

# Abstracts of the 60th Annual Conference of IACTS, February 2014

## To analyse and study the regression of PH following intracardiac repair for VSD with severe PH

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**Introduction:** To analyse and study the regression of pulmonary hypertension following intracardiac repair for ventricular septal defect presenting with severe pulmonary hypertension.

**Methods:** Preoperative echocardiography was used to assess the baseline pulmonary artery pressure. Intraoperative PA pressure was measured after coming off-bypass. Subsequently PA pressures were measured echocardiographically at 1 month, 3 months and 6 months after surgery.

**Results:** A total of 261 patient data was studied retrospectively from Jan'07 to Oct'13 from a single unit in our institute. The mean age of presentation was 1 year 4 months with 61 % being males. The mean duration of complaints was 9 month 17 days Postoperative mortality was 4.07 %. The mean duration of ventilation was 18 hours and mean stay in recovery being 2.8 days. The average duration of hospital stay was 5.9 days. The regression of PH at 6 months was found to be app. 60 % of the baseline value.

**Conclusions:** Intracardiac repair for VSD with severe PH is fraught with many complications including PH crisis in immediate post-operative period. The regression of PH occurs usually with intracardiac repair of VSD. This study tries to measure the regression of PH over 6 month post-operative period.

## Unusual types of Scimitar syndrome – Case series

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**Introduction:** Scimitar syndrome is a rare variety of PAPVC in which the anomalous right pulmonary vein, generally draining the entire right lung but occasionally only the middle and the lower lobe descend to drain into the IVC. Scimitar syndrome along with anomalous drainage of left sided pulmonary veins is rare and poses a surgical challenge. We report a case series of 3 unusual cases of scimitar syndrome. In our institute, we had 3 patients with rare variety of scimitar syndrome over a period of 6 years (2005 – 2011). All were symptomatic with recurrent respiratory tract infections. All of them had wide and fixed split second heart sound. Chest

roentgenography revealed scimitar vein along the right heart border. Right lung hypoplasia was seen in one patient.

Case 1> ECHO: Scimitar vein formed by RUPV and RLPV, LLPV draining into LA, LUPV draining into Innominate vein. ASD. Cardiac catheterization: revealed same findings. Case 2> Scimitar vein formed by RUPV and RLPV, IAS – intact. MRI: LUPV draining into Innominate vein, LLPV draining into LA. Case 3> ECHO: Scimitar vein formed by RUPV, RLPV and LLPV, ASD. MRI: Scimitar vein (RUPV, RLPV and LLPV), LUPV draining into LA with ostial stenosis.

**Methods:** All were approached through median sternotomy and aorto-bicaval CPB. Case1> TCA was used, Scimitar vein routed to LA across the ASD with autologous pericardial baffle, LUPV disconnected from Innominate vein and anastomosed to LAA. Case2> Deep hypothermia was used, Scimitar vein was disconnected and anastomosed with the LA. LUPV disconnected and anastomosed with LAA. Case3> TCA was used. Scimitar vein was routed to LA across the ASD with autologous pericardial baffle. LUPV ostial stenosis was repaired by osteoplasty technique.

**Results:** All three patients had uneventful recovery in the post operative course. Post operative follow-up ECHO evaluation showed laminar pulmonary venous drainage in all three patients and all are in NYHA FC-I till date.

**Conclusions:** Scimitar syndrome is a rare type of PAPVC and is associated with multiple conditions. All patients diagnosed to have scimitar syndrome have to undergo detailed imaging evaluation to delineate the cardiac anatomy and to look for associated cardiac lesions, which will aid in surgical decision making. Hypothermia is a useful strategy in repair. Unusual types can be repaired with good surgical results and long term outcome.

## Neonatal BT-shunts –our experience June 2010-Oct 2013

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**Introduction:** BT shunt is the major strategy for palliation (systemic-PA)of cyanotic lesion in neonates.

**Methods:** Between jun2010–Oct 2013 28 neonates underwent systemic-PA shunting for duct dependant cyanotic heart disease

**Results:** Out of 28 neonates 18(64%) were male 10 (36%) were female. The mean age was 13.4 days. The mean weight was 1.8 kgs.17/28 babies were on prior prostin infusion prior

to the procedure. Of the 28 shunts 7(25%) were Rt-sided, 2(7%) were Lt-sided 19(68%) were central shunts. Thoracotomy was done in 2(7%), rest were sternotomies. They were divided into four groups Fallot's 7(25%), PA with intact IVS 2(7%) PA with VSD 13(45%) the last group was TA/PA and single ventricle physiology 6(21%) 10/28 babies died in the post operative period. Most common cause of death being

**Conclusions:** Despite being a relatively safe procedure the mortality still remains high due to the complexity of the cases.

#### Video- assisted cardioscopic repair of muscular ventricular septal defect

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**Introduction:** Muscular trabecular Ventricular Septal Defect (VSD), a congenital cardiac defect has been a diagnostic and therapeutic challenge due to numerous muscular trabeculations of the right ventricle overlying the defect. It may not be possible to visualize the true edges of the defect through the transatrial approach and may be difficult to achieve secure and complete closure of these VSDs with subsequent postoperative complications. We have developed a technique for visualisation of remote intracardiac structures and to facilitate surgical repair of muscular VSD.

**Methods:** We have operated a total of five patients with muscular VSD (with three patients having additional perimembranous VSD) over a period of last two years from September, 2011 to October, 2013 admitted in our department. Intracardiac exposure was made through trans-atrial approach and adapting Thoracoscopic instrumentation (5 mm, 30 degree forward-oblique HopkinsII telescope with 3-chip camera) and paediatric bronchoscope, septal defects were repaired after adequate visualisation with treated autologous pericardial patch.

**Results:** The patients ranged in age from 4 to 22 years and included two male and three female patients. Adequate visualization of the intended structures was achieved without much increasing the operative time in each case. There were no complications associated with the videoscope.

**Conclusions:** Video-assisted cardioscopic surgical techniques have been employed to improve visualization of small intracardiac structures within confined spaces and it was found to very useful in secure and complete closure of low trabecular or apical VSDs. Further experience with video-assisted cardioscopy might widen its role in cardiac surgery.

#### Cone reconstruction of the tricuspid valve in Ebstein's anomaly

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**Introduction:** We sought to describe a new technique for tricuspid valve repair in Ebstein's Anomaly and to report early echocardiographic results, as well as early clinical outcomes.

**Material and methods:** From September, 2011 through November, 2013, 43 consecutive patients with Ebstein's Anomaly. (mean age was 19.25 years) underwent a new surgical repair modified from the Carpentier's procedure the principle details of which are as follows. Our youngest patient was 11 months and oldest patient was 45 yrs. There were 22 males and 21 females.

The anterior and posterior tricuspid valve leaflets are delaminated from their anomalous attachments in the right ventricle preserving chordal attachments to RV apex and the free edge of this complex is rotated clockwise to be sutured to the septal border of the anterior leaflet, thus creating a cone the vertex of which remains fixed at the right ventricular apex and the base of which is sutured to the true tricuspid valve annulus level. Additionally, the septal leaflet is incorporated into the cone wall whenever possible, and the atrial septal defect is closed in a valved fashion.

**Results:** There was one death. Early post-operative echocardiograms have shown good right ventricular morphology and reduction in tricuspid regurgitation grade from severe to mild to nil. One patient had a bi-directional glenn shunt along with cone reconstruction (1 ½ ventricle repair). Another patient had a mitral valve repair along with cone repair and 4 patients underwent right atrial reduction plasty. There was one complete heart block and no tricuspid valve replacement at any time. Two patient had junctional tachycardia responded well for anti-arrhythmic treatment. There was one hospital mortality. Mean follow-up of 24 months. All patients were in NYHA Class I, except one patient who has NYHA Class II symptoms (moderate to severe TR). One re-operation required. RA reduction plasties were done in 23 cases. One case was associated with VSD, Valvar PS wherein Transatrial repair along with Cone reconstruction was done.

**Conclusions:** This surgical technique for Ebstein's anomaly can be performed with low mortality and morbidity. Early echocardiograms showed significant reduction of tricuspid insufficiency and intermediate follow up showed improvement in patient's clinical status and ventricular function.

#### Delayed primary arterial switch operation in patients with TGA and Intact ventricular septum

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**Introduction:** Patients with TGA and IVS presenting for surgery beyond the first few weeks of life have been considered at high risk for arterial switch operation because of concern over the ability of the left ventricle to support the systemic circulation. Hence, alternative strategies such as –

- Trial PA Banding followed by arterial switch
- Rapid 2 stage arterial switch
- Atrial switch
- Atrial switch + PA Banding later conversion to ASO.

**Material and methods:** Our study period was from September, 2006 to November, 2013, our experience was – Delayed primary ASO 65...cases, Early ASO .43 cases. Total number of ASOs for intact IVS = 108/293. Our youngest patient was 23 days and oldest patient was of 180 days.

**Results:** All cases were evaluated by Echo during the intensive care stay and at time of discharge. Early post-operative Echo revealed LV dysfunction in some patients. No ventricular dysfunction at the time of discharge. Our follow up ranged from 1 month – 72 months (mean around 36 months). At follow up patients were asymptomatic and 2D Echo showed no LV dysfunction.

**Conclusions:** Our experience supports the notion that LV in TGA-IVS maintaining the potential for systemic work well beyond the neonatal period. Temporary post operative LV dysfunction appears to be manifest by a prolonged post operative course, the duration of which is a function of age at surgery and is REVERSIBLE in the majority of cases. However, the need for mechanical support as a rescue strategy may limit the widespread adoption of such an approach.

#### Long term results of Aortic valve repair in Ventricular septal defect with aortic regurgitation and risk factors for failure of repair-A 20 years experience

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**Introduction:** Aortic Regurgitation associated with ventricular septal defect is often repaired using a modification of Trusler's aortic repair technique. The purpose of this study is to present long term results of aortic valve repair with ventricular septal defect and to identify the risk factors for failure of aortic valve repair.

**Methods:** From November 1994 till November 2013, 205 patients with ventricular septal defect with aortic regurgitation underwent surgical correction. Male to female ratio was 1.6:1. The ventricular septal defect was perimembranous in 35 (17.1%) subaortic in 97 (47.3%), sub pulmonic in 42 (20.5%) and doubly committed in 30 (14.6%). The prolapsed aortic cusp was the right coronary cusp in 124 (60.5%), the noncoronary in 43 (21%), and both in 1 (0.5%). Severe aortic regurgitation was present in 64 (31.2%) and moderate aortic regurgitation was present in 116 (56.6%) patients. Plication was performed at one end of the free edge of the prolapsed cusp(s) in 118 (57.6%) and at more than one end in 47

(22.9%) of the patients. The ventricular septal defect was closed by use of a patch in all cases. The repair was reinforced with Gortex/Dacron or pericardial hood in 34 patients (16.6%). Intraoperative transesophageal echocardiography was performed in all and 2Dimensional echocardiography was repeated in immediate postoperative period and before discharge. Patients were followed up from 3mths to 5 years (early), 6- 10 years (midterm) and more than 10 years (long term).

**Results:** The early, mid and long term follow-up were 95.1%, 66.3% and 24.5% respectively. The degree of aortic regurgitation was moderate to severe in 13(6.3%) patients. One patient developed cusp perforation causing severe aortic regurgitation. Aortic valve replacement was required in 8 (3.9%) patients. None of the patient with reinforcement of repair with hood at commissure developed significant aortic regurgitation in mid and long term follow-up. There was no in hospital, early or late mortality. The actuarial freedom from reoperation was 93.7% on follow-up.

**Conclusions:** Trusler's aortic valve repair is an effective and durable technique for the surgical treatment of patients with ventricular septal defect and aortic regurgitation syndrome. The adequacy of the initial repair is the most important determinant of the long-term results. Use of reinforcement hood improves the stability of repair. The risk factors for the failure of repair are age, severity of regurgitation, quality of the cusp tissue, technique of repair and post operatively uncontrolled blood pressure.

#### ASO for TBA: Are the results any different from TGA & Large VSD

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**Objective:** An arterial switch operation is considered the treatment of choice for double-outlet right ventricle with subpulmonic ventricular septal defect (VSD) and also TGA & VSD. The clinical results of an arterial switch operation (ASO) with VSD closure for this (Taussig—Bing) anomaly were retrospectively studied and compared with the group of patients with TGA & large VSD undergoing ASO in the same time period.

**Methods:** From January 2008 through June 2013, 30 patients with Taussig-Bing anomaly and 54 patients of TGA with large VSD underwent ASO at the Escorts Heart Institute in New Delhi. Age at surgery for TBA was 27 days -7 years (median age 3 months); and for TGA with VSD it was 1 day-6 years (median age 2 months). Weight of the patients for TBA was 4.1±2.6 kg and TGA VSD group was 4.4±2.5 kg. Great arteries relationship was side by side in 30% of TBA and 20% in TGA VSD group. Non type 1 coronary arteries arrangement was present in 23% of TBA and 13% of TGA VSD

(2 intramural coronaries in each group). 33% of TBA had associate aortic arch obstruction (AAO) while the incidence was 11% in TGA VSD. 17% of TBA had cleft in AML and 3% in TGA VSD. 46.7% patients in TBA and 30% patients in TGA presented with sepsis secondary to pneumonitis. 13% of TBA and 5.5% of TGA patients were on intermittent positive pressure ventilation (IPPV) which continued up to surgery.

**Results:** Anatomical & surgical complexity was higher in the TBA group due to statistical significant higher incidence of side by side great arteries ( $p < 0.0001$ ); AAO ( $p < 0.01$ ); MR ( $p < 0.03$ ) but coronary artery abnormalities was not statistically significant difference in both groups. Despite this difference in complexity the mortality was not different between the groups. The only factors in both groups contribute to mortality was presence of preoperative sepsis ( $p < 0.019$ ) and preoperative mechanical ventilation ( $p < 0.001$ ). Freedom from reoperation was 100% at 5 years. One patient of TBA group is being followed up with subaortic membrane gradient of 50 mm of Hg may require reoperation. 4 of TBA patient and 1 of TGA VSD patient have mild subpulmonic obstruction on their follow up Echo. Hospital mortality was 23.3% (7 of 30) for TBA and 11.1% (6 of 54) for TGA with Large VSD. Among the patient who had no preoperative sepsis and IPPV the mortality was 0%. Actuarial survival was 85% at 5 years. Follow-up was 92% completed from July to November 2013 with a mean follow-up 4.1 years (range 6 months to 5.9 years). There was one late mortality (after 6 months of operation) in TGA VSD group and cause of death was not identified.

**Conclusions:** In our experience preoperative conditions (recent sepsis/ IPPV) of this patient is the only determinant factor for mortality and morbidity but not the underlying disease per se.

### Total anomalous pulmonary venous drainage along with atrial septal defect and pulmonary stenosis—a rare congenital anomaly

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**Introduction:** Total Anomalous Pulmonary Venous Connection (TAPVC) is a rare congenital cardiac abnormality which, untreated, usually results in death in infancy or early childhood.

**Material and methods:** We describe 2 cases of TAPVC and severe pulmonary valve stenosis which is even rarer and adds to the burden of obstruction to the pulmonary venous drainage. Low pulmonary blood flow is protective against the development of pulmonary vascular disease but on the other hand causes increased systemic desaturation. Which results in reduced tissue oxygen delivery and its ill effects. Further more cardiac out

put will be compromised if the interatrial communication becomes restrictive and results in severe acidosis, cyanosis and death. However, an occasional patient with TAPVC survives into adulthood without therapy and even without severe symptoms. Both diagnoses were suspected clinically and from the chest X-ray, 2D ECHO, and the patients underwent surgery.

**Results:** Their initial postoperative course has been unremarkable. The hemodynamic factors relevant to long term survival and relative freedom from symptoms in TAPVC are considered based on findings in these patients. We have recently treated these two patients with TAPVC and severe pulmonary stenosis is of unusual interest.

### The arterial switch operation - the game changer in neonatal and infant cardiac surgery

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**Introduction:** The Arterial Switch Operation (ASO) for Transposition of Great Arteries (TGA) is presently the preferred anatomic surgical correction for d-TGA in isolation or with associated cardiac defects.

**Methods:** Between July 2009 and October 2013, we have performed the ASO in 166 patients at our institution. This included 91 with dTGA and an intact ventricular septum, 46 with dTGA and a ventricular septal defect and 29 with dTGA with a ventricular septal defect and coarctation, hypoplasia or interruption of the aortic arch.

**Results:** The overall hospital mortality for the ASO was 9.03% and 5.4% for the subset with an intact ventricular septum. As the ease of performing the ASO improved, the operative techniques involved were extrapolated in the surgery for Anomalous Left Coronary Artery Origin from Pulmonary Artery (ALCAPA), Aortic Origin of Branch Pulmonary Artery (AORPA), aorto-pulmonary window and truncus arteriosus. Of note, experience with aortic arch repair in the subset of patients with TGA and hypoplasia of the aortic arch has led to improved surgical technique and cardiopulmonary bypass management of patients undergoing single stage correction of aortic arch hypoplasia or interruption with other intracardiac defects.

**Conclusions:** Our experience with the ASO for TGA has provided us ideas for operative and cardiopulmonary bypass techniques and removed the 'fear factor' in operating on a wide spectrum of congenital heart defects in neonates and young infants and thereby resulted in excellent outcomes for all these defects. It has also resulted in the ASO acquiring the status of a benchmark in deciding the success of a neonatal congenital heart surgery program and in this respect it has been a true game changer.

### Tailor made Bicuspid PTFE valve for RVOT reconstruction – Mid term experience

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**Introduction:** Repair of TOF requires placement of transannular patches in patients with small annulus. Use of PTFE membrane to construct valves in RVOT has gained popularity and has been shown to improve short term outcomes. We report our experience using standardised approach for making bicuspid PTFE valves.

**Material and methods:** Our modification of the original Nunn's technique is tailored to the width of the native right ventricular outflow and uses 0.1 mm PTFE and autologous pericardium. We use two pieces of silk to measure the width of the PTFE membrane and autologous pericardium necessary for reconstruction of RVOT. The RVOT is usually tailored to a size 2 mm more than that suggested by the Hegar dilators. The width of the PTFE is usually much more than what we would expect by eyeballing. A rectangular piece of pericardium is used to complete the RVOT reconstruction.

**Results:** This technique has been used in 35 patients since Feb 2012 with age ranging from 6 m -15 yrs, with weight ranging from 5- 45 kg. The mean duration of follow up is 8 months with longest being 18 months. 12 patients have no regurgitation, 20 patients have mild regurgitation and 3 patients have moderate regurgitation. The mean RVOT gradient is 25 mmHg and none of the valves have required explantation for stenosis or regurgitation.

**Conclusions:** The tailor made PTFE valve with autologous pericardium has given us reproducible satisfactory results in the mid-term. Longer followup would be necessary to see it maintains its competency in the long run.

### Effect of monocusp valve construction on Tetralogy of Fallot repair – Early and midterm outcomes

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**Introduction:** The aim of this study are a) to compare the early outcomes of pulmonary valve sparing vs Transannular Patch(TAP) with monocusp valve reconstruction using PTFE membrane or TAP alone and b) evaluate the mid term results after monocusp valve reconstruction.

**Methods:** Between 2007-2013, 112 patients underwent Total Correction. 44 patients (39.2%) underwent pulmonary valve sparing procedure (Group 1), 55 patients (49%) underwent PTFE monocusp valve reconstruction (Group 2) and 13 patients (11.6%) underwent TAP only. The early outcomes were measured by RV/LV ratio, RV outflow tract gradient, tricuspid and PV function and ICU parameters. Group 1 patients were

also evaluated at the mid term for clinical/Echo parameters with specific focus on monocusp function.

**Results:** The mean age, weight and PV Z-value of Group 2 were lower ( 38 months, 12.5 kgs and -4 respectively). Post operative RV/LV ratio was < 0.5 in all groups. In Group 3, the mechanical ventilation time and total ICU stay was significantly longer. The in hospital mortality was 2.6% (3 pts). The pulmonary incompetence was moderate or severe in 2% of Group 1 pts, 2.5% of Group 2 pts and 55% of Group 3 pts. The mid term follow up of Group 2 pts revealed 85% had normal function or mild monocusp incompetence. There were overall 3 mid term deaths.

**Conclusions:** A competent pulmonary valve ( either valve sparing/ monocusp ) improves early and mid term results after TOF repair. The RV function is preserved in the long term with this strategy.

### Early and intermediate outcome of surgery in patients with Transposition of great arteries with large Ventricular Septal Defect (TGA+VSD) and severe PAH and Taussig Bing Anomaly (TBA) presented beyond 6 months of age

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**Introduction:** Arterial Switch Operation (ASO) is the preferred surgical strategy for the Transposition of great arteries (TGA) and Taussig Bing Anomaly (TBA). This is usually done early in life and advisable before 3 month of life to avoid early demise and irreversible pulmonary vascular changes. Here we present early and intermediate outcome of the TGA+large VSD and TBA patients who presented to us beyond 6 months of age and underwent ASO or Palliative Senning Procedure beyond the prescribed time.

**Methods:** This study includes all patients who were more than 6 months of age at the time of ASO or Palliative Senning procedure. This was a retrospective study; preoperative and postoperative data were collected from hospital records. ASO was performed on 22 children and Palliative Senning procedure in 4 patients between 2007 and 2013. 17 patients had TGA+VSD and 9 patients TBA. Palliative Senning Procedure was done on 2 patients of TGA+VSD and 2 patients of TBA. Decision for the Palliative Senning procedure was made on the basis of non invasive investigations based on LA/LV size preoperatively or increase in pulmonary venous blood flow with oxygenation during surgery. Follow up ranged from 3 months to 6 years.

**Results:** A total of 26 patients were operated between 2007 and 2013. 21 patients were males and 5 patients were females. 14/17 were males in TGA+VSD (ASO 13 male and 1 male Palliative Senning) group and 7/9 males in TBA (ASO 5 males and Palliative Senning 2 males). The age of TGA+VSD patients ranged from 6 to 72 months (mean age 24.35± 18.35

months) and TBA patients 6 to 92 months (mean age  $38.78 \pm 32.29$  months). Mean age for ASO for TGA+VSD  $23 \pm 19.18$  months, for TBA  $29.86 \pm 28.48$  months and for palliative Senning Procedure was  $52.75 \pm 28.25$  months. Mean preoperative saturation was  $74.59 \pm 10.68\%$  in TGA+VSD,  $78.33 \pm 8.35\%$  in Taussig Bing. LA/LV was dilated in 12 patients (7 TGA+VSD and 5 TBA patients) preoperatively, out of these 4 patients were in Palliative Senning group. 1 patient had cleft AML repaired in TGA+VSD and 1 in TBA. Average hospital stay for TGA+VSD patients operated as ASO was  $26.27 \pm 13.17$  days, Taussig Bing (ASO) was  $28.00 \pm 16.02$  days and Palliative Senning procedure was  $13.25 \pm 1.71$  days. The ICU stay for TGA+VSD (ASO) was  $13.73 \pm 11.90$  days; Taussig Bing (ASO) was  $10.14 \pm 7.27$  days and for Palliative Senning Procedure  $3.25 \pm 1.5$  days. Ventilatory support for ASO for TGA+VSD patients was  $8.87 \pm 8.02$  days, for TBA  $8.57 \pm 8.07$  days and for Palliative Senning Procedure  $1.5 \pm 0.58$  days. There was an early mortality in ASO for TGA+VSD patients due to repeated episodes of PAH crisis and no early mortality in TBA or Palliative Senning procedure group. They have been in follow up and showed significant symptomatic improvement during this period except 1 late death in ASO for TGA+VSD patients. Those patients operated at age more than 1 year were continued on pulmonary vasodilator therapy. 1 patient in TBA developed sub aortic gradient and may need to be operated in future.

**Conclusions:** Arterial switch operation for Transposition of the great arteries plus ventricular septal defect and Taussig Bing anomaly in children older than 6 months shows satisfactory early and intermediate term outcome, low mortality without long term complication. Careful selection is required to decide if VSD should be closed or left open in late presenting TGA+large VSD and TBA as it has important implications on early survival and late subsidence of PAH.

#### A novel technique of intra-operative identification of muscular ventricular septal defect

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**Introduction:** Different techniques for identification of multiple muscular ventricular septal defects have been used with variable success. Our technique of per-operative identification of muscular ventricular septal defects serve as a better guide to surgical closure.

**Methods:** Following the closure of large ventricular septal defect, we passed an 8 or 10Fr infant feeding tube into the left ventricle through the fossa ovalis and fixed the tube with wall of the atrial septum. A twenty ml syringe was filled with diluted fluorescein saline. Anterior wall of the right ventricle was retracted by the assistant while the scrub nurse pushes the fluorescein saline through the infant feeding tube. Operating surgeon meanwhile looked through the tricuspid valve to see

the site of leak of saline and located the ventricular septal defect.

**Results:** This technique of intra-operative identification of ventricular septal defects was used in 18 patients who underwent operative VSD closure. In 18 patients, total of 40 defects were reported on pre-operative echocardiography. Intraoperatively, 42 defects were identified and closed. In 5 patients, 8 additional ventricular septal defects were identified which were not reported on pre-operative echocardiography. Post-operative echocardiography, showed 5 small residual defects in 4 patients while there was no residual defect in rest of 14 patients.

**Conclusions:** Per-operative location of muscular ventricular septal defects by the operating surgeon using diluted fluorescein saline injection technique is simple and easily reproducible. This reduces the dependency on the pre-operative echocardiography, confusing orthogonal echocardiographic views and different classifications.

#### Off pump surgery in congenital heart defects

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**Introduction:** At The Time Of Increasing Publications Regarding The Most Debated And Polarizing Issues In Cardiac Surgery, Comparing Off Pump To On Pump Coronary Surgery There Are Very Few Similar Publications Comparing On Pump To Off Pump Pediatric Cardiac Surgeries. The Objective Of This Study Is To Provide A Descriptive Comparison Of A Single Institutional Experience Of On Pump And Off Pump Palliative/Corrective Surgeries In A Wide Spectrum Of Congenital Heart Diseases.

**Material and methods:** In Our Institution, From 2001 To 2013, We Have Operated On 4800 Cases Of Congenital Heart Diseases, Which Include 3800 Cases Of Acyanotic Congenital Heart Diseases And 1000 Cases Of Cyanotic Congenital Heart Diseases. In This Particular Study, We Are Comparing The Impact Of Palliative And Corrective Surgeries Namely 1) Bidirectional Glenn (48 Cases), 2) Fontan (13 Cases), 3) Hemitruncus (3 Cases), 4) Aortopulmonary Window (37 Cases) And, 5) Coronary Cameral Fistula (6 Cases), Performed Without Cardiopulmonary Bypass (50 Cases) (47.1%) And With Cardiopulmonary Bypass (56 Cases) (52.8%), On Various Morbidity And Mortality Parameters Like: (1) Hepatic Impairment (2) Renal Impairment (3) Chest Tube Drainage/Chest Infections/Sternal Wound Problems (4) Mortality Rate (5) And, Completeness Of Repair/Postop Follow Up. And, Resource Utilization Parameters Like: (1) Need For Additional Support (2) Blood Product Utilization (3) Ventilation Hours (4) Icu Stay (5) Hospital Stay And (6) Readmission Rate.

**Conclusions:** In Our Experience Of 106 Cases ,We Conclude That Off Pump Procedure Results In Improvement In Postoperative Hemodynamics, And Decreased Morbidity And Mortality. It Is A More Efficient And Economical Operation With Faster Recovery,Decreased Use Of Blood And Blood Products And It Also, Decreases The Deleterious Effects Of The Pump(Cardiopulmonary Bypass) Run.

### Tetralogy of Fallot and Hemitruncus: Anatomy, decision making, surgical strategies, and results

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**Introduction:** Tetralogy of Fallot (TOF) with Hemitruncus (HT) is a rare entity. In this report, we present our experience with this condition over the last 20 years.

**Methods:** Between January 1994 and June 2013, 11 patients with HT and TOF underwent surgery at the All India Institute of Medical Sciences, New Delhi, India. All the available clinical, radiographic, echocardiographic, cardiac catheterization, operative and follow-up data were reviewed.

**Results:** Mean age was  $73 \pm 7.1$  months (range 7 months to 18 years), mean weight was  $15.7 \pm 1.2$  kg. Mean pre-operative saturation was  $79.3 \pm 11.7\%$  (range 62–92%). Six patients had anomalous left pulmonary artery (PA) whereas 5 had anomalous right PA arising from the aorta. Surgical procedures consisted of complete intracardiac repair of TOF with direct implantation of anomalous PA into the main PA ( $n=7$ ), intracardiac repair of TOF with interposition saphenous vein graft between the right PA and main PA ( $n=1$ ), and reconstruction of left PA with autologous pericardium with intracardiac repair of TOF ( $n=1$ ), direct implantation of anomalous PA into MPA with innominate to RPA shunt( $n=1$ ) and right PA band with innominate to left PA shunt ( $n=1$ ). There were two early deaths. Follow up ranged from 3 to 73 months. All the survivors are in NYHA class I and follow up echocardiograms have not shown any residual lesions.

**Conclusions:** Surgical repair of HT with TOF results in acceptable early outcomes. The surgical strategy needs to be individualized to the patient anatomy.

### Exercise performance after total cavopulmonary connection with or without prior bidirectional superior cavopulmonary anastomosis

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**Introduction:** This study compares the cardiopulmonary exercise capacity of patients undergoing primary Total

Cavopulmonary Connection (TCPC) with those undergoing TCPC after a prior Bidirectional Glenn (BDG).

**Methods:** Out of 42 patients in this study, 24 had undergone primary TCPC while 18 had undergone staged TCPC. The peak oxygen consumption ( $O_2$  peak), peak carbon dioxide production ( $CO_2$  max), anerobic threshold and other exercise parameters were studied.

**Results:** There were no significant differences in  $O_2$  peak ( $940 \pm 538$  versus  $1010 \pm 417$  ml/min,  $p=0.42$ )  $CO_2$  max ( $606.5 \pm 276.6$  versus  $755.88 \pm 314.74$  ml/min,  $p=0.11$ ) and anaerobic threshold ( $22.81 \pm 14.02$  versus  $22.32 \pm 10.33$  ml/Kg/min,  $p=0.52$ ) of patients undergoing staged TCPC versus primary TCPC respectively; however, chronotropic index ( $0.43 \pm 0.23$  versus  $0.30 \pm 0.17$ ,  $p=0.047$ ) was significantly different. Exercise tolerance was the same in fenestrated versus non fenestrated TCPC groups and age at TCPC less than or more than 7 years. However,  $O_2$  peak,  $CO_2$  max and  $O_2$  pulse of patients with extracardiac TCPC was better than patients with Lateral Tunnel TCPC ( $p$  values 0.05, 0.05, 0.04 respectively). Some parameters of exercise tolerance of patients with Antegrade Pulmonary Blood Flow (APBF) interrupted at the time of BDG were better than those with APBF open.

**Conclusions:** There were no differences in the exercise parameters of patients undergoing a staged versus a primary TCPC, fenestrated versus non fenestrated TCPC and age at surgery less than or more than 7 years. Exercise parameters were better in the extracardiac conduit group versus lateral tunnel TCPC groups. Patients who had a TCPC after prior interruption of APBF had better exercise parameters.

