



Cardiac Pseudo-aneurysm with Resection and LVAD Placement

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Abstract

We present the case of an unusual chest finding and unique cardiac intervention for a high-risk heart failure patient. The patient presented in cardiogenic shock, and after initial stabilization, it was discovered that the patient had been living with a cardiac pseudo-aneurysm complicated by thrombus formation. This was demonstrated by his enlarged cardiac silhouette and progressively worsening symptoms of heart failure. Because the patient was not deemed eligible for cardiac transplant, the option was offered for Left Ventricular Assist Device (LVAD) placement with surgical resection of his pseudo-aneurysmal thrombus. The patient had a complicated post-operative course but was eventually discharged home. We believe that not only was this case presentation unique in the patient's findings, but also that his options for intervention were also innovative in the approach made with eventual resection of the pseudo-aneurysm with thrombus and placement of the LVAD.

Keywords: Cardiac; LVAD; Pseudo-aneurysm

Introduction

Cardiac pseudo-aneurysms are not a common phenomenon, but if discovered are often the result of complications from a prior myocardial infarction or cardiac surgery [1]. Typically, the formation of the pseudo-aneurysm is the result of a cardiac rupture that is contained within scar tissue or adherent pericardium [2]. Sometimes patients present with heart failure-like symptoms, but sometimes patients are asymptomatic and are consequently only diagnosed incidentally with additional imaging [2,3]. Unfortunately, the mortality rate of patients with pseudo-aneurysms is high, with some estimates predicting up to 30% for individuals who present with the condition [1,4]. Most commonly, if left unrepaired, the cause of death is cardiac rupture and sudden cardiac death [1]. Ultimately, the treatment for these patients is surgical resection, but often times the course can be complicated by acquired heart failure or other co-morbid conditions [1,5].

The treatment for heart failure has evolved as the American population continues to age, and as a result heart failure is one of the leading problems for the aging adult population [6]. Part of this reality is likely secondary to the advances made in the interventions and salvage therapies offered to patients currently living with heart failure, thereby extending patient lives longer than previously [6]. One such intervention, the Left Ventricular Assist Device (LVAD), has made significant improvements in the lives of heart failure patients, as it can provide an option for patients who otherwise have already failed medical therapeutic interventions for their heart failure and who are otherwise not candidates for transplant [7]. This can be considered the case for the treatment or intervention for complicated cardiac pseudo-aneurysm.

Case Presentation

A 60 year-old male with a history of substance abuse, chronic obstructive pulmonary disease, coronary artery disease, inferior myocardial infarction without reperfusion therapy secondary to late presentation, mitral regurgitation status post 2012 three-vessel coronary artery bypass surgery and mitral valve repair, and ischemic cardiomyopathy (ejection fraction of 15%) presented to a small community hospital with symptoms of shortness of breath and lower extremity edema non-responsive to his oral diuretics. Pertinent physical exam findings included a holosystolic murmur, with a palpable and dyskinetic PMI with notable lower extremity dependent edema.

Immediate medical interventions were initiated as the patient came in with obvious cardiogenic shock: hypotensive with acute renal failure and in respiratory distress. He was initially placed on a

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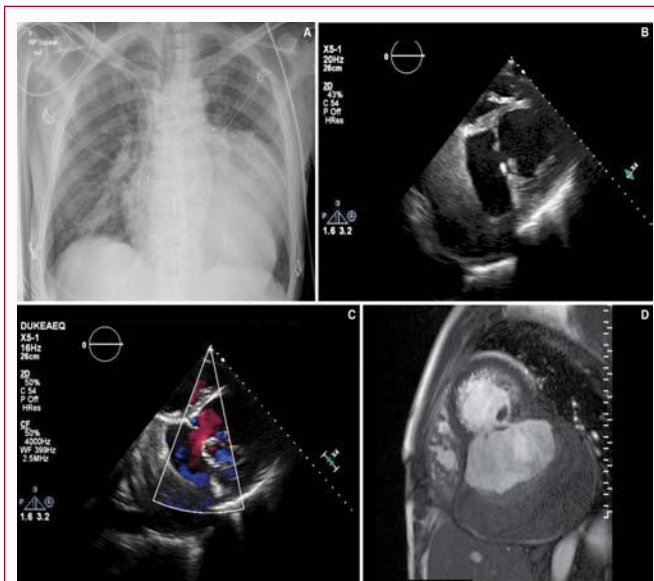


