

PERICARDIAL CYST: AN UNCOMMON CAUSE OF HEART FAILURE. CASE REPORT AND THORACOSCOPIC MANAGEMENT. VIDEO PRESENTATION

ABSTRACT #1 REF: 11002633

Introduction.

Pericardial cyst are rare congenital abnormalities resulting from abnormal fusion of mesenchymal lacunae retaining communication with the pericardial space with a reported incidence rate of 1:100.000, comprising approximately 7% of the mediastinal masses. We present a case of a 61 y years old male patient consulting to his PCP with heart failure symptoms. Additional workup showed the incidental finding of a large complex pericardial mass (14 x 7 x 14 cm) with severe compression of the heart, lung and liver.

Methods.

Case report and literature review. Video presentation.

Conclusion.

Pericardial masses are uncommon entities that represent a diagnostic challenge for the clinician, specially because of the slow growing rate and unspecific constellation of symptoms. Regardless the benign nature of this masses, severe symptoms can develop secondary to the mass effect. Thoracoscopic management is feasible as long as the benign nature of the mass is confirmed and the surgical anatomy is favorable.

COST OF SURGICAL AORTIC VALVE REPLACEMENT AND ASSOCIATED COMPLICATIONS

ABSTRACT #2 REF: 11002585

Introduction:The cost of Surgical Aortic Valve Replacement (SAVR) and its complications in the United States is not well characterized. Understanding these costs will be important in building risk-adjusted payment models and guiding quality-improvement projects.

Methods:We identified 316,586 patients from the Nationwide Inpatient Sample who underwent isolated SAVR between 2001 to 2011. Adjusted linear and logistic regressions were utilized to assess risk of complications, estimate cost of SAVR without complications and estimate the incremental cost of complications. We further assessed for differences in cost of SAVR as well as differences in cost and risk of complications by patient, payer and hospital characteristics.

Results:A total of 250,736 (79.8%) SAVR patients experienced no complications at an average adjusted cost of \$31,866 (95% CI: \$29,798, \$33,934). Costs were higher for younger, Black, higher-risk, and Medicaid or uninsured patients, and was higher in teaching hospitals, hospitals in the West, and at low-volume centers (all $p < 0.05$). Complications were more likely among older patients, males, minorities, uninsured and public payers. Hospitals in the Northeast and higher-volume centers had significantly lower rates of complications. Incremental cost of complication was highest for tracheostomy (\$80,430), followed by sepsis (\$28,519), wound infection (\$27,794), mortality (\$23,588), pneumonia (\$20,971), acute renal failure (ARF) (\$18,329), postoperative dialysis (\$15,636), postoperative pacemaker (\$15,510), and stroke (\$8,733) (all $p < 0.0001$). These complication costs are generally higher at teaching hospitals and hospitals in the West but do not differ by hospital SAVR volume. ARF was the most burdensome complication nationally, averaging over \$63M annually.

Conclusions:Complications after SAVR pose significant economic burden. Higher volume centers confer lower risk at lower cost, suggesting a positive volume-outcome relationship as well as a value proposition. ARF is increasing in prevalence and is the most burdensome complication. Variations in cost and risk by patient, hospital and payer characteristics warrant further investigation.

PENETRANCE AND MORTALITY OF VATS LUNG RESECTIONS WITHIN THE VA

ABSTRACT #3 REF: 11001726

Purpose: Minimally invasive lobectomy for early stage lung cancer has become the standard of care. Video-assisted thoracoscopic surgery (VATS) has lower rates of morbidity and mortality and equivalent oncologic outcomes as compared to thoracotomy. However, little has been published on the penetrance and outcomes of VATS within Veterans Affairs (VA).

Methods: The VA Clinical Data Warehouse (CDW) was queried for current procedural terminology (CPT) codes for open and VATS lobectomies and wedge resections performed between 2002 and 2015 nationally. Inclusion criteria included a preoperative ICD-9 code corresponding to known or suspected lung cancer, and exclusion criteria included ICD-9 codes denoting known metastatic or benign disease preoperatively. Patient demographics and unadjusted 90-day all-cause mortality were abstracted from CDW data. Fisher's exact test, ANOVA, Pearson's correlation, and Wilcoxon signed-rank test were used for statistical comparisons.

Results: Of the 11,004 included procedures, 77.5% were lobectomies and 22.5% wedge resections. Median Veteran age was 66 years (interquartile range, 61-72), and 96.2% were male. Age did not differ by open versus VATS approach ($p=0.31$). The proportion of VATS increased from 20.5% before 2008, to 38.4% from 2008-2011, and 44.5% after 2011 ($p<0.01$). VATS utilization by facility ranged from 0% to 81.7%, and higher facility volume correlated with higher VATS utilization ($p<0.01$). VATS penetrance and rate of uptake varied widely across VA regions ($p<0.01$). Overall 90-day mortality was 5.2% for open procedures versus 2.9% for VATS ($p<0.01$). For lobectomies, 90-day mortality was 5.3% for open vs. 2.6% for VATS ($p<0.01$).

Conclusions: In parallel with U.S. academic hospitals, minimally invasive thoracic surgery has increased substantially within the VA, doubling over the past decade and approaching 50%. Ninety-day mortality is halved with the uptake of the VATS approach for Veterans. More research is needed to identify reasons behind the heterogeneous uptake of VATS across VA regions.

IDIOPATHIC GIANT PULMONARY ARTERY ANEURYSM WITHOUT PULMONARY ARTERY HYPERTENSION

ABSTRACT #4 REF: 10998487

Introduction: Giant Pulmonary artery aneurysms are rare. We present a case of a giant pulmonary artery aneurysm in the absence of pulmonary hypertension.

Methods: Data were reviewed from hospital records, including magnetic resonance imaging, echocardiography, computed tomography, histology, and intraoperative photography.

Results: A 63-year-old man was referred to cardiothoracic surgery due to incidental finding of a 5.0cm pulmonary artery aneurysm while being evaluated for pulmonary embolism. The patient's past medical history was notable for hypertension, infrarenal aortic and bilateral iliac artery ectasia, and tobacco and cocaine abuse. Family history of connective disorders was negative. Evaluation for infectious and rheumatological etiologies was noncontributory. Surveillance by computed tomography demonstrated slow progressive growth to 6.1cm followed by rapid growth to 6.7cm during a 6-month period concomitant with increased cocaine consumption. Preoperative echocardiography demonstrated moderate pulmonary valve regurgitation without evidence of right ventricular dysfunction. Right heart catheterization demonstrated normal pulmonary artery pressures (25/17mmHg, mean 19mmHg). Aneurysm excision and repair was performed via a midline sternotomy on cardiopulmonary bypass with bicaval cannulation. Pulmonary arteriotomy demonstrated normal arterial tissue and a structurally intact pulmonic valve. Commissural plication of the pulmonary valve was performed with 4-0 polypropylene horizontal mattress sutures on felt pledgets. A generous elliptical portion of the anterior aneurysm wall was resected and the pulmonary artery was closed longitudinally in two layers over an 18F Hegar dilator using 3.0 polypropylene suture. Intraoperative transesophageal echocardiography demonstrated resolution of pulmonary valvular regurgitation and normal cardiac function. The patient was discharged on the 3rd post-operative day and returned to normal activity on clinical follow up. Pathology of the resected specimen indicated pulmonary artery medial hypertrophy. This finding was consistent with known heavy use of cocaine.

