

Unconventional Use of Total Artificial Heart in a Patient With Severe, Destructive Prosthetic Valve Endocarditis

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Abstract

Here, we report the case of a patient who presented to our institution with severe, destructive, and un-reconstructable prosthetic valve endocarditis which required the planned implantation of a total artificial heart (TAH) to function as a bridge to cardiac transplantation.

INTRODUCTION:

Unconventional use of the total artificial heart (TAH) is rarely reported in the literature. We describe a patient with un-reconstructable prosthetic valve endocarditis whom was salvaged with TAH leading to transplantation. The importance of the multi-disciplinary transplant and heart failure teams cannot be understated in this type of challenging patient population.

CASE PRESENTATION:

A 57-year-old male presented to an outside hospital in the setting of persistent fevers and chills for nearly two weeks following a dental procedure. He had undergone an aortic root replacement with a mechanical valve 9 years prior. He was diagnosed with severe, destructive prosthetic valve endocarditis via echocardiography at the outside hospital with blood cultures positive for *S. sanguinis* and was subsequently transferred to our institution for tertiary level care and consideration of high risk surgical intervention.

Upon arrival to our institution the patient was in first degree heart block, though hemodynamically stable. Initially, transthoracic echocardiogram (TTE) revealed an unstable root with evidence of aortic valve “rocking” in addition to a large anechoic space concerning for root abscess. Blood cultures were positive for *S. sanguinis* in 4/4 bottles and *S. epidermidis* in a single bottle. Coronary computed tomography angiography (CCTA) was performed which revealed multiple peri-aortic abscesses and mycotic pseudoaneurysmal collections circumferentially surrounding the aortic root which communicated with the graft lumen. There was extensive inflammatory phlegmon tracking into the substernal space with focal areas of osteomyelitis in the adjacent manubrium (Figure 1).

Transesophageal echocardiogram (TEE) was performed 24 hours after admission, which revealed extensive, progressive destruction of the entire circumference of the aortic annulus, with infection now involving the aorto-mitral curtain and the entirety of the ascending aortic graft.

A comprehensive, multi-disciplinary team was brought together to evaluate potential surgical treatment options for this patient given the highly unlikely ability to reconstruct the root and aorto-mitral curtain given the extreme destruction and need for extensive and thorough debridement. The decision was made to

proceed to the operating room to evaluate the situation in real time, with plans for TAH should there be insufficient remaining tissue to perform a reconstruction.

The patient was brought to the operating room for exploration and definitive therapy. The aortic root was entirely dehiscent, as was the aorto-mitral curtain. Extensive pseudoaneurysm and infection was found throughout the heart and the aortic graft. The decision was made to proceed with debridement and TAH implantation.

TAH was implanted in the standard fashion without complication. The patient's chest was left open at the conclusion of the operation, and he was brought back for washout and definitive closure on post-operative day one. He was extubated on post-operative day three. The patient currently remains in the hospital, where he is actively ambulating, eating, and participating in therapies. Our committee plans to list the patient for heart transplantation three months prior to TAH implantation with no current barriers identified with respect to transplant listing.

DISCUSSION:

Infective endocarditis, specifically of prosthetic valves and the aortic root can pose technical challenges to cardiac reconstruction. The need for radical debridement in the setting of massive tissue destruction can leave the surgeon in a situation in which the aortic root, aorto-mitral curtain and coronaries may all pose challenges. While there are well-recognized techniques for each of these anatomic issues, having to employ them all in the same patient is high-risk. When this situation arises, outside of the box thinking to utilize mechanical circulatory support in unconventional ways may be meritorious.

Our patient presented a unique challenge given his young age, and rapidly progressive, destructive endocarditis. This case highlights the utility of caring for these patients at a tertiary center, specifically one with cardiac transplant and mechanical circulatory support programs. The collective input of the multidisciplinary heart failure team and technologies available for biventricular mechanical support are powerful.

TAH as a technology is utilized most commonly to provide biventricular support in patients with severe biventricular failure^{1,2}. Data demonstrates that over 50% of patients implanted with TAH survive to transplant, with a mean time to transplant of 87-97 days^{1,3}. The use of TAH in the setting of un-reconstructable, infective endocarditis has been described previously with favorable reported outcomes³.

In conclusion, we describe an unusual case with a technically successful outcome utilizing the TAH to treat a patient with severe, destructive and un-reconstructable prosthetic valve endocarditis. This case highlights the importance of caring for these clinically complex patients specifically at tertiary centers where cardiac transplantation advanced mechanical circulatory support options are available should standard surgical reconstructive techniques following radical debridement be insufficient or pose prohibitive risks.

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