Pannus, thrombus, calcium—Bioprosthetic mitral replacement in young children has it all

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In this issue of the *Journal*, Gellis and colleagues¹ present a cohort of 31 children younger than 5 years with bioprosthetic mitral valve replacement (MVR), excluding valve-in-stent options. They report rereplacement in 32% of patients at a median follow-up of 10.5 months. They performed histologic evaluation of 13 valves (8 of the 10 replaced valves, 4 from autopsy, and 1 after transplant), clearly depicting the roles predominantly of pannus but also of thrombus and calcification as factors underlying stenosis of the prostheses. The only factor related to prosthesis failure was age at the time of replacement—not new news.

In a 2008 report² from the authors' institution of a cohort of 118 patients younger than 5 years with mechanical MVR, 86 valves were size 19 mm or smaller. Freedom from redo MVR was approximately 90% at 2 years. This finding is consistent with other published data from similar age cohorts and mechanical replacement, with freedom from redo MVR ranging from 85% to 100% at 1 year of follow-up.³⁻⁷ In the cohort of Gellis and colleagues,¹ 22 of 31 valves were size 19 mm or larger, with a much lower freedom from redo MVR.

Mitral replacement in the young child remains a formidable problem for our specialty. The need for replacement typically implies bad anatomy, previous exhaustive repair attempts, a labile pulmonary vascular bed, limited annular size, and a challenging overall clinical situation. Dacron polyester fabric skirt extension and supra-annular placement have not solved the problem. Results from the HALO trial of the St Jude 15-mm mechanical prosthesis are forthcoming.⁸ Tubularized biologic material is another option with limited data at present. The report of Gellis and colleagues¹ indicates that although a bioprosthetic option exists, it is not the solution to the problem. It is true that 27 patients were managed without warfarin, which can be a big advantage for certain patients; however, the early failure rate was high. Gellis and colleagues¹ have championed alternative approaches as well, and presumably they will present their results with the valve-in-stent approach in a future report.

Ronald K. Woods, MD, PhD (left), and Viktor Hraska, MD, PhD (right)

Central Message

Among young children with bioprosthetic mitral replacement, early prosthesis failure occurs in a high percentage of patients.

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The demonstration of early thrombus and prosthesis failure raises an important concern with implications for the evolving valve-in-stent option. The literature on adult aortic valve replacement, both standard bioprosthetic and transcatheter valve-in-stent options, has documented early thrombus formation as a significant issue.^{9,10} For the bovine jugular stented valve in the mitral position, we currently bridge with heparin to warfarin anticoagulation and use aspirin, although our experience is limited. We would not be surprised if as a specialty we ultimately learn that all nonautologous materials in the mitral position in this age group would perform better with both anticoagulation and antiplatelet therapy—both unlikely to affect early calcification. If this is true, then there is no role for a commercially available bioprosthesis in this context. For the annulus that prohibits patient size-matched intra-annular placement of a 19-mm or larger mechanical valve, tubularized biologic material and valve-in-stent technology remain reasonable options. Otherwise, it would appear that a mechanical valve is still the best option. For the size permissible context, better prediction of which repaired valves are going to repeatedly fail with earlier replacement before multiple failed repairs impair physiology, avoidance of oversizing, and perhaps self-check international normalized ratio are potential options to improve outcomes with mechanical replacement.

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