Conclusion: Pulmonary artery repair with aneurysm resection and primary closure is a viable and durable technique for repair of large pulmonary artery aneurysms. Cocaine may be a causal agent responsible for development or progression of pulmonary artery aneurysms without the presence of pulmonary hypertension.

IMPACT OF PRIOR PERCUTANEOUS CORONARY INTERVENTION ON CORONARY ARTERY BYPASS GRAFTING (CABG) OUTCOMES AND SURVIVAL IN A U.S. MILITARY VETERAN POPULATION.

ABSTRACT #5 REF: 10998318

Background. The clinical impact of prior Percutaneous Coronary Intervention (PCI) on outcomes and survival after Coronary Artery Bypass Grafting (CABG) is debatable. In this retrospective analysis, we study the impact of prior PCI on CABG outcomes in the Veterans.

Methods. Between Jan, 1992 and December 2014, 3253 consecutive patients with first-time isolated CABG were compared with 530 patients with prior PCI. After propensity matching, 528 patients were compared in each group.

Results. There was no significant difference in 30 day mortality [7 (1.3%) vs. 7 (1.3%) P: 1.00]; 180 day mortality [11 (2.1%) vs. 14 (2.7%) P: 0.55]; renal failure [7 (1.3%) vs. 4 (0.8%) p: 0.37]; Coma [1 (0.2%) vs. 3(0.6%) P: 0.32]; Stroke [10 (1.9%) vs. 11 (2.1%) p: 0.83]; Perioperative MI [4 (0.8%) vs. 5 (1%) p: 0.74]; reoperation for bleeding [6 (1.1%) vs. 7 (1.3%) p: 0.78], repeat Cardiopulmonary bypass [0 (0.0) vs. 2 (0.4) p: 0.16]; Repeat ventilator within 30 days [9 (1.9%) vs. 17 (3.4%) p: 0.12] and Tracheostomy [1 (0.2%) vs. 5 (1.0) p: 0.10] in the no-prior PCI vs prior-PCI group. However, Cardiac Arrest [3 (0.6%) vs. 11 (2.1%) p: 0.032]; prolonged ventilation >48 h [31 (5.9%) vs. 47 (8.9%) p: 0.059] and need for mechanical circulatory support [6 (1.2%) vs. 14 (2.8%) p: 0.074] was significantly lower in No-prior PCI group. Kaplan-Meier curve showed no significant survival difference at 10 years (82.5% vs 85.3%), 15 years (79.2% vs 75.5%), and 20 years (68.5% vs 68.6% P: 0.52) between no prior-PCI VS prior-PCI group. Multivariate regression analysis showed prior-PCI was not an independent predictor for either operative death or MACE.

Conclusions. In U.S military veterans, PCI preceding elective CABG does not appear to have an adverse impact on perioperative risk, MACE and long term survival up to 20 years.

SINGLE DOSE DEL NIDO CARDIOPLEGIA: CABG OUTCOMES IN AN ACADEMIC VETERANS TEACHING HOSPITAL

ABSTRACT #6 REF: 10993752

INTRODUCTION

del Nido cardioplegia (DN) has not been studied in the Veterans Affairs population, although it is becoming increasingly used in adult cardiac surgery. We retrospectively analyzed all patients undergoing coronary artery bypass graft (CABG) after its introduction in our institution. We hypothesized that with single-dose del Nido cardioplegia, outcomes would be equivalent, if not superior to conventional multiple-dose blood cardioplegia solution (BS).

METHODS

A retrospective chart review of 94 consecutive CABG operations at an academic, VA teaching medical center, was performed from October 2016 to June 2017. DN was used to induce cardioplegic arrest in 50 patients, and BS was used in 44 patients. Fast-track protocols were used as per surgeon preference. The outcomes between the two groups were compared.

RESULTS

The preoperative characteristics were similar between the groups. Median cardiopulmonary bypass (120 vs. 86 minutes, $P<0.0001$) and aortic cross clamp times (74 vs. 59 minutes, $P<0.0001$) were lower in the DN group. Median number of bypasses performed (3.0 vs. 3.0, $P=0.34$) were similar. The DN group more often had fast track protocols employed intraoperatively and post-operatively (42.9% vs 2.3%, $P<0.0001$). Median time in the OR (371 vs. 255 minutes, $P<0.0001$) and median time to extubation (16.8 hours vs 16.0 hours, $P=0.05$) was lower in the DN group. Median ICU (3.0d vs 3.9d, $P=0.11$) and total post-operative length of stay (6.9d vs. 7.1d, $P=0.26$) were similar between the two groups. The ICU and post-operative LOS were reduced by one day in the fast-track group. Outcome measures (30-day mortality, stroke, renal failure, perioperative MI, mechanical circulatory support, and blood products) were similar.

CONCLUSIONS

DN is a safe and effective method of cardioplegic arrest during CABG. In a teaching hospital, similar outcomes can be attained with shorter cardiopulmonary bypass and aortic cross clamp times, as well as time in the OR.

LONG-TERM OUTCOMES IN VETERANS UNDERGOING TRANSCATHETER AORTIC VALVE REPLACEMENT

ABSTRACT #7 REF: 10993744

INTRODUCTION

Transcatheter aortic valve replacement (TAVR) has risen as a transformative technology in the field of cardiothoracic surgery in treating patients with severe aortic valve stenosis (AS). The Washington D.C. VA Medical Center launched its TAVR program in 2014 to treat veterans with high to inoperable risk.

METHODS

We retrospectively reviewed 33 TAVRs we performed from 2014 and 2017. Patients were selected by our Heart Center based on Society of Thoracic Surgery risk score and guidelines. All valves implanted were SAPIEN XT or SAPIEN 3. All patients were followed by the Heart Center. The median time of follow up was 534 days (Range: 17 – 1234 days).

RESULTS

Median age was 81 years old. 88% of the patients were New York Heart Association classification III/IV. Mean preoperative aortic valve area was 0.74 ± 0.24 cm². 97% of the cases were approached transfemoral and 3% were performed transapical. 9% underwent valve-in-valve TAVRs. Median operative time was 80.9 minutes. 27% (n = 9) had trace paravalvular leak intraoperatively, 3 of which spontaneously resolved at a follow-up echocardiogram. Pre- versus postoperative mean gradients were 39.9 ± 13.0 mmHg and 10.3 ± 4.6 mmHg respectively ($p < 0.001$). The Pre- versus postoperative dimensionless indices were 0.22 ± 0.05 and 0.57 ± 0.17 respectively ($p < 0.001$). The median length of ICU and hospital stay were 26 hours and 3 days respectively. We had one 30-day mortality (3%). Our one-year survival was 96%. 6% presented with neurologic deficit requiring hospital readmissions. Total 1-year readmission rate was 24%.

CONCLUSION

Our 30-day and one-year mortality rate compare favorably to the Transcatheter Valve Therapy National Registry (3% vs. 2.9% and 4% vs. 21.6%). our data show that TAVR is a safe option for treatment of AS in the veteran population when managed in a comprehensive cardiac center.

USE OF INTRAOPERATIVE INHALED EPOPROSTENOL AND CONTINUOUS MECHANICAL VENTILATION DURING OPEN HEART SURGERY FOR HIGH RISK MULTIVALVE INFECTIVE ENDOCARDITIS

ABSTRACT #8 REF: 10989285

Introduction. The objective of the study is to evaluate the safety and efficacy of continuous mechanical ventilation with inhaled epoprostenol during multivalve endocarditis surgery by assessing the incidence of pulmonary edema, increased pulmonary artery pressure(PAP), and decreased oxygenation postoperatively.

