Fellow in Training Research Abstracts Oral Competition

Indiana-ACC Poster Competition Abstract

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Please structure your case study abstract using the following headings: * Introduction/objective * Case presentation * Discussion * Conclusion

Title:

Left atrial hypertension and the risk of recurrent heart failure after atrial fibrillation ablation

Abstract: (Your abstract must use Normal style and must fit into the box. You may not alter the size of this)

Background:
Catheter ablation is a safe and effective procedure to reduce symptoms from atrial fibrillation (AF), but one potential complication is early occurrence of heart failure (HF). Elevated intraoperative left atrial pressure is associated with an increased risk of AF recurrence, but it is unknown if this correlates with HF.

Objective:
The objective of this study is to determine if left atrial hypertension not only predicts recurrent AF, but can also drive HF events.

Methods:
We performed a prospective, single center, cohort study measuring left and right atrial pressures during AF ablations in 100 patients. The primary endpoint was a clinical HF event defined by the composite of acute HF office visit, emergency room visit, hospitalization, or HF symptoms by telephone survey.

Results:
21% of patients had a clinical HF event within 30 days. HF patients had a higher post procedural left atrial pressure (mean [+/-SD], 12.7+/-4.6 vs 10.1+/-4.5; P=0.01) and higher post procedural right atrial pressure (7.7+/-3.6 vs 5.7+/-3; P=0.04). Other baseline correlates to HF included presence of moderate to severe mitral valve disease or not taking a class III antiarrhythmic medication (P=0.01 and P=0.02). A multivariate analysis including post ablation pressures, mitral valve disease and use of class III antiarrhythmics was performed and revealed presence of mitral valve disease and absence of class III antiarrhythmics were independent predictors of HF events. Additionally, the secondary endpoint of AF-free HF event was also associated with higher left atrial pressure (p = 0.04).

Conclusions:
Patients with a clinical HF event after AF ablation had significantly higher left and right atrial pressures post procedure, which cannot be explained by early recurrence of AF alone. Future studies may target these patients for intervention to reduce the risk of incident HF.

Indiana-ACC Poster Competition Abstract

Authors:

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Indiana-ACC Poster Competition Abstract

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Please structure your case study abstract using the following headings: * Introduction/objective * Case presentation * Discussion * Conclusion

Title:

Multi-View Right Ventricular Strain is a Better Predictor of Cardiovascular Events Compared with Right Ventricular Free Wall Longitudinal Strain

Abstract: (Your abstract must use Normal style and must fit into the box. You may not alter the size of this)

Background: Right ventricular (RV) free wall longitudinal strain has achieved significant popularity in recent literature as a tool to assess RV systolic function in various cardiac pathologies. Numerous studies have demonstrated the prognostic value of RV free wall longitudinal strain (FWS) assessed by 2D speckle tracking, but evaluation remains mostly limited to one apical 4-chamber view. We have shown that RV strain can be acquired using multiple 2D-views and has greater prognostic value when compared with RV-FWS.

Methods: GE Vivid echocardiographs were used to acquire images in 3 views of the RV in 106 subjects (mean age 56 yrs, 60 % male) with variable RV systolic function and EF>40%. The RV focused apical 4-chamber (4C) view imaged the septum and RV free wall, the apically tilted medially angulated long axis (LAX) view imaged the anterior and inferior walls and the short axis (SAX) view at the aortic valve level imaged the RV outflow tract. 2D strain was processed using a semi-automated software program. For each subject, RV-FWS was calculated as the average of the basal, mid and apical free wall segments and global RV strain was calculated as the weighted average of the 3 views (4C and LAX with 6 segments, SAX with 4 segments). Subjects were followed for cardiovascular (CV) events (cardiac death, cardiac arrest, cardiogenic shock, heart failure and malignant arrhythmias). SPSS was used perform cox regression and ROC analysis.

Results: 106 subjects with mean global RV strain of -17.9 ± 4.6 and RV-FWS of -20.2 ± 7 were followed for 19 + 17 mos. On cox regression analysis, significant univariate predictors of events were history of coronary artery disease ($p = 0.01$), hypertension ($p = 0.01$), right atrial area ($p<0.001$), RV outflow tract diameter ($p = 0.03$), RV basal diameter ($p<0.001$), global RV strain ($p <0.001$) and RV-FWS ($p<0.001$). Age, gender, ejection fraction and type 2 diabetes mellitus were not predictors. On subsequent multivariate analysis, RV basal diameter ($\chi2 = 30$), global RV strain ($\chi2 = 24.7$) and h/o CAD ($\chi2 = 7.9$) emerged as independent predictor of events. RV-FWS ($\chi2 = 10.8$) was not an independent predictor of events. ROC analysis revealed that global RV strain had an area under the curve of 0.801 (95% CI: 0.708 – 0.894) with optimal cutoff value of -17.5% (Sensitivity 81%, Specificity 67%), while RV-FWS had an area under the curve of 0.729 (95% CI: 0.627 – 0.832) with optimal cutoff value of -19.3 % (Sensitivity 69%, Specificity 65%).

Conclusion: Global RV strain derived from multiple views is an independent predictor of cardiovascular events while RV free wall longitudinal strain is not. Global RV strain is better at risk stratifying subjects with various levels of RV systolic function when compared to RV-FWS.

Indiana-ACC Poster Competition Abstract

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Fellow in Training Research Abstracts

Judge Group A

Indiana-ACC Poster Competition Abstract

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Title:

Impact of Formal Bedside Transthoracic Echocardiography Training for Internal Medicine Residents

Abstract: (Your abstract must use Normal style and must fit into the box. You may not alter the size of this)

Background
The expanding use of point of care beside ultrasound in the medical field has resulted in a growing need to implement formal training for medical students and residents in training (1). Studies have illustrated that internal medicine residents have a strong interest in learning bedside ultrasound, yet formal training is lacking (2,3). Transthoracic echocardiography (TTE) is an imaging modality obtained in nearly all cardiac patients. Multiple studies have suggested that with adequate training, non-cardiologist clinicians can perform and interpret focused TTE exams, which can be used to alter patient management decisions (4-6).

Objective
This study aims to assess the impact and effectiveness of a formal bedside TTE training curriculum for internal medicine residents.

Methods
A once monthly, cardiology fellow-led, bedside TTE training session during the internal medicine resident ambulatory block was initiated in January 2019. The session begins with a 30-minute didactic lecture which reviews how to obtain the standard TTE views and identify the associated anatomy. The didactic also reviews imaging interpretation to assess left ventricular ejection fraction and volume status and identify signs of cardiac tamponade and right ventricular strain in acute pulmonary embolism. There are also 4 clinical case-based examples which highlight appropriate clinical application. Following the didactic session, residents take turns practicing obtaining bedside TTE images on a live model using the Philips Lumify® portable ultrasound probe. Residents also practice image acquisition on the CAE Vimedix® ultrasound simulator. Two cardiology fellows are available during this time to help assist the residents in optimizing the images and identifying the anatomy. Resident knowledge is assessed with a pre- and post-test. Resident satisfaction is assessed using a survey with a Likert scale.