### Arterial switch operation in patients with physiologically uncorrected complete TGA with L posed aorta

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**Introduction:** In viscerotransposition, the aorta is right sided and anterior whereas an anterior and left sided aorta is the rule in corrected transposition. A rare but important exception to this rule occurs when in patients with viscerotransposition and complete transposition, the aorta lies to the left and anterior, described as complete transposition (S,D,L). Physiologically uncorrected complete TGA with L posed aorta is a rare variant of TGA which presents with unique diagnostic and surgical challenges.

**Methods:** Between January 2002 and December 2013 twenty patients (fifteen males) of TGA with dextrocardia or TGA with aorta which was anterior and to the left (TGA with L posed aorta) underwent ASO. Hospital records were analyzed for segmental anatomy, associated cardiac anomalies, coronary

patterns, aortic cross clamp and cardiopulmonary bypass times, specific surgical techniques used for coronary transfer and reconstruction of great arteries. Outcome in terms of in hospital survival and left ventricular function at most recent follow up were recorded.

**Results:** There were one early death. Other patients remain alive and well with normal left ventricular function. (follow up range- 2 months -89 months, mean  $17.6 \pm 2.7$  months.)

**Conclusions:** With appropriate technical modifications, patients with complete TGA and dextrocardia (with viscerotransposition or situs inversus) or L posed aorta {S,D,L} can undergo successful anatomical repair.

### LeCompte maneuver in situations other than the arterial switch operation

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**Introduction:** The aim of the original LeCompte maneuver was to simplify the right ventricular outflow tract reconstruction during the arterial switch operation. However it is currently also being used for other indications.

**Patients and methods:** Between January 2008 and December 2013, we used the LeCompte maneuver along with intracardiac repair in 17 patients. Indications were Tetralogy of Fallot with absent pulmonary valve (n=5), Left to right shunts (n=6), truncus arteriosus with type B interrupted aortic arch (n=1), aortopulmonary window with interrupted aortic arch (n=1), ALCAPA (n=3), to alleviate right pulmonary artery compression (n=1).

**Results:** Four patients with left to right shunts were on preoperative mechanical ventilatory support due to severe respiratory compromise and all had evidence of airway compression by dilated aneurismal PAs. There were three deaths: one in a 5 years old patient who underwent repair of TOF with APV due to refractory ventricular arrhythmia and another in the patient with truncus arteriosus and interrupted aortic arch due to unexplained ventricular fibrillation. One patient with ALCAPA died due to severe left ventricular dysfunction that did not improve after surgery (preoperative LV ejection fraction 15%). Following closure of septal defects and LeCompte maneuver, all patients recovered uneventfully. Follow-up CT angiograms revealed no evidence of airway compression.

**Conclusions:** The LeCompte maneuver is no longer confined to patients undergoing the arterial switch operation. An understanding of the physiological alterations that take place following its application help to apply it to other situations.

### Early and mid-term results of Kawashima procedure

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**Introduction:** Patients with single ventricle physiology and an interrupted inferior vena cava undergo the Kawashima procedure. With increasing follow-up, pulmonary arteriovenous malformations may develop requiring hepatocardiac venous redirection.

**Methods:** Between January 2005 and December 2012, 15 patients underwent the Kawashima procedure. Preoperative and postoperative characteristics along with functional class, intra-operative details, post-operative course, saturations and hematocrit were recorded.

**Results:** Median age at operation was 5 years (range 1- 20 years). Five patients had antegrade pulmonary blood flow interrupted and 10 patients had open antegrade flow. There were no deaths. Mean saturation in postoperative period was  $90.8 \pm 1.36\%$ . Median duration of mechanical ventilation and inotropic support was 6 and 16 hours respectively. Median duration of pleural drainage was 6 days. Median duration of pleural drainage in antegrade flow open and interrupted group was 6 days and 4 days respectively. The mean hospital stay was 10.5 days  $\pm 7.1$  days. Mean follow up was 40.2  $\pm 31$  months (median-30 months). Nine patients (60%) were in New York Heart Association (NYHA) functional class 1 and 5 patients (33.3%) were in NYHA functional class 2 at last follow-up. Only one patient was in class 3 and needs completion Fontan.

**Conclusions:** The Kawashima procedure can be safely performed with acceptable early results. Although studies have shown the risk of pulmonary arteriovenous malformations after Kawashima procedure in the mid and long-term, our findings do not support this. Kawashima procedure with open antegrade pulmonary blood flow as a definite intervention in such patients is debatable.

### Results of surgery for Tetralogy of Fallot in or beyond the fourth decade of life

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**Introduction:** Patients with Tetralogy Of Fallot (TOF) undergoing surgery in adulthood represent a challenge. We report our experience with such patients in or beyond the fourth decade of life.

**Material and methods:** Between January 2002 and March 2013, 41 patients (age 30-52 years) with TOF, underwent surgery for TOF at AIIMS New Delhi. A comprehensive retrospective analysis of this cohort of patients was performed.



**Results** - Significant aorto-pulmonary collaterals were present in 28 patients; these were occluded in cardiac catheterization laboratory prior to repair. Median intra-operative right:left ventricular pressure ratio was 0.40(range 0.2 – 0.8).Median inotropic score was 10(range 5-30).Median duration of mechanical ventilation was 12 hours(range 6–48 hours).Pre-operative oxygen saturation was negatively correlated with inotropic score ( $p=0.001$ ,  $r=-0.485$ ),mechanical ventilatory support( $p=0.003$ ,  $r=-0.460$ ),ICU stay ( $p=0.004$ ,  $r=-0.442$ ) and hospital stay ( $p=0.028$ ,  $r= - 0.353$ ).Inotropic score was higher in patients with aortopulmonary collaterals ( $n=28$ ,  $p=0.03$ ),high pre-operative haematocrit ( $n= 29$ , $p=0.029$ )and with right ventricular dysfunction( $n=6$ ,  $p=0.05$ ).Patients with RVOT gradient  $>80$  mmHg ( $n=19$ ) had prolonged hospital stay ( $p= 0.002$ ).Patients undergoing pure transatrial repair( $n=24$ )showed lower inotropic score( $p=0.045$ ),less ICU( $p= 0.04$ ) and hospital stay ( $p=0.031$ ).There were two early and two late deaths (one from trauma and one from unknown etiology). Median follow up was 42 months. 31 patients were in NYHA class II and six were in class III.

**Conclusions:** Repair of TOF in and beyond the fourth decade of life is feasible with acceptable results. Patients with high hematocrit, lower oxygen saturation, right ventricular dysfunction, aortopulmonary collaterals and high pre-operative RVOT gradients have a prolonged post-operative course.

### Long term result of adult Tetralogy of Fallot – A study of 22 Years

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**Introduction:** The natural history of tetralogy of Fallot allows that a minority of patients reach adulthood without any treatment,representing mild forms of the disease. The aim of this study is the long-term evaluation of patients with TOF surgically treated in adulthood, in order to define its real benefit.

**Methods:** Between November 1991 and November 2013, 219 patients older than 18 years of age with tetralogy of Fallot underwent total correction. Mean age was 23.6 years (range 18–47) and 135 patients (61.6%) were males. A previous shunt operation was performed in 12 patients (5.5%).180 patients (82.2%) were in NYHA functional class II or III. Meanhematocrit was  $53.6 \pm 10\%$ ,199 patients (90.8%) had infundibular and valvar stenosis, 12 patients (9.1%) had Branch pulmonary artery stenosis requiring intervention and 22 patients (10%) had abnormal coronary artery. The operation wasperformed via transatrial/transpulmonary/right ventricular outflow tract approach and 132 patients (60.3%)

required transannular patch. Two patients required conduit repair. Haemostatic drug was used in 74 patients (33.8%).

**Results:** Hospital and late mortality were 2.2% and 0%, respectively. The early, midterm and long term follow-up was 95.89%, 51.14% and 47.03% respectively. Actuarial survival was 98.1%, 84.2% and 59.6% at 3, 7 and 15 years, respectively. In the latest follow-up, 78.1% of the survivals are presently in NYHA functional class I. Echocardiography has shown moderate to severe pulmonary regurgitation in 32 patients(14.6%), moderate pulmonary stenosis in 14 patients (6.4%) and Tiny or insignificant residual ventricular septal defect in 43 patients (20.2%) while significant residual shunt requiring surgery in 4 patients(1.4%) . Arrhythmias were identified in 24 patients (10.9%)in form of right bundle branch block and one patient who had complete heart block required permanent pacemaker implantation. There was impairment of right-ventricular function in 4 patients (1.8%).

**Conclusions:** The overall survival of surgically treated adult patients with TOF is acceptable. Morbidity seen in the form of, a) Prolonged ICU stay, inotropic supports, oxygen requirement and intravenous fluids and b) Post-operative blood loss. Blood loss in the post-operative period can be minimized by the use of Fresh frozen plasma, fresh blood and Haemostatic drugs in very cyanotic cases. Early and long term results of intra cardiac repair are gratifying with 1) Low incidence of residual cardiac defects, right ventricular outflow obstruction and pulmonary regurgitation and 2) Low incidence of post-operative arrhythmias. The great benefit of the complete repair at this age is the functional improvement.

### Characterization of Blood Flow Circulation in Fontan (TCPC) Configuration using Volumetric PIV

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**Introduction:** Comprehensive understanding of intravascular flow dynamics would enable us the surgical preplanning for optimized three-dimensional vascular configuration. A laser based flow measurement technology, Volumetric PIV, has recently been evolved and added to the armamentarium of fluid dynamics laboratory. This technology uses three precision fixed high speed cameras, to point and shoot the flow field visualised under rapid succession of laser flashes. In order to gain new insights to complex cardiovascular flow dynamics in Fontan configuration, for the first time, we have made exploratory use of the Volumetric PIV marketed by the TSI, USA.

**Methods:** Two Fontan circulation models with and without SVC and IVC offset were made from glass tubes. Appropriate inlet and outlet connections were made to generate variable flow from 1 to 4 litters from the SVC and IVC in to the

pulmonary system. The model was immersed in glycerine filled clear Perspex tank and the blood-mimicking fluid (mixture of glycerine, water and sodium iodide having the dynamic viscosity around 4.4 cP and refractive index matching with the glass) was circulated through the models. A complete transparency in the medium through refractive index and seeding the flow with tracer particles is crucial for obtaining images with high SNR of the flow field.

**Results:** Velocity vectors extracted from the images clearly showed 3D features of separated flows, vortex formation and high shear regions which corroborate the previous CFD findings presented at the 59th Annual Conference of IACTS, 2013. The potential of this technique needs to be extensively exploited to optimize the Fontan geometry.

### Valve replacement in children: Permanent solution to everlasting problem

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**Introduction:** The purpose of this paper is to highlight the result of valve replacement in children under 15 years of age and stress that mechanical valve replacement in this age group is safe, effective and permanent solution for everlasting problem.

**Methods:** We conducted a retrospective review of all consecutive mechanical valve replacement in children less than 15 years of age from January 2010 till October 2013. The end point of this study were mortality, valve related morbidity and reoperation if any.

**Results:** 23 patients underwent valve replacement. Their ages ranged from 09 years to 15 years. MVR was performed in 20 patients(86%)and AVR in 3 patients (14%).The valve failure in terms of mortality, Valve thrombosis and bleeding is zero. We agree that ours is a small follow up period and these results might be different in long term follow up.

**Conclusions:** Mechanical valve replacement has excellent outcome in terms of mortality and valve related events. Anticoagulation is well tolerated with very low risk of bleeding even in this socio economic setting.

### Challenges and outcomes of AV valve repair during completion Fontan procedure

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**Introduction:** Longterm outcomes of Staged Fontan Procedure in single ventricle palliation can be impaired due to the presence of AV Valve regurgitation. Hence addressing the AV valve regurgitation at the time of completion Fontan is important.

This study is aimed at evaluating a small group of patients who underwent AV Valve Repair with Completion Fontan.

**Material and methods:** The group includes five patients with single ventricle morphology. The age varied from 3 years 8 months to 7 years. Male : Female ratio was 4:1.They all underwent BDGS in the past as a part of staged single ventricle management. On evaluation ,they were found to have significant Left AV Valve regurgitation. It varied from moderate to severe regurgitation. Three patients had grade 2 regurgitation , one had grade 3 regurgitation, one had grade 4 regurgitation.

**Results:** All had redo sternotomy. CPB established with aortic and bicaval cannulation. All five Patients underwent Lateral Tunnel Fontan with left AV Valve repair . It includes annuloplasty , neo chordae, commissural stitch, and sliding plasty. Almost all patients had prolonged ICU stay with extended ventilator supports and escalated inotropic supports. One patient died on POD 5 and one late death .

**Conclusions:** Though the concept of combined AV valve repair and completion Fontan carries high morbidity and mortality , addressing the AV valve regurgitation becomes important and it has clearly shown to improve the late outcome of patients with single ventricle morphology .

### Non-compaction cardiomyopathy: manifestation as a surgical pitfall-rare but real

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**Introduction:** Non-Compaction Cardiomyopathy (NCC) is a rare cardiomyopathy, characterised by hypertrabeculation of myocardium, especially of the left ventricle. The patients present with heart failure along with variable combination of arrhythmias and thrombo-embolism. Though several articles shed light on the medical aspect of this disease, we attempt to underscore its surgical relevance, which as per our knowledge is the first. A torrential post-operative course resulting in mortality in ligation of a patent ductus arteriosus prompted us to evaluate the surgical aspects of this disease.

**Methods:** Autopsy records from 2003 to 2012 were reviewed and cases identified as NCC were retrieved and analysed clinically and pathologically. Cases with obligatory hypertrabeculation were excluded.

**Results:** Thirteen patients were found to have NCC among 9427 autopsies performed, an incidence of 0.14%. Their ages ranged from four months to 55 years. Ten were children and three patients were adults, all of whom were above 45 years of age. Only one patient had a diagnosis of NCC. Seven cases were post-operative deaths; among these, five had a similar post-operative course culminating in failure and death.

**Conclusions:** Though NCC is rare, missing its diagnosis in a patient operated for some other indication can spell disaster

post-operatively. As the clinical picture is non-specific and the disease not very well known, it needs vigilance on the part of the echocardiographer and surgeon.

### **In-vitro valve tester for Handmade conduits**

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**Introduction:** Several congenital heart diseases require a valved conduit to re-establish continuity between the RV and the Lung. Several options are available to achieve this like Homografts, Xenografts and Handmade conduits. Handmade conduits are cheap and readily available in all sizes. They can be made entirely of pericardium or PTFE. In-vitro testing of these handmade conduits are not standardized and complex setup is required to achieve this. We describe an experimental setup using readily available material in the hospital to make an in vitro tester for these conduits.

**Methods:** The tester consists of a water reservoir kept at an elevated place, this reservoir is made air tight and can be pressurized using a sphygmomanometer pump. This is connected to glove kept in an airtight bottle at a lower level through a one way Heimlich valve. The water from the reservoir enters the glove in the bottle through the valve; the bottle is connected to an Ambu bag. Compression of the Ambu Bag squeezes the water out of the glove, the one way valve prevents the it from going back to the reservoir. The water exits through 3/8 inch cardiopulmonary bypass tubings to the conduit. The conduit is placed in an acrylic tube. Ambuing creates pulsatile flow through the conduit. By varying the occlusion on the tubing and varying the pressure in the reservoir the valve can be tested at different pressures. Since the valve was meant for pulmonary implantation, an afterload of max . 60 mmHg was kept. The water then returns to the reservoir. Y connectors placed above and below the valve permit cystoscope to be passed above and below the valve. This permits direct visualization of the closure mechanism. Echocardiographic evaluation can also be performed to calculate the regurgitant fraction.

**Study:** Decellularised bovine pericardium was used to reconstruct trileaflet valve and was tested in vitro. Direct visual examination revealed a central coaptation defect and a regurgitant fraction of 8%. Further changes in valve design made before animal implantation.

### **Arterial switch in transposition with left ventricular outflow tract obstruction**

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**Background:** Among the various surgical options are available for children with transposition of great arteries with left

ventricular outflow tract obstruction, the Arterial switch operation with or without left ventricular outflow tract resection provides superior results. Our aim was to analyze the results of Arterial switch in this subset of children.

**Methods:** We identified 16 children with transposition and anatomical left ventricular outflow tract obstruction who underwent the Arterial switch operation between January 2006 and December 2011 and were followed up with clinical evaluation and echocardiography. All the 16 children required left ventricular outflow intervention as either pulmonary valvotomy and/ or subvalvular resection.

**Results:** There were 4 in hospital deaths and 1 death within 6 months of discharge. Post-operative echocardiography identified 3 children with moderate to severe neo- aortic valve insufficiency.

**Conclusions:** Arterial switch with left ventricular outflow intervention gives acceptable midterm results in children with transposition of great arteries and anatomical left ventricular outflow obstruction. Type of left ventricular outflow tract obstruction does not predict the neo aortic valve insufficiency during the follow up. They need to be followed up for possible neo-aortic valve intervention in the future.

### **Use of the Rev/Lecompte procedure for ventriculoarterial connection abnormalities in infants and children with congenital heart disease**

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**Introduction:** The Rastelli Procedure Has Been Considered The Standard Repair For Complete Transposition Of The Great Arteries, Double – Outlet Right Ventricle (DORV) Associated With A Ventricular Septal Defect And Pulmonary Stenosis. This Procedure Had One Major Drawback Of Reconstructive Operations For Congenital Heart Disease, In That Suitable Homografts Are Not Always Available, And Prosthetic Conduits Need To Be Replaced Due To The Growth Of The Patient And Valve Or Conduit Failure. In An Effort To Avoid This Limitation, Lecompte And His Colleagues Introduced A New Surgical Technique For The Treatment Of Complete Transposition Of The Great Arteries, DORV Associated With A Ventricular Septal Defect And Pulmonary Outflow Tract Obstruction. They Called This Technique The Rev (Reparation A L'etage Ventriculaire) Procedure. The Rev Procedure Had Been Called The Lecompte Procedure Or Operation. The Basis Of This Technique Is Resection Of The Outlet (Infundibular) Septum, Which Enables Construction Of A Shorter, More Direct Intra-Ventricular Tunnel. As A Consequence, It Is Possible To Re-Implant The Pulmonary Trunk Directly On The Superior Margin Of The Right Ventricular Infundibulotomy Without A Conduit. The Objective Of This Study Is To Review Our Overall Experience With The Rev/Lecompte Procedure

For Treatment Of 31 Patients With TGA/DORV, VSD, PS With D-Malposed Great Arteries.

**Material and methods:** From August, 2010 To November 2013, 31 Patients Underwent The Rev/Lecompte Procedure For TGA / DORV, VSD and PS. The Patient’s Age At Operation Ranged From 4 Months To 8 Years (Mean Age Was 3.2 Years).

**Results:** One Patient (4%) Died In The Immediate Post Operative Period. This Patient Was In Complete Heart Block And Underwent Permanent Pacemaker Implantation (Epicardial Lead). The Cause Of Death Was Sepsis. There Were No Late Deaths. The Mean Follow Up Was 30 Months. The Average Cardiopulmonary Bypass Time Was 135 Mins, And The Aortic Cross-Clamp Time Was 88 Mins. One Patient Had LPA Origin Narrowing On Follow Up With A Gradient Of 40mmhg. All Survivors Were Studied By Echocardiography At Interval Of 6 Weeks, 6 Months And Every Year Thereafter. In All Survivors, The Estimated Pressure Gradient Between The Right Ventricle And The Pulmonary Artery, The Structure Of The Left Ventricular Outflow Tract, Left Ventricular Function, And Right Ventricular Function Were All Satisfactory.

**Conclusions:** In Conclusion, Most Patients With Complete Transposition Of The Great Arteries, DORV, DOLV Associated With A Ventricular Septal Defect And Pulmonary Stenosis, Could Be Managed Successfully With The Rev/Lecompte Procedure. The Rev/Lecompte Procedure May Allow Early, Complete Anatomic Correction, And Reduce The Need For Late Re-Operation. Our Experience Remains Limited, However, And Further Follow Up Is Mandatory.

**Elevated C-reactive protein preoperatively as a predictor for post-op atrial fibrillation in patients undergoing elective off-pump coronary artery bypass surgery**

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**Introduction:** This study was undertaken to investigate the association between preoperative C-Reactive Protein (CRP) levels and Atrial Fibrillation (AF) after isolated off-pump coronary artery bypass surgery.

**Methods:** 1456 consecutive patients undergoing isolated CABG by 2 surgeons between January 2012 and December 2013 were evaluated. All the patients were prospectively analyzed after excluding the following 291 cases: on-pump surgery (n = 201), chronic AF (n = 52), pacemaker rhythm (n = 5), and preoperative CRP of  $\geq 10$  mg % (n = 34). The analysis was done on a case to case basis as well as on a group basis. CRP level categorized into three groups:  $\leq 1.0$  mg%, n = 116(Group 1); 1.0–3.0 mg%(Group 2), n = 815; and 3.0–10.0 mg%, n = 233(Group 3).

**Results:** AF occurred in 210 patients (18%, 210/1165) of patients after surgery. A univariate analysis was done initially.

Patients in both Group 2 and 3 were found to have a greater predisposition to develop Atrial Fibrillation within 7 days ( $p < 0.03$ ). Then a step by step multivariate analysis was done which again showed a strong correlation with CRP values above 1 mg%( $p < 0.01$ ). The predictive accuracy of preoperative CRP as a predictor of postoperative AF was tested by plotting the area under the receiver operating characteristic curve (95% confidence interval). It was found to be 0.84 (0.79–0.87) ( $p = 0.001$ ).

**Conclusions:** Elevated preoperative CRP is an independent predictor of the occurrence of AF in patients after isolated off-pump coronary artery bypass surgery.

**Heart valve teams: New solutions to emerging challenges**

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**Introduction:** The ageing population has lead to an increase in Aortic Stenosis (AS) in the UK. Left untreated average survival with symptomatic AS is less than three years. The objective of this prospective study was to determine outcome and rationale for treatment selection in patients with severe aortic stenosis.

**Methods:** From June 2012 to July 2013, 394 patients with severe aortic stenosis were identified from echocardiography. Data was collected prospectively over three months and entered into an electronic database for all of these patients.

**Results:** The mean age was 79 years (female n=202). 12 patients had previous aortic valve surgery and 22% patients (n=88) had moderate to poor left ventricular function. More than half the patients were not referred to a cardiac surgeon (n=225).

Not Referred to surgeon ( n = 225 )	
Patient / Family Decision	53
Asymptomatic	118
Advanced patient Age	61
AS not severe	71
Limited life expectancy	32
High operative Risk	16
Comorbidities	66

Referred to surgeon ( n =169 )				
	No Intervention	BAV	SAVR	TAVR
Patient / Family Decision	14	6	95	54
Comorbidities	7			
High Operative Risk	4			
	3			

**Conclusions:** With advancing age and associated comorbidities many patients with significant aortic valvular

disease are deemed unsuitable for surgical intervention. As we offer new transcatheter valve therapies in the 21<sup>st</sup> century. The setting up of regional heart valve teams comprising of clinicians, echocardiographers, interventional cardiologists and surgeons may help patients who are conventionally off the radar of interventional therapists

### Del Nido cardioplegia versus Conventional St. Thomas cardioplegia in adult (congenital and valvular) cardiac surgery – Comparative study

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**Introduction:** Starting from birth in 1955 to present day, various cardioplegia (CP) solutions came into the market. We need less frequent CP dosing, efficient myocardial protection, short cross-clamp/bypass time and reduced work flow interruption during prolonged adult cardiac surgical procedures. Through this study, we aim to compare the safety and efficacy of Del Nido cardioplegia (DNCP) with conventional [St. Thomas] cardioplegia (CCP) in adult complex congenital and multi-valvular cardiac surgeries.

**Materials and Methods:** 44 consecutive adult cardiac patients in the age group between 14 to 52 years with complex congenital and multi-valvular lesions (exclusion criteria: 1. All patients with coronary artery disease and congestive cardiac failure, 2. Those with LVEF <40%, 3. Those with hepatic and renal dysfunction 4. those simple congenital and single valve lesions which require <30 min cross-clamp time) posted for surgery during the period between July to December 2013 were divided into 2 groups randomly and assigned to undergo surgery with DNCP (Group 1) and surgery with CCP (Group 2) by an experienced surgeon in each group. The root of administration of CP was antegrade in all cases. Perioperative and postoperative variables for comparison include cross-clamp (CC) time, cardiopulmonary bypass (CPB) time, number of defibrillations needed to return the circulation, postoperative events (include prolonged ventilation (>24 hours), arrhythmias, heart block, acute renal failure, reoperation and death) and length of stay in Intensive care unit (ICU). A sub-group analysis was done for patients with valvular surgery.

#### Results with discussion:

Variables	Group2 - CCP	Group1 - DNCP	p-value
Age in yrs (mean)	35.0	36.3	
BMI (mean)	26.54	26.68	
Sex ratio M/F	12/10	13/9	
CC time (min) mean	75.2	68.7	

CPB time (min) mean	148.8	110.1	
CP dose (mean)	4.8	1.5	<0.0001
No. of defibrillation (mean)	2.5	1.9	
Postoperative events (mean)	2.1	2.2	
Length of ICU stay (Days)	3.4	3.0	

Our results show reduced CC and CPB time with fewer CP doses in DNCP group compared to CCP group. (p=<0.0001)

**Conclusions:** With limited sample study, our results show DNCP is safer in terms of reduced dose with effective myocardial protection and offers interruption free work flow with less operating time when compared to CCP in adult cardiac surgery. However large sample results from other centres with more variables for comparison are needed before any confirmative recommendation

### Acute post infarct VSR-our experience

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**Objective:** Post infarct VSR offers a formidable surgical challenge. Early surgical intervention offers the best chance of survival in most of these patients. Surgical correction in these high risk patients is associated with high morbidity and mortality. The purpose of the study is to present our experience and to analyse the result of surgical repair in these patients.

**Material and methods:** Over a period of 4 years from Jan 2010 to Dec 2013, 7 patients underwent surgery for post infarct VSR. The mean duration between myocardial infarction and VSR was 6 days. The diagnosis was established with Trans thoracic echocardiography supplemented with Trans oesophageal echocardiography in selected cases. Coronary angiography revealed single vessel disease 4 patients, double vessel disease in 2 and triple vessel disease in 1 patient. All patients were operated within mean time of 14 hours ( 4 to 46 )hours after diagnostic confirmation.(VSR was anterior in 5, midseptal in 1, posterior in 1 patient. The various surgical techniques used were infarctectomy , prosthetic path closure, infarct exclusion and CABG

**Results:** There were 2 death in the study because of low cardiac output. Mean CPB time was 140 min ( 98 to 220 min); aortic cross clamp time 75 min (63 to 178). IABP used in 4 patients. Concomitant CABG was done in 3 patients. Most patients needed prolonged ventilation and moderate inotropic support. Five patients survived after surgery and are on follow up

**Conclusions:** Early decision making and surgical intervention despite unstable haemodynamics in these patients is life saving

### Morphogenic protein expression of the calcific mitral stenotic valve in patients with rheumatic heart disease

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**Objective:** In the mitral valve stenosis, matrix nucleation of calcium and phosphates bound to bone morphogenetic proteins are assembled in the correct spatial orientation necessary for crystal formation is the detrimental mechanism.

**Methods:** Mitral valve biopsies were taken from patients undergoing routine mitral valve replacement operations (2008-2013) in the Department of Cardiovascular and Thoracic surgery, Sri Venkateswara Institute of Medical Sciences, Tirupati. The mitral valves were excised from the 25 male patients (Mean age,  $35.6 \pm 16.3$ ) and 25 females ( $34.6 \pm 10.0$ ) with heart rate of  $83.71 \pm 15.75$ , MVOA showing  $0.98 \pm 0.56$ . The excised mitral valves are examined for the expression analysis of bone morphogenic proteins and normal Mitral valves were obtained from cadaveric hearts which serves as control. In the present study MVS patients with clinical indications: MVOA ( $0.98 \pm 0.56$ ), LAD ( $50.62 \pm 8.69$ ), LVEDD ( $45.56 \pm 8.87$ ), LVESD ( $31.29 \pm 6.87$ ), LVEF ( $57.74 \pm 5.41$ ) and some other risk factors were examined. The expression of Osteopontin (OPN) and alkaline phosphatase (ALP) in the calcified mitral valves and were analyzed to demonstrate the underlying mechanism of calcification in stenotic valves.

**Results:** The diseased valves showed intense Alizarin red S staining with conspicuous calcium depositions compared to the normal valves. The elevated expression of OPN, ALP genes as deduced from RT-PCR experiment (0.892kb and 1.8kb) and ALP enzyme kinetics (Enzyme activity:  $1.5 \pm 0.3 \mu\text{M}/\text{mL}/\text{min}$  and  $0.05 \pm 0.004 \mu\text{M}/\text{mL}/\text{min}$  and  $K_M$ :  $59.41 \pm 0.5 \mu\text{M}$  and  $2.0 \pm 0.12 \text{ mM}$  in the diseased and normal mitral valves respectively) indicated that most of the OPN in diseased mitral valve is probably in non-phosphorylated form due to action of alkaline phosphatase; which supports the hypothesis that non-phosphorylated OPN provides network for nucleation process which is the detrimental step in the mineralization process. Therefore, the expression of alkaline phosphatase in these diseased tissues which triggers calcification process with BMPs and with other collagens will be the adverse factors to cause MVS.

**Conclusions:** The present study clearly demonstrated that the increased OPN and ALP activities has profound role in the matrix nucleation for correct spatial orientation necessary for crystal formation facilitated by BMPs, Collagens etc due to increased ALP activity in the diseased tissue.

### Minimal Invasive cardiac surgery- Our experience

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**Aim:** To compare the results of minimal invasive cardiac surgery with conventional sternotomy procedure with respect to postoperative pain, intensive therapy unit and hospital stay, duration of ventilation, infection rate, morbidity and mortality.

**Methods:** At KLES Heart Foundation 43 patients underwent minimal invasive cardiac surgery between Jan-2013 to Dec-2013. During this period 1408 underwent cardiac surgery through sternotomy. Out of 43 patients, 31 were males and 12 were females. Age ranged from 18 to 76 years with a mean of 62 years. Out of them 29 underwent aortic valve replacement, 5 mitral valve replacement and 9 atrial septal defect repair. Use of carbon dioxide gas for deairation was done in all the cases.

**Results:** Mean hospital stay was 4 days compared to 7 days in post sternotomy group. Similarly duration of ventilation was 4 hours as compared to 12 hours in post sternotomy group. Average cardio pulmonary bypass time was 95 minutes as compared to 75 minutes in post sternotomy group. Average aortic cross clamp time was 71 minutes as compared to 50 minutes in post sternotomy groups. There was no single case of wound infection or re-exploration in minimal invasive surgery group. Conversion of sternotomy was done in one case.

**Conclusions:** Minimal cardiac surgery reduced post-operative pain, duration of ventilation and hospital stay.

### Submitral left ventricular aneurysm: a rare congenital defect presenting in adult age: our experience and review of literature

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**Introduction:** Submitral Left Ventricular Aneurysm (SMLA) is very rare congenital weakness of posterior fibrous annulus of mitral valve and is predominantly described in the indigenous African population and rarely in mixed races and Caucasians.

**Methods and results:** We had 3 patients of SMLA in retrospective review of our institution from 2000 to 2012. Two out of 3 patients were offered surgical management. One patient underwent plication of aneurysm neck with mitral valve replacement and the other patient was subjected to patch-plasty of the neck of SMLA and buttressing the aneurysm wall. Third patient with poor EF(15%) and severe mitral incompetence was enlisted for cardiac transplant but expired after 1 year. The etiology is believed to be congenital in origin. The SMLA arises from potentially weak fibrous annulus of the

mitral valve near atrio-ventricular junction. Basic pathology may result from disjunction of left ventricular musculature from the left atrium- mitral valve region, similar to that associated with floppy mitral valve.

