The use of a homograft in the setting of infective endocarditis after transcatheter aortic valve replacement

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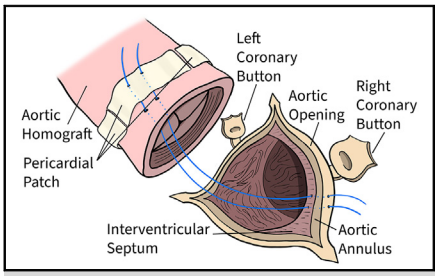


Aortic homograft implantation via simple interrupted sutures and bovine pericardial strips.

CENTRAL MESSAGE

In patients with prosthetic valve endocarditis after transcatheter aortic valve replacement, homografts are a safe option with potentially lower reinfection rates.

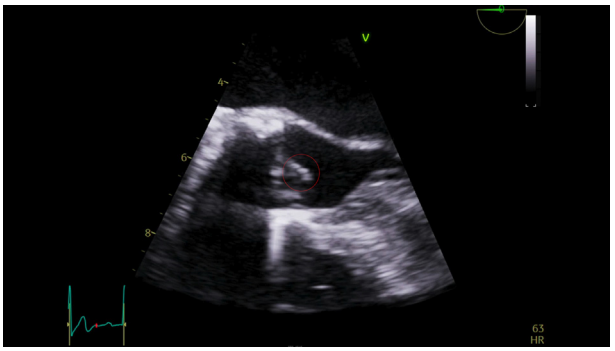
Video clip is available online.

The revolution in transcatheter aortic valve replacement (TAVR) since its inception in 2002 has seen many patients undergo this procedure. This has consequently led to an increase in prosthetic valve endocarditis (PVE) after TAVR (TAVR-PVE), which now has an incidence similar to surgical AVR at 0.3 to 2 per 100 person-years.[1] Common organisms include *Enterococcus and Staphylococcus aureus*.[1] Despite the rising clinical significance and significant mortality associated with this diagnosis, optimal management has yet to be elucidated. We present a case of TAVR-PVE with root abscesses treated by full-root replacement with an aortic homograft (written-informed consent obtained, IRB000217752; December 12, 2022).

CLINICAL SUMMARY

A 79-year-old man with a history of coronary artery disease treated with percutaneous intervention, insulin-dependent diabetes mellitus, chronic kidney disease, pancreatitis, hepatic steatosis with cirrhosis, hypertension, hyperlipidemia, and symptomatic severe aortic stenosis (Society of Thoracic Surgeons risk of mortality, 3.98%) underwent TAVR with a 26-mm Sapien 3 Ultra Transcatheter Heart Valve System (Edwards Lifesciences). He presented 15 months post-TAVR with a gastrointestinal bleed (on aspirin monotherapy 81 mg daily), and *S salivarius* bacteremia. Endoscopies confirmed multiple duodenal erosions and benign colonic polyps, but no malignancy. Transesophageal echocardiogram (TEE) did not reveal any valvular vegetations and demonstrated expected gradients with trivial paravalvular insufficiency. He completed a 6-week course of intravenous ceftriaxone. Notably, blood cultures showed intermediate penicillin susceptibility (minimum inhibitory concentration, 0.25), but no aminoglycoside was added. No surveillance TEE was completed, and 4 months later he presented with a thromboembolic splenic infarct. A repeat TEE was performed and demonstrated mobile vegetations on the TAVR-prosthesis indicating PVE (Video 1).

He underwent urgent median sternotomy and TAVR-prosthesis explantation. This revealed heavy calcification with florid vegetations on the aortic and ventricular aspects of the valve (Figure 1) (Video 2), along with root abscesses in the aortic annulus. After careful debridement and curettage, a 23-mm aortic homograft (CryoLife Inc) was implanted using full-root technique, using simple interrupted 3-0 Ethibond sutures over pericardial strips. The coronary buttons were inserted into the homograft at their respective sites with continuous 5-0 polypropylene



VIDEO 1. Transesophageal echocardiogram demonstrating endocarditis of the transcatheter aortic valve replacement with mobile vegetation on the left ventricular outflow tract side of transcatheter aortic valve replacement. Video available at: https://www.jtcvs.org/article/S2666-2507(23)00281-X/fulltext.

suture over pericardial strips. The distal anastomosis of the homograft to the native aorta was completed with continuous 4-0 polypropylene suture over pericardial strips (Figure 2). Cardiopulmonary bypass time was 256 minutes, and aortic crossclamp time was 197 minutes. His postoperative course was complicated by atrial fibrillation requiring amiodarone. Surgical pathology showed negative tissue cultures and gentamicin was discontinued. He was discharged on the seventh postoperative day to a rehabilitation hospital on a 6-week course of intravenous ceftriaxone.

