Fellow in Training
Research Abstracts
Abstract

Background

Pre-operative risk stratification is important to select the appropriate patients for surgery, improve outcomes and lower hospital costs. Pre-operative echocardiogram is routinely performed to assess valves. Identifying echocardiographic indices associated with short term postoperative complications will be a cost-effective strategy to risk stratify patients scheduled for valvular surgeries.

Aim: To identify echocardiographic parameters of left and right ventricular dysfunction which are associated with increased adverse outcomes (AO) within 30 days of cardiac valvular surgery.

Method: Retrospective study including all patients undergoing valvular surgeries (aortic, mitral, tricuspid) at the University of Toledo Medical Center from 2006 to 2014. Preoperative echocardiogram and society of thoracic surgeon database were reviewed for each patient. Independent echocardiographic variables were LVEF, LAVI, LVEDV, LVESV, E/e’, right atrial area, basal RV diameter, RV dP/dt, TAPSE, TDI S’, TV E/e’, RVSP and RIMP. 30 days AO included at least one of the following; 30 days mortality, post-operative arrythmia, renal failure, cardiac arrest, multisystem failure, prolonged ventilation time, re-intubation and readmission due to cardiac causes.

Results: 266 patients were included. Majority were males (n=162, 61%) with an average age of 67±15 years. Parameters of both left and right ventricular dysfunction were associated with adverse short term outcomes. LVEF<40% (p=0.018, CI:1.17-5.46), LAVI>42 (p 0.043, CI:1.02-3.11) E/e’>14 (p=0.048,CI:1.006-3.111) , RVSP>35 (p=0.0371,CI:1.036-3.11) , RIMP>0.55 (p=0.036,CI:1.05-4.15) were associated with 30 days AO. In additional, we identified indices associated with the type of AO (Table 1)

<table>
<thead>
<tr>
<th>Echocardiographic parameter</th>
<th>30 days adverse outcome</th>
<th>p-Value</th>
<th>Confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>RIMP&gt;0.55</td>
<td>Prolonged ventilation</td>
<td>.047</td>
<td>1.009-4.260</td>
</tr>
<tr>
<td></td>
<td>Re-intubation</td>
<td>.022</td>
<td>1.165-7.309</td>
</tr>
<tr>
<td></td>
<td>Post-operative cardiac arrest</td>
<td>.026</td>
<td>1.325-9.1</td>
</tr>
<tr>
<td>RVSP&gt;35mmHg</td>
<td>Prolonged ventilation</td>
<td>.029</td>
<td>1.071-3.686</td>
</tr>
<tr>
<td></td>
<td>Post-operative arrythmia</td>
<td>.003</td>
<td>1.330-3.900</td>
</tr>
<tr>
<td></td>
<td>Post-operative multi system failure</td>
<td>.05</td>
<td>1.000-20.838</td>
</tr>
<tr>
<td>E/e’&gt;14</td>
<td>Post-operative arrythmia</td>
<td>.022</td>
<td>1.091-3.091</td>
</tr>
<tr>
<td>LVEF&lt;40%</td>
<td>Prolonged ventilation</td>
<td>.000</td>
<td>1.633-5.731</td>
</tr>
<tr>
<td></td>
<td>Post-operative</td>
<td>.029</td>
<td>1.071-3.478</td>
</tr>
<tr>
<td>Category</td>
<td>Description</td>
<td>p-value</td>
<td>Odds Ratio (95% CI)</td>
</tr>
<tr>
<td>-------------------</td>
<td>--------------------------------</td>
<td>---------</td>
<td>--------------------</td>
</tr>
<tr>
<td>arrhythmia</td>
<td>Post-operative cardiac arrest</td>
<td>.014</td>
<td>1.323-11.743</td>
</tr>
<tr>
<td></td>
<td>LAVI&gt;42</td>
<td>.005</td>
<td>1.399-6.528</td>
</tr>
<tr>
<td></td>
<td>Post-operative arrhythmia</td>
<td>.004</td>
<td>1.265-3.487</td>
</tr>
</tbody>
</table>

Conclusion: Pre-operative left or right ventricular failure prior to valvular surgeries are associated with increased short term post-operative complications. Identifying high-risk patients with the help of echocardiographic parameters mentioned above will help to improve the overall surgical outcomes.

Categories

Fellow Research
Abstract

Background: Admission decisions for patients with drug ingestions can be challenging. Many patients will be admitted to an inpatient cardiac unit for telemetry monitoring without specific criteria or justification based on evidence.

Objective: To optimize patient resource utilization and safety, we created a standard of care guideline for patients admitted with drug ingestion. The specific goal was to decrease the amount of drug ingestion admissions to an inpatient cardiac unit at a pediatric tertiary hospital by 75%.

Design/Methods: We created specific guidelines for telemetry in the context of admissions for drug ingestions. The guidelines stipulated admissions to inpatient cardiology for the following criteria: 1) QTC ≥ 500ms, 2) ingestion of an antiarrhythmic, or 3) ingestion of TCA. Guidelines for EKG frequency for non telemetry admissions were also created and included: 1) patients with QTC > 440ms, obtain EKG every 8 hours until QTC normalized and 2) patients with normal QTC, no additional EKGs are needed. Both guidelines were discussed with an assigned ED attending and change in policy was reiterated at an ED staff meeting at the end of November 2015. These guidelines were discussed with DPIC (poison control) to keep recommendations consistent. Guidelines were discussed with telemetry unit nursing staff, NP staff and cardiac fellows. We retrospectively reviewed charts of patients requiring admission to the inpatient cardiac unit for drug ingestion from 1/1/15 to 6/30/16. These case patients were then split into two groups; before intervention and after intervention based on their admission date. QTc on the initial EKG, drugs ingested (if known) and number of EKGs were recorded. Each patient was subsequently marked as meeting or not meeting criteria according to the guidelines.

Results: There were a total of 115 drug ingestion admissions to the inpatient cardiac unit for telemetry monitoring during the entire study period. The pre-guideline baseline (1/1/15- 11/30/15) included 107 admissions (9.7/ month) and the post-guideline period (12/1/15-6/30/16) included 8 admissions (1.3/month), which represented an 87% decrease in cases per month. The median percentage of ingestion patients admitted for telemetry in the pre-guidelines period was 14%, which decreased to 3% in the post-guidelines period. We are presently analyzing cost difference and change to patient outcome (data will be available by date of presentation).

Conclusions: Our review demonstrates that implementing a standardized protocol for patients with drug ingestion can safely decrease the amount of costly admissions to subspecialty care.

Categories

Fellow Research
Rate of progression of AS in RACD

Eoin Donnellan, Brian Griffin, Douglas Johnston, Zoran Popovic, Samir Kapadia, Amar Krishnaswamy, Joseph Sabik, Stephanie Mick, Lars Svensson, Milind Desai

Cleveland Clinic, Cleveland, USA

Abstract

Background: Aortic stenosis (AS) patients with radiation associated cardiac disease (RACD) patients have worse outcomes when compared to a matched sample with similar degree of AS without RACD. We sought to assess whether this was due to more rapid progression of AS in RACD patients.

Methods: We included 81 RACD patients with >moderate AS who had ≥2 surface echoes 1 year apart & matched them in a 1:2 fashion based on age, gender & aortic valve area (AVA) with those without RACD. Serial AV gradients (AVG) & AVA were recorded. AV replacement (AVR) & mortality during follow-up were recorded.

Results: Relevant characteristics of 2 groups are shown in Figure 1. 100% patients had 1, 71% had 2 & 39% had 3 follow-up echoes. Prior to AVR, over the course of follow-up echoes, peak/mean AVG & AVA were not significantly different between RACD and matched patients (Figure 2a). At 6.6±4 years of follow-up, 60% underwent AVR (of which 42% were isolated surgical & 16% were transcatheter AVR) &19% died (Figure 1). Kaplan-Meier curves of RACD vs. non-RACD group are shown in Figure 2b.

Conclusion: Prior to AVR, AS patients with RACD have an AVG & AVA rate of progression similar to matched non-RACD patients. Despite an earlier time to AVR in RACD patients, their long-term survival is significantly worse vs. non RACD group. Other comorbidities likely account for a higher rate of adverse outcomes in RACD patients.
Programme Code: 11

Development of Late Right-Sided Heart Failure Predicts 1-Year Mortality Post-LVAD Implantation

Daniel Pinkhas, Katherine Dodd, Ellen Liu, Sakima Smith

The Ohio State University Wexner Medical Center, Columbus, USA

Abstract

Background: Late right-sided heart failure (LRHF) is increasingly recognized as a specific clinical entity after left ventricular assist device (LVAD) implantation. It is distinct from early right-sided heart failure and is associated with increased morbidity and mortality. Our goal was to determine 1-year mortality post LVAD implantation in patients who developed LRHF and identify risk factors associated with LRHF.

Methods: We performed a single-center retrospective analysis of 210 patients who underwent continuous-flow LVAD implantation between Jan 1st 2007 and Dec 31st 2015. LRHF was defined as clinical signs of RHF documented on exam and requirement of inotropic support at a hospital readmission more than 30 days but less than 365 days from the index LVAD implant hospitalization discharge date. Potential clinical risk factors for LRHF were investigated with univariate and multivariable logistic regression. Survival analysis was completed to determine if LRHF was associated with 1-year mortality.

Results: A total of 18 patients (8.5%) developed LRHF. Median time to LRHF was 161.5 days (IQR: 75-258 days). Significant baseline differences between those with or without LRHF were duration of LVAD support, number of readmissions, total bilirubin, and cardiac index (CI) by thermodilution (Table 1). Multivariable analysis demonstrated that CI < 1.5 (OR: 5.46; 95% CI: 1.49-19.95; P = 0.010) and prior CABG (OR: 6.80; 95% CI: 1.19-38.70; P = 0.031) were independent predictors of developing LRHF. Univariate analysis demonstrated that LRHF was associated with 1-year mortality (log rank P = 0.019). Multivariable analysis (adjusted for age, gender, INTERMACS score, and history of CABG) further demonstrated that baseline serum creatinine > 1.5 mg/dL (HR: 2.35; 95% CI: 1.15-4.82; P = 0.020) and development of LRHF (HR: 3.04; 95% CI: 1.25-7.39; P = 0.014) were significant independent predictors of 1-year mortality post-LVAD implantation.

Conclusion: There is growing evidence that LRHF is associated with significant morbidity and mortality. We have demonstrated that LRHF is a significant predictor of 1-year mortality and independent predictors for LRHF are prior CABG and pre-implantation CI < 1.5. Consideration of these risk factors should therefore be taken into account when evaluating patients for LVAD support.

Categories

Fellow Research
Programme Code: 14

Metanalysis on egg consumption and heart failure

Hemindermeet Singh, Owais Khawaja, Faraz Luni, Ameer Kabour, Syed Sohail Ali, Mohammed Taleb

Mercy-Health St Vincent Medical Center, Toledo, USA

Abstract

Background:

Heart failure (HF) remains a global health problem affecting 5.7 million adults in USA. It carries a major economic impact with total projected cost by year 2030 being $69.7 billion. Identification of simple and inexpensive yet effective strategies to help prevent incident HF can be of paramount importance. Observational data on association of egg consumption and HF have been inconsistent. We, therefore, conducted this meta-analysis of prospective cohort studies to assess the role of egg consumption on the incidence of HF in humans.

Methods:

Using extensive online search, we conducted a meta-analysis of new onset heart failure following exposure to egg consumption. A random-effect model was used and between studies heterogeneity was estimated with $I^2$. Publication bias was assessed graphically using a funnel plot. All analyses were performed with Comprehensive Meta-Analysis (version 2.2.064).

Results:

We identified 4 prospective cohorts for a total of 105,999 subjects and 5,059 cases of new onset HF. On comparing the highest to the lowest category of egg consumption, pooled relative risk ratio (RR) of HF was 1.25 (95% CI = 1.12-1.39; p= 0.00). There was no evidence for heterogeneity ($I^2$=0%). There was no evidence of publication bias.

Conclusions:

Our meta-analysis suggests an increased risk of HF with frequent egg consumption.

Categories

Fellow Research
Correlation between birth weight and left ventricular hypertrophy in infants of diabetic mothers

Tamika Rozema, James Strainic

Rainbow Babies and Children’s Hospital, Cleveland, USA

Abstract

Purpose
Infants of diabetic mothers (IDM) are known to have numerous complications during the neonatal period, including varying degrees of left ventricular hypertrophy (LVH). The purpose is to assess a correlation between birth weight and degree of LVH in IDM.

Hypothesis
There is no correlation between birth weight and LVH in IDM.

Methods
A retrospective review at a tertiary university single-center for all neonates admitted to the NICU/NBN from 03/01 – 07/17. Inclusion criteria: maternal history of diabetes, echocardiogram (echo) completed during stay. LVH defined as LV mass (LVm) > 95th percentile based on gender, male (17.6 g, LVm index (LV mi) 80.1 g/m^2.7) and females (16.5 g, LVmi 85.6 g/m^2.7). Data obtained included demographics, birth weight, maternal HBA1c and echo measurement.

Results
There were 53 IDM, equal number of males, 50% (p =1.0). Gestational age range 30.5 – 39.4 weeks; preterm 31 (60%), term 21 (40%), (p<.001). Birth weight range of 1.2 – 5.370 kg, SGA; 1 (2%), AGA; 23 (44%), LGA 28 (54%), (p <.001). LVm range 3.28 – 19.1g, LVmi range 27.9 – 150.24. Based on gender, 1 male meet LVH criteria by LVm and 7 by LVmi; 0 female meet LVH criteria by LVm and 4 LVmi. There is a positive correlation of birth weight and LVm, R= 0.49 (p <.002), and a correlation with LVmi, R= 0.21 (p=.14) for all subjects. For males with LVH, there was insufficient data based on LVm alone, for LVmi there is a positive correlation, R= 0.158 (p= 0.73). For females with LVH, there was insufficient data for both LVm and LVmi.

Conclusion
Infants of diabetic mothers are known to have increased risk of cardiovascular problems, including LVH. From these results, IDM infants are more likely to be premature and large for gestational age. The weakly positive correlations between birth weight and LVm in IDM suggest that by focusing on LGA infants alone, infants with increased risk for LVH maybe missed and not followed over time.

Categories
Fellow Research
Trends in Hospitalization of Patients with Acute Coronary Syndrome and Concurrent Amyloidosis

Avirup Guha, Benjamin Buck, Xu Gao, Ellen Liu, Michael Dunleavy, Devin Haddad, Yvonne Efebera, Ragavendra Baliga
Ohio State University, Columbus, USA

Abstract

Background: Amyloidosis is a systemic disease which has been associated with Acute Coronary Syndrome (ACS) through both traditional risk factors based mechanisms and infiltrative mechanisms. However, trends in hospitalizations for patients with ACS and amyloidosis have not previously been reported.

Purpose: To describe trends in hospitalization for patients who present to US hospitals with ACS with and without concurrent amyloidosis, the procedures used during these hospitalizations and in-hospital mortality among these two groups.

Methods: Using the National Inpatient Sample database, we identified hospitalizations of adult patients with ACS who presented with and without amyloidosis between 2003 and 2013. We estimated the weighted prevalence of amyloidosis in patients hospitalized for ACS. Further, we estimated the weighted utilization of different management strategies for ACS in patients with and without amyloidosis and evaluated whether or not patients in different groups were managed differently. Finally, we compared the rates of in-hospital mortality among these two groups.

Results: Over the 11-year period of time, there were 1,645 hospitalizations for ACS with concurrent amyloidosis, representing 1.1% of all patients admitted with amyloidosis. Between 2003 and 2013 hospitalizations for ACS in patients with amyloidosis have increased by 12 per year (p=0.0065), with an opposite trend in patient without amyloidosis (reduction of 12,480 per year, p = 0.0002). Heart catheterization and percutaneous coronary intervention are utilized less frequently in the amyloidosis population (39%/20% in amyloid vs 63%/42% in general population, p < 0.0001 for both interactions). The use of intravenous antiplatelet infusion was more frequent in amyloid patients compared to the general population (14% vs 4%, p < 0.0001). Patients with amyloidosis survived to discharge at a significantly lower rate than patients hospitalized for ACS without amyloidosis (93.9% vs 85.9%, p<0.0001).