SMLA is often detected in adulthood due to manifestations of complications like mitral valve incompetence, heart failure, embolism, compression of adjacent structures, cardiomyopathy, ventricular tachycardia or sudden death. Surgical treatment depends on pathophysiology and includes closure of aneurysm (via LA or aneurysm), correction of mitral incompetence and surgical ablation for existent ventricular tachycardia.

**Conclusions:** SMLA should be offered surgical treatment dealing the aneurysm and existent mitral incompetence. Patients with ventricular tachycardia should undergo concomitant surgical ablation during the operative procedure to prevent later sudden death.

### Surgery for mitral valve regurgitation and coronary artery disease: single institution experience

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**Introduction:** Combining Coronary Artery Bypass Grafting (CABG) and mitral valve surgery carries higher mortality and morbidity. Here we are reviewing our experience which was spanned of 5 years.

#### Material and methods:

All consecutive patients since May 2008 till May 2013 operated for combine procedure CABG and Mitral valve replacement or Mitral valve repair were included in study. Total 24 such patients were found. Their records obtained from Medical records department (MRD) and Hospital Information System (HIS) were analyzed retrospectively with complete follow-up by calling patient to the hospital for their clinical examination and Echocardiography.

**Results:** Twenty four (n=24) patients were operated for combined procedure. There were 3 female and 21 male patients. Etiologies for mitral regurgitation (MR) were Ischemic 19, Rheumatic 2, Degenerative 1 and Myxomatous 1. There were 4 cases of Acute MR post recent Myocardial infarction and were operated in emergency. Numbers of bypass grafts were  $2.57 \pm 1.2$ . There were 8 mitral valve repairs using Annuloplasty rings, and 16 patients received mitral valve prosthesis ( 8 bioprosthesis and 8 mechanical). Mean ICU stay was  $150.5 \pm 65.6$  hours. There were 2 early cardiac cause death and one late cardiac cause death. One patient required percutaneous coronary intervention for new native vessel disease after 2 years of surgery. Eleven patients were found in NYHA class II and 6 patients were in NYHA class II status at follow-up.

### Impact of patient prosthesis mismatch in patients undergoing aortic valve replacement due to severe aortic stenosis - an ongoing study in the Indian scenario

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**Introduction:** The impact of Patient Prosthesis Mismatch (PPM) after aortic valve replacement (AVR) remains issue of debate. We determine how PPM (defined as Effective Orifice Area Index <0.85) affects NYHA class, Quality of Life (QOL) by Karnofsky performance score, trans prosthetic gradient, regression of Left ventricular mass index.

**Material and methods:** From June 2012 to June 2013, 15 patients undergoing AVR due to severe aortic stenosis were analysed. Patient improvement was determined by i) NYHA class ii) Karnofsky performance score (QOL) iii) regression of LV mass index iv) trans-prosthetic gradient at rest and stress using Dobutamine Stress Echo (DSE).

**Results:** Out of 15 patients 8 had PPM. They were all evaluated 6 months after operation. There is no mortality till now. NYHA class improved in both the categories. QOL(Karnofsky Score  $\geq 70$ ) improved in both groups. Regression of LV mass index was similar in both categories. Both groups showed marked reduction in trans-prosthetic gradient at rest and with DSE at 6 month. Though the trans-prosthetic gradient increased more in the PPM group- this was probably more related to flow as EOA remains almost unchanged.

**Conclusions:** Based on this study it is evident that PPM till now does not affect the outcome of patients though the sample size is still too small to comment anything strongly.

### Dialyser based device: As an alternative to Cell Saver

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**Introduction:** Cell Saver system has become the method of choice for red cell salvage from the surgical field. We have devised a cost effective version of autotransfusion system for collection, washing and filtration of shed blood during cardiac surgery.

**Material and methods:** A prospective randomised observational study was performed in 50 consecutive patients undergoing off-pump coronary artery bypass grafting for 2 or 3-vessel coronary artery disease. Patients were divided into two groups. In group 1, our dialyser based autotransfusion system was used while in group 2, conventional cell saver system was used. Both the groups were analysed for salvaged haemoglobin, platelets, protein and albumin and cell lysis by serum glutamate oxaloacetate tansaminase and lactate dehydrogenase.

**Results:** The amount of haemoglobin salvaged by our dialyser based system was comparable to cell saver system ( $21.32 \pm 9.34$  gms vs  $17.17 \pm 9.89$  gms) ( $p = 0.134$ ). Absence of anisocytosis and free haemoglobin in both salvaged blood and effluent suggests the absence of significant amount of hemolysis in either of the systems. However, the dialyser based system was more efficient in salvaging platelets ( $181500 \pm 117807$ /cmm vs.  $29500 \pm 20289.57$ /cmm) ( $p = 0.001$ ), proteins ( $10.86 \pm 5.01$  g/dl vs.  $2.77 \pm 2.36$  g/dl) ( $p < 0.0001$ ) and albumin ( $5.89 \pm 3.09$  g/dl vs.  $1.44 \pm 1.52$  g/dl) ( $p < 0.0001$ ). Moreover, the blood salvaged by dialyser based system was free of particulate matter and free haemoglobin similar to cell saver system.

**Conclusions:** In-vitro study shows that dialyser based system is cost-effective, safe and equally efficacious in salvaging the red blood cells and more effective in salvaging the platelets and proteins including albumin.

#### Haemodynamic Performance of the St. Jude Medical Trifecta Aortic Bioprosthesis In young patients under 65

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**Objective:** 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 haemodynamics. The aim of this prospective study was to evaluate midterm haemodynamic performance of valve implanted into patients under 65.

**Methods:** Twenty three consecutive patients undergoing aortic valve replacement using the St. Jude Medical Trifecta valve at a single UK centre over a 36-month period were included in this study. Patients undergoing concomitant cardiac procedures were included. All implanted valves were 19, 21, 23, 25 and 27 mm in size. Assessment of haemodynamic function was carried out using transthoracic echocardiography pre-operatively and at follow-up, as well as transoesophageal echocardiography intra-operatively.

**Results:** The study population consisted of 23 patients (12 male, 11 female). Mean age was  $60.7 \pm 2.1$  years. Implanted valve sizes were 19mm (n=3), 21mm (n=6), 23mm (n=7), 25mm (n=4) and 27mm (n=3). Overall mean post-operative pressure gradients were  $7.34 \pm 4.2$  mmHg (mean) and  $14.31 \pm 4.8$  mmHg (peak). Subgroup mean post-operative pressure gradients were  $7.35 \pm 2.8$  mmHg,  $7.62 \pm 2.1$  mmHg,  $7.94 \pm 3.7$  mmHg,  $7.61 \pm 2.7$  mmHg,  $7.21 \pm 2.8$  mmHg, for the 19, 21, 23, 25 and 27mm cohort respectively. Overall mean post-operative left ventricular ejection fraction was  $62 \pm 1.7\%$ . Overall mean effective orifice area was  $1.86 \pm 0.4$  cm<sup>2</sup>. There were only 2 patients with trivial regurgitation.

**Conclusions:** These results of our experience demonstrate excellent haemodynamic performance of the Trifecta bioprosthesis valve in young patients under 65.

#### Haemodynamic performance of the St. Jude Medical Trifecta Aortic Bioprosthesis – The training perspective

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**Objective:** The Trifecta aortic bioprosthesis provides exceptional haemodynamic performance, durability and implantability. The unique design, encompassing a contoured silicone insert within a unique cuff is specifically designed to conform to the native annulus shape for proper seating and minimal risk of paravalvular leak. The aim of this prospective study was to evaluate haemodynamic performance of valves implanted by cardiothoracic trainees at a single UK centre.

**Methods:** Twenty-one consecutive patients undergoing aortic valve replacement using the Trifecta valve performed by trainees at a single UK centre over a 36-month period were included. Patients undergoing concomitant cardiac procedures were included. Assessment of haemodynamic function was carried out using transthoracic echocardiography pre-operatively and at follow-up, as well as transoesophageal echocardiography intra-operatively.

**Results:** The study population consisted of 21 patients (14 male, 7 female). Mean age was  $72.4 \pm 7.6$  years. Implanted valve sizes were 19mm (n=1), 21mm (n=7), 23mm (n=9), 25mm (n=3) and 29mm (n=1). Overall mean post-operative pressure gradients were  $6.47 \pm 1.7$  mmHg (mean) and  $13.42 \pm 5.3$  mmHg (peak). Subgroup mean post-operative pressure gradients were  $7.21 \pm 3.1$  mmHg,  $7.51 \pm 3.1$  mmHg,  $7.63 \pm 2.4$  mmHg,  $7.31 \pm 4.6$  mmHg,  $7.46 \pm 4.9$  mmHg, for the 19, 21, 23, 25 and 27mm cohort respectively. Overall mean post-operative left ventricular ejection fraction was  $56 \pm 0.12\%$ . Overall mean effective orifice area was  $1.63 \pm 0.7$  cm<sup>2</sup>. All valves were well-seated and only 2 exhibited trivial regurgitation.

**Conclusions:** Our experience demonstrates the excellent haemodynamic performance of the Trifecta bioprosthesis in implantations performed by surgical trainees, resulting from the innate superior haemodynamic properties of the Trifecta valve as well as the simple yet faultless implantability of the valve.

#### Surgery for ruptured sinus of Valsalva aneurysm: 5-year experience with 19 patients

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**Introduction:** Rupture of sinus of Valsalva Aneurysm is a rare cardiac malformation. That usually causes reduced cardiac



performance. Different surgical strategies have been evolved for the surgical treatment of Ruptured Sinus of Valsalva Aneurysm (RSVA) from simple primary closure to patching of the rupture site by a dual chamber approach. We reviewed our 5-year experience and current literature regarding the efficacy of patch closure.

**Methods:** A retrospective review identified 19 patients who underwent RSVA repair between Jan. 2009 and Oct.2013. The mean age was  $28.3 \pm 10.7$  years (14 to 55 years). The RSVA originated from the right coronary sinus in 17 patients (89.4%), from the non-coronary sinus in 2 (10.5%) and no rupture originated from left coronary sinus. Rupture into the right atrium was the most common result 8 patients (42.10%), right ventricle 6 pt. (31.5%) and RVOT 5 pt. (26.3%) subaortic VSD in 2 pt. (10.7%), Aortic insufficiency in 7 pt (36.8%) and Tricuspid insufficiency in 1 pt. (5.2%) were common associated defects. For repair aorta and cavity into which aneurysm had ruptured was opened. RSVA was repaired with a ePTFE patch in all cases. Where as the aortic valve was replaced in seven patients and tricuspid in 1 patient.

**Results:** The hospital mortality rate was 5.2%. The follow-up was available in 94.3% (18 patients) of survivors ranging from 1 month to 5 years. Actual survival rate was 95% Freedom from reoperation for reoccurrence was 100%.

**Conclusions:** To conclude surgical repair is the choice of treatment for ruptured sinus of valsalva aneurysm. Surgery is preferred rapidly after diagnosis which leads to excellent outcome.

### Feasibility of fast tracking in adult cardiac surgery

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**Introduction:** Fast tracking includes On Table Extubation (OTE), early removal of drain tubes, removal of invasive lines, judicious and prudent usage of inotropes, decreasing the dependency on antibiotics, reducing repeated usage of arterial blood gas analysis, good and aggressive chest physiotherapy, early mobilisation, reduced icu and hospital stay. Aim is To know the parameters affecting the fast tracking manoeuvre and the protocols implemented in it compared to the conventional method of post-operative cardiac care

**Methods and materials:** We reviewed the outcome of fast tracking in 200 patients. They are divided in to Group A and Group B, both containing regular and high risk patients. Group A consist of 65 regular cases and 35 high risk cases. Group B consist of 59 regular cases and 41 high risk cases. Variables like hours of ventilation, drain tube removal, duration of inotrope therapy, arterial and central line removal, re exploration, blood transfusion, icu stay and hospital stay were analysed

**Results:** Hours of ventilation in Group A regular and high risk patients is significantly less compared to the Group B regular and high risk patients. Out of 200 patients group A regular patients had ( $12.682 \pm 5.786$ ) hours of ventilation and group B patients had ( $27.65 \pm 11.82$ ) hours of ventilation. Group A high risk had ( $17.3.3 \pm 6.649$ ) hours and group B ( $20.317 \pm 17.855$ ) hours of ventilation. Drain tube removal was done in Group A regular cases with a mean of  $15.952 \pm 9.204$  hours, Where as in Group B with a mean of  $27.964 \pm 6.84$  hours. In group A high risk cases the drains removed with an interval of  $4.030 \pm 5.637$  hours and in Group B with  $24.512 \pm 4.354$  hours. The duration of inotropic support for group A regular ( $19.492 \pm 33.88$  hours) and High risk ( $29.303 \pm 29.45$  hours) patients is much lesser than the group B regular ( $34.32 \pm 86.031$ ) and high risk ( $57.43 \pm 69.65$ ) patients. The duration of arterial line and central line removal in group A regular ( $26.841 \pm 9.123$ ) ( $56.210 \pm 23.72$ ) hours and high risk ( $39.636 \pm 5.589$ ), ( $60.848 \pm 64.29$ ) has much less duration than the group regular ( $56.210 \pm 23.72$ ), ( $63.578 \pm 34.43$ ) and high risk ( $89.804 \pm 53.768$ ), ( $102.75 \pm 57.829$ ) patients. Group A regular patients and high risk patients had significantly less ICU stay and hospital stay when compared to the group B Regular and high risk patients. In group A regular case 63.07% left ICU in <48 hrs and 27.69% within 48-72 hrs and 10.16% in >72 hrs., where as in group B regular case only 27.11% left icu in <48 hrs, and 59.30% in 48-72 hrs and 13.55% in >72 hrs

**Conclusions:** Fast tracking in cardiac surgery is safe and reliable if it is introduced under strict protocols, then there should not be any compromise for maintaining the quality of care.

### Mid term results of pulmonary thromboendarterectomy for chronic thromboembolic pulmonary hypertension: The MMM experience

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**Introduction:** Chronic Thromboembolic Pulmonary Hypertension (CTEPH) complicates 3.8% of acute pulmonary embolic events.<sup>1</sup> CTEPH is the only cause of severe pulmonary hypertension which is potentially curable without lung transplantation. Surgical intervention with Pulmonary Endarterectomy (PEA) is the preferred treatment for CTEPH.<sup>2,3</sup>

**Materials and methods:** Retrospective analysis of twelve Patients who underwent pulmonary thromboendarterectomy for CTEPH from 2009 to 2013 was done. The demography, preoperative baseline characteristics, intra operative characteristics, postoperative details and followup data was analysed.

**Results:** Mean age was 41.3 yrs with male: female ratio of 6:6. 8 patients were in NYHA Class III and 4 were in NYHA

Class IV. 4 had DVT of whom 3 underwent IVC Filter deployment preoperatively. Mean preoperative PA pressures were  $82.2 \pm 12.5$  mm Hg and decreased to  $30.2 \pm 11$  at discharge and was  $25 \pm 12$  on follow-up. 2 patients had in hospital mortality of which one had type 4 CTEPH and other died due to intractable RV dysfunction. Only 2 patients required prolonged ICU stay with ventilation hrs  $> 100$  hrs due to persistent pulmonary hypertension. Pulmonary artery pressure and pulmonary vascular resistance decreased in all patients following thromboendarterectomy. All of the 10 survivors are on regular follow up.

**Conclusions:** Our results are in concurrence with current literature which suggests that PTE for patients with CTEPH is associated with acceptable perioperative morbidity and mortality rates and improved hemodynamic indices and survival.

#### Post MI VSD repair infarct exclusion patch closure

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**Introduction:** VSD is a rare but lethal complication of MI. High morbidity and mortality. Emergency surgical treatment. We present our experience of three cases of Post MI VSD repair in last six months.

**Methods:** From Feb. to Sep. 2013, three patients underwent Repair of Post MI VSD by infarct exclusion technique. All three pts. were female in late 50's, presented in cardiogenic shock. Stabilised preoperatively with IABP and inotropic support. Subsequently operated and VSD repair done by infarct exclusion bovine pericardial patch closure along with CABG. Postinfarction VSD occurs in approximately 2% of patients with an acute infarction. Carries 100% mortality rate, unless surgically treated. Of three patients operated, one expired due to post op. low cardiac output and pneumonitis. She was operated on emergent basis due to hemodynamic deterioration preop. Other two were discharged after 12 days. Post op IABP support was continued in all three. We employed infarct exclusion patch closure technique for VSD repair. Saph. Vein grafts were used for CABG. Bovine pericardium was used for VSD closure. Exclusion of infarcted muscle and avoiding sutures in infarct area is essential.

**Conclusions:** Postinfarct VSD is a devastating complication. Deferring operation, if possible, until one week after infarction is better option. Cardiac support with intra-aortic balloon pump insertion to allow preoperative hemodynamic stabilization till surgery is done. Many different techniques are used for closure of VSD, but infarct exclusion patch closure appears to be a viable alternative for avoiding recurrent VSD.

#### A prospective study to evaluate minimally invasive right thoracotomy versus conventional sternotomy approach for mitral valve repair

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**Objective:** This study was planned to evaluate the feasibility of mitral valve repair through minimally invasive right anterolateral thoracotomy approach and compare the outcomes with conventional sternotomy approach.

**Methods:** From May 2012 to October 2013, 25 patients underwent mitral valve repair through limited right anterolateral thoracotomy (Group 1). Various clinical outcome parameters were compared with a 25-patient (Group 2) sternotomy. The age and sex distribution in two groups were comparable. All patients in both groups were having similar spectrum of RHD and functional status. Different repair techniques were used with rigid ring annuloplasty. TEE was used.

**Results:** There was no operative mortality. Clinical parameters were better with group 1 compared to group 2, like ICU stay (68.84 hrs vs 88.82 hrs), hospital stay (5.4 days vs 9.5 days), chest tube drainage (375.60 ml vs 536.5 ml), chest tube removal (55.96 hrs vs 65.78 hrs), incision length 7.4 cm vs 14.2 cm). Cross clamp time and bypass time were higher in group 1. Superficial groin wound discharge was in one in group 1. Outcome in term of mitral valve function was comparable (significant MS, MR 4%, 0% group 1 vs 4%, 4% group 2 at maximum follow up of 18 months).

**Conclusions:** Mitral valve repair is feasible and safe with minimally invasive thoracotomy approach with equivalent functional results and is better with respect to cosmesis, incision length, ICU stay, hospital stay, early mobility and patient satisfaction compared to sternotomy.

#### Cardiac Surgery in Nonagenarians: Analysis of survival, patient characteristics and outcomes

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**Introduction:** Improvements in quality of life and healthcare provision have contributed to more patients being considered for cardiac surgery in their ninth decade of life. Increasingly, elderly 'high risk' patients are offered percutaneous intervention including trans-catheter aortic valve implantation; we sought to objectively assess the outcomes of nonagenarians undergoing conventional cardiac surgical procedures.

**Methods:** This is a single centre retrospective review of all consecutive patients operated on, aged greater than ninety, between April 2006 – November 2013 (n=16). Baseline and peri-operative data were retrieved from our prospectively

maintained database. Survival information was obtained from the national patient tracking system.

**Results:** A total of 16 nonagenarians underwent cardiac surgery: 10 received isolated Aortic Valve Replacement (AVR); 4 combined CABG and AVR; 1 combined CABG and repair of acute aortic dissection and 1 combined CABG and mitral valve replacement. The mean age was 91.3 years (range 90 – 93, SD 1.07); 50% were male; mean logistic Euroscore was 22.10 (range 10.14 – 67.70, SD 15.60). 30-day mortality was 18.8%; survival 68.8% at 1 year; 62.5% at 5 years. Kaplan-Meier curve after the initial 1-year period shows plateau extending to 7 years. Post-operative complications included: 12.5% atrial fibrillation, 31.3% chest infections, 12.5% re-ventilated, 6.25% GI bleed, 6.25% sternal wound infection, 12.5% renal impairment.

**Conclusions:** This single-centre retrospective analysis demonstrates that cardiac surgery in nonagenarians carries a high risk of mortality and morbidity. Despite advances in surgical technology and peri-operative patient management, careful selection is necessary to offer these patients favourable long-term outcomes.

#### The benefits of Coronary revascularization with DOR procedure: Our experience

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**Background:** The role of ventricular restoration by DOR procedure has been documented in many studies. We analyzed the benefits of CABG plus DOR procedure in patients with coronary artery disease with left ventricular aneurysm.

**Methods:** We retrospectively analyzed patients who underwent coronary revascularization along with DOR procedure between 2005 and 2013 in our institution. Preoperative demographic profile, risk factors, nature of the disease, intra-operative variables and immediate postoperative characteristics were assessed. Outcomes were survival, re-hospitalization, NYHA class, improvement in LV Ejection fraction and MR.

**Results:** In the time period studied, 25 patients underwent CABG plus DOR procedure. All patients showed an improved post-operative ejection fraction ( $p < 0.05$ ), post-operative reduction in the severity of mitral regurgitation ( $p < 0.05$ ) and an enhanced functional status in the follow-up ( $p < 0.05$ ) when compared to pre-operative NYHA class. Early mortality ( $< 30$  days) was seen in 1 patient in the study group (4%) due to Mediastinitis and Sepsis. Occurrence of CVA during the ICU stay was seen in 2 out of 25 patients with complete neurological recovery (8%). 1 patient was re-

admitted with sepsis (4%). None of these patients were re-admitted for heart failure ( $p < 0.05$ ).

**Conclusions:** Patients who underwent CABG plus DOR procedure have definite impact in improved survival, ejection fraction, NYHA class and reduction of MR. In our experience, LV aneurysm repair with this procedure during concomitant CABG is a viable option with significant benefits.

#### The impact of concomitant left ventricular linear plication along with CABG

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**Introduction:** The optimal management of the scarred myocardium in patients undergoing CABG post myocardial infarction is controversial. In our study, we assess the impact of left ventricular plication of the scarred myocardium while doing CABG.

**Methods:** Between January 2009 and December 2013, a total of 40 patients underwent CABG along with left ventricular linear plication for scarred and akinetic myocardium. Retrospective analysis was done to assess the pre-operative demographic profile, intra-operative findings and post-operative difference in ejection fraction, NYHA and angina class, mitral regurgitation severity, recurrent heart failure and survival.

**Results:** The mean age in the study group was  $54.12 \pm 5.9$  years. Mean number of grafts per patient was  $3.82 \pm 1.18$ . Concomitant endarterectomy was done in 3 patients (7.5%). There was no early mortality. Two patients were re-admitted for recurrent CHF (5%). Late mortality was seen in 1 patient (2.5%). Substantial enhancement in the LV ejection fraction was seen post-operatively ( $p < 0.05$ ). Mitral regurgitation decreased post-operatively ( $p < 0.05$ ). The functional NYHA class and the angina symptoms showed significant improvement ( $p < 0.05$ ).

**Conclusions:** LV plication along with CABG is a practical option for patients having severely scarred myocardium. Early and mid-term results show the progressive effect with excellent improvement in survival and functional status.

#### Is full dose of protamine mandatory post cardiopulmonary bypass – Less is better than more

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**Objectives:** The current standard of practice for reversing protamine after cardiopulmonary bypass is in a ration of

1.4:1. Protamine has many side effects which include hypotension, anaphylaxis and vasoconstriction. Our study was designed to evaluate if a reduced dose of protamine would be as effective in neutralising heparin.

**Methods:** A prospective study of 25 consecutive patients who underwent cardiac surgery in our institution was carried out. Post decannulation, half the calculated dose of protamine was administered and ACT was measured

2 mins later. If required, a further dose (25% of calculated) was administered and ACT measured. If any further heparinised blood was transfused an additional 50 mgs of protamine was administered and serial ACTs were measured. ACTs were tabulated and graphed

**Results:** Our results clearly demonstrated that 80% of our patients (20) achieved target ACTs with administration of half the calculated dose of protamine.

Pre Op ACT	Post Heparin ACT	Post ½ dose protamine ACT	Additional pump blood given	Extra Protamine given	Final ACT in theatre	ACT after 1 hour	Blood loss
153.77	515.91	154.2	573.52	46.87	136.33	139.92	523.88

\* All figures are average calculated for 25 patients

**Conclusions:** Our study concludes that patients are being administered much higher doses of protamine than required; exposing them to the risks secondary to protamine administration.

**Safety of routine and complex cardiac surgeries in Jehovah’s Witness: a single centre study**

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**Introduction:** Jehovah’s Witness is a section of Christian faith that is well known for their refusal to use blood and blood products. They are considered as a high risk group for undergoing major surgeries especially cardiac surgery where use of blood and blood products are usual. This study reviews our strategies and experience in conducting routine and complex cardiac surgeries in this sect of people.

**Methods:** Over a period of 5 years from 2008 to 2013, 16 patients underwent open heart procedures including CABG, valve replacements, aortic root replacements and other aortic surgeries. A retrospective analysis of demographic data, peri-operative management, and clinical outcomes was examined.

**Results:** The mean age was 50 (± 15) years with 10 men and 6 women. Operative procedures included: isolated coronary artery bypass grafting (CABG) (n = 10), isolated valve replacement/repair (n = 2), valve replacement and CABG (n = 2), ASD closure and ascending aorta replacement (n = 1), and redo MVR+ascending aorta replacement (n = 1).

**Conclusions:** These results suggest that even complex open heart operations can be performed without homologous transfusion by optimally applying available blood conservation techniques. More generalized application of these measures may increasingly allow "bloodless" operations in all patients.

**Effectiveness of Calafiore and Buckberg methods in CABG**

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**Introduction:** Coronary Artery Revascularisation (CABG) using on-pump surgery is performed with various cardioplegic strategies.

**Methods:** 600 patients (pts) undergoing (CABG) were evaluated by a random generator. Two cardioplegic methods - Calafiore (CAL, 300 pts) or Buckberg (BUC, 300 pts) - were analyzed retrospectively.

**Results:** The indications for CABG differed significantly: elective (CAL 83%, BUC 51%), urgent (CAL 7.7%, BUC 41%) and emergent cases (CAL 9.3%, BUC 8%) (p< 0.0001). Significant parameters associated with cardioplegic methods were analyzed: initial volume (CAL 535ml, BUC 955ml) (p< 0.0001), initial perfusion time (CAL 3.2min, BUC 4.3min) (p< 0.0001), number of replegia/pt (CAL 1.4, BUC 1.7) (p< 0.0001) and ischemic time (CAL 67min, BUC 70min) (p< 0.012).

Release of CK was significantly higher in CAL 2 days post-op (p< 0.001), while CK-MB was significantly higher in BUC, but only the first postoperative day (p< 0.0001). Troponin I release was significantly higher in BUC only 1 day after CABG.

Further postoperative parameters were significant: arrhythmias (CAL 0.3%, BUC 4%)(p<0.002), low cardiac output (CAL 0%, BUC 7%), rethoracotomy due to bleeding (CAL 0.3%, BUC 5%) (all: p< 0.0001), renal failure (CAL 0%, BUC 3%) (p< 0.003) and pneumonia (CAL 0.7%, BUC 5.3%) (p< 0.001). Grafts/pts (CAL 3.0, BUC 2.9) were similar in both groups.

**Conclusions:** Calafiore solution being routinely used in CABG offers safe myocardial protection with simple

applicability. Our data further prove that the protective power of CAL is superior to BUC method. Due to economic reasons BUC is also inferior since it is more expensive.

### Pattern of coronary artery disease progression after OPCAB

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**Objective:** Off Pump Coronary Revascularization (OPCAB) is popular here despite doubts about long term graft patency compared to conventional On Pump Surgery.

We evaluated pattern of disease progression in symptomatic patients after OPCAB using 64 slice CT angiogram.

**Methods:** Between January 2005 and February 2013 we performed OPCAB on 6373 patients. . Among these 2491 are on regular follow up and 29 patients who were symptomatic had 64 slice CT angiograms to evaluate progression of disease (7 became symptomatic within 1 year; 4 in 2 years; 7 in 3 years; 2 in 4 years; 4 in 5 years, 1 in 6 years; 2 in 7 years and 2 in 8 years).

**Results:** Total grafts evaluated were 77 (62 patent and 15 occluded), 1/28 had occlusion of left internal mammary artery, 7/23 obtuse marginal, 5/10 posterior descending, 1/7 right coronary, 1/5 diagonal while all 3 grafts each to ramus intermedeus and posterior left ventricular were patent. Single graft was occluded in 11 patients while 2 grafts in 2 patients and remaining had patent grafts.

Progression in native vessels was seen in 25 patients (RCA – 9, LAD – 8, LCx – 8). Mean total cholesterol levels were also evaluated (cholesterol- 141; LDL – 86.87; HDL – 36.91; TGL – 158.08).

**Conclusions:** Progression of native vessel disease is main cause of symptoms after OPCAB in our patients despite adequate control of lipid profile. LIMA to LAD has least likelihood of being occluded while saphenous vein grafts to OM and PDA have highest incidence.

### A review of procedure relevant complications after minimal access cardiac surgery

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**Introduction:** Over the past decade Minimal Invasive Cardiac Surgery (MICS) has grown in popularity. MICS is favored by surgeons and patients because of reduced postoperative discomfort, faster healing times, lowered infections or complications with improved quality of life and cosmetic results. However doing MICS will require a better understanding of potential complications. This paper reviews the procedure

relevant complications that occurred after MICS at our hospital.

**Methods:** From Oct 2009 to Nov 2013 we performed 256 total minimal invasive cardiac procedures, 128 CABG surgeries, (09 on pump, 119 off pump) 56 mitral valve replacement surgeries, 18 mitral valve repairs, 08 aortic valve replacements and atrial septa defect closure in 46 patients.

**Results:** Operative mortality was 3/128 (2.3%) after CABG surgery, 01/82 (1.21%) after valve surgery, and 01/46 (2.17%) after congenital procedures. In 9 patients we had to be converted to open sternotomy method (6 patients after CABG, two patients after mitral valve replacement- one for intermittent stuck valve and the other for ruptured left ventricle and one patient had external iliac artery perforation during femoral artery cannulation while operating for minimal invasive aortic valve replacement. External iliac artery repaired and procedure converted to open sternotomy). Femoral artery thrombosis was noticed in one patient after minimal invasive ASD closure on the table for which thrombectomy was performed. Deep vein thrombosis in the cannulated limb was noticed in two patients, one after ASD closure and one after MVR, on the 3rd postoperative day and managed conservatively. One patient had cardiac arrest on the 3<sup>rd</sup> postoperative day in the postoperative ward after ASD closure could be due to pulmonary embolism.

**Conclusions:** Current evidence has demonstrated that MICS is a feasible alternative to open cardiac procedures. Knowing the potential complications may help surgeons make the right decision for each individual patient depending on the patient's anatomy and co-morbidities. With this present experience we feel that confirmation of guidewire position in the thoracic aorta with help of TEE is a must to avoid false passages during femoral arterial cannulation. In view of the above mentioned thrombotic events we continued to give heparin for 5 days post surgery. Further studies need to focus on individualizing the patients for MICS to prevent vascular and thrombotic complications.

### Effect of clopidogrel on postoperative bleeding and transfusions after off pump coronary artery bypass surgery

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**Introduction:** Aspirin combined with clopidogrel is treatment of choice to treat acute myocardial infarction, unstable angina, acute coronary syndromes and secondary prevention after PTCA and CABG is well accepted. The purpose of this study is to assess the impact of clopidogrel

on intra and postoperative bleeding and transfusion requirements in off pump coronary artery grafting surgery when clopidogrel is continued over a period of 5 days preoperatively.