DISCUSSION

PVE is being increasingly recognized following TAVR. Despite a large body of evidence supporting surgical intervention for surgical AVR-PVE, the optimal surgical management of TAVR-PVE remains unclear.[2] In fact, a majority of studies found that <20% of patients have undergone surgical intervention for TAVR-PVE.[1] One possible explanation for this finding is that TAVR historically has been offered to high-risk patients. With the added complexity of explanting a prosthetic valve, perhaps these patients present prohibitive surgical risk. However, our case demonstrates the effective surgical management of concomitant endocarditis for an already high-risk patient. We therefore recommend surgery more frequently for this population as surgical and intensive care unit management continuously improve.

After a careful literature review, few reports exist to offer guidance to surgeons. Previous groups have described

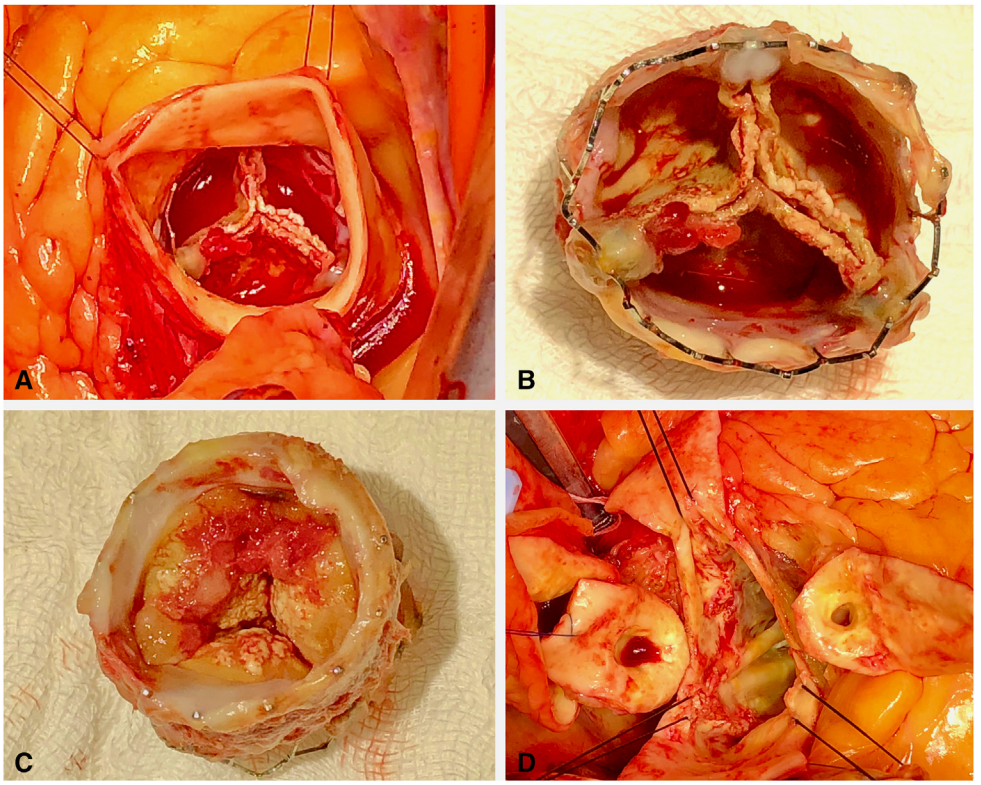
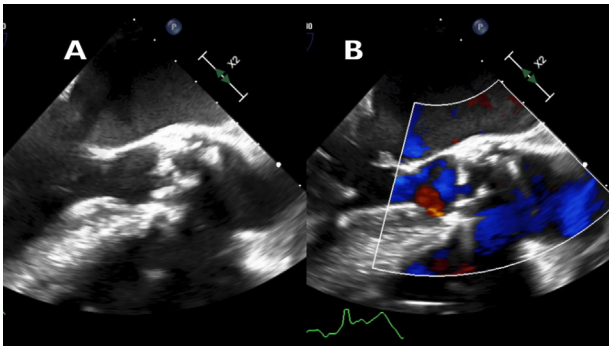


FIGURE 1. Prosthetic valve endocarditis of a transcatheter aortic valve replacement (*TAVR*). A, TAVR valve before explantation with visible vegetations on the *right* and *left* coronary cusps. B, Aortic side of TAVR valve after explantation with visible vegetations on the *right* and *left* coronary cusps. C, Ventricular aspect of TAVR valve after explantation with visible vegetations on the *right* and noncoronary cusps. D, Aortic root after explantation of TAVR with *right* and *left* coronary buttons.



VIDEO 2. A, Intraoperative transesophageal echocardiogram performed before valve explantation demonstrating thickened leaflets of the aortic valve. B, Intraoperative transesophageal echocardiogram with Doppler performed before valve explantation demonstrating trace paravalvular regurgitation. Video available at: https://www.jtcvs.org/article/S2666-2507(23)00281-X/fulltext.

patients with TAVR-PVE in which bioprosthetic valves were implanted after explantation of the infected prosthesis.[3,4] However, conventional bioprostheses and xenografts pose risk of reinfection due to the polyethylene terephthalate and other prosthetic material in them, which is best avoided in PVE.[2] We are the first to report the successful use of an aortic homograft to surgically manage TAVR-PVE. Homografts may therefore be the material of choice in patients with TAVR-PVE secondary to their inherent lack of synthetic elements, especially in the presence of root abscesses. To support this, Yousif and colleagues[5] found that treatment of non-TAVR infective endocarditis with homografts resulted in 83% freedom from reintervention at 10 years and 95% freedom from reinfection at 17 years.