Results
To date, 82 internal medicine residents have completed the training program. Most residents were inexperienced with performing bedside TTE with 82% reporting only having performed 0-5 bedside TTEs prior to the session. Additionally, only 24% reported feeling comfortable with performing bedside TTE. There was a 17% improvement in scores on the knowledge pre- and post-test. On a satisfaction survey, 82% strongly agreed that the lecture portion was informative and expanded their knowledge of TTE and 81% strongly agreed that the hands-on portion was helpful in learning bedside TTE. At the end of the session, 77% reported feeling comfortable with performing bedside TTE, compared to 24% prior to the session. Additionally, 86% of residents strongly agreed that performing bedside TTE was a useful skill and 68% strongly agreed that they would utilize this skill in the future.

Conclusion
The use of bedside ultrasound is rapidly growing in the field of medicine. Formal training for internal medicine residents at our institution has been limited. The initiation of this cardiology fellow-led bedside TTE training session is a step toward improving internal medicine resident exposure to bedside TTE. While the improvement in test score was only modest at 17%, we hope that with reinforcement of TTE knowledge during cardiology inpatient services, resident comprehension will improve. At the conclusion of the sessions residents were far more comfortable performing bedside TTE and most found it to be a useful skill that they would utilize in practice.

References

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3. Watson K et al. Point of care ultrasound training for internal medicine: a Canadian multi-centre learner needs assessment study. *BMC Medical Education*. 2018 (18):217.
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Indiana-ACC Poster Competition Abstract

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Indiana-ACC Poster Competition Abstract

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Title:

Safety and Feasibility of Orbital Atherectomy via Transradial Approach in Severe Coronary Artery Calcification.

Abstract: (Your abstract must use Normal style and must fit into the box. You may not alter the size of this)

Background

Severe coronary artery calcification is associated with worse clinical outcomes following percutaneous coronary intervention (PCI). Atherectomy strategies have been used to improve overall procedural success, facilitate stent delivery, promote maximal stent expansion and improve long term outcomes. We compared outcomes between transfemoral (TF) and transradial (TR) approach in patients undergoing orbital atherectomy (OA) with adjunctive PCI for severe coronary calcification.

Methods

A retrospective review between November 1, 2015 and May 31, 2017 of clinical variables for 91 consecutive patients undergoing OA with PCI (51 TF and 40 TR) was performed. This represented 6% (91/1505) of all PCIs performed during that period. Baseline patient characteristics, procedural variables and 30-day serious adverse event rates (vascular/bleeding complications and major adverse cardiac event) were compared. Independent t-test and Fisher's exact test were performed and p-values of <0.05 were accepted as statistically significant.

Results

There was no significant difference in number of lesions treated (TF 1.67 +/- 0.7 vs. TR 1.83 +/- 0.68; p = 0.28) or atherectomy vessel stents placed (TF 1.72+/- 0.77 vs. TR 1.93 +/- 0.69; p = 0.18) between groups. There were significantly more total stents (atherectomy plus non atherectomy vessel) placed in the transradial group (TF 2 +/- 0.9 vs. TR 3.1 +/- 1.14; p = 0.038). Fluoroscopy time was longer in the transradial group (TF 23.78 +/- 9.74 vs. TR 28.9 +/- 12.8 min; p = 0.033) and contrast volume was higher in transradial group (TF 200.27 +/- 75.1 vs. TR 238.07 +/- 80.96 mL; p = 0.024). Technical success was achieved in all cases and there was no crossover from TR to TF. At 30 days, there were significantly more serious adverse events seen in the transfemoral group (TF 7/51 vs. TR 0/40 events; p = 0.017).

Conclusions

Orbital atherectomy, regardless of approach, is feasible with a high procedural success rate and an overall low complication rate. In our patients, TR approach was associated with longer fluoroscopy time and higher contrast volume compared to TF approach. In the TR group, however, more stents were placed and a greater number of vessels were treated. At 30 days, the TR group had experienced significantly fewer serious adverse events. Hence, TR orbital atherectomy is a safe and effective alternative to standard TF approach for treating complex, calcified coronary lesions.

Indiana-ACC Poster Competition Abstract

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Fellow in Training
Case Abstracts
1st Year
(Judge Group A)

Indiana-ACC Poster Competition Abstract

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Title:

Failed TAVR in a Patient with AI on Long-Term LVAD

Abstract: (Your abstract must use Normal style and must fit into the box. You may not alter the size of this)

Introduction:
Aortic insufficiency (AI) is a common complication of long-term support on a left ventricular assist device (LVAD) and portends a poor prognosis. While multiple surgical correction options exist, many patients are not candidates for an open procedure and/or prefer a minimally invasive operation. Small case series of the use of the Self-Expanding Evolut Valve Transcatheter aortic valve replacement (TAVR) have been reported in this subset of patients with mixed results. This case reviews an unsuccessful attempt at TAVR with the balloon expandable Sapien S3 valve in an LVAD patient with stand-alone AI.

Case:
This patient is a 78-year-old male with a past medical history significant for end stage ischemic cardiomyopathy, as well as hypertension and atrial fibrillation. In the setting of progressive heart failure symptoms, he underwent placement of a HeartMate III LVAD as destination therapy in 2017. Following implantation, he noted a significant improvement in his functional status (NYHA II) until April of 2019 at which time he again developed heart failure symptoms.

Original workup at that time included a transthoracic echocardiogram (TTE) which was notable for severe, centrally directed aortic insufficiency with an ejection fraction of 10%. The AI was a new finding from his echocardiogram three months prior. Following this, a right heart catheterization was performed which demonstrated a mild elevation in biventricular filling pressures with a right atrial pressure of 9mmHg and a pulmonary capillary wedge pressure of 16, with a significantly depressed cardiac output and index of 3.7 L/min and 1.55 L/min/$M^{2.}$, consistent with cardiogenic shock.

Based on these findings, it was felt that the patient would benefit from correction of his aortic regurgitation. Both an open as well as a minimally invasive procedure were discussed, and the patient opted for a minimally invasive approach. The TAVR protocol CTA demonstrated a valve area of 594 mm^2 with minimal annular or valvular calcium. Based on the CTA and previous case reports, it was felt that the patient should undergo a transfemoral TAVR using a 29mm Sapien S3 device using nominal inflation +3 cc for a target valve area of 720 mm^2.

Originally, the patient underwent placement of the TAVR valve with the intraoperative transesophageal echocardiogram demonstrating trivial AI. Unfortunately, within a few minutes, the patient developed severe, perivalvular aortic insufficiency, with migration of the valve into the left ventricular outflow tract (LVOT). Placement of a second 29 mm Sapien S3 device was then attempted, and originally was successful, but the patient again developed severe aortic insufficiency with migration of the valve into the LVOT. Given the lack of success with the prior two attempts, the procedure was aborted and the patient was returned to the CV ICU for further care. After further discussion, the patient ultimately elected for surgical aortic valve replacement SAVR with retrieval of the unsuccessfully implanted valves. At the current time, the patient is doing well and is recovering from his open procedure.

Discussion:
Aortic insufficiency is a known long-term complication of LVAD therapy, with a prevalence of severe AI as high as 50% at 18 months. The etiology of this is felt to be multifactorial, including postoperative hemodynamic changes leading to aortic root dilatation, valvular myxoid degeneration, and fusion of commissures of the aortic valve. The development of AI may lead to circuit overload, worsening heart failure symptoms, and reduced survival.

