thoughts but postoperative pharmacologic control of BP should command more attention during the remodeling phase as the pulmonary autograft adjusts to systemic pressures. We view these findings as comforting but see several areas of continued concerns for Ross surgeons. The first is the increased stiffness of the autografts in both patients with AS and AI. In the authors' tailored technique, it appears that there is not a biomechanical difference in the early (1-year) results following the Ross procedure between patients with AS and AI. In addition, the authors found that the interposition of a Dacron graft distally further increased stiffness, and note that they have become less aggressive in using these grafts when possible. The long-term implications of autograft stiffness are unclear. Further imaging studies and longer-term clinical follow-up will help elucidate a mechanism associated with late Ross autograft failure. The present study shed light on the fact that it may not be due to an early biomechanical difference between the 2 groups. Finally, we must recognize that this study represents a subset of their Ross procedures and that this subset

is further divided into those willing and able to return at 1 year for a follow-up CMR. This may represent a group especially dedicated to following up with their health and thus more aggressive in following their prescribed BP control. It remains unknown if less aggressive BP control would have exposed differences between AS and AI.

We congratulate the authors both on their excellent work and long-term dedication to improving the Ross procedure. The authors have taken a procedure born in London and maintained a steady and determined approach to solving the problems they faced—a stiff upper lip—or perhaps for our Montreal friends—*essayer de garder le sourire*. Stay calm and carry on with your excellent work.

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Commentary: There is no aortic root remodeling after aortic conduit surgery

Ari A. Mennander, MD, PhD

A patient with a diseased aortic valve does not usually seek superb technical achievement. The aortic valve or conduit operation using prosthesis are reliable options; at least there is no risk for pulmonary graft or homograft root dilatation.

The Ross procedure is an innovative option to replace the diseased aortic valve using the native pulmonary valve as a graft¹; the main aim is to avoid life-long anticoagulation

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CENTRAL MESSAGE

Possible aortic and pulmonary root tissue compatibility may hint that many patients with aortic valve disease need not have their aortic root resected.

therapy.² Would the dilated aortic valve annulus and aortic root after aortic valve insufficiency signify imminent dilation of the corresponding parts of the pulmonary root graft after the Ross procedure?³ The study by Lenoir and colleagues⁴ investigated whether aortic insufficiency may be controlled

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with a tailored Ross operation technique. In a retrospective fashion of clinically acquired imaging data, the early 1-year outcome of the Ross procedure was investigated in patients with either aortic valve stenosis or insufficiency. The operative technique was not described in detail in this study, but it seemed to include careful assessment of the aortic root and adding a supplemental ascending aortic prosthesis to ensure the stability of the Ross reconstruction, which may prove to be important during aortic valve insufficiency. Of 210 patients who underwent a Ross procedure, magnetic resonance imaging was performed and investigated in 71 patients.

The study included meticulous measurements from different parts of the aorta. The strict regimen of blood pressure control was exemplary. The advantages and disadvantages of the Ross procedure and the alternative aortic valve operations were carefully discussed with each patient as part of a detailed preoperative consultation. A remarkable low incidence of clinical events occurred, and the pulmonary graft seemed normal at 1 year.⁴

A 1-year follow-up may be insufficient to identify the development of pulmonary graft or homograft dilatation.⁵ Clinical terms such as aortic dilatation, distensibility, and stiffness are yet to be clarified and certainly difficult to demonstrate using whatever imaging protocol. Only patients with imaging data were included in this study. Ideally, repeated measurements should be done during longer follow-up for each individual patients and patient group.

The Ross procedure requires surgical expertise.⁶ For many traditional surgeons, the procedure signifies making a simple aortic valve surgery into a complex procedure; one sacrifices long hours of practice, and technical trivia are supposed to compensate additional risk-taking; and

then, the early functional outcome is at its best only similar to traditional surgery. Possible later failure after the Ross procedure in patients with aortic insufficiency may be due to the histopathologic features of the pulmonary artery root, which shares distinct genetic, embryologic, and morphologic background with the resected aortic root.

Knowledge on tissue pathophysiology may further help to plan the right procedure for any patient; the theoretical background of aortic wall distensibility remains interesting. The absence of early pulmonary graft complications after the Ross procedure in patients with preoperative aortic valve insufficiency or stenosis suggests that many patients may safely keep their own pulmonary and aortic root tissue during aortic valve surgery with or without the Ross procedure.

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