Our technique of implantation merits some attention. We have systematically avoided pledgeted sutures due to reinfection risk. We have used simple interrupted sutures rather than a continuous suture because quite often the tissue overlying abscesses is rather fragile and may tear during the continuous suture and parachuting technique. To avoid the risk of sutures cutting through the fragile homograft tissue, we reinforced all suturelines with bovine pericardial strips (Figure 3).

CONCLUSIONS

If expertise is available, the aortic homograft should be the prosthesis of choice in patients presenting with TAVR-PVE, especially in the presence of root abscesses.

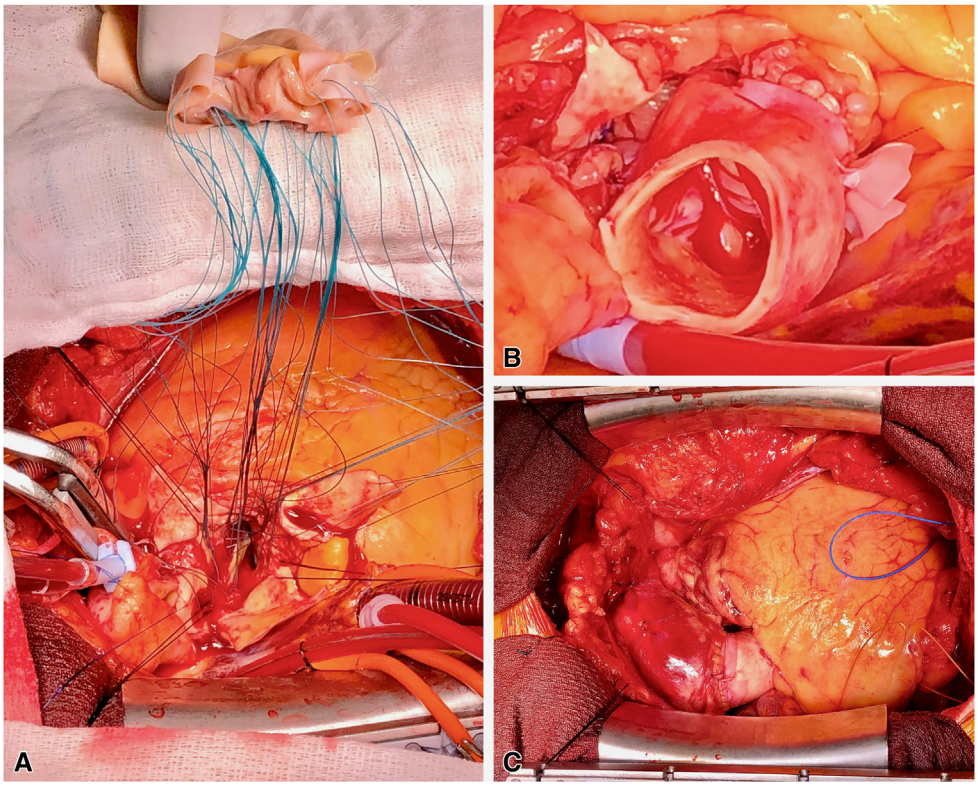


FIGURE 2. Implantation of 23-mm cadaveric homograft aortic valve, aortic root, and ascending aorta. A, Intra-annular insertion of the aortic homograft. B, Successful implantation of the aortic valve and aortic root, reinforced with a strip of bovine pericardium. C, The heart off bypass after successful implantation of the aortic valve, aortic root, coronary ostium, and ascending aorta anastomosis.

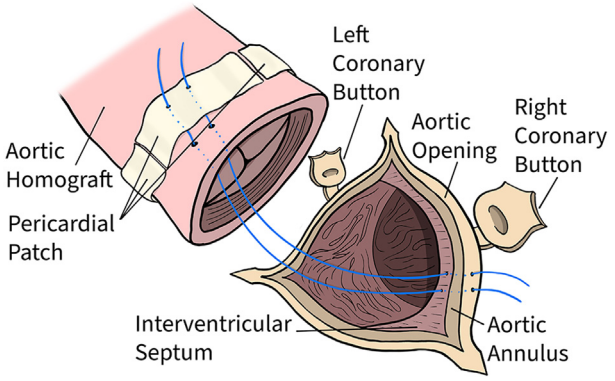


FIGURE 3. Aortic homograft implantation via simple interrupted sutures and bovine pericardial strips.

Conflict of Interest Statement

The authors reported no conflicts of interest.

The *Journal* style requires editors and reviewers to disclose conflicts of interest and to decline handing or reviewing manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

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