Will transcatheter valve-in-valve become the standard for replacing the degenerative aortic valve bioprosthesis? Hold your horses, the jury is still out

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Cardiac surgeons and cardiologists are confronted with an increasing number of elderly patients being seen with structural valve degeneration of previously placed surgical bioprosthetic heart valves. According to the US Department of Health and Human Services, by 2030 the elderly population will be about 72.1 million, more than twice the number in 2000. This represents a staggering proportion of the overall population of approximately 19%. In this issue of *The Journal of Thoracic and Cardiovascular Surgery*, Conradi and colleagues¹ report their cumulative experience of implanting 6 types of transcatheter heart valves in degenerated bioprostheses through different anatomic access sites. They found that valve-in-valve (ViV) placement can be performed safely and with acceptable hemodynamic and clinical outcomes in all 4 valve positions.

With the increasing trend of younger patients choosing bioprosthetic valves for their primary operation to minimize or eliminate the need for lifelong warfarin, the need to decide between surgical and transcatheter reoperative valve surgery is expected to increase during the next decade. In most series of surgical reoperative aortic valve surgery, the 30-day operative mortality ranges from 4% to 9%.²⁻⁴ A large series of patients younger than 60 years with a pericardial prosthesis implanted in the aortic position reported a freedom from structural valve degeneration of 57% ± 6% at 15 years.⁵ Reoperation occurred approximately 11 ± 5 years after the initial aortic valve surgery.⁵ Conradi and colleagues¹ reported an index procedure time to ViV of 9.3 ± 4.9 years. Among the high-risk patient population, Conradi and colleagues¹ showed a 30-day mortality of 5.6% in the patients undergoing aortic ViV placement. A recent series of 3380 patients from the Society of Thoracic Surgeons database who underwent reoperative aortic valve replacement showed that the operative mortality is acceptable but higher than that of the first surgery (4.6% vs 2.2%). Reoperative aortic valve replacement was associated with a higher rate of major morbidities (21.6% vs

11.8%), including postoperative stroke, aortic insufficiency, pacemaker requirement, and vascular complications. These adverse events may be overcome by a less invasive technique such as ViV placement.⁶

Currently, it is not uncommon to recommend a bioprosthetic valve for primary operations in younger patients, with the possibility of a ViV transcatheter aortic valve replacement in the future. It is important to implant a valve size of at least 23 mm to avoid patient-prosthesis mismatch. Conradi and colleagues¹ demonstrated that the mean aortic valve gradient obtained during ViV with a surgical 21-mm valve was significantly higher than with larger surgical valve sizes. Correspondingly, Dvir and associates⁷ showed that 1-year survival of patients who underwent a ViV procedure was lower among patients with small initial bioprosthesis (≤21 mm; hazard ratio, 2.04). To accomplish the goal of an adequate initial surgical valve, it is vital to prevent patient-prosthesis mismatch by implanting an adequately sized valve through either root enlargement or stentless valve techniques.

There remains a steep learning curve for the performance of a transcatheter ViV placement. Whereas Conradi and

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Central Message

Transcatheter valve-in-valve is safe for some high-risk patients, but standard of care mostly remains surgical reoperative replacement.

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colleagues¹ noted that the transfemoral ViV placement was performed in only 43% of their patients, we expect that in the future most of these procedures will be performed through the femoral artery. Furthermore, the majority of these procedures have been performed in stented aortic valves.⁶ In patients who previously received stentless valves, valves without annular markers, or valves with high valvular struts, the implantation of a transcatheter valve has a higher rate of complications, including device migration, embolization, and coronary occlusion.^{8,9} Conradi and colleagues¹ showed a high mortality (8%), even when the procedures were performed in a relatively young patient population (mean age 74 years). A variety of prostheses were used in their study, however, leading to the potential of a learning curve for each device. With a small number of patients and at the beginning of an experience, focusing on 1 or 2 available prostheses might have resulted in more accurate and reliable results. Additionally, the high mortality may be explained by the fact that a majority of their procedures were performed through a transapical approach (53%).⁶

The procedural success for ViV placement in the mitral, tricuspid, and pulmonary heart valves is encouraging. As noted in the series of Conradi and colleagues,¹ however, there was an 8% 30-day all-cause and cardiovascular cause mortality among all patients and a 17.6% mortality among those undergoing elective mitral ViV placement. There should be some caution against overzealous performance of this procedure, and continued monitoring of outcomes in other series is necessary.

As with every transformative technology, it remains imperative to evaluate the short- and long-term outcomes of a minimally invasive technique when compared with

the criterion standard of open surgical techniques. The heart team must make these decisions in conjunction with the patient not only for the primary valve but also for the ViV procedure. For elderly, high-risk patients with structural valve degeneration, transcatheter options may provide improved short-term outcomes. The valve community eagerly awaits larger series with adjudicated outcomes of the transcatheter ViV procedure.

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