Methods: From October 2014 to August 2015 fifteen patients underwent open heart surgery for complex endocarditis treated with continuous mechanical ventilation and inhaled epoprostenol 0.01 mcg/kg/min to 0.05 mcg/kg/min, before, during, and after cardiopulmonary bypass(CPB). Mean age was 55 years, ten were male (67%). Mean ejection fraction was 54%. Fourteen patients had an aortic root abscess (93%). Five patients underwent primary surgery, six second time, and four third time operation. All patients had aortic valve replaced, eleven had mitral valve and five tricuspid valve procedures.

Results: Mean PAP before inhaled epoprostenol was 38 mm Hg, during inhaled epoprostenol but before CPB the mean PAP was 28 mm Hg ($p=0.018$), and 25 mm Hg ($p=0.005$) at the end of the operation. The mean partial pressure of oxygen in the blood (PaO₂) at the beginning of the operation was 145, and 222 ($p=0.036$) at the end of the operation. One patient developed pulmonary edema and required ECMO, four required temporary tracheostomy. There were no hospital mortalities. Mean days on inhaled epoprostenol after surgery was 1.6 (range 0-6). Mean mechanical ventilation days was 11.4 (range 1-57). Mean ICU stay was 13.5 days (range 2-57). The mean hospital stay was 18 days (range 6-57).

Conclusions: The use of continuous inhaled epoprostenol and mechanical ventilation during open heart surgery for high risk multivalve endocarditis is a safe and effective novel technique, which reduced PAP, improved oxygenation, and reduced the incidence of pulmonary edema postoperatively. Further prospective studies are needed to determine the potential benefits of this technique in high risk cardiac surgery patients other than endocarditis.

DECISION ANALYSIS OF tPA/DNASE FIBRINOLYSIS VERSUS VATS DECORTICATION FOR EARLY EMPYEMA

ABSTRACT #9 REF: 10981719

Introduction: Intrapleural tissue plasminogen activator (tPA) and deoxyribonuclease (DNase) are increasingly used to treat early empyemas. Current guidelines do not recommend their use due to limited evidence. This study compared the cost and effectiveness of video-assisted thoracoscopic surgery (VATS) decortication to fibrinolysis using decision analysis modeling, which compares risks and benefits of alternative treatment options given uncertain data.

Methods: The base clinical case was a 65-year-old Caucasian male presenting with early empyema and treated by either VATS decortication or tPA/DNase fibrinolysis. A decision analysis model using TreeAgePro was developed to estimate costs and relative effectiveness. We defined effectiveness as the health utility at one year post-empyema. Medicare diagnosis-related group (DRG) and manufacturers' drug prices were used for cost estimates. Probabilities of key outcomes and utilities were estimated using published reports derived from literature, where available. One and two-way sensitivity analyses were performed.

Results: Fibrinolysis with tPA/DNase was more cost-effective than VATS decortication, generating a higher health utility of 0.81 for a cost of \$12,534, whereas initial VATS decortication produced a health utility of 0.66 and cost \$18,535. Upon sensitivity analysis, fibrinolysis remained superior to VATS when the effectiveness of fibrinolytic therapy to resolve empyema decreased to 64% from 82%, generating a health utility of 0.78 for \$15,836. VATS became more cost-effective when the cost of fibrinolytic therapy surpassed \$16,000 or its effectiveness dropped below 60%.

Conclusions: tPA/DNase is the preferred initial treatment for early empyema when the efficacy of fibrinolysis is judged to be above 60%. If the cost is fixed and clinicians estimate the probability of tPA/DNase resolving the empyema to be less than 60% for a particular patient, decision analysis favors VATS instead. Further sensitivity analyses and clinical validation would verify the robustness of this comparison across a range of tPA/DNase prices and other model parameters.

DIASTOLIC BLOOD PRESSURE VARIABILITY IS AN INDEPENDENT RISK FACTOR FOR ADVERSE OUTCOMES AFTER CORONARY ARTERY BYPASS GRAFTING

ABSTRACT #10 REF: 10981710

Introduction: Hypertension is a recognized risk factor for adverse cardiovascular events. Blood pressure variability (BPV) has been associated with more frequent chronic end-organ injury, hospitalization and death in outpatients, independent of mean blood pressure. Patients with diffuse atherosclerotic cardiovascular disease such as those undergoing coronary artery bypass grafting (CABG) may be especially prone to BPV due to pathologic alterations in vascular stiffness. Whether chronic preoperative BPV affects outcomes after CABG is unknown.

Methods: Consecutive patients undergoing isolated CABG at a single institution over four years were studied (n=1334). Data were prospectively collected but retrospectively analyzed and 21,813 blood pressure recordings were reviewed. BPV was defined as systolic and diastolic standard deviation in patients with a minimum of ten preoperative blood pressure recordings up to three years before surgery. Society of Thoracic Surgery (STS) predefined outcomes were quantified for patients who met criteria (n=405) and correlated with BPV with and without risk-adjustment using individual patient STS risk scores.

Results: Overall raw mortality was 2.2% and the predefined incidence of renal failure was 2.0%. Diastolic BPV predicted an increased risk of predefined combined major morbidity/mortality (OR 1.115 p<0.05), and a similar trend was seen with systolic BPV (OR 1.072 p<0.1). When adjusted for risk using STS risk score, diastolic BPV remained an independent predictor of combined major morbidity/mortality after CABG (OR 1.154 p<0.05). Systolic BPV was also significantly associated with renal failure after CABG (OR 1.143 p<0.05).

Conclusions: These data suggest that after risk adjustment, diastolic and systolic BPV are independent predictors of adverse outcomes after CABG. The use of electronic medical record technology to calculate and flag the standard deviation in blood pressure between office visits may offer the clinician a previously unrecognized screening tool for identifying patients at risk for major morbidity/mortality and renal failure after CABG.

PRESENCE OF CORONARY ARTERY CALCIFICATIONS ON STAGING CT IMAGING MAY PREDICT HIGHER MORTALITY IN PATIENTS WITH EARLY-STAGE LUNG CANCER

ABSTRACT #11 REF: 10981707

Introduction: Coronary artery calcifications (CAC) have recently emerged as an independent predictor of fatal and non-fatal cardiac events, as well as all-cause mortality, in several lung cancer screening populations. The impact of CAC on all-cause mortality in patients with resected Stage I Non-Small Cell Lung Cancer (NSCLC) is unknown.

Methods: We queried our retrospective database of 145 Veterans who underwent lung resection with pathologic stage I NSCLC between 2005-2015. Chest computed tomography (CT) images were reviewed by a radiologist to identify the presence and grade of CAC (mild, moderate, or severe). The primary outcome of death from any cause was abstracted, in addition to clinical and demographic covariates. Kaplan-Meier survival analysis and Cox proportional hazards regression were used to compare time-to-death by varying CAC.

