Title: Prosthetic Root Endocarditis treated with Radical Debridement and Pulmonary Autograft Reconstruction

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Informed consent: The patient provided written informed consent for publication of their study data.
Glossary of Abbreviations

TEE, transesophageal echocardiography;
LVOT, left ventricular outflow tract;
POD, post-operative day

Central message

Although it can add operative complexity, the Ross procedure can provide good clinical outcomes for young and active patients with prosthetic aortic root endocarditis.

Central picture legend

PET cardiac imaging identified two separate peri-annular abscesses.
Prosthetic root endocarditis remains a challenging disease that requires thoughtful perioperative planning, aggressive debridement and often comprehensive aortic root, left ventricular outflow tract and central fibrous trigone reconstruction(1). The optimal reconstructive surgical approach for prosthetic root endocarditis requires careful, patient centered decision making and surgical expertise, but remains a subject of ongoing debate(2). We present a challenging case of a 55-year-old female patient who had previously undergone a mechanical Bentall and hemiarch repair for bicuspid aortic valve stenosis and ascending aorta aneurysm in 2016 who presented with a stuck prosthetic valve disc, severe aortic insufficiency, congestive heart failure, and Streptococcus salivarius bacteremia. Transesophageal echocardiography (TEE) revealed prosthetic valve vegetations with severe prosthetic aortic stenosis and regurgitation with minimal movement of the prosthetic disc. CT heart demonstrated suspicion for vegetative thrombus and peri-annular abscess formations. Further valve fluoroscopy confirmed a stuck tilting disc (Figure 1a) and PET cardiac imaging identified two separate annular abscesses but ruled out distal hemiarch graft involvement (Figure 1b). The patient provided informed written consent for the publication of the study data; IRB approval was not required (Surgical video).

Given the diagnostic findings and the patient's young age, urgent surgery was arranged and the Ross procedure was selected as the preferred reconstructive strategy to reduce recurrent infection risks and for optimal long-term event-free survival. Intra-operative TEE found abscesses around both coronary ostia (Figure 1c, d). At operation, the adhesions were extremely dense, necessitating a meticulous 4-hour dissection. After initiating cardiopulmonary bypass and diastolic arrest through ostial del Nido cardioplegia, the previous Bentall graft was excised, exposing extensive vegetations on both mechanical disc (Figure 2a) and notable abscesses with frank pus beneath both coronary buttons (Figure 2b, c). The prosthetic root was carved out of the
frozen periaortic root space (Figure 2d), and the entire peri-abscess space, including around the conduction tissue and left ventricular outflow tract (LVOT) was debrided extensively. Subsequently, the pulmonary autograft was harvested as usual, which was measured around 21 mm, which matched the small 21 mm aortic annulus. Neo-aortic commissures were developed and the pulmonary autograft was implanted deep with the LVOT with interrupted sutures to exclude the abscess cavities and prevent late autograft dilatation. Deep suture placement in the LVOT aimed to avoid recurrent infection and dehiscence. A 27 mm Artivion Synergraft pulmonary homograft was anastomosed distally to the pulmonary bifurcation and proximally to the right ventricular outflow tract. The autograft was finally anastomosed to the previous hemiarch graft, and the cross-clamp was removed. Post-operative TEE confirmed preserved biventricular function, the excellent function of the pulmonary autograft and pulmonary homograft, demonstrating mean/peak gradients within normal ranges (4/12 mmHg and 3/9 mmHg, respectively) and no valvular insufficiency. The cardiopulmonary bypass and aortic cross clamp times were 381 and 275 minutes, respectively. The patient was transfer back to intensive care unit without inotropic support and extubated on post-operative day (POD) 1. A leadless single-chamber ventricular pacemaker was implanted on POD 2 due to complete atrioventricular block. Intra-operative tissue culture results, consistent with initial blood culture findings of Streptococcus salivarius, led to a 6-week course of intravenous vancomycin. The patient was discharged uneventfully on POD 9. She remained well at 3 months follow-up, with Transthoracic echocardiography showing normal ventricular function, aortic valve mean/peak gradients at 4/8 mmHg with trace insufficiency and pulmonary mean/peak gradients at 4/9 mmHg with trace regurgitation.
Although prosthetic aortic root infections can be quite extensive, we believe that with aggressive
debridement and complete reconstruction can achieve good outcomes, including using the
pulmonary autograft to optimize and enhance survival and patient quality of life(3). In addition,
comparing with aortic homografts, a living pulmonary autograft in the aortic position can
significantly improve the long-term clinical outcomes(4,5). The present case report highlights the
challenges of managing prosthetic root endocarditis and the successful use of the Ross procedure
in managing complex prosthetic infections, particularly in a relatively young and active patient
population.

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Figure legends

Figure 1. Pre-operative evaluations. (a) Valve fluoroscopy showed one stuck tilting disc (red
arrow); (b) PET cardiac imaging identified two separate annular abscesses (red arrows) but ruled
out distal hemiarch graft involvement; (c, d) Intra-operative TEE images showing abscess
formations around right coronary artery (c, red arrow) and left main coronary artery (d, red arrow).

**Figure 2.** Intra-operative images. (a) extensive vegetations on both mechanical leaflets (white arrow); (b) frank pus and abscess cavity beneath right coronary ostium (white arrow); (c) Abscess with significant frank pus beneath left coronary ostium (white arrow); (d) explanted previous prosthetic root.

**Video legend:**

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