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Commentary: Trifecta valve: Does a word of caution prevail?

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The use of bioprosthetic valves for surgical aortic valve replacement has increased during the last few decades due to continuous improvements in durability and hemodynamic performance.^{1,2} Many commercially available aortic bioprosthetic valves have been modified to increase their effective orifice area, minimize transvalvular pressure gradient, and avoid patient–prosthetic mismatch (PPM) after surgery.³

The Trifecta bioprosthetic aortic valve (Abbott, St Paul, Minn) is a trileaflet, stented pericardial valve designed for supra-annular placement during surgical aortic valve replacement. The valve leaflets are made from a single bovine pericardial tissue that is externally mounted on a titanium stent to maximize hemodynamic performance.^{3,4} The Trifecta valve has shown excellent hemodynamic performance with a low transvalvular gradient, acceptable effective orifice area, and low rates of PPM.⁵ However, a number of early Trifecta valve failures have been reported, and the most common cause of dysfunction was aortic regurgitation due to leaflet tear involving the noncoronary cusp and pannus formation in the inflow portion.⁶⁻¹⁰ Although the mechanism of these early failures is unclear, it has been suggested that technical failures, such as incautious knot tying, oversized valve selection, and accidental bending of the sewing ring or the titanium stent posts, may cause a change in valve geometry, eventually leading to leaflet damage and tearing.¹¹ To avoid these technical pitfalls, the next-generation Trifecta valve with Glide Technology (Trifecta GT; Abbott) was introduced in 2016. This new valve allows easier suturing and better placement



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CENTRAL MESSAGE

Although Trifecta valves provided excellent hemodynamics, unpredictable structural valve deterioration associated with abrupt leaflet tear remains a major concern.

in the native annulus, with a modified holder to facilitate parachuting and seating to minimize distortion to the stent and leaflets.¹²

Thocuta and colleagues¹³ reported an unexpected early failure of the refined Trifecta GT that presented as newly diagnosed severe aortic insufficiency associated with a detached cusp at the stent post between the noncoronary and the right coronary cusps.¹³

Noncalcified leaflet tears at the stent post or at the bottom of the leaflet without significant leaflet calcification are rather typical for Trifecta valves, whereas slow progress of calcification has been the primary cause of structural valve deterioration (SVD) in other types of bioprosthetic valves.¹² Given the characteristics and timing of the SVD in the newer Trifecta GT, hemodynamic or mechanical stress on the externally mounted leaflet of the valve may contribute to the incidence of SVD, as has been seen among other externally mounted leaflet valves, including the Ionescu–Shiley valves in the 1980s,^{14,15} and the recent-generation Mitroflow valves in the 2000s.¹⁶

Trifecta valves provided excellent early- to mid-term hemodynamic performance and a very low rate of PPM up to 6 or 7 years after surgery.^{3,12,17} The absolute number of observed SVD cases remains limited.^{12,17} However, clinical presentation of SVD caused by abrupt valve tears often involves sudden-onset severe dyspnea and heart failure and may require emergent redo surgery or a valve-in-valve procedure.^{12,13,18}

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Disclosures: The author reported no conflicts of interest.

The *Journal* policy requires editors and reviewers to disclose conflicts of interest and to decline handling or reviewing manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

Received for publication Nov 5, 2020; revisions received Nov 5, 2020; accepted for publication Nov 13, 2020; available ahead of print Nov 18, 2020.

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JTCVS Techniques 2021;5:21-2

2666-2507

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<https://doi.org/10.1016/j.xjtc.2020.11.010>

Physicians involved in the follow-up of these patients should always keep in mind the possibility of rapid SVD in the Trifecta valve. Thus, I recommend a “word of caution” regarding this valve.

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