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EDITORIAL COMMENTARY

Percutaneous aortic and mitral valve implantation. Is it ready to match the results of contemporary surgical valve replacement?

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In this issue of the *Journal*, Duncan and colleagues¹ deal with the problem of paravalvular regurgitation after conventional aortic and mitral valve replacement as a “benchmark for alternative approaches.” The authors¹ sought to determine the contemporary occurrence of paravalvular regurgitation after conventional surgical valve replacement. To this end, they analyzed retrospectively 1630 patients who underwent aortic and/or mitral valve replacement surgery at their institution over an 8.5-year period. Follow-up echocardiography was performed in 73% of patients and a $\geq 2+$ (moderate) paravalvular regurgitation occurred in 0.9% of aortic valve replacement and 2.2% of mitral valve replacement patients (0.4% if infective endocarditis is excluded). They thus conclude that “the overall rate of paravalvular

regurgitation is very low and late clinically significant structural (noninfectious) paravalvular regurgitation is rare”¹

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Central Message

Surgical aortic (or mitral) valve replacement remains the gold-standard against which percutaneous valve implantation must be compared.

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FIGURE 1. Intraoperative photograph of a surgical aortic valve replacement.

and consider that the benchmark they have established “should be considered when evaluating patients for transcatheter or sutureless (aortic) valve replacement.”¹

The latter techniques are fast gaining acceptance but ought to be compared with conventional aortic valve replacement, which remains the gold standard (Figure 1). But comparisons are usually made with mostly historical surgical series, and are often based on scoring systems that are neither based on contemporary series nor produced specifically for valve replacement. In this regard, it is particularly regrettable that some current studies still use the original European System for Cardiac Operative Risk Evaluation, almost 4 years since it was replaced by the second European System for Cardiac Operative Risk Evaluation, which predicts mortality at one-third to one-quarter of the rates predicted by the previous version.

Therefore, a contemporary study, such as that offered by Duncan and colleagues¹ is most welcome, although the excellent results reported may not reflect the real world. Indeed, when we scan through the surgical literature we still come across results that are no longer acceptable, but are used to further justify the new technologies. Hence, this article should also serve as benchmark for surgical, classic aortic valve replacement. But, as acknowledged by the authors in their Limitations section,¹ only three-quarters of their patients had follow-up echocardiograms, and clinical follow-up was available in only 90% of cases, which may have influenced the incidence of events downward, although severe cases would most certainly have surfaced in the clinical follow-up.

By contrast, percutaneous implantation of the aortic valve is plagued by several types of complications that are often underplayed. One of the most important of these

complications is periprosthetic leakage, which results from inserting a mostly round and smooth structure into a rough landing zone, characteristic of calcific aortic stenosis, even after the calcium has been squeezed by balloon predilation of the valve. Its significance depends on the type of device, angle of implantation, and method of deployment, among other factors.² Up to two-thirds of patients had significant regurgitation, and moderate and greater degrees of regurgitation were initially described in up to one-third of patients.³ However, in a meta-analysis covering about 6000 patients included in 9 studies, O’Sullivan and colleagues⁴ revealed that the rates of periprosthetic regurgitation vary between devices.

The medium- and long-term consequences of significant residual aortic regurgitation in these patients is yet to be determined, but it has been previously demonstrated to negatively influence survival in surgical series. The PARTNER trial showed that paravalvular regurgitation significantly increased mortality from 35.3% for mild to 60.8% for moderate-to-severe regurgitation after a 3-year follow-up. Vasa-Nicotera and colleagues⁵ also demonstrated poorer 1-year survival in patients with significant regurgitation after percutaneous aortic valve implantation, even in cases with mild regurgitation.⁵ Furthermore, Crouch and colleagues⁶ demonstrated that paravalvular aortic regurgitation after transcatheter aortic-valve implantation assessed as mild by transthoracic echocardiogram may in fact be more severe.

Besides, periprosthetic leaks appear to be associated with increased incidence of prosthetic endocarditis in surgically treated patients. Given the time, this will also come up in percutaneous valves, which is an important consideration to have in mind if the use of these devices is to be extended to younger patients expected to live longer with their prosthesis. Several cases have already been described and many more have certainly not been reported.

Currently, the incidence of periprosthetic leaks has significantly decreased with some percutaneous devices. They have been modified to incorporate soft outer skirts to improve their adaptation to a patient’s aortic annulus, as is the case with the Edwards LifeSciences (Irvine, Calif) Sapien 3 valve.⁷ Hence, this complication may become a thing of the past, although it is unlikely that it will ever be less important than in surgically implanted valves. But the evolving experience with this complication should be used to place into perspective other complications, such as the persisting incidence of atrioventricular block, especially associated with some devices.

As in any other situation, progress has come out of experience, but one must not forget those who had to live with the consequences of our learning process. Besides those who did not survive the procedure, there are many patients out there who still have to live with their periprosthetic leaks.

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