Results: Overall mortality was 48%, with a median follow-up time of 3.8 years (interquartile range, IQR 1.9-6.4). Median time-to-death was 2.1 years (IQR, 1.0-4.7). Median age, pack-years, and BMI were 66.8 years (IQR 60.7-72.6), 60 pack-years (IQR 40-90), and 25.7 (IQR 23.0-29.4), respectively. The majority (65%) were Stage 1A, with 35% Stage 1B. Overall, 12% of Veterans had no CAC, 27% had mild CAC, 28% had moderate CAC, and 34% had severe CAC. Median unadjusted survival was 9.7 years for patients without CAC versus 7.4 years for mild CAC and 6.1 years for moderate/severe CAC ($p=0.08$; none vs. moderate/severe, $p=0.022$). As compared to patients with absent/mild CAC, the hazard ratio for moderate/severe CAC adjusted for age, BMI, and pathological stage was 1.14 (95% confidence interval, 0.62-1.66).

Conclusions: Coronary artery calcifications are a marker of higher mortality risk in this Veteran cohort with early-stage, resectable NSCLC. Further work is needed to determine whether the degree of CAC is an independent predictor of mortality after adjusting for age and other clinical variables.

CONSCIOUS SEDATION CAN SAFELY REPLACE GENERAL ANESTHESIA FOR TRANSCATHETER AORTIC VALVE REPLACEMENT IN A VETERANS AFFAIRS POPULATION

ABSTRACT #12 REF: 10981645

Introduction:

Transcatheter aortic valve replacement (TAVR) has rapidly become an accepted alternative to surgery for treatment of intermediate-, high- and prohibitive- risk patients with severe aortic stenosis. Increasing adoption of transfemoral TAVR has led to improved TAVR survival. Recent studies within high-volume TAVR centers suggest safety and efficacy of a minimalist TAVR approach using conscious sedation and intraprocedural transthoracic (TTE) rather than transesophageal echocardiography to shorten length of stay without impacting operative mortality. The objective of this study was to examine the impact of a minimalist TAVR approach using conscious sedation versus general anesthesia specific to the VA patient population.

Methods:

This single-institution retrospective cohort study was conducted at a VA institution to compare TAVR outcomes using conscious sedation versus general anesthesia between November 2013 and May 2017. We characterized post-operative outcomes including hospital length of stay, post-operative complications, and thirty-day mortality.

Results:

Of 130 total TAVR patients, 33.8% (n=44/130) underwent conscious sedation. In 1.5% (n=2/130) of cases, the procedure was converted from conscious sedation to general anesthesia, for a total of 66.1% (n=86/130) of cases under general anesthesia. Hospital length of stay was 5.3 days with general anesthesia and 5.2 with conscious sedation (p = 0.93). Median procedure time was 124 minutes with general anesthesia and 93 minutes with conscious sedation (p=0.003). Moderate paravalvular leak (PVL) occurred in 3.5% of general anesthesia patients and 0% of conscious sedation patients. Early 30-day mortality was 1.2% in the general anesthesia group and 0% in the conscious sedation group.

Conclusions:

In our single-institution VA population, TAVR with conscious sedation demonstrated significantly decreased procedure time with no change in length of stay, operative mortality, or PVL compared to TAVR with general anesthesia. These results suggest TAVR with conscious sedation may be safely implemented in a VA population.

DOES ISCHEMIC TIME MATTER IN THE ERA OF THE LUNG ALLOCATION SCORE: THE PITTSBURGH EXPERIENCE

ABSTRACT #13 REF: 10981320

Introduction

Lung transplantation (LTx) is a life-saving procedure for those with end-stage lung disease. Controversy still remains regarding the influence of ischemic time on survival following LTx. We reviewed the impact of the ischemic time on graft survival, complications, and patient survival.

Methods

We conducted a retrospective review of 445 consecutive patients undergoing double LTx between 1/2010 and 2/2015. Implantation time (IT), cold ischemic time (CIT), and total ischemic time (TIT) for each lung (#1 or #2) were each separately identified from our prospectively maintained database. Complications, causes of death, and survival were independently adjudicated. Cox proportional-hazards regression was used to predict graft survival from ischemic time, and Kaplan-Meier curves were used to compare graft survival between standard and prolonged ischemic time groups. Generalized linear regression was used to predict perioperative complications from ischemic time.

Results

The 95th percentile for CIT#1 was 318 minutes, CIT#2 was 462 minutes, IT#1 was 102 minutes, IT#2 was 106 minutes, TIT#1 was 395 minutes, and TIT#2 537 minutes. Using Cox regression analysis, we identified that survival was not significantly related to any components of ischemic time for either implanted lung. However, prolonged CIT#1 was associated with increased rates of respiratory failure and insufficiency ($p=0.05$, $p=0.01$) and use of extracorporeal membrane oxygenation (ECMO) ($p = 0.02$). Prolonged CIT#2 was associated with increased rates of respiratory failure ($p<0.01$), ECMO ($p=0.01$), and pneumonia ($p<0.01$). Longer IT#2 was related to increased rates of respiratory failure ($p<0.01$), ECMO ($p=0.04$), and cardiac atrial arrhythmia ($p=0.03$). Prolonged TIT#1 and TIT#2 were each related to increased rates of ECMO ($p=0.01$ for both), respiratory insufficiency ($p=0.03$ and $p=0.05$ respectively), and pneumonia ($p=0.05$ and $p<0.01$ respectively).

Conclusions

Increased prolonged ischemic time was associated with increased incidence of pulmonary complications and the use of ECMO, but had no direct influence on survival post LTx.

USE OF NON-PLEDGETED SUTURE TECHNIQUE IS SAFE AND FEASIBLE FOR HEART VALVE REPLACEMENT

ABSTRACT #14 REF: 10981086

Introduction:

Major paravalvular leak after heart valve replacement is a serious complication. Traditionally, pledgeted sutures are used to secure these valves in order to avoid tearing of native annular tissues. The aim of this study is to determine the safety and feasibility of using non-pledgeted sutures for heart valve replacements.

Methods:

We retrospectively reviewed all consecutive patients undergoing heart valve replacements from 11/2014 to 10/2017 in a tertiary referral center. One hundred and fifty patients had prosthetic heart replacements performed using interrupted non-pledgeted sutures. One hundred and thirty-seven patients with documented follow-up echocardiograms were used for this study to determine extent of paravalvular leak as our primary outcome of interest.

Results:

Our cohort included patients undergoing aortic valve replacement (AVR) (n=55, 40.1%), mitral valve replacement (MVR) (n=13, 9.5%), AVR+coronary artery bypass grafting (CABG) (n=48, 35.0%), MVR+CABG (n=5, 3.6%), AVR+MVR (n=6, 4.4%), AVR+tricuspid valve replacement (TVR) (n=2, 1.5%), MVR+TVR (n=6, 4.4%), AVR+MVR+TVR (n=1, 0.7%) and TVR (n=2, 1.5%). The average age was 65.9±1.0 years. Median time to follow-up was 2 months, with a range between 2 days to 35 months. All 137 patients (100%) had no paravalvular leak on completion intraoperative transesophageal echocardiogram. During the follow-up period, freedom from >1+ paravalvular leak was 99.3% (136/137). One patient (0.7%) developed 3+ prosthetic aortic valve paravalvular leak 17 months after initial operation from recurrent endocarditis due to continued illicit drug abuse.

Conclusions:

The use of interrupted non-pledgeted sutures to secure prosthetic heart valves is a safe and feasible technique. This technique is a non-inferior and viable option compared to traditional pledgeted technique, and could potentially improve the efficiency of heart valve replacement surgery.

