Commentary: Steps toward understanding the root of the issue

Andrew Mesher, MD,^a Muhammad Aftab, MD,^a Thomas G. Gleason, MD,^b and T. Brett Reece, MD^a

From the ^aDivision of Cardiothoracic Surgery, Department of Surgery, University of Colorado School of Medicine, Aurora, Colo; and ^bDepartment of Cardiac Surgery, University of Pittsburgh, Pittsburgh, Pa.

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Address for reprints: T. Brett Reece, MD, University of Colorado, 12631 E 17th Ave, Room 660, MS C310, Aurora, CO 80238 (E-mail: Brett.reece@ucdenver.edu).

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The Valsalva graft (A) development inspired techniques for sinus creation in tube grafts (B), too.

Central Message

The evolution in understanding of the aortic root anatomy has spurred both technologic and conceptual advances in the surgical approach to the aortic root.

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The article in this issue of the *Journal* by De Paulis and colleagues¹ summarizes 2 decades of experience with the Valsalva graft from the unique perspective of the innovators who developed the device. Since the initial descriptions of the valve-sparing operations by David and Feindel² and Yacoub and colleagues,³ numerous modifications in technique, some iterative and others progressive, have been proposed to optimize various aspects of the repair. The Valsalva graft represents a device adjunct to surgical technique in the evolution of root procedures to address the potential advantages of neosinus creation. The incorporation of a bulged skirt portion between 2 cylindrical sections of graft creates a construct around which neosinuses and a trilobate conformation of the aortic root may be more reliably recreated. Finite element models⁴ demonstrating improved valve opening and closure while minimizing leaflet stress have provided experimental rigor beyond intuitive sense to “mimic Mother Nature” in recapitulating a configuration similar to that of the native root.

Indeed, use of the Valsalva graft has gained favor among many aortic surgeons in both valve-sparing root operations and the Bentall procedure. Despite improved geometric mimicry of the native root and favorable experimental data supporting mitigated leaflet stress and mobility, however, clinical superiority versus a cylindrical graft or modified cylindrical graft remains unproven. In experienced centers, midterm and long-term outcomes with both types of grafts for valve-sparing root operations are excellent.^{5,6}

De Paulis and colleagues¹ acknowledge the paramount importance of additional technical factors in valve-sparing root procedures to the long-term durability of repair and freedom from aortic insufficiency beyond the single factor of graft type. In fact, one may argue that valve placement

within the Valsalva graft, given that the bulged portion is essentially a spherical shape before commissural reattachment at the neosinuotubular junction, incorporates an additional degree of freedom necessitating more precision than a cylindrical graft. Graft oversizing, 2-graft technique,⁷ plication of the intercommissural spaces,⁵ and other strategies to create a similar recess outside the leaflets with a cylindrical graft may confer the same clinical advantages. The complexity of successful neosinus creation is mitigated by experience and seems to be largely unaffected by the choice of graft type.

De Paulis and colleagues¹ deserve congratulations for their achievements in the development of the Valsalva graft and resultant contributions to the advancement of aortic surgery. The question of whether a bulged graft for root replacement improves patient outcomes remains unanswered; however, innovations like the Valsalva graft continue to drive knowledge and understanding of the complexity of the mechanics of the aortic root.

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