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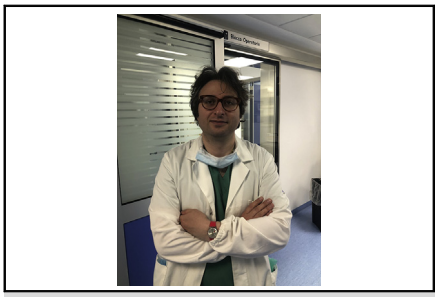
Commentary: Taking innovation to heart in pediatric mitral valve replacement

Matteo Trezzi, MD



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CENTRAL MESSAGE

In recent years, adaptation of the Melody valve for pediatric MVR has been introduced and results are promising when compared with currently available prosthesis.

In the current issue of the *Journal*, Choi and colleagues[1] from the Boston Children's Hospital elegantly compare the demographics and outcomes of children undergoing mitral valve replacement (MVR) based on the prosthesis valve type selected at operation. The primary outcome was freedom from re-replacement, whereas secondary outcomes were transplant-free survival and incidence of bleeding/thromboembolic events.

This retrospective 26-year review of patients younger than 20 years old showed mechanical and stented bovine jugular vein valves (Melody) to be associated with increased durability compared with fixed-diameter tissue valves. In addition, the authors found that Melody valves were noninferior to tissue valves in terms of risk of death or transplant. However, as expected, MVR portended complications such as bleeding and thromboembolic events in 12% and 11% of the patients analyzed.

MVR in children always poses a significant question: should the faulty valve be replaced with a tissue valve or a mechanical one? To date, the answer has never been straightforward. Standard choices do not exist for pediatrics due to the unique anatomy of each case and limited available replacement options for small-sized patients.

Both mechanical and tissue valves present different advantages that should be considered for each patient. Mechanical valves are certainly more durable than tissue valves, but difficulties managing the anticoagulation and poor patient adherence to therapy all portend a significant disadvantage. In contrast, tissue valves are easy to manage but prone to early structural degeneration.

In congenital heart surgery, some innovations never catch on, whereas others spread rapidly. Over the last few years, surgeons started to implant Melody valves in patients with small native mitral annuli (ie, <15 mm). Proven advantages include favorable effective orifice area index and potential for subsequent expansion by percutaneous catheter-based balloon dilation as the child grows.[2] In the presented study, 26 Melody valves of 34 implanted (76%) underwent interventions that were successful in resolving or decreasing transmitral gradient. In most cases, these valves remained functional until they were replaced by a larger mechanical prosthesis (median time to re-MVR 3.7 years, 95% confidence interval, 2.8-5.0 years). This is consistent with our institutional experience, where Melody valve implantation has been used as a bridge to a future, more definitive, valve-replacement surgery. Clearly, time to re-MVR is short but consistent with the high-risk profile of patients undergoing an off-label procedure.

The authors are to be congratulated for this large experience, their clinical results, and for pioneering the use of Melody valves in mitral position (34/290 replacements, 11%). This represents a clear advancement, offering a therapeutic option where there was not one previously.[3] Furthermore, this is the first study to date providing direct comparison of the Melody valve performance against benchmark references.

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This study further corroborates the idea that mechanical prosthesis are a good option for pediatric MVR whereas fixed-diameter tissue valves have currently very narrow indications. It also provokes consideration for Melody valve implantation in suitable high-risk patients with small annuli. For patients with annular size of 15 mm, a new mechanical valve has recently been approved and outcomes have been positive.[4] While the desirable prosthesis has yet to come and final judgment must be reserved, it is crucial to take innovation to heart.

References

1. Choi PS, Sleeper LA, Lu M, Upchurch P, Baird S, Emani S. Revisiting prosthesis choice in mitral valve replacement in children: Durable alternatives to traditional bioprostheses. *J Thorac Cardiovasc Surg*. 2021;161:213-25.e3.
2. Quiñonez LG, Breitbart R, Tworetsky W, Lock JE, Marshall AC, Emani SM. Stented bovine jugular vein graft (Melody valve) for surgical mitral valve replacement in infants and children. *J Thorac Cardiovasc Surg*. 2014;148:1443-9.
3. Pluchinotta FR, Piekarski BL, Milani V, Kretschmar O, Burch PT, Hakami L, et al. Surgical atrioventricular valve replacement with Melody valve in infants and children. *Circ Cardiovasc Interv*. 2018;11:e007145.
4. Eltayeb OM, Readdy WJ, Mongè MC, Forbess JM, Sawark AE, Patel A. Mitral valve replacement in infants using a 15-mm mechanical valve. *Ann Thorac Surg*. 2019;108:552-7.

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Commentary: And the winner is…

Carl L. Backer, MD

Once a decision has been made that the mitral valve of an infant or child cannot be repaired, the next step is to decide what type of valve to implant. This decision is multifactorial and the variables evaluated are the size of the mitral annulus, what new valves are available as technology advances, the issue of anticoagulation, and surgical bias that may or may not be evidence-based. The review by Choi and colleagues[1] of a large number of infants and children undergoing mitral valve replacement adds useful and important evidence for surgeons evaluating a child requiring mitral valve replacement.

The clear overall winner is the mechanical valve. This was not only the most frequently implanted valve in this series (62% of mitral valve implants), but also the valve with the longest time to re-replacement. In this series, the median time to repeat mitral valve replacement was 11.2 years for mechanical valves. The smallest mechanical valve currently available is the 15-mm valve.[2] In addition, a subanalysis by the authors on bleeding and thromboembolic events concluded: "Although further investigation is necessary, these results suggest in this population mechanical valves are not at significantly higher risk for bleeding or thromboembolic events compared to nonmechanical valves."

The remaining question is, What is the best valve for patients who have an annulus that is smaller than 15 mm? The technological advance that has been previously reported but now has longer-term follow-up in this article is the use of the Melody valve (stented bovine jugular vein valve) (Medtronic, Minneapolis, Minn) in the mitral position. This valve

A 15-mm mechanical valve.

CENTRAL MESSAGE

In a large series of infants and children undergoing mitral valve replacement, the best performance of an implanted valve was achieved by mechanical valves and stented bovine jugular vein valves.

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