mechanical ventilation time was 56.3 h, ICU stay was 5.21 days, and hospital stay was 12.75 days. One patient needed re-intervention after 6 months due to anastomotic narrowing.

Conclusions: Aortic arch anomalies are uncommon and are commonly associated with VSD and COA. Almost all defects could be corrected primarily with acceptable mortality. We have noticed high mortality in patients who had associated ventricular septal defect compared with those with other anomalies.

Abstracts for Award Session

A novel custom made mitral annuloplasty ring - six years experience

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Background: To assess the effectiveness of custom made annuloplasty ring in mitral valve repair.

Methods: Over six years we have operated 50 patients for mitral valve repair in both rheumatic and myxomatous mitral pathology. Mitral regurgitation was the predominant lesion. Age varied from 10 years to 50 years. Co-existent lesions were ventricular septal defect, AV canal defect, aortic regurgitation, tricuspid regurgitation. All patients underwent mitral valve repair with custom made ring (saw toothed stiff Teflon ring) posterior mitral annuloplasty and correction of associated lesions. All patients underwent preoperative 2D Echo and parameters recorded were - LA size, LVIDd, LVIDs, Mitral valve pathology, Mitral annulus, PA pressure, EF and associated pathology. Patients are assessed by intraop TEE, echocardiogram at immediate per discharge, postop at 3months, 6 months and yearly thereafter to assess the effectiveness of repair.

Results: At follow up we found that significant reduction in left ventricular dimensions (LVIDd, LVIDs), severity of mitral

regurgitation and improvement in left ventricular function, reduction in PA pressures. Out of 50 patients three patients needed reintervention and two patients died. Literature search showed that our results are comparable.

Conclusions: This simple, easily reproducible custom made ring gives adequate and effective support for the mitral valve repair.

Primary graft failure following cardiac transplantation- our experience over 18 months

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Background: Primary graft failure (PGF) remains the strongest determinant of perioperative mortality after heart transplantation (HT). PGF was defined by four criteria reflecting significant myocardial dysfunction, severe hemodynamic impairment, and early onset after heart transplantation, and absence of secondary causes of graft dysfunction. This study looks at the incidence and outcomes of PGF at our centre after we started heart transplant 18 months ago.

Methods: 11 orthotopic heart transplants were done at this centre from May 2013 till November 2014. All patients were included in the study. All transplants were done in the standard batrial technique by the same surgeon. Primary graft failure was defined as echocardiographic finding of dysfunction of either or both ventricles; cardiogenic shock lasting more than 1 hour in the form of systolic blood pressure less than 90 and /or cardiac output <2L/min/sq meter despite adequate filling pressures of 15 mm CVP or PCWP of 20 mm; or requirement of mechanical circulatory devices like IABP, ECMO or VAD. Secondary causes of PGF like hyper acute rejection or cardiac tamponade were excluded.

Results: 4 patients out of 11 had PGF (36 %). One had isolated LV dysfunction requiring IABP support for 48 hours. 3 patients required ECMO in the immediate post operative period and only 1 could be successfully weaned off. Mortality was 2 patients (18 %).

Conclusions: PGF is the lone cause of mortality in our series and results are improving with increasing understanding of the causes and better and judicious use of mechanical circulatory devices.

Prosthetic valve thrombosis- should fibrinolysis be considered as first line of management?

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Background: Traditionally prosthetic valve thrombosis has been managed with emergency surgery. However, there is

growing evidence that fibrinolysis is a suitable alternative. In this study we aim to examine the safety and efficacy of fibrinolysis in the management of prosthetic valve thrombosis (PVT).

Methods: This retrospective study was carried out at a single centre between June 2010 to June 2014. All patients presenting with PVT were included in the study. All patients were treated with fibrinolysis using our institutional protocol. Exclusion criteria included presence of pannus.

Results: 19 patients presented with 24 episodes of PVT. In patients with first episode of PVT, 11 out of 15 patients (73.33 %) were successfully treated with fibrinolysis leading to clinical as well as haemodynamic improvement. In 4 (26.6 %) patients no definite thrombus could be identified and these patients were taken directly for an operative intervention. 3 patients presented with second episode of PVT of which 2 were treated successfully with repeat fibrinolysis. 1 patient had a 3rd episode and was operated upon. There was 1 incidence of intra-cerebral bleed leading to death. Mitral valve was the commonest valve involved in our study; 78.94 % case (15 out of 19). However, this association was non-significant with an Odds' ratio of 1.30 (95 % CI 0.34-4.95).

