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GLOSSARY OF ABBREVIATIONS

LVOT: left ventricular outflow tract
PVE: prosthetic valve endocarditis
SAVR: surgical aortic valve replacement
TAVR: transcatheter aortic valve replacement
TAVR-PVE: prosthetic valve endocarditis after transcatheter aortic valve replacement
TEE: transesophageal echocardiogram
TTE: transthoracic echocardiogram
CENTRAL MESSAGE

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

CENTRAL FIGURE LEGEND

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

The revolution in trans-catheter 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 (SAVR) at 0.3-2 per 100 person-years. Common organisms include Enterococcus and Staphylococcus aureus. 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(12/12/22).

CLINICAL SUMMARY

A 79-year-old male 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 [STS risk of mortality 3.98%] underwent TAVR with a 26mm Edwards SAPIEN 3 Ultra Transcatheter Heart Valve System (Edwards Lifesciences, Irvine, CA). He presented 15-months post-TAVR with a gastrointestinal bleed (on aspirin monotherapy 81mg daily), and Streptococcus 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 IV ceftriaxone. Notably, blood cultures showed an intermediate penicillin susceptibility (MIC 0.25), but no aminoglycoside
was added. No surveillance TEE was completed, and four months later he presented with a thrombo-embolic splenic infarct. A repeat TEE was performed and demonstrated mobile vegetations on the TAVR-prosthesis concerning for PVE (Video 1).

He underwent urgent median sternotomy and TAVR-prosthesis explantation. This then revealed heavy calcification with florid vegetations on the aortic and ventricular aspects of the valve (Figure 1) (Supplemental Video 1), along with root abscesses in the aortic annulus. After careful debridement and curettage, a 23 mm aortic homograft (CryoLife, Inc., Kennesaw, GA) was implanted as a 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 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 cross-clamp 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 7th 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 SAVR-PVE, the optimal surgical management of TAVR-PVE remains unclear. In fact, majority of studies found that <20% of patients have undergone surgical intervention for TAVR-PVE. 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 ICU management continuously improve in
safety.

After a careful literature review, few reports exist to offer surgeons guidance. Previous
groups have described patients with TAVR-PVE in which bioprosthetic valves were
implanted after explantation of the infected prostheses.\textsuperscript{3,4} However, conventional
bioprosthesis such as xenografts pose risk of reinfection due to the Dacron and other
prosthetic material in them, which is best avoided in PVE.\textsuperscript{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 et al. found that treatment of non-TAVR infective endocarditis with homografts
resulted in 83\% freedom from re-intervention at 10 years and 95\% freedom from re-infection
at 17 years.\textsuperscript{5}

Our technique of implantation merits some attention. We have systematically avoided
pledgeted sutures due to re-infection risk. We have used simple interrupted sutures rather
than a continuous suture, as 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 suture lines with bovine pericardial strips (Central Figure).

**CONCLUSION**

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.
REFERENCES


FIGURE LEGENDS

Central Figure:
Demonstration of the surgical approach to aortic homograft implantation using simple interrupted sutures and reinforcing bovine pericardial strips.

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

Figure 2:
Implantation of 23mm cadaveric homograft aortic valve, aortic root, and ascending aorta. 2A)
VIDEO LEGEND

Video 1:

Transesophageal Echocardiogram demonstrating endocarditis of the transcatheter aortic valve replacement with mobile vegetation on the LVOT side of TAVR.

Supplemental Video 1:

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.