**Methods:** Our study is a prospective observational study which included 80 patients who underwent off pump coronary artery bypass grafting between July 2013 and Sep 2013 at our hospital. We divided these patients into 2 groups, group A (n=40) receiving clopidogrel with aspirin till one day prior to surgery, group B(n=40) patients who have discontinued clopidogrel 5 days before surgery. Postoperative bleeding and transfusion requirements compared between two groups.

**Results:** We found no significant difference between both groups concerning the preoperative characteristics except for unstable angina and left main coronary artery stenosis which were more frequent in group A. There was no 30 day mortality and re-exploration performed for postoperative bleeding in either group. In group A patients we noticed higher intraoperative and postoperative bleeding. The mean chest tube output after 24 hours postoperatively is 900 ml in group A and 390 ml in group B. Patients in group A also had higher total requirements of blood and platelet transfusions

**Conclusions:** Although Continuation of aspirin until surgery does not affect postoperative bleeding after coronary artery surgery, postoperative bleeding and transfusion requirements dramatically increased when clopidogrel is continued over a period of 5 days preoperatively. Clopidogrel did not increase the reoperation rate, the length of stay or mortality in this study. We conclude that when clopidogrel can not be stopped before surgery in view of unstable angina or LMCA disease, platelet transfusions and blood conservation strategies could be useful in these patients to minimize blood transfusions, but it remains to be studied in rigorous trials.

### Management of post infarct VSD:- Our institutional experience

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**Introduction:** To establish a management protocol for the patients with post infarct VSD.

**Methods:** 5 patients were managed by our department with post infarct VSD over the past 2 years. Most of the patients (4) were having a recent history of myocardial infarction with one patient having failure as the predominant symptom. All the patients were subjected to surgical intervention after initial medical stabilization. Surgical VSD closure was done in all patients with infarctectomy done in 3 patients. None of the

patients were subjected to concomitant CABG. Post op patients required high inotropic and IABP support. 3 patients expired and 2 were discharged and are on follow up.

**Discussion:** Post infarct VSD develops secondary to a massive myocardial infarction. Medical management though necessary, it requires early surgical intervention to salvage the patient. Use of inotropic support and IABP are complimentary to the surgery. LV reduction (infarctectomy) helps to restore the LV geometry and improve the contractility. Associated mitral regurgitation and coronary artery disease needs to be addressed as per the individual case basis.

**Conclusions:** Aggressive early management both medical and surgical favours better outcome. Delay in intervention and elderly patients have poor surgical outcome.

### Can postoperative renal dysfunction be predicted by measuring intraoperative Glomerular Filtration Rate in patients undergoing coronary artery bypass grafting without cardiopulmonary bypass? A pilot study

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**Introduction:** Currently, there is no effective paradigm to identify patients who are at risk for renal dysfunction following cardiac surgery. The specific mechanisms of renal injury during surgery are incompletely understood. Aim of the study was to evaluate whether postoperative renal dysfunction can be predicted from intraoperative Glomerular Filtration Rate(GFR). Design: Prospective study. Setting: Tertiary care multi-specialty hospital.

**Methods:** GFR was measured in 24 patients (mean age 56.6 ± 11.09 years, 20 male) undergoing elective off-pump coronary artery bypass grafting during preoperative period, intraoperative period, after 24 hours of surgery (ICU GFR) and on 5<sup>th</sup> postoperative day (final GRF).

**Results:** Compared to preoperative GFR, 14 (58.3%) out of 24 patients had fall in intraoperative GFR (mean 36.4%). Of these 14 patients, one patient required dialysis support and 3 patients required inotropic support. Deterioration in final GFR (mean 28.7%), when compared to preoperative GFR was noted in 7 (50%) of patients with fall in intraoperative GFR. Rise in intraoperative GFR was noted in 10(41.7%) of 24 patients. They all had an uneventful hospital course and achieved an improvement in final GFR.

**Conclusions:** Postoperative renal dysfunction can be predicted from intraoperative GFR. Patients who have a rise in intraoperative GFR do not develop postoperative renal dysfunction and only patients with intraoperative fall in GFR are at risk of postoperative renal dysfunction.

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### Artificial neochordal reconstruction for the maintenance of posterior papilla annular continuity in patients of severe calcific mitral stenosis following mitral valve replacement and its effects on the left ventricle

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**Introduction:** This study was aimed at studying the left ventricular function and remodeling after conventional MVR versus MVR with the maintenance of papillo annular continuity with goretex sutures in patients with severe calcific mitral stenosis where it is not possible to preserve the subvalvular apparatus. Background: Effect of papillary muscle resuspension with goretex sutures has not been well established. In late cases of severe calcific mitral stenosis the subvalvular apparatus is frozen. Our aim was to implant artificial chordae in three positions after excising the subvalvular apparatus.

**Methods:** A total of 15 patients with severe calcific mitral stenosis underwent MVR with artificial neochordae reconstruction. Post operative echo was done at the end of 1<sup>st</sup> week, 1<sup>st</sup> month and 3 months.

**Results:** There was a statistically significant difference in LVEF in the cases at one month post op ( $p < 0.031$ ) and three months ( $p < 0.031$ ). Regarding fractional shortening there was a statistically significant difference in the values one week and one month and three months post operative ( $p < 0.023, 0.044, 0.024$ ) respectively.

**Conclusions:** There was significant improvement in the post operative left ventricular systolic function where reconstruction of an artificial chordae will cause significant improvement in the left ventricular systolic function and prevents dreadful complications of posterior wall rupture after first time MVR. Definite parameters of left ventricular remodelling like ejection fraction, fractional shortening showed significant improvement post neochordaeplasty. Left atrial dimensions and LVED reduced significantly post reconstruction. However they were not statistically significant.

### Vacuum-Assisted Closure (VAC) therapy in the treatment of sternal wound infection after cardiac surgery

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**Introduction:** Vacuum-Assisted Closure (VAC) was primarily designed for the treatment of pressure ulcers or chronic debilitating wounds. We used this modality for treating sternal wound infection after cardiac surgery.

**Methods:** 13 patients with sternal osteomyelitis and mediastinitis underwent VAC therapy. All had their primary surgery at another hospital – 11 were post CABG and 2 were

post DVR. All had deep sternal wound infections. The median age was 67.9 years (range 48 to 79) and the median BMI was 34.2 kg/m<sup>2</sup> (range 28 to 41). 10 of the 13 were diabetics. All were referred after failure of the conventional treatment strategy at the primary hospital.

**Results:** All 13 patients were successfully healed. In hospital mortality was 0% and 30 day survival was 100%. The overall length of hospitalization reached 19.4 days (range 11 to 62). The median number of dressing changes was 4.9 (range 3 to 15). The median VAC treatment time was 9.7 days (range 6 to 60 days). In 4 patients the excessive residual sternal defect required a local advancement flap transfer. One patient with a chronic wire-related fistula was readmitted 6 months after VAC therapy and needed a LD flap.

**Conclusions:** VAC therapy can be considered as an effective treatment strategy associated with a low risk of procedure failure and wound infection recurrence in the management of sternal wound infection after cardiac surgery.

### Modified Del nido cardioplegia as a safe alternative in DVR

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**Introduction:** Del Nido cardioplegic solution (UNM solution) has a different chemical composition compared to which is administered as one single dose of cardioplegia. The aim of our study was to compare the effects of modified Del Nido cardioplegia solution with multi-dose St. Thomas cardioplegia solutions in patients operated for double valve replacement.

**Methods:** We did a prospective randomized controlled trial involving total of 100 patients undergoing double valve replacement. In group 1, modified del-Nido cardioplegia solution was administered every 60 min while in group 2, St Thomas cardioplegia solution was administered and repeated every 20 minutes. Cardioplegia was given by antegrade method with topical surface cooling. Both the groups were compared for aortic cross clamp time, cardiopulmonary bypass time, mean numbers of cardioplegia doses, incidence of ventricular fibrillation after aortic declamping, post-operative creatinine phosphokinase (CPK MB) and Troponin T levels, post-operative ejection fraction, duration of ventilation and hospital stay.

**Results:** Both the groups were comparable for NYHA Class, aortic cross clamp time, cardiopulmonary bypass time. There was no significant difference in postoperative rise of CPK-MB and Troponin T level between two groups. Post-operative ejection fraction in both the groups was comparable. Requirement of number of defibrillation in immediate post-operative period were significantly lower in modified Del Nido group. The duration of ventilation, hospital stay and survival were comparable in both the groups.

**Conclusions:** Modified Del Nido cardioplegia solution is as safe as St. Thomas cardioplegia solution with no difference in post-operative myocardial markers, ejection fraction and inotropic score.

### Short term results following aortic root replacement with Medtronic Freestyle graft- a single centre experience

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**Introduction:** The ideal substitute for aortic root replacement remains undetermined. The composite mechanical valve conduit has been most commonly used for patients who require combined aortic valve, root, and ascending aorta replacement, but is limited, especially in the elderly, because of the need for long-term anticoagulation. Aortic homografts have been used with good long-term results, particularly when implanted as freestanding aortic roots. Their lower transvalvular gradients are associated with better left ventricular mass regression. They also show good resistance to infection and other valve-related complications. However, homografts can undergo late degeneration marked by heavy calcification and valve dysfunction. This finding coupled with limited availability of homografts has stimulated the search for other substitutes with a similar hemodynamic profile and equal or better durability. The present study was undertaken to evaluate clinical, hemodynamic, and morphologic results of composite stentless xenograft with or without polyethylene terephthalate fiber (Dacron) graft extension for replacement of the aortic valve, root, and ascending aorta.

**Methods:** Between 2008 and 2013, 18 patients (age  $54 \pm 24$  years) underwent total aortic root replacement using Freestyle bioprosthesis. Median follow-up was 2.5 years (maximum 5 years). “Evolving” aortic valve dysfunction was defined as aortic regurgitation  $\geq 2/4$  and/or mean gradient  $>15$  mm Hg. Concomitant procedures included coronary artery bypass graft (CABG) alone ( $n = 4$ ), mitral valve replacement ( $n=2$ ) and atrial septal defect repair ( $n = 1$ ).

**Results:** Median aortic cross-clamp and cardiopulmonary bypass times were 138 and 191 min, respectively. None of the patients had excessive bleeding (average mean total drain = 540 ml) or need of re exploration. Median blood transfusions and length of hospital stay were 3 units and 7 days, respectively. None of the patients had significant aortic regurgitation and the mean post operative gradient across the valve was 9 (5-19) mm Hg. Perioperative mortality was one. Cause of death was post-operative pneumonia with MODS.

**Conclusions:** The composite freestyle valve with or without graft extension is a reasonable alternative to a mechanical valve conduit or aortic homograft for patients who require a

combined aortic valve, root and ascending aorta replacement, in whom anticoagulation is not desirable or contraindicated. It also has excellent hemodynamic properties in the short term follow-up. However, long term follow up is necessary for assessing valve durability.

### Early results of mitral valve repair from a tertiary level institute

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**Introduction:** Mitral valve repair is the treatment of choice in patients with mitral insufficiency. Mechanical valves, even when functioning perfectly, are less efficient hemodynamically than a native mitral valve and also have attendant morbidity from thrombolism, anticoagulant-related hemorrhage, and endocarditis. Long-term data have confirmed the durability of mitral repair.

**Methods:** Mitral valve repair was performed on 64 consecutive patients between Nov. 2009 and april 2013,. The repair technique included quadrangular resection, artificial chordae placement, chordal transfer, and chordal shortening. In all patients repair was reinforced with flexible incomplete annuloplasty ring

**Results:** There were 64 patients (consecutive) in our study. Of these 37 were males (57.8%). Most of our patients were having mitral valve prolapse (50%). Other etiologies being Rheumatic (26.5%). Associated procedures included AVR (4/64), Tricuspid repair (4/64), LV aneurysm repair (1) and ASD closure (1). All patients underwent placement of annuloplasty with flexible incomplete ring. Additional procedures included triangular resection, quadrangular resection, and placement of synthetic chordae, commisurotomy, chordal splitting and closure of clefts. The approach valve was mostly through LA.. All cases had moderate or mod-sev or severe MR. Before and after repair they underwent saline test. Our hospital did not have the privilege of an intraop TEE during the period of study. No patients had more than mild MR post op.

### A retrospective study to evaluate surgery for severe aortic stenosis with low transvalvular gradient and poor left ventricular function

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**Introduction:** The optimal management of patients with severe aortic stenosis, low transvalvular gradient, 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.



**Methods:** Between July 2009 and May 2013, 32 patients with left ventricular ejection fraction (EF)  $\leq$  35% and severe aortic stenosis with transvalvular mean gradient  $<$  30 mm Hg underwent aortic valve replacement at NIMS, Hyderabad. The mean preoperative characteristics included EF  $35 \pm 8\%$ ; aortic valve mean gradient  $24 \pm 4$  mm Hg; aortic valve area,  $0.7 \pm 0.2$  sq.cm. Simultaneous coronary artery bypass graft surgery was performed in 12 patients.

**Results:** Perioperative (30-day) mortality was 12.5% (4 of 32 patients). Advanced age and small aortic prosthesis size were significant predictors of hospital mortality. The mean aortic prosthesis size was  $23 \pm 1.8$  mm in survivors and  $21.6 \pm 2.1$  mm in patients who died perioperatively. 75% (n=24) were severely symptomatic (NYHA class III or IV) before and only 18.6% (n=6) were severely symptomatic after operation. At 6 months follow-up, interventricular septal wall thickness regressed from  $14 \pm 2$  to  $12 \pm 1$  mm and posterior wall thickness from  $13 \pm 3$  to  $11 \pm 2$  mm. Postoperative EF was assessed in survivors; 80.6% showed an increase of  $10 \pm 12$  EF units. Positive change in EF was related to smaller preoperative aortic valve area.

**Conclusions:** Despite severe left ventricular dysfunction, low transvalvular mean gradient, aortic valve replacement was associated with improved functional status. Postoperative survival was related to younger patient age and larger aortic prosthesis size.

#### Septal myectomy in HOCM- a single centre six year experience

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**Introduction:** Six percent of the patients with Hypertrophic Obstructive Cardiomyopathy (HOCM) have symptoms unresponsive to medical treatment and are candidates for invasive therapy. The objective of this study was to analyze the effectiveness and risk involved with surgical treatment of HOCM during the last 6 years.

**Methods:** Between June 2008 and April 2013 - 40 patients with HOCM were operated on. The mean age was  $55 \pm 12$  years, 60% (n=24) were men. 35% cases were in NYHA class I & II while 65% in class III & IV. Septal myectomy was performed, in combination with Mitral valve repair in 6 cases and replacement in 2. Grade of dyspnea, Left Ventricle Outflow Tract Gradient (LVOTG), Mitral regurgitation, after surgery was analyzed. Effectiveness was assessed by echocardiography, early risks by intraoperative and postoperative complications were followed upto 5 years.

**Results:** There was no in-hospital mortality. Myectomy resulted decrease in septal thickness (from  $2.1 \pm 0.46$  to

$1.2 \pm 0.35$  cm), reduction in LVOTG (96.5 to 19.5 mmHg), grade of mitral regurgitation (from 2.14 to 0.49) leading to improvement in functional class, 50% (n=20) were NYHA class I while 19% in functional class II. Two patients underwent AVR for procedure related injury immediately. 3 patients had septal perforation (however shunt was minimal needing no correction). Total AV-block occurred in 8 patients requiring pacemaker-implantation. Actuarial survival at 5 years was 96%.

**Conclusions:** We found septal myectomy provides patients with survival equivalent to an age matched population without HOCM with relatively few complications.

#### Concomitant tricuspid valve repair with mitral valve replacement: Our experience using Rigid vs Flexible ring

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**Introduction:** Surgical management of tricuspid valve regurgitation mainly comprises tricuspid valve annuloplasty, usually performed with implantation of a rigid ring or a flexible ring. We review and compare our experience with tricuspid ring annuloplasty between usage of the Duran flexible ring and the Carpentier-Edwards rigid ring for repair of functional tricuspid regurgitation to determine the efficacy and postoperative durability of tricuspid annuloplasty.

**Methods:** We retrospectively analyzed 125 patients, operated between January 2011 and August 2013; who underwent tricuspid valve repair with either a flexible Duran ring (n=62) or a Rigid Carpentier-Edwards ring (n=63) with concomitant mitral valve replacement (mechanical or bio-prosthetic valve with or without chordal preservation).

**Results:** Mean patient age was  $38.90 \pm 12.76$  years, out of which 66% were female. Pre-operative NYHA Class was  $2.28 \pm 0.53$  (Duran ring  $2.30 \pm 0.61$ , Carpentier-Edwards ring  $2.26 \pm 0.44$ ), which was reduced to  $1.04 \pm 0.37$  at one month follow-up (mid-term post-operative period). Post-operative echocardiography showed significant improvement in tricuspid valve function, with reduction in tricuspid regurgitation grade from  $2.68 \pm 0.55$  to  $1.34 \pm 0.63$  (regurgitation severity grade: 0 to 4) and there was no differences between the groups with similar pulmonary hypertension between both groups. Thirty day mortality was 3.2% (flexible Duran ring, 3.22%; Carpentier-Edwards ring, 3.17%). There was no ring dehiscence in mid-term post-operative follow up.

**Conclusions:** Placement of an annuloplasty ring in patients undergoing tricuspid valve repair is associated with enhanced symptomatic improvement. Both flexible and rigid ring annuloplasty provide equivalent outcome in mid-term post-operative period with significant reduction in functional tricuspid valve regurgitation.

### Initial experience of adult ECMO in India for cardiorespiratory failure

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**Introduction:** Extracorporeal Membrane Oxygenation (ECMO) is a rescue therapy for critically ill patients with reversible cardio-respiratory pathology and those who have probability of death around 80% despite maximal conventional treatment. The positive results of the recent trials have stimulated our interest to use ECMO for life threatening conditions due to cardiorespiratory failure. Here we describe our experience at a tertiary care center in India.

**Methods:** We established an adult ECMO program for cardiorespiratory support in April 2013. In the last 8 months, we supported eight patients on ECMO and it was only considered once the conventional therapy deemed failing. A retrospective analysis of our patient data was performed to collect information regarding patient demographics, indication for ECMO, type of ECMO and outcomes.

**Results:** A total of eight patients received ECMO between April to November 2013. The mean age was 36.4 yr (range 18–57 years), 5 Male:2 Female. Out of eight 2 were Veno Arterial (VA) and 6 were Veno Venous (VV) ECMO. In VA ECMO the first patient had intractable arrhythmias and second had acute viral myocarditis leading to refractory cardiogenic shock. Out of six patients of VV ECMO, three had viral pneumonia, two bacterial pneumonia and one with fulminant fungal infection leading to ARDS. ECMO was instituted by peripheral cannulation in all patients. Average support time was 9 days (range 5 to 13 days). Five patients (62.5%) were successfully separated from ECMO and 4 (50%) survived to hospital discharge. Two patients had major complications including pump failure and bleeding. One underwent lobectomy for multiple bronchopleural fistulae in right lung.

**Conclusions:** ECMO is salvage therapy in patients with life threatening refractory circulatory shock or severe ARDS. This therapy has the potential to save lives if applied in time and in appropriate clinical settings.

### Early experience with minimally invasive cardiac surgery program

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**Introduction:** Minimally Invasive Cardiac Surgery (MICS) offers the advantage of improved patient satisfaction with outcomes comparable to standard techniques. However, the enhanced cost, need for specialised instrumentation, and the fear of the unknown has limited the number of

surgeries performed. Persistence, patience and a willingness to re-train our surgical teams will however, ensure the necessary impetus to this new paradigm of cardiac surgical care.

**Methods:** Seventy three (73) patients operated between January 2012 and October 2013 were considered for this study. The patients were offered the choice of MICS during the outpatient interaction and were operated upon after obtaining informed consent for the same. The in-patients case records were reviewed and analysed.

**Results:** During the study period, 73 patients underwent MICS procedures comprising of 26 MICS Coronary Artery Bypass Graft (CABG), 24 Atrial Septal Defect (ASD) closures, and 23 valve replacements (13 aortic and 10 mitral). There were no in-hospital or early postoperative deaths. The average Intensive Care Unit (ICU) stay was 1.12 days with an average hospital stay of 5.3 days. Two patients (2.7%) were re-explored for bleeding and two (2.7%) required re-operation for procedure related complications. There were no wound infections.

**Conclusions:** Minimally invasive approaches are gaining increasing popularity in view of better cosmesis and earlier recovery times. Careful patient selection is mandatory for successful outcomes during the learning curve and with increasing experience acquired by the team the procedure can be tailored to include a larger number of patients.

### Simultaneous carotid endarterectomy with CABG: A good treatment strategy

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**Introduction:** Concomitant coronary artery disease with significant symptomatic carotid artery stenosis requires treatment of both lesions on a priority. There are only few surgical series where both lesions have been tackled in the same sitting. We present our series of CABG with carotid endarterectomy (CEA) over a 11 year period.

**Methods:** Demographics and outcomes of all patients undergoing synchronous CEA/CABG between Jan 2002 and Dec 2012 were reviewed from our vascular registry and patient charts. We included patients who underwent CEA with synchronous CABG. Any neurologic event within the first 30 days of surgery was considered a stroke.

**Results:** Out of 25 patients operated, 19 were males (76%) and 6 were females (24%). 22 (90%) complained of loss of consciousness episodes in the previous 6 months. Mean age of patients was 61 +/-3.2 yrs. 8 were smokers (36%), 17 had diabetes (68%). There was no early mortality. There was no neurological event in this series. Postoperative awakening in these patients was

seen to be 6 hours ( $\pm 30$  mins). The mean hospital stay was 11.6 days. A vascular shunt was used during the procedure. Following carotid endarterectomy, 22(80%) had primary closure technique for the carotid artery, 3(12%) required vein patch plasty of the carotid artery. 5(20%) patients had longer requirement of inotropic support due to LV dysfunction, 1(5%) required re-exploration for hematoma of the neck wound.

**Conclusions:** In this high risk group of patients, concomitant CABG with Carotid Endarterectomy in our series has shown good results. Hence we recommend this strategy rather than staged procedures which are prone to morbidities.

### Early results of Tricuspid valve repair in a predominantly rheumatic population: An institutional report

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**Introduction:** Tricuspid valve involvement is a frequent accompaniment of rheumatic mitral valve disease. Tricuspid valve disease is a marker of more severe form of disease and is associated with increased operative mortality and morbidity. We present early results of tricuspid valve repair at our institute.

**Methods:** Ninety four patients underwent Tricuspid repair at our institute between January 2010 and October 2013. Mean age was 32.61 years (range 4 to 65 years). Male to female ratio was 1:1. Concomitant surgeries were 15.95% (n=15) AVR, 14.89% (n=14) Mitral valve repairs, 59.57% (n=56) MVR, and 9.57% (n=9) ASD repair. 20.21% patients had organic disease. Tricuspid repair was performed by commissurotomy 10.64% (10), bicuspidization 2.12% (2), modified de Vega's annuloplasty 30.85% (29), anterior leaflet augmentation with pericardial patch (2), and ring annuloplasty 44.68% (42) in patients having Severe TR 78.72% (74) or Moderate TR 15.96% (15). The follow up was 92.55% complete.

**Results:** Clinically patients improved from NYHA III 61.70% (58) & IV 27.66% (26) to NYHA I 61.70% (58) or II 20.21% (19). Follow-up Transthoracic echocardiography showed moderate TR in 3.19% (3) and mild/trace 26.59% (25) or trivial/no regurgitation in 7.44% (7) in the annuloplasty group compared to 19.15% (18) and 22.34% (21) in deVega repair/bicuspidization group. 4(4.25%) patients had Severe TR in the de Vega/Bicuspidization group. In hospital mortality was 9.57%.

**Conclusions:** TV disease is a marker of advanced rheumatic valve disease. TV repair can be performed with acceptable early results. Organic TV disease is difficult to treat and have suboptimal early results with the present established repair techniques. Ring annuloplasty is superior to suture annuloplasty especially for severe secondary TR

### Mitral valve repair has durable results: A long term study of patients with varied aetiologies

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**Introduction:** Mitral valve repair has been widely performed as an isolated procedure and otherwise. We sought to determine the preoperative characteristics, clinical presentation, surgical techniques and long term results of patients undergoing mitral valve repair for various conditions.

**Methods:** Between June 2002 and July 2013, 408 patients (mean age 43.7 $\pm$ 3.5 years, range 4 to 83 years) underwent mitral valve repair. 296(72.5%) underwent isolated mitral repair while 112(27.4%) underwent concomitant procedures such as aortic valve replacement (62), CABG (44) and Bentalls procedure (6).

**Results:** The mitral valve lesions were rheumatic in 218 (53.45%) cases, degenerative in 127 (31.12%), of ischaemic etiology in 48 (11.7%) and infective in 15 (3.67%). Out of the 218 patients of rheumatic etiology, 172 patients (78.8%) were in NYHA III and IV and 76 (34.86%) had atrial fibrillation preoperatively. 130 patients (59.6%) had pure mitral regurgitation and 22 (10.09%) had pure mitral stenosis. 210 (51.4%) patients had an annuloplasty ring. Follow up was complete in 87% of the patients (mean duration of follow up was 42 $\pm$ 16 months, range was 3 to 107 months). The in hospital mortality was 1 (0.24%). There was moderate MR in 5 patients (1.22%) and 2 (0.49%) required a redo mitral valve replacement. 96% had freedom from symptomatic MR and 98% had freedom from reoperation.

**Conclusions:**

Mitral valve repair offers increased event free survival and freedom from anti-coagulation. Mitral reconstruction techniques are now standardised, reliable and reproducible with excellent early and long term outcomes.

### Role of ROBO in minimally invasive cardiac surgery

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**Introduction:** Minimally invasive cardiac surgery is upcoming and promising future. It needs a steep curve of learning in this regard a role of robo place an important role in experienced hands.

**Methods:** Selected cases are valves and CABGS

NO OF CASES 8

VALVES 5

CABG 3

TYPE OF SURGERY MVR 5 and CABG 3

PROCEDURE: Rt chest for MVR left for CABG no of ports 3, DLET for collapsing lung sub mammary incision 4 cm femoro femoral bypass and svc separate cannulation

under TEE guide right femoral and right radial art line chest retractor paediatric single blade pericardium incised and stay sutures next port is for co2 and sump sucker. Canulation for cardioplegia over the aorta separate port for chittwood aortic cross clamp. 3<sup>rd</sup> port for working. Under robo assisting mitral valve replacement completed. Deairation through vent and shaking the patient under tee guide. Patient shifted to post op with good haemodynamic status. Patient discharged on 4<sup>th</sup> day. For CABG LIMA dissection assisted with robo is very helpful from subclavian to bifurcation and anastomosis to lima lad with y grft to om and diagonal. DISCUSSION -MICS assisted robotic surgery is very encouraging and pain relief to cardiac patients in view of no sternotomy and minimal blood loss minimal icu stay is helpful to many patients.

**Conclusions:** Robotic surgery give very much encouraging results in valves, ASD AND CABG patients. No patients had major complication

### Unexpected calcified aorta during cardiac surgery: Is it safe to clamp?

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**Introduction:** Atherosclerosis of ascending aorta is becoming an increasingly recognized problem as the mean age of the patients undergoing cardiac surgery increases. The diseased aorta is often an unexpected intra-operative finding as the preoperative investigations may not always pick up the presence of a calcified ascending aorta. Cross-clamping a diseased aorta can theoretically lead to an increased risk of distal atheroembolic events. We report our experience of clamping the calcified aorta during cardiac surgery and its sequel.

**Methods:** We retrospectively reviewed 1895 consecutive patients who underwent cardiac surgery by a single surgeon between Jan 2004 and Aug 2013. 68 patients (3.58%) (31 females, 37 males) were identified to have a severely calcified ascending aorta intraoperatively. The age range from 55 to 89 (mean 75.2 years). The aorta was cross clamped in 61 patients, 6 underwent replacement of the ascending aorta under circulatory arrest for porcelain / lead pipe aorta and in 1 case, the operation was abandoned.

**Results:** 4 patients (5.9%) suffered neurological complications (3 CVA and 1 TIA) in the cross clamp group and none in the circulatory arrest group. All 4 patients made a full neurological recovery postoperatively. There was 1 post operative mortality (1.47%).

**Conclusions:** This study demonstrated that cross clamping a severely diseased ascending aorta during cardiac surgery does not appear to be as hazardous as expected.

### Transcatheter aortic valve implantation on cardiopulmonary bypass: Safe hybrid approach

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**Introduction:** Transcatheter Aortic Valve Implantation (TAVI) is a novel approach for high-risk patients with severe aortic stenosis. During the phases of rapid pacing (valvuloplasty and valve deployment) there may be period of haemodynamic instability, which may be prolonged in patients with significant pre-existing left ventricular dysfunction or cardiogenic shock. The perioperative risk can be reduced in such patients with the use of Cardiopulmonary Bypass (CPB).

**Methods:** We reviewed 14 patients (8 Transapical, 4 Transfemoral) where CPB (Femoral-Femoral) was used during 138 consecutive TAVI procedures between Dec 2008 and December 2012. Clinical risks and outcomes were retrospectively analyzed from patient records.

**Results:** Mean age was 77.5 years (56-89 years). EuroSCORE was 10.64 (6-14) and Logistic EuroSCORE 23.11 (5.96- 52.45).

Elective CPB was planned in 10 patients with poor Left ventricular function (<30%), 4 patients had non-elective CPB due to cardiac instability during the procedure.

The technical success rate was 100% with no conversion to conventional surgery. Mean CPB time was 28 minutes (17-42). There was no intraoperative mortality. 30-day mortality was 7.14% (1/14); survival at 1, 3 and 6 months was 92.85%, 85.71% and 85.71% respectively and 1 year survival was 78.57%. None of the patients had CVA or required permanent pacemaker.

**Conclusions:** In patients with severe left ventricular dysfunction or inadvertent haemodynamic instability, the short use of CPB enhances the safety in critical TAVI procedures.

### Preoperative and postoperative use of IABP in high-risk patients undergoing OPCAB

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**Introduction:** Our study compares the usefulness of preoperative and postoperative insertion of IABP in high risk patients under going off pump coronary artery bypass surgery (OPCAB).

**Methods:** We studied 50 high-risk patients who fulfilled two or more of the following criteria; left main coronary artery stenosis more than 75%, EF less than 35% and/ or unstable angina. Preoperative insertion of IABP was done in 25 patients (Group I) and postoperatively in the other 25 patients (Group II). Both groups were matched. All patients had triple vessels disease.

**Results:** Complete revascularization was done in both groups. The number of grafts did not differ significantly between the two. No patients were put on CPB. However, significant reduction in cardiac output, arrhythmia, ICU stay and renal failure was noted in group I as compared to group II. Postoperative mortality was significantly less in group I. However survival and quality of life did not differ after one year of follow-up between the two groups.

**Conclusions:** Preoperative use of IABP in high risk patients undergoing OPCAB is comparatively safer and avoids more complications than postoperative use of IABP.

### Early results of off-pump coronary bypass grafting in patients with left main disease and higher EuroScore

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**Introduction:** Left Main Disease (LMD) and associated cardiac risk factors are often perceived as a limiting factor for the outcome of Off-Pump Coronary Artery Bypass (OPCAB) grafting. In this study, we retrospectively analysed our results of the OPCAB surgery in such patients.