FIRST EXPERIENCE OF TRILEAFLET AORTIC VALVE RECONSTRUCTION WITH AUTOLOGOUS PERICARDIUM IN U.S.

ABSTRACT #15 REF: 10981011

Introduction:

Prosthetic valve replacement is the established surgical treatment for aortic valve disease. Trileaflet aortic valve reconstruction utilizing autologous pericardium (Ozaki procedure) has emerged as an attractive alternative option with durable mid-term results in Japan as it does not require the use of any prosthetic material. Our objective was to assess outcomes of patients undergoing the Ozaki procedure in a tertiary referral medical center in the U.S.

Methods: We performed a retrospective review of 19 consecutive patients who underwent trileaflet aortic valve reconstructions utilizing autologous pericardium (Ozaki procedure) between August 2015 and November 2017.

Results:

The mean age was 69 ± 10.2 years with an average Society of Thoracic Surgeons predicted risk of mortality of $1.4 \pm 0.92\%$. Bicuspid valves were appreciated in 52.6% (10/19) of our cohort with 10.5% (2/19) Sievers type-0, 68.4% (13/19) Sievers type-1, and 21.1% (4/19) Sievers type-2. Preoperative mean aortic valve gradients were 47.1 ± 13.3 mmHg and mean preoperative aortic valve areas were 0.89 ± 0.78 cm² for patients who presented with aortic stenosis. Concomitant cardiac procedures were performed in 21.1% (4/19) of patients. The average cardiopulmonary bypass and myocardial ischemic times were 150.1 ± 24.6 and 120.3 ± 18.3 minutes respectively. The mean post-operative aortic valve gradients were 5.8 ± 2.3 mmHg with all patients having $\leq 1+$ aortic insufficiency intraoperatively. The mean length of hospital stay was 5.8 ± 2.3 days with no patients in our cohort experiencing renal failure, cerebrovascular accidents, heart block requiring permanent pacemaker placement or need for conversion to traditional prosthetic valve replacement. Median length of follow-up was 12 months with a range from 2 to 72 months with 100% freedom of $>1+$ aortic insufficiency on transthoracic echocardiogram. There were no mortalities, operative (within 30-days) or on follow-up.

Conclusions:

Trileaflet aortic valve reconstruction with autologous pericardium (Ozaki procedure) is a safe alternative option for patients requiring surgical treatment of aortic valve pathology with excellent short-term outcome.

ACCESS TO LUNG TRANSPLANTATION IN THE US: THE POTENTIAL IMPACT OF THE ACCESS TO A HIGH VOLUME CENTER

ABSTRACT #16 REF: 10980772

Introduction

Lung transplantation (LTx) is a life saving procedure for those with end-stage lung disease. Disparities in access to care may be a major issue. While implementation of the lung allocation score has helped prioritize patients based on their severity of illness, the process of listing to LTx remains a challenge due to donor supply. We sought to evaluate measures of socioeconomic status (SES) and its potential to fuel a disparity in access.

Methods

We performed a retrospective analysis of United Network for Organ Sharing Database identifying all adult primary LTx recipients from May 2005 to December 2014. Patients were stratified into quartiles based on pre-evaluation zip-code Diez-Roux SES score. A probability algorithm was implemented to identify those transplanted at the nearest institution (home) vs those who traveled elsewhere. Spherical distance from transplant institution and zip-code centroid were calculated.

Results

Median distance traveled was 62.9 miles. There was an inverse relationship between Diez Roux SES and median distance traveled ($p < 0.001$). There was a statistically significant association between LAS and Diez-Roux SES ($p < 0.001$). Over 80% of patients exhibiting center switching behavior were transplanted at a center with higher annual volume. Those that were more likely to switch were those with an associates/bachelor ($p < 0.005$) or graduate level degree ($p < 0.05$). Recipients with high volume home institutions had the least probability of switching (OR 0.009, $p < 0.001$). There was no difference in survival when comparing those who were transplanted in their home institution to those who switched in total group analysis (55.3% vs 55.0%, $p = 0.41$). There was no significant association between time on waitlist and SES.

Conclusions

Access to LTx in the US varies among populations stratified by SES. There were clear advantages for those with center switching to a high volume institution. Despite these differences, there were no differences in outcomes following LTx.

CORONARY ARTERY BYPASS GRAFTING: THE INFLUENCE OF TRANSIT TIME FLOW PROBES ON GRAFT REVISION IN THE REGROUP TRIAL

ABSTRACT #17 REF: 10978303

Introduction: Despite the correlation between graft patency after coronary artery bypass grafting (CABG) and intraoperative Transit Time Flow (TTF) probe pulsatility index (PI) and flow values, the impact of TTF probe data on the decision for graft revision is not well known. This study investigated TTF probe use and its influence on intraoperative graft revisions for CABG patients enrolled in Cooperative Studies Program (CSP) #588, the Randomized Endo-Vein Prospective (REGROUP) Trial.

Methods: Intraoperative TTF use, left to the discretion of the operating surgeon, was recorded for patients participating in REGROUP. The reasons for nonuse were noted. Graft revisions were recorded. If a TTF probe was used, the surgeon was asked whether TTF data influenced the decision to revise.

Results: Of the 1150 patients enrolled in CSP#588 at 16 medical centers (3/2014-4/2017), TTF probe use and graft revision data were available for 790 patients. Probes were not used in 513 (64.9%) patients. Reasons included: unavailable probe (295/315 patients, 57.5%), probe use considered superfluous (212 patients, 41.3%), doppler used instead (2 patients, 0.4%), graft flows measured with other means (1 patient, 0.2%), no data to support use (2 patients, 0.4%), nonfunctional probe (1 patient, 0.2%). Of the 37 graft revisions; 12 (32.4%) were based on TTF data. An unsatisfactory PI or flow reading was seen in 8 and 15 cases, respectively; in 8 cases, both PI and flow readings were unsatisfactory. No significant correlation was seen between probe use and revision rates at the institutional level.

Conclusions: Most patients in CSP#588 did not have TTF probe graft assessment - mainly because the probe was unavailable or considered unnecessary. Probe impact on the decision for intraoperative graft revision was limited. Longitudinal follow-up of these patients may provide insight on whether intraoperative TTF use influences intermediate-term clinical outcome.

COMPARISON OF MINIMALLY INVASIVE THERAPIES FOR ISOLATED AORTIC VALVULAR DISEASE: SURGICAL AND TRANSCATHETER AORTIC VALVE REPLACEMENT AT A VETERANS AFFAIRS MEDICAL CENTER

ABSTRACT #18 REF: 10974382

INTRODUCTION: Minimally invasive surgical aortic valve replacement (MIAVR) and transcatheter aortic valve replacement (TAVR) have emerged as alternatives to the current standard of care, full-sternotomy surgical aortic valve replacement (SAVR). Most MIAVR and TAVR are performed at high volume institutions. Their respective outcomes and how they compare to one another at federal facilities with lower volumes is relatively unknown. Our objective was to describe the experience of minimally invasive techniques for aortic valve replacement at a Veterans Affairs Medical Center (VAMC).

METHODS: A single center retrospective cohort study of all patients who received MIAVR or TAVR for isolated aortic valvular disease at a VAMC between May 2010 and December 2017 (n=230; 100 MIAVR, 130 TAVR) was performed. Thirty-day mortality, hospital length of stay, and perioperative outcomes were analyzed using SPSS Statistics 23.

