Surgical treatment of complex double valve endocarditis involving transcatheter aortic valve prosthesis: Utility of the commando procedure

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As indications for transcatheter aortic valve replacement (TAVR) expand, surgeons will see an increasing number of patients with TAVR complications, including prosthetic valve endocarditis (PVE). PVE represented 21% of patients undergoing TAVR explant in 1 large series. PVE involving the aortomitral curtain may require the commando procedure, with reconstruction of this fibrous body and replacement of both the aortic and mitral valves. Here we describe technique for the commando procedure in PVE involving a TAVR prosthesis. The institutional review board at our organization exempted this study. Patient written consent for publication of study data was not required.

CASE PRESENTATION

The patient is an 80-year-old woman with history of breast cancer treated with lumpectomy, chemotherapy, and radiation in 1993 and 2009, lung cancer treated with thoracoscopic resection, and severe aortic stenosis treated with a 23-mm balloon expandable TAVR in 2017. She presented with 2 weeks of chills and malaise and was found to have elevated inflammatory markers and a positive blood culture for Enterococcus faecalis. Her transthoracic echocardiogram demonstrated a 1.4 × 1.1 cm mobile echodensity on the mitral valve with moderate mitral regurgitation (Figure 1). The aortic valve appeared normal. She developed progressive conduction abnormality prompting concern for an annular abscess and was referred for urgent surgery.

After establishment of cardiopulmonary bypass, the aorta was opened to examine the TAVR prosthesis. The prosthesis was encased in vegetation and was carefully removed by developing a plane between the stent frame and the aortic wall and native leaflets. The mitral valve was then examined through the aortic root. There was an abscess extending through the intervalvular fibrous body and into the anterior mitral leaflet with resultant destruction of most of the leaflet. Given the extent of the infection, the decision was made to proceed with commando reconstruction of the intervalvular fibrous body to obtain source control of the infection and create normal tissue to which to anchor the aortic and mitral valve prostheses. The exposure was improved by extending the aortotomy though the left coronary–noncoronary commissure, through the anterior mitral leaflet, and onto the dome of the left atrium. At this point all infected tissue, including the aortic valve, mitral valve, and intervalvular fibrous body, was aggressively debrided and treated with glutaraldehyde. The mitral valve was sized and pledgeted annular sutures were placed around...
the mitral annulus up to the point of intervalvular fibrous body resection. A patch of bovine pericardium was sewn to the anterior annular portion of the 25-mm porcine mitral prosthesis and the annular sutures were passed through the remaining circumference of the valve. One side of the patch was used to close the dome of the left atrium. The other half was sewn up the left ventricular outflow tract to the ascending aorta. Then the aortic valve was sized and replaced with a 23-mm pericardial prosthesis, with sutures being passed out-to-in on the left ventricular outflow tract patch. A separate patch was used to close the remainder of the aortic root defect, connecting to the outflow tract patch. Video 1 demonstrates the technical details in a step-by-step manner. After closure of the aorta, the patient was weaned from cardiopulmonary bypass uneventfully. After the operation, the patient was transported to the open-heart intensive care unit. Total cardiopulmonary bypass time was 264 minutes and crossclamp time was 218 minutes.

The postoperative transesophageal echocardiogram showed well-seated bioprosthetic valves with no paravalvular leak and normal biventricular function. The postoperative course was complicated by atrial tachyarrhythmia that improved with beta blockade. No anticoagulation aside from aspirin was deemed necessary on discharge. She continues to be followed by an infectious disease specialist postoperatively and completed 8 weeks of ampicillin and ceftriaxone under his supervision. Upon completion of intravenous antibiotics, the patient was transitioned to oral amoxicillin and has continued on a slow dosage taper under the supervision of her infectious disease specialist.

**DISCUSSION**

We report a complex case of double-valve endocarditis involving the intervalvular fibrous body in a patient with prior TAVR. The patient underwent successful TAVR explant and commando reconstruction of the intervalvular fibrous body. Prosthetic valve endocarditis is a grave complication after surgical aortic valve replacement or TAVR and is associated with high rates of mortality. Data on PVE after TAVR is growing, but lags due to expanding
indications for TAVR. As the number of implanted TAVR valves increases, we expect to see more cases of TAVR PVE in patients who are candidates for reoperation.

Annular abscess and destruction of the intervalvular fibrous body are characteristics of advanced and aggressive endocarditis. Surgical repair in appropriately selected patients is the mainstay of treatment. Aortic and mitral valve replacement with reconstruction of the intervalvular fibrous body—called commando operation—is an effective technique for treatment of complex double-valve endocarditis. TAVR prostheses may be at lower risk of development of abscesses compared with surgical aortic valve replacement, possibly due to annular debridement in surgical aortic valve replacement. However in cases where TAVR PVE is complicated by annular abscess and destruction of the intervalvular fibrous body, TAVR explant and the commando operation is a feasible technique.

Tips and pitfalls for this challenging operation include developing a plane between the TAVR prosthesis and aortic wall to limit trauma to the aorta upon explantation, sizing of the mitral valve, and deciding the length of the reconstructed intervalvular fibrous body. Appropriate sizing of the mitral valve is necessary to prevent abnormal canting of the aortic prosthesis. Lastly, the length of the intervalvular fibrous body is created by the distance between the aortic and mitral suture lines on the pericardial patch. Too short a distance (ie, <1 cm) may create tension on the patch, whereas too long a distance may result in valve rocking due to patch instability.

References