A simplified reinforcement: The Florida sleeve Ross procedure

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The Ross renaissance is expanding with increasing literature demonstrating its advantages. However, tackling the autograft’s main shortcoming of long-term dysfunction and need for reoperation remains controversial. Dilatation of the annulus, sinus of Valsalva, and sinotubular junction are the problems, but the solutions vary. Some propose complete root reinforcements with the autograft sitting inside a polyester woven graft, yet these techniques add complexity to an operation that is already elaborate. In response, the authors demonstrate an easy-to-adopt technique, the Florida sleeve Ross procedure, providing support to the aortic root and simultaneously maintaining efficiency by adding only a few steps while crossclamped.

PROCEDURE
Following median sternotomy and cardiopulmonary bypass initiation, the aorta is transected at the sinotubular junction, the valve leaflets are excised, the coronary ostia are circumferentially resected, and all 3 sinuses are removed, leaving 5 mm of aortic wall above the annulus (Video 1). The pulmonary artery is opened and the autograft is harvested in standard fashion. The initial root reinforcement steps are performed similarly to a Tirone David valve-sparing root replacement where the base of the aortic root is dissected followed by subannular suture deployment. Six pledgeted sutures are placed in the left ventricular outflow tract within the same horizontal plane: 1 situated below each nadir and each commissure (Figures 1 and 2). The diameter of the bulged woven polyester aortic root graft is determined by the autograft annulus, which is gauged with a Medtronic Mosaic valve sizer, then adding 3 mm to account for pulmonary arterial wall thickness. The root graft is marked in sixths and bisected vertically (Figure E1).
The autograft proximal anastomosis is completed as the surgeon prefers, which in this case involves interrupted horizontal mattress sutures. Next, 5 of the 6 subannular sutures are passed through the bulged root graft at the prior marked intervals. It is parachuted down and those 5 sutures are gently tied. The sixth subannular sutures are passed through the bulged root graft at the prior marked intervals. It is parachuted down and those 5 sutures are gently tied. The sixth
Suture lies at the nadir of the noncoronary annulus and is placed through the bisected portion of the root graft after crossclamp removal.

Two slits with apertures are created in the bulged root graft and the coronary buttons are reimplemented. The autograft is trimmed 5 mm distal to the commissures and the native ascending aorta is replaced. Generally, the straight portion of the bulged root graft is used for ascending aorta replacement, but sometimes the distal autograft necessitates the use of a smaller diameter graft.

After standard implantation of the pulmonary homograft, the crossclamp is removed. Focus is turned to the remaining subannular suture below the noncoronary annulus because it determines the tightness of the annuloplasty. The suture is passed through the bisected root graft and tied under transesophageal echocardiographic guidance, assessing for changes in valvular and subvalvular dynamics. The remaining split portions of the graft are loosely approximated with interrupted sutures and the distal portions are tacked to the ascending aortic graft. This laxity in the root graft may provide compliancy for beat-by-beat hemodynamic changes during the early postoperative period. Informed written consent was obtained to include patient information; institutional review board approval was not required.

**DISCUSSION**

With the increasing literature regarding long-term benefits of the Ross procedure, strong concerns regarding reoperations remain. Efforts to combat autograft dysfunction have resulted in reinforcement strategies that may be protracted and potentially restrictive. Considering historical feats focused on simplifying aortic root surgery, the authors were inspired by the origins of the Florida sleeve technique, where subannular sutures are placed followed by slipping a graft over the aortic root, downsizing it. The technique diverged from its contemporary Yacoub and David procedures and had a goal to distribute aortic root repair to a broader audience. The Florida sleeve Ross procedure has similar aspirations. To address challenges associated with autograft use by combating its long-term dysfunction, the technique is simple and streamlined, making it a viable option to Ross surgeons.

**CONCLUSIONS**

Long-term autograft dysfunction continues to be a weakness for the Ross procedure. The Florida sleeve Ross procedure aims to prevent dilation of the annulus, sinus of Valsalva, and sinotubular junction with a reinforcement method that maintains efficiency within the operation.

**Conflict of Interest Statement**

The authors reported no conflicts of interest.

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**References**

FIGURE E1. Preparation of the bulged woven polyester aortic root graft, which is marked in sixths and bisected vertically.