Conclusions: Over the 11-year period, 1) there was an increase in the prevalence of hospitalization for ACS in patients with amyloidosis, 2) medical therapy was preferred over procedural therapy in patients with ACS and amyloidosis and 3) patients with ACS and amyloidosis have worse in-hospital survival.

Categories

Fellow Research
Predictors and Outcomes of Staged Versus One-Time Complete Revascularization in Patients with Multivessel Coronary Artery Disease and Outcomes: Insights from the Veterans Affairs (VA) Clinical Assessment, Reporting, and Tracking (CART) Program

Peter Hu1,2, Schuyler Jones2,3, Thomas Glorioso4,5, Stephen Waldo4,5, Thomas Maddox4,5, Mladen Vidovich6,7, Subhash Banerjee8,9, Sunil Rao2,3,10

1Cleveland Clinic, Cleveland, USA, 2Department of Medicine, Duke University Medical Center, Durham, USA, 3Duke Clinic Research Institute, Durham, USA, 4Denver Veterans Affairs Medical Center, Denver, USA, 5Colorado School of Public Health, University of Colorado, Aurora, USA, 6University of Illinois College of Medicine, Chicago, USA, 7Jesse Brown Veterans Affairs Medical Center, Chicago, USA, 8University of Texas Southwestern Medical Center, Dallas, USA, 9Veterans Affairs North Texas Health Care System, Dallas, USA, 10Durham Veterans Affairs Medical Center, Durham, USA

Abstract

Background and Aims: Prior observational studies of Staged PCI vs. one time complete revascularization (OTCR) in patients have not accounted for unmeasured site variation on the decision to pursue Staged PCI or the potential impact of unmeasured confounding on outcomes.

Methods: We utilized data from the Veterans Affairs (VA) Clinical Assessment, Reporting, and Tracking (CART) Program to evaluate patients who underwent PCI to 2 or more vessels between October 1, 2007 and September 30, 2014. Associations between patient, procedural, and site factors and the decision to perform Staged PCI were assessed using a reference effect measure (REM) methodology. Cox proportional hazards models were used to determine the association between Staged PCI and all-cause mortality using inverse probability weighting; post-procedure blood transfusion rates between the two strategies were compared using the chi-square test. To assess the impact of an unmeasured confounder we examined the change in the association between Staged PCI vs OTCR and mortality as we varied the prevalence of the hypothetical confounder in these groups and the hazard ratio and observed changes in our primary results.

Results: A total of 7,599 patients at 61 sites were included in our analysis. Staged PCI patients had higher rates of treated three-vessel disease, STEMI presentation, atherectomy use, treated chronic total occlusions and calcified lesions when compared with patients with OTCR (p<0.01). Factors associated with Staged PCI included chronic kidney disease (OR: 1.31, 95% CI: 1.14 to 1.52; p< 0.01), three-vessel disease treated versus two (OR: 2.17, 95% CI: 1.77 to 2.68; p< 0.01) and STEMI presentation (OR: 2.48, 95% CI: 1.74 to 3.52; p< 0.01). REM analysis indicated that procedural characteristics and unmeasured site variation had a large impact on the decision to pursue Staged PCI. Staged PCI was associated with a lower risk for all-cause mortality compared with OTCR (HR 0.78, 95% CI: 0.72 to 0.84; p< 0.01). The impact of an unmeasured confounder on mortality showed that the mortality benefit that we observed with Staged PCI became non-significant when the prevalence of a confounder in the OTCR group was approximately 50%, 30%, and 20% higher than in the Staged PCI groups assuming the hazard of death was 1.5, 2, and 3 times higher with a confounder present, respectively. There was no difference in the rate of blood transfusions between the Staged PCI (1.4%) and OTCR (1.3%) groups (p=0.96).

Conclusions: Staged PCI was driven primarily by procedural characteristics and unmeasured site variation, rather than patient characteristics, and was associated with lower mortality compared with OTCR. A prospective randomized trial comparing the two approaches is needed to guide clinical practice given the large variation in revascularization decision-making.

Categories

Fellow Research
Programme Code: 27

Cardiopulmonary aerobic fitness assessment and pulmonary function testing in tetralogy of Fallot patients after repair

Adam Powell, Wayne Mays, Sandra Knecht, Clifford Chin

Cincinnati Children's Hospital, The Heart Institute, Cincinnati, USA

Abstract

**Purpose:** The cardiopulmonary exercise test (CPET) is a valuable tool to assess cardiopulmonary exercise capacity in tetralogy of Fallot patients. While cardiac dysfunction is well described to cause exercise intolerance in these patients, there has been less known regarding the lung function in these patients and a potential co-factor of abnormal functional capacity. The pulmonary function test (PFT) is a method to measure lung performance and is routinely performed in our lab in concert with the cardiopulmonary exercise test. **Methods:** A retrospective chart review was done from 2015-2017 on patients with tetralogy of Fallot who underwent CPET with cycle ergometry. Exclusion criteria included submaximal tests (n=9). 57 tetralogy of Fallot patients remained and compared to normal predicted values. Study patients were compared to age, gender and size-matched normal controls. Additionally, QRS duration as measured on electrocardiogram (EKG) and both right-ventricular indexed end-diastolic volume (RVEDVi) and right ventricular ejection fraction (RVEF) by cardiac MRI were recorded in the study group to determine possible correlations. **Results:** The tetralogy of Fallot group demonstrated abnormal PFT results: forced vital capacity (FVC) (79.4%±18.6%), forced expiratory volume (FEV1) (75.9%±19.9%) and maximum voluntary ventilation (MVV) (71.5%±17.9%). The breathing reserve was low in 9/57 patients with tetralogy of Fallot (44.4±26.6). The tetralogy of Fallot group when compared to the normal controls demonstrated significantly lower exercise time (8.3±1.2 vs. 10±2.2, p<0.05), systolic blood pressure (SBP) at peak exercise (157.8±20.4 vs 181.6±23.9, p<0.05), heart rate at peak exercise (163.9±23.4 vs. 182.8±14.8, p<0.05), indexed peak oxygen consumption (VO2) (24.7±7.1 vs. 36.1±10.7, p<0.05), indexed peak oxygen pulse (10.5±4.8 vs. 13.4±4.6, p<0.05), VE/VCO2 slope (30.6±6.9 vs. 27.7±5.2, p<0.05), and indexed VO2 @RER 1.0 (18.4±5.7 vs. 25±8.1, p<0.05). Additionally, the FVC was positively correlated with the indexed maximal VO2 (r=0.29, p<0.05) and the indexed peak oxygen pulse (r=0.39, p<0.05) but was negatively correlated with the VE/VCO2 slope (r=-0.302, p<0.05). The FEV1 was positively correlated with the indexed maximal VO2 (r=0.38, p<0.05), the indexed peak oxygen pulse (r=0.39, p<0.05), and exercise time (r=0.27, p<0.05). The RVEDVi by cardiac MRI was positively correlated with both the FEV1 (r=0.33, p<0.05) and the MVV (r=0.34, p<0.05). **Conclusions:** Patients with repaired tetralogy of Fallot can have abnormal pulmonary function testing. Abnormal pulmonary function testing is associated with poor exercise capacity in patients with tetralogy of Fallot. Additional study should be performed to determine the etiology of abnormal PFT results in this population so that this can be treated with aggressive pharmacotherapy and cardiac rehabilitation.

Categories

Fellow Research
Abstract

Background: Pneumothorax (PTX) is a potential complication during transvenous cardiac implantable electronic device (CIED) implantation. An intramural protocol employing Trendelenburg position and routine venogram prior to axillary/subclavian venous access was developed to curtail the risk of PTX.

Methods: The protocol involved i) positioning the patient in Trendelenburg position prior to axillary/subclavian vein access (supine, legs elevated 15-30°), ii) obtaining a venogram of axillary/subclavian vein after injection of 10 cc iodinated contrast via peripheral venous access, ipsilateral to side of CIED implantation, iii) using the venogram as roadmap during venous access and iv) obtaining a chest x-ray to assess PTX 4 hours after the procedure. A total of 4622 leads were implanted during the study period of 30 months (intervention group). Control group comprised of 4622 leads consecutively implanted prior to the implementation of the protocol. In a subgroup analysis of patients (n=188) with chronic kidney disease (baseline creatinine > 1.5), pre-procedural creatinine was compared with the post procedure creatinine obtained within one week of the procedure.

Results: Both groups had similar clinical characteristics. There were 24 PTX (0.52 %) before and 12 (0.26%) after implementation of the protocol. The protocol significantly reduced the incidence of PTX (P = < 0.046). Routine venogram did not result in contrast induced nephropathy in patients with CKD. No clinical characteristic predicted the risk of PTX.

Conclusion: Routine contrast venogram and Trendelenburg position prior to venous access for CIED implantation reduces the risk of PTX without compromising renal function.

Categories

Fellow Research
**Myocardial Fibrosis in Myotonic Muscular Dystrophy: Highly Prevalent But Not Predictive of Pacemaker Implantation**

Andrea Cardona, William Arnold, John Kissel, Subha Raman, Karolina Zareba

1Division of Cardiovascular Medicine - The Ohio State University, Columbus, USA, 2Department of Neurology - The Ohio State University, Columbus, USA

**Abstract**

**Introduction:** Myotonic muscular dystrophy (MMD) is the most common muscular dystrophy in adults. Conduction system disease leads to cardiac arrhythmias and mortality in MMD, mitigated by timely permanent pacemaker implantation that has proven efficacy for prevention of sudden cardiac death (SCD). Cardiac magnetic resonance (CMR) studies have demonstrated high prevalence of myocardial fibrosis in MMD, though its association with surface conduction abnormalities remains uncertain. We explored the value of myocardial fibrosis by CMR in predicting pacemaker implantation in a cohort of consecutive patients with MMD.

**Methods:** Retrospective analysis of patients with genetically confirmed MMD was conducted. Standard 12-lead electrocardiography performed within 6 months of CMR exam was necessary for inclusion. Surface conduction abnormality was considered present if the PR interval was >200 msec and/or the QRS interval was ≥120 msec. Comprehensive CMR exams included cine imaging for quantification of ventricular volumes and function, myocardial T1 mapping, and late gadolinium enhancement (LGE). The presence, location, and mass of LGE were assessed blinded to clinical data. Patients’ charts were reviewed up to 12 months post-CMR for occurrence of permanent pacemaker (PPM) implantation.

**Results:** A total of 61 patients, 38% male and age 43.1±14.4 years, were identified for inclusion. Overall, 37 (61%) showed a surface conduction abnormality and 25 (41%) demonstrated myocardial fibrosis by LGE-CMR. After a median time of 42 days from the CMR exam, 18 patients (29.5%) underwent PPM implantation. Demographic and clinical characteristics were not significantly different between the LGE-positive and LGE-negative groups. Importantly, no ECG parameters, including evidence of surface conduction abnormality, differed between LGE-positive and LGE-negative groups. By multivariate logistic regression analysis, the presence of a prolonged QTc interval (>450 msec) was the only predictor of PPM implant (OR 7.6, 2.0-25.3, p<0.002). Presence and amount of myocardial fibrosis by LGE did not predict PPM implantation.

**Conclusions:** Myocardial fibrosis in MMD is highly prevalent but not related to surface conduction abnormality and subsequent need for pacemaker. The complementary predictive value of myocardial fibrosis in the absence of surface conduction abnormalities warrants further evaluation in SCD risk stratification in this disease.
Upper panels (A-C) show an abnormal ECG with prolonged PR interval and borderline QRS interval (A) of a subject with no evidence of myocardial fibrosis by LGE-CMR (B,C) that received a PPM implant. Lower panels (D-F) show a normal ECG (D) of a subject with evidence of extensive midwall fibrosis (E,F) who did not receive a PPM implant.
Abstract

Background - Mitral annular calcification (MAC) is emerging as an important disease in patients with mitral valvular dysfunction. It is recognized as a rare cause of mitral stenosis (MS). However, little is known regarding its natural history. In this study, we aimed to define the progression of MS in patients with severe versus non-severe MAC. Furthermore, risk factors for MAC progression and echocardiographic versus CT correlation were investigated.

Methods - Database for the years 1996 through 2013 was searched for patients who had severe MAC. MAC was graded into none (0), mild (1), moderate (2), or severe (3) in a semi-quantitative manner. It was then grouped into severe (3) and non-severe (1,2) groups. Patients were included if they had MAC at their index study and underwent ≥ 2 studies in the period of ≥ 2 years. Patients with prior mitral valve (MV) surgery, rheumatic heart disease, or other identifiable MV disease were excluded. MV gradients were evaluated with peak and mean MV gradients, right ventricular systolic pressure (RVSP) and mitral valve area (MVA) from pressure half time (PHT) method. Mixed model analysis was applied obtain the MS progression rates. Patients that had chest CT scans during the study period were further identified and their Ca score were measured. Ca scores were log-transformed for correlation analysis.

Results – A total of 2995 patients (18794 studies) were included. Data are expressed as mean ± standard deviation. Population age at index study was 71 ± 11 years. Follow up time was 5.4 ± 3.2 years. Number of echocardiograms performed per patient was 5 ± 3. MS progression rates between non-severe and severe MAC were: peak gradient (0.92 vs 1.849mmHg, p <0.001), mean gradient (0.041 vs 0.561mmHg, p< 0.001), RVSP (3.398 vs 5.249mmHg, p <0.001), MVA (0.163 vs -0.052cm², p < 0.001). Of those identified, appropriate, accessible chest CT scans were found in 78 patients (Contrast: 47, Non-contrast: 31). Of those patients, echocardiographic median MAC grade was 2 ± 0.5 (N=mild: 4, moderate: 56, severe: 18). Overall Calcium score range was 2 to 59174, median was 1106 (IQR: 240 – 4332). Correlation coefficient between echocardiographic MAC grade and CT Calcium score was 0.38 with p < 0.001. Age >= 65, male sex, EF < 50%, CKD stage >= 4, atrial fibrillation (AF), leaflet prolapse, warfarin use and left ventricular hypertrophy (LVH) were identified as potentially important factors for MAC progression using a univariate model using a p cutoff of < 0.1. Multivariate modeling revealed risk factors for progression of significance were age >= 65, CKD stage 5, and LVH.

Conclusion – Compared to non-severe MAC, patients with severe MAC had faster progression of MS, at a rate faster than rheumatic MS. Risk factors for MAC progression was similar to that of MAC pathogenesis. Echocardiography and CT assessment of MAC had statistically significant correlation.

Categories

Fellow Research
Initiation and Outcomes with Class Ic Antiarrhythmic Drug Therapy

Diego Alcivar Franco, Xu Gao, Benjamin Buck, Dilesh Patel, Michael Boyd, Muhammad Afzal, Auroa Badin, Hemant Godara, Zhenguo Liu, Jaret Tyler, Steven Kalbfleisch, John Hummel, Raul Weiss, Ralph Augustini, Mahmoud Houmsee, Emile Daoud

Ohio State University, Columbus, USA

Abstract

Background: Expert opinion recommends performing exercise testing with initiation of Class Ic antiarrhythmic medication.

Objective: To evaluate the rate and reason for discontinuation of Ic agent within the first year of follow up, with particular attention to rate of proarrhythmia and the value of routine treadmill testing.

Methods: This is a single center retrospective cohort study including consecutive patients with atrial arrhythmias who were initiated on a Class Ic agent from 2011-2016. Data was collated from chart review and pharmacy database.