Conclusions: Fibrinolysis is safe and should be considered as primary treatment strategy for first episode of prosthetic valve thrombosis. In recurrent thrombosis while a trial of fibrinolysis can be given, success.

Subxiphoid (sternal sparing) approach for minimal access coronary artery bypass grafting

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Background: Introduction: Coronary Artery bypass grafting (CABG) is one of the commonest cardiothoracic surgical procedures carried out in today's day and age. Traditionally the midline sternotomy approach was in vogue and CABG would be done on cardiopulmonary bypass. With further advances and expertise various procedural modifications have been made including off pump CABG and minimally access procedures which include minimally invasive direct coronary artery bypass (MIDCAB) grafting and partial sternotomy techniques. Subxiphoid CABG is a sparingly used novel approach, but nonetheless an excellent choice in many cases. To study the feasibility of minimal access subxiphoid CABG and its outcomes in patients.

Methods: We used the subxiphoid approach in 6 cases from June 2014 to date. Patients were followed up prospectively and evaluated for various factors which included post op pain scores, healing, graft patency.

Results: This technique is very useful and has various advantages. Blood loss was found to be less. Healing was found to be faster and pain scores were found to be less.

Conclusions: The subxiphoid approach for CABG is a relatively new advancement in this surgery and is a true minimal access procedure which includes doing the CABG through a small incision, just starting below the xiphisternum and extending below to less than three inches. Direct CABG is done through this approach including multivessel grafting, gastroepiploic artery harvesting and redo cases. We hereby would like to describe this new advancement in the field of cardiothoracic surgery.

A 15-year experience and outcomes of constrictive pericarditis treated with surgery

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Background: Constrictive pericarditis is a rare disease with varying etiologies that can lead to disabling symptoms and severe heart failure with poor quality of life. Its cause has changed over the years, but tuberculosis remains most prevalent in India. This study examines our experience with constrictive pericarditis treated with pericardiectomy, and attempts to identify factors that predict poor long-term survival.

Methods: A retrospective review was performed on the database of patients that underwent partial or complete pericardiectomy for constrictive pericarditis between 1998 and 2014. Demographic, comorbid, operative and outcome data were analyzed.

Results: A total of 120 patients underwent pericardiectomy for constrictive pericarditis at our institution over the last 15 years. The mean age was 48 years and there were 108 males (90 %). The most common etiology was tuberculosis. Complete pericardiectomy was performed in 118 patients and incomplete in 2 patients due to dense adhesions. There were two re-operations for bleeding, and 1 intra-operative deaths. Cardiac function as assessed by echocardiogram showed considerable improvement after pericardiectomy. Overall 30-day, 1-year, 5-year, 10-year, and 15-year survival rates were 100 %, 96 %, 92 %, 86 %, and 77 %, respectively. On multi-variate analysis, high pre-operative total bilirubin and high pre-operative creatinine were associated with increased long-term mortality.

Conclusions: Constrictive pericarditis can be a disabling disease that needs aggressive surgical treatment before severe symptoms of heart failure develop. Pericardiectomy can improve significantly the cardiac performance. Pre-operative liver failure and renal insufficiency are clear risk factors for decreased long-term survival.

Perfusion strategies in arch repair

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Background: Arch repair is a daunting task in all aspects, from the perfusion strategy to the technique itself. The aim of this paper is to discuss various aspects of the surgery and perfusion techniques which can be applied to any situation of neonatal arch issues.

Methods: We retrospectively analyzed our experience over the last 5 years of all the consecutive patients requiring intervention for arch hypoplasia. Total of 108 patients underwent arch reconstruction, 40 hypoplastic arch with VSD, 18 TGA with VSD and hypoplastic arch, 19 isolated hypoplastic arch/severe coarctation amounting to aortic interruption, 20 patients of HLHS out of which 12 underwent Norwood's stage I procedure and 8 underwent DKS, 4 AP window with hypoplastic arch, 3 hypoplastic arch with PAPVC, 2 hypoplastic arch with AVCD, 1 hypoplastic arch with ASD and one with sev AS.