RESULTS: Thirty-day mortality was 1.0% for MIAVR and 0.77% for TAVR ($p > 0.99$, Fisher's). Median length of hospital stay was 10 days (IQR 7-14) for MIAVR and 5 days for TAVR (IQR 2.5-5.5; $p < 0.001$, t-test). Post-operative new onset atrial fibrillation occurred in 52% of MIAVR patients and 5.4% of TAVR patients ($p < 0.001$, Chi-Square). Post-operative stroke occurred in 5.0% of MIAVR patients and 3.1% of TAVR patients ($p = 0.51$, Fisher's). In patients who underwent MIAVR, 7.0% required placement of a permanent pacemaker post-operatively, compared to 13.8% of TAVR patients ($p = 0.10$, Chi-Square).

CONCLUSIONS: MIAVR and TAVR have replaced full median sternotomy as the approach of choice for isolated aortic valvular disease at our VAMC. In patients with isolated aortic valve pathology, MIAVR and TAVR can both be performed with low mortality, with neither conferring a significant mortality benefit over the other. Length of hospital stay and rates of post-operative atrial fibrillation were significantly lower for TAVR patients. Heart block necessitating permanent pacemaker placement was more common in patients undergoing TAVR than those undergoing MIAVR.

ANTITHROMBOTIC USE AFTER BIOPROSTHETIC AORTIC VALVE REPLACEMENT IN THE VETERANS HEALTH ADMINISTRATION SYSTEM

ABSTRACT #19 REF: 10969221

Introduction: National anticoagulation practices after bioprosthetic aortic valve replacement (bAVR) at Veterans Affairs (VA) hospitals are not known and is the primary focus of this investigation.

Methods: Patients undergoing bAVR with or without concomitant coronary artery bypass grafting (CABG) at 41 VA medical centers (2005-2015) were identified using current procedural terminology (CPT) and international classification of disease codes (ICD-9 and 10). Text mining of operative notes was used to specifically identify bAVR patients. Excluded patients included those who underwent reoperative valve replacement, died during the same hospitalization, were transferred to hospice, or left against medical advice. Outpatient pharmacy files (VA and nonVA) were queried for discharge antithrombotic medications.

Results: From 2005-2015, 9766 patients underwent bAVR; 4600 (47.1%) patients underwent concomitant CABG. BAVR volume steadily increased from 641 cases in 2005 to 1282 in 2015. Most patients were men (96.8%). The mean age was 69.7 ± 8.9 years. Preoperative atrial fibrillation (AF) was seen in 4919 (41.1%) patients. Preoperative aspirin (ASA) and warfarin use were 70.2% and 11.3% respectively. Discharge medication regimens were as follows: 4758 patients (48.7%) received ASA alone, 2992 patients (30.6%) ASA and warfarin, 1562 patients (16.0%) dual anti-platelet therapy, 183 patients (1.9%) warfarin only, 125 patients (1.3%) an anti-thrombotic other than ASA or warfarin, and 146 (1.5%) received no anti-thrombotic medication at discharge. Significant variation in anticoagulation practice was seen among the 41 facilities; for example, discharge ASA use varied from less than 10% to over 70%.

Conclusions: The volume of bAVR at VA facilities is increasing. Although most patients are prescribed ASA after surgery, either alone or in combination with warfarin, there is significant practice variation at the institutional level. Additional investigation is needed to determine the factors that contribute to this variation in practice as well as the optimal anticoagulation strategy.

COMPARING ANTITHROMBOTIC STRATEGIES AFTER BIOPROSTHETIC AORTIC VALVE REPLACEMENT: A SYSTEMATIC REVIEW

ABSTRACT #20 REF: 10969084

Background: Optimal anticoagulation strategies after surgical bioprosthetic aortic valve replacement (bAVR) are inconclusive. A detailed review of the literature was the focus of this investigation by the Veteran's Affairs Evidence-based Synthesis Program (ESP).

Methods: ESP queried the literature, through January 2017, on antithrombotic use and outcomes after bioprosthetic aortic valve replacement (bAVR). The search encompassed multiple databases (MEDLINE, PubMed, EMBASE, EMB Reviews -CDSR, DARE, HTA, Cochrane CENTRAL, etc.). Included were clinical trials and cohort studies that focused on aortic valve surgery (including concomitant CABG or studies analyzing AVR and mitral valve patients separately). Key questions included a comparison of the benefits vs. harms of antithrombotic strategies and the impact of patient thromboembolic risk profiles or concomitant coronary artery bypass grafting (CABG). A standardized approach, adopted from the Agency for Healthcare Research and Quality, was used to assess evidence strength as high, moderate or low.

Results: Four randomized clinical trials and 11 cohort studies meeting inclusion criteria were identified among the 4,554 titles and abstracts reviewed by the ESP. Study methodology varied substantially. Moderate-strength evidence indicated that ASA vs. warfarin use after bAVR yielded similar mortality, thromboembolism, and bleeding outcomes; although ASA and warfarin combined was associated with reduced mortality and thromboembolism, increased bleeding risk was noted. The investigation was limited by inadequate information on warfarin efficacy - including therapy duration or time within therapeutic international normalized ratio (INR) range. There was insufficient evidence to identify an optimal antithrombotic regimen for patient subgroups based on risk factors or concomitant CABG.

Conclusions: Based on current literature, single agent antithrombotic therapy with either ASA or warfarin yields similar outcomes with regard to mortality, thromboembolism and bleeding. The literature regarding the combined effect of ASA and warfarin after bAVR is inconclusive. Additional study in this area is needed within the VA.

REDUCING BENIGN LUNG RESECTIONS BY INTEGRATING AN INTERVENTIONAL PULMONOLOGY PROGRAM WITH A THORACIC SURGERY DEPARTMENT

ABSTRACT #21 REF: 10955885

Introduction

Pulmonary resections can concurrently diagnose and treat known or suspected lung cancer, but are not without risk. Benign resection rates range widely (9-40%) and have increased since the introduction of video assisted thoroscopic surgery. We evaluated the reduction of benign resections achieved with integration of an Interventional Pulmonology (IP) program with our Thoracic Surgery Department.

Methods

Navigational bronchoscopy with an interventional pulmonologist was initiated in August 2010 and a dedicated pulmonary nodule clinic in August 2013. We retrospectively reviewed all patients undergoing resection for known or suspected lung cancer between 2005 and 2015 at our tertiary referral hospital. Demographics, preoperative pathologic tissue diagnoses, surgical procedure, final pathology and staging were collected. Quarterly benign resection rates were calculated. Statistical quality control charts (P-Chart) were used to measure the impact of IP on benign resection rates over time. Statistical significance was determined using standard control chart rules. Bivariate comparisons between time periods were made with Fisher's exact test.

Results

Of 1170 resections for known or suspected lung cancer, 220 (19%) returned benign. Variation in quarterly benign resection rates decreased after the introduction of navigational bronchoscopy. After introduction of the pulmonary nodule clinic, preoperative tissue diagnostic rates increased from 48% to 64% ($p < 0.01$) and benign resection rates decreased from 22% to 13% ($p = 0.01$). Video assisted thoroscopic (VATS) resections increased over time ($p < 0.01$). Sustained reductions in the benign resection rate associated with the IP program indicated special cause variation and a new baseline of 13% after the second quarter of 2013 ($p < 0.05$), a reduction of 41%.

