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EDITORIAL COMMENTARY

Little things matter

Duke Cameron, MD

See related article on pages 912-8.

In the crowded world of the small aortic root, nuances of prosthesis design and surgical technique can have significant consequences. Incomplete relief of outflow tract obstruction, manifest as high transvalvar gradients and patient-prosthesis mismatch, can lead to higher operative mortality, less symptomatic relief, decreased late survival, impaired left ventricular remodeling and mass regression, and diminished durability of the bioprosthesis. The commercial valve wars have focused us on the role of prosthetic valve design, and master surgeons have debated the relative merits of root replacement, root enlargement, and more recently catheter-based stent valve delivery, but relatively little attention has been paid to the simple matter of suture technique. All of us who have implanted small aortic bioprostheses and then looked through the valve orifice to see tissue and pledgets encroaching on the real estate know that these considerations are important too.

Earlier this year in this *Journal*, Tabata and colleagues¹ reported a provocative retrospective clinical study showing that, in their hands, small supra-annular bioprostheses (19- and 21-mm Carpentier Edwards [Irvine, Calif] pericardial

FIGURE 1. Simple interrupted (*left*) versus noneverting pledgetted mattress (*right*) suture techniques. Adapted from www.cthsurgery.com.

valves) had higher gradients if implanted using noneverting pledgetted mattress sutures rather than simple plain interrupted sutures (Figure 1). These elevated gradients translated into a higher incidence of patient-prosthesis mismatch, but without clinical sequelae. Conversely, simple interrupted sutures had lower gradients; of note, this was achieved without the expense of more periprosthetic leaks. Also in the *Journal*, Ugur and colleagues² followed with an analysis of the early multi-institutional St Jude Medical Inc (St Paul, Minn) Trifecta pericardial bioprosthesis experience and compared suture techniques, but they found no significant difference between simple interrupted and noneverting pledgetted mattress groups. In the current study, Tasca and colleagues³ went to the laboratory to evaluate the small (19 and 21 mm) Trifecta bioprostheses in a mock circulation loop using pig hearts, standardized implant techniques, and sophisticated analyses of valve performance. Their study showed statistically significant lower transvalvar gradients with simple interrupted sutures across a broad range of flows and stroke volumes. It appeared that in the interrupted mattress group, tissue and pledgets impinged on the orifice and reduced the effective orifice area, but

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the differences in effective orifice area and gradient were not large.

Clearly, there are other important factors at work: appropriate valve sizing, depth of the suture bite into the annulus, number of sutures, and angled positioning of the prosthesis, to name a few. These considerations may not be as important in the larger valve sizes. Prostheses with better fluid dynamic profiles may “unmask” differences in suture technique. The mock circuit that uses a flaccid heart and saline may not be an ideal physiologic model. But these studies do suggest that the simple interrupted techniques pull tissue away and out of the valve orifice, and if enough sutures are used, will not result in an increase

in periprosthetic valve leaks. This is useful information for management of the small root, a difference that can make a difference.

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