Hemodialysis-Associated Bacteremia Resulting in Trans catheter Aortic Valve Replacement Endocarditis

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Abstract

An 80-year-old female with history of end stage renal disease on hemodialysis and a transcatheter aortic valve replacement (TAVR) eight months prior was transferred to our facility for treatment of acute embolic right lower extremity ischemia. A transesophageal echocardiogram performed to evaluate for the source of emboli demonstrated large mobile vegetation on the aortic valve prosthesis. Blood cultures isolated methicillin-susceptible Staphylococcus aureus. Multiple complications developed, including small cerebral infarcts contributing to acute encephalopathy, acute liver failure secondary to rifampin therapy, and coagulopathy with multiple episodes of bleeding. She was discharged to a rehabilitation facility to complete a six-week course of cefazolin followed by lifelong oral antibiotic suppression therapy with cephalxin. She ultimately required below-the-knee amputation of the ischemic limb.

ABBREVIATIONS

TAVR: Transcatheter Aortic Valve Replacement; STEMI: ST Segment Elevation Myocardial Infarction; MSSA: Methicillin-Susceptible Staphylococcus Aureus

INTRODUCTION

Transcatheter aortic valve replacement (TAVR) is a percutaneous procedure that treats a stenotic aortic valve via insertion of a replacement valve within a large stent using a balloon deployment catheter. TAVR was introduced in 2002 as a less invasive alternative for severe symptomatic aortic stenosis in patients who are at high risk of surgical complications or are poor surgical candidates [1]. The most common complications include vascular issues, stroke, and paravalvular regurgitation. Infectious complications such as endocarditis occur infrequently; yet the outcome can be devastating given the limited surgical options in the high risk patients who receive these devices [1,2]. It is important to review treatment management options in this population as there is very little data discussing the long-term sequelae of TAVRs.

CASE PRESENTATION

An 80-year-old female presented to another facility with dyspnea and volume overload believed to be related to missed dialysis appointments. On admission, elevated troponins were noted and she was diagnosed with a non-ST-segment elevation myocardial infarction. She subsequently developed acute right lower extremity ischemia from an occluded popliteal artery and was transferred to our facility with critical limb ischemia. Past medical history was significant for severe aortic stenosis, status post TAVR with a 26mm Edwards SAPIEN valve eight months prior, end-stage renal disease on hemodialysis via an internal jugular Ash-split catheter, and hypertension.

On admission, she had a temperature of 98.3°F, blood pressure of 171/61 mm Hg, pulse rate 68 bpm, and respiratory rate of 20 breaths/min. She had bilateral clear breath sounds; cardiac examination revealed a soft systolic murmur. Her right lower extremity was cold, mottled, and exquisitely tender to touch without evidence of arterial flow by Doppler ultrasound. Physical exam findings were without any other peripheral sequelae of endocarditis. She developed an acute inferior ST segment elevation myocardial infarction (STEMI) with concern...
for septic embolus to a coronary artery in the setting of previous coronary catheterization demonstrating minimal atherosclerotic disease (Figure 1). Transthoracic echocardiogram did not show vegetations, but subsequent transesophageal echocardiogram revealed a large (1 x 1.5cm), mobile vegetation on the bioprosthetic aortic valve without significant prosthetic valve regurgitation (Figure 2). Blood cultures collected at the outside hospital isolated methicillin-susceptible Staphylococcus aureus (MSSA). Repeat transthoracic echocardiogram, done three weeks later, demonstrated persistent vegetations and possible valve ring abscess (Figure 3). Acute encephalopathy developed related to a combination of opioid medications and small cerebral infarcts secondary to embolic showering.

Pharmacomechanical thrombolysis was not successful and ultimately she underwent right below the knee amputation for severe gangrene. Cardiothoracic surgery evaluated the patient for consideration of another valve replacement, but given the history of calcified aorta and multiple co-morbidities, deemed the patient not a suitable candidate for standard open valve replacement and recommended medical management for her endocarditis. She was initially treated with cefazolin, rifampin, and two weeks of gentamicin. Unfortunately, she developed acute liver failure/acute cholestasis believed to be associated with rifampin administration. Rifampin was discontinued and a six-week course of cefazolin followed by life time oral antibiotic suppression therapy with cephealexin was planned. She was initially started on therapeutic heparin drip, which was briefly changed to argatroban following precipitous drop in platelets. Heparin-induced thrombocytopenia antibody was negative, so anticoagulation with warfarin was initiated. The patient had some episodes of minor bleeding at the site of amputation with a prolonged prothrombin time. Her coagulopathy was managed with fresh frozen plasma and vitamin K administration. Given the difficulty with warfarin therapy, anticoagulation with a novel oral agent was discussed, though there is limited data in the setting of end stage renal disease. The consensus among the consultants was to use aspirin 81mg daily and avoid further bleeding risk with the understanding that the patient was at increased risk for thrombotic events.

She survived her hospitalization to be discharged to rehabilitation center, but her overall prognosis remains poor. One month following initial discharge, she returned with non-

Figure 1 ECG demonstrating inferior ST segment elevation myocardial infarction.

Figure 2 Transesophageal echocardiogram demonstrates large, mobile 1 x 1.5cm vegetation (arrow) on bioprosthetic aortic valve. Valve is well-seated. RA: right atrium; LA: left atrium; AV: aortic valve; LV: left ventricle.

Figure 3 Transthoracic Echocardiogram, Three Weeks after Admission, Showing Persistent Aortic Valve Vegetations (Arrow) and Questionable Valve Ring Abscess. Parasternal Long Axis (A) and Parasternal Short Axis (B) Views Shown. LV: Left Ventricle; LA: Left Atrium; AO: Aortic Valve; RVOT: Right Ventricular Outflow Tract; RA: Right Atrium.
healing amputation site requiring surgical debridement. Six months following original discharge, patient required below the knee amputation of her left extremity secondary to extensive gangrene and critical limb ischemia.

**DISCUSSION**

Our case demonstrates the potential for severe complications when a TAVR becomes infected, in this case likely from bacteremia associated with our patient’s hemodialysis treatments. Typical presentation of infective endocarditis following TAVR includes fever and heart failure [1,3], with a small number of patients presenting with embolic phenomenon. [3] Though our patient’s clinical presentation was skewed by missed dialysis appointments attributing to her volume overload, she did present with heart failure and embolic-associated critical limb ischemia. Intermediate-onset infectious endocarditis (between 60 and 365 days of TAVR) is primarily healthcare-associated bacteria, usually staphylococci, non-viridans streptococci, or enterococci. [3]. Prior reports of infectious complications generally show this to be a highly morbid and frequently lethal condition. A multi-center registry published in 2015 reported an incidence of endocarditis one year following TAVR at 0.5%. This publication further states that while most patients had at least one complication of infective endocarditis, only a minority underwent surgical valve intervention and almost half died during hospitalization [1]. Despite aggressive antimicrobial therapy, TAVR-associated endocarditis is associated with a high mortality [1-3]. These cases present significant management challenges as patients who undergo TAVR have already been evaluated for standard open aortic valve replacement and deemed unsuitable surgical candidates. As discussed, our patient suffered multiple complications secondary to her endocarditis, including amputation for ischemic limb and STEMI. We believe our case presents an underrepresented comorbidity, hemodialysis, in the consideration and management of infectious complications of transcatheter aortic valve replacement.

**REFERENCES**