**Methods:** We retrospectively compared perioperative parameters in 50 OPCAB patients (group A) with LMD and 200 OPCAB patients without (group B) LMD. The patients were operated in the time frame between 2008 and 2013.

**Results:** Patients in group A had a higher EuroSCORE, increased history of congestive heart failure, more urgent surgery, previous Percutaneous Transluminal Coronary Angioplasties (PTCA), previous stent implantation, increased Coronary Artery Disease (CAD) family history and cerebrovascular accidents. An Intra-Aortic Balloon Pump (IABP) was inserted more frequently in the LMD group preoperatively and per-operatively. There were two conversions to on-pump beating heart surgery during OPCAB surgery. There were no differences in the post-operative outcomes in the LMD group A versus group B, such as cardiac-related events, neurological deficits, cardiac enzyme course, arrhythmias, blood loss, infections and renal failure.

**Conclusions:** The presence of LMD and higher EuroSCORE does not yield adverse outcomes in OPCAB patients.

### Management of the ruptured sinus of Valsalva aneurysms

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**Introduction:** The aneurysm of the sinus of Valsalva is a rare anomaly with a higher incidence reported in Eastern than

Western populations. The consequent intracardiac shunts and frequently associated cardiac lesions such as aortic regurgitation lead to deterioration in heart function which can be corrected by early surgical repair. We retrospectively analyzed our experience of 40 patients who underwent repair of ruptured sinus of Valsalva aneurysm at our institution from January 2000 to January 2013.

**Methods:** Forty patients with ruptured sinus of Valsalva aneurysm underwent surgical correction. There were 30 males and 10 females in the study group. The diagnosis in these patients was mostly made on echocardiography though cardiac catheterization study was done in 10 patients for confirmation of diagnosis. The aneurysms originated from the right coronary sinus in 31 patients and from the noncoronary sinus in 9, and ruptured into the right ventricle in 29, right atrium in 10, and unruptured in 1. Operative procedures included patch repair in 39 patients and aortic valve replacement in 25 patients. In one patient with unruptured giant calcified aneurysm of sinus valsalva the ascending aortic replacement was done using Dacron tube graft with reimplantation of right coronary artery using the button technique.

**Results:** There were 3 early deaths. Patients required inotropic and ventilatory support for  $3 \pm 1.6$  days and  $1.8 \pm 1.2$  days respectively. The mean ICU stay and hospital stay was  $3.5 \pm 1.6$  days and  $7.5 \pm 2.5$  days respectively. The 37 survivors were followed up for  $6.4 \pm 3.6$  years; all had an improvement in functional NYHA class with superior results in those with no aortic regurgitation. There was no late death.

**Conclusions:** Surgical treatment of ruptured sinus of Valsalva aneurysm using the transaortic patch technique has an acceptably low operative risk, lesser distortion of aortic valve and good long-term symptom-freedom survival. An early aggressive approach is recommended to prevent worsening of symptoms and more extensive disease.

### Women undergoing CABG -An analysis of factors affecting in-hospital ( 30 Day ) outcomes

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**Introduction:** There is a paucity of literature from Western Maharashtra on the factors affecting early (30 day) outcomes in women undergoing CABG. Aim: To analyze data of women undergoing CABG and identify the factors determining the in-hospital (30 day) outcomes.

**Methods:** Data of 3029 patients who underwent CABG over a 6 year period (Jan 2008 to November 2013) were reviewed. Preoperative, intra operative and post operative variables were analyzed.

**Results:** 355 (11.7%) of the patients were women. In hospital mortality was 51 /2674 (1.9%) in men and 11 /355(3%) in women. The commonest cause of mortality in women was

renal dysfunction 60%. Women were found to be older; had significantly greater co-morbidities, including hypertension, diabetes mellitus, hyperlipidemia, unstable angina, congestive heart failure, peripheral vascular disease and were more likely to undergo urgent CABG (23% vs 15%). Intra operatively, the coronary arteries in women were smaller/diffusely diseased and resulted in less number of mean grafts (3.0) versus (3.3) in men. The use of saphenous vein grafts was more in women as compared to total arterial grafts. The other post operative parameters like ventilation time, duration of stay in recovery, use of IABP, arrhythmias, re exploration rates and surgical site infection were comparable in both groups.

**Conclusions:** Women undergoing CABG carry an overall higher risk than men. Renal dysfunction was the commonest cause of in hospital mortality among women in our study.

### Does prior PCI effect perioperative outcomes in patients undergoing CABG

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**Introduction:** The number of patients with prior Percutaneous Coronary Interventions (PCI) referred for Coronary Artery Bypass Grafting (CABG) is on the rise. These patients could be having a more severe coronary pathology, which may influence the perioperative outcome. Aim: To study the perioperative outcomes of patients undergoing CABG after prior PCI.

**Methods:** Data was collected on patients who underwent first time CABG at our centre. An analysis was made on the perioperative outcomes of patients who had undergone prior PCI as compared to a similar subset of patients who didn't have past PCI.

**Results:** Between Jan 2011 and November 2013, 1316 consecutive patients underwent CABG. 102 of these patients had previous elective PCI (Group A). These patients were compared to a group of 156 patients who underwent CABG without prior PCI, matched for age, sex and preoperative risk factors (Group B). Both groups were comparatively studied for in hospital mortality and perioperative complications. In Group A, the mean number of stents was 2. In preoperative risk factors: history of previous myocardial infarction [Group A n= 14, Group B n=5], DM+HTN [Group A n= 56 Group n= 38], distribution of CAD (CTO/diffuse disease in coronaries) [Group A n= 69 Group B n= 30], LVEF< 40% [Group A n=29 Group B n=25] played a crucial role in outcome. Intraoperative factors which affected outcome were mean number of grafts [Group A n= 2.8 versus Group B n=3.2]. Postoperatively the following factors decided outcome: incidence of bleeding complications [Group A n= 16 Group B n=10], mean number of blood products used [Group A n= 2.8 group B n= 0.8], acute renal failure [Group A n=23 Group B

n= 12] and IABP use [Group A n=8 Group B n=6]. In hospital Mortality in Group A was 9.8% (n=10) and in Group B was 2.5% (n=4).

**Conclusions:** Patients with prior PCI have a worse perioperative outcome in terms of mortality and perioperative complications as compared to patients without history of PCI.

### Coronary artery bypass grafting In chronic renal failure patients: our center experience

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**Introduction:** Patients with chronic renal disease frequently present with coronary artery disease. These patients are considered to be at high risk for coronary artery bypass grafting. Therefore, off-pump coronary artery surgery may become a good option for these patients.

**Methods:** We retrospectively reviewed all cases of elective or emergency coronary artery bypass grafting in our hospital, from 1 January 2008 through 1 January 2013, and identified 30 patients with chronic renal failure (group A). Out of these ten patients were on maintenance hemodialysis. The mean duration of dialysis was  $15.5 \pm 20.5$  months. We chose 30 matched non-dialysis patients who underwent bypass grafting in 2012 as our control group (group B). Preoperative, operative, and postoperative data on these patients were compared. Group A consisted of 22 men and 8 women with a mean age of  $64.7 \pm 8.7$  years, and the mean number of distal anastomoses was  $3.5 \pm 1.2$ . While Group B consisted of 20 men and 10 women with mean age of  $65.5 \pm 9.9$  years and mean number of distal anastomoses was  $4.0 \pm 1.2$ .

**Results:** There were no significant differences between the 2 groups in preoperative factors, intubation time, intensive care unit stay, major complications, and 30-day mortality. Uremic patients had a greater bleeding tendency, longer postoperative hospital stays, more late deaths.

**Conclusions:** We conclude that with a good dialysis program and proper perioperative management, coronary artery bypass grafting can be performed in chronic renal failure patients, with increased but acceptable perioperative morbidity and mortality risks.

### A prospective study to quantify risk factors for significant carotid artery stenosis in patients presenting for coronary artery bypass grafting

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**Introduction:** Patients presenting for coronary artery bypass grafting (CABG) often have concomitant carotid artery

disease. A number of risk factors have been identified, in presence of which carotid studies have been indicated. However, the impact of individual risk factors has not been quantified. The aim of this study was to quantify the different risk patterns and to identify a scoring system.

**Methods:** 50 patients for primary CABG were prospectively studied in the pre-operative period for presence of risk factors. All the patients underwent carotid Doppler study. The risk factors were defined as- presence of history of previous neurological injury, left main stem stenosis, diabetes mellitus, hypertension, peripheral vascular disease (PVD), age above 70 and smoking. Carotid bruit was listened for in all cases.

**Results:** Of the 50 patients eight patients (16%) had significant carotid artery stenosis. Individual risk factors were analyzed and was found that diabetes mellitus alone was a significant risk factor ( $p=0.03$ ). Age  $>70$  ( $p=0.13$ ); PVD ( $p=0.19$ ); previous neurological injury ( $p=0.19$ ); smoking at time of operation ( $p=0.17$ ) did not achieve significance. Carotid bruit had 100% specificity (95% CI: 91.51 % to 100.00 %) but a very low sensitivity of 25 % (95% CI: 3.93 % to 64.95 %). A combined score of 3 or more risk factors was significantly associated with carotid artery disease (Fishers exact test, 2 tailed,  $p=0.05$ ).

**Conclusions:** Diabetes mellitus is independently associated with carotid artery disease. In presence of 3 or more risk factors a carotid Doppler should be carried out.

### Surgical management of post MI VSD – Our experience

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**Introduction:** The incidence of Post MI VSD is  $<1\%$  of all infarcts. It is potentially a lethal complication. Early diagnosis and timely intervention is essential for good surgical outcomes.

**Methods:** This is a retrospective review of Post MI VSD patients who underwent surgical repairs in our institution between Oct 2008 to Oct 2013. There were 7 patients with a mean age of 49 yrs. At admission, they were in NYHA III( $n=5$ ) with moderate LV dysfunction, NYHA IV( $n=1$ ) with severe LV dysfunction, NYHA II( $n=1$ ) with mild LV dysfunction. Five patients had suffered AAMI with anterior apical VSD and the other two had IWMI with posterior type VSD. CAG revealed LAD total cutoff ( $n=4$ ), recanalised LAD ( $n=1$ ) and TVD ( $n=2$ ). The surgical status was urgent ( $n=5$ ), emergency salvage in cardiogenic shock ( $n=1$ ), elective ( $n=1$ ). Pre induction IABP was utilized in 6 patients. VSD was closed using single synthetic patch ( $n=3$ ) and double patch technique using synthetic and treated pericardial patch ( $n=4$ ). Associated LV pseudoaneurysm in four patients was treated by Dorr's

aneurysmorrhaphy. Concomitant coronary revascularization was done in 2 patients.

**Discussion:** Five patients had smooth postoperative recovery. One patient had delayed neurological recovery. There was one in hospital mortality. Follow up period varied from 6 months to 5 years. Five patients are in regular follow up and were in NYHA I/II. One patient was lost to follow up.

**Conclusions:** Our experience shows that early diagnosis and appropriate timely surgical intervention provides good outcomes in post MI VSD patients, the longest follow up being 5 years.

### Early experience with the Synergy® Micro-pump in INTERMACS Class 1-2 patients as a Bridge to Transplantation

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**Introduction:** The Synergy® Pocket Micro-pump is the smallest surgically implanted long-term Left Ventricular Assist Device (LVAD), designed to provide partial support for patients who are not yet sick enough for a full-support LVAD. In this multi-center study, we present our early experience with the use of Synergy® Pocket Micro-pump in INTERMACS (Interagency Registry for Mechanically Assisted Circulatory Support) class 1-2 patients.

**Methods and results:** From 01/02/2012 to 31/08/2013, 13 patients with severe heart failure were supported with the Synergy® Pocket Micro-pump. Patients were divided into 2 groups according to the INTERMACS class: high risk group (INTERMACS class 1-2,  $n=7$ ) and low risk group (INTERMACS class 3-4,  $n=6$ ). There were no statistically significant differences in patient demographics and preoperative baseline characteristics. There were no statistically significant differences in postoperative outcome as well as the rate of postoperative adverse events. The overall survival was comparable between the two groups (1 death in each group, Log-Rank  $p=0.608$ ). 2 patients from the high risk group were upgraded to a full support LVAD ( $p=0.462$ ) after  $65\pm 84.9$  days of mean support. 1 patients from the high risk group and 2 patients from the low risk group were successfully transplanted ( $p=0.559$ ).

**Conclusions:** Synergy® Pocket Micro-pump use in appropriately selected higher-risk INTERMACS 1-2 patients is feasible and is associated with postoperative outcomes comparable to those seen with as in INTERMACS 3-4 patients.

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### Excellent intermediate outcomes in high-risk patients undergoing AVR with the Trifecta Valve

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**Introduction:** Aortic Valve Replacement (AVR) in high-risk patients carries a significant morbidity and mortality as reported in the PARTNER Trial.

**Methods:** Early outcomes were assessed in patients undergoing AVR with the Trifecta tissue valve (St Jude Medical, Inc.). Patients were categorised according to their Logistic Euroscore: Low-risk 0 to 4.9, Intermediate risk 5 to 9.9 and High-risk >10.

**Results:** Pre-operative characteristics are summarised in table below.

	Low-risk (n=27)	Intermediate risk (n=38)	High risk (n=45)	p value
Age*( years)	71 (4)	76 (5)	78 (5)	<0.01
Log Euroscore*	3.9 (0.7)	7.1 (1.2)	16.2(8.1)	<0.01
Pre-op Peak AV gradient*, mmHg	79 (28)	85 (28)	73 (20)	0.1
CPB time*, min	130 (35)	123 (44)	136 (55)	0.4
Male (%)	74	32	36	<0.01
Pre-op NYHA III/IV (%)	44	58	49	
Urgent operation (%)	4	11	36	<0.01
PVD (%)	4	0	40	<0.01
COPD (%)	0	24	38	<0.01
Combined AVR procedure (%)	56	45	69	

\*= mean (SD)

A size 19mm or 21mm Trifecta tissue valve was used in 67% of the low-risk group, 63% of the intermediate-group and 67% of the high-risk group. Post-operatively, heart-block requiring permanent pacemaker occurred in only 2 patients in the high-risk group. The latter group also had a higher proportion of post-operative chest infection and need for renal replacement therapy. As a result, the median in-hospital length of stay was higher in the high risk group (6 vs 6 vs 9 days,  $p=0.02$ ). Survival at 3-months was not significantly different in the 3 groups (93% vs 97% vs 91%,  $p=0.5$ ). At 1-year follow-up, most patients were in NYHA I/II (96%, 91%, 97%). Despite the small valve size used, the peak post-op gradients across the Trifecta valve were only 22, 18 & 18 mmHg, at follow-up. One-year survival was comparable between the three groups.

**Conclusions:** The Trifecta valve offers excellent early and intermediate outcomes in high-risk patients undergoing AVR either in isolation or as a combined procedure. A small size Trifecta valve (19 or 21mm) still has

a low peak-post-op gradient and correlates with improvement in NYHA grade.

### Minimally invasive mitral valve repair

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**Introduction:** Minimally invasive valve surgery is a technically challenging procedure with huge benefits to the patient not only benefitting from a mitral repair procedure but also having a cosmetically acceptable incision

**Materials:** Our early experience with 5 cases...

(1)Careful patient selection (2)Etiology- Rheumatic -1.Non Rheumatic -4 (3)Associated Procedures-ASD Closure METHODS-Right Mini Thoracotomy, Video Assisted, Femoro-Femoral Bypass, Use of Annuloplasty Rings, Chordal repair techniques-(1)Neochordae, (2)Chordal shortening Early experience -Can be done safely in suitable subjects, We feel Rheumatic Mitral Repairs may not be suitable for MIVS, as extensive valve repair, with limited accessibility inhibits aggressive repair.

**Conclusions:** Safe Technique, Low perioperative complications, Shorter Hospital stay, Cosmetic Incision

### Comparison of two validated risk models in high-risk adult cardiac surgery: Detection of clinical predictors of mortality and morbidity in North Indian population

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**Introduction:** Isolated CABG forms the majority of adult cardiac work but procedures such as valve surgeries, combined procedures and thoracic aortic surgery are also important contributors to mortality. The objective of this study was to evaluate both the Euroscore and System 96 risk models in high-risk cardiovascular procedures, validate the models and check for predictive accuracy.

**Methods:** We enrolled a total of 8675 cardiac patients between January 2007 and December 2012. Data were collected prospectively by a cardiac surgeon. All were prospectively risk stratified using both the Euroscore and System 96 models.

**Results:** 6246 procedures were isolated CABG's, 1735 were valve surgeries, 520 were combined or double valve procedures and 174 were thoracic aortic surgeries. In a 30-day operative mortality analysis, 25 variables were significantly associated with outcome. In comparison to isolated CABG, the odds ratios for 30-day mortality were 1.96 for valve surgery (2.31 in mitral valve replacement and 2.01 in aortic valve, 3.12 in multi valve procedures & 2.76 in valve with



CABG) and 2.88 for thoracic aortic surgery. CABG combined with other procedures (n = 219) had increased risks in both the mortality risk models. The predictive power of both models was calculated by obtaining the C-statistic for a 30-day post-operative mortality (.867 for System 96 & .802 for Euroscore).

**Conclusions:** Increasingly the patient being referred to the cardiac surgeon has multiple co morbidities and a higher mortality risk. Better recognition of these factors using standardized models provide scope for early targeted perioperative interventions and explain a concomitant increase in cost of care that the modern cardiac surgeon faces

### Role of Levosimendan in patients with severe Left ventricular dysfunction undergoing off-pump coronary artery bypass grafting surgery

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**Introduction:** Levosimendan is a new calcium sensitizer drug which has been used in cardiac surgery for the prevention of postoperative low cardiac output syndrome and in difficult weaning from cardio pulmonary bypass. This study aims to evaluate perioperative hemodynamic effects of Levosimendan in patients undergoing for off-pump coronary artery bypass grafting with low Left Ventricular Ejection Fraction (LVEF < 30%).

**Methods:** Sixty patients undergoing off-pump coronary artery bypass graft surgery with low LVEF (< 30%) were enrolled in the study. Patients were randomly divided in two groups: Levosimendan (Group A) & Placebo (Group B) of 30 each. Group A, patients received levosimendan infusion 200 mcg/kg over 24 hours before surgery and was continued during the surgery and in Group B Patients received placebo. The clinical parameters measured before and after the drug administration up to 48 hours were heart rate, cardiac index and pulmonary capillary wedge pressure. The requirement of inotropes, intra-aortic balloon pump, intensive care stay and hospital stay were also measured.

**Results:** The patients in group A exhibited higher CI and PCWP during operative and early post-operative period as compared to control group B. Group A also had a less requirement for inotropes, cardio pulmonary bypass support and intra-aortic balloon pump with shorter ICU stay as well as hospital stay.

**Conclusions:** Levosimendan (24h infusion) in patient for off-pump coronary artery bypass graft with poor LVEF shows better outcomes and hemodynamics in terms of inotropes, CPB and IABP requirements. It also reduces ICU and hospital stay.

### Less invasive saphenous vein harvest for CABG - 7 year experience and lessons learnt

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**Introduction:** The long saphenous vein still remains an important conduit for coronary artery bypass surgery, and is conventionally harvested by a long incision starting at the ankle and extending along the length of the saphenous vein. Problems associated with the vein harvest often contribute significantly to post-operative morbidity and may result in prolongation of hospital stay. Increased post-operative morbidity associated with the vein harvest can also significantly reduce the patient's feeling of wellbeing after surgery, and hence results in a perception of less effective treatment. Attempts to reduce the morbidity associated with harvest of the long saphenous vein have sparked interest in alternative methods of harvesting the saphenous vein. Various endoscopic systems and vein strippers are available for harvesting the saphenous vein.

**Methods:** From August 2006 through November 2013, a total of 1427 patients underwent coronary artery bypass surgery by a single surgeon at two institutions. Of these 36 had a solitary LIMA graft or total arterial re-vascularisation using bilateral IMA. Two patients undergoing re-do CABG had conventional harvest of the saphenous vein from the leg. In all the other patients the long saphenous vein was harvested from the thigh, through a series of short, transverse incisions. We present here our 7-year experience with this method of harvesting the saphenous vein, focussing on the lessons learnt over time, which have helped in reducing post-operative morbidity while providing a vein of comparable quality to that obtained by conventional harvesting techniques.

### A retrospective comparative study of 242 consecutive cases of single vessel LAD disease over 5 years: PCI vs. CABG

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**Introduction:** Single vessel coronary artery disease involving the left anterior descending artery with significant stenotic lesions has myocardial revascularization options of PCI and CABG. We study a set of consecutive patients who underwent From 2008 to 2012 over a 5 year period, 242 patients underwent interventions for these lesions.

**Methods:** myocardial revascularization for SVD. Of these, 80 patients had PTCA with stent and 162 had CABG. 38(16%) patients underwent previous intervention. 179(73%) patients were diabetic. 82(33%) of these have total occlusion of the LAD. 15(6%) had significant LV dysfunction.

**Results:** The subset of patients who underwent CABG in the study were found to have higher incidence of DM (81%) in CABG vs PCI (63%) and more complex LAD lesions (CABG

17%) Vs PCI (8%). The re-intervention for CABG was 1 (0.6%), vs 7(8%) for PCI. Symptomatic improvement in angina was seen to be better with CABG group (0.6%), Vs PCI (13%). Early mortality was 7(3%) for PCI vs 1(0.6%) for CABG.

**Conclusions:** Single vessel LAD disease requires careful assessment before myocardial revascularization is contemplated. In spite of higher co-morbid factors and complex lesions, CABG had significantly better short and long term outcomes.

### Prosthetic valve sparing aortic root replacement: A long term series

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**Introduction:** Reoperations on the aortic root are predisposed to complications. In a long term series of these patients, we present our experience wherein we retained the prosthetic valve in cases where reoperations were necessary.

**Methods:** From Jan 2002 to July 2013, 15 patients with prosthetic valve sparing root replacements were operated, mean age was 45.7 years  $\pm$ 10 yrs. 3(20%) were females, 12(60%) were males. 6(40%) were diabetic, 11(73%) had pre-existing hypertension. 5(33%) were diagnosed to have Marfan's syndrome. Primary etiology leading to aortic valve replacement was rheumatic in 4(27%), bicuspid aortic valve in 5(33%), degenerative calcific AS in 5(33%), repair of RSOV in 1(4%). The indication leading to redo surgery was endocarditis in 4(20%), type A dissection in 5(33%), pseudoaneurysm of ascending aorta in 1(4%), and aneurysm of ascending aorta in 4(27%).

**Results:** This series of patients also had the following associated procedures like CABG in 1(4%), Hemi arch replacement in 1(4%), proximal arch in 3(20%), ascending aortic replacement in 6(40%). There was 1(4%) mortality due to infective endocarditis. 1(4%) patient had complete heart block requiring a permanent pacemaker implantation.

**Conclusions:** Reoperations on the aortic root can be performed with good results. We feel from our experience that a strategy of retaining the prosthetic valve where possible reduces mortality and morbidity.

### Off pump total arterial revascularisation in severe LV dysfunction

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**Introduction:** Off pump CABG has been documented to reduce the risk of surgery in compromised LV function. Total arterial revascularisation provides for good long term results. We analysed our early results in patients going for off pump total arterial revascularisation in severe LV dysfunction.

**Methods:** All patients with LV function less than 30%, operated off pump with total arterial revascularisation were included in this study.

**Results:** 3684 patients underwent CABG between January 2003 and December 2013. Of these, 552 had LV function less than 30%. Of these, 441 patients were operated using total arterial revascularisation off pump using a LIMA-RIMA or a LIMA-Radial "Y". Operative mortality was 4/441 ( 0.90% ).

**Conclusions:** Off pump CABG allows total arterial revascularisation in severe LV dysfunction with low mortality.

### Mitral valve repair

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**Introduction:** Valve Repair has become the procedure of choice for Mitral Regurgitation because of lower operative mortality, better preservation of left ventricular function and freedom from anti-coagulation.

**Methods:** We report our experience of 79 patients (52 Males) from January 2011 to December 2013. The Mean age was 48.3  $\pm$ 18.18. The cause was Rheumatic in 34 patients, Myxomatous 29 patients, Functional 11 patients, congenital 3 patients, Infective Endocarditis 2 patients. Most of the patients were in NYHA functional class III/IV. Congestive heart Failure was present in 10 patients. Reparative procedure included Ring Annuloplasty, Chordal shortening, Neo-Chordal Replacement, Quadrangular resection, Commissurotomy and Release of Posterior Mitral Leaflet. Associated procedure included Aortic Valve Replacement was in 20 patients, Coronary Artery Bypass Surgery in 17 patients, Tricuspid Valve Repair in 8 patients, MAZE procedure in 8 patients, ASD Closure in 3 patients.

**Results:** Attempt of valve repair were failed in 4 patients. Operative Mortality was 1 patient. Follow-Up range from 6 months to 1 year (60%). Most of the patients were in NYHA class I, most of the patients had Trivial or Mild MR.

**Conclusions:** We conclude that No. of Myxomatous Valve Disease is increasing in our population. Mitral Valve Repair in Myxomatous Valve and in selected Rheumatic Valve Disease has excellent immediate result with low Operative Risk. Intra Operative Transoesophageal echocardiography is must in decision making.

### Redo cardiac surgery by conventional sternotomy: Our experience

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**Introduction:** Redo cardiac surgery is associated with increased morbidity and mortality compared with primary

operation. The danger of reoperation is mainly in reopening the sternum. We report our experience of redo cardiac surgery by conventional sternotomy.

**Methods:** Between Jan 2011 and Aug 2013, 20 patients underwent redo cardiac surgery with mean age of  $58 \pm 6$  years. 12 patients underwent CABG, 5 patients mitral valve replacement and 3 patients underwent aortic valve replacement. All patients underwent CT scan of the chest preoperatively. Femoral vessels were exposed and taken full control before sternotomy for any peripheral bypass if required. Redo median sternotomy was done in a down to up fashion by conventional saw in all the cases. Intraoperative and perioperative data were monitored. Follow-up was performed 1 week, 1 month, 3 months after hospital discharge and then 6 monthly.

**Results:** 3 patients developed minor injury of right ventricle managed easily. We did not require peripheral cardiopulmonary bypass in any patient. 5 patients of CABG had to be done on cardiopulmonary bypass because of hemodynamic instability. IABP was placed in 4 patients. 2 patients had to undergo dialysis for renal dysfunction postoperatively. 2 patients underwent reexploration. Average hospital stay was 11 days. 1 patient expired during the study.

**Conclusions:** Redo cardiac surgery can be safely performed by conventional median sternotomy. It was time saving without any additional morbidity.

### Radial artery as second conduit in diabetic patients undergoing CABG – Single unit experience

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**Introduction:** To evaluate the role of radial artery as second conduit in diabetic patients undergoing CABG, and to identify their immediate and short term survival benefits.

**Methods:** All diabetic patients undergoing CABG in our unit with age  $\leq 70$  years, normal radial artery doppler, negative allen's test, EF  $\geq 40\%$ , target coronary lesion above 80% were included in the study since December 2009. The radial artery was harvested a traumatically as a pedicle using a no-touch technique and aorto coronary conduit was made in all cases. Papaverine was used to prevent spasm intra-op. Post-op all patients were started on dilzem infusion for 24 hours and thereafter on tablet for 1 year. After discharge patients are followed up at 2 weeks, 1 month, 3, 6 months and thereafter every 6 months to assess clinically functional class. Echo is done at 6 monthly intervals. If symptomatic TMT is done as and when needed, if positive will be subjected to CAG.

**Results:** A total of 104 patients with diabetes have undergone CABG using radial graft as second conduit (80 male, 24 females). Mean age group 49.5 yrs (33-68 yrs). Radial conduit was used to graft OM in 72 patients, RCA in 7, RAMUS in 21 and as

sequential in 5 cases (OM1- OM2, OM-D). No periop or immediate postop morbidity or mortality. Three patients lost follow up, rest of the patients are clinically in functional class I, echo no new RWMA or drop in EF. Mean follow up period was 18 months.

**Conclusions:** The results of the study are promising in early part but needs long term follow up to establish the survival benefits.

### Off pump plication of post MI left ventricular aneurysm: Improve cardiac function and mitral regurgitation

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**Introduction:** Post MI LV aneurysm results into dilatation of ventricle, reduced ejection fraction and appearance of mitral regurgitation. LV aneurysm repair was done using CPB by endovascular patch or linear plication. Advantage of aneurysmorrhaphy and off pump CABG may be extended to patient by linear plication of LV aneurysm without CPB.

**Methods:** From January 2010 to August 2013, 9 patients were operated on for post infarction antero apical aneurysm during off pump CABG. Repair was completed on the beating heart with help of two tissue stabilizer (ACROBAT – i Maquet) applied around the LVA after spreading the suction pods. All patients presented with symptoms of angina or congestive heart failure. Mean pre operative ejection fraction was  $27 \pm 8\%$ . The mean left ventricular end diastolic diameter was  $52.5 \pm 9.6$  cm. Three patients were having moderate to severe MR. Pre and post operative ejection fraction, left ventricular end diastolic dimension and grade of MR were compared and re-accement were done at 6 month post operatively.

**Results:** There was no in hospital mortality. Coronary artery bypass was performed with an average 3.2 grafts per patient. At the time of discharge all patients were asymptomatic. There was significant improved in LV ejection fraction and left ventricular end diastolic dimension. Mitral regurgitation was significantly reduced. All these parameters were maintained at 6 months follow-up.

**Conclusions:** Surgical closure of left ventricular aneurysm especially in antero apical region can easily be performed during off pump coronary artery bypass and stabilization of area with two tissue stabilization facilitate this procedure.

### Outcome after valve replacement for severe aortic stenosis Associated with reduced left ventricular ejection fraction

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**Introduction:** Because valve replacement for Aortic Stenosis (AS) remains a difficult surgical challenge in the presence of

left ventricular dysfunction, the immediate and long-term outcomes, and evolution of Left Ventricular Ejection Fraction (LVEF) in this setting, were analysed.

**Methods:** Thirty consecutive patients with severe AS and reduced LVEF (approximately 40%) who underwent valve replacement surgery at our institution between April 2008 and September 2013 and were studied retrospectively.

**Results:** Preoperative characteristics included: LVEF  $33 \pm 6\%$ , mean transaortic pressure gradient  $46 \pm 13$  mmHg, and aortic valve area  $0.58 \pm 0.15$  cm<sup>2</sup>. Concomitant coronary artery bypass grafting was performed in 3 patients (10%). Perioperative (30-day) mortality was 2.3%, with 39.5% morbidity. During a mean follow up of  $33.4 \pm 17.6$  months, five patients died. Postoperatively, the survivors remained in NYHA functional classes I to II. The postoperative LVEF assessed in 81.8% of survivors had improved.

**Conclusions:** Patients with severe AS and reduced LVEF can undergo valve replacement with low perioperative mortality and moderate postoperative morbidity. Good long-term survival with good NYHA functional status and improved LVEF can be obtained.

#### The Dor procedure for left ventricular reconstruction. Five - year clinical experience

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**Introduction:** This is a retrospective study of left ventricle (LV) aneurysm repair done at the Sri Jayadeva Institute of Cardiovascular Sciences and Research, Bangalore, since June 2009.

**Methods:** Between June 2009 and October 2013, 23 patients underwent LV aneurysm repair using Dor's repair. The location of the left ventricular aneurysm was anteroapical (57%), apical (18%), poster inferior (17%), or lateral (8%). The indication for operation was congestive heart failure in all patients.