Results: The study population included 300 patients (55% male, mean age 61; mean ejection fraction, 56%) started on flecainide (n = 153; 51%) and propafenone (n = 147; 49%). Drug initiation was completed while hospitalized on telemetry and dosing was directed by the staff electrophysiologists. There was one proarrhythmic event during initiation (0.3%). The primary reason for not being discharged on Ic agent was due to detection of proarrhythmia (n = 15) or ischemia (n = 1) with treadmill testing (7%). Exercise testing affected the decision to discontinue Ic drug, p <0.0001 (95% CI: 2.4-9.9%). During follow up, the primary reason for discontinuation of Ic agent is lack of efficacy, 32%.

Conclusions: With proper screening, initiation of Class Ic agent is associated with very low rate of proarrhythmia. Treadmill testing is of incremental value and should be completed in all patients after loading Class Ic antiarrhythmic

Categories

Fellow Research
Programme Code: 49

Routine contrast venogram and Trendelenburg position prior to implantation of cardiac implantable electronic devices significantly reduces the risk of pneumothorax

Courtney Campbell, Muhammad Afzal, Nicholas Amata, Nancy Matre, Kari Dunham, Patricia Black, Dilesh Patel, Auroa Badin, Hemant Godara, Toshimasa Okabe, Jaret Tyler, Mahmoud Houmsse, Steven Kalbfleisch, Raul Weiss, John Hummel, Emile Daoud, Ralph Augustini

The Ohio State University Wexner Medical Center, Columbus, USA

Abstract

Background: Pneumothorax (PTX) is a potential complication during transvenous cardiac implantable electronic device (CIED) implantation. An intramural protocol employing Trendelenburg position and routine venogram prior to axillary/subclavian venous access was developed to curtail the risk of PTX.

Methods: The protocol involved i) positioning the patient in Trendelenburg position prior to axillary/subclavian vein access (supine, legs elevated 15-30°), ii) obtaining a venogram of axillary/subclavian vein after injection of 10 cc iodinated contrast via peripheral venous access, ipsilateral to side of CIED implantation, iii) using the venogram as roadmap during venous access and iv) obtaining a chest x-ray to assess PTX 4 hours after the procedure. A total of 4622 leads were implanted during the study period of 30 months (intervention group). Control group comprised of 4622 leads consecutively implanted prior to the implementation of the protocol. In a subgroup analysis of patients (n=188) with chronic kidney disease (baseline creatinine > 1.5), pre-procedural creatinine was compared with the post procedure creatinine obtained within one week of the procedure.

Results: Both groups had similar clinical characteristics. There were 24 PTX (0.52 %) before and 12 (0.26 %) after implementation of the protocol. The protocol significantly reduced the incidence of PTX (P = < 0.046). Routine venogram did not result in contrast induced nephropathy in patients with CKD. No clinical characteristic predicted the risk of PTX.

Conclusion: Routine contrast venogram and Trendelenburg position prior to venous access for CIED implantation reduces the risk of PTX without compromising renal function.

Categories

Fellow Research
Standardizing the Care of Outpatient Pediatric Chest Pain: A Lesson in Utilization and Charge Reduction

Colleen Pater1, James Brown2, Katherine Simon2, Jeff Anderson1, Christopher Statile1

1Heart Institute - CCHMC, Cincinnati, USA, 2James M. Anderson Center for Health Systems Excellence - CCHMC, Cincinnati, USA

Abstract

Background: Chest pain is a common presenting complaint in a general pediatric cardiology outpatient clinic. The majority of cases are not due to significant cardiac pathology. It has previously been demonstrated that medical history, exam, and EKG were sufficient to determine which patients needed additional testing. It has been shown that a clinical chest pain algorithm can lead to decreased practice variation and resource utilization. Variability in medical practice is associated with higher cost without improved outcome.

Objective: Our aim was to standardize the evaluation and treatment of chest pain in an outpatient cardiology setting and track resultant charge savings.

Methods: A multidisciplinary team developed a care algorithm using best evidence and expert consensus for evaluation of otherwise healthy pediatric patients with chest pain. Quality improvement methods guided acceptance and implementation of the algorithm into our cardiology clinics. Primary outcome measure was weekly mean charge per patient, primarily driven by the number of cardiac tests ordered. Total charges were compared using patient billing data. Statistical process control charts evaluated the system over time. Baseline data (7/2016-10/2016) were collected and data were monitored after implementation of the algorithm through 8/2017.

Results: There were 270 patients identified during the baseline period: median age 14.3 years (2-19); 18% were less than 10 years old, 59% female; 81% Caucasian. At the midpoint after algorithm implementation, there were 174 patients evaluated: median age 13.8 years (3-18); 17% were less than 10 years old; 56% female; 82% Caucasian. When utilized, 91% of providers followed the proposed algorithm. Following introduction, there was a significant shift in mean charge per patient of 28% from $1,785 to $1,284. This was driven primarily by reduction in testing beyond an electrocardiogram, from 32% of patients to 20%. There was also a decrease in the standard deviation of charge per patient of 48% from $1,631 to $856, indicating improved standardization in variable practice patterns.

Conclusion: Standardization of evaluation for pediatric patients presenting with chest pain resulted in a significant charge decrease for our patients. This study highlights the generalizable process of standardization, as well as the importance of obtaining consensus and using quality improvement methodology to gain reliable use. Standardization can lead to a measurable reduction in testing and charge to the patient. This process can be used by clinicians as prototype by which to standardize other similar clinical decisions.

Categories

Fellow Research
Pericardial Complications After Cardiac Implantable Electronic Device Placement: A Systemic Review and Meta-Analysis

Andrew Noll, Beni Verma, Chandra Ala, Kinjal Banerjee, Mustanser Badar, Arnav Kumar, Ayman Hussein, Allan Klein

Cleveland Clinic, Cleveland, USA

Abstract

Introduction: Post cardiac injury syndrome (PCIS) is an emerging condition which includes pericarditis, pericardial effusion and tamponade. It is associated with increased long-term morbidity and adverse quality of life. Data are lacking about the incidence of these complications after permanent pacemaker, implantable cardiac defibrillator, and cardiac resynchronization therapy device implantation. The diagnosis can be difficult due to delay in symptom onset and differing presentations. We performed a meta-analysis to determine the incidence of PCIS after cardiac implantable electronic device (CIED) placement.

Methods: Medline, Embase and Cochrane CENTRAL databases were searched according to PRISMA guidelines for literature published from February 2007 until February 2017 for randomized controlled trials, clinical trials, and observational studies evaluating pericardial complications subsequent to CIED implantation. Primary outcome was the total incidence of pericarditis, pericardial effusion and cardiac tamponade.

Results: Of 823 references, 20 articles (enrolling 241,941 patients) were included. Primary outcomes 30 days after the procedure were reported by 19 studies while 1 year follow-up was reported in 8 studies. Pooled estimates from random effects analysis showed an overall incidence of 6.25 per 1000 patients (95% confidence interval [CI], 4.33 – 8.17) at 30 days, and 1.12 per 1000 (95% CI: 0.23 – 2.47) at 1 year. Heterogeneity was very high ($I^2 = 97\%$, $p < 0.01$) and was possibly due to variations in selected patient cohorts in the articles.

Conclusion: In our analysis of literature from the last decade, CIED implantations are associated with low incidence of pericardial complications at 30 days. Additional studies are needed to determine the long term incidence of PCIS in this study group.

Categories

Fellow Research
Right ventricular dysfunction parameters in patients with Low Ejection Fraction and undergoing CABG are associated with increased post-operative adverse events.

Jered Cook, Andaleeb Chowdhury, George Moukarbel, Sana Chikodi, Thomas Schwann, Mark Bonnell, Christopher Cooper, Samer Khouri

University of Toledo, Toledo, USA

Abstract

Background: Left ventricular failure increases pulmonary venous pressure and with time results in pulmonary vascular remodeling and eventually right ventricular dysfunction (RVD). Such patients might be at increased risk for right ventricular failure post cardiac surgeries.

Aim: To identify right ventricular echocardiographic parameters in patients with EF<40% undergoing isolated CABG which are associated with 30 days post-operative major adverse events (POMAE).

Method: Retrospective study including all patients undergoing isolated CABG at the University of Toledo Medical Center from 2006 to 2014. Preoperative echocardiogram and society of thoracic surgeon databases were reviewed for each patient. Independent echocardiographic variables were LAVI, LVEDV, LVESV, E/e’, right atrial area, basal RV diameter, RV dP/dt, TAPSE, TDI S’, TV E/e’, RVSP and RIMP. 30 days POMAE included at least one of the following; 30 days mortality, post-operative atrial fibrillation, renal failure, cardiac arrest, multisystem failure, prolonged ventilation time, re-intubation and readmission due to cardiac causes.

Results: 105 patients who underwent CABG had an EF<40%. The average age was 67±12 years with majority being male (n=72, 69%). E/e’>14 (p=0.047, CI: 1.01-4.9), RVSP>35 (p=0.04, CI: 1.04-5.05), RVFAC<35% (p=0.026, CI: 0.77-0.85) and RIMP>0.55 (p=0.038, CI: 1.05-6.11) were found to be associated with 30 days POMAE.

Conclusion: RVD parameters in patients with EF<40% were associated and can be predictive of 30 days POMAE. Using a non-invasive modality such as an echocardiogram to screen patients for RVD will aid in pre-operative risk stratification and decision making.

Categories

Fellow Research
A Multi-disciplinary approach to cardiovascular risk reduction in the statin intolerant population

Salvatore Savona, Kristina Moon, Haikady Nagaraja, Kavita Sharma

The Ohio State University, Columbus, USA

Abstract

Background:

The 2013 American College of Cardiology/American Heart Association Blood Cholesterol guidelines indicate that patients who require cardiovascular risk reduction would benefit from statin therapy, after patient-clinician discussion. However, statin intolerance can complicate this management.

Objective/Purpose:

To examine efforts of a multi-disciplinary lipid clinic to start statin therapy and reduce calculated low density lipoprotein cholesterol (LDL-C).

Methods:

A retrospective institutional chart review of the lipid clinic over 38 months was performed on patients seen on at least three occasions.

Results:

A total of 166 patients were included, and 98 had a history of statin intolerance. All-comers, those with statin intolerance, and those without statin intolerance had a baseline mean LDL-C of 148 mg/dL, 151.8 mg/dL and 126 mg/dL, respectively. At follow-up, the mean LDL-C decreased to 108.5 mg/dL for all patients. The decrease in LDL-C in the statin intolerant and statin tolerant groups was 34 mg/dL and 30.5 mg/dL respectively, a similar decrease with no statistically significant difference between the groups. Only 32% of those with statin intolerance were on a statin at baseline, improving to 72.1% at follow-up.

Of those with statin intolerance, 66 were not on a statin initially. At follow-up, 65% were on a statin and had a statistically significant mean reduction in LDL-C of 48 mg/dL (95% CI 37-60) compared to 25.5 mg/dL (95% CI 9-42) in the patients who were not on a statin at follow up. The average number of appointments was 5.5 for those on statin at follow-up and 5.7 for those not on a statin at follow-up, with an average treatment time of 1.11 and 0.98 years, respectively.

Conclusion:

The results of our study indicate that patients with statin intolerance can achieve a statistically significant lowering of their LDL through a collaborative approach with cardiologists and pharmacists. This highlights the importance of a cost effective personalized concerted approach to achieve guideline directed therapy. Future studies may need to focus on the ability to achieve cardiovascular exercise and dietary goals through an approach incorporating dieticians and exercise therapists.

Categories

Fellow Research
Periperafe Clinical outcomes with uniterupted anticoagulation during implantation of subcutaneous implantatble defibrillator (S-ICD)

Muhammad Rizwan Afzal, Divyesh Mehta, Christopher Evenson, Raul Weiss, Daniel Pinkhas, Emile Daoud, Toshimasa Okabe

OSUWMC, Columbus, USA

Abstract

Background: The subcutaneous implantable cardioverter defibrillator (S-ICD™) is a new technology; therefore the implantation technique and perioperative care is evolving.

Objective: To assess whether it is safe to perform S-ICD implantation with uninterrupted anticoagulation (AC).

Methods: A retrospective review of patients undergoing S-ICD implantation during 10/2012 to 06/2017 was performed. The most common indication for the implantation was primary prevention of sudden cardiac death (75 %). AC with Warfarin or newer anticoagulants (NOACs) was continued in 25 patients group 1). Other 112 patients were either not on AC or it was stopped prior to the procedure (group 2).

Results: 137 patients underwent successful S-ICD implantation during study period. Perioperative clinical outcomes including procedure duration, significant pocket hematoma and hospital stay was collected from chart review. 6 patients (24 %) from group 1 while only 1 patient (0.9 %) in the group 2 developed significant hematoma. HAS-BLED or CHADS2-VASC score did not predict the risk of hematoma. Concomitant use of aspirin or dual antiplatelet therapy also did not predict the risk of hematoma.

Conclusion: Uninterrupted AC with Warfarin or NOACs during SICD implantation increases risk of pocket hematoma. Further randomized studies are need to evaluate the safety of uninterrupted AC during implantation of S-ICD.

Categories

Fellow Research
Fellow in Training

Case Abstracts
Final category: Fellow Case

Programme Code: 2

GIANT PSEUDO ANEURYSM –IN ERA OF PCI

Bharat Marwaha, Heminder Meet Singh, Pooja Suri, Syed Sohail Ali, Christopher Philips

Mercy St Vincent Medical Center, Toledo, USA

Abstract

Introduction:
Rupture of the free wall of the left ventricle (LV) is a catastrophic complication occurring in 4% of patients after myocardial infarction (MI) and in 23% of those who die of MI. Left ventricular pseudo aneurysms form when cardiac rupture is contained by pericardial adhesions. True aneurysm is caused by scar formation which results in the thinning of myocardium. It is clinically important to differentiate between two as management differs.

Case Report: 74 year old Caucasian female presented to the emergency department with shortness of breath and typical chest pain. Systolic rumbling murmur in mitral area heard. She had C.A.D S/P left circumflex proximal and mid segment and R.C.A Drug eluting stent in 6/2015. E.K.G showed non specific ST Segment changes & troponin were normal. Chest X ray showed retro cardiac opacity. CT Chest showed defect in inferior wall of left ventricle with 6.4 cm * 7.2 cm mass with small neck. CT Surgery and Cardiology evaluated the patient and decided for diagnostic cardiac cath. Patient’s home medications lisinopril, coreg, aspirin, plavix and Lipitor were resumed along with saline to prevent contrast induced nephropathy.

Management: Cardiac catheterization showed Left main: Distal 35% Stenosis, LAD: Proximal 20% stenosis, LCX: Osstial 40% Stenosis, patent mid stent area, OM1: Osstial 90% stenosis RCA: Patent stents with minimal disease. It showed the anterior-apical pseudo aneurysm. Intra operative Trans Esophageal Echocardiogram showed 5.5 cm pseudo aneurysm inferior to the basal posterior segment with severe mitral regurgitation and ejection fraction 35%. Team found a 1.5 cm circumferential hole directly communicating with the ventricle. 1.5 mm diameter dacron graft was sewn in place using suture followed by 2 cm diameter pericardial patch that was then sewn around the surrounding tissue. Patient had C.A.B.G with saphenous vein graft to OM-1. The patient had a mitral valve repair with a 33 mm Attune annuloplasty ring. Patient was discharged home after 7 days with cardiac rehab and follow up echo in 1 month showed 55% EF.

Discussion:
Myocardial infarction (55%), surgery (33%), trauma (7%), followed by infection (5%) are common etiologies for the pseudo aneurysm. Congestive heart failure (36%) is the most common presentation followed by angina (30%), ventricular arrhythmias and embolization. 10 to 20% of cases are discovered incidentally on imaging. EKG and X ray chest findings are nonspecific. Diagnostic modalities include computed tomography, echocardiography and magnetic resonance imaging. Contrast Ventriculography and coronary angiography helps in evaluating the location and anatomy of the aneurysm.

