Structure valve degeneration in new bioprosthesis: New concerns and valve-in-valve (VIV) bailout

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Central Message

New aortic bioprosthetic valves may have reduced durability requiring a valve-in-valve transcatheter aortic valve replacement approach. The residual gradients, potential patient prosthesis mismatch and durability will be the focus.

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Bioprosthetic valves in current use have well-known and very acceptable tissue durability. Tissue failure is multifactorial. Stress on the leaflets is in part a cause of tissue degeneration. Decades have been spent perfecting the incorporation of tissue into the valve stent housing and using strut material with “spring” properties to reduce the tissue load during leaflet closure.

Now we have the same tissue mounted into transcatheter aortic valve replacement (TAVR) valves and self-expanding sutureless aortic bioprostheses. Leaflet function can be determined in vitro and in vivo within a short period of time; however, these new valve designs are mounting the leaflet tissue to stents and present a different stress pattern that can lead to premature calcification and leaflet degeneration. It takes years to study these adverse events. Because these devices are used in lower-risk and younger patients, the clinical concerns shift from feasibility and function to durability.

In this issue of the *Journal*, Amable and colleagues¹ report a TAVR, valve-in-valve (VIV) treatment strategy, for 5 failed self-expanding sutureless (Perceval; LivaNova PLC, London, United Kingdom) aortic valves. A VIV treatment strategy for the Perceval valve carries concern regarding adequate fixation and valve stability as well as paravalvular leak. Another concern of VIV procedures is the prosthetic gradient and patient prosthesis mismatch. The 5 prostheses reported in this series were treated with self-expanding TAVR valves. Early gradients were as high as 32 mm Hg (mean) and at 30 days decreased by 10 mm Hg (mean). There was only mild residual regurgitation.

These case reports serve as alerts to new problems we may face. Future data and experience will help us

understand the durability of TAVR valves, the Perceval valve, and future bioprosthetic tissue valves with tissue mounted within stents. When these valves fail from tissue degeneration, the next best valve therapy will be a VIV strategy. The best VIV device is not known. The self-expanding device worked well in this series, but valve gradients and patient prosthesis mismatch are real concerns.

Data are mounting that VIV treatment of failed surgically implanted bioprosthesis will result in residual valve gradients. Thus, the initial surgical valve must have the largest annular size for each patient to accommodate a potential VIV therapy. The strategy of annular enlarged to accommodate a larger bioprosthesis in large (body mass index) young patients with a small annulus is prudent if future VIV procedures are predicted.

Reference

1. Amable N, Zannis K, Veugeois A, Caussin C. Early outcome of degenerated self-expandable sutureless aortic prostheses treated with transcatheter valve implantation: a pilot series. *J Thorac Cardiovasc Surg*. 2016;152:1635-7.