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STRUCTURAL

FOCUS ON TAVR: POINTS OF VIEW

Time to Explore Transcatheter Aortic Valve Replacement in Younger, Low-Risk Patients

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ABSTRACT

During the last decade transcatheter aortic valve replacement (TAVR) has been established as a treatment for patients with severe aortic stenosis, who are at particularly high surgical risk. As compared with surgical aortic valve replacement (SAVR), TAVR has been associated with lower early risk of mortality, atrial fibrillation, acute kidney injury, and bleeding. Furthermore, device and periprocedural improvements have addressed most of the initial limitations for TAVR, including the Achilles' heel, paravalvular leakage. Supported by this as well as preliminary data among lower-risk patients, TAVR is currently being evaluated in prospective randomized trials against SAVR in younger low-risk patients. Although durability of the TAVR device may be of concern in younger patients given their longer life expectancy, intermediate-term controlled data does not reveal any difference between TAVR and SAVR devices. (J Am Coll Cardiol Intv 2016;9:2183–5) © 2016 by the American College of Cardiology Foundation.

Since the pioneering works by Andersen et al. (1) and Cribier et al. (2), transcatheter aortic valve replacement (TAVR) has become a well-established and evidence-based therapy for severe and symptomatic aortic stenosis in patients at higher surgical risk. TAVR has been associated with lower all-cause mortality than best medical therapy in patients who were ineligible for surgical aortic valve replacement (SAVR) (3), as well as noninferiority or even superiority to SAVR with respect to all-cause mortality in patients at high surgical risk (4,5). In patients at intermediate risk, TAVR has been reported non-inferior to SAVR regarding death from any cause or disabling stroke (6). In addition, the first randomized trial comparing TAVR and SAVR in all-comer patients indicated that these findings may apply to patients at lower surgical risk (7). Furthermore, a meta-analysis of the 4 randomized clinical trials including 3,806 patients comparing TAVR and SAVR showed that TAVR was associated with a 13% relative risk reduction ($p = 0.038$) in mortality at 2-year follow-up (8).

Although patients included in these randomized trial had a Society of Thoracic Surgeons risk score predicted mortality ranged from a high of 11.6% to a low of 3.0%, their mean age was around 80 years (3–7). Consequently, a logical question is whether TAVR is an alternative to SAVR in patients deemed to be at low surgical risk. But how should we define a low-risk patient? One way is to use a Society of Thoracic Surgeons score of <4%, yet an 85-year-old male patient without comorbidities who generates a low score (1.8%) would already be offered TAVR at many institutions. Thus, it may be more interesting to pursue the role of TAVR patients with aortic stenosis who are not only at low surgical risk, but also of a younger age, particular due to a marked decrease in the age at which surgical bioprostheses are preferred at many sites (9).

A number of procedural complications, such as new-onset atrial fibrillation, acute kidney injury, and

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ABBREVIATIONS AND ACRONYMS

SAVR = surgical aortic valve replacement

TAVR = transcatheter aortic valve replacement

major bleeding, are only one-half as common after TAVR than SAVR (5,6). However, to justify expansion of TAVR into patients who can undergo SAVR at low risk and with excellent outcome, the transcatheter technology needs to address some of its own initial shortcomings. Furthermore, durability may be even more important among patients with longer life expectancy than among most patients treated so far.

Moderate or severe paravalvular leakage was initially reported in 10% to 15% of patients treated with TAVR (3,4,7) and has been associated with increased mortality. However, routine use of cardiac computed tomography scans for sizing of the aortic annulus has minimized the use of undersized bioprostheses and paravalvular leakage, which in the beginning of the TAVR era was a potential risk related to the measurements by 2-dimensional echocardiography. In addition, newer generation transcatheter aortic bioprostheses have an outer skirt or adaptive seal, and some systems are even retrievable to optimize the implantation position. These iterations have reduced the rate of more than mild paravalvular leakage to 1% to 6% (5,10,11), and thereby close to what is seen after SAVR.

Due to the proximity between the transcatheter valve frame extending into the left ventricular outflow tract and the conduction system, heart block with need for permanent pacemaker implantation has been frequent after TAVR. Although new permanent pacemaker implantation may have a negative effect on left ventricular function over time, it protects against unexpected death, probably due to the inherent risk of complete heart block among patients with severe aortic stenosis (12). The appreciation of the importance of higher prostheses implantation, as well as introduction of re-positional TAVR systems have lowered the need for permanent pacemaker to 10% to 15% after 30 days for most systems. Furthermore, conduction abnormalities resolve beyond the periprocedural period in one-half of these patients (13).

Recently, poor long-term durability of TAVR bioprostheses has been reported (14). Even though this early signal calls for caution with regard to expanding TAVR into younger patient cohorts, it is important to note that these findings were observed in older patients using first-generation devices. Furthermore, only echocardiographic findings were used to define degeneration, which is in contrast with the need for re-intervention used as definition for surgical valves. This is similar to the more common prosthesis-patient mismatch seen after SAVR compared to TAVR, although the role of this echocardiographic finding is uncertain (15). Durability is an important factor for both transcatheter and surgical aortic bioprostheses, but the definition for both therapies should ideally be based on both symptoms, valve dysfunction, and need for re-intervention. At present, the only robust data comparing the 2 techniques do not reveal any difference in valve performance and durability (16,17). Although some of the earliest TAVR devices already have longer follow-up data than some of the newer surgical bioprostheses introduced to the market, the only way to get reliable long-term durability data is to introduce the therapy into younger, low-risk patients, preferably in randomized clinical trials against SAVR.

TAVR has been through major evolvements since its introduction a decade ago. Newer devices, better procedural planning and performance, as well as improved post-procedural treatment have led to a safe and effective therapy for patients with aortic stenosis. The time is right to explore the expansion of TAVR in low-risk patients (NCT02675114, NCT02701283) including younger patients (NCT02825134).

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