Characteristic findings of pseudo aneurysm include the neck diameter 50% smaller than the maximum diameter of the aneurysm, lack of surrounding coronary arteries and posterior location compared to anterior location in true aneurysm.

Surgical intervention is recommended as the benefits outweighs the risks. Smaller sizes (<3 cm) and chronic pseudo aneurysm developing after the years of the myocardial infarction can be monitored by serial echo. 48% mortality has been found in patients with conservative management compared to (23 %) mortality after surgical intervention.

It is a rare clinical scenario with advancement in medical science, but has been associated with diagnostic ambiguity and grave outcomes.

Categories
Fellow Case
Programme Code: 10

Intra-Aortic Migration of Epicardial Pacing Wire

Omar Kahaly, Dilesh Patel, Ralph Augustini, Gregory Rushing, Mahmoud Houmsse

The Ohio State University Wexner Medical Center, Columbus, USA

Abstract

Temporary epicardial pacing wires are routinely placed during open heart procedures. Typically, these wires are removed prior to hospital discharge; however, in certain cases, removal poses a greater risk than leaving the retained temporary pacing wires in the mediastinum. Long-term complications from retained temporary epicardial pacing wires are not fully known. We present a case where a retained temporary epicardial pacing wire was found to have migrated into the aorta.

Categories

Fellow Case
Programme Code: 16

Coronary Artery To Pulmonary Artery Fistula

Sravya Chirumamilla, Niranjan Reddy

Kettering Medical Center, Kettering, USA

Abstract

61-year-old male patient with hypertension, hyperlipidemia, obstructive sleep apnea, presented with angina. Electrocardiogram was revealing of sinus rhythm without ST or T wave changes. There was no elevation in cardiac enzymes. Given persistent symptoms, coronary vascular evaluation was undertaken.

Though not revealing of obstructive coronary disease, coronary evaluation was suggestive of a fistula from Conus artery to Right Pulmonary artery.

Echocardiogram was revealing of normal left ventricular ejection fraction and normal pulmonary artery systolic pressures.

Patient underwent CTA for further evaluation. Management was geared toward risk factor modification and patient remains symptom free through two year follow-up.

Discussion: Though identified as early as 1840s, coronary pulmonary fistulas remain rare. Studies vary in terms of origin of the fistula site and drainage -- either right or left system origin with drainage into the right ventricle and pulmonary artery. We present a rare case of Conus artery to Pulmonary artery fistula, which is rare in its origin and in its termination. Management of asymptomatic patients remains controversial as nearly 50% remain asymptomatic upon follow-up. Symptoms may be due to coronary steal phenomenon and include but are not limited to recurrent angina, congestive heart failure. Symptomatic patients are recommended to undergo surgical or percutaneous fistula ligation or coil embolization.

Categories

Fellow Case
Varicella-Zoster Induced Cardiomyopathy; A Rare Occurrence

Muhammad Chaudhry, Nagapradeep Nagajothi, Sandeep Anreddy, Ira Friedlander

Aultman Hospital, Canton, USA

Abstract

Introduction: Varicella Zoster infection related cardiomyopathy is extremely rare. The pathogenesis remains largely elusive.

Case presentation:
An 83-year-old man with previous history of hypertension and hyperlipidemia was admitted with one week of worsening lower back pain. Blood pressure was 195/125 mm/Hg. Initial troponin was 0.109 ng/ml and peak was 0.11 ng/ml.

Electrocardiogram demonstrated normal sinus rhythm, right bundle branch block and left anterior fascicular block. An echocardiogram performed two months prior to admission demonstrated normal left ventricular ejection fraction (LVEF) of 55 to 60% and mild pulmonary hypertension.

Within three days, a characteristic vesicular rash developed in the right lower lumbar region. Dyspnea with minimal exertion developed and physical examination revealed worsening volume overload. Diuresis was initiated with Intravenous Lasix. Lexiscan stress test demonstrated a marked change with diffuse hypokinesis and LVEF of 30%. Right and left heart catheterization did not reveal significant coronary artery disease. There were elevated filling pressures but no Takotsubo pattern on ventriculogram. Repeat echocardiogram demonstrated an LVEF of 25-30%, moderate mitral regurgitation and pulmonary artery systolic pressure of 65 mm/Hg. Volume status was corrected and therapy was optimized. Varicella rash resolved in two weeks. Multi-gated acquisition scan (MUGA) three months post hospital discharge demonstrated normalization of LVEF to 48%.

Conclusion:
The sequence and time frame of clinical events with typical rash in dermatomal distribution followed by development of reversible LV dysfunction was suggestive of Varicella Zoster induced cardiomyopathy. This cardiomyopathic process responded well to optimal medical management. The spectrum of this disease entity can vary from subclinical infection to fulminant heart failure. Detailed physical examination and clinical correlation leading to timely diagnosis and rapid institution of therapy is associated with favorable clinical outcomes.

Categories
Fellow Case
Programme Code: 18

A Case of Scleroderma Induced Cardiomyopathy

Samira Bahrainy

Wright State University, Dayton, USA

Abstract

Introduction/Objective: Scleroderma (systemic sclerosis, SSc) is an autoimmune disease characterized by small vessel vasculopathy and deposition of collagen in vessels and connective tissue. Hallmark of diffuse disease include the extension of skin fibrosis proximal to the wrists, and increased risk of renal, lung and cardiac involvement. Due to improvement in treatment of renal crisis, pulmonary and cardiac disease have now become the main causes of death in SSc with a 10-year survival rate of 66%.

Case presentation: A 44-year-old female with known non-ischemic cardiomyopathy (NISC) was referred to University of Washington Medical Center for evaluation of advanced heart failure therapy. Her past medical history included mild hypothyroidism, NISC with NYHA Class 3b symptoms (normal angiogram within the last year) and single lead ICD placement for ventricular tachycardias within the last year. Her medications included digoxin, spirinolactone, ACE I and betablocker. Physical examination showed bilateral waxy thickening of the skin extending from dorsum of the fingers to the proximal forearms with hypohidrosis and yellow hue. In her fingers she had diffused sclerodactyly and limited flexion (Figure 1). History also revealed new Raynaud symptoms for 1 year.

Pulmonary and cardiac studies displayed mild restrictive lung disease, severely reduced global systolic function with an ejection fraction (EF) of 6% and moderate right ventricular enlargement. There was no evidence of infarct on cardiac viability study. Right heart catheterization results are summarized in Table 1.

6mm skin punch biopsy from the proximal forearm showed thick, closely packed hyalinized collagen bundles with loss of adventitial fat around eccrine glands (Figure 2). Laboratory studies demonstrated elevated antinuclear antibody titer (1:640), erythrocyte sedimentation rate, creatine kinase and indeterminate Scl-70 and RNP antibodies.

Based on the above findings heart failure was thought to be secondary to myocarditis associated with diffuse systemic sclerosis and myositis. While initially ina- aortic ballon pump was in place, she was started on intravenous methylprednisolone and transitioned to a long PO prednisone taper. Throughout this period she remained on her baseline cardiac medications. She was then given a single dose of rituximab, ultimately discontinued because of hypotension, and subsequently placed on cyclophosphamide. Repeat echocardiogram after 30 days of therapy showed improvement in her EF to 34%. At 3 months of follow-up, she was transitioned off cyclophosphamide and on to mycophenolate mofetil (MMF) for maintenance therapy. 6 months out, she continued on MMF with stable EF, and reported increased energy, resolution of dyspnea on exertion and orthopnea symptoms.

Discussion/Conclusion: This case demonstrates diffuse systemic sclerosis with myocarditis overlap presenting as congestive heart failure and responding to treatment with high dose glucocorticoids, cyclophosphamide and mycophenolate mofetil. Histological involvement of myocardium and pericardioim occur in up to 80% of patients with SSc. There are very few published reports on effective treatment of scleroderma related acute myocarditis. This is the first report of myocarditis in the setting of diffuse SSc with good response to the above combination of treatment.
Table 1: Right Heart Catherization

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>RA</td>
<td>4</td>
</tr>
<tr>
<td>PA</td>
<td>20/9</td>
</tr>
<tr>
<td>PCWP</td>
<td>8</td>
</tr>
<tr>
<td>CI/CO</td>
<td>2.1/3.3</td>
</tr>
<tr>
<td>SVR</td>
<td>1743</td>
</tr>
<tr>
<td>SVO2</td>
<td>60%</td>
</tr>
</tbody>
</table>

Figure 1:

![Figure 1](image1.jpg)

Figure 2:

![Figure 2](image2.jpg)

Categories

Fellow Case
PFO closure in high risk patient with Paradoxical Arterial Embolism, Deep Vein Thrombosis, Pulmonary Embolism, and Factor V Leiden Genetic Mutation

Vacek Thomas

Wright State University, Dayton, USA

Abstract

Those who suffer a stroke have no absolute indication for mechanical closure of a PFO (Patent Foramen Ovale). Patient was advised that closure is off label but opted to proceed with closure with the severity of presentation and factor V Leiden heterozygosity; Amplatzer PFO occluder device was deployed later in clinical course. We describe the case of a 51 year old male who had presented with left arm pain and shortness of breath. The CT angiography of chest showed pulmonary emboli with heavy clot burden bilaterally. Heparin was started, but patient was found to have occlusion of the left brachial artery. Emergent left axillary, brachial, radial, and ulnar embolectomy for acute critical arm ischemia was performed. The Transthoracic echocardiogram that was done the next day with bubble study was positive for PFO (patent foramen ovale). Long term anticoagulation was started with rivaroxaban since patient presented with unprovoked PE.

Categories

Fellow Case
Programme Code: 22

Anomalous Connection of the IVC to the Left Atrium

Jeremy Steele, Francine Erenberg, Malek El Yaman, David Majdalany

Cleveland Clinic Foundation, Cleveland, USA

Abstract

Objective

Recognize the symptoms of anomalous IVC to the left atrium, the imaging needed for diagnosis, and the treatment.

Case Presentation

A 23 year old male was referred to our center for evaluation of cyanosis and erythrocytosis found incidentally during a workup for nephrolithiasis. He had no significant past medical history but reported that as a child he had difficulty keeping up with his peers and would tire easily. Presently, he is very active participating in cross fit and distance running noting occasional dizziness and fatigue with significant exertion. The remainder of his cardiac review of systems was negative. Physical exam was remarkable for clubbing and a fixed-split-second heart sound without a murmur. His oxygen saturation in room air was 94%. Chest x-ray was unremarkable. Electrocardiogram showed sinus rhythm with sinus arrhythmia and an incomplete right bundle branch block. During a walk test, pulse oximetry decreased to 80% with prolonged time interval prior to return to saturation of 94%. A transthoracic echocardiogram showed normal atrio-ventricular and ventriculo-arterial concordance, normal ventricular size and function and the presence of an atrial level shunt by color Doppler and agitated saline contrast but overall the atrial septum was poorly visualized.

He was referred to the pediatric cardiology catheterization laboratory for assessment of his anatomy and hemodynamics as well as a trans-esophageal echocardiogram. The trans-esophageal echocardiogram revealed an anomalous IVC connection to the left atrium with a secundum atrial septal defect with continuous left to right flow. This was further confirmed by angiography performed in the IVC. The Qp:Qs was 0.85 : 1; his pressure data was normal. The patient was referred for surgery where the septum primum was unroofed to the level of the IVC orifice and then closed in a manner that baffled the IVC flow anteriorly into the right atrium. Post-operative trans-esophageal echocardiogram showed no residual atrial septal defect and unobstructed IVC, SVC and pulmonary venous flow. He was discharged home on post-operative day three with a saturation of 98% on room air.

Discussion

Anomalous IVC to the left atrium is most likely the result of a persistent right sinus venosus valve that fuses with the superior part of the secundum septum. Most commonly IVC flow to the left atrium is iatrogenic during the repair of an inferior secundum atrial septal defect where the surgeon can mistake a prominent Eustachian valve for the inferior atrial septal rim.

Isolated drainage of an anomalous IVC to the left atrium is a rare congenital anomaly with an unknown prevalence. It was first described in 1955 by Dr. Gardner as an autopsy finding of a 32 year old female. It is reported in the literature only as case reports. This anomaly results in cyanosis and polycythemia with its complications. The patients are often young adults at the time of diagnosis. Diagnosis is made by either by invasive imaging or less invasively with cardiac MRI or CT angiography. Surgical correction is required and post-surgical prognosis is excellent.

Categories

Fellow Case
“Clot in Transit” A commonly missed diagnosis with Pulmonary Embolism.

Ebrahim Sabbagh, Mujeeb Sheikh

University of Toledo, toledo, USA

Abstract

Introduction

A clot in transit is a serious and life threatening manifestation of pulmonary embolism. This clot is a free floating in the right side of the heart going to the pulmonary arteries. Although seen only in approximately 4% of patients with pulmonary embolism it is usually under diagnosed due to the limited number of emergent echocardiographs done on patients with pulmonary embolism. The mortality rate of these patients are high 27-45%. The course is rapid and mortality is seen within the first 24 hours.

Case Details

An 80 year old male with no past medical history presented to the ER of outside facility with increasing dyspnea for the past ten days. Two weeks prior the patient had a fall and hasn’t been as mobile as his usual. CTA that showed completely occluded right pulmonary artery and a partially occluded left pulmonary artery. Patient was transferred to our facility for possible ekos. On arrival an emergent bed-side echocardiography was done and patient was found to have transit clot from right atrium to left atrium. It was thought he would not to be a candidate for Ekos due to possible showering of clots. Decision was made that he would be a better candidate for surgery. Embolectomy was performed with no complications. The clot was found to be going from right atrium all the way to the pulmonary arteries. Surgery was successful in removing most of the clot. There was some degree of clot that was not able to be removed in the subsegmental areas. Picture of the clot in the right atrium is seen in figure. Patient improved and was able to go home in a couple of days.

Discussion

Clot in transit is easily missed due to the lack of obtaining echocardiograph with pulmonary embolisms. Massive pulmonary embolisms should always have an emergent echocardiograph to look at the degree and burden of the embolism. The patient may look stable but could quickly change. Due to the rapid mortality of clot in transit the decision of treatment should be made quickly. There many treatments options for massive pulmonary embolism with heparin, systemic TPA, ekos, and embolectomy being the most common methods. Due to the high risk of showering with tPA and EKOS, embolectomy is a safer option for the patient depending on the size of the transit clot.

Categories

Fellow Case
Aggressive Aortopathy in Neonatal Marfan Syndrome

Laura D’Addese, Rukmini Komarlu, Kenneth Zahka

Cleveland Clinic Children’s, Cleveland, USA

Abstract

Introduction: Neonatal Marfan syndrome (NMFS) is a rare, severe form of Marfan syndrome (MFS) with a poor prognosis. While aortic dilatation is common, dissection is not and death typically occurs at a young age from congestive heart failure (CHF) secondary to severe atrioventricular valve (AV) regurgitation and ventricular dysfunction. Systemic findings are more prevalent and at least 70% of cases result from de novo mutations.

Case Presentation: 11 month old female with prenatally diagnosed aortic root dilatation. Her mother has ectopia lentis and aortic root dilatation as diagnostic criteria for MFS, but negative genetic testing for FBN1. Initial post-natal echo showed myxomatous, severely prolapsing AV valves, mild tricuspid (TR) and mitral regurgitation (MR), normal biventricular size and function, and moderate aortic root dilation (1.46 cm, Z-score 3.90), as well as an aberrant right subclavian artery with Kommerell’s diverticulum. Marked arachnodactyly, scoliosis, malar hypoplasia, flat corneas, and pectus deformity were noted. She had persistent arterial desaturation due to right diaphragm eventration causing hepatic compression of the right atrium which streamed IVC blood across a PFO. Chromosome microarray showed a 17q22 microdeletion and whole exome sequencing demonstrated a partial FBN1 deletion.