Figure 1: A: Chest X-ray demonstrating a left mid lung lesion (red arrow). B, C: Echocardiogram concerning for an ejection fraction of 15% with severe mitral regurgitation (green arrow) and possible pseudo-aneurysm with layered thrombus (yellow arrow). D: Cardiac MRI notable for a severely dilated left ventricle with global systolic dysfunction and impressive images of a pseudo-aneurysmal sac of the left ventricle (blue arrow) with a stable mural thrombus (purple arrow). The pseudo-aneurysm had neck measurements (orange arrow) of 4.9 cm x 6.5 cm extending from the mitral valve to the apex and from the septum to the inferolateral wall, with a maximal diameter of 12 cm and thickness measured at 4.8 cm.

dobutamine and Lasix drip and preliminary imaging was obtained. Based on the initial X-ray imaging (Figure 1A), the patient had a remarkably enlarged cardiac silhouette. His x-ray findings, coupled with his acute need for advanced care, led to his eventual transfer to a more advanced local hospital.

During his second hospitalization, he resumed his Lasix and dobutamine drips, but a milrinone drip was added. Physicians were able to perform a right heart catheterization, which demonstrated severely elevated right heart pressures, right atrial pressures and an elevated pulmonary capillary wedge pressure of 44 mm Hg at rest. He had a low cardiac index of 1.4. Additionally, physicians also performed an echo that was notable for severe mitral regurgitation, moderate tricuspid regurgitation, and ventricular pseudo-aneurysm with possible thrombus. Because of his increased need for medical intervention and failure to progress with the medical interventions of lasix, milrinone, dobutamine and albumin drips that had been started, the decision was made to consider his candidacy for LVAD placement at a tertiary referral center. He was provided with an amiodarone load with continued dosages prior to transfer.

Upon his arrival to the tertiary care center, his initial vitals were a blood pressure of 111/80 mm Hg and heart rate of 67 beats per minute, a temperature of 36.5 Celsius, a respiratory rate of 17 on 2-3L nasal cannula oxygen therapy while saturating 98%. Additional imaging, which included a repeat ultrasound and a cardiac MRI were obtained for strategic planning (Figures 1B-1D). The aneurysm itself was confirmed, as well as the notable thrombus that the patient developed within the aneurysm. While his acute renal failure improved with inotropic support (thought largely to be secondary to acute cardiogenic shock), he continued to require multiple diuretics and inotropic support.

Ultimately, he was deemed not a candidate for cardiac transplant, and instead the patient was considered for immediate left ventricular device assistance implantation.

Discussion

This patient presented in notable cardiogenic shock secondary to decompensated heart failure, complicated by a left ventricular pseudo-aneurysm with thrombus burden. Ultimately, it was determined that the patient was not a candidate for cardiac transplant surgery based on his history of drug abuse and pulmonary hypertension. Instead, he underwent a median sternotomy for a Heartmate II Left Ventricular Assist Device (LVAD) insertion and resection of the thrombus within the left ventricle pseudo-aneurysm. Unique to this presentation was the decision to remove the thrombus burden and work around it with the implantation of the LVAD. His course was complicated by both clotting and bleeding, requiring multiple blood transfusions and an exchange LVAD secondary to clot burden within the first LVAD. He did well after the LVAD exchange and was discharged about one month after his initial hospital presentation. Little is known about the patient after as he failed to follow up and later decided to continue treatment with a facility closer to his home.

While there are few specific guidelines to determine LVAD candidacy (hunt), more recent ones suggest it is “reasonable in highly selected patients with refractory end-stage HF and estimated 1-year mortality over 50% with medical therapy [8]”. Approximately 2,220 heart transplants are performed annually in the United States, so LVADs offer an alternative to transplant therapy [6]. In the event that transplant is not an option for patient, the LVAD devices offer a way to still defer the mortality of patients by months, if not years. As technology continues to advance, there have been many changes in the models utilized. The HeartMate II is often selected because it uses continuous flow and has demonstrated improved mortality compared to other pulsatile flow models [9].

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