Commentary: All tissue valves fail

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David G. Lehenbauer, MD (left), and John Calhoon, MD (right)

Modern-day bioprosthetic valves have many positive attributes. Just as all bleeding stops, however, all tissue valves fail. As a result, surgeons continue the quest for the perfect valve. Ideally, a valve should be viable, durable, nonthrombogenic, biologically inert, easily implanted with minimal invasiveness, resistant to infection, and able to grow with the patient—and, while we are at it, cheap and available on the shelf. In short, we search for a unicorn.

In this issue of the *Journal*, Pragt and colleagues¹ present their experience with the implantation of the Carpentier-Edwards (CE) Perimount valve (Edwards Lifesciences, Irvine, Calif). This is a retrospective review of 45 patients, almost exclusively adults, who underwent pulmonary valve replacement with a mean follow-up approaching 6 years. Previous early to intermediate experience with the CE Perimount valve in the pulmonary position has varied. Nomoto and associates² reported a laudable reintervention rate of 0% for the first 5 years after valve implantation. Kwak and colleagues,³ however, demonstrated that 50% of the CE Perimount valves needed reintervention at 5 years. However, especially when implanted in children.³ In Pragt and colleagues' series,¹ the number of patients with longer term follow-up was limited, but at 10 years, 83% of patients remained free from reintervention. Somewhat concerning is the finding that 11% of their patients had an episode of endocarditis. It is quite intriguing that only 1 of the 5 patients with endocarditis required reoperation. This nonoperative management suggests that prosthetic pulmonary valve endocarditis is far more responsive to medical therapy than seen in the traditional experience with endocarditis of the systemic prosthetic valve.

Pragt and colleagues' review¹ of their experience with pulmonary valve replacement is unique in that they focused on a single product line of valves, performed morphologic examination of explanted valves, and chose a broader definition of failure to analyze their outcomes. They arbitrarily defined failure as "at least moderate regurgitation or moderate stenosis."¹ This definition led to 12 patients, in a relatively short period, being designated as having valve failure

for moderate stenosis or regurgitation. Previous studies have reserved the label of valve failure for those requiring reintervention on the valve and reported regurgitation or stenosis not requiring intervention as dysfunction. If some patients in this "failure" cohort were free of symptoms, should their moderate stenosis or regurgitation represent valve failure? This article highlights a need for consistent definition of bioprosthetic valve failure as we analyze patient outcomes in a search for a more nearly ideal valve.

A positive characteristic of stented bioprosthetic valves is that they facilitate percutaneous intervention with a valve-in-valve approach. It should be noted that only 2 of 7 valves replaced in this cohort underwent a transcatheter approach. We know 1 of these 7 replacements was due to endocarditis; for the remainder, however, it is unclear why more of these patients did not undergo percutaneous replacement. Across all centers, we anticipate that the number of patients who undergo percutaneous valve replacement in the setting of a failed bioprosthetic valve will only continue to grow. Pragt and colleagues¹ are to be commended for a nice series with reasonable outcomes in adult stented bovine pulmonary valve replacement. Their results, however, demonstrate that the ideal replacement for the pulmonary valve remains elusive.

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Central Message

The perfect pulmonary valve replacement remains elusive. We need a clear and consistent characterization of bioprosthetic valve performance as we continue in our search for a more ideal valve.

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