Atenolol and losartan were started at 6 weeks of age following significant progression of her aortic root dimension (figure 1). Her AV valve regurgitation remained mild. At 4.5 months of age she was admitted in congestive heart failure (CHF) refractory to maximal medical therapy. She had severe TR, moderate MR, and trivial aortic regurgitation. Her aortic root measured 2.46 cm (Z-score of 9.14). She underwent mitral and tricuspid valvuloplasty and right hemidiaphragm plication. Post-operative TEE demonstrated persistent moderate MR.

Serial echocardiograms showed worsening MR and progressive aortic root dilatation. She was re-admitted in CHF at 9.5 months and underwent a second mitral valvuloplasty with leaflet resection and artificial chordae creation. Her aortic root measured 3.1 cm (Z-score 13). Despite losartan being switched to irbesartan, her most recent echo showed further aortic root dilation to 3.35 cm (Z-score 14.4) with compression of the left atrium (LA) and left-sided pulmonary veins between the dilated aortic root and spine. Chest CT revealed near complete obliteration of the LA.

Discussion: Neonatal Marfan syndrome is a rare disorder with a poor prognosis. While aortic root dilatation is seen, dissection is unusual and death typically results from CHF due to mitral regurgitation and ventricular dysfunction. We show that successful AV valve repair is possible in this population. However, our patient’s aortic dilatation progressed despite high dose combined angiotensin receptor and beta blocker therapy. Aortic root remodeling is planned to relieve her atrial compression and eliminate her risk of type A aortic dissection. We speculate that her disease is the result of her compound 17q22 microdeletion and her partial FBN1 deletion since neither one alone would explain her phenotype. The long term risk of thoracic aortic dilatation and dissection, including her Kommerell diverticulum, as well as the challenge of her non-cardiac systemic features remains to be defined.

Figure 1
Categories

Fellow Case
Balloon valvuloplasty for severe calcific pulmonic stenosis in an adult.

Jordan Thomas, Peter Bittenbender, Justin Dunn, Meharsi Singh

Summa Health, Akron, USA

Abstract

A 71 year old male presented to the hospital with cough, exertional dyspnea, and progressive lower extremity edema. Noted medical history included permanent atrial fibrillation, PVD, and COPD. ECG demonstrated rate-controlled atrial fibrillation with right axis deviation. A review of outpatient records from the past 10 years revealed intermittent episodes of mild lower extremity edema and exertional dyspnea controlled with a loop diuretic.

A chest x-ray at admission indicated cardiomegaly with right sided enlargement and pulmonary artery dilation. An echocardiogram demonstrated preserved LVEF, severely dilated RA/RV and RV hypertrophy. There was markedly elevated RV pressure with RVSP >100 mmHg and a mean gradient across the pulmonic valve of 65 mmHg. Peak velocity across the pulmonic valve was measured at 5.2 m/sec. The interventricular septum was D-shaped and there was at least moderate TR. Moderate RV dysfunction was noted with mean RA pressure estimated at >15 mmHg. A TEE confirmed the above findings and demonstrated a heavily calcified pulmonic valve annulus with evidence of severe stenosis. Heart catheterization revealed diffuse but chronic CAD with appropriate collateralization. Right heart catheterization demonstrated a severely elevated peak-to-peak pulmonic valve gradient of at least 72 mmHg and mean gradient of 43 mmHg. Mean RA pressure was noted to be 12 mmHg. A cardiac CT revealed a markedly dilated main PA with a diameter of 6.6 cm and severe calcification of the pulmonic valve. The valve appeared to be tri-leaflet with no other obvious abnormalities.

Given the progression of symptoms and data obtained from testing, a multi-disciplinary meeting was held to discuss options for the management of his valve disease and subsequent RV structural changes and dysfunction. It was decided, with the assistance of local adult-congenital cardiology colleagues, to perform single-balloon valvuloplasty of the pulmonic valve. A 24 mm valvuloplasty balloon was inserted into position under fluoroscopic guidance and inflated, resulting in sudden release and opening of the stenotic valve. Hemodynamic changes were monitored with a Langston dual lumen catheter during balloon inflation and deflation. The pulmonic transvalvular peak-to-peak gradient dropped markedly from greater than 70 mmHg to 10 mmHg. RV systolic pressures improved from super-systemic levels of greater than 100 mmHg to 30-40 mmHg. The patient tolerated the procedure well with no immediate complications and only trivial pulmonic insufficiency. In follow up he reported marked improvement in his edema and overall improvement in his functional status and dyspnea.

Severe calcific pulmonic valve stenosis is exceedingly rare. Pulmonic stenosis is a well-known congenital heart defect in the pediatric population and is usually the result of a primary valve abnormality often in the setting of other congenital heart diseases. Isolated severe pulmonic stenosis in adulthood is very uncommon and the presence of extensive valve calcification is even more unusual. Though there is very limited data behind its use, balloon pulmonic valvuloplasty (BPV) appears to be the first-line strategy for symptomatic patients with severe, calcific pulmonic stenosis.

Categories

Fellow Case
INTRODUCTION:

We report the case of an infant prenatally diagnosed with left ventricular noncompaction (LVNC) associated with complex congenital heart disease (CHD). LVNC represents the third most common form of pediatric cardiomyopathy, whose true incidence is unknown. Phenotypic variations include ‘normal’, dilated, restrictive or hypertrophic and may change over time; as can clinical manifestations. A significant barrier to accurate incidence reporting is inconsistency of diagnostic criteria, which currently lack sensitivity and specificity.

Coexistent cardiac defects are more common in children with LVNC than adults. Fetal LVNC is strongly associated with other cardiac as well as non-cardiac and chromosomal anomalies, complete heart block and poor prognosis.

CASE:

Our patient is a term male with prenatal diagnosis of d-transposition of the great arteries (d-TGA) and large muscular ventricular septal defect (VSD). Suspicion for LVNC first arose at 32 weeks, with observation of hypertrabeculation of the left ventricle. There were no associated fetal cardiac rhythm abnormalities or evidence of hydrops. Genetic testing was declined.

The patient was vigorous at birth. Postnatal echocardiogram established the definitive diagnosis of d-TGA, unrestrictive atrial septal defect, large muscular VSD with inlet extension, multiple smaller apical VSDs and bicuspid pulmonic valve with valvar pulmonic stenosis. LVNC criteria were satisfied. Biventricular function was mildly diminished immediately after birth, and subsequently improved. Adequate mixing of systemic and venous circulation was apparent following spontaneous ductal closure.

DISCUSSION:

Multiple authors have reported association with various forms of CHD in pediatric patients. A prospective study of LVNC in children revealed the most common associated lesion to be VSD. More complex lesions such as Tetralogy of Fallot and pulmonary atresia/intact ventricular septum were less common. In our case, successful biventricular repair is felt to be unlikely. Cardiac lesions requiring staged or complex surgical approaches to repair could be associated with higher morbidity and mortality when they are complicated by LVNC, even in patients with ‘benign’ phenotype. LVNC has been identified as a risk factor for adverse outcomes and postoperative length of stay following cardiothoracic surgery even in the presence of normal systolic function, regardless of the complexity of the associated CHD.

The interplay between complex CHD and LVNC and their combined effect on long term prognosis is unclear. Symptomatic LVNC patients may exhibit the triad of congestive heart failure (CHF), arrhythmia and thromboembolic events. Lilje found no significant difference in prevalence or severity of CHF symptoms between patients with isolated LVNC and those with CHD. However, arrhythmia and thromboembolic events, which are recognized comorbidities of both CHD and LVNC, have not been well analyzed in patients exhibiting both forms of disease.

Better understanding of natural history, comorbidities and sequelae of patients with LVNC complicated by complex CHD will serve to inform surgical and medical management approaches in patients like ours. Data quality in this area of study would be optimized if consensus regarding diagnostic criteria could be established.
Categories

Fellow Case
Programme Code: 38

Wolff-Parkinson-White Related Cardiomyopathy: Beyond the Arrhythmia

Cameron Lambert, Mohamed Kanj, Venugopal Menon

Cleveland Clinic Foundation, Cleveland, USA

Abstract

INTRODUCTION: Wolff Parkinson White (WPW) is a relatively common condition, affecting approximately 1-3 in 1000 persons (1). The reentrant tachyarrhythmia and sudden cardiac death associated with the WPW electrocardiographic (ECG) pattern is well documented. In patients who develop incessant tachycardia from the reentrant circuit, left ventricular dysfunction may develop. Left ventricular dysfunction in a patient without incessant tachycardia but with the WPW ECG pattern is rare and is thought to arise from the dyssynchrony induced by the abnormal conduction (2, 3).

CASE PRESENTATION: A 24 year old male was evaluated in the emergency department for chest pain. Diagnostics in the ED revealed normal cardiac biomarkers and an ECG with a normal rate and rhythm with a WPW pattern (Figure 1). He was discharged with a 30 day event monitor, electrophysiology follow up and a scheduled echocardiogram. Event monitor revealed no tachycardic events. Echocardiogram revealed a dilated left ventricle (LVEDD 5.4cm) with a dyskinetic septum. The left ventricular ejection fraction was 22%. The basal inferior wall was akinetic with hypokinesis noted in the inferior wall. An EP study was performed. At baseline, there was a positive delta wave in I, II, and aVL. Activation mapping was performed with the earliest ventricular electrogram noted at the 10 o’clock position of the tricuspid annulus (Figure 2). Several radiofrequency (RF) ablation lesions (up to 45W) were delivered to the ventricular side of the pathway but were unsuccessful in eliminating the pathway. Next, additional RF ablation lesions were delivered to the atrial side of the pathway which were successful in abolishing the pathway. A guideline directed heart failure medical regimen was started before discharge. Follow up echocardiogram 4 months after ablation showed an ejection fraction of 57% with normal LVEDD and no wall motion abnormalities. Follow up ECG revealed normalized QRS intervals and an absence of delta waves (Figure 3). The patient’s heart failure symptoms had improved at the time of his last medical appointment. CONCLUSION: Ventricular dyssynchrony induced cardiomyopathy is a rare complication of WPW syndrome and should be on the differential for left ventricular dysfunction with dyssynchrony. This is especially important given potential for a curative accessory pathway ablation to reverse left ventricular dysfunction and prevent future arrhythmogenic complications.
Figure 1 – Electrocardiogram during emergency department evaluation

Figure 2 – Activation map (Biosense Webster CARTO software) in left anterior oblique and right anterior oblique projections showing area of earliest activation near the 10 o’clock position on the tricuspid valve annulus.
Figure 3 – Electrocardiogram during cardiology clinic follow up after WPW ablation.

References:


Categories
Fellow Case
Coronary Subclavian Steal Syndrome: A Rare Cause of Refractory Angina

Kelly Laipply, Saad Ahmad
University of Cincinnati Medical Center, Cincinnati, USA

Abstract

Introduction

Coronary subclavian steal syndrome (CSSS) is a rare complication of coronary artery bypass grafting (CABG) with use of internal mammary artery (IMA) grafts almost always caused by subsequent occlusion or flow-limiting stenosis of the ipsilateral proximal subclavian artery. We present a case of chronic angina pectoris due to coronary subclavian steal physiology, with occlusion of the proximal left subclavian artery producing retrograde flow through a patent LIMA to LAD graft causing anterior myocardial ischemia.

Case presentation

A 64-year-old Caucasian male with a past history of CAD s/p CABG, PAD s/p aortobifemoral bypass, and tobacco abuse presented to the emergency department with complaints of chronic typical anginal chest pain. The pain was not nitrate responsive. The patient was admitted to the hospital, and acute coronary syndrome was ruled out with negative serial cardiac enzymes and serial electrocardiograms without ischemic change. Pain control was ultimately achieved with rest and intravenous morphine.

The patient underwent cardiac stress testing with myocardial perfusion imaging which revealed a basal inferior wall scar and a mixed antero-apical perfusion defect which was ischemia-predominant. He was subsequently taken to the cardiac catheterization laboratory where he was found to have a 100% occlusion of the left subclavian artery at its origin from the aorta. There was angiographic evidence of coronary subclavian steal with flow reversal observed in the LIMA graft from its anastomosis to a severely diseased native LAD and supplying perfusion to the left subclavian artery. A follow up CT angiogram was obtained which re-demonstrated the causative proximal left subclavian artery occlusion.

The patient ultimately received a successful left carotid subclavian bypass restoring favorable antegrade flow to the anterior myocardium via LIMA graft with resolution of angina.

Discussion

Coronary subclavian steal syndrome (CSSS) is a rare complication of internal mammary artery bypass grafting with an estimated incidence of 3.4% in IMA CABG patients. It is seen almost exclusively with subsequent obstructive atherosclerotic disease of the ipsilateral subclavian artery, but case reports exist involving large vessel vasculitides such as Takayasu arteritis.

Risk factors for CSSS are those which increase risk of atherosclerotic disease in general. As such, CSSS should always be considered a possible long term complication of CABG involving IMA grafts. Initial patient examination should include comparative measurement of blood pressures in bilateral arms which is a useful, non-invasive test for both subclavian artery stenosis or occlusion as well as aortic dissection in the initial workup for chest pain. Arch angiography should be performed at time of diagnosis of CABG-qualifying coronary disease to rule out pre-existing significant subclavian stenosis.

Correction of the syndrome when present involves restoration of perfusion to the subclavian artery either with operative bypass or percutaneous intervention.

Categories

Fellow Case
Very Late Presentation Of A Partial Anomalous Pulmonary Venous Connection

Muhanad Al-Zubaidi1, Mohammed AbdulRazzaq2, Tiba Alwardi3, Kamran Riaz1

1Wright State University, Beavercreek, USA, 2Wright State University, Beavercreek, USA, 3Dayton VA Medical Center, Dayton, USA

Abstract

Case: An 80 year-old female was referred to cardiology service to evaluate for dyspnea of several months duration. Initial transthoracic then transesophageal echocardiogram showed normal left ventricular systolic function, large right atrium (RA) and intact intra-atrial septum with negative agitated saline study for atrial shunt. Eventually, she underwent right heart catheterization, which revealed more than 10% oxygen saturation step-up between the RA and right ventricle, as well as, a moderate degree of pulmonary hypertension. Reviewing an old contrast chest CT scan, which was done 1 year earlier to rule out pulmonary embolism, showed an anomalous return of the right inferior pulmonary vein to the RA.

After discussion with the patient and the cardiac surgery team, patient elected medical management with close monitoring.

Discussion: Partial anomalous pulmonary venous connection (PAPVC) is a rare congenital cardiac defect, found in about 0.7% of population. Commonly, a single pulmonary vein is anomalous and rising from the right lung than from the left one. Most of the time, PAPVC is associated with atrial septal defect and only 3% have an intact atrial septum.

PAPVC can be asymptomatic but symptomatic patients usually develop symptoms in their 3rd or 4th decade of life, depending on the amount of systemic to pulmonary shunt. Our patient right-sided failure symptom is related to the anomalous venous return and shunting that increases the right-sided pressure and volume. Her very late presentation, which starts at age 80, is very unusual. This raises a concern of other pulmonary and/or cardiac diseases that contributes to increase shunting and subsequent clinical symptoms.

Medical treatment is directed to heart failure therapy with diuresis, beta-blocker and afterload reduction. Time for surgical correction is controversial but can be considering when systemic to pulmonary shunt ratio is 2:1 or more. Close follow-up to assess right heart function and cardiac rhythm are necessary in patients who did not undergo surgical treatment. With a significant shunt, the pulmonary artery pressures can be elevated, and pulmonary vascular resistance can increase with age.

Conclusion: PAPVC is a valid cause of dyspnea even in elderly. Causes of increase systemic to pulmonary shunting needed to evaluated and treated if possible. Close monitoring for those who did not underwent surgical correction is recommended. Last, physicians and fellows should look at the diagnostic images as part of their patient evaluation and not depend only on the diagnostic report.