Initial management is primarily medical (diuretics, afterload reduction agents) in addition to lowering of the LVAD speed. For patients with residual symptoms, surgical repair/ replacement with a bioprosthetic valve is considered first line, but many patients are not surgical candidates and/or elect not to pursue an open operation. Complete aortic valve closure (surgically or via transcatheter occlusion devices) is an option as well, but these patients become completely LVAD dependent and can quickly decompensate should their LVAD malfunction.

TAVR has emerged as a reasonable therapeutic option, as was chosen by the patient in this case. Although extensive data exists for this therapy in calcific aortic stenosis, outcomes of TAVR for AI in LVAD patients is not well studied. Available research consists of case reports with mixed results. A 2017 meta-analysis by Phan et al. identified only 8 cases of LVAD patients undergoing TAVR for AI. Of these 8 patients, 3 patients experienced similar complications to our patient. These patients, however, received the self-expanding CoreValve, unlike our patient who received a Sapien valve. Ladanza et al. described another case complicated by CoreValve migration into the left ventricle. Our patient can be added to this small but growing list of LVAD patients with AI unsuccessfully treated with TAVR and appears unique in that he is the only documented failure of a Sapien valve.

Conclusion:
AI is a known complication of long term LVAD therapy and is expected to increase in prevalence as the number of VAD's being implanted continues to increase. Current non-surgical options are limited, and percutaneous strategies are being trialed with new investigational devices on the horizon. Until there are devices specifically designed to treat AI, patients should be counseled on the significant risks, and bail out strategies should be discussed prior to undergoing TAVR.

Indiana-ACC Poster Competition Abstract

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Indiana-ACC Poster Competition Abstract

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Title:

Isolated RV Infarction presenting as Anterior ST-Segment-Elevation Myocardial Infarction

Abstract: (Your abstract must use Normal style and must fit into the box. You may not alter the size of this)

Introduction:
Isolated right ventricular (RV) myocardial infarction is very rare. Traditionally, right ventricular myocardial infarction has been diagnosed by obtaining a right-sided ECG, which is acquired by placing the standard precordial leads across the right side of the chest in a mirror image of the standard ECG. Patients with acute coronary syndromes presenting with ST-segment elevation in the anterior precordial leads on a standard ECG most commonly have an occlusion of the left anterior descending artery. However, it is possible to have acute proximal right coronary artery (RCA) obstruction and isolated right ventricular myocardial infarction that presents with ST-elevation in the anterior precordial leads on a standard ECG if the RCA is non-dominant. In this situation, preservation of blood flow to the inferior left ventricular myocardium allows for the injury current from the anteriorly positioned right ventricle to be appreciated. Differentiation between left ventricular anterior wall myocardial infarction and an isolated right ventricular myocardial infarction is critical as medical management and possible complications differ significantly. We present a rare case of an isolated right ventricular myocardial infarction presenting with ST-elevations in the anterior precordial leads due to an acutely occluded non-dominant RCA with complete resolution of symptoms following percutaneous coronary intervention.

Case Presentation:
A 62 year old female with history of hyperlipidemia and tobacco use presented to the ER with acute onset chest pain. Thirty minutes prior to arrival in the ER, patient suddenly experienced 10/10 substernal squeezing pain radiating to her jaw. She took sublingual nitroglycerin tablet every 5 minutes for three doses with no relief. EMS was called, and ECG was performed. ECG was concerning for STEMI. On arrival to the ER, ECG showed anterior ST elevations in leads V1-V4 (Fig. 1). STEMI team was activated and patient was brought emergently to the cardiac catheterization lab. The suspected non-culprit vessel was imaged first, revealing a 100% occlusion of the RCA proximally. Coronary angiography of the left coronary system revealed patent left main coronary artery, a patent left main coronary artery, 20% stenosis in the mid LAD, and a patent left circumflex supplying the PDA. At this point, patient was still complaining of chest pain and vomiting. JR4 guide was used to engage the RCA and BMW wire was passed though the thrombotic lesion. A 2.0 x 15mm Apex balloon restored flow to a non-dominant RCA, then a 2.25x20mm Synergy DES was placed in the proximal RCA with resultant TIMI 3 flow (see image). Patient's symptoms resolved after PCI was performed. Echocardiogram was obtained and revealed a hyperdynamic left ventricle with no wall motion abnormalities and an enlarged, hypokinetic right ventricle with TAPSE 1.4 and reduced RV fractional area of change. Patient's troponin peaked at 3.04. The patient was monitored in the ICU for 48 hours without further symptoms and then discharged after all appropriate medical therapies were started.

Discussion:
Patients presenting with ST-elevations in the anterior precordial leads usually are found to have acute occlusion of the left coronary system, most commonly the LAD, leading to injury of the anterior wall of the left ventricle. In this situation, positive injury current from the myocardium of the anterior wall of the left ventricle is directed toward the precordium, causing ST-elevations. Commonly, reciprocal ST-depressions can be seen in the inferior leads due to the injury current from the anterior wall superceding the normal conduction through the inferior wall of the left ventricle. Anterior LV wall myocardial infarctions can cause decreased LV systolic function resulting in low cardiac output, and in severe cases, cardiogenic shock. In our case, the patient presented with the unusual presentation of ST-elevations in the anterior precordial leads, V1-V4, without reciprocal ST-changes in the inferior leads due to acute occlusion of proximal RCA. The majority of patients have right coronary dominance (blood supply to the PDA originates from RCA); given this, acute occlusion of the RCA usually presents with ST-elevations in the inferior leads (II, III, aVF) due to injury to myocardium of the inferior wall of the left ventricle. Only 5-10% of patients have anatomy in which the PDA is supplied by the left circumflex, leading to the RCA supplying blood flow to only the right ventricle. When the non-dominant RCA is acutely occluded, the myocardium of the right ventricle becomes ischemic, and since it is located anteriorly in relation to the left ventricle, the injury current is seen greatest in the anterior precordial leads (V1-V4). Differentiation of anterior LV infarction and isolated RV infarction is critical because despite similar injury patterns on ECG, medical management is quite different. In isolated RV infarction, decreased RV function decreases preload to the normally functioning LV. This can result in hypotension which is treated with IV fluids and may be exacerbated by nitrate administration. In contrast, decreased anterior LV wall function can cause reduced LV systolic function decreasing cardiac output and leading to hypotension. In this case, hypotension is treated with inotropic support and limiting IV fluids.

Conclusion:
Isolated RV myocardial infarction is rare, and, in patients with left coronary dominance, can present with ST-elevations in the anterior precordial leads, mimicking myocardial infarction of the anterior wall of the left ventricle. Differentiation between these two clinical entities is very important as their medical management and complications differ significantly.

Indiana-ACC Poster Competition Abstract

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Fellow in Training
Case Abstracts
2nd Year
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Indiana-ACC Poster Competition Abstract

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Title:

Acute myocardial infarction complicated by cardiogenic shock: Case of a isolated cleft mitral valve.

Abstract: (Your abstract must use Normal style and must fit into the box. You may not alter the size of this

Introduction: The management of acute myocardial infarction (AMI) has evolved over the last few decades. The standard of care now is emergent coronary revascularization with a greater than 90% chance of survival to hospital discharge. However, the cardiogenic shock in the setting of AMI continues to have a mortality of 35-50% despite aggressive upfront therapy. This is an area that has been the focus of intense discussion over the last few years, especially with the advent of robust mechanical circulatory support devices. We present here a case of a patient who presented with an acute anterior wall myocardial infarction that was complicated by cardiogenic shock. This was accompanied by an incidental finding of severe, chronic, mitral valve regurgitation due to an isolated cleft mitral valve.