**Results:** Intra-aortic balloon pumping was used postoperatively in 3 cases and 7 patients needed inotropic support for more than 24h. Mean time on the ventilator was  $16 \pm 25$  (3–168) hours and mean stay in the intensive care unit was  $2.1 \pm 2.2$  (0–13) days. Overall mortality was 4.3% (one patient). Mean preoperative ejection fraction (EF) after surgery in was 29.2%. EF showed improvement after surgery to 48.5%. Decrease in end-diastolic volume (EDV) was from 156 cm<sup>3</sup>/m<sup>2</sup> to 88.6 cm<sup>3</sup>/m<sup>2</sup>. Decrease in end-systolic volume was from 109 cm<sup>3</sup>/m<sup>2</sup> to 64.5 cm<sup>3</sup>/m<sup>2</sup>. All of these values showed statistically significant improvement. At six months postoperatively, 17 patients (75%) out of 23 patients who were preoperatively in New York Heart Association (NYHA) Functional Classes III and IV improved to class II while 2 patients (7.5%) improved to

class I. Mean follow-up was  $2.2 \pm 1.4$  (0.1–5.4) years. Actuarial survival at 6 months, 1 and 3 years was 88, 79 and 65%

**Conclusions:** Dor's repair is a reproducible surgical option for treatment of postinfarction left ventricular aneurysm to restore its volume and geometry. Early and mid-term results are good in terms of survival.

#### Pericardiectomy for chronic constrictive tuberculous pericarditis: Risks and predictors of survival

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**Introduction:** We performed this study to determine the predictors of early and long-term survival in the surgical treatment of tuberculous pericarditis and to examine the risks of pericardiectomy and the functional outcome in patients after surgery.

**Methods:** A retrospective analysis was undertaken in 32 consecutive patients, 26 male and 06 female, with a mean age 34.86 years ( Range of 06–64 Years), who underwent pericardiectomy for chronic constrictive pericarditis from 2009 to 2013. All patients received antitubercular therapy in the postoperative period.

**Results:** The operative mortality rate was 10% ( 3 patients); the cause of death in all cases was severe low-cardiac-output syndrome. The median stay in the intensive care unit was  $3 \pm 1$  days. The median hospital stay was  $10 \pm 4$  days. The median ventilation time was 24–36 hours. The median volume of blood transfused was 2–3 units. Advanced age, atrial fibrillation, concomitant tricuspid insufficiency, inotropic support, and low cardiac output were significant negative predictors of survival, according to univariate analysis. There were 2 late deaths. Actuarial survival at 5 years was 87.5% At the 1-year follow-up examination, improved functional status was noted in 85% of patients.

**Conclusions:** We suggest that pericardiectomy be performed early and as radically as possible, in an effort to prevent chronic illness. A combination of chemotherapy and surgery yields gratifying results in the treatment of tuberculous pericarditis.

#### A study on correlation of coronary sinus lactate and Troponin T levels with perioperative outcome in patient undergoing cardiac surgery on cardiopulmonary bypass

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**Introduction:** Myocardial ischemia is a metabolic phenomenon that occurs in patients undergoing open heart surgery like Coronary Artery Bypass Grafting (CABG), valvular heart surgery, vascular surgeries etc. due to stress imposed during

Cardiopulmonary Bypass (CPB), obligatory interruption of coronary blood flow during aortic cross clamp and reperfusion after aortic cross clamp release. Myocardial injury sustained during coronary artery surgery is an important determinant of functional and clinical outcome. The present study is designed to have a detailed study on estimation of coronary sinus lactate and troponin T levels during cardiopulmonary bypass in adult cardiac surgery and its correlation with various parameters related to the postoperative outcomes.

**Methods:** study area: Institute of Postgraduate Medical Education and Research, SSKM Hospital, Kolkata, West Bengal, India. **STUDY POPULATION:** All patients of age group 18-65yrs with cardiac surgery on cardiopulmonary bypass attending Outpatients Department of Cardiothoracic and Vascular Surgery, ICVS, Institute Of Postgraduate Medical Education And Research, SSKM Hospital, Kolkata, West Bengal, India. **STUDY PERIOD:** 1st MARCH 2012 to 31st AUGUST 2013 **SAMPLE SIZE:** 120 adult patients undergoing cardiac surgery on cardiopulmonary bypass. Coronary sinus blood sampling was done for estimation of Myocardial Lactate (ML) and Troponin T (TT): pre Cardiopulmonary Bypass (CPB), after removal of cross clamp and 15 minutes post CPB.

**Results:** Baseline coronary sinus ML and TT levels were in normal range in all patients undergoing cardiac surgery before cross clamp. Both these markers increased significantly after cross clamp release and 15 minutes after CPB. The higher quantitative values of ML (> 6mmol/l) and troponin T (> 100ng/l) correlated significantly with the aortic cross clamp time, CPB time, the duration of surgery, and also with the post-operative outcomes. Higher values were noted in patients with multivalvular replacement. Incidences of arrhythmias necessitating intervention were also more noted in patients with higher marker levels. We followed these patients for six weeks after discharge.

**Conclusions:** Estimation of myocardial lactate and troponin T in various stages of cardiac surgery can be used as markers of myocardial dysfunction during and after CPB. This study helps to evaluate the correlation of myocardial lactate and troponin T with hemodynamic parameters and perioperative outcomes in patients undergoing elective adult cardiac surgery with CPB.

#### Tips & Pitfalls in transition from conventional full sternotomy Aortic Valve Replacement(AVR) to Ministernotomy (Minimal Access) AVR in an Urban Tertiary institution and review of literature

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**Introduction:** Minimal access Aortic Valve Replacement(AVR) utilising Cardiopulmonary Bypass(CPB) is aimed at better cosmesis, reduction in morbidity and cost. The short-term

benefits arise from less extensive incision and lower rib cage remaining intact. Long-term results are expected to remain the same . However in attempt to achieve minimal access AVR, the risks involved should not be higher than complete sternotomy approach.

**Methods:** Upper Ministernotomy with horizontal extension in 3<sup>rd</sup>/ 4<sup>th</sup> intercostal space. Aortic/ right atrial cannulation performed via same incision and femoral cannulation was avoided. CPB and AVR performed in usual manner.

**Results:** Performed 30 cases(25-AS/ 5 -AR) of ministernotomy AVR and 60 of complete sternotomy since April 2012 . Incision was 5.5cm+/- 1.2 cm. No statistical difference in cross-clamp & CPB time, bleeding, blood transfusion, ventilation time. One patient had conversion to full sternotomy to enable control of aortic suture line bleeding. No complications of stroke/ wound infection. Mean hospital stay reduced to 5.3+/- 1.4 days compared to 7.7+/-0.8. One mortality due to post-operative hyperkalemic arrest(3.3%). Hospital cost reduced by 18%.

**Tips And Pitfalls:** Transcutaneous defibrillator paddles. (2)warm till CPB.(3)3rd/4<sup>th</sup> ICS,(4)TEE (5)Preserve RIMA.(6)Vent via RSPV/PA.(7) Ventricular pacing before declamping,(8)Hotshot,(9)Declamp after heart beats,(10)Paediatric paddles for deairing (11)Drains / Inferiormost sternal wire before weaning,(12)Conversion to full sternotomy not a 'failure',(13)AVOID Femoral cannulation.

**Conclusions:** Ministernotomy AVR can be performed safely with reduced cost and better cosmesis.

#### Dual antiplatelet therapy after coronary artery bypass grafting: Is there any benefit? A systematic review and meta-analysis

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**Introduction:** Anti-platelet therapy is an important component of medical therapy post Coronary Artery Bypass Grafting (CABG). While aspirin administration is a Class I indication after CABG, the benefit of concomitant clopidogrel is a controversial issue. We performed a systematic review and meta-analysis to assess the safety and benefit of dual anti-platelet therapy in patients after CABG.

**Methods:** We searched OVID Medline, Cochrane, Scopus and EMBASE for randomized control trials and observational studies comparing aspirin+/-placebo to aspirin+clopidogrel after CABG. We used random effects models to estimate risk ratios (RR) and 95% confidence intervals (CI).

**Results:** Eleven articles (5 randomized control trials and 6 observational studies) including 25728 patients met inclusion criteria. Early saphenous vein graft occlusion was reduced

with the use of dual anti-platelet therapy (R.R. =0.59, 95% CI 0.43-0.82,  $p=0.02$ ). In-hospital or 30-day mortality was lower in with aspirin + clopidogrel (0.8%) compared to aspirin alone (1.9%) ( $p<0.0001$ ), while risk of angina or peri-operative myocardial infarction were comparable (R.R. =0.60, 95% CI 0.31-1.14,  $p=0.12$ ). Patients treated with aspirin + clopidogrel demonstrated a trend towards a higher incidence of major bleeding episodes as compared to patients treated with aspirin alone (R.R.=1.17, 95% CI 1.00-1.37,  $p=0.05$ ). In a pooled analysis of studies involving off-pump CABG, compared to aspirin alone, dual antiplatelet therapy reduced the risk of peri-operative myocardial infarction and saphenous graft occlusion by 68%(47-71%) and 55%(2-79%) respectively.

**Conclusions:** Dual anti-platelet therapy after CABG improves early saphenous vein graft patency, but may increase bleeding risk. Randomized studies are needed to investigate whether dual anti-platelet therapy may be associated with decreased mortality after CABG.

#### **Aortic valve surgery for active infective endocarditis: 14 year single centre experience**

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**Introduction:** Infective endocarditis is a challenging problem with significant mortality and morbidity. The objective of this study was to examine the outcome of patients undergoing surgery for aortic valve endocarditis.

**Methods:** Between January 1999 and October 2013, 127 consecutive patients were identified from the institution database to have undergone aortic valve surgery for active infective endocarditis. 103 patients had native valve endocarditis (82%) with 79 patients having only the aortic valve involved, and 24 patients had both aortic and mitral valve endocarditis. 24 (19%) patients underwent redo surgery for prosthetic aortic valve endocarditis. Median follow up is 3.8 (range 0 to 14 years)

**Results:** Mean age was 60.1 years, mean EUROscore of 10.53. 24 patients underwent radical resection with bovine pericardial aortic root reconstruction along with prosthesis implantation for root abscess. Mechanical prosthesis was implanted in 71 patients, and tissue prosthesis in 56 patients. 30 day mortality was 20/127 (15.7%). Further late deaths were noted in 19 patients. There was no significant predictor of overall mortality or long term survival. Freedom from recurrent endocarditis at 10 years was 82%.

**Conclusions:** Prosthetic aortic valve implantation with or without root reconstruction concurs good long term prognosis and freedom from recurrent infection. Wide surgical debridement, with reconstruction where required, associated with

standard prosthetic replacement, appears to be a reasonable surgical strategy.

#### **Cardiac surgery in patients of CKD on Hemodialysis with 0% in hospital or 30 days mortality: How we achieve it**

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**Introduction:** To study the early outcome of patients with Chronic Kidney Disease on Hemodialysis (CKD on HD) undergoing cardiac surgery.

**Methods:** The mortality rate for patients on hemodialysis is 20% per year. Approximately 50% of deaths among these patients are due to a cardiovascular cause. We include 26 consecutive patients (CKD on HD) from January 2009 to Oct 2013. 22 were CABG (all off pump with 2 ACS, one each for AVR, DVR, CABGx4+MVR, RA Myxoma). The patient outcome was defined in terms of mortality, morbidity, ALOS, periprocedural complication.

**Results:** In hospital and initial 30 days mortality was 0%. Only 1 patient had sternal dehiscence on 4<sup>th</sup> week due to avascular necrosis of left sternum. Alos was  $9.19\pm 3.23$  days, graft/patient were 3.05/patient (range 2-4) and minimal PRBC requirement. Minor skin site infection was 20%. No culture positive systemic infection. Amongst all cardiac surgery 59.03% patients in 2011 and 60.69% patients in 2012 did not required any blood transfusion. Good preoperative, intraoperative, postoperative care and prevention of risk factors (Infection, need for blood transfusion, prolonged ventilation, re-operation or Reopening, stroke, increased length of hospital stay) are factors responsible for good results.

**Conclusions:** The early outcome of patients with CKD on HD undergoing cardiac surgery can be improved with good surgical skills, minimizing blood transfusion, combined team effort including intensive care and nephrology backup.

#### **Does a woman's Heart need more care than a man's?**

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**Introduction:** Total Arterial Revascularization has been advocated to improve long term outcomes in patients with Coronary Artery Disease, especially the young. This is of great relevance especially in a resource restrained, minimal insurance covered country like India. Cardiac surgeons have believed that women have smaller hearts, smaller target vessels and smaller arterial conduits, posing difficulties in achieving TAR in women. Aim: We aim to study the difference in disease pattern, surgical strategy and outcomes in women and

men presenting for CABG. Methodology: All patients who underwent CABG surgery between January 2011 and September 2013 were included in the study. The disease pattern, conduits used, surgery time, type of arterial reconstruction, number of vessels grafted and outcomes were studied.

**Results:** A total of 432 patients underwent CABG procedure during the study period. Of these patients, 67 (15%) were women. A majority (49/67 – 73%) of the women had triple vessel disease. Most (65%) were diabetics. 6% of the Mammary arteries in women were during harvesting. TAR was however accomplished in all. There was no difference in morbidity or mortality among men and women. Discussion: Achieving TAR in women presenting for CABG is a challenge. Conduits being thin walled and friable are more susceptible for damage during harvesting. Harvesting bilateral mammary arteries in elderly, diabetic women has been avoided.

**Conclusions:** Total arterial revascularization can be achieved in all women presenting for CABG surgery. However, this requires some modifications in technique, choice of arterial conduit in order to achieve good outcomes.

#### Modified Radial V/S Batrial Maze for atrial fibrillation in rheumatic valvular heart surgery: prospective, randomised controlled study

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**Introduction:** Atrial Fibrillation(AF) is commonest sustained atrial arrhythmia producing high morbidity. Although Cox's Maze III procedure cures AF in majority, reduced Atrial Transport Function(ATF) is a concern. Radial approach with ablation lines radial from sinus node towards atrioventricular annuli and parallel to atrial coronary arteries, has shown better ATF.

**Methods:** Single blind open randomised prospective study of 80 patients was undertaken in two groups(40 each) of modified Cox's maze III and modified radial approach, to evaluate conversion to Normal Sinus Rhythm(NSR) and ATF. Patients undergoing surgery for rheumatic valvular heart disease with continuous AF were prospectively randomised. Ablation lines were created with Radiofrequency (RF)bipolar coagulation with cryoablation for the isthmal lesions and coronary sinus. Results were compared at 6 months and ATF was evaluated by Atrial Filling Fraction(AFF) and A/E ratio on echocardiography.

**Results:** The rate of conversion to NSR in both groups was statistically insignificant by Fisher's exact test( $p > 0.05$ ). ATF was better in modified radial approach compared to modified Cox's Maze III(A/E compared by unpaired t test:  $0.52 \pm 0.08$  v/s  $0.36 \pm 0.10$ ;  $p < 0.05$ . AFF compared using Mann Whitney U test: median AFF for radial group was 23 v/s 20 for biatrial group;  $p < 0.05$ ).

**Conclusions:** In patients with AF undergoing rheumatic valvular surgery, radiofrequency radial approach is as effective as modified Cox's maze III for conversion to NSR with better atrial transport function.

#### EuroSCORE in Indian population – A single centre experience

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**Introduction:** To validate the predictive power of risk stratification model European System for Cardiac Operative Risk Evaluation (EuroSCORE) in Indian population undergoing cardiac surgery in a single centre and to evaluate the impact of diabetes, atrial fibrillation and smoking as risk factors on early mortality if any present.

**Methods:** From January 2010 to September 2011, 1,000 consecutive patients undergoing cardiac surgery on cardiopulmonary bypass were studied. In addition to the risk factors in EuroSCORE system, diabetes, smoking and atrial fibrillation were also studied as factors to determine risk for mortality in Indian population. Logistic regression analysis was done using Hosmer Lemeshow test for predicting the accuracy of scoring system and discriminatory power was assessed by measuring the area under the Receiver Operating Characteristic (ROC) curve.

**Results:** Applying both logistic and additive euroscore models, the predicted mortality was found similar to observed mortality and logistic regression with Hosmer Lemeshow test confirmed good calibration power on all risk groups. Discriminatory power determined by the area under ROC curve was more than 0.5 indicating good discrimination. We have observed that patients with an additive EuroSCORE of more than 4, had lower survival rates. It was revealed that diabetes, smoking and atrial fibrillation are not predictive enough of early mortality.

**Conclusions:** Both additive and logistic EuroSCORE models were validated well with good calibration and may be employed to estimate early postoperative mortality in Indian population. An additive EuroSCORE of more than 4, showed lower survival rates.

#### Is routine computerized tomographic angiography justified in patients undergoing Aortic Valve Replacement for Bicuspid Aortic Valve Disease?

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**Introduction:** Role of Computed Tomographic Angiography (CTA) in patients with Bicuspid Aortic Valve (BAV) undergoing Aortic Valve Replacement (AVR) needs assessment.

**Methods:** After echocardiography, 54 patients with BAV were referred for AVR. CTA was performed routinely. Pre-operative characteristics, echocardiographic and CTA findings, and details of surgery were obtained.

**Results:** The study population had 54 subjects (48 males). Median age was 35.5 years (range 7 to 78 years), and median weight was 57.5 Kg (range 14 to 83 kg). On echocardiography, aortic sinus diameter ranged from 13 to 38 mm (median 28 mm). In none of the patients, ascending aorta was reported to be dilated. On CT angiography, the sinus diameter ranged from 16 to 46mm (median 35mm). Sinus diameter was  $\geq 40$ mm in 13 patients. The sinus diameter on echocardiography was within the range of 0 to 2mm of CT angiographic estimates in 31 patients, within 2.1 to 5mm in 22 patients, and more than 5 mm in one patient. The ascending aortic diameter ranged from 19mm to 70mm (median 43mm). In 26 patients, ascending aortic diameter was  $\geq 45$ mm. In 12 patients, the proximal arch diameter was  $\geq 40$ mm. In two patients, the distal ascending aorta and proximal arch were aneurysmally dilated (48mm and 57mm). In 12 patients, the ascending aorta was dilated ( $\geq 45$ mm) without any sinus dilatation. In one patient, the distal ascending aorta and proximal arch were aneurysmally dilated (57mm) without any proximal dilatation. Based on CT angiographic findings, 25 patients (46.3%) underwent additional aortic replacement in the form of Bentall's procedure (n= 7), Bentall's + Hemiarch replacement (n= 6), aortoplasty (n= 5), Wheat procedure (n= 6) and Wheat procedure + Hemiarch replacement (n= 1).

**Conclusions:** CT angiography is justified as a routine pre-operative evaluation tool in all patients with BAV who are undergoing open heart surgery for significant aortic valve dysfunction.

#### Role of coronary lactate during CPB in assessing intra operative and post operative outcome: A comparison of antegrade perfusion with retrograde perfusion technique

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**Introduction:** Serum lactate levels are considered as a indicators of inadequate oxygenation. Elevated blood lactate level associated with metabolic acidosis are common among critically ill patients. The objective of this study was to determine the role of coronary lactate during CPB in assessing intra-operative and post-operative outcome: a comparison of antegrade with retrograde perfusion technique.

**Methods:** It was a prospective randomized study involving 20 patients, who underwent valvular surgery. Age varying between 18-72years. patients were randomly

divided into Group A(n=10) received antegrade cardioplegia and Group R (n=10) received retrograde cardioplegia. The following samples were collected: cardioplegic sample, after arrest from coronary sinus in Group A and Group R through the aortic vent, after the procedure during rewarming. Lactate level, HR, MAP, CVP, urine output, total CPB time, cross clamp time were also measured.

**Results:** In this study the CPB time and cross clamp time was comparable. There was no significant difference in lactate level in the base line and the second dose. Samples between Group A while the first dose sample shows a statistically significant difference. Weaning off bypass was difficult in 40% of patients in Group A while it is only 20% in Group R. There was no statistical significant difference between 2 groups in post-operative outcome like serum lactate, duration of ICU stay, while the duration of ventilation showed a statistically significant difference.

**Conclusions:** Antegrade as well as Retrograde cardioplegia technique offered equal myocardial protection. The intra-operative and post-operative indicators of mortality and morbidity were same in both the groups. The coronary lactate levels also did not correlate with any of the above indicators of mortality and morbidity.

#### Can patients with left main stenosis wait for coronary artery bypass grafting?

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**Introduction:** This study was designed to examine the clinical results of patients with left main stenosis who were placed on a wait list for operation in government hospital.

**Methods:** Data were collected retrospectively on 50 patients undergoing isolated coronary artery bypass grafting between 1989 and 1994. Critical left main stenosis (LMS, 50% or more stenosis) was present in 281 patients and 1,864 patients had no left main disease or a left main stenosis of less than 50% (no LMS).

**Results:** The average time from angiography to operation was shorter in patients with LMS Three patients in the LMS group died; they had declined operation. Five patients suffered non Q wave myocardial infarctions, all of whom subsequently underwent operation with no perioperative complications. The presence of LMS did not influence operative mortality, the incidence of low output syndrome, or incidence of perioperative myocardial infarction. To examine the effect of waiting time on outcomes, patients with LMS were divided into early (operation 10 days or less after angiography) and late revascularization group (more than 10 days). Operative mortality, low output syndrome and myocardial infarction were similar in the early and late groups. Patients in the early



group were more likely to have New York Heart Association functional class IV symptoms, unstable angina or a recent preoperative myocardial infarction.

**Conclusions:** Carefully selected patients with significant left main stenosis can safely wait for operation with a low risk of complications. Early surgical intervention is allocated to patients with severe symptoms or recent preoperative myocardial infarction.

#### Our experience with St Jude Epic Valve in Mitral position. A retrospective study in 100 patients

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**Introduction:** Presently Cardiac Surgeons are using Bioprosthetic Valves more frequently in patients. This is because of our aging population, improved manufacturing techniques and long durability as compared to previous generation valves. In our case, one of the major reason is inability to take oral anti coagulants regularly and maintain an appropriate INR. As a result, we decided to use bioprosthetic valves in more younger population groups and studied its impact.

**Methods:** Patients those who underwent mitral valves replacements and received Epic Bioprosthetic Valves between 2011 June to 2013 June were included in the study. Pre operative and intra operative echocardiographic findings were obtained from our hospital database. Such patients were followed at regular intervals. They were examined clinically and evaluated with 2D transthoracic Echocardiographic examination. Haemodynamic parameters like, peak and mean pressure gradients, indexed valve area and NYHA class were recorded. All patients more than 30 years of age irrespective of left ventricular ejection fraction were included in the study. Patients undergoing combined procedures were excluded from the study. Intra operative TEE was used in almost all cases.

**Results:** Average size of the valve that has been used in our centre is 33 mm in mitral position. Mean and peak pressure gradients were 2 mm hg and 4 mmol hg respectively measured immediately after surgery. This above pressure gradients almost remained similar in subsequent 2D echocardiographic examinations. We operated ten cases who had severely depressed left ventricular ejection fraction (<40%). There was no in hospital death and no such events were reported within subsequent one year follow up.

**Conclusions:** Epic Bioprosthetic valves have been quite successfully used in different age group patients. This has resulted better haemodynamic parameters, faster clinical recovery. We have used it in patients more than 30 years of age due to their non compliance to anticoagulants. It has also been used in patients with AF as it helps in reduction in dose of oral anticoagulants

#### Comparison of Partial Vs Complete reversal of heparin in off-pump coronary artery bypass grafting surgery

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**Introduction:** Off pump coronary artery bypass grafting surgery (OPCAB) as such have an procoagulant effect and may affect the patency of venous grafts. To mitigate the procagulant effect of OPCAB partial reversal of heparin has been advocated. The purpose of this study is to know whether any significant difference is there between full reversal of heparin vs less than full (partial) reversal of heparin in terms of postoperative bleeding and requirement of blood products.

**Methods:** Fifty consecutive patients undergoing OPCAB were prospectively randomized in two groups. Group A received 1mg of protamine every 100iu of heparin, group B received less than 1mg of protamine every 100iu of heparin. The two groups were analyzed for differences in pre, intra and post operative coagulation profiles, intraoperative variables, post operative bleeding and blood products requirement. Both the groups were matched with age, gender, weight of patient, preoperative stoppage of antiplatelet drugs. No statistically significant difference were found in preoperative cardiac function, pre and intraoperative coagulation profile.

**Results:** In group A, first hour drainage was (45.54±36.89ml) significantly lower than group B (70±45.24ml) {p=0.008}, But there was no statistically significant difference, in drainage at 8 hours between group A (194.8±66.58ml) and group B (184.1±80.56ml) {p=0.22}, at 24 hours between group A (325±106.39 ml) and group B (323±99.54ml) {p=0.27}, no of patients requiring blood products, which were 5 in each group {p=1}.

**Conclusions:** In OPCAB, Partial heparin reversal may be sufficient and it does not increase post operative bleeding risk, rather it may reduce dose dependant protamine adverse effects and may improve the long term patency of venous grafts.

#### First 50 cases of MICS MVR: “Still learning.”

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**Introduction:** Minimally Invasive Cardiac Surgery (MICS) represents a challenge in that it requires a new learning curve and carries apprehension about compromising the surgical results. For the established surgeon, MICS necessitates a departure from the comfort zone and considerable metamorphosis. Mitral valve surgery is one of the early subset which can be successfully done with MICS. This subset in developing countries is different from the developed world. It not only is ideal for starting MICS but is also the most to benefit.

**Methods:** We have a budding MICS programme at our centre. Over the past two years we have done 50 cases of mitral valve

replacement through a mini-thoracotomy on femoro-femoral bypass. In this report we share our experience with this technique.

**Results:** There was no peri-op mortality. There were 2 conversions to standard sternotomy both in the early part of our learning curve. One patient developed right lower limb edema related to femoral vein cannulation. 12 patients had minor air leak which settled spontaneously. There was one incidence of deep surgical site infection. The mean age of the patients was 35.06 years. The mean cross clamp time for MVR was 50.20. The mean bypass time was around 74.20 mins. The median Intensive Care Unit (ICU) stay was 2 days and the median hospital stay was 4 days.

**Conclusions:** The technique for MICS MVR is reproducible and has a short learning curve. MICS is a definite paradigm for future. The patient today is concerned not only about survival but also about quality of life. MICS is the answer for this very question. However, MICS is not for all. Careful patient selection with the aim “to tailor the operation to the patient” is the crux of a successful MICS programme.

#### Minimally invasive coronary artery bypass graft surgery – Our experience

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**Introduction:** Minimally invasive coronary artery bypass grafting can be achieved via limited access, safely and successfully. Therapeutic strategies are evolving and dedicated instrumentation is being developed. Our experience of MICS CABG cases performed over the last 2 years is discussed.

**Methods:** Between 2011-13, 82 patients with a mean age of 50.46 years have undergone MICS CABG at Care hospital. Our study included 25 patients with unstable angina and 47 patients with post MI. Mean ejection fraction was 56.4. Associated co-morbidities were diabetes(19.5%), hypertension(25.8%) and CKD(2.4%). Surgery was performed via left mini-thoracotomy with the use of specialized minimally invasive instruments. LITA and Saphenous vein were used as graft conduits. All cases were performed on beating heart. Femoral exposure and cannulation is not done as routine. For emergency, we use sternotomy and complete the procedure.

**Results:** The overall outcomes were good. LAD was grafted in 100% patients, diagonal in 29.2%, OM in 14.6%, ramus in 6.6% and PDA in 1.2%. 3 patients needed conversion to sternotomy and 1 patient needed re-exploration. Mean peri operative blood transfusion was 1.63 units. Post operative complications included new onset AF in 8 patients, new onset renal failure in 2 patients and none developed CVA. The mean ICU stay was 2.51 days. Mortality was zero. All the patients

are on regular followup and none had recurrence of cardiac symptoms.

**Conclusions:** Minimally invasive coronary artery bypass grafting is safe and effective, with good early and mid-term results.

#### Outcome and survival analysis of post-infarction VSR: Our experience

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**Introduction:** To review our experience of post-infarction ventricular septal rupture and analyze the outcomes

**Methods:** Retrospective analysis of post-infarction VSR from 2005 to 2013 from SCTIMST database. Preoperative demographic profiles, risk factors, nature of the disease and its presentation, medical vs surgical and immediate postoperative characteristics were assessed. Outcomes were evaluated in terms of survival, re-hospitalization, improvement in NYHA class and LVEF.

**Results:** In the studied period, 18 patients presented with VSR of which 6 were subjected to medical therapy, 2 device closure and 11 underwent surgery. Mean age of presentation was 58.8 years. It was predominant in male population with M: F ratio of 10:8. The mean time of presentation was 11.8 days. Overall mortality was 38.8% with higher mortality in non surgical group. Average post-op ICU stay was 3 weeks. Better results were noted in patients on IABP. Pre discharge EF was improved. Patients were followed up for 6 months to 5 years.

**Conclusions:** VSR is still a challenging subset in adult cardiac surgery with high mortality and morbidity. Patients when treated early and aggressively in immediate post MI period have better survival and improved quality of life.

#### Pregnancy in patients with Mechanical Prosthetic Valves: Observation in Rural and Semi-urban North Indian Population- management issues at a Tertiary care institution

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**Introduction:** Pregnancy presents a unique challenge in women with prosthetic heart valves even in developed nations where the standard of maternal and cardiac care is systematic and available easily to all. Rheumatic heart valve disease continues to be widespread amongst rural and semi-urban Indian population. Despite improvements in general education

girl child is still neither favored in pregnancy nor in sickness. We have studied the effects of uniqueness this social problem and its impact of the pregnancy outcomes. Mechanical heart valves are inherently prone for increased thromboembolic events and acute hemodynamic problems due to mechanical dysfunction caused by valve thrombosis and pannus formations. Advanced heart disease associated with poor knowledge about pregnancy related issues, appropriate maternal care during pregnancy, malnutrition, increased pulmonary artery pressures, high incidence of right-sided valve and ventricular dysfunction along with chronic atrial fibrillation also pose a greater challenge in these patients.

**Methods:** Between April 2002- till May 2013, 683 married young women aged between 19-35 years (child bearing age) received mechanical prosthetic valves at a single unit.

**Results:** Twenty-seven women died within 30 days following operation due to cardiac causes. In the remaining six hundred and fifty-six (656) women another 69 died or were lost to follow-up. Of the remaining 587 survived beyond 1-year to be able to conceive a pregnancy. The median follow-up of 587 survivors (who are in regular follow-up) was 6.5 years. Sixty-nine out of 587 became pregnant during this period on 1 or multiple occasions. All women received only oral Nicoumalone as anticoagulant as standard of care. Forty-three women had successful deliveries and rest 26 had single or multiple stillbirths. Incidence of stillbirth in those who delivered successfully was lower. Of those 43, only 9 patients had stillbirth before or after live births. All thirty-three successful outcomes were conducted under supervision of an obstetrician trained to manage high-risk pregnancies at a medical university hospital or at our MRH unit. Six children out of 43 has mild anticoagulation related embryopathy.

**Conclusions:** The overall incidence of complications in the most rigorously and despite focused management of young Indian pregnant patients with mechanical prosthetic valves is higher than compared to western standards but best achievable at tertiary level. Our innovative management protocol, maternal anticoagulation regimen, maternal and fetal complications and outcomes associated in above mentioned scenarios in women with mechanical prosthetic valves will be discussed and presented.