Categories

Fellow Case
Ruptured Coronary Artery Angioplasty Balloon Entrapment: A Review Of This Rare Complication And Its Management

Imad Hariri, Hemindermeet Singh, Faraz Khan Luni, Fayyaz Hashmi, Ameer Kabour

Mercy St. Vincent Medical Center, Toledo, Ohio, USA

Abstract

Introduction

Percutaneous coronary intervention (PCI) is widely used to treat discrete coronary artery stenosis. In the current era of advanced intervention, it is increasingly used to manage multiple and complex lesions. Fracture, rupture or entrapment of angioplasty equipment including catheters, guidewires, balloons or stents are rare but potential complications associated with PCI. Their incidence is reported to be 0.1-0.8%. It can lead to panic in the Cath Lab, and in rare instances, catastrophic complications such as embolization or thrombus formation. We report an unusual case of rupture of a non-compliant (NC) angioplasty balloon in the right coronary artery (RCA), which required emergent surgery. We also discuss the catheter-based techniques that are used to retrieve the broken and entrapped material.

Case Report

An 81-year-old lady with hypertension and hyperlipidemia presented with a sudden onset 2-day history of worsening shortness of breath. An electrocardiogram showed sinus tachycardia and her laboratory workup was significant for elevated cardiac troponins. She underwent urgent coronary angiography revealing severe single vessel coronary disease with high-grade stenosis in a heavily calcified ostium of the RCA. After an unsuccessful attempt to pre-dilate the lesion with a 3.5 x 12 mm regular balloon, a 3.5 x 8 mm NC balloon was used and inflated to maximum of 20 atmospheres. On withdrawal, the NC balloon was noted to be broken in its middle portion with its distal portion limiting flow to the distal part of the artery. Subsequently, an unsuccessful attempt was made to retrieve the broken balloon with a gooseneck snare. At that time, the patient started experiencing symptoms of epigastric discomfort and indigestion with ST-segment elevation in the inferior leads on the monitor. Next, a second wire was advanced across the entrapped balloon. A new balloon was then passed over this wire and inflated to regain flow in the distal part of the vessel. In an attempt to entangle the broken balloon, a slow constant pulling force was applied to both wires while the guide catheter was pushed forward without any success. Ultimately, the Cardiothoracic Surgery team was called and the patient underwent emergent coronary artery bypass surgery through a median sternotomy. The entrapped balloon and wires were retrieved after the placement of a saphenous vein graft bypass to the RCA. Intra-operatively, the ostium of the RCA was found to be heavily calcified with sharp edges of calcium protruding into the lumen. The patient had an uncomplicated postoperative recovery and remained hemodynamically stable.

Conclusion

Rupture of angioplasty balloons during PCI can occur due to patient, operator or equipment related factors. Various catheter-based techniques have been reported and can be used to retrieve the broken material. A wider understanding of these retrieval techniques can be lifesaving. Emergent surgical intervention may ultimately be required in cases of failed percutaneous attempts.

Categories

Fellow Case
A Unique Case of Myocarditis Causing Isolated Right Ventricular Dysfunction

Ahmad Abdin MD, Federico Trobo MD, Roger Chaffee MD, Joseph Pietrolungo DO

Summa health System/NEOMED, Akron, USA

Abstract

Introduction:

Left ventricular (LV) or biventricular dysfunction secondary to acute myocarditis is not an uncommon complication. We present a unique case of myocarditis causing acute isolated right ventricular (RV) dilatation and dysfunction where no other identifiable causes were found.

Case Presentation:

A 45-year-old man with past medical history of rectal adenocarcinoma status post abdominoperineal resection with colostomy and urostomy, recent admission for polymicrobial bacteremia that is being treated with intravenous antibiotics, presented to the emergency department (ED) with acute chest pain and shortness of breath that started couple of hours prior to his presentation. His review of systems was otherwise unremarkable. In the ED, he was hypoxic, tachypnic and tachycardiac. The blood pressure and the remainder of the physical examination were normal. Initial labs were remarkable for leucocytosis, positive Troponin and elevated BNP. EKG showed a sinus tachycardia with new T wave inversion in septal leads. Transthoracic Echocardiogram (TTE) exhibited a normal LV function and a severely dilated hypokinetic RV that was a new finding comparing with very recent studies. Transoesophageal Echocardiogram (TEE) confirmed the severe RV dysfunction and ruled out endocarditis or any valve pathology. Chest CT angiogram and pulmonary angiography showed no evidence of pulmonary embolism or any parenchymal process. Left and right heart catheterization showed no coronary artery disease with normal pulmonary artery pressure, pulmonary capillary wedge pressure, and cardiac output. However, mean RA pressure and RV pressure were 15 mmHg and 37/16 mmHg respectively, consistent with RV dysfunction. In view of these findings, the most likely diagnosis was acute RV dysfunction secondary to acute myocarditis. The patient significantly improved with diuretic therapy and was successfully extubated within 48 hours.

Discussion:

Acute right ventricular dysfunction is usually secondary to acute pulmonary embolism, acute inferior myocardial infarction or acute severe left ventricular dysfunction. Myocarditis is known to cause left ventricular dysfunction but is not reported to cause isolated right ventricular dysfunction. Most cases of myocarditis are usually triggered by viruses and augmented by autoimmunity. The myocyte damage is believed to be mediated both by direct invasion of the myocardium and by immune insult. Treatment of myocarditis includes general measures to treat the sequelae of heart disease, including heart failure (HF) therapy and treatment of arrhythmias. Mechanical circulatory support should be considered when HF is intractable or when cardiogenic shock does not respond to medical therapy. Nonsteroidal anti-inflammatory drugs should be avoided, given the risk of HF exacerbation and possible risk of increase mortality.

Conclusion:

Our case proves that myocarditis can cause isolated right ventricular dilatation and dysfunction. Currently, we are not aware of any similar case of right ventricular dysfunction that is reported in the adult medical literature.
Categories

Fellow Case
Echocardiographic Characterization of Metastatic Leiomyosarcoma: A Case presentation and Review of Literature

Mohammed Abdulrazzaq¹ ², Hymie Chera², Lila Abassi², Jason Lazar², Yitzhak Rosen², Muhanad Al-Zubaidi¹

¹Wright State University, Dayton, USA, ²SUNY Downstate Medical Center, Brooklyn, USA

Abstract

Leiomyosarcoma is a malignant growth of smooth muscle connective tissue. Primary cardiac neoplasm is a very rare condition with a prevalence of 0.001%-0.03% in autopsy series. Leiomyosarcoma occur in less than 1% of cases. Cardiac primary leiomyosarcoma is typically localized in left atrium and often involves pulmonary veins.

In our case, the patient had metastatic leiomyosarcoma to the left ventricle detected by echocardiography.

Case Presentation:

51-year-old male presented with left-sided flank pain of 6-month duration which had become intolerable over a period of 2 weeks and 20-pound weight loss. CT Abdomen showed a retroperitoneal mass measuring 9.8x9x7cm encasing the left renal artery and displacing the left renal vein. Biopsy showed a spindle cell tumor suspicious for sarcoma.

Patient was referred to surgical oncology and was scheduled for surgery. MRI abdomen revealed a retroperitoneal mass measuring 8.0x10.3x10.0cm suggestive of sarcoma. An en bloc left nephrectomy with en bloc inferior vena cava resection and lymphadenectomy was done.

The patient followed up with radiation oncology. Patient then presented to surgical oncology clinic and was admitted to medicine with a left upper extremity mass measuring 10x8x8cm along with a 3cm mass in the left ventricle.

TTE showed 2.93x1.97 cm mass located in the left ventricle along the lateral apical wall, had a sessile appearance and had no stalk or peduncle. The mass was immobile during systole and diastole, did not impair left ventricular outflow and showed mild vascularization on color Doppler. Normal EF, Grade I diastolic dysfunction and mild TR.

By the end of the month the mass had grown exponentially. A core needle biopsy was done and revealed recurrence of leiomyosarcoma. Pan scan was done and found to have significant metastases to the lung, lytic lesion to T10 vertebral body, and 2.8cm mass within the left ventricle arising from the wall of the apex.

The patient was later transferred to a higher level of care for further treatment.

Discussion:

This is a rare case of a secondary cardiac leiomyosarcoma metastatic to the left ventricle.

Several small studies indicated the utility of echocardiography for detecting cardiac masses. In their small 11 case series, Takenaka et al concluded that echocardiography is better than CT for diagnosing cardiac metastasis; furthermore, Takenaka et al recommended that echocardiography should be considered in all patients presenting with soft-tissue metastases. Tominaga et al in a small 6 case series, diagnosed various tumor involvement in the heart and pericardium with TTE. These included sacral chordoma, mediastinal seminoma, leiomyosarcoma of the uterus, osteosarcoma, invasive thymoma, and lung cancer. Tominaga et al concluded that if cardiac involvement is suspected, TTE should be performed in patients with any kind of malignant tumor.

TTE findings of our case showed a left ventricle mass with no Doppler or other acoustic findings indicating either a thrombus or a vascular mass.
Furthermore, it is highly unlikely to find a tumor or a thrombus in the lateral left ventricle.

We conclude that a soft tissue tumor with suspected cardiac involvement can benefit from TTE characterization.

Categories

Fellow Case
A case of “Burn out Kawasaki” disease with a coronary aneurysm

Federico G Trobo, Tyler Moore, Kevin Silver

Summa Health Systems, Akron, USA

Abstract

INTRODUCTION: Kawasaki disease (KD) is an acute febrile, systemic vasculitis syndrome of unknown etiology, occurring primarily in children younger than 5 years of age. Though rare, giant aneurysms of the coronary arteries may develop in untreated cases and prove extremely challenging to manage.

CASE PRESENTATION: This is a 40 year old male with no significant cardiovascular risk factor or past medical history presented to Akron City Hospital on 06/26/2017 after developing chest pain while running on a treadmill. His electrocardiogram on arrival showed ST elevation in inferior leads and was taken to the Cath. He was noted to have an aneurysm in his distal RCA that measured greater than 12 mm in diameter by IVIS. Thrombectomy with balloon angioplasty was performed in multiple passes with an aspiration catheter with extensive thrombus removed. Multiple PTCA inflations were performed to break up the thrombus and TPA was administered directly into the thrombus via Pronto catheter. This was felt to be possible burned out Kawasaki disease. The patient was placed on aspirin, Ticagrelor and heparin drip for 48 hours and transferred to HLU and monitored. Patient's chest pain improved and he was discharged home 2 days later.

DISCUSSION: Cardiovascular sequelae of Kawasaki disease includes giant coronary artery aneurysms with thrombosis. It can develop in approximately 20% of children with untreated Kawasaki disease, and the outcome of interventional approaches is poorly studied.

Categories

Fellow Case
Call a Spade a Spade: An Atypical Presentation of Apical Hypertrophic Cardiomyopathy

Peter Unkovic, Elston Johnson, Kruti Patel, Nitin Gera, Nicholas Maksim
OhioHealth Doctors Hospital, Columbus, USA

Abstract

Introduction: Apical Hypertrophic Cardiomyopathy (ApHCM) is a rare variant of hypertrophic cardiomyopathy which typically involves the apex of the left ventricle. ApHCM accounts for ~25% cases of hypertrophic cardiomyopathy in Japanese populations; however, it typically comprises only 1-2% of cases in non-Japanese populations.

Case Presentation: We present a 56 year old male with prior history of hypertension and episodes of infrequent but recurrent syncope who was referred to cardiology for an episode of dyspnea with exertion. His EKG revealed sinus rhythm with diffuse, symmetrical T wave inversions predominantly in the anterolateral lead distribution. Echocardiogram revealed apical hypertrophy in a “spade-like” configuration without outflow tract obstruction. Lexiscan nuclear stress testing was also performed; however, he experienced a syncopal episode immediately after administration of regadenoson due to an episode of asystole with a 19 second pause prior to resuming sinus rhythm. Left Heart Cath was performed to rule out obstructive CAD and revealed normal coronaries while redemonstrating spade-like appearance of apex on LVgram. His pause was attributed to a combination of an exaggerated vasodepressor response to the negative dromotropic effects of regadenoson in the setting of structural heart disease. Cardiac MRI confirmed the presence of ApHCM. There was no evidence of ventricular arrhythmia throughout his workup.

Discussion: Classic EKG findings of ApHCM are “giant T wave” inversions (>10mm) in the precordial leads with LVH. Echocardiogram may reveal spade-like appearance of left ventricle and apical wall thickness ≥ 15mm. Cardiac MRI is often preferred in addition to echo as it allows for early diagnosis and better visualization of hypertrophied myocardium, even in “non-spade like” configurations. Therapy is directed at symptom control.

Conclusion:

Diagnostic features on EKG along with history of recurrent syncope should prompt an evaluation for ApHCM.

Categories

Fellow Case
Coronary thrombus in the Fontan circulation

Sruti Rao, Rukmini Komarlu, Ashish Saini, Lourdes Prieto

1Cleveland Clinic Children's Hospital, Ohio, USA, 2Akron Children's Hospital, Ohio, USA

Abstract

Introduction:
The Fontan procedure has increased the survival of newborns diagnosed with single ventricle physiology into adulthood. We describe a rare case of coronary thrombus in a Fontan patient as a cause for acute myocardial ischemia that required urgent thrombolysis.

Case presentation:
A 15 year old male with hypoplastic left heart syndrome, palliated to a lateral tunnel fenestrated Fontan with subsequent closure of the fenestration for exertional desaturations, presented to the emergency department with acute onset chest pain, shortness of breath and palpitations. An ECG obtained during symptoms showed diffuse T wave inversion and ST segment depression. Troponins were elevated at 0.132mg/dl. History revealed non compliance to aspirin. A myocarditis work up was initiated due to symptoms of myalgia and viral symptoms.

Echocardiogram revealed a patent Damus-Kaye-Stansel anastomosis and no significant interval decline in ventricular function.

After an initial decline in the troponins, they began to serially rise up to 0.5 mg/dl, with worsening ST-T changes despite resolution of symptoms. A cardiac MRI was obtained to assess myocardial viability and intracardiac thrombus which revealed hypertrophied, severely dilated right ventricle with globally diminished systolic function. The Fontan baffle was widely patent with no stenosis, leaks or thrombi. There was no evidence of myocarditis or pericarditis. Even though the proximal coronary system appeared patent, the distal coronary vasculature could not be well visualized. A transesophageal echocardiogram was again negative for any intracardiac thrombi with Holter monitor negative for any arrhythmia.

Given the persistent troponin leak, concern for an ischemic process and negative work up for myocarditis/pericarditis, he underwent diagnostic cardiac catheterization that revealed right dominant coronary system with a filling defect in the bifurcation of the posterior descending coronary artery with preserved distal filling, suggestive of a thrombus. The vessel proximal to this bifurcation showed a tubular stenosis or bridge in the distal coronary artery, proximal to the thrombus. An additional small thrombus was noted in the acute marginal branch. He was emergently taken to the coronary intensive care unit and started on triple therapy with ticagrelor, tirofiban and heparin. His troponins normalized and he was discharged home on aspirin, clopidogrel and warfarin. Repeat cardiac catheterization 3 months later revealed pristine coronary arteries with no filling defects.

Discussion: The lack of pulsatile blood flow to the lungs in the Fontan circulation leads to elevated systemic venous pressure, preload dependent cardiac output in the systemic ventricle and possibly subclinical thromboembolism. Circulating levels of protein C, protein S, antithrombin III and other clotting factors are elevated in this physiological state along with abnormal platelet activity. In our patient, non compliance to aspirin therapy could have precipitated platelet aggregation and propensity for thrombus formation. Historically, multimodality imaging and cardiac catheterization have been used to evaluate only the proximal coronary artery origins. Our case highlights that distal coronary artery thrombosis is a potential though rare complication in the Fontan patient and emphasizes the need to not ignore the distal coronary arteries in this unique physiology.
Fig 1: Mild ST segment depression with inverted T waves diffusely in the precordial leads.
Fig 2: Initial nadir of cardiac troponin (arrow), followed by a steep rise consistent with ongoing ischemia.
Fig 3: Filling defect (arrow) in the posterior descending artery with more distal filling.