Case Presentation: A 49 year old Caucasian male truck driver with no prior underlying medical issues who was driving through the state, when he developed sudden onset chest pain. He came to the emergency room immediately; his EKG showed atrial fibrillation with rapid ventricular response with 3 mm ST elevations in the anterior precordial leads. His heart rate was 120-130's, blood pressure around 90/70mmhg, on 90% on 2L of oxygen via nasal cannula. He was immediately brought to the cardiac catheterization lab where right radial access was achieved and the left anterior descending artery found to be occluded in the proximal segment (figure 1) with TIMI grade 0 flow. The lesion was traversed and aspiration thrombectomy was performed using the Export AP Aspiration Catheter. This helped restore TIMI 2 blood flow. Subsequently the patient began to become more hypotensive with mean arterial pressures consistently less than 60mmhg. He was also beginning to exhibit signs of respiratory distress with increase oxygen requirements. He was intubated by critical care staff and started on norepinephrine and dopamine infusions. Hemodynamics improved marginally and the team proceeded with percutaneous coronary intervention with drug eluting stent in the proximal LAD (Figure 2). Despite revascularization he continued to show signs of hemodynamic compromise with worsening hypotension in the face of increasing pressor requirements. The decision was made to place an intra aortic balloon pump to help off-load the left ventricle and allow diastolic coronary augmentation. His Left ventricular end diastolic pressure (LVEDP) was 33mmhg with a very narrow pulse pressure. Despite the high LVEDP, the team felt it was prudent to perform a LV angiography to assess for mechanical complication. Subsequent LV-angiography (figure 3) revealed grade 4+ mitral regurgitation with a severely enlarged left atrium. In view of tenuous status, the decision was made to switch the patient to hemodynamic support using extra-corporeal membrane oxygenation (VA-ECMO) in the lab with cardiovascular surgery. Since the actual cause of his severe MR was unclear, a transesophageal echo was performed, which revealed the presence of a cleft mitral valve (Figure 5). The patient remained critically ill for a number of days and then the patient's clinical course improved. He was slowly weaned off pressors and on day five and removed from the ECMO circuit. Repeat imaging revealed mitral regurgitation that was only mild in nature with an ejection fraction of 45%. He was discharged after staying in the hospital for ten days and has followed up subsequently and has been doing well clinically.

Discussion: The incidence of cardiogenic shock complicating myocardial infarction ranges from 7-12%, and despite prompt revascularization mortality for these patients is near 50%. Rapid identification of patients with cardiogenic shock is of the utmost importance as this is can lead to quick decisions and rapid interventions can translate into a reduction in morbidity and mortality. The patient described in this case is an example of a patient who had a large anterior AMI with profound cardiogenic shock that was further complicated by an isolated cleft mitral valve. Our patient benefited from rapid identification of shock despite urgent revascularization and required rapid escalation of therapies from vasopressors, intubation, and intraaortic balloon pump to VA-ECMO to provide temporary cardiac and respiratory support. Our patient's cardiogenic shock can be attributed to a combination of a stunned anterior wall as well as mitral regurgitation due to a cleft mitral valve, which acutely worsened immediately after the coronary insult. While such congenital mitral anomalies are found less than 0.5% of the time, it is important to note that they are not without hemodynamic consequences. Getting extra information with LV angiography was helpful in our patient's management despite a relatively high LVEDP. The information we obtained from it helped make the decision to transition to advanced mechanical circulatory support very easy and is what eventually saved the patients life.

Conclusions: Urgent revascularization in the setting of AMI has vastly improved outcomes, but patients with concurrent cardiogenic shock continue to have high mortality. Early identification of shock and executing appropriate interventions can be lifesaving for these patients. Obtaining additional information from LV angiography can be helpful in navigating the care for these patients and potentially reveal significant findings like severe mitral regurgitation from an isolated cleft mitral valve.

Indiana-ACC Poster Competition Abstract

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Title:

CTEPH and Ehlers Danlos Syndrome, When Two Rare Disorders Collide

Abstract: (Your abstract must use Normal style and must fit into the box. You may not alter the size of this)

Introduction

Chronic thromboembolic pulmonary hypertension (CTEPH) is a form of pulmonary hypertension (PH) that is important to identify, as its treatment includes potentially curative pulmonary thromboendarterectomy. Patients with underlying hypercoagulable and vascular disorders are at increased risk for progression to CTEPH, but the exact incidence is unclear. Ehlers Danlos Syndrome (EDS) encompasses a group of connective tissue disorders that can be hereditary and are characterized by joint hypermobility, skin hyperextensibility, and tissue fragility. EDS has not previously been described as a common cause of thromboembolic disease. We present a case of a patient with EDS who developed PH and was diagnosed with CTEPH who ultimately underwent pulmonary thromboendarterectomy with successful results.

Case Description

A 32-year-old female with a past medical history of EDS, atrial tachycardia complicated by tachy-brady syndrome with permanent pacemaker, dysautonomia, and chronic pain was referred for progressive shortness of breath. She had been diagnosed with a deep venous thrombosis in her left arm eight months prior that was associated with a peripherally inserted central catheter she had in place for chronic pain treatment, subsequently treated with systemic anticoagulation. She then had progressive shortness of breath resulting in evaluation with a computed tomography angiogram, showing a chronic left lower lobe pulmonary embolus. Given her recurrent thromboembolic disease on apixaban, she was switched to low molecular weight heparin after consultation with hematology. She continued to have significant fatigue and exertional, functional class 3 dyspnea. Subsequent echocardiogram showed right ventricular enlargement with mildly reduced right ventricular function, severe tricuspid regurgitation at least in part due to the pacemaker lead, and an estimated right ventricular systolic pressure of 46 mm Hg. Given these findings, she underwent a workup for CTEPH. The diagnosis was confirmed by ventilation/perfusion scan, pulmonary angiogram, and hemodynamics revealing RA 18, RV 60/19, PA 49/23 (32), PCW 12, TPG 20, Fick CO/CI 4.0/1.99, Thermal CO/CI 4.54/2.25, Fick/Thermal PVR 5/4.4.

Ultimately, she underwent successful pulmonary thromboendarterectomy, tricuspid valve repair and pacemaker lead excision revealing right atrial lead thrombus formation. Three months post-operatively, she has a significant improvement in functional capacity (class 2) and has no hypervolemia.

Discussion

CTEPH related to EDS has not been previously described. In this case, hypercoagulability may be related to underlying arteriopathy with PH compounded by severe tricuspid regurgitation resulting from pacemaker lead placement.

Indiana-ACC Poster Competition Abstract

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Title:

The Utility of Fractional Flow Reserve – Computerized Tomography (FFR-CT) in the presence of coronary artery calcification.

Abstract: (Your abstract must use Normal style and must fit into the box. You may not alter the size of this)

Introduction:

The presence of coronary artery calcification can result in the overestimation of stenosis severity due to imaging artifacts that obscure the underlying vessel, thereby reducing diagnostic accuracy. Fractional flow reserve derived from coronary computed tomography angiography (FFR-CT) offers hemodynamic insight into the significance of a stenosis. We present a case in which FFR-CT accurately identified hemodynamically significant disease despite high degree of coronary artery calcification.