#### Continuous suture technique for mitral valve replacement- A prospective post-operative analysis

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**Introduction:** The deleterious effects of Cardiopulmonary Bypass (CPB) are well known. Techniques to reduce the

duration of CPB without compromising patient's safety have been evolving. One such technique is the use of continuous suture technique for Mitral Valve Replacement (MVR). In our study we have analyzed postoperative course, morbidity and mortality in patients undergoing isolated MVR with continuous suture technique.

**Methods:** From August 2011 through September 2012, 71 patients underwent isolated MVR with continuous suture technique. The study was prospective, and the database maintained by medical record section and phone contacts with patients. After discharge, patients were followed up clinically on day-7, & 1, 3 and 6 months. Transthoracic echocardiography was done at 1 & 6 months. Statistical analysis was done using SPSS-15 software. The tests used were Chi-square test, Student 't' test and ANOVA test.

**Results:** Average CPB time was 50.73±12.48 minutes and mean aortic cross-clamp time was 29.86±8.81 minutes. During ICU course, significant decrease in inotropic support (p=0.004), ventilator time (p=0.037), mediastinal drainage (p<0.001) and shorter ICU stay (p<0.001) were found associated with decrease in CPB time. Mediastinal drainage averaged 258.31±172.53 ml whereas 0.94±0.843 units of packed red blood cells were transfused. Incidence of paravalvular leak was 4.2%. There were no incidences of suture breakage or prosthetic valve dehiscence. There was single peri-operative mortality resulting from cerebral thrombo-embolism.

**Conclusions:** Improved & faster post-operative recovery, equivalent morbidity-mortality and cost effectiveness mandates use of continuous suture technique for MVR.

#### 100 Intra aortic balloon pump insertions following coronary artery bypass grafting surgery in a single tertiary care cardiac center:

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##### Risk and outcome analysis

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**Introduction:** The use of Intra Aortic Balloon Pump (IABP) in patients undergoing CABG has been traditionally associated with a high complication rate and adverse outcomes. The aim of this study is to compare the outcome of IABP insertion – Pre-operative, Intra-operative and Post-operative insertions, in EuroSCORE II high and low risk patients

**Methods:** Medical records of CABG patients requiring IABP support at our institution between 2010 and 2012 were retrospectively reviewed. Data from 100 consecutive IABPs inserted were collected and analysed. They were classified into 2 sub groups – Low Risk (EuroSCORE II<5) and High Risk (EuroSCORE II >5)

**Results:** The overall mortality was 18%.The mortality (%) according to timing of IABP insertion was : Preoperative

7.7% (n=1), Intraoperative 15% (n=6) and Postoperative 22% (n=11). Mortality based on timing of surgery : Elective 14.8% (n=12) and Emergency 31% (n=6). The common causes of death were : Low Cardiac Output (n=13) and Intractable Arrhythmias (n=5). 1 patient died of Septicemia and MODS. There were 84 patients in Low Risk EuroSCORE II group, of which 14 patients died (22%) while of the 16 patients in High Risk EuroSCORE II group, 4 died (25%). Morbidity: Renal Dysfunction – 12 cases, 2 requiring Hemodialysis ; Re-exploration – 8 cases ; Wound infection – 11 cases including 1 case of Sternal dehiscence ; Post operative limb ischemia – 2 cases ; CVA – 2 cases ; Liver dysfunction – 4 cases and bleeding – 1 case. Pre-operative high Serum Creatinine is associated with higher morbidity and mortality.

**Conclusions:** IABP insertion is associated with low incidence of morbidity. Outcome of IABP use in High Risk EuroSCORE II patients is comparable to Low Risk EuroSCORE II group.

### Single dose amino acid enriched crystalloid cardioplegia—Our experience of 100 cases

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**Introduction:** Amino acids play a central role as source of acetyl-CoA and their ability to produce non-oxidative ATP production. This ability of amino acids is now widely appreciated as a cardioprotective substrate in recent formulae of cardioplegia. Custodiol®-HTK solution which is widely used as single dose cardioplegia contains histidine and tryptophan. However the benefits of other aminoacids cannot be underestimated. These aminoacids not only have the effect of prolonging the cardioplegia duration but also act as metabolic substrates during cardiac ischemia.

**Methods:** In this study freshly prepared crystalloid cardioplegia with all available aminoacids was used as single dose cardioplegia during 100 open heart surgeries. 60 patients underwent CABG (Coronary artery bypass graft), Mitral valve replacement was done in 13 patient, AVR IN 4, DVR in 7, ASD in 9, VSD 1 patient. 6 patients had surgeries for other lesions of heart.

**Results:** Aortic cross clamp time was Max.=3hours 20 min and Min.=38min. Troponin T levels were measured on all post-op patients at 0, 12 hours, 24 hours of surgery and pre-op Ejection fraction was compared with post-op EF at the time of discharge on first follow-up and 3months.

**Conclusions:** Single dose aminoacid enriched cardioplegia was found to be a good non-repeatable cardioplegia and an effective metabolic substrate for deriving energy in an ischemic heart.

### Aortic Root enlargement for small aortic root in patients of combined rheumatic aortic and mitral valve lesions

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**Introduction:** It is debatable whether to use small prosthesis or aortic root enlargement in patients of combined rheumatic aortic and mitral valve lesions with small aortic root.

**Methods:** We review 14 patients who underwent aortic root enlargement during surgical therapy for combined rheumatic aortic and mitral valve lesions from April 2011 to September 2013. Aortic root enlargement was considered for these patients when 19mm valve sizer was not easily negotiated through the small aortic annulus, on the basis of body surface area and type of prosthetic sizes available. Gluteraldehyde treated autologous pericardium was used for aortic root enlargement.

**Results:** All patients had mechanical bileaflet prosthesis implantation. Mean Aortic and Mitral valve prosthesis sizes were 20.93 and 28.08 respectively. Mean age of the patients was 30.71 years (range 16 years to 51 years). Body Surface area was  $1.47 \pm 0.17 \text{m}^2$  (range 1.20 to 1.79). The mean aortic annulus diameter was  $18.21 \pm 0.89 \text{mm}$ . CPB time and Mean aortic cross clamp time were  $156 \pm 37.64$  minutes (range 104–220 minutes) and  $124 \pm 32.19$  minutes (85–178 minutes) respectively. One case was reexplored for bleeding. One patient had cerebrovascular accident on 10<sup>th</sup> post-operative day. No heart blocks were detected. The postoperative peak and mean aortic and mitral transvalvular pressure gradients were  $14.57 \pm 8.77$ ,  $8.27 \pm 6.38 \text{mm Hg}$  and  $8.07 \pm 2.76$ ,  $3.79 \pm 1.42 \text{mmHg}$  respectively. There was one in hospital mortality. There were no post-operative paravalvular leaks, hemolysis. At mean follow up of  $9 \pm 7.75$  months all thirteen patients are doing well.

**Conclusions:** Aortic root enlargement can be done safely in patients with small aortic root who need surgical intervention for combined aortic and mitral valvular lesions of rheumatic aetiology with advantage of bigger size prosthesis without increased mortality and morbidity.

### Surgery in endocarditis: A single unit experience

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**Introduction:** Endocarditis has always posed a significant challenge to the cardiac surgeon. The wide spectrum of presentation and findings makes it a harder disease to manage optimally. The objective of this study was to analyze our experience with surgery in endocarditis in a single cardiac surgical unit.

**Methods:** The period of the study was from Jan 2009 to Nov 2013. Over this period, 25 patients underwent surgery in endocarditis. Patients from all age groups with treated, culture positive endocarditis were included in the study.

**Results:** Patient age ranged from 14 yrs to 65 yrs, with 6 female patients. Commonest presentation was valvular pathology, aortic

valve being involved in 17 patients, with 3 patients presenting in congestive cardiac failure, two patients had ventricular septal defects and one with a ruptured sinus of Valsalva. Intraoperatively, vegetations were noted in 12 patients, with leaflet perforation seen in one patient, annular and subcommissural abscesses were seen in 5 patients. 15 patients underwent Aortic valve replacement, 4 underwent mitral valve replacement, 5 patients underwent multivalve procedure and three patients underwent intracardiac repair. Choice of valve included both mechanical and bioprosthetic valves. There was only one in-hospital mortality, of a patient who had undergone aortic valve replacement. The other patients continue to remain in follow up.

**Conclusions:** Our experience with surgery in endocarditis has showed us the wide spectrum of presentation and the variable intraoperative findings which necessitate constant reworking of the surgical strategy, including the choice of prosthesis and perioperative management for optimal outcome.

#### Simultaneous carotid endarterectomy and coronary artery bypass grafting vs staged procedure in patients with severe carotid and coronary artery disease: a single unit experience

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**Introduction:** The occurrence of significant carotid artery disease in patients requiring Coronary Artery Bypass Grafting (CABG) results in a dilemma regarding the best surgical management.

**Aim:** Our objective was to compare the efficacy of staged Carotid Endarterectomy (CEA) followed by Coronary Artery Bypass Grafting (CABG) with synchronous carotid endarterectomy and CABG in patients with severe carotid and coronary artery disease.

**Methods:** During a 4-year period, from 2009 to 2013, 42 patients underwent carotid endarterectomy and CABG, of these 20 patients underwent simultaneous procedure (group 1), and 22 (group 2) underwent staged procedures, upto 30 days apart. All patients underwent preoperative carotid Doppler studies, contrast CT of neck vessels and standard coronary angiography. The principal indications for combined procedures were the need for CABG and (1) symptomatic carotid artery disease; (2) internal carotid artery stenosis of 70% or more, with or without contralateral disease; or (3) an ulcerated, unstable internal carotid artery lesion, regardless of degree of stenosis.

**Results:** The average patient age was 60 years, with a male predominance. CABG surgery was performed within one month of the carotid surgery in the staged group. One patient in group 1 had post-operative convulsions and stroke, and one patient in group 2 required re-exploration following endarterectomy. There were no perioperative myocardial infarctions or deaths.

**Conclusions:** We propose that this strategy of staged procedure may be a possible option for patients who present with severe disease in both coronary and carotid distributions. The results of our study, though based on a limited cohort, suggest that this approach of staged CEA–CABG can yield good outcomes.

#### Surgical repair of post infarction ventricular septal rupture by infarct exclusion technique - Our experience

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**Introduction:** Ventricular Septal Rupture (VSR) is rare but one of the most serious and life threatening complication of acute myocardial infarction. Incidence of post infarction VSR is 0.2–0.34%. The aim of the study was to evaluate early and long term outcome and prognostic factors of surgical repair of post infarction VSR by infarct exclusion technique.

**Methods:** A total of 13 consecutive patients (mean age, 60) underwent surgical repair of VSR in our department in MMHRC from year 2006 to 2013. A retrospective analysis of clinical and operative data, predictor of early mortality and long term survival was performed.

**Results:** The hospital mortality was 46% (6 patients), one year mortality was 14% (1 patient), among the discharged, there are 3 patients in this cohort study who survived beyond 5 years. Five out of seven patients died, who presented with cardiogenic shock. 4 patients died who were operated within 4 days of occurrence of myocardial infarction. Four patients had residual shunt post VSR repair. One patient needed Re-do VSR repair for significant residual shunt who succumbed later.

**Conclusions:** The repair of postinfarction VSR by infarct exclusion with double pericardial patch technique is safe and feasible. This technique seems to offer sufficient favourable early and long term results. Preoperative cardiogenic shock carries a poor prognosis for this patients group. Early intervention, preoperative intra aortic balloon pump support may improve the surgical results.

#### Perspective, Practice and Personalized threshold for Abdominal Aortic Aneurysm

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**Introduction:**

- 1) To determine long term results of open abdominal aortic aneurysm repair.
- 2) To determine long term predictors of mortality.

- 3) To derive a formula for intervention for abdominal aortic aneurysm on basis of body surface area.

**Methods:** From 1998 till date, open repair of abdominal aortic aneurysm performed in 274 patients, elective for intact aneurysms in 214 and emergent in 60. 32(14.9%) of the elective procedures were performed for small aneurysms measuring 4–5.4 cms in patients with low body surface area (BSA). Body weight and height were recorded in 100 patients undergoing computed tomography of abdomen for non-vascular reasons and 32 with small aneurysms who underwent elective repair. BSA was calculated from height and weight using Mosteller formula.

**Results:** 30 day mortality for elective and emergent groups was 3.73% and 60% respectively. Perioperative mortality- 8 (3.73%) and major complications occurred in 41(19%). Long term survival was assessed by Kaplan-Meier analysis. Predictors of long term mortality were analysed with univariate (Chi-square) and multivariate (Cox regression) analysis. 5 and 10 year survival rates were 84.6% and 66.6%.

Aortic diameter ranged from 1.4–1.8cms and calculated body surface area from 1.44–1.70m<sup>2</sup> in patients with small aneurysms. Threshold diameter of 5.5 cms has ingrained defining factor of ‘3’ considering body surface area in western males of  $\geq 1.8\text{m}^2$  ( $5.5/1.8=3$ ).

**Conclusions:** Elective repair of abdominal aortic aneurysm is safe, durable with low reintervention rates and easy surveillance protocol. Body surface area, calculated from height and weight, multiplied by threshold factor ‘3’ to determine personalised threshold, so optimal size and time to intervene, in patients with small aneurysm, is at best proof of concept with compelling evidence useful world over.

### The Clinician and the dissected patient - Aortic dissections

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**Introduction:** The Dept of CTVS at the Military Hospital Cardiothoracic Centre (Pune) has operated on 19 cases of Aortic Dissections in the last 4 years. Of these, 50% (n=9) were deBakey Type “A”, 40% (n= 7) were deBakey Type “B” and the rest (n=3) were deBakey Type III (Stanford B).

**Materials:** We report the unusual clinical presentation of two such cases. The first was a young male who presented 02 months after a Road Traffic Accident and was referred as a case of Aortic Transection, found to have a Type III de Bakey dissection. The second was an elderly male who presented with Right lower limb claudication and was diagnosed to have Type A deBakey dissection.

**Results:** Both cases were managed successfully.

**Conclusions:** However the aim of the presentation is to highlight the need for a high index of suspicion during clinical

examination and outline the experience of management of aortic dissections at this centre.

### Penetrating diaphragmatic rupture due to arrow injury, a rare case series

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**Introduction:** To study retrospectively the clinical presentation and the operative results of the 7 cases of diaphragmatic rupture caused only by arrow injury admitted at SSKM hospital, a tertiary referral centre in eastern India during a period of 2 years from august 2011 to august 2013.

**Methods:** 7 patients of traumatic rupture of the diaphragm caused only by arrow injury were admitted and operated. All the seven cases were penetrating injuries. All the cases were diagnosed with clinical suspicion and radiological investigations such as chest x-ray and CT scan-Thorax. Patients were operated through thoracotomy or laparotomy.

**Results:** 7 cases of traumatic diaphragmatic rupture caused by arrow injury were admitted and all were penetrating injuries. All 7 patients were male. All the patients were operated on emergency basis. All the seven patients survived and are doing well in the follow up period.

**Conclusions:** Traumatic rupture of the diaphragm due to arrow injury is a unique and occult clinical entity which can be easily missed. It is more common in males and usually occurs on the left side of the diaphragm. Their delayed presentation is due to the delayed rupture of the diaphragm or delayed detection of diaphragmatic rupture, making the accurate diagnosis of diaphragmatic injury challenging to the thoracic surgeons. Emergency thoracotomy and laparotomy is the gold standard in the management of these injuries.

### Giant cell aortitis – A single unit audit

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**Introduction:** Review the incidence of recurrent aortic aneurysm development in patients with non-infectious giant cell aortitis at our institution.

**Methods:** All patients diagnosed with giant cell aortitis between 2003 and 2013 were identified and reviewed for the development of recurrent aortic aneurysms.

**Results:** Six patients were identified during the study period and of those, one patient was found to have giant cell aortitis with recurrent aortic aneurysm formation. They originally presented with massive ascending aortic dilatation and associated aortic incompetence and underwent a successful Bentalls procedure.

Histopathology demonstrated intimal and adventitial thickening with media destruction and the presence of non-necrotising granulomas containing multinucleate giant cells consistent with giant cell aortitis. Despite annual surveillance, this patient presented acutely with a Stanford Type B dissection of the descending thoracic and upper abdominal aorta that was managed conservatively. A recent biopsy due to a photosensitive facial rash demonstrated sub-acute lupus. Currently non-infectious aortitis is classified clinically, however Burke *et al* (2008) previously found that certain histologic patterns of aortitis (non-necrotising) were highly suggestive of associated systemic connective tissue disease while another histologic pattern (necrotising) were almost always isolated, a key point highlighted here.

**Conclusions:** Patients with giant cell aortitis necessitate life-long surveillance to enable appropriate early diagnosis and management of potential additional aneurysmal development with awareness that underlying connective tissue diseases may be diagnosed at a much later period. Knowledge of histopathological patterns may guide patient management / follow-up.

#### **Pneumonectomies in a tertiary center in India- A study of 115 cases and comparison with western data**

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**Introduction:** The incidence of pneumonectomy is higher in India as compared to the west. Since there is no large Indian series available, we studied the details of the pneumonectomy done in our centre and endeavoured to compare it to western data.

**Materials:** All patients who undergo pneumonectomy in our institution are routinely analysed and the patients followed up. The data obtained after 2005 were studied.

**Results:** 115 adults underwent pneumonectomy over the last nine years. The peak incidence was in the 4<sup>th</sup> 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 was a lunge destroyed by tuberculosis. Patients with poor spirometry results underwent a six minute walk test. All patients were routinely digitalised and extubated on table. Three patients were re-explored for postoperative bleeding. Five patients developed empyema. Three were treated by thoracoplasty and omentoplasty and two had modified Eloesser flap procedure done. There was no mortality. The average routine follow up was for one year.

**Conclusions:** In India the incidence of pneumonectomy are higher and they are mostly done for inflammatory lesions. The left to right ratio here is skewed in favour of the left side due to the higher number of inflammatory diseases. Poor pre operative 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.

#### **The pedicled latissimus dorsi muscle for treatment of wounds related to broncho-pleural fistula**

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**Introduction:** Transposition of extrathoracic muscle flaps has been the cornerstone of treatment of a number of complex intrathoracic chronic wounds related to bronchopleural fistulas (BPF) and residual infected pleural spaces. We used the Lattismus Dorsi (LD) flap for treating BPF related empyemas.

**Material and methods:** 4 patients with BPF and chronic empyema underwent a LD flap based repair. All had in situ chest tubes and continuous air leak with pus discharge. 3 had received a full course of ATT. All were on appropriate antibiotics. All were referred after failure of the conventional treatment strategy at the primary hospital. Intrathoracic transposition of an extrathoracic muscle to buttress repair of the BPF was performed. The standard posterolateral thoracotomy incision was used.

Superior and inferior subcutaneous flaps were raised superficial to the muscle fascia extending to its anterior and posterior borders. the muscle was then detached from its points of origin. The thoracodorsal nerve is routinely divided in order to prevent any muscle stimulation that may disrupt the muscle. A large mass of muscle was available.

The muscle was then wrapped in a moist laparotomy pad to be used for transposition later. The decortication was then done followed by closure of the BPF with the LD flap.

**Results:** The average time for harvesting the entire LD flap was approximately 20–30 min. All 4 patients were successfully healed. The overall length of hospitalization reached 8.4 days (range 6 to 15). One patient developed a sterile donor site seroma which needed to be drained. There was no functional disability of shoulder movement.

**Conclusions:** The extrathoracic muscle LD flap transposition is an effective technique to obliterate potential pleural space problems, especially in the presence of chronic infectious disease, and to reinforce closure of postoperative BPF. The LD flap should be part of the armamentarium of any surgeon dealing with challenging chronic infected wounds.

#### **A valuable option in the management of complicated empyema – modified Eloesser flap A study of seventy two consecutive cases**

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**Introduction:** To assess the effectiveness of window procedure as a treatment option in management of empyema when indicated.

**Methods:** The medical records of all patients with empyema who were surgically treated in the Christian medical college Hospital, Vellore over the last three years were retrieved and those who underwent a window thoracoplasty were analyzed. The method of presentation, indication for window procedure, surgical details and outcomes were studied. These patients were followed up in the outpatients' clinic.

**Results:** The average age was 39.2 years. The male female ratio was 4.5:1.

The mean postoperative length of stay was 6.4 days. Gram negative organisms were most predominant. Tissue studies showed AFB in 15 (20%) patients. Biopsy showed necrotising granulomatous inflammation in 29 (41%). Thirteen (18%) had failed prior surgical interventions. The average follow up was for 11 months. Most windows healed by 6 months. Dressings were managed at home after initial hospital dressings.

**Conclusions:** We assert that, when indicated, window procedure can be performed as an easy and definitive surgical treatment for empyema. It gives immediate relief from signs and symptoms of empyema and avoids the complications of prolonged tube drainage. Patient compliance is good. It does not cause major disfigurement and hence a surgical closure is seldom necessary.

#### Study of mediastinal tumors

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**Introduction:** Recent advances in diagnostic and surgical techniques have brought major changes in the clinical presentation, diagnosis and the surgical management of mediastinal masses. Indian literature in this scenario is deficient, which our retrospective descriptive study aims to address.

**Material and methods:** Details of patients operated for mediastinal masses from 01/2007 to 2013 were collected. Clinical presentation, symptomatology, radiological/pathological findings, surgical approaches, intraoperative/ immediate / intermediate post operative results were evaluated and analysed.

**Results:** Of the 112 patients, (71 males, mean age 43 yrs, range 10 yrs to 65 yrs) 2 deaths were due to complications following exacerbation of myasthenia gravis, and two patients died due to post operative bleeding. Thymic neoplasms were the most common, followed by neurogenic tumours. Most common presentation was myasthenia gravis, followed by nonspecific back pain. 4 % of patients had symptoms due to local compressive effects. Tumour was in the anterior mediastinum, middle and posterior mediastinum in 68.75%, 4.46%, 26.78% of cases. Surgery done with a curative intent was through sternotomy (74), posterolateral thoracotomy (32), combined approach (3) and cervical route (3). Residual tumour was present in 5 % of cases due to nerve involvement. Follow up was 98% (2 months to 6 years). 3 patients died of unrelated causes

and one developed multiple lung metastases. 2 patients with neurogenic tumours developed recurrence.

**Conclusions:** We describe our series in the Indian scenario. Inadequately optimized Myasthenic patients and svc obstruction are poor prognostic factors. Complete excision may not be possible in neurogenic extension to spine even with concomitant neurosurgery. Neurological infiltration has a poorer prognosis.

#### Our experience with surgical repair for aortic aneurysm over last three years

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**Introduction:** Most aortic aneurysms are asymptomatic, not detectable on physical examination, mostly discovered during radiologic testing for other reasons. Tobacco, hypertension & male sex are risk factors. Repair is indicated when the aneurysm greater than 5.5 cm in diameter or grows more than 0.6 to 0.8 cm per year or is symptomatic. Rupture of an aortic aneurysm is an emergency requiring immediate repair. The mortality rate approaches 90 percent if rupture occurs outside the hospital. This study reviews the results of aortic aneurysm surgery over last 3 years (Sep 2010 to October 2013).

**Methods:** A prospectively gathered database of patients operated in a tertiary care centre was analysed.

**Results:** Aortic Aneurysm repair was performed in 75 patients, 50 (66%) had elective repair & 25 (33%) had emergency repair. Most of the patients belonged to 60-69 yrs group & were males. The 30 day/ same admission mortality rates were 20 & 52 % respectively. For abdominal aortic aneurysm mortality rates were 25% & 48% in elective & emergency cases. The most important risk factors were male sex, old age & hypertension. The most important cause of mortality are cardiac arrest & acute renal failure.

**Conclusions:** It remains only minority of patients have elective operation before the onset of symptoms and/or rupture. Despite anaesthetic and surgical specialization, the results of AA repair in emergency setting have not improved over the past two decades. Operative mortality may be increasing, possibly because of the increasing age and associated comorbidity of the patients presenting to this unit.

#### Our experience of carotid body tumours

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**Introduction:** Carotid body tumours though rare, represent majority of head and neck paragangliomas. They are benign tumour with malignant potential ranging from 2.5 to 25%. We report our experience of this rare clinical entity.

**Methods:** Fifteen patients of carotid body tumour were operated at our institute in the period Jan 2004 to October 2013.



Case records were studied as regards the clinical presentation, surgical procedure, in-hospital morbidity and recurrence at follow up.

**Results:** There were fifteen patients in the study group out of which six were females. The mean age of presentation was 50 years (range 30 to 60 years). The commonest presentation was a slow growing mass. All patients underwent CT angiography. None of the patients had endocrinologically active tumours at presentation. In all the patients meticulous subadventitial excision was done and total resection was achieved without any significant blood loss. All tumours were confirmed to be carotid body tumour on histopathological examination. Of the ten patients operated one needed re-anastomosis of the external carotid artery and one needed repair of common carotid artery. At five year follow up no recurrences of the tumour were noted.

**Conclusions:** Carotid body tumours are rare benign tumours with no or low rate of recurrence. A meticulous and patient sub-adventitial excision is the recommended operative procedure which allows a complete resection of the carotid body tumours with minimal morbidity and no surgical mortality. Operative complications include injury to the carotid arteries and its branches and thus facility for arterial repair should always be available.

#### A five year study of surgery for empyema- A single centre experience of 231 consecutive cases

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**Introduction:** The bulk of the thoracic surgical work in the western literature pertain to neoplasm, whereas in India, empyema predominate. We endeavored to study the management details of patients with empyema thoracis who were treated surgically in our institute

**Methods:** A retrospective analysis of all patients who were treated surgically over the last 5 years were studied and the patients followed up

**Results:** 231 patients were operated upon for empyema between 2009 and 2013. The average age was 37.46. Window procedure (63 %), Decortication (60%) and Thoracoplasty (24%) were the three surgical procedures employed. Many had combination of these procedures. Gram negative bacteria were the commonest pathogen identified. Tuberculosis was identified in 54.16% patients. 34 patients had bronchopleural fistula and in 11 of these patients omentum was used to repair them. Eight patients underwent surgery as treatment of complication of previous lung surgeries.

**Conclusions:** Empyema thoracis is treated successfully by surgery when medical methods and tube drainage fail. There is a high incidence of tuberculosis in these complicated

patients. Tuberculosis, bronchopleural fistula, diabetes and debility were major factors causing delay in healing and spontaneous window closure

#### Ruptured aortic aneurysms management strategies and outcomes

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**Background:** Aortic aneurysm, complicating with rupture leads to Inevitable death if not timely intervened. Such an emergency referred to tertiary care centre is increasing in trend as a result of awareness of the referring physician and access of facilities.

**Material and methods:** Retrospectively analysed over 10 years from June 2001 to June 2011 at PSG IMSR, Coimbatore, India. All Aortic aneurysm which was surgically intervened for aneurismal rupture. They were grouped into Group A: Ruptured thoracic aneurysm – 8, Group : B : Thoraco abdominal – 3, Group : C : Infra renal – 4

**Methods:** Group-A: Underwent aneurysm excision, interposition grafting, under Left atrial femoral bypass. Group-B: Underwent aneurysm excision, interposition grafting under left atrial femoral bypass. Group-C : Underwent aneurysm excision, Aorto Bi iliac reconstruction – 3, CABG with Aorto Bi Iliac reconstruction-1

**Results:** In Group: A

Peri operative mortality – 1, Secondary to massive hemotypsis as a result of aneurismal erosion through the bronchus: Morbidity – 1, post operative major stroke.

Group: B

Recovered well, followup over 2 years satisfactory

Group: C

Renal failure – 1, Recovered, No Mortality; Followup over 2 years satisfactory

**Conclusions:** Surgical outcome depends on time of intervention and associated comorbid status. Endovascular aneurismal repair may not be feasible at all centres. Most of the situation surgery is the only option. In our series the overall morbidity and mortality is less than 10% is comparable to other series were mortality is predicted upto 50%.

#### Pulmonary hydatid cysts and their management in a tertiary care centre in Northeast India: Case reports and review of literature

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**Introduction:** Hydatid disease is caused by the larval stage of the cestode, Echinococcus granulosus. Man is the intermediate host in its life cycle. The most common organ involved is

liver followed by lung. Pulmonary hydatids are quite frequent in India, especially so in Assam and the Northeast. In this study, under the light of current literature, we aim to present case reports of our experience in management of pulmonary hydatid cysts at our centre over a 3-year period.

**Materials:** The clinical presentation, laboratory investigations, diagnostic imaging findings, mode of surgical with medical management and the follow-up were recorded in the patients.

**Results:** 7 patients presented with pulmonary hydatid cysts in the said period. The patients underwent various laboratory and diagnostic imaging studies to confirm the diagnosis and to ascertain their location. All cases underwent thoracotomy and incision of the adventitious capsule and delivery of the cyst by inflation of the lungs. Two cysts ruptured during delivery, with contamination of the pleural space. Pleural space of such cases was irrigated with hypertonic saline. Anti-helminthic therapy was instituted empirically. All patients have been followed up with none showing evidence of recurrence.

**Conclusions:** Distinction of pulmonary hydatid disease must be made from other causes of isolated, peripheral pulmonary lesions as the technique of delivery of a pulmonary hydatid cyst is different from the management of other single peripheral lesions. This makes preoperative recognition of hydatid disease important. Surgical management followed by anti-helminthic therapy offers favorable outcome in nearly all patients.

### Transhiatal Esophagectomy for carcinoma oesophagus – A single surgeon experience

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**Background:** Surgery is considered as treatment of choice for esophageal carcinoma. Transhiatal Esophagectomy (THE) with cervical esophagogastric anastomosis is considered relatively safe with an oncological outcome comparable to that using the transthoracic approach with minimal complications. Recent advances in diagnosis, staging and treatment of this neoplastic condition have lead to small but significant improvement in survival.

**Methods:** It was a prospective study and included 172 patients having oesophageal carcinoma. Indications for surgery included documented esophageal cancer. The aim of the study was to know the perioperative events, complications, surgical outcome and long term results of THE performed by a single surgeon.

**Results:** From November 2005 to October 2013, THE was performed in 172 patients. Male female ratio was 2.3. Most of the patients were from rural areas (81.38%). Most of the

patients had TNM stage III and II (54.35 % and 46.43%). Stomach was the esophageal substitute in 96%. Blood loss averaged 679 cc. The hospital mortality rate was 3.89%. Major complications were anastomotic leak (7.6%), atelectasis/pneumonia (4.3%), intrathoracic hemorrhage, cardiovascular complications (3.67%), vocal cord paralysis (3.6%), chylothorax (2.56%), and tracheal laceration (1 patient). Estimated 3-year disease free survival (DFS) was 32.21%, whereas the 3-year overall survival (OS) was 47.26%. Also, the estimated 5-year DFS was 23.55, whereas the 5-year OS was 29.14%.

**Conclusions:** Transhiatal esophagectomy is a relatively safe approach for infracarinal oesophageal carcinoma. The author's large THE experience provides a valuable basis for benchmarking data regarding the procedure.

### Pulmonary carcinoid: A descriptive study

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**Introduction:** Pulmonary carcinoid tumors are neuroendocrine malignant tumors that make up 1% to 2% of all lung tumors. Indian data on this subgroup is severely deficient. We present our study on this relatively under reported entity.

**Method and materials:** This is a retrospective clinicopathological study conducted in our tertiary teaching institute, on 19 patients who had bronchial and parenchymal pulmonary carcinoid tumors between jan 2009 and dec 2013. Epidemic, clinical, pathological, follow up data are collected and evaluated.

