A 78-year-old woman had undergone a biological aortic valve replacement (Mitroflow Pericardial, Sorin Inc, Burnaby, BC, Canada) and coronary artery bypass graft surgery 8 years previously. Acute exacerbation of her symptoms resulting from prosthetic aortic valve stenosis caused respiratory failure, necessitating resuscitation and mechanical ventilation. A transthoracic Doppler echocardiogram demonstrated peak and mean prosthetic aortic valve gradients of 70 and 51 mmHg, respectively, and a calculated valve area of 0.5 cm² (Figure 1). Coronary angiography demonstrated triple-vessel disease and 3 patent grafts to all coronary territories. Although the need for a tracheostomy and the seeming adherence of patent grafts to the sternal plate precluded conventional surgical intervention, the prosthetic valve size of 19 mm deemed the patient unsuitable for a conventional transcatheter aortic valve implantation. A Melody valve (Medtronic Inc, Santa Ana, CA), because of its suitability for annular diameters of 16 to 22 mm, was a possible solution. A surgical transapical approach was chosen because of the limitations of the Melody transvenous delivery system, poor vascular access, and the need for absolute control during the procedure.

A pediatric cardiologist (E.B.) familiar with the Melody system was integrated into the team. The valve delivery system, Ensemble, is a balloon-in-balloon over-the-wire catheter onto which the valve is hand crimped. The level of expansion of the valve is determined by the size of the outer balloon used for inflation (range, 18–22 mm). The balloon and Melody valve are covered by a movable sleeve that is retracted before positioning and deployment with 22F profile that could easily be advanced through a 24F Ascendra-2 transapical sheath (Ascendra Inc, Reston, VA) originally designed for Edwards-XT transcatheter aortic valve implantation with its radiopaque markers and a reliable hemostatic seal.

The femoral vessels were accessed for transvenous pacing and an aortic root marker pigtail catheter. The working angle was determined to be perpendicular to the Mitroflow ring (Figures 2 and 3). To avoid unequal valve expansion and to verify the true inner diameter of Mitroflow, we predilated the stenotic valve with a Nucleus 18-mm balloon (NuMed Inc, Hopkington, NY; Figure 4). After the valvuloplasty, the Melody delivery system was introduced via the Ascendra-2 sheath and positioned in a 50:50 position through the valve.
ring (Figure 5). The valve was deployed under rapid pacing (Figure 6), and the procedure was terminated after verification of no residual leak (Figure 7) and resolution of the left ventricle-to-aortic gradient. A transthoracic Doppler echocardiogram on discharge demonstrated peak and mean transvalvular gradients of 25 and 14 mm Hg with no valvular or perivalvular leak. The patient was discharged with full functional recovery. On follow-up 10 months later, patient was doing very well, was asymptomatic, had a transesophageal echocardiogram demonstrating minimal transvalvular gradients (peak, 21 mm Hg; mean, >12 mm Hg), and had no signs of leak or structural degeneration (Figure 8 and Movies I–III in the online-only Data Supplement).

Discussion
Use of transcatheter aortic valve implantation in patients after surgical aortic valve replacement has previously been reported.\(^1,2\) The 26-mm CoreValve is suitable for native

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Figure 3. Contrast injection in the final working view.

Figure 4. Aortic prosthesis valvuloplasty with a 1-mm Nucleus balloon (tip of Ascendra-2 sheath marked by white arrow).

Figure 5. Positioning of the Melody valve (50% to 50% arrangement, left ventricle to aorta).

Figure 6. Melody valve deployed inside the 1-mm degenerated Mitroflow valve.
The Melody valve was designed primarily for percutaneous transvenous implantation into pulmonary artery conduits, predominantly in pediatric and adolescent populations. The valved vein segment is sutured to a 28-mm-long platinum-iridium stent, can be crimped to a diameter of 6 mm and re-expanded up to 22 mm, and is competent over a range of 16 to 22 mm.

To the best of our knowledge, there are no previous reports describing transapical deployment of a Melody valve in a 19-mm degenerated aortic valve. Although it was designed for low-pressure pulmonary circulation, Hasan et al.4 recently described good-durability performance of the Melody valve in 30 patients in a high-pressure hemodynamic environment after a mean follow-up of 1 year.

Because our patient had patent grafts, we had little concern of coronary ostial occlusion, but a possible measure with no coronary grafts is to fenestrate the tissue from the outflow portion of the valve stent to allow flow to the aortic sinuses, as previously described.4

In conclusion, transapical-transcatheter melody implantation may provide some resolution for very-high-risk surgical patients with degenerated small-diameter (19–21 mm) annular sizes of 20 to 23 mm; the Edwards 23-mm valve is suitable for minimal diameters of 18 to 21 mm. Therefore, these valves raise considerable concerns when treating patients with degenerated surgical valves with outer diameters of 19 to 21 mm,3 and the results of these procedures are highly unanticipated.

Figure 7. Contrast injection into the aortic root showing no perivalvular leak and good fill of contrast into the left main coronary artery.

Figure 8. Transthoracic echocardiogram 10 months after the procedure. A, Melody valve in the long-axis view. B, Transvalvular gradients. C, Melody valve in the short-axis view. D, Doppler image with no valvular or perivalvular aortic insufficiency. LVOT indicates left ventricular outflow tract.
prosthetic aortic valves that are currently unsuitable for conventional valve-in-valve transcatheter implantation.

Disclosures

None.

References


Transapical Implantation of a Melody Valve in a Degenerated Low-Diameter Prosthetic Aortic Valve
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