Case Presentation:

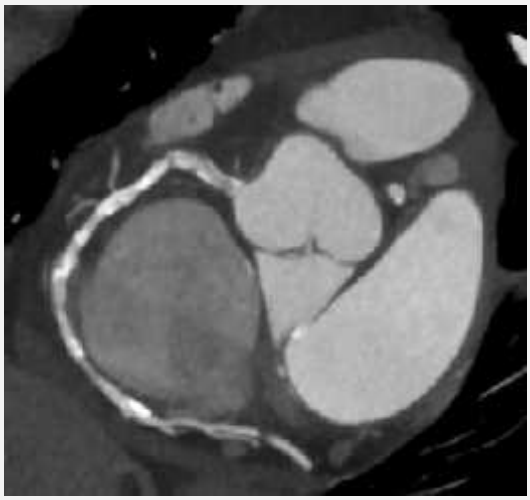
A 73-year-old Caucasian female with hypertension, hyperlipidemia, and breast cancer treated with chemotherapy and radiation presented with exertional dyspnea. Myocardial perfusion imaging showed no evidence of ischemia. However, due to persistent symptoms, she underwent coronary CTA, which revealed severe coronary calcification (Agatston score 1267) and high grade stenoses in the left anterior descending (LAD) and right coronary (RCA) arteries. FFR-CT results were 0.56 and 0.59 in the mid-RCA and mid-LAD, respectively. Subsequent left heart catheterization confirmed two-vessel coronary artery disease, and the patient is awaiting coronary artery bypass grafting.

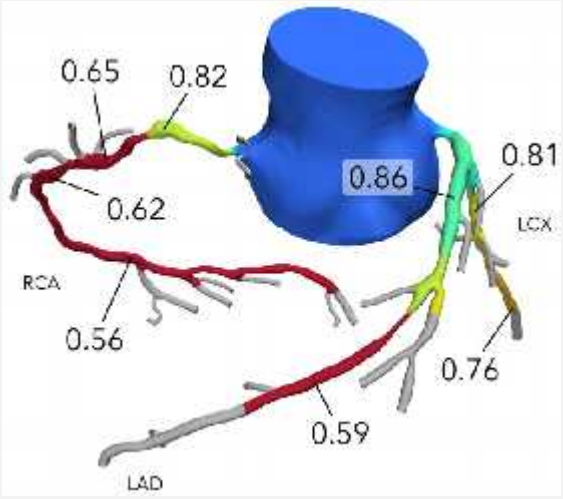
Discussion

Noninvasive functional diagnostic tests do not directly visualize coronary lesions. Coronary CTA offers anatomic assessment but with reduced accuracy in the presence of extensive coronary calcification. FFR-CT has been shown to be diagnostically accurate over varying degrees of coronary calcification. This case demonstrates the superior ability of FFR-CT to identify both anatomic and hemodynamically significant disease over other widely used noninvasive tests.

Conclusion

FFR-CT technology offers the ability to detect hemodynamically significant coronary artery disease, even in the presence of highly calcific disease.





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Please structure your case study abstract using the following headings: * Introduction/objective * Case presentation * Discussion * Conclusion

Title:

Management of Bioprosthetic Aortic Valve Thrombosis in Protein S Deficiency

Abstract: (Your abstract must use Normal style and must fit into the box. You may not alter the size of this)

Introduction

Bioprosthetic tissue valve thrombosis is a rare however concerning entity.[1] This incidence is likely enhanced but unknown in the setting of Protein S Deficiency. We present a case where explanation and reimplantation for obstructive thrombosis of a bioprosthetic aortic valve posed an unknown but concerning risk of redo procedure, morbidity and mortality, and unknown but concerning risk of re-thrombosis due to hypercoagulable state and use of fibrinolytic therapy was initiated.

Case Presentation

61-year-old male history of Protein S Deficiency complicated by recurrent DVT/PE and status post bioprosthetic aortic valve (pericardial tissue valve) replacement 13 months prior for aortic regurgitation presented with syncopal event and daily dizziness. Transthoracic Echocardiogram showed AV Peak Velocity 4.08m/s, mean gradient 45.3mmHg and aortic valve area of 0.71cm^2. Transesophageal echocardiogram revealed layering echogenic material over valve leaflets concerning for thrombus. Redo AVR was concerning given hypercoagulability state. Alteplase 25mg over 6 hours with heparin infusion given with AV peak velocity down to 3.1m/s and thrombus not visualized on transesophageal echocardiogram and resolution of dizziness on ambulation.[2]

Discussion

Bioprosthetic valve thrombosis in the aortic position has a reported incidence of 0% to 1.26% based on bioprosthesis type particularly 0% with stented pericardial tissue valve in one study.[1] Management with fibrinolytics have been performed in a few small studies mainly in mechanical valves with some success including one promoting it as first line trial prior to surgery.[3-6] However surgery appears safer in terms of thromboembolic risk and in longer term follow-up in a study by Roudaut et al.[4] This case however presented a diagnostic challenge as concerns of redo procedure, morbidity, and mortality, and the unspecified risk of hypercoagulability and re-thrombosis risk.

Conclusions

This case however presented a diagnostic challenge as concerns of redo procedure, morbidity, and mortality, and the unspecified risk of hypercoagulability and re-thrombosis risk. Use of fibrinolytic therapy was a reasonable alternative with improvement in qualitative echocardiographic features, mild improvement in quantitative measurements, and clinical symptoms. Per literature search this appears to be the first case using fibrinolytic therapy in Protein S Deficiency in relation to bioprosthetic aortic valve thrombosis.

Indiana-ACC Poster Competition Abstract

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Title:

Right Ventricular Infarction presenting with Refractory Hypoxemia due to Right-to-Left Shunting across a Patent Foramen Ovale

Abstract: (Your abstract must use Normal style and must fit into the box. You may not alter the size of this)

Introduction:
Right ventricular (RV) infarction is associated with considerable morbidity and mortality. Here, we report a case of late presentation of right ventricular infarction associated with persistent hypoxemia due to right-to-left shunting through a patent foramen ovale (PFO).

Case Presentation:
A 71-year-old male with a past medical history of hypertension presented to the emergency room 12 hours after onset of substernal chest pressure and dizziness. He was normotensive, bradycardic, and hypoxic to 87% on room air. Cardiopulmonary exam revealed clear lung fields, regular rhythm, no murmurs, rubs, or gallops, no jugular venous distension, intact pulses throughout, and no lower extremity edema. EKG showed a junctional escape rhythm. Initial troponin-I was 30.48. Urgent coronary angiography revealed a 100% thrombosis of the proximal right coronary artery. Percutaneous coronary intervention was performed with sub-optimal improvement in flow (TIMI 0 to TIMI 2). Transthoracic echocardiogram revealed severe right atrial and ventricle dilatation with right-to-left shunting observed at the atrial level with agitated saline injection. The patient was placed on medical therapy but his hospital course was complicated by persistent hypoxemia requiring high flow nasal cannula. Transesophageal echo was performed to further investigate this shunt and it revealed a moderate-sized PFO with gross right-to-left shunting.