Results: Average age 54 days, 60 % male, average weight of 3.16, CPB 239 minutes, cross clamp time of 97 minutes, Innominate perfusion 45 minutes and TCA of 38 minutes. Operative mortality 15/108 13.8 %, blood culture positive sepsis, 22/108 20 %, Seizure activity 10/108 9 %, LCO 21/108 19.4 %, residual gradient across the arch requiring intervention in 6/108 5.6 %.

Conclusions: Our technique of arch repair is applicable to all situations of arch involvement. The perfusion strategy is simple to institute and using it the TCA time can be kept to the minimum.

Surgical strategies in the management of anomalous origin of left coronary artery from pulmonary artery (ALCAPA) in different age groups - a 14-years experience: SSSIHMS-Whitefield

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Background: We compared mid-term and long term outcomes of various surgical strategies for management of anomalous origin of left coronary artery from pulmonary artery (ALCAPA) in various age groups.

Methods: Between 2001 and 2014, 26 patients in a wide range of age groups (5 months–56 yrs) underwent ALCAPA repair. They were chosen for different surgical approach-based on the sinus of origin of coronary ostia. 13 patients underwent direct coronary transfer, 9 underwent Takeuchi repair, 2-modified Takeuchi and 2 patients - coronary artery bypass grafting. 6 patients needed additional mitral valve repair. These patients

had a mean follow up of 31.36 months(3 months to 166 months).

Results: There were 2 cases of in-hospital mortality .three patients showed new onset of mitral valve regurgitation. 6 among 26 patients developed supralvalvular pulmonary artery stenosis.

Conclusions: 1) In the majority of patients with ALCAPA, both ventricular function and mitral valve regurgitation can normalize over time. 2) there was no significant difference in the immediate morbidity/ mortality, among the various surgical approaches employed. 3) supralvalvular pulmonary artery stenosis as a complication was found to be more in the patients who underwent Takeuchi procedure

Minimizing blood and blood product usage in open heart surgery by simple approach of blood conservation

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Background: The objective of this study was to perform an audit of the use of homologous blood and blood products in patients who underwent open-heart surgery by a single surgical team that follows an in-house protocol for blood conservation.

Methods: Consecutive 2300 patients undergoing open-heart surgery over a period from Jan 2002 to November 2014 were retrospectively reviewed to assess the comprehensive blood and blood product usage. This series included adult as well as paediatric patients (Age 6 months to 86 years). All types of cases were included (routine & emergency, coronaries, valves, congenital and minimally invasive). Homologous blood and blood product usage during and after surgery, in the intensive care unit and up to hospital discharge was analyzed. Different statistical tests were used to analyse this data including the sub-group analysis. 82 % patients did not receive any blood or blood products. Average unit usage of blood, FFP and platelets per patient were 0.63, 0.34 and 0.37 respectively. The sub-group analysis was done for adult vs paediatric group, CABG groups (on vs off pump). Mean hemoglobin at the time of discharge was 9.5 gm % (7.9–13.5 gm %). Factors were identified which would increase the need for transfusion.

Conclusions: The results of these tests and the measures used to reduce blood and blood product usage will be discussed. Simple standardized multidisciplinary approach of blood conservation in cardiac surgery, decreases bleeding and transfusion requirements in a safe and cost effective manner.

Management of chronic thromboembolic pulmonary hypertension

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Background: Venous thromboembolism is the third most frequent acute cardiovascular syndrome after M.I and Stroke. Intravenous thrombolysis is the choice for massive pulmonary embolism with unstable haemodynamics. The management varies in patients with pulmonary embolism and right sided thrombi. The treatment of choice for patients with chronic thromboembolic pulmonary hypertension(CTEPH) is pulmonary endarterectomy with significant symptomatic and prognostic benefits. We evaluated the different management strategies & their outcomes in this study. Pulmonary endarterectomy being the only treatment option for (CTEPH). Medical pre-treatment with therapies specific for pulmonary hypertension is used as a bridge to PEA.

Methods: We analysed 43 patient with pulmonary embolism from 2003-2014. Ten patient were managed surgically, because of presence of right sided thrombi with pulmonary embolism. The challenge is to find and follow the correct pulmonary artery endarterectomy plane in the time allowed during circulatory arrest.

Results: Out of 10 patients who underwent surgery there were 7 males and 3 females within age group range (23-73 years). 7 patients had right arterial thrombi and one patient had right ventricle thrombi and 2 patient's had thrombi extending into LA through PFO. Associated DVT was present in 8 patient's. Out of these 10 patient's, 3 patient required IVC filter, one patient died after surgery within 7 days of procedure with surgical mortality being 10 %.