**Results:** The average age of the patients was 38.63 years, with a male to female ratio of 1.1:0.9. Haemoptysis and cough were the commonest presenting symptoms. Surgical option was offered to all except one; 8(42.1%) patients had pneumonectomy, 8 patients (42.1%) had lobectomy and 2 patients (10.5%) had bilobectomy. Of the 19 patients, 12(63.15%) were diagnosed pathologically to have typical bronchial carcinoid tumors and the other 7(36.84%), atypical bronchial carcinoid tumors. Typical carcinoids had mainly endobronchial growth and atypical carcinoids had predominantly peripheral involvement. Follow up ranging from 3 months to 5yr showed 100% survival rate in patients with typical carcinoid tumors and one patient with atypical carcinoid had hepatic metastasis and expired, tumor recurrence was noted in one patient.

**Conclusions:** We present our series of this relatively under reported Indian spectrum of pulmonary carcinoids. Good surgical result can be achieved in typical carcinoids. However atypical carcinoids have propensity to metastasize locally and systemically.

### Our experience with surgical treatment of peripheral vascular pseudoaneurysm

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**Introduction:** Peripheral vascular Pseudoaneurysms are not rare. Management of peripheral vascular injuries often present critical challenges in resource limited settings specially in developing countries. Peripheral vascular injury patients are often present late with pseudoaneurysm. Objective: To determine the frequency of peripheral artery aneurysms and to analyse the outcome of surgical intervention.

**Methods:** A total of 54 patients who underwent surgery for Peripheral arterial pseudoaneurysm from Jan 2008 to Oct'2013 were analyzed retrospectively, including clinical presentation, surgical procedures used, and postoperative follow-up data obtained 10 days after discharge.

**Results:** All the patients except 2 are male. Most common mode injury was penetrating injury (83.3%). Most commonly involved artery was Femoral artery. The mean duration from injury to hospital admission was 19 months (range, 2 months-3 years). All patients underwent color-flow arterial Doppler ultrasonography. Primary surgical repair of the rent was done in majority of the cases (87.03%) and resection and repair with saphenous vein graft interposition was done in 7 cases (12.9%). There was no instance of death or ischaemic extremity loss. Patients were discharged from the hospital a mean of 7 days after surgery. Early and late graft patency rates were 100%.

**Conclusions:** Very rarely, post-traumatic Pseudoaneurysms of peripheral arteries show symptoms after a long period of time. Diagnosis is very easy with a review of the patient's history and a physical examination. Surgery is the preferred treatment for such cases.

### Mycobacterial aortopathy: an institutional review

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**Introduction:** Mycobacterial infection is a rare but definite cause of pseudoaneurysm of aorta and its branches in developing countries.

**Methods:** From 1996 to July 2013 we treated 52 cases of tuberculosis of aorta and its branches. Most of these patients had evidence of treated or active tuberculosis. The most common site of involvement were abdominal aorta (n=20), followed by descending thoracic aorta (n=13), ascending aorta (n=10), arch (n=12) and its branches (n=4). It presented as pseudoaneurysm in 38(73%), true aneurysm in 10 (19.2%) and stenosing lesion in 2(3.8%) patients. One patient had dilated and inflamed aorta and aortic valve. One patient had

both a pseudoaneurysm and true aneurysm. Fifty patients (96.1%) had single level or contiguous two level involvement. Two patients had more than one non-contiguous level of involvement. Open surgery was performed in 45 patients, endovascular stent was performed in three patients, and four patients refused intervention. Surgical procedures were patch repair (n=21), interposition graft (n=15), Bentall (n=3), primary repair (n=2), AVR(n=1), extra-anatomic bypass (n= 2), and patch repair of pseudoaneurysm of sinus of Valsalva and vegetectomy in one. 25 (83%) had granulomatous inflammation suggestive of tuberculosis. In six (13.3%) patients, operative specimen had positive AFB stain. Culture for AFB was positive in 9 (20%) patients, and PCR analysis was positive in 3 (6.6%) patients. All patients received Anti-Tubercular Treatment (ATT) postoperatively.

**Results:** There were five early deaths. The median stay in ICU was 3 days (range 2-34 days). Median hospital stay was 8 days (range 6 to 34 days). The median duration of follow-up was 58 months (ranging from 1 to 130 months). There was one late death due to recurrence at original site followed by reoperation, sepsis and death.

**Conclusions:** Mycobacterial aortopathy is not so rare. Aortic involvement may be in the form of pseudoaneurysm, true aneurysm, or stenosing lesions or aortic valvulitis. All the segments of aorta are prone to get involved. With advent of newer investigative modality like CT scan and MRI, it is possible to diagnose more and more such involvement with precise anatomical definition. With adequate surgical / endovascular intervention and proper chemotherapy, satisfactory results are achieved.

### In hospital and short term outcome of Hybrid repair of aortic arch aneurysms

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**Introduction:** The hybrid technique of open surgical supra-aortic extra-anatomic bypasses along with simultaneous or staged thoracic endovascular grafting is less invasive than open surgery in the treatment of complex aortic arch aneurysms. The aim of the study is to report our hybrid experience and in hospital and short term. Objective: To assess in hospital and short term outcome of hybrid repair of arch aneurysms

**Methods:** Retrospective review computerized database. All patients had regular clinical as well as computed tomography follow up.

**Results:** 9 patients (9 males) with mean age of 59 yrs ( Range 44-62 ) were treated with the hybrid technique between 2012 - 2013. There were 8 elective and 1 emergency procedures. 8 patients had arch or proximal descending aortic aneurysms and 1 had aortic dissection. All extra-anatomic bypasses were done simultaneously with a mean operating time of 2 hours.

One patient underwent Type I hybrid procedure while 7 patients required partial debranching Last patient underwent type III repair. All patients received Medtronic Devices . Deployment success was 100 % with no endoleak on completion angiogram. There was 1 mortality. 1 patient had post-operative debilitating stroke. The mean follow up period was 4.5 months. The Extra-anatomic bypasses performed were:

No of cases	Aneurysm location	Extra anatomic bypass
1	Arch	Trifurcating graft from Ascending aorta to right common carotid, left common carotid and left subclavian
1	Arch distal to brachiocephalic	Bifurcating graft from Ascending aorta to left common carotid and left subclavian
1	Extensive thoracic	Type III Replacement of arch and arch vessels followed by stent graft to distal thoracic aneurysms
6	Arch involving left subclavian	Partial de branching Subclavian to subclavian

**Conclusions:** Supra-aortic hybrid procedures are a safe and effective mode of treatment for complex aortic disease. Our experiences with this procedure with respect to the early and mid-term results have been encouraging.

**Primary chest wall tumors-Challenge to a thoracic surgeon**

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**Introduction:** Primary chest wall tumours are rare not. The numbers are so low that proper categorization and studies are difficult. For a thoracic surgeon also, these rare tumors often cause diagnostic and management dilemma. In the Christian medical college hospital, Vellore, being a tertiary referral centre, we ventured to study these rare tumors.

**Methods:** All the patients with primary chest wall tumors treated surgically in our institution in the last 6 years were studied and the patients followed up.

**Results:** Of the 1057 chest wall tumors identified in our institution over the last six years , 94 (8.9%) were primary. Of these 67 (71%) were operated upon. There were 32 benign and 35 malignant tumors. Common primary tumors were fibromatosis and Ewing’s sarcoma. Two thirds of the tumors were more than 5 cm in diameter when they presented. Most patients were asymptomatic at presentation and swelling was the presenting feature. Only 12% of the patients had pain as the presenting features and these were mostly malignant. Most of the tumors were in the anterior chest wall. Large tumors required plastic reconstruction after resection. Most patients

required adjuvant treatment in addition to surgery. There were no surgical mortalities.

**Conclusions:** Next to metastatic tumors, fibromatosis and Ewing’ sarcoma were the most common chest wall tumors. Multimodal treatment is mandatory for primary malignant chest wall tumors. Surgery whenever indicated and feasible is considered the best option. Because of rarity and their varied presentations, drawing a common surgical protocol is difficult. Each case has to be treated in an individual basis in consultation with the radiation and medical oncologists. The post operative morbidity and mortality are negligible.

**Role of decortication in management of parapneumonic empyema thoracis in children**

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**Introduction:** Parapneumonic empyema thoracis is a rare complication of bacterial pneumonia in children that emencely increases the morbidity. Classically parepneumonic effusions are divided into three stages. Stage I or exudative stage, Stage II or fibrinopurulent stage and stage III or organised effusion stage. The present study was designed to highlight the role of open decortication by thoracotomy in cases of para-pneumonic empyema of stage II and stage III disease in children.

**Methods:** A prospective observational study was done on 31 children of less than 15 years of age, who presented with stage II and stage III parapneumonic empyema thoracis. They underwent decortication surgery through postero-lateral thoracotomy.

**Results:** Out of the 31 children included in this study, there were 21 boys (67.74%) and 10 girls (32.26%). The average duration of symptoms was 17.84 days. The mean duration of post-operative chest drain was 2.55 days. *Staphylococcus aureus* was the most frequently encountered organism isolated in culture of fibrino-purulent material from the pleural cavity in 12 cases (38.7%). Mean duration of total hospital stay was 8.3 days.

**Conclusions:** Decortication by thoracotomy is a safe and effective approach for stage II & III parapneumonic empyema thoracis in children leading to early recovery and less hospital stay.

**Pneumonectomy: Assessment of the risk/benefit ratio-Results in 66 consecutive cases**

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**Introduction:** Chronic inflammatory & malignant lung diseases resulting in severe unilateral pulmonary pathology

necessitating pneumonectomy encountered in our present day Practices.

**Methods:** A retrospective study, of the 66 patients undergone pneumonectomy, was performed from 2009-2013. The detected underlying lung pathology was: Destroyed lung due to chronic tuberculosis & its complications in 40 patients (60.60%); Severe bronchiectasis in 05 patients (7.5%); Bronchial carcinoid / tumor in 11 patients (16.66%); Lung tumor in 06 Patients (9%); congenital left pulmonary artery aneurysm with complete collapse of residual left lung in 01 Patient (1.5%); Hydatid cyst of Lung in 01 Patient (1.5%); Traumatic lung destruction in 01 Patient (1.5%); Completion pneumonectomy done in 02 cases following previous lobectomy (3%). Among these patients 06 patients (9%) are below 15 years of age (Range 03-15 years).

**Results:** Intra-operative & Peri-operative complications were outlined. Branch Pulmonary arteries were injured, intra-operatively, in 02 cases (3%). Peri-operative morbidity include Secondary hemorrhage in 2 patients (3%); Post-pneumonectomy empyema in 3 patients (4.5%); Bronchopleural fistula in 01 case (1.5%). There were 2 mortalities (3%), both due to fulminant respiratory failure. Excellent results were achieved in 63 number of the patients (95%).

**Conclusions:** This retrospective study shows that Pneumonectomy in active pulmonary tuberculosis did not carry any extra mortality or morbidity as experienced by others. Pneumonectomy in infiltrative malignant lung / bronchial diseases are safe. Pneumonectomy in children was remarkably uncomplicated. Completion pneumonectomy can be done with an acceptable morbidity in selected patients. Tuberculosis, being common in the developing world, adequate pre-operative and operative cover with anti-tuberculosis drugs may enhance results.

#### Use of Mediastinoscopy in era of latest imaging modalities

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**Introduction:** With the advent of modern anatomical and functional imaging techniques, application of mediastinoscopy remains gold standard in diagnosis and staging of mediastinal diseases. Aim- To evaluate the usefulness of mediastinoscopy in assessing the mediastinal disease when imaging modalities are non-diagnostic.

**Methods:** Retrospective analysis of records of a KMC Hospital, Manipal. Three patients with mediastinal pathology of different aetiologies underwent mediastinoscopy. Pre- and post-operative diagnosis was compared.

**Results:** In 3 out of 3 cases (100%), mediastinoscopy provided a confirmatory final diagnosis.

**Conclusions:** Mediastinoscopy is useful minimally invasive modality in a scenario where imaging tools are non-diagnostic.

#### Bronchial carcinoids – ill understood disease pathology

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**Introduction:** Bronchial carcinoids are uncommon lung neoplasm. There is no large data available in Indian literature. Hence we decided to study this unusual pathology systematically.

**Methods:** An analysis of the patients with bronchial carcinoid who underwent surgery in our institution over the last 5 years was done.

**Results:** There were 47 patients operated upon over the last 5 years. The average age was 38 years with male to female ratio of 1:1.3. Most of them were diagnosed within 6 months of onset of symptoms. The most common symptom was hemoptysis. The disease is not related to smoking. Chest X ray showed a lung collapse in 41%, pulmonary mass in 11%. CT thorax was not contributory to the diagnosis. There was no distant metastasis. Bronchoscopy was the chief modality of diagnosis. The left side was more involved than the right. All patients underwent radical resections. Lung conservation was possible using bronchoplasty techniques. 11% of the carcinoids were atypical. The average size was 28 mm and sizes up to 14 centimeters were seen. Two patients had positive lymph nodes. 2 patients had positive resection margins and underwent postoperative radiotherapy. There was no surgical mortality or recurrence when followed up for 6 months. The average post operative stay was 8 days and the average follow up was 9 months.

**Conclusions:** Carcinoids present early because of their endobronchial location. The pathology of the disease is ill understood since the histopathology does not correlate with the clinical behavior. Guidelines as to appropriate treatment modality are still undefined. The incidental findings of microcarcinoids confound the issues further.

#### Central cannulation through standard left thoracotomy for surgery on the descending aorta: A single centre experience

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**Introduction:** Various techniques have been described for protection of vital organs during descending aorta surgery. We described a technique of central cannulation of the ascending aorta and main pulmonary artery to provide antegrade blood flow and reduce cerebral ischemic time via a standard left thoracotomy (Kuo et al, J Card Surg 2006). The objective of this study is to examine the safety and procedure related complications of the technique.

**Methods and technique:** 40 consecutive patients were identified from our institutional database to have undergone major descending thoracic aorta surgery with central cannulation via a standard left thoracotomy. The indications for the use of the technique include surgery for descending aorta aneurysm, chronic Type B aortic dissection, and transection and for descending aorta leak. All patients underwent the standard left thoracotomy through the 5<sup>th</sup> or 6<sup>th</sup> intercostal space after the lung was collapsed. After the pericardium is opened anterior to the left phrenic the great vessels are mobilized and two 3/0 purse string placed. A 24F armored aortic cannula (Medtronic) is inserted under direct vision. Two large 3/0 prolene purse string sutures placed on the main pulmonary artery and a 30 F armored right angled cannula (Medtronic) passed through the pulmonary valve into the right ventricle to establish cardiopulmonary bypass.

**Results:** There was no procedure related complications or intra-operative deaths. 3 patients had peri-operative stroke. 4 patients required renal support and 4 early deaths (30 day mortality).

**Conclusions:** Our technique of standard left thoracotomy and central cannulation is safe and easily reproducible. This provides the advantages of antegrade flow and can be used in routine and emergency operations on the descending thoracic aorta.

#### Techniques and outcomes of caval tumour thrombectomy in radical nephrectomy for renal cell carcinoma

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**Introduction:** The optimal management of patients with Renal Cell Carcinoma (RCC) with inferior vena cava tumour thrombus remains unresolved. Traditional approaches have included resection with or without the use of cardiopulmonary bypass. Chemotherapy has played a minor role except for biotherapeutic agents used for metastatic disease. Tumour invasion into inferior vena cava is a concern in radical nephrectomy where the techniques highly demand for safe tumour thrombectomy for better outcome. We like to present our institution experience.

**Material and material:** At PSG IMS&R we prospectively analysed over 5 years from Jan 2003 to December 2008, total number of 5 cases who underwent radical nephrectomy for RCC. All tumours were resected by inferior vena cava isolation and when necessary extended hepatic mobilization and Pringle's maneuver with primary or patch closure of vena cavotomy. Cardiopulmonary bypass was necessary only in patients with intra atrial extension and tumour thrombus.

**Results:** No perioperative and inhospital mortality. All are alive and maintaining good renal function. Follow up over 2 years was satisfactory

**Conclusions:** Resection of an intracaval tumor thrombus arising from renal cell carcinoma can be performed safely

and can result in prolonged survival even in the presence of metastatic disease. In our experience extra corporeal circulatory support was required only when a tumor thrombus extended into the heart. The long term outcome over 5 years needs to be followed up

#### Minithoracotomy and decortication, Retrospective analysis of 20 cases

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**Introduction:** We attempt to analyze the results of the first 20 cases of minithoracotomy and decortication at a new cardiothoracic unit in a teaching hospital.

**Methods:** The first 20 cases of minithoracotomy and decortication done over a period of 8 months from April to November 2013 were retrospectively analyzed. 20 patients underwent decortication, empyema secondary to pneumonia (15 cases), ruptured lung abscess causing pyopneumothorax (2 cases) and post-traumatic clotted hemothorax (3 cases). Empyema had been present for an average duration of 4 weeks (3-12 weeks). Parietal pleural stripping and visceral decortication were done in 12 cases while visceral decortication alone was done in 8 cases. The average duration of surgery was 2.5 hours (2-4 hours) and average intra-operative blood loss was 250 ml. (100 ml -500 ml).

**Results:** 16 patients (80%) had an uneventful postoperative course with drainage for 4 days and hospital stay of 7 days. One patient died in the postoperative period due to complications of diabetic ketoacidosis. One patient had a prolonged air-leak requiring drainage for 1 month and two patients had residual pouches. 19 patients were followed for a mean period of 4 months. 16 patients had complete lung re-expansion and 3 patients had a residual space.

**Conclusions:** Decortication with good lung expansion can be achieved through a muscle-sparing minithoracotomy.

#### From Matas to Parodi and beyond – Paradigm shift in therapy of thoracic aortic pathologies at Sree Chitra Tirunal Institute

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**Introduction:** Retrospective analysis of patients treated by endovascular stent-graft devices for thoracic aortic pathologies for **a)** technical success, clinical outcomes **b)** complications, need for secondary interventions and survival.

**Material and methods:** Over a period of 6 yrs from 2007-2013, 53 patients underwent aortic stent grafting using 61 stent grafts for various thoracic aortic pathologies including aortic

arch aneurysm in 11(20.7%), arch+upper thoracic aortic aneurysm in 4(7.5%), Thoracoabdominal Aortic Aneurysm(TAAA) in 8(15.1%), descending thoracic aortic(DTA) aneurysm 6(11.3%) and Type B Aortic Dissection(TBAD) in 11(20.7%). Rest of the 14(26.4%) patients underwent emergency procedures which included ruptured arch aneurysm in 2, ruptured DTA aneurysm in 2, ruptured TAAA in 5, acute TBAD with rupture in 2 and with mesenteric malperfusion in 1 and traumatic DTA pseudoaneurysm in 3. Hybrid procedures were employed in 27(50.9%) patients, dictated by anatomy of aneurysm and need for extending proximal sealing zone. 39(73.6%) procedures were done under local analgesia+awake sedation, rest under general anaesthesia. Access was obtained through common femoral artery cut down in all except in 5(9.4%) patients where graft was attached to infrarenal aorta or an ilio-femoral conduit graft was implanted.

**Results:** Procedural success was 100%. 30-day mortality was 4(7.5%) [3- elective, 1-emergency]. Major complications included CVA in 1 following carotid debranching, secondary aorto-esophageal fistula in 1 and need for prolonged ventilation in 2. 3 patients died during follow-up ranging 1-75 months (2 aneurysm related and 1 unrelated).

**Conclusions:** Endovascular stent-graft placement in thoracic aortic pathologies provided excellent technical results. Proper selection and planning is key to success. Minimally invasive endovascular procedures with appropriate hybrid collaborations have surpassed total open repair currently world-over. Long term results are still awaited.

### Surgical treatment of pulmonary hydatidosis: A single center experience of four years

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**Introduction:** Hydatid disease is endemic in sheep raising regions of the world. It is caused by the larval stage of a tapeworm *Echinococcus granulosus*. The lifecycle of *Echinococcus* revolves between sheep and dog. Humans get the infection by ingesting the eggs. Lungs are the second most common site of involvement after liver. We review our 4 years experience of surgical treatment of pulmonary hydatid cysts.

**Methods:** Clinical presentation, radiological investigations, operative techniques, postoperative outcome and follow up of 120 cases of pulmonary hydatid cysts treated surgically were studied between June 2009 and June 2013 at SSKM Hospital, Kolkata.

**Results:** There were 68 males(56.67%) and 52 females(43.33%). The median age of presentation was 33 years. 111 patients were from rural areas with farming and cattle raising as their occupation. Lung hydatid cysts are usually asymptomatic before reaching large sizes. Cough and chest pain are often the only symptoms. Right lung was affected in 58.33% cases and left lung was affected in 35% of cases. Right

lower lobe was most commonly involved (26.67%). Enucleation of the cyst with capitonnage was the preferred technique. The mean duration of hospital stay was 9.3 days. Oral Albendazole was used in post-operative period at the dose of 10 mg/kg/day for 3 months. The recurrence rate was 0.33%.

**Conclusions:** Surgery in the form of enucleation and capitonnage is the most effective treatment for pulmonary hydatid cyst as it causes removal of the cyst without spillage and maximum preservation of the lung parenchyma. Povidone iodine is a good scolicial agent to prevent contamination of the surgical field from spillage of the cyst contents. Albendazole should be used postoperatively.

### Our experience with lung hydatids in association with hydatid cysts in other locations

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**Introduction:** A retrospective study of lung hydatid cysts with or without associated extra pulmonary hydatid cysts.

**Methods and material:** 154 patients were operated for hydatid cysts of lung from the year 2000 to 2013 in our centre . Out of these 14 patients had associated hydatid cysts in extra pulmonary locations. There were 9 in the liver, 1 in the pericardial cavity, 1 in spleen , 1 in parotid, 1 in right breast, 1 in chest wall. There were 64 males and 90 females (age range 10 to 69 years). Every patient was worked up with Chest X-ray, Ultrasonography of abdomen and CT-scan thorax. Abdominal hydatids were worked up with CT-abdomen, in addition. The parotid hydatid was suspected on the basis of an Ultrasonography scan. Lung hydatids were treated by enucleation with [n=98] or without [n=54] capitonnage and lobectomy [n=2]. Four liver hydatids were removed in the same sitting through the right dome of the diaphragm. The pericardial hydatid was also removed in the same sitting. Hydatids in other locations were surgically removed later on. All patients were given anthelmintic treatment.

**Results:** There was no mortality. Major complications were – major air leak requiring reintervention in three cases, recurrence in same lung needing surgery in three cases.

### Procedures on the aortic root and proximal aorta in patients with aortoarteritis: Single centre experience

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**Introduction:** Aortoarteritis has a predisposition for affecting the descending thoracic and abdominal aorta. Aortoarteritis can present with various lesions- stenotic, dilated, aneurysmal or with irregular lesions. This unusual subset of patients rarely has involvement of the aortic root, ascending aorta and the

arch. We present our experience with Aortoarteritis involving the aortic root and proximal aorta.

**Material and methods:** Six cases with Aortoarteritis affecting Ascending Aorta were studied. In this set various procedures were performed. All of them were on medical treatment prior to surgery. 2 of them had a Bentall's operation, 2 had hemiarch replacements, 1 had isolated AVR and 1 had a valve sparing aortic root procedure. Patients were placed on optimal medical therapy for disease and control of hypertension.

**Results:** In the early postoperative period, 3 required long inotropic supports due to LV dysfunction. Minor neurological event was seen in 1 patient. 1 patient died after undergoing 2 previous valve and aortic root procedures, 5 years after the first surgery. The others are free of any significant morbidity and are on regular immunomodulatory medications.

**Conclusions:** Aortoarteritis affecting the proximal aorta and the aortic valve is uncommon. Extensive procedures are often required when this area is diseased. Surgical repair of this pathology mandates extensive resection and repair of the aorta. Our experience demonstrates the possibility of good outcomes in this difficult subset of patients.

### Reinflation pulmonary edema a rare but fatal complication with a high mortality

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**Introduction:** Reinflation pulmonary edema is a rare but fatal complication with a high mortality following rapid reinflation of a chronically collapsed lung for massive pneumothorax or pleural effusion. Pathophysiology is still unclear but hypoxia induced oxidative stress, ischemic reperfusion injury, inflammatory response and negative intrathoracic pressure are possible mechanisms.

**Methods:** A prospective analysis of 842 patients with spontaneous pneumothorax/pleural effusion is reported. All the patients have reported to the hospital during the period from August, 1997 to August 2011. Risk factors were evaluated and clinical profile of patients with re-expansion pulmonary edema was studied.

**Results:** 6 of 842 (.71%) patients had developed reinflation pulmonary edema after decompression of spontaneous pneumothorax and pleural effusion. Out of 6 patients 5 had massive spontaneous pneumothorax and 1 had massive pleural effusion. 2 of 6 (33.3%) patients died instead of all possible manures and mechanical ventilation.

**Conclusions:** Reinflation pulmonary edema should always be considered when in presence of risk factors patient develops hypoxemia after drainage/re-expansion for spontaneous pneumothorax and deteriorates dramatically. Treating surgeons need to be quite aware of this rare entity and take immediate steps to correct it.

### Mediastinal tumours –is it common ?? a retrograde study of 15 cases of mediastinal tumours in 1 year

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**Introduction:** Common tumours are common but uncommon tumours are also common in our experience. Presenting 14 cases of mediastinal tumours over a period 1 year in our institution, Coimbatore Medical College Hospital. The mediastinal tumours operated are

1. Thymoma with myasthenia gravis-2 (male, aged 25 and 47), without myasthenia gravis -2 (females aged 45 to 53)
2. Schwannoma brachial plexus intrathoracic right side-2 (male- 35 and female -56 years) intrathoracic dumbbell shaped tumours D4-D5 – 2 males aged 23&32, at D10-D11- 1 (male-24 years)
3. Carcinoid tumour superior mediastinum-1 (male-34 years)
4. Hodgkins lymphoma anterior mediastinum-1 (male- 46 years)
5. Adenoma thyroid inferior pole-as superior mediastinal mass-1 (female-45)
6. Dermoid cyst-superior mediastinum-2 (male-46 years & female-52 years)

**Symptoms and signs:** Most of the patients (40%) were asymptomatic. Some of the symptoms are related to compression over underlying structures like cough, difficulty in breathing & chest pain (Brachial plexus Schwannoma), severe pain at the back with radiation (Dumbbell shaped Schwannoma), cough/expectoration - 18 months (carcinoid), fever with weight loss (Hodgkins lymphoma). **DIAGNOSIS:** Most of the patients were diagnosed by routine Chest X-Ray conformed by CT Chest and MRI, CT guided biopsy of the mass lesion except for Schwannoma. Biopsy for carcinoid tumour- showed neoplastic cells positive with Synaptophysin, Chromograin and cytokeratin. IHC - S100 & Vimentin positive, LCA negative. Schwannoma showed typical Antoni A and B cell. For lymphoma, immunohistochemistry showed CD15, CD20, CD30 and Carcinoid -NSE.

**Treatment:** Median sternotomy for dermoid cyst and 2 cases of thymoma (mass was situated more in the superior mediastinum size varying from 5cm-15cm with variable consistency & carcinoid-cytoreduction). Schwannoma of right brachial plexus & thymoma - removed through right thoracotomy since the mass was more in the right apex, the size was around 7cm-10cm more of cystic consistency, aspiration showed blood stained fluid and some areas of degenerative changes. Left thoracotomy at the level of fifth intercostal space for Dumbbell shaped schwannoma with laminectomy at D4-D5 for 2 patients and D10-D11 Schwannoma removed through posterolateral thoracotomy at the level of eighth



intercostal space. Hodgkins lymphoma-cytoreduction through left thoracotomy. Follow up chemotherapy given for Hodgkins lymphoma&carcinoid tumours.

### Combined abdominal aortic and renal artery surgery

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**Introduction:** To demonstrate the safety of renal artery reconstruction in patients undergoing abdominal aortic surgeries. We also compared their outcome with patients undergoing other abdominal aortic surgeries.- Renal artery reconstructions carry significant rates of mortality and morbidity and may fare poorly compared with less-invasive procedures. We share our experience which demonstrate that abdominal aortic surgery combined with renal artery reconstruction is a safe procedure.

**Materials and methods:** 23 patients undergoing different abdominal aortic surgeries in our unit in 2013 were included in this study. 6 patients required simultaneous renal artery reconstruction. 2 had abdominal aortic aneurysm, 1 abdominal aortic stent blockage and remaining 3 had diffuse atherosclerotic disease. 1 patient required bilateral renal artery reconstruction and remaining 5 only left sided. There was no mortality. 5 patients recovered satisfactorily post op and had normal renal function while 1 showed features of acute kidney injury in the form of reduced renal output. But that patient also recovered well and urine output normalized 3 hours post op. when compared with the remaining 17 patients who underwent only aortobifemoral bypass grafting these patients required more operative time, post op icu stay, paralytic ileus and more hospital stay.

**Conclusions:** Renal artery revascularization is a safe procedure. It can be performed in selected patients as an adjunct to aortic reconstruction.

### Autologous blood patch pleurodesis in patients with persistent air leak after lung resection

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**Introduction:** Persistent Air Leak (PAL) after lung resection is most frustrating to manage for thoracic surgeons . We present 5 patients who underwent autologous blood patch pleurodesis for PAL after lung resection.

**Methods:** Between January 2012 and July 2013 , 21 patients had lung resections for various etiologies . 5 patients ( 24 %) had PAL of more than 5 days after surgery. On 6<sup>th</sup> POD 2ml/

kg autologous blood was drawn from femoral vein and immediately introduced into chest tube without any additives. The chest tube was connected to waterseal and kept 60 cm above patient chest and left unclamped. Patient was positioned in different positions for 30 minutes each. After 48 hours, with no clinically evident air leak, chest tube was clamped and removed if CXR showed no evidence of pneumothorax. Follow up with CXR was done at 1 & 3 months.

**Results:** Within 24 hours of autologous blood instillation air leak stopped in all patients (100%). 1 patient developed recurrence on 2<sup>nd</sup> day and required second instillation resulting in complete cessation . 4 patients (80 %) had complete air leak cessation after single instillation and chest tube removed at 48 hours . No patient experienced pain, breathlessness or fever. On follow up, there was no air leak or empyema.

**Conclusions:** Autologous blood patch pleurodesis for PAL in patients of lung resection is safe, effective & easy bed-side procedure and allows for early chest tube removal. Autologous blood quantity of 2 ml/kg body weight is effective.

### Surgical Management of Pulmonary Hydatidosis- Our Experience

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**Objectives:** Echinococcosis remains an endemic surgical problem in countries where sheep and cattle raising is carried out. It is a serious health problem, causing economic implications globally. This study aims to evaluate the management of different presentations of pulmonary hydatidosis and their outcome over 7 years.

**Materials and methods:** Fifty one patients operated upon for pulmonary hydatid disease over a period of 7years were included in the study. The study had 30 males, 21 females with a mean age of 26.4 years. All patients were investigated by laboratory, serological and radiological studies. Thoracotomy was done in all patients, different surgical techniques were used to remove the hydatid cyst from the lung.

**Results:** The most common presenting symptom was cough (31 patients). 12 patients were asymptomatic. Chest X-ray showed a rounded opaque shadow in 33 patients; 9 cases were of size >10 cm. The mean hospital stay was 8 days. Postoperative complications occurred in 6 patients; prolonged air leak in 3 patients, pneumothorax in 2, pleural effusion in 1 and wound infection in one patient.

**Conclusions:** The Surgical excision with maximum preservation of the lung parenchyma is the main stay in the management of pulmonary hydatidosis.