Discussion:
Limited case studies have reported successful closure of atrial shunts in the setting of RV infarction. However, it is usually unnecessary as the RV often recovers after infarction even without reperfusion. In this patient, RV recovery was seen on repeat echo after five days and he was slowly able to be weaned off high flow nasal cannula. He was discharged in stable condition and has done well at follow-up.

Conclusion:
Shunting through a pre-existing patent foramen ovale or atrial septal defect should be considered in cases of hypoxemia complicating right ventricular infarction.

Indiana-ACC Poster Competition Abstract

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Title:

Multi-Vessel Spontaneous Coronary Artery Dissection: The Conservative Approach

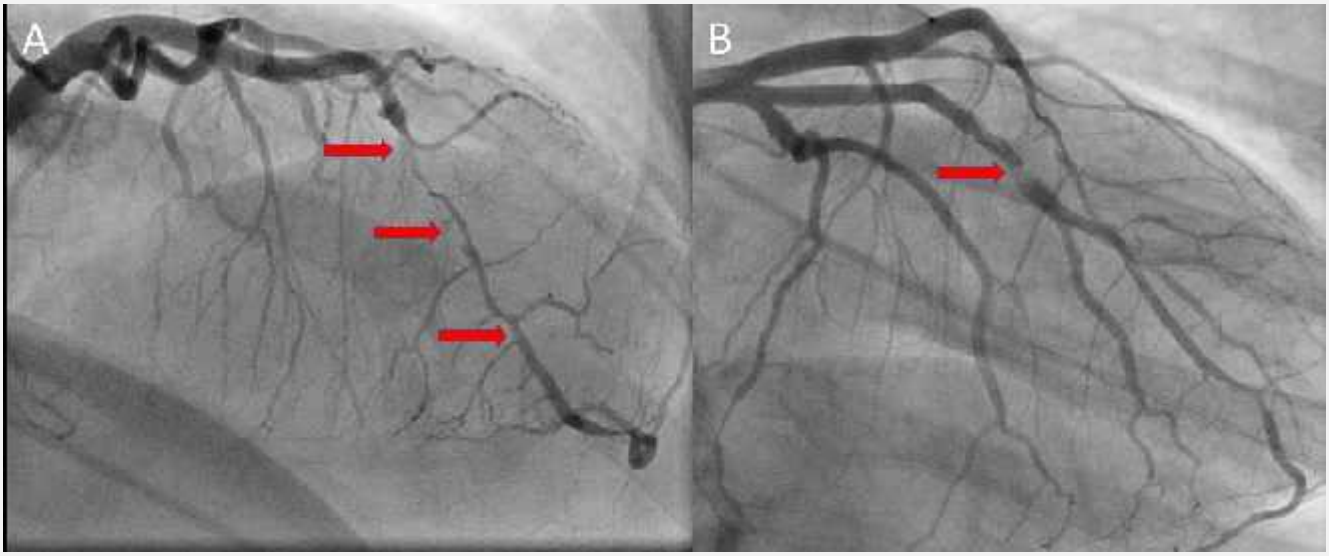
Abstract: (Your abstract must use Normal style and must fit into the box. You may not alter the size of this)

Background:
Spontaneous coronary artery dissection (SCAD) has been increasingly recognized as a common pathologic mechanism of acute coronary syndromes in the absence of coronary atherosclerosis and vessel trauma. Pregnancy-associated SCAD compared to non-pregnancy associated SCAD, carries a worse prognosis.

Case:
A 39 year old female with no significant past medical history presented to the emergency department with chest pain of a 1 hr duration. She was 2 weeks post Caesarean section of her fourth child. Her ECG showed pronounced lateral ST-segment depression. Troponin was elevated to 1.65ng/ml.

Decision-making:
The patient was taken to the cath lab, where coronary angiography revealed long 80-90% stenosis in her mid-distal left anterior descending artery (LAD), with a dissection flap (Fig 1A), as well as a 95% stenosis with dissection flap and thrombus in obtuse marginal 1 (OM1)(Fig 1B). In addition there was a tubular 50% focal stenosis in a small diameter right posterior descending artery. Conservative management was attempted given presence of TIMI 3 flow in all vessels. She was placed on aspirin, ticagrelor, and metoprolol tartrate. Intravenous unfractionated heparin was continued for 48hrs. The patient's chest pain resolved a few days later and she was discharged home on the above medication.

Conclusion:
Simultaneous multi-vessel SCAD is rare, but more common in pregnancy associated SCAD. Conservative management should be preferred over percutaneous coronary intervention or CABG.



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Title:

Rare Cause of Acute STEMI: Coronary Embolism from Infective Endocarditis

Abstract: (Your abstract must use Normal style and must fit into the box. You may not alter the size of this)

INTRODUCTION:
Coronary embolism is a rare but potentially lethal cause of ST elevation myocardial infarction (STEMI). Previous studies report the incidence of coronary embolism in the setting of acute myocardial infarction between 2.9 to 4.3 percent. Atrial fibrillation is the most common cause of coronary embolism. Other causes include cardiomyopathy, valvular heart disease, and malignancy. Infective endocarditis is one of the least common causes of coronary embolization. This case presents an example of septic emboli from mitral valve endocarditis presenting as acute STEMI.

CASE PRESENTATION:
A 57 year old male with history of intravenous drug abuse, untreated HIV, and Hepatitis C presented with generalized body aches and encephalopathy. He was diagnosed with methicillin-resistant *Staphylococcus aureus* bacteremia and anterior mitral valve leaflet endocarditis with 2.5 x 1.6 cm vegetation with eccentric moderate to severe mitral regurgitation. He was started on intravenous vancomycin but hospital course was complicated by endophthalmitis, for which he underwent vitrectomy and received intraocular antibiotics, and right arm abscess requiring ultrasound-guided drainage. A computed tomography scan of the head did not reveal any abnormalities. Lumbar puncture revealed lymphocytic predominance but cerebrospinal fluid studies did not reveal evidence of meningitis. He was transferred to our facility for surgical evaluation for mitral valve replacement.

Upon arrival, he became acutely agitated and tachycardic. An EKG revealed ST elevations in the anterior leads. The patient was loaded with aspirin and ticagrelor and taken emergently to the cardiac catheterization lab where 95% mid left anterior descending and 100% distal left circumflex artery lesions were discovered. Aspiration thrombectomy resulted in residual 40% left anterior descending artery stenosis and resolution in the left circumflex artery. ST elevations resolved with aspiration. Samples aspirated from the coronary arteries were sent for pathologic analysis. Histologic sections of the thrombus showed eosinophilic fibrin and collections of neutrophils, and at 600x magnification, basophilic granularity consistent with coccoid bacteria. This is consistent with embolism from bacterial vegetation.

Unfortunately, he developed subarachnoid hemorrhage following heart catheterization. Magnetic resonance imaging of the brain revealed multiple septic emboli and hemorrhage in cerebellar hemispheres and bilateral frontal lobes. Neurosurgical intervention could not be performed for this. Eventually, his blood cultures cleared and mental status improved. A repeat transesophageal echocardiogram showed enlarged mitral valve vegetation with severe mitral regurgitation, development of new severe tricuspid regurgitation without visualized vegetation, and vegetation on hemodialysis catheter. Plans were made for mitral and tricuspid valve replacements but he suffered cardiac arrest the morning before surgery. After prolonged hospitalization, the patient died.