Conclusions

Benign resection rates have significantly decreased at our institution over the past decade notwithstanding increased VATS utilization. Integration of an IP program employing advanced diagnostic bronchoscopic techniques has improved pre-operative diagnostic rates of suspicious pulmonary nodules and resulted in fewer benign resections.

COMMANDO PROCEDURE FOR SEVERE PROSTHETIC MITRAL VALVE ENDOCARDITIS.

ABSTRACT #22 REF: 10955732

OBJECTIVE: Prosthetic mitral valve (MV) endocarditis with aggressive pathogens such as MRSA often leads to destruction of surrounding cardiac tissue. The most critical aspect of endocarditis surgery is the complete debridement of all infected tissue. However, given the extent of destruction and debridement, reconstruction of the heart is required. This video demonstrates the reconstruction of mitral annulus and the aortomitral curtain in a patient with complicated prosthetic mitral valve endocarditis.

CASE VIDEO SUMMARY: A 63 year old male with a remote history of MV repair for MV prolapse with a subsequent replacement due to endocarditis presents with a recurrent mitral valve MRSA endocarditis accompanied by a partial dehiscence with severe regurgitation and stenosis, right ventricular dysfunction, tricuspid regurgitation. After the heart is arrested, the MV is exposed through an extended transeptal incision. Once the prosthetic mitral valve is removed, the aortomitral curtain was noticed to be heavily infected and would not hold sutures to anchor the mitral valve. The aortomitral curtain is divided and all infected tissue were completely debrided leaving a friable mitral annulus. The annulus is patched with bovine pericardium, sewn into the left ventricle and atrium encompassing around 60% of the annulus. A Diamond shaped patch was tailored with the width of the patch representing the distance between the medial and lateral trigones and the middle of the patch anchored onto the mitral valve sewing ring between the two trigones. The second flap of the patch was used to close the roof of left atrium and aortic root followed by aortic valve replacement and tricuspid valve repair.

CONCLUSIONS: A complete resection of all infected issue is a prerequisite for successful surgical treatment of complicated prosthetic valve endocarditis. This may involve resecting the aortomitral curtain and the mitral annulus which can then be reconstructed with a commando operation.

https://fs20.formsite.com/scientz/files/f-7-90-10955732_QG4Kb6xR_Commando_Procedure_for_Endocarditis.3gp

TRANSCATHETER VS. SURGICAL AORTIC VALVE REPLACEMENT AFTER PRIOR CORONARY ARTERY BYPASS GRAFTING: A PROPENSITY-MATCHED ANALYSIS

ABSTRACT #23 REF: 10952203

Importance: Published trials and observational studies have shown no survival advantage for transcatheter aortic valve replacement (TAVR) over surgical aortic valve replacement (SAVR) in patients with severe aortic stenosis after prior coronary artery bypass grafting (CABG). However, differences in discharge location, in addition to procedural morbidities, have not typically been the focus of these studies.

Objective: To investigate differences in procedural morbidity, length of hospital stay, and discharge to extended-care facilities between TAVR and SAVR after CABG.

Design: Propensity matching was used to compare outcomes of TAVR versus SAVR.

Setting: Single, tertiary care academic institution, 2006–2015.

Participants: Two hundred eighty-three patients with a history of CABG presenting with severe aortic stenosis, including 57 propensity-matched pairs (54% of possible matches).

Intervention: TAVR (n=104/37%) or SAVR (n=179/63%).

Main Outcomes and Measures: In-hospital morbidity and mortality, length of hospital stay, and discharge location.

Results: Among propensity-matched patients, SAVR was associated with more transfusion (n=54/95% vs. n=17/30%; P24 hours (n=13/23% vs. n=3/5.3%; P=.01). Operative mortality, stroke, and permanent pacemaker implantation were similar. Minor vascular access site injury occurred in 4 TAVR patients (7%). Discharge to extended-care facilities was more common following SAVR than TAVR (n=17/30% vs. n=3/5%; P=.0005). Of these, 3 SAVR patients (vs. no TAVR patients) were discharged to long-term acute-care facilities. TAVR patients had shorter intensive care unit (32 vs. 50 hours, P=.001) and hospital lengths of stay (4.6 vs. 7.7 days; P<.0001).

Conclusions and Relevance: For patients developing severe aortic stenosis after CABG, TAVR is advantageous compared with SAVR because of less morbidity, shorter length of stay, similar prevalence of stroke, mortality and reintervention, and increased likelihood of home discharge.

BILATERAL MAMMARY ARTERY GRAFTING- TECHNICAL PEARLS

ABSTRACT #24 REF: 10948235

Introduction: The body of evidence based on large and well-designed observational studies supports the use of bilateral mammary artery (BIMA) for coronary artery bypass grafting (CABG) in suitable patients. In addition, professional clinical practice guidelines encourage the use of multiarterial grafting in CABG because of its association with improved long-term survival, yet few surgeons perform bilateral mammary grafting.

Methods: This video demonstrates a BIMA CABG case in which the left internal mammary artery is grafted to the left anterior descending artery and the right internal mammary artery is grafted to the obtuse marginal vessel.

Results: According to the Society of Thoracic Surgeons Adult Cardiac Surgery Database, there has been a steady decline in the percentage of patients who receive bilateral mammary artery grafting or multiarterial grafting (2000 to 2009, 11.6%; and 2010 to 2013, 6.7%). So why is there a reluctance to use multiple arterial grafts in multivessel CABG despite the potential benefit? The answer is complex but not elusive. The barriers to multiarterial grafting are diverse and range from perceptions about available scientific evidence, to technical difficulties, and more.

Conclusion: In this video we focus on the technical aspects of BIMA grafting. The goal is to simplify the operation and to point out some potential pitfalls and avoidable complications. Pointers are also presented to ensure graft patency and enhance quality.

SIMPLIFIED RETROGRADE PULMONARY EMBOLECTOMY FOR MASSIVE PULMONARY EMBOLISM: A NOVEL APPROACH

ABSTRACT #25 REF: 10937534

Purpose: Pulmonary embolectomy is indicated for patients who have massive pulmonary embolus (PE) with contraindications to thrombolytic therapy. The standard surgical technique (antegrade embolectomy) does not fully evacuate peripheral clots, later leading to residual pulmonary hypertension and chronic thromboembolic pulmonary hypertension (CTEPH). We developed a novel technique to address this issue.

Methods: Between 12/2015 and 12/2016, 6 patients (median age 56) who were not candidates for thrombolytics underwent retrograde embolectomy after consultation with our PE response team. One patient had failed catheter directed thrombolytic therapy. Three patients had hemodynamic collapse with 2 requiring preoperative extracorporeal membrane oxygenation (ECMO). All patients had severe right ventricular (RV) failure, 5 had PFO, 2 had left atrial thrombus and 1 had paradoxical embolization. After antegrade embolectomy, the left atrium around the pulmonary veins was clamped and cold blood is infused into the pulmonary veins, flushing the vasculature backward and allowing extraction of all clots through the pulmonary arteries.

Results: All patients had complete clot extraction from the pulmonary vasculature with immediate improvement in hemodynamics and RV function. Patients were easily separated from cardiopulmonary bypass, including the patients requiring preoperative ECMO. Survival rate was 100%. Median ICU length of stay was 3.5 days. Median follow-up period was 6 months. The RV function was significantly improved post-operatively.