Categories
Fellow Case
Late Onset Asystole in a Patient With a Vagal Nerve Stimulator.

Theresa Ratajczak¹², Abdul Wase¹, Robert Blank¹, Analkumar Parikh³
¹Wright State University, Dayton, USA; ²VAMC, Dayton, USA; ³Dayton VAMC, Dayton, USA

Abstract

Introduction:

Insertion of a vagal nerve stimulator (VNS) is an option in patients with refractory epilepsy. It’s reported to be safe and well tolerated. We present a case of late onset asystolic episodes, presumed due to previously placed VNS, causing excessive vagal stimulation and syncopal episodes.

Case description:

46 year-old female with long history of intractable complex partial seizures, underwent an implantation of a Linq recorder for suspicion of recurrent cardiac syncope. Prior brain MRI revealed left mesial temporal sclerosis. Electroencephalogram monitoring showed left hemispheric epileptiform activity. Medications included stable maximally tolerated doses of levaricetam, topiramate and carbamazepine without recent changes. A VNS placed in 2004 was upgraded in 2012. Initial settings were 0.75mA current output, off time 3 minutes, magnet current 1 second. Despite optimal therapy, patient experienced monthly breakthrough seizures. VNS settings were progressively changed with some improvement in breakthrough episodes, however patient then noted a change in her seizure pattern. VNS current was increased to 2.5mA, then decreased to 2.25mA, off time increased to 5 minutes, magnet current increased to 2.75s, then decreased to 2.5s. There was an absence of prodromal auras which consisted of staring periods and unresponsiveness with gradual automatic behaviors. Instead, she reported brief syncopal episodes without any neurological or vasovagal symptoms such as positional changes, long postictal periods or loss of bowel or bladder. The falls occurred twice a month with injuries requiring admissions to the hospital. Differential diagnosis included syncope, drop attacks and complex partial seizures. Labwork, imaging and telemetry were unremarkable. Ziopatch report was normal. Ischemic etiology was ruled out with negative stress test. Due to infrequent nature of events a Linq recorder was implanted with periodical interrogation performed. It noted several asystolic episodes with pauses 10 to 12 seconds in duration. Review of medical record showed that these episodes correlated with recent falls and injuries at home. A decision was made for permanent pacemaker placement via a right subclavian approach. Patient has been seen in follow-up since and has been doing well with resolution of syncopal episodes.

Case discussion:

It has been proposed that the left and right vagus nerves exhibit a degree of “sidedeness”. The right vagal nerve preferentially affects the sinus node and left has more influence on AV node. However, the distribution of neural input to the heart is complex with significant overlap. Theoretically, a VNS is placed on the left side of chest to avoid stimulation of SA node. A generator is implanted in the left chest wall with a lead wrapped around the vagus nerve in the neck near the carotid artery delivering electrical signals. Six cases of 10-20s asystole have been reported during lead testing during VNS implantation. Worldwide rare case reports of late onset asystolic episodes in patients with VNS were treated with removal of device. The proposed mechanisms include changes in sensitivity of cardiac mechanoreceptors or nuclei in the medulla due to chronic stimulation by device. Our patient was successfully treated with a permanent pacemaker insertion.

Categories

Fellow Case
Exercise Induced Relapse of Recurrent Pericarditis in an Athlete Despite Medical Therapy

Nishant Shah, Chandra Ala, Beni Verma, Ahmed Bafadel, Allan Klein

Cleveland Clinic, Cleveland, USA

Abstract

Introduction:

Recurrent Pericarditis is defined as a recurrence of pericardial inflammation after a symptom free period of 4-6 weeks following an initial episode of pericarditis. The rate of recurrence after the initial episode ranges between 15 to 30% and more in patients who are treated with corticosteroids. Further multiple recurrences are seen in about 20-50% of patients after an initial recurrence. The causes of relapse are not clear in idiopathic pericarditis but exercise has been proposed to be one of the precipitating factors, though with very limited literature. We present a case of an athlete who developed a recurrence after participating in exercise despite being on maximal medical therapy.

Case Presentation:

A 47 year old female athlete with a history of idiopathic pericarditis presented to our pericardial clinic with complaints of recurrent chest pain worse on inspiration and laying supine. Her EKG showed diffuse concave ST elevations with PR depression, and her inflammatory markers were elevated suggesting recurrent pericarditis. This was further supported by non-invasive imaging (see image 1).

Image 1: Cardiac MRI with delayed Gadolinium enhancement of the pericardium (see red arrows).

She continues high intensity exercise and currently works as a basketball coach where she often runs with the team. She first noticed recurrent pain after the start of the basketball season. She was diagnosed with recurrent idiopathic pericarditis at an outside facility and was treated with Azithromycin, Methylprednisone, and Colchicine. Her pain improved and about 4 weeks later had flare up. She was started on a long prednisone taper and referred to our clinic. At the time of her visit, she had about 3 recurrences despite being on triple therapy with Prednisone, Colchicine, and Ibuprofen. Throughout these spells, she continued to exercise and coach her team during the busy season. She was strictly advised to stop all exercise and strenuous
activity. This became easier to do during the off season and her symptoms became better controlled. Azithromycin has been added to her medical regimen to help taper off her steroids.

**Discussion:**

Our patient with recurrent idiopathic pericarditis had been treated with quadruple anti-inflammatory therapy. However she continued to relapse due to exercise and an active coaching lifestyle of competitive sports. While complicated pericarditis is difficult to treat and steroids may increase the chance of recurrences, it is important that exercise and competitive sports be stopped to allow healing and reduce chances of relapses. Current guidelines for athletes with pericarditis recommend to abstain from competitive activity until there is no more evidence of inflammation. However, these are based on expert consensus with limited literature. There are several mechanisms as to how exercise can worsen pericarditis, however none have been studied. It is also poorly understood how much exercise is permissible in the general population, as activity limitations can diminish quality of life. Further investigation is needed to better understand these questions.

**Categories**

Fellow Case
Troponin I elevation leads us on a wild-goose chase

Hans Reyes, Hareeprasad Vongooru, Stephanie Dunlap, Imran Arif

University of Cincinnati Medical Center, Cincinnati, USA

Abstract

Introduction:
Cardiac troponins (cTnI and cTnT) are markers with high sensitivity and specificity for myocyte necrosis, however, elevation in cardiac troponins is not sine qua non with acute coronary syndromes. Abnormal levels of troponins can also be found in conditions such as heart failure, PE, sepsis, myocarditis, infiltrative cardiomyopathies, etc. However, spurious elevation in troponins is extremely rare.

Case presentation:
47 yo female presented to the ED with intermittent left-sided, stabbing chest pain, 8/10 in intensity, lasting for several seconds at a time and occurring many times a day, no radiation, not related to exertion or position. PMHx of hypertension. On presentation, physical examination was remarkable for BP 170/92 mmHg, HR 65, RR 22, O2Sat 100% in RA, and reproducible chest pain to palpation over left chest. Initial labs showed normal CBC, CMP and Coags. cTnI was elevated at 30 ng/ml (ULN 0.04ng/ml). ECG showed NSR and no ischemic changes. CXR was unremarkable. Repeated ECG showed no significant changes. TTE showed mildly depressed LVEF (40-45%), mild global hypokinesis with no regional variations. Chest CT with contrast showed no evidence of PE or acute aortic pathology. Serial cTnI levels were elevated in the range of 30 – 32 ng/ml. Coronary angiography showed clean coronary arteries, and endomyocardial biopsy (EMB) was then done. A Cardiac MRI was done showing mild left ventricle dilatation with normal LVEF (57%) and no signs of myocardial inflammation or infiltrative processes. EMB reported as minimal myocyte hypertrophy with no additional significant histopathologic changes. She was continued on appropriate medical therapy for NSTEMI, HTN and a subsequent extensive work-up was non-revealing with a normal ESR & CRP, negative ANA, ds-DNA, RF, lupus anticoagulant, anti-histone antibody, heavy metal screen, and viral panels including HIV. With continued cTnI elevation for days and negative work-up otherwise, a spurious elevation of cTnI was suspected. Troponin T and ck-mb levels were sent out, lo and behold, they were both negative. Ultimately, it was determined that patient had interfering antibodies that resulted in falsely elevated troponin I levels.

Discussion/Conclusion:
When an increased troponin value is encountered in the absence of myocardial infarction and other etiologies excluded, a falsely elevated troponin should be considered. Our patient continued to have episodes of chest pain, which along with very high cTnI values lead us to complete and appropriate work-up to rule out any possible cause of myocardial necrosis. The lack of variation in troponin levels over time was important to suspect that a myocardial damage was unlikely. Rarely, cTnI immunoassays are prone to various forms of interference such as heterophile antibodies, RF, hemolysis, animal antigens etc. If heterophile antibody positivity is suspected, cTnI levels should be reevaluated with other markers; like ck-mb, cTnT or myoglobin. Awareness of the possibility of a false positive cTnI result may assist the physicians in the management of the patient without ACS and may spare the patient additional diagnostic procedures, especially when the cTnI elevation is not consistent with clinical manifestations.

Categories

Fellow Case
Technetium-99m Pyrophosphate SPECT: A valuable diagnostic tool for TTR Cardiac Amyloidosis

Vishal Dahya, Brian Donelan
Summa Health, Akron, USA

Abstract

Introduction

Amyloidosis is a family of disorders that are precipitated by extracellular deposition of misassembled proteins and these are noted to be either hereditary or acquired. This deposition of proteins reduce organ function and in particular can cause cardiomyopathy with associated systolic and diastolic dysfunction. There are primarily two types of amyloid that cause cardiac amyloidosis which are immunoglobulin light chain (AL) amyloid and transthyretin (TTR) amyloid. TTR amyloid has two subsets which include familial amyloidotic cardiomyopathy and wild type TTR amyloid. Early diagnosis and recognition of this disease is essential to begin treatment as cardiac dysfunction can progress to advanced combined heart failure. Advances in cardiac imaging have improved our diagnosis of this disease and this case presents the utilization of technetium-99m pyrophosphate SPECT imaging as a valuable tool to aid in the diagnosis of TTR amyloidosis.

Case History

A 72 year old African American male presented with complaints of exertional dyspnea and intermittent chest tightness. He also included having lower extremity edema with a slow rise in his body weight. Patient had no significant cardiovascular history but family history was notable for heart failure in his brother and father with similar symptoms in advanced age. Patient underwent transthoracic echocardiogram which was significant for moderately increased biventricular wall thickness with a septal thickness of 1.8 cm. Systolic function was moderately decreased with an ejection fraction of 35%. Diastolic function was noted to be impaired consistent with restrictive physiology. EKG was notable for sinus rhythm with diffuse low voltage. Given these findings as well as the patient’s age and family history, he was evaluated for possible familial transthyretin amyloidosis with technetium-99m pyrophosphate single-photon emission computed tomography (SPECT). This revealed diffuse increased technetium pyrophosphate uptake within the myocardium consistent with transthyretin-related cardiac amyloidosis.

Discussion

We present a case of a 72 year old male with symptoms of heart failure who underwent an echocardiogram with findings consistent with infiltrative disease and given his history he underwent further testing with technetium pyrophosphate SPECT imaging. A recent study showed that this imaging method was 97% sensitive and 100% specific for identifying TTR cardiac amyloidosis. This case highlights the utility of technetium pyrophosphate scan as an essential tool in the evaluation of TTR related cardiac amyloidosis.

Categories

Fellow Case
Abstract

Idiopathic Aortic Arch Thromboembolism

Introduction:
Thrombus in the aortic arch is an unusual source of systemic embolism. We report a case of idiopathic aortic arch thrombus with emboli to kidneys and ileal artery.

Case presentation:
A 49-year-old healthy woman was admitted with abdominal pain, vomiting and hematuria of one day duration. No recent infections, hospitalization or regular use of any medications was reported. She was afebrile, hemodynamically stable and physical examination was otherwise unremarkable. CT scan of chest and abdomen showed an intraluminal lesion in thoracic aorta distal to the origin of left subclavian artery and wedge-shaped lesions consistent with renal infarction in the bilateral kidneys. Trans-esophageal echocardiography (TEE) demonstrated a large mobile mass attached to the thoracic aorta wall. Blood levels of D-Dimer, CRP, LDH and Creatinine were elevated. Diagnosis of aortic arch thrombus with emboli to the kidneys was made and surgical excision of the mass was planned. On the following day, pre-operative TEE demonstrated no aortic mass; possible dislodgment and embolism was suspected. CT angiogram of the chest, abdomen, pelvis and lower extremities showed no thrombus at the previous location in the aorta; however, new thrombotic occlusion of the ileal artery was observed. Anticoagulation with heparin was initiated. Symptoms, hematuria and renal dysfunction resolved and a week later she was discharged to home on Warfarin. She had no history of vascular thrombosis or tobacco smoking and there was no family history of premature coronary artery disease or stroke. She had normal lipid profile and a negative hypercoagulable workup. Three months later patient remains on anticoagulation and no recurrent symptoms have been reported.

Discussion:
Aortic arch thromboembolism in otherwise healthy individuals is a rare condition and in many cases exact etiology remains unknown. The potential risk factors include atherosclerosis, trauma, malignancy, hypercoagulable disorders, pregnancy and hormone replacement therapy. Prognosis is determined by the severity of damage to the organs by emboli. Treatment options include surgical excision of the affected organ and anticoagulation therapy.

References:

Categories

Fellow Case
Left ventricular aneurysm from severe coronary vaso-spasm

Atif Hassan, Fahad Waqar, Romesa Sajjad

University of Cincinnati, Cincinnati, USA

Abstract

Introduction/objective

A Left ventricular aneurysm (LVA) is mostly the result of myocardial infarction (MI), usually involving the anterior myocardial wall. Other causes of LVA include hypertrophic cardiomyopathy and chagas disease, both of which can lead to the formation of an apical aneurysm [1]. LVA are usually at the anterior or apical walls. LVA secondary to lateral wall MI is exceedingly rare and is also not usually associated with coronary vasospasm. We present a rare case of profound coronary artery vasospasm leading to a large sized lateral left ventricular wall aneurysm.

Case presentation

A 70 year old Female with minimal risk factors for CAD presented with acute coronary syndrome (ACS) with lateral ST elevation myocardial infarction on EKG after which she had an emergent coronary angiogram. Coronary angiogram showed no significant coronary artery disease but showed a long segment of severe coronary vasospasm involving diagonal branch of left anterior descending artery (LAD). A left ventriculogram was also performed which showed profound focal aneurysm involving lateral wall of the left ventricle with moderately reduced left ventricular ejection function (LVEF) which was confirmed by an echocardiogram as well. There was no hemodynamically significant obstructive coronary lesion seen on angiogram explaining the profound lateral wall aneurysm.

Discussion/Conclusion

Coronary artery vasospasm is caused by focal or diffuse spasm of an epicardial coronary artery mostly due to the combination of endothelial dysfunction, microvascular dysfunction and vascular smooth muscle hypertrophy [2]. Myocardial infarction (MI) in patients with vasospastic angina is usually at the site of an atherosclerotic plaque [3] and usually not without any atherosclerotic CAD like in our patient. This case describes the importance of aggressively treating and recognizing coronary vasospasm since it can cause myocardial infarction and ventricular aneurysm even with angiographically normal coronary arteries that can lead to cardiomyopathy, ventricular arrhythmias and increased mortality.