DISCUSSION:
Infective endocarditis complicated by ST elevation myocardial infarction is a rare condition, which may be attributed to coronary embolism, obstruction of coronary ostia by large vegetation, or coronary artery compression due to abscess formation. The incidence of coronary artery embolism from infective endocarditis is reported as less than one to two percent. Acute coronary syndrome typically only accounts for about three percent of complications in patients with infective endocarditis. It normal occurs in the acute phase of the disease (first 15 days) and is more often associated with virulent microorganisms, aortic valve infection, severe valvular regurgitation, and large periannular complications.

Traditionally, surgical intervention is recommended for treatment of endocarditis. However, STEMI mandates urgent evaluation. Treatment in these situations is controversial. Coronary angiography has proven to be safe in patients with infective endocarditis except in cases of dislodgement of aortic vegetations. The consensus from review of literature suggests that aspiration be performed. Some authors report successful cases with stent deployment; however, others report the development of mycotic aneurysms at the sites of stenting and cite increased bleeding risk as complications.

CONCLUSION:
Coronary embolism due to infective endocarditis is a rare complication which may cause STEMI. Further research is needed to better understand the optimal treatment strategies for this population of patients.

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Title:

Unusual Right Ventricular Restriction and Tricuspid Regurgitation Causing Recurrent Syncope.

Abstract: (Your abstract must use Normal style and must fit into the box. You may not alter the size of this)

Introduction

Syncope is a common diagnosis accounting for 1-1.5% of emergent department and office visits with neurocardiogenic syncope as the leading diagnosis. Around 20% of syncope cases may be attributed to a cardiac etiology. A good history and physical exam drive risk stratification, diagnostic testing and treatment. Syncope with exertion is a high-risk feature with a differential diagnosis of both mechanical (aortic stenosis and hypertrophic obstructive cardiomyopathy) and arrhythmogenic causes (long QT, coronary disease, arrhythmogenic right ventricular cardiomyopathy and catecholaminergic polymorphic ventricular tachycardia). We present an uncommon cause of exertional syncope.

Case Description

An otherwise healthy 71-year-old female presented after numerous episodes of syncope. There was an initial suspicion that it could be vasovagal syncope given prodromal symptoms but tilt table testing was unrevealing. Unfortunately, her symptoms became progressively more concerning for a cardiac etiology as it was exertional with rapid loss of consciousness and quick recovery. She then underwent an evaluation with both holter and event monitors, which were also unrevealing. She ultimately had a transthoracic echocardiogram, which revealed preserved LV function, severe right atrial dilation with moderate to severe tricuspid regurgitation. In order to further characterize her tricuspid valve, a transesophageal echocardiogram (TEE) was performed and showed severe tricuspid regurgitation, which was thought to be possibly related to tricuspid valve prolapse.

For further evaluation, she underwent multimodality imaging including cardiac CT and MRI, which collectively revealed an unusual papillary muscle attaching to the anterior wall of the right ventricle (RV) and extended to the anterior leaflet of the tricuspid valve leading to RV invagination and lack of coaptation of the tricuspid valve. As a result, she had severe tricuspid regurgitation with severe right atrial dilation (5.1 cm). In addition, the invagination of the RV free wall created a free space in the pericardium that appeared as a moderate sized pericardial effusion without echocardiographic or clinical manifestations of cardiac tamponade. Cardiac CT images displayed in figure 1.

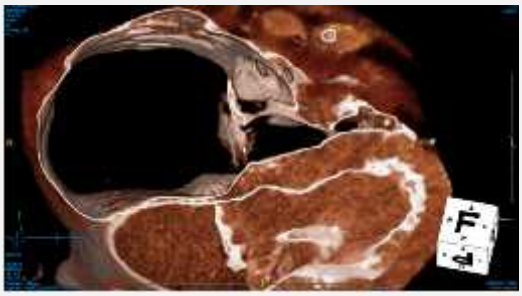

Figure 1. RV morphology by 3D reconstruction of Cardiac CT.

It was felt that she had partial RV obstruction related to the unusual plication of the midportion of her RV that led to her exertional syncope in her preload dependent state. Thus, she underwent a bioprosthetic tricuspid valve replacement with excision of multiple right intraventricular myocardial muscle bundles. Intraoperative findings were suspicious for a variant of double chambered right ventricle (DCRV). She is now around 2 years from her procedure and remains symptom free without syncope.

Discussion

To our knowledge, this is the first case report of exertional syncope caused by a variant of DCRV causing mid RV obstruction in late adulthood. We suspect that this was a morphologic change to the RV, but it is unclear the precipitant that led to hemodynamic effects causing syncope at the age of 70. DCRV has been well reported particularly in the pediatric population and tends to be associated with other congenital abnormalities such as ventricular septal defects. However, this is an isolated case without cardiac manifestations until late adulthood. This case emphasizes the utility of multimodality imaging leading to the appropriate diagnosis and management through rare causes of syncope. In addition, it creates increased recognition to continue to investigate to find a rare cause of a common symptoms when initial tests are less revealing.

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Title:

Veno-arterial extracorporeal membrane oxygenation complicated by right sided intracardiac thrombosis

Abstract: (Your abstract must use Normal style and must fit into the box. You may not alter the size of this)

Introduction

Extracorporeal membrane oxygenation (ECMO) is a mechanical circulatory support that is becoming more commonly used in cardiorespiratory failure as a bridge to recovery, therapy, or decision making. While advances to ECMO delivery since its inception in the 1970 have progressed, the use of ECMO is associated with high mortality related to severity of underlying disease and complications related to ECMO. We describe a rare case of right ventricular thrombus extending into the pulmonary arteries in a patient on ECMO with underlying non-ischemic cardiomyopathy.

Case Presentation

Patient is a 61-year-old female without significant medical history who initially presented to outside hospital after suffering a fall and syncopal event. In the ED, she was found to have wide complex tachycardia with heart rate in the 200s and was treated with synchronized cardioversion. Coronary angiography revealed no obstructive coronary disease. Echocardiogram revealed a left ventricular ejection fraction of 20% without significant valvular abnormalities. Her clinical course deteriorated and she was transferred to our tertiary center for advanced heart failure therapies.

Upon arrival, she was in cardiogenic shock, multiple vasopressors, and VT storm. She was emergently placed on veno-arterial ECMO and was given empiric intravenous steroids. When she was sent to the catheterization lab for right ventricular endomyocardial biopsy, the vascular wires and catheters did not cross into the RV. Right atrial angiography demonstrated filling defect in most of the right ventricle (figure 1). Transesophageal echocardiogram showed thrombus encompassing most of the right ventricle and extending into the pulmonary artery; there was a small thrombus on downstream aspect of the aortic valve associated with minimal leaflet mobility (figure 2). She was referred to Interventional Radiology for salvage thrombectomy, but this was unsuccessful. Patient continued to deteriorate with low flows and ventricular arrhythmias. Family was updated on patient's condition and treatment philosophy was transitioned to comfort care.

Figure 1: Angiogram of right atrium showing absence of opacification of right ventricle.
Figure 2: TEE showing large thrombus filling right ventricle and traversing into the pulmonary artery.

Discussion

Intracardiac thrombosis (ICT) is a detrimental complication of VA-ECMO. ICT accounts for 5-6% of all ECMO-related complications and is responsible for 8.7% of all ECMO-related mortality. Risk factors for ICT formation include regional wall motion abnormality, severely reduced LV ejection fraction, cardiogenic shock, and hypertrophied hearts. Complications related to ICT include low circuit flows and embolization to brain, kidney, and mesentery.