Conclusions: Surgery is likely to remain the main stay of therapy for such patients with (CTEPH).

Early & mid - term outcomes of rupture of sinus of valsalva aneurysms

(RSOVA) – surgical repair / percutaneous closure - a single institutional

experience: SSSIHMS, WhitefieldA

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Background: a retrospective study - to evaluate the early and mid-term outcomes of surgical and percutaneous management of ruptured sinus of valsalva aneurysms.

Methods: between 2001-2014, among a total of 112 patients - 75 patients underwent surgical intervention (66.69 %) and 37 cases underwent percutaneous device closure (33.03 %). These patients were followed up for a period of 6 months to 32.5 months in the percutaneous closure group and 1 month to 175 months in the surgical closure group.

Results: among 112 patients, right coronary sinus was involved in 80 patients (71.42 %) and non coronary sinus in 32 (28.57 %). RSOVA drained into right atrium in 34 cases (30.35 %), right ventricle outflow tract in 72 (64.28 %), right ventricle inlet in 5 (4.4 %) and left atrium in 1 (0.8 %). 88 patients (78.57 %) were found to have associated anomalies like ventricular septal defect (48.2 %), moderate/ severe aortic regurgitation (16.9 %) and others (13.3 %). In the surgical group - 20 patients underwent direct closure (26.67 %), 55 underwent patch repair (73.33). 2 patients required reinterventions. In the percutaneous closure group, 9 patients (24.43 %) required device retrieval and surgical procedure.

Conclusions: 1. transcatheter RSOVA repair is a safe and effective option in isolated cases of RSOVA. However long term follow up is necessary. 2. in the surgical group - patch closure showed better outcomes with lesser residual lesions and need for reinterventions as compared to the direct closure group. 3. associated aortic regurgitation or aortopathy is an indicator of poor outcome, on follow up.

Does high HbA1c have a protective effect on post-operative atrial fibrillation in patients undergoing off pump coronary artery surgery?

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Background: It has recently been reported that higher preoperative hemoglobin A1c (HbA1c) is associated with lower incidence of post-operative atrial fibrillation (AF) after off-pump coronary bypass surgery (OPCAB). Aim of this study was to examine if high HbA1c (poorly controlled diabetics) had a protective effect on post-operative AF.

Methods: The study was carried out between 2006 and 2013 in a single centre. Pre-operative HbA1c was measured in 5259 consecutive patients undergoing primary isolated OPCAB. Patients were put in 2 groups depending on whether HbA1c was ≥ 6.6 (n=2451) or ≤ 6.5 (n=2808). Groups were compared for baseline and operative characteristics and post-operative outcomes. Risk factors for AF were analysed.

Results: Groups were well matched in terms of age, EuroSCORE, recent myocardial infarction (MI), concomitant carotid artery disease, and Chronic Obstructive Airway Disease. There were a significantly higher number of females in the group with HbA1c ≥ 6.6 . Number of grafts performed was

similar [2.69 ± 0.82 vs. 2.77 ± 0.81]. There was no difference in the incidence of AF in the group with HbA1c ≥ 6.6 [272 (11.1 %) vs. 351 (12.5 %); $p=0.116$; Odds ratio 1.144, 95 % CI 0.967-1.354]. Mortality was similar [39 (1.6 %) vs. 43 (1.5 %); $p=0.88$]. Apart from increased incidence of sternal wound infection [76 (3.1 %) vs. 59 (2.1 %), $p=0.022$] there was no major difference between the groups in post-operative outcomes. Risk factor for AF included age above 60 (Odds ratio 1.08; 95 % CI 1.069-1.091), recent MI (Odds ratio 0.768; 95 % CI 0.606-0.971), extra-cardiac arteriopathy (Odds ratio 1.667; 95 % CI 1.091-2.517).

Conclusions: HbA1c ≥ 6.6 is not associated with decreased risk of AF. Increased age, recent MI and presence of extra-cardiac arteriopathy are associated with increased incidence of AF in patients undergoing OPCAB.

