

EDITORIAL COMMENT

Transcatheter Aortic Valve Replacement for Pure Noncalcific Aortic Regurgitation Is Coming, But Not Yet Primetime*



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Physicians have robust indications for transcatheter aortic valve replacement (TAVR) as a therapeutic option in as many patients with severe aortic stenosis (AS). However, we still lack clarity in several settings, particularly (1) low surgical risk, (2) bicuspid valves, (3) failed bioprosthetic valves, and (4) noncalcific aortic regurgitation (AR).

SEE PAGE 2308

In this issue of the *JACC: Cardiovascular Interventions*, Franzone et al. (1) review the published experience with TAVR for pure AR. Beyond the mere presence of regurgitation, there are clinically important factors that distinguish “pure” AR from calcific AS: the relative absence of calcification, relatively larger annuli, association with aortic root pathology, and relatively greater potential for longevity.

Currently available transcatheter valves for AS rely largely on the presence of calcification for fixation. In the case of pure AR, a smooth, noncalcified valve complex renders anchoring difficult. The risks of malposition, embolization, duplicate valves, or severe paravalvular regurgitation are increased (1).

The association with aortic root pathology and progressive aortic or annular dilation is a particular concern. Patients with dilated aortic roots may have annuli that are simply too large for current transcatheter valves. Even if this is not the case, transcatheter valves that depend on aggressive oversizing

and radial expansion for anchoring might predispose to progressive annular enlargement. Many patients with a dilated aorta and the potential for longevity might be better served by a surgical procedure that addresses both the valvular and aortic pathology (2). Unfortunately, we have minimal information about the durability of transcatheter valves in the setting of pure AR (3).

Although the overall outcomes in this systematic review may be acceptable for some patients in whom the risks of surgery are very high, limitations of any such review are very real (1). They include publication bias, small patient numbers, and heterogeneity among the studies. Procedural mortality ranged from 0% to 30% and significant post-procedural AR ranged from 0% to 88%. In part, this may reflect variations in patient selection and technique. However, it is clear that generalizations about the role of TAVR in the setting of pure AR are problematic. Outcomes are largely device specific.

Experience with first-generation transcatheter valves has been disappointing. Early balloon-expandable valves provided inadequate fixation and were rarely used in the setting of pure AR. The largest experience to date was with the self-expanding CoreValve device (Medtronic, Minneapolis, Minnesota). With its large size and limited repositionability, good outcomes are certainly possible, although malposition and problematic paravalvular regurgitation are, unfortunately, frequent (3-5).

Some newer second-generation valves are more promising. The Acurate valve (Symetis, Ecublens, Switzerland) is unique, with a narrow waist that offers advantages in terms of facilitated positioning, fixation, and sealing (6). The mechanically expandable Lotus (Boston Scientific, Marlborough, Massachusetts) and Direct Flow (Direct Flow Medical, Santa Rosa,

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California) valves are fully repositionable with very effective sealing (7,8). Recently, favorable short-term outcomes with the newer generation balloon expandable SAPIEN 3 valve have been reported in small numbers of patients (9). The widespread availability of this valve will likely result in a growing experience. However, experience remains very limited with these devices, and although it is encouraging we can only really say that this has demonstrated feasibility.

To date the bulk of favorable published experience in the setting of AR is with the JenaValve (JenaValve Technology, Munich, Germany), the only transcatheter valve currently approved for pure AR in Europe (10). An ongoing trial in Europe and planned U.S. trial will hopefully provide us with valuable information to guide therapy. A recent newcomer, J-Valve (JieCheng Medical Technology, Suzhou, China), utilizes a somewhat similar approach with favorable published experience to date (11). Both valves utilize supraleaflet nitinol tabs (feelers, clips, claspers) to facilitate initial positioning and subsequent anchoring of an intra-annular nitinol frame valve. Both devices were originally designed for

antegrade transapical implantation (which allows the positioning or anchoring tabs to be pulled down onto the native aortic valve leaflets), although transfemoral delivery systems are becoming available. Both are available in sizes suitable for relatively large but not the largest annuli. Again, information about late outcomes are not known.

What then are the desirable characteristics of a transcatheter valve in the setting of pure AR? The availability of multiple and large sizes, fixation not dependent on calcification or aggressive oversizing, and features that facilitate annular positioning, repositionability, and retrievability. Importantly we need extensive, long-term, and favorable device-specific and patient-level experience. TAVR for pure AR is coming, the obstacles are not insurmountable, but for now surgical aortic valve replacement remains the gold standard.

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REFERENCES

1. Franzone A, Piccolo R, Siontis GCM, et al. Transcatheter aortic valve replacement for the treatment of pure native aortic valve regurgitation: a systematic review. *J Am Coll Cardiol Intv* 2016;9:2308-17.
2. Nishimura RA, Otto CM, Bonow RO, et al. 2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol* 2014;63:e57-185.
3. Rossi ML, Barbaro C, Pagnotta P, Lucarelli C, Gasparini G, Presbitero P. Transcatheter aortic valve implantation in patients with pure severe native aortic regurgitation: results after 3 year of follow-up. *J Am Coll Cardiol* 2014;64 Suppl: B221-2.
4. Roy DA, Schaefer U, Guetta V, et al. Transcatheter aortic valve implantation for pure severe native aortic valve regurgitation. *J Am Coll Cardiol* 2013;61:1577-84.
5. Testa L, Latib A, Rossi ML, et al. CoreValve implantation for severe aortic regurgitation: a multicentre registry. *EuroIntervention* 2014;10: 739-45.
6. Toggweiler S, Biaggi P, Grünenfelder J, Reho J, Bühler I, Corti R. First-in-man transfemoral transcatheter aortic valve implantation with the ACURATE neo for the treatment of aortic regurgitation. *EuroIntervention* 2016;12:78.
7. Wöhrle J, Rodewald C, Rottbauer W. Transfemoral aortic valve implantation in pure native aortic valve insufficiency using the repositionable and retrievable Lotus valve. *Catheter Cardiovasc Interv* 2016;87:993-5.
8. Schofer J, Nietlispach F, Bjuklic K, et al. Transfemoral implantation of a fully repositionable and retrievable transcatheter valve for noncalcified pure aortic regurgitation. *J Am Coll Cardiol Intv* 2015;8:1842-9.
9. Urena M, Himbert D, Ohlman P, et al. Transcatheter aortic valve replacement to treat pure aortic regurgitation on noncalcified native valves. *J Am Coll Cardiol* 2016;68:1705-6.
10. Seiffert M, Bader R, Kappert U, et al. Initial German experience with transapical implantation of a second-generation transcatheter heart valve for the treatment of aortic regurgitation. *J Am Coll Cardiol Intv* 2014;7:1168-74.
11. Wei L, Liu H, Zhu L, et al. A new transcatheter aortic valve replacement system for predominant aortic regurgitation implantation of the J-valve and early outcome. *J Am Coll Cardiol Intv* 2015;8:1831-41.

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