Most ICT form in the LV but right-sided involvement has been infrequently described. The risk of ICT formation is linked the breakdown of Virchow's triad, including low flow state relating to the underlying hemodynamic collapse, vascular injury from tubes and pro-inflammatory milieu, and coagulopathy related to factor consumption/sequestration.

Once ICT is formed, prognosis is severely grim with mortality approaching 80%. There are infrequent cases of successful of management with the use of thrombectomy and intracardiac thrombolysis. However, the presence of cerebrovascular accident and major bleeding preclude the use of these measures.

Several strategies are available to circumvent the formation of ICT. The use of a LV vent permits flow within the cardiac chambers. When anticoagulating with heparin, anti-FXa levels should be examined due to less laboratory variation. Bivalirudin may be considered due to independence of ATIII effect and higher PTT/ACT levels.

Conclusion

Intracardiac thrombosis is a rare but detrimental complication of ECMO. Clinical perturbations of Virchow's triad should prompt more frequent assessment for ICT formation. Future studies are needed to elucidate earlier recognition of ICT as well as more treatment strategies for removal. Institutions should device protocols for active surveillance and anticipatory management in positive cases.

Indiana-ACC Poster Competition Abstract

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Please structure your case study abstract using the following headings: * Introduction/objective * Case presentation * Discussion * Conclusion

Title:

Thrombotic coronary occlusion in a 23-year old with refractory seizures and myopathy

Abstract: (Your abstract must use Normal style and must fit into the box. You may not alter the size of this)

Background:
Premature coronary artery disease (CAD) is rare: patients younger than 40 years of age account for approximately 3% of all CAD cases (1). Traditional atherosclerosis risk factors - smoking, hyperlipidemia, obesity, diabetes, hypertension, family history of premature CAD - do apply to younger individuals with coronary atherosclerosis (1,2). Additionally, young patients presenting with acute myocardial infarction tend to be males (2).
When significant hyperlipidemia is identified as a risk factor, it is followed by work-up for secondary and, potentially, genetic causes of elevated non-HDL cholesterol. Patients with epilepsy have a unique risk factor for accelerated atherosclerosis and hyperlipidemia: longterm treatment with anti-epileptic drugs (3,4). Older anti-epileptics (phenytoin, carbamazepine, phenobarbital) and several newer ones (e.g. rufinamide, perampanel) all induce hepatic cytochrome P450 enzymes, leading to an alteration in the hepatic cholesterol metabolism (5). This is associated with elevation in non-HDL cholesterol and, consequently, increased risk of atherosclerotic end-organ disease.

Case presentation:
23 year old male with refractory seizures, possible myofibrillar myopathy, global developmental delay, OSA who was admitted for several days of intermittent chest pain. He was normotensive, tachycardic, and afebrile. Physical exam was remarkable for chronic findings of dysarthria, dysmetria, psychomotor slowing. Preliminary work-up revealed point-of-care troponin 14.33, follow-up serum troponin of 55.67, BNP 122, ESR 20, CRP 6.2. ECG showed sinus tachycardia with evolving ST segment changes in the lateral precordial leads. Initial echo showed normal LVEF with no apparent wall motion abnormalities. Coronary angiography revealed 100% occlusion of proximal left circumflex coronary artery, which was treated with a drug-eluting stent. Additional cath findings included non-obstructive RCA disease, LVEDP 21 mmHg, and lateral wall akinesis by ventriculogram. Corresponding wall motion abnormalities were noted on follow-up echo, along with mild reduction in LVEF to 45%. Search for causes of premature coronary artery disease identified LDL 258, which placed him in the probable familial hypercholesterolemia group by the Dutch Lipid Clinic Network criteria (score 7). There were no secondary causes of elevated LDL, aside from treatment with multiple anti-epileptics (phenobarbital, rufinamide, perampanel, leviteracetam). On clinic follow-up, patient was doing well from cardiovascular standpoint, and his lipid profile normalized on high-intensity atorvastatin and ezetimibe.

Discussion:
This case illustrates that severe hypercholesterolemia is a powerful risk factor for premature coronary artery disease, even when it is the only risk factor present. Among secondary causes of elevated cholesterol, drug-induced hyperlipidemia should not be overlooked. Long-standing treatment with cytochrome-inducing anti-epileptics can lead to significant increase in LDL, and it has been shown to correlate with higher risk of MI and stroke (3,4). This patient's regimen contained 3 anti-epileptics that are known cytochrome inducers. However, because of his young age and absence of other atherosclerosis risk factors, there was no strong indication for hyperlipidemia screening prior to his AMI, at least based on USPSTF recommendations. Unfortunately, this patient's genetic background remains undefined; previous genetic testing for chromosomal abnormalities and for oxidative phosphorylation defects was negative. An unknown error of metabolism could certainly have led to severely elevated LDL and increased propensity for coronary atherosclerosis. However, it would be unusual to see a dramatic response in LDL (from 258 to <70 in 3 months) with statin and ezetimibe alone, if he truly had a genetic disorder of cholesterol metabolism. Patient did not get formal genetic testing for familial hypercholesterolemia because, in his case, testing would not alter management for the patient or for his family members.

Conclusions:
Severe hypercholesterolemia is associated with premature coronary artery disease. Epilepsy patients are vulnerable to accelerated atherosclerosis, especially when treated with multiple cytochrome-inducing anti-epileptics long-term.

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CV Team Research Abstracts

(Judge Groups A&B)

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Title:

Impact of IVC Filter Guidelines, Registry, and Clinic on Filter Retrieval

Abstract: (Your abstract must use Normal style and must fit into the box. You may not alter the size of this)

Background: Inferior vena cava filters (IVCFs) are a medical device used in patients with venous thromboembolism (VTE) and a contraindication to or failure of anticoagulation. Retrievable filters are indicated when the contraindication to anticoagulation is transient, and they may be removed once the contraindication has passed. Retrievable filters are associated with serious complications such as filter fracture, migration, and IVC perforation. Subsequently, they have become the subject of litigation. As such, strategies should be undertaken to reduce filter dwell time and improve filter retrieval rates. We hypothesize that implementation of IVCF guidelines, registry, and clinic will reduce dwell time while increasing retrieval rate.

Methods: This study was a mixed retrospective and prospective chart review of patients who received an IVCF before and after implementation of IVCF guidelines, registry, and clinic in 2017. Cases were analysed retrospectively based on insertion years 2014-2015 (n=191) and compared with cases analysed prospectively based on insertion years 2017-2018 (n=103). Data was obtained on filter retrieval rate, dwell time, patient follow-up, filter-associated complications, and indication for placement.

Results: There was a significant increase in filter retrieval rate (46.86% vs 71.58%, $p<0.001$) and a significant decrease in dwell time (310 ± 38 days vs 130 ± 14 days, $p<0.001$) and patients lost to follow-up (25.90% vs 2.9%, $p<0.001$) after clinic implementation. There was no difference in complication rate.

Conclusion and potential impact: Implementation of IVCF guidelines, registry, and clinic were effective at improving filter retrieval and patient follow-up. Although there was no significant difference in complication rate, these efforts may still be protective against litigation by patients who experience a filter-associated complication.

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