Randomized controlled trial comparing histidine-tryptophan-ketoglutarate cardioplegia versus conventional blood cardioplegia in children undergoing tetralogy of Fallot repair

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Background: Histidine- tryptophan-ketoglutarate (HTK) cardioplegia solution has been used for myocardial protection in adults. However, evidence about its use in the paediatric population is sparse. Aim of this study was to identify the effectiveness and issues of HTK Cardioplegia in children undergoing tetralogy of Fallot (TOF) repair at our institution.

Methods: In this single-centre, prospective, randomized controlled trial, 50 consecutive patients undergoing TOF repair were randomized in 2 groups- those who received conventional blood cardioplegia and those receiving the HTK cardioplegia. Myocardial protection was compared using Troponin I and CPK-MB at time points 6 hrs, 24 hrs and 48 hrs. Clinical data and post-operative echocardiographic parameters were also compared in both groups.

Results: Increase in both Troponin I and CPK-MB levels were seen immediately after surgery which decreased in both groups in a time related fashion. However, the levels of Troponin I was significantly higher at all time points in the group receiving conventional cardioplegia (p values - 0.002 at 6hrs 0.026 at 24 hrs; 0.036 at 48 hrs). The level of CPK-MB was not significantly different between the groups. However, the Tricuspid annular plane systolic excursion (TAPSE) value was significantly lower in the HTK cardioplegia group. [$8.75 \text{ cm} \pm 2.30$ vs. 10.75 ± 3.35 ; $p=0.017$] There were 2 deaths; one in each group. No other clinical differences between the groups were seen.

Conclusions: HTK solution is safe in children with evidence of decreased myocardial injury in children undergoing TOF repair. However presence of right heart dysfunction remains a concern.

A combined minimally invasive approach of endoscopic oesophageal stenting and video-assisted thoracoscopic drainage and decortication for management of thoracic empyema secondary to oesophageal perforation

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Background: Intrathoracic oesophageal perforation with empyema thoracis is a potentially life-threatening condition, which is conventionally managed by a thoraco-laparotomy. We hereby describe a novel minimally invasive approach for managing such cases.

Methods: Between April 2012 and October 2014, 3 male and 6 female patients with thoracic empyema resulting from oesophageal perforation underwent stenting of the perforation by endoscopic deployment of Self expanding Metallic Stents (SEMS) by our gastroenterologist. 48 hours later and after ascertaining no oesophageal leak, this was followed by a video assisted thoracoscopic (VATS) drainage of empyema and decortication.

Results: Oesophageal perforation was iatrogenic in 4 patients, due to Boerhaves syndrome in 3, caustic ingestion in one and secondary to fish bone impaction in one. Leak from the Oesophageal perforation stopped after placement of SEMS in all patients except one, who had to undergo readjustment of stent 3 days later. VATS drainage of empyema and decortication was possible in all 9 patients. One patient had to be re-explored due to bleeding. There was no mortality. Mean chest drain dwell time post VATS was 4 days.

Conclusions: Outcomes of intrathoracic oesophageal perforation and empyema are generally poor. Managing such

complex cases by a combination of oesophageal stenting and VATS seems to be an effective approach in decreasing the morbidity and mortality.

Video assisted thoracoscopic bilateral cervico-thoracic sympathectomy for recurrent uncontrolled arrhythmias in a patient of Jervell and Lange-Nielsen syndrome

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Background: Jervell and Lange-Nielsen syndrome (JLNS) is a type of long QT syndrome, associated with severe, bilateral sensorineural hearing loss. If untreated it can lead to syncope, seizures, or sudden death. The usual management is using beta blockers, however surgical sympathetic denervation is required in refractory cases. We present a video showing VATS bilateral cervico-thoracic sympathectomy for one such patient.

Methods: We had a 3 year male child who was having recurrent ventricular arrhythmias. He suffered 3 cardiac arrests inspite of being managed with highest doses of beta blockers. So he was referred to us by the pediatric cardiologist for a minimally invasive surgical management. Bilateral 3 port VATS hemistellate ganglionectomy and T2, T3 and T4 ganglionectomy was performed.

Results: The intraoperative course was uneventful and there were no ectopics or hemorrhage. Post operatively he was extubated and he did not experience any more arrhythmias and was kept on maintenance doses of beta blockers which was gradually tapered off and patient discharged on 4th post-operative day.

Conclusions: Thoracoscopic denervation surgery, offers a safe and effective treatment option for patients with prolonged QT syndrome with intractable arrhythmias refractory to medical management.