Conclusion: Retrograde pulmonary embolectomy is a safe and effective procedure in patients with life threatening acute pulmonary embolus who have contraindications to thrombolytic therapy. By allowing complete clot extraction, patients have much improved immediate hemodynamics and respiratory function. Long term, we may also have decreased incidence of CTEPH.

BATTLE OF THE LEFT VENTRICULAR ASSIST DEVICES: WHAT THE MAUDE DATABASE IS TELLING US

ABSTRACT #26 REF: 10937499

BACKGROUND:

The Manufacturer and User Facility Device Experience (MAUDE) Database was established by the Food and Drug Administration (FDA) to allow for voluntarily reporting of adverse outcomes with medical devices. Two commercially available left ventricular assist devices (LVAD) are the HeartMate II® (HM2; Thoratec Corporation; Pleasanton, CA) and the Heartware® ventricular assist device (HW; Medtronic Inc. Minneapolis, Minnesota). We sought to examine MAUDE reporting of these two LVAD systems.

METHODS:

The MAUDE database was accessed from December 2016 to December 2017 at a single time point for 500 entries related to each system. The time to report from index event and negative patient outcomes (injury, malfunction or death) were collected.

RESULTS:

The HM2 system had a reduced reporting time (93 ± 194 days vs. 340 ± 355 ; $p=0.0001$, t-test), higher injury rate (60.6% vs. 23.4%, $p=0.0001$, Fisher's Exact test) and higher mortality rate (16% vs. 7.4%; $p=0.0001$, Fisher's Exact test) compared to the HW system. The HW had a higher reported rate of malfunction rate compared to the HM2 system (69.2% vs. 23.4%; $p=0.0001$, Fisher's Exact test).

CONCLUSIONS:

MAUDE database analysis of these two LVAD systems found the HM2 had a significantly reduced reporting time, higher percentage injury rate and higher mortality rate. The HW had a higher reported malfunction rate. These data demonstrate should inform the cardiothoracic surgical community at large of the potential morbidity and mortality patterns of these two LVAD systems.

UNDERSTANDING REAL-TIME CHANGES IN SURGEON'S COGNITIVE WORKLOAD. FEASIBILITY STUDY IN CARDIAC SURGERY

ABSTRACT #27 REF: 10845226

Introduction: Cognitive overload may negatively impact on surgeon's performance, increasing the risk of patient harm. In order to capture in real-time dynamic changes in surgeon's cognitive workload we propose to employ heart rate variability (HRV) as an indirect physiological measure.

Methods: A Bluetooth Smart heart rate sensor (Polar H7, Polar Electro Inc., Kempele, Finland) was worn by the surgeon using a chest strap during cardiac surgery procedures (N=10). Inter-beat intervals (R-R-intervals) were captured via a validated smartphone app. At the completion of each procedure the Surgery Task Load Index (SURG-TLX) questionnaire was completed to assess subjective cognitive load. Using audio and video recordings, the HRV parameters were embedded into the surgical workflow, enabling synchronized visualization of video, audio and cognitive load metrics.

Results: Physiological metrics of cognitive workload were successfully collected in all cases. The HRV parameters presenting correlation with SURG-TLX were SDNN ($r=-0.61$, $p=0.02$) and RMSSD ($r=0.80$, $p<0.001$).

Conclusions: Dynamic changes of cognitive workload of the surgeon can be collected noninvasively using a wireless sensor during the performance of routine cardiac surgery procedures. A correlation between HRV parameters and SURG-TLX was observed. More data is required to confirm these findings and devise approaches to mitigate the deleterious effects of cognitive overload.

HIGH REPAIR RATE IN A LOW VOLUME MITRAL VALVE SURGERY CENTER: A QUALITY PARADOX?

ABSTRACT #28 REF: 10843453

Introduction: Current society guidelines favor mitral valve repair over mitral valve replacement for patients with severe mitral regurgitation secondary to degenerative pathology. Mitral valve repair rates are used as a surrogate for judging the quality of a mitral valve surgery center and are known to vary widely, with a positive correlation with procedural volume. Centers with low volume of mitral valve repairs (e.g. <20 mitral repairs/center/year) are not expected to have high mitral valve repair rates.

Methods: Patients undergoing mitral valve surgery for posterior mitral valve prolapse with severe mitral regurgitation at a single VA center from May 2010 to October 2017 were included in the study; clinical, operative and echocardiographic outcomes were assessed. Exclusion criteria were prior cardiac surgery, cardiogenic shock, active endocarditis, combined aortic valve replacement.

Results: The study cohort included 47 consecutive subjects with severe mitral regurgitation and posterior mitral valve prolapse (with or without flail segment) operated on over a 7-year period by three surgeons employed full-time by the Department of Veterans Affairs. The mitral valve surgery repair rate was 95.8% (45/47). CABG was an associated procedure in 32% of the cases (15/47). The mitral valve repair technique was triangular resection in 25 subjects (53%) and folding plasty in 22 (47%); all subjects received concomitant mitral annuloplasty. The pre-discharge residual mitral regurgitation grade by echocardiography was 0 in 44 patients and 1+ in 3 patients. There was one hospital mortality due to cerebrovascular accident in a subject undergoing minimally invasive repair through a mini-thoracotomy (1/47=2.1%).

Conclusions: We report a paradoxically high mitral valve repair rate (>95%) in a low-volume mitral valve surgery center. We speculate that these results are due to a strong Heart Team collaboration including an active Valve Clinic, echocardiography board-certified cardiac anesthesiologists and cardiac surgeons with specialized training in mitral valve repair techniques.

SYSTEM THEORETIC PROCESS ANALYSIS (STPA) OF TEAM COORDINATION IN CARDIAC SURGERY

ABSTRACT #29 REF: 10783155

Introduction: Cardiac Surgery is a complex and error-prone sociotechnical system. New approaches to medical errors and patient safety are needed to bridge a known safety gap with other high-reliability organizations (e.g. commercial aviation). We describe a new safety assessment technique to predict hazardous scenarios that can arise from coordination issues between the members of the Cardiac Surgery Team (Surgeons, Anesthesiologists, Perfusionists) during mission-critical steps required to wean patients off cardiopulmonary bypass.

Methods: We conducted safety analysis using the System Theoretic Process Analysis (STPA) which provides a structured framework through which potential sources of risk are identified. Possible unsafe actions from the Team are identified first, followed by the possible causes. STPA involves interviews with members of the Team and review of audio/video recordings of actual procedures.

Results: As an example of the results of the STPA analysis, the following hazardous scenario is described. **UNSAFE CONTROL ACTION:** The Surgeon fails to communicate the need to restart the ventilator for weaning from the cardiopulmonary bypass. **POSSIBLE CAUSES:** (a) trainee takes the leading role assuming the resume ventilator order has already been given, without double checking; (b) a surgical trainee is not aware that it is his/her responsibility to communicate with the anesthesiologist about the need to restart the ventilator; (c) the surgeon is distracted by an unexpected surgical complication and overlooks the communication protocol. **POSSIBLE IMPROVEMENTS:** (a) provide surgeon with feedback on current status of ventilator; (b) establish standard phraseology; (c) implement "sterile cockpit" concept to protect situation awareness; (d) additional electronic order tool controlled by surgeon.

Conclusions: STPA identifies possible sources of hazards during the weaning phase from cardiopulmonary bypass of a cardiac surgery procedure through a structured, non-blame based process. Recommendations to improve the process and to avoid preventable losses can also be drawn from the result of the analysis.