Valve-sparing root replacement for failed pulmonary autografts: Should a David repair a Ross?

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Mechanical and bioprosthetic prostheses are limited by their significant thromboembolic risk and questionable durability, respectively, when implanted in younger individuals. An ideal substitute for the aortic valve would demonstrate excellent hemodynamics, avoid the need for long-term anticoagulation, reduce infectious risk, and grow with the recipient. The pulmonary autograft was used to meet most of these characteristics, but the trade-off was a more technically demanding operation.¹ Although the Ross procedure has its merits, in reality there is no perfect replacement for the native aortic valve. In fact, greater perioperative risk coupled with a real risk of reoperation has recently made many surgeons rethink the utility of the Ross procedure.² Because the Ross procedure is typically reserved for younger patients, when the autograft fails, the early risk versus late benefit discussion must be revisited, particularly if considering salvaging a failed autograft.

In this issue of the *Journal*, Mookhoek and colleagues³ describe the European multicenter experience with valve-sparing reoperations after the Ross procedure. Mookhoek and colleagues³ should be congratulated on their results; their technical expertise is clearly evidenced by their superlative outcomes. An operative mortality of 1.2% in the setting of a reoperative aortic root is truly exemplary. It is, however, surprising that this operative mortality is lower than that of the index Ross procedure, which typically carries an operative mortality between 2% and 3%.⁴⁻⁶ Despite longer operative times and nearly 1 in 5 patients undergoing concomitant replacement of the pulmonary outflow graft, the operative mortality achieved by Mookhoek and colleagues³ falls within the range that the Society of Thoracic Surgeons risk calculator predicts for a reoperative aortic valve replacement (0.8%-1.2%) in patients with average characteristics of the study population (for male patients, 38 year old, normal ventricular function, predicted operative mortality is 0.8%; for female patients, 38 year old, left ventricular ejection fraction, predicted operative mortality is 50%-1.2%). Therefore, unlike that of the index Ross procedure, early risk of autograft valve-

Autograft valve before (A) and after (B) leaflet repair and valve-sparing root replacement late after Ross procedure.

Central Message

Despite remarkable early success, long-term outcomes will determine the fate of valve-sparing reoperations for failed Ross procedures.

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sparing reoperation does not seem to be a significant limitation.

Salvaging a valve to avoid long-term anticoagulation at the expense of a marginally increased operative risk is acceptable only if that valve remains durable from reoperation. Reconstruction may also require repair of the autograft leaflets.⁷ Unfortunately, rates of reoperation for failure of the valve-sparing reoperation in the current study are far from negligible. Nearly 25% of patients required a reoperation within 8 years of their valve-sparing operation. Mookhoek and colleagues³ note that those at the greatest risk for failure of the valve-sparing reoperation were those with isolated or severe aortic regurgitation, as well as those who did not undergo a full root procedure for their index surgery. When the analysis was limited to those who underwent the full root procedures, however, 8-year freedom from reoperation was 85%. Although it is not evident in the study of Mookhoek and colleagues,³ the exact variant of the valve-sparing root replacement likely impacts durability. As such, we favor the reimplantation technique in all scenarios, regardless of complexity, as well as robust leaflet repair as demonstrated in our patient undergoing valve-sparing root replacement after a Ross procedure (Figure 1).⁷⁻⁹

True of most surgical procedures, selection bias is paramount in evaluating outcomes. Missing from the article by Mookhoek and colleagues³ is an explanation of why 110 patients who underwent autograft reoperation after a failed Ross procedure were not selected for a valve-sparing

FIGURE 1. Autograft valve before (A) and after (B) leaflet repair and valve-sparing root replacement late after Ross procedure.

operation. An understanding of the reasons for treatment allocation provides insight into additional patient or anatomic characteristics that preclude a safe, successful valve-sparing reoperation.

Lacking a perfect substitute for the aortic valve in the young adult, surgeons must weigh the risks and benefits of each therapy in a probabilistic manner, as well as respect patient preferences and social circumstances. Choosing the Ross procedure as an index operation is a difficult decision in and of itself¹⁰; choosing to spare the autograft valve after failure of the Ross repair is equally, if not more, difficult. The patient who undergoes a successful, durable valve-sparing reoperation will benefit greatly from this anticoagulant-free option. The patient who requires yet another reoperation for the autograft failing—not once, but twice—has certainly suffered. Mookhoek and colleagues³ should be complimented for providing the hard data to add real numbers to this complex risk-benefit equation. Although more long-term data are needed before autograft valve-sparing reoperations can be considered routine, it is clear that this operation can be performed safely in specific populations.

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