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Commentary: Hybrid valve-in-valve mitral valve replacement: Surgeon's role matters

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Although surgical reoperation is the standard of care for degenerative mitral bioprosthetic valves, repeat surgery carries significant morbidity and mortality.¹ Valve-in-valve (ViV) transcatheter mitral valve replacement (TMVR) has emerged as a treatment for a degenerated bioprosthetic valve failure. Although less invasive, ViV-TMVR carries a formidable risk of left ventricular outflow tract (LVOT) obstruction because of displacement of the anterior bioprosthetic leaflets toward the interventricular septum, creating a narrowed and elongated “neo-LVOT.” ViV-TMVR-induced neo-LVOT obstruction with hemodynamic compromise is a serious complication with limited treatment options and can be fatal.^{2,3}

In this issue of *JTCVS Techniques*, Harloff and colleagues⁴ report a “hybrid trans-spatial approach” using cardiopulmonary bypass (CPB) to resect leaflets of a previously placed bioprosthesis, thereby reducing the risk of neo-LVOT obstruction for ViV-TMVR. The authors should be congratulated on their excellent results, accomplished with short CPB and crossclamp time, without paravalvular leak or significant LVOT obstruction.

Appropriate evaluation of patient characteristics and comorbidities is key in selecting the procedure for ViV-TMVR. The patient in this report had a Society of Thoracic Surgeons score of 3.5%; however, her frailty assessed by Charlson Comorbidity Index and Katz index deemed her high risk for redo surgical MVR. Providing accurate risk

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CENTRAL MESSAGE

Surgeons should play a major role in a multidisciplinary heart team's selection process for candidates for valve-in-valve transmitral valve replacement, including a surgical hybrid procedure.

scores in candidates for ViV-TMVR is challenging since it is still unknown how many frailty indices are necessary to develop a prognostic model with good discrimination and accuracy.⁵

Although this transatrial ViV-TMVR case was a redo procedure, initial surgical MVR was performed through a minimally invasive right thoracotomy. Since the patient did not undergo a reoperative median sternotomy, the actual risk for ViV-TMVR was lower than conventional redo surgical MVR. Once the appropriate view of the mitral bioprosthesis was obtained, excision of 2 leaflets adjacent to the LVOT was easily performed to avoid LVOT obstruction. Precise positioning and accurate adjustment for orientation of ViV-TMVR were also possible under direct vision.

Currently, major catheter-based ViV-TMVR procedures to avoid neo-LVOT obstruction include the transseptal approach with percutaneous laceration of the anterior mitral leaflet (LAMPOON procedure) using a radiofrequency catheter⁶ and the transapical approach with balloon-assisted translocation of the anterior mitral leaflet (BATMAN procedure).⁷ Although both procedures have emerged as feasible options, about one half of LAMPOON procedures required the prophylactic use of intra-aortic balloon pumping support⁶ and all BATMAN procedures required femoro-femoral CPB.⁷ Thus, the degree of “minimal invasiveness” of these catheter-based procedures is questionable.

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Although the presence of significant tricuspid regurgitation is common (>50%) in patients with failed mitral valve bioprostheses and may result in poorer outcomes,⁸ neither LAMPOON nor BATMAN patients underwent tricuspid regurgitation repair at the time of intervention.^{6,7,9} In contrast, hybrid ViV-TMVR with concomitant tricuspid valve repair can be easily performed when needed, with minimal additional CPB and crossclamp time, resulting in better late functional outcomes.

Selection of the optimal procedure for ViV-TMVR should be individualized and determined based on open discussion and local experience in a multidisciplinary heart team. However, surgeons should lead the discussion because we are the most familiar with the risks and benefits of the surgical ViV-TMVR approach.

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