In which patients should the Trifecta bioprosthesis be chosen?

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September 25, 2021

Invited Commentary

In which patients should the Trifecta bioprosthesis be chosen?

Runnning title: The advantages and disadvantages of the Trifecta bioprosthesis

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Funding: none

Text word count: 535 words

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The Trifecta bioprosthesis (Abbott, Minneapolis, MN, USA) is a tri-leaflet, stented, bovine pericardial valve that is designed for implantation in the supra-annular position in surgical aortic valve replacement (SAVR). The bovine pericardial sheet is mounted outside the stent frame, allowing for a circular cross-section during systole. Several reports have indicated a favorable hemodynamic profile for this bioprosthesis, such as low peak and mean transprosthetic gradients, excellent effective orifice area, and low incidence of patient–prosthesis mismatch (PPM), in patients with a small aortic annulus [1,2]. However, a high incidence of structural valve degeneration (SVD) with cusp tear has been reported as a common cause of SVD [3]. Moreover, it is unsuitable for valve-in-valve transcatheter aortic valve replacement (TAVR) in future SVD owing to its externally wrapped design. In particular, in prostheses with small sizes and in degenerated bioprostheses with external leaflets, performing TAVR for Trifecta SVD is associated with a higher risk of coronary obstruction. Thus, the Trifecta bioprosthesis has both advantages and disadvantages for patients undergoing SAVR.

This study [4] is a systematic review and meta-analysis comparing the Trifecta and Perimount bioprostheses for SAVR. The authors reviewed six studies, which included 11,135 cases, and reported a higher reintervention rate with Trifecta than with Perimount. However, the all-cause mortality rate did not significantly differ between the two groups. The authors also stated that the reintervention rates do not necessarily reflect the true rates of SVD and emphasized that 50% of the patients with a failed Trifecta valve did not undergo

reintervention owing to various clinical reasons and eventually died. Evidently, several patients who were not considered candidates for redo SAVR nor had unsuitable valve-in-valve TAVR anatomy were not included in the review. The authors postulate that this may be a contributing factor to the similar all-cause mortality rates between the groups despite the higher reoperation rate in the Trifecta group. The authors did not focus on hemodynamic outcomes, such as the incidence of PPM, and did not recommend the use of Trifecta for SAVR bioprosthesis.

The treatment of aortic stenosis (AS) has undergone changes since TAVR was further developed and trialed in intermediate- and low-risk patients. There was an option to select either bioprosthesis or mechanical valve for SAVR in AS treatment before the TAVR era. However, there are currently a wide variety of options for SAVR, including minimally invasive cardiac surgery, addition of annular enlargement, new valve selection, rapid deployment valve, and a variety of valves, including Trifecta bioprosthesis. The options for TAVR include the trans-femoral (TF) or non-TF approach and the valve selection (balloon expandable or self-expanding). Hence, it is desirable to consider not only the patients' physical or anatomical characteristics but also their way of life to decide the treatment option.

PPM should be considered when making this decision. PPM has been associated with increased operative mortality after SAVR, particularly when associated with left ventricle (LV) dysfunction [5]. Takaseya et al. [6] reported that the favorable hemodynamic performance of the Trifecta bioprosthesis may have resulted in the same operative outcomes in both patients with LV dysfunction and normal LV function. The Trifecta bioprosthesis might be a suitable choice for small root or LV dysfunction in older patients with SAVR. However, because there is not a lot of data on the Trifecta bioprosthesis in LV disfunction patients, a randomized study comparing the Trifecta and Perimount bioprostheses is warranted. The advantages and disadvantages of the Trifecta bioprosthesis should be carefully considered when selecting it for patients with SAVR.

Conflict of interest ; All authors declare no conflict of interest.

Reference

1. Colli A, Marchetto G, Salizzoni S, et al. The TRIBECA study: (TRI)fecta (B)ioprosthesis (E)valuation versus (C)arpentier Magna-Ease in (A)ortic position. *Eur J Cardiothorac Surg.* 2016 Feb;49(2):478-85.
2. Kilic A, Sultan I, Navid F , et al. Trifecta aortic bioprosthesis: midterm results in 1953 patients from a single center. *Ann Thorac Surg* 2019 107:1356–1363
3. Fukuhara S, Shiomi S, Yang B, et al. Early Structural Valve Degeneration of Trifecta Bioprosthesis. *Ann Thorac Surg* . 2020 Mar;109(3):720-727.
4. Yokoyama Y, Kuno T, Takagi H, et al. Trifecta Versus Perimount Bioprosthesis for Surgical Aortic Valve Replacement; Systematic Review and Meta-Analysis. *J Card Surg* . in press
5. Blais C, Dumesnil JG, Baillot R, et al. Impact of prosthesis-patient mismatch on short-term mortality after aortic valve replacement.*Circulation* 2003; 108:983–988
6. Takaseya T, Oryoji A, Takagi K, et al. Impact of the Trifecta bioprosthetic valve in patients with low-flow severe aortic stenosis*Heart and Vessels* 2021 ;36:1256–1263