References


Categories

Fellow Case
Abstract

Introduction: Myopericarditis represents a clinically challenging diagnosis due to a significant overlap in symptoms, electrocardiogram changes, and cardiac enzyme abnormalities with acute coronary syndrome. Even if patients remember a recent viral-like illness, these symptoms may give rise to an atypical coronary presentation, especially in women. In cases where myopericarditis is suspected, cardiac magnetic resonance imaging (cMRI) is unparalleled in confirming the diagnosis.

Case Presentation: A 49-year-old female presented after three months of recurrent substernal chest pain. On examination, she was afebrile and hemodynamically stable with a regular rate and rhythm and normal cardiac auscultatory findings. A pericardial friction rub was not appreciated. Her initial troponins were mildly elevated (0.08 ng/mL) and her EKG showed normal sinus rhythm without any ST segment or T wave changes. A regadenoson nuclear stress test performed one month prior revealed inferolateral ischemia with a left ventricular ejection fraction of 39%. Given her troponin elevation, positive stress test, and recurrent chest pain, she underwent a left heart catheterization which demonstrated no angiographically significant coronary artery disease. She was ultimately referred for cMRI for evaluation of myopericarditis. cMRI allows for assessment of right and left cardiac size and function, edema, pericardial adherence, constrictive physiology, and delayed gadolinium enhancement to suggest pericarditis, myocarditis, or infarction. The standard protocol at our institution for the evaluation of myopericarditis includes SSFP localizer images, SSFP cine imaging, triple inversion recovery sequences, tagged short axis imaging, resting perfusion imaging, and delayed gadolinium enhancement. In this patient’s case, the cMRI demonstrated a severely dilated left ventricle with an ejection fraction of 39%, a thickened pericardium, right ventricular free wall edema, and delayed gadolinium enhancement of the right ventricular free wall and associated pericardium, consistent with a diagnosis of myopericarditis. She was treated with a slow prednisone taper, high-dose aspirin, and colchicine, and a nuclear multigated acquisition scan obtained one month following her discharge showed an improvement in her left ventricular ejection fraction to 52%.

Discussion: Overall, the case described serves as an excellent example of how localized myopericarditis is often missed on routine testing. In this respect, cMRI serves as an unrivaled modality for detecting pericardial and myocardial inflammation and allows for differentiation of these processes from ischemia due to coronary artery disease.

Categories

Fellow Case
INTRODUCTION

Spontaneous coronary artery dissection (SCAD) is an infrequent cause of acute coronary syndrome, typically affecting a younger and otherwise healthy population. The population-based incidence of SCAD is unknown. Retrospective studies report SCAD in 0.07 – 1.1% of all coronary angiograms performed. Case series that typically excluded atherosclerotic dissection demonstrate a female preponderance and an association with peripartum or postpartum status. Other associations include connective tissue disorders, vasculitides and exercise. The spectrum ranges from single to multiple coronary artery involvement, with symptoms alone to ST-elevation myocardial infarction, ventricular fibrillation and sudden death as the clinical presentation. While dissection of the coronary intima or media is a hallmark finding, hematoma formation deeper within the vessel wall is often present suggesting an underlying vascular predisposition.

CASE

We highlight an unusual presentation of an already rare phenomenon: 47 year old male with significant risk factors for ischemic heart disease (smoker, obesity, strong first degree family history, dysplipidemia, and hypertension). He did not use recreational drugs and had no underlying connective tissue disease. He presented with an acute anterolateral myocardial infarction. Coronary angiography showed a long (~12 cm), diffusely narrowed lesion in the mid to distal left anterior descending (LAD) artery, extending well into the proximal diagonal artery. There were varying degrees of changes in arterial caliber, with a maximal stenosis of 90%, and an abrupt return to a normal caliber distally in both the LAD and diagonal arteries. The characteristics were unusual for atherosclerotic disease and a diagnosis of SCAD was entertained. We opted to manage medically with anticoagulation and anti-platelets for a few days and considered bypass surgery if no improvement. In four days, the lesion size and severity had improved and intravascular ultrasound (IVUS) revealed an intramural hematoma in the LAD, confirming the diagnosis of SCAD. Serial angiography demonstrated almost complete resolution at six weeks on medical therapy alone. Wall motion abnormalities on echocardiography resolved within one week, left ventricular function was normal on hospital discharge and remained normal after one year.

DISCUSSION

Our case raises a few key points regarding SCAD: recognition of the angiographic findings prompted a conservative approach, with a favorable outcome. Our patient had essentially no risk factors for SCAD, hence, without a high degree of suspicion, it may have been missed. The natural course of SCAD was documented well with early serial angiography and resolution seen six weeks after the event.

The optimal treatment strategy for acute SCAD remains undetermined and varies with type and severity of presentation. Our patient presented with a STEMI; percutaneous coronary intervention (PCI) followed by coronary artery bypass grafting (CABG) would not have been unreasonable. The early recognition of a type II SCAD led to a conservative strategy, with continued favorable results at one year follow up. Reports have shown encouraging outcomes with all treatment arms: from conservative management to PCI or CABG, but there have been no comparative studies. Regardless of initial treatment strategy, in-hospital, early and long-term outcomes have generally been favorable.

Categories

Fellow Case
A Rare Case of Leucocytoclastic Vasculitis in an LVAD patient

Linda Njoroge, Mohamed Khayata, Mahazarin Ginwalla

Case Western Reserve University/University Hospitals, Cleveland, USA

Abstract

Introduction:

Left ventricular assist devices (LVADs) are increasingly used in the management of patients with end stage heart failure. They are known to improve survival in these patients however there are several short and long-term complications associated with LVAD therapy. Amongst the long-term complications are infections that commonly occur at the pump, the pump pocket or around the driveline. We aim to describe a unique presentation of infection in the form of leucocytoclastic vasculitis secondary to Corynebacterium jeikeium bacteremia. To our knowledge, this is the second case described in literature.

Case Presentation:

A 64-year-old Hispanic male with a past medical history of ischemic cardiomyopathy status post CABG and mitral valve repair, biventricular ICD, LVAD placement 4 years ago complicated by multiple driveline infections with E fecium, Pseudomonas and MSSA, maintained on Augmentin for chronic suppression presented with fever and a rash on bilateral lower extremities. He denied any sick contacts, recent travel history or outdoor exposure. Examination was significant for multiple purple non blanching macules and patches in the lower extremities, trunk and back with no signs of infection around the driveline. ANA, ANCA, Hepatitis B and C, TB screen and HIV results were negative. Complement levels were normal. Blood cultures were positive for Corynebacterium jeikeium that was susceptible to Doxycycline. A skin biopsy confirmed leucocytoclastic vasculitis. A PET scan showed increased metabolic activity around the LVAD inflow cannula and the driveline within the mediastinum that was increased from a prior study. Given the susceptibility to Doxycycline, LVAD/ICD explant was not indicated and was started on long-term antibiotics. His hospital course was complicated by acute kidney injury secondary to infectious glomerulonephritis confirmed on renal biopsy and was treated with a prolonged prednisone taper. Blood cultures were negative prior to discharge and his rash had improved in appearance. Renal function also significantly improved on discharge. Repeat PET showed no evidence of infectious activity and he was discharged on Doxycycline in addition to Augmentin for chronic suppression of infection.

Discussion/Conclusion:

LVAD related infections are a common complication of LVAD implantation postoperatively however they may persist long after device implantation with significant morbidity and mortality. This case describes a rare manifestation of infection in the form of leucocytoclastic vasculitis. Typical vasculitis-associated infections include Hepatitis B & C infection and HIV. Corynebacterium has not previously been previously described as a cause of leucocytoclastic vasculitis. In addition, despite a patient being on chronic antibiotic therapy, they may still develop an atypical bacterial infection. Clinicians should have a high index of suspicion of infection if an LVAD patient presents with a new onset rash despite being on antibiotics as early recognition and aggressive management may increase survival and decrease morbidity among LVAD patients.

Categories

Fellow Case
Programme Code: 77

Transcatheter Aortic Valve Replacement in a patient with severe cardiogenic shock without mechanical support

Fahad Waqar, Romesa Sajjad, Donald Lynch, Atif Hassan
University of Cincinnati, Cincinnati, USA

Abstract

Introduction/Objective

The use of transcatheter approach to replace severely stenotic aortic valves (TAVR) has risen considerably in United States and Europe over the past decade. PARTNER trial, major trial showed TAVR is associated with significantly improved outcome in patients considered high-risk for open-heart surgery [1]. However, the trial excluded "very high risk" patients, including the patients with cardiogenic shock and those requiring inotropic support or mechanical circulatory support devices (MCS). We present a case and outcome of a high-risk patient in cardiogenic shock who underwent TAVR without use of MCS and had complete resolution of shock following TAVR.

Case presentation

A 65 year old Male with history of severe calcific aortic stenosis was referred by outpatient cardiology for TAVR consideration. While waiting for the procedure, patient had progressed to NYHA class IV with LVEF of 45% and critical aortic stenosis with valve area of 0.56 cm2. Using heart valve team approach, plan was made to perform TAVR. A right heart cath was performed before the procedure that revealed severely reduced cardiac index of 1.6 L/min/min2 and pulmonary artery pressure of 49/20 mmHg. Patient underwent TAVR without inotropic or mechanical circulatory support with a cardiac index of 2.8 L/min/m2 two hours after the procedure. Patient had uneventful recovery and was discharged within 48 hours of the procedure.

Discussion/ Conclusion

TAVR is a feasible option for patients with decompensated heart failure in the setting of severe aortic stenosis which provides superior results compared to balloon valvuloplasty in suitable patients. Mechanical circulatory support’s (MCS) role has been only well established in high-risk and severely ill patients undergoing cardiac and coronary interventions [2]. However, the use of MCS in patients undergoing TAVR is not very well studied. We present this case of a patient in cardiogenic shock related to poor cardiac function and low output state secondary to severe aortic stenosis which resolved immediately after the TAVR procedure. Improved trans-aortic gradient likely improved the cardiac output and resolution of cardiogenic shock. While the use of MCS may remain an attractive option for patients who develop hypotension or cardiac arrest during the procedure, the use of MCS as a planned strategy may not be necessary. It is proposed that, patients in similar situation, may see an immediate improvement in clinical condition and cardiac output following valve replacement, making the elective use of MCS less necessary. Although more data is needed to test this hypothesis, avoidance of MCS for such procedures will certainly reduce the cost and risk of complications related to the use of MCS.

References


Categories
Fellow Case
Resident Case Abstract
Final category: Resident Case

Programme Code: 5

A Unique Case Utilizing Orthotopic Heart Transplantation

Daniel Pinkhas, Amrita Karve, Rami Kahwash

The Ohio State Wexner Medical Center, Columbus, USA

Abstract

Introduction

Cardiogenic shock secondary to post-infarction ventricular septal defect (VSD) is an uncommon but serious complication and typically requires urgent surgical repair of the VSD. We present a unique case where orthotopic heart transplantation was used as definitive therapy for refractory biventricular heart failure due to a complex post-infarct VSD not amenable to surgical repair.

Case Presentation:

A 56-year-old man presented to our institution with progressive dyspnea and volume overload. His medical history included an inferior wall STEMI 4 months prior that was managed at an outside hospital. A 100% right coronary artery (RCA) occlusion was found and treated with multiple stents to the RCA along with a large VSD that was complicated by cardiogenic shock requiring inotropes and intra-aortic balloon pump. He responded well initially but had re-presented to our facility 2 months after infarction in cardiogenic shock. Transthoracic echocardiography (TTE) demonstrated a large posterior VSD measuring 21 mm. At this time, he went to the operating room where intra-operative transesophageal echocardiography (TEE) demonstrated a patent foramen ovale (PFO) not previously identified and severe tricuspid insufficiency. Urgent PFO closure, VSD repair with a bovine pericardial patch, and bioprosthetic tricuspid valve replacement were performed.

His current presentation of cardiogenic shock occurred seven weeks after surgery. On arrival he was cool and wet. He had a harsh 4/6 pansystolic murmur, elevated jugular venous pressure, bibasilar crackles, pitting leg edema, and ascites. Treatment was initiated with inotropes and aggressive IV diuresis. TTE demonstrated a left ventricular ejection fraction of 55%, severe right ventricular (RV) systolic dysfunction, left to right shunting due to a residual large VSD associated with a paravalvular leak of the prosthetic tricuspid valve, and a mass floating in the RV inflow tract which was thought to represent a dislodged fragment of the VSD patch. Findings were confirmed with TEE. Based on imaging characteristics, he was not a candidate for surgical or percutaneous repair due to the large size and posterior location of the VSD. As a result, he was listed as a Status 1A exception for urgent heart transplantation for refractory heart failure. Exception status was necessary due to inability of performing right heart catheterization as part of standard pre-transplant evaluation due to the high risk of cannulating the VSD site and further dislodging the patch. Three days after being listed, a suitable donor heart became available and he underwent successful orthotopic heart transplantation. He was discharged 25 days after receiving his transplant. He had two episodes of early rejection - grade 3R acute rejection one month post-transplant followed by grade 2R rejection two months later. Both episodes were successfully treated with high-dose systemic steroids and he has had a favorable overall clinical course to date.

Discussion/Conclusion:

As witnessed in this case, a residual post-infarct complex VSD not amenable to surgical repair can rapidly evolve into biventricular heart failure refractory to high-dose inotropic agents. Orthotopic heart transplantation proved to be a successful and definitive treatment for this patient who had a large, posterior, complex VSD that carried a very high operative mortality risk with surgical VSD repair.
2 Months Post-MI

4 Months Post-MI

A. Pre-operative transesophageal echocardiography (TEE) mid-esophageal 4-chamber view at 90 degree with color Doppler showing left-to-right ventricular shunting due to a non-restrictive basal inferior muscular ventricular septal defect (VSD) measuring 17 mm which was repaired with a porcine tissue patch. Given the central location of the VSD and associated severe tricuspid regurgitation with dilated annulus his native tricuspid valve was removed and replaced with a bioprosthetic St. Jude Epic valve (#3). B. Arrow indicates large patent foramen ovale (PFO) with right to left shunting on pre-operative TEE four months prior to MI. PFO closure was performed in addition to VSD patch closure and tricuspid valve replacement. C. TEE with color Doppler showing significant left-to-right shunting. Measured gradient between left and right ventricles measured to be 84 mm Hg. D. Transthoracic echocardiogram, RV inflow view, Asterisk marks a 32 x 21 mm circular mass near the coronary sinus (CS) and inferior vena cava (IVC) thought to represent a dislodged fragment of the VSD patch. E. Parasternal short axis view on TTE showing large residual infranodal VSD (arrow).
CV TEAM

Case Abstract
Pattern of atrial fibrillation detection with implantable cardiac monitors in patients with cryptogenic stroke in a large academic center

Julie Mease, Donna Frazier, Smeer Salam, Noah Grose, Archana Hinduja, Muhammad R Afzal, Emile Daoud

The Ohio States University, Columbus, USA

Abstract

**Background:** Current guidelines recommend outpatient rhythm monitoring with wearable or implantable loop recorder (ILR) for detection of atrial fibrillation (AF) in patients with cryptogenic stroke (CS). However, the pattern of AF detection during follow-up with ILR has not been described.

**Objective:** The objective of this study was to characterize the pattern of AF detection with ILR detected in CS patients.

**Methods:** We retrospectively reviewed the records of 75 patients with CS who underwent long-term ECG monitoring using an ILR at the Ohio States University. All ILRs were programmed using CS programming. All episodes of device detected AF were recorded.

**Results:** The study cohort of 75 patients who were followed for 12 month. During this period, 10 (13.3 %) of patients had confirmed AF. The duration of the first AF episode ranged from 2 – 26 minutes. Only two patients had AF in first one month.

**Conclusions:** Incidence of AF is significant in patients with CS. Detection of AF in first month is low. This data supports the routine use of ILR for detection of AF. Future research will need to determine the clinical significance of these episodes and whether anticoagulation can alter the natural history of these pts.

**Categories**

CV Team Case