Preserving the V-engine shape of the left ventricle with Melody mitral valve replacement in small children

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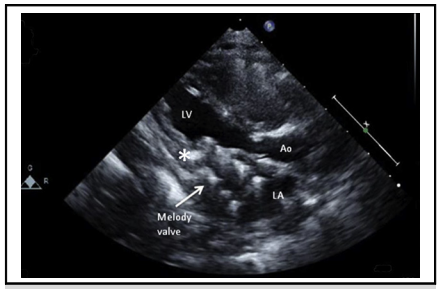

Melody mitral valve replacement preserving V-engine configuration of the left ventricle.

Central Message

Echocardiographic assessment of Melody mitral valve replacement in small children showed excellent hemodynamic results. The mitral Melody valve preserved the left ventricle's V-engine configuration.

See Article page 153.

In this issue of the *Journal*, Freud and colleagues[1] describe their experience with mitral valve replacement (MVR) with a modified Melody valve (Medtronic, Minneapolis, Minn). This contribution expands on this group's previous reports,[2,3] focusing on the echocardiographic assessment of the valve. This is a challenging group of infants and small children with hypoplastic mitral and aortic valves. The growth of the mitral annulus at this small age is exponential,[4] and currently approved prosthetic valves cannot grow with the child. In combination with borderline left heart structures, this makes for a difficult valve replacement, as evidenced by the poor results of MVR in small children, with survival at 10 years of 33% to 75%.[5-7] The concept of a transcatheter expandable prosthetic mitral valve is appealing, and this contribution brings further data to support Melody MVR.

Freud and colleagues[1] derived "potential" mitral annulus measurements to estimate the maximum operative expansion of the Melody valve, which correlated with intraoperative Melody dilatation. A ratio between the narrowest subaortic region to mitral annuls diameter of at least 0.5 predicted a low risk of left ventricular outflow tract obstruction (LVOTO) after Melody valve implantation.

The worldwide experience with the Melody valve in the systemic position is very small beyond the Boston Children's Hospital experience,[1-3] with 2 other reports in children[8,9] and increasing reports in adult patients.[10,11] There are several outstanding technical issues that need to be investigated for the use the Melody valve in the mitral position. First, the valve stent is 28 mm long,[10] which takes a significant space within the left side of the heart. Emani's group[2] proposed shortening the ventricular end of the valve. Trezzi and colleagues[9] proposed folding over the distal stent struts to avoid disrupting the stent structure. This large amount of prosthetic valve tissue in a diminutive ventricle can create LVOTO. Emani's group[3] refined their technique, suturing the distal stent to the inferior wall of the left ventricle to prevent deviation of the distal stent into the outflow tract (Figure 1). This orients the inflow of the valve away from the pulmonary veins and preserves the V-engine inlet-to-outlet architecture of the left ventricle. LVOTO has been reported in only 4 patients after Melody MVR, predominantly in those with preoperative LVOTO and an anatomy of unbalanced right-dominant atrioventricular canal defects. These results are reassuring with regard to this theoretic limitation of the Melody valve, and the

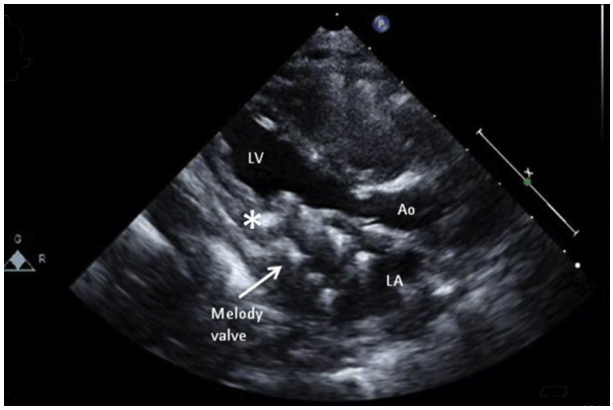

FIGURE 1. Melody (Medtronic, Minneapolis, Minn) mitral valve replacement, preserving the V-engine configuration of the left ventricle. Fixation (*asterisk*) of the distal stent to the inferior wall of the left ventricle (*LV*) prevents deviation of the distal stent into the left ventricular outflow tract. *Ao*, Aorta; *LA*, left atrium. Reproduced with permission.[3]

echocardiographic ratio of the narrowest subaortic region in systole to the actual mitral valve dimension could be of use in deciding when to be more aggressive in preventing LVOTO.

Second, the durability of a venous valve submitted to systemic pressures is unknown. In an experimental lamb model, a bovine jugular venous valve remained competent in the aortic position after up to 2 months.[12] Hasan and coworkers reported satisfactory performance of the Melody valve in high-pressure environments, with freedom from moderate to severe regurgitation of 100% at 1 year.[13] Further follow-up is currently lacking, although the current report of Freud and colleagues[1] comforts these initial results.

In conclusion, the Melody valve provides an appealing solution for MVR in infants and small children. Further echocardiographic and clinical follow-up data in this very challenging population are required.

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