Mitral arcade (MA) is a rare congenital heart disease, with a poor prognosis and a difficult treatment course. We discuss a case of an alternative surgical treatment for MA in a newborn infant using a Melody valve (Medtronic Inc), with a favorable result. Although the concept of a Melody valve in the mitral position is not new and has been performed in infants and small children, its use in a neonate is exceptional.

**CASE PRESENTATION**

A 9-day-old term female newborn infant presented signs of respiratory distress. MA was suspected with a transthoracic echocardiogram (TTE) and later confirmed by a computed tomography angiography (Video 1). Due to dependence on invasive mechanical ventilation (IMV) and persistent pulmonary hypertension, a mitral valve repair was performed.

However, symptoms persisted and withdrawal of IMV was attempted, but this led to hemodynamic instability. Given this situation, a second surgery was scheduled for a mitral valve replacement with a bovine valved jugular vein graft. Before the surgery, the Melody valve #22 was chosen and adjusted (Figure 1). A bovine pericardial skirt (BPS) was sutured at the junction of the distal third with the proximal two-thirds of the Melody valve, using a continuous 6–0 polypropylene suture (Figure 1).

Resternotomy was performed. The leaflets and the subvalvular mitral apparatus were resected. To secure the distal...
end of the deflated Melody valve, 2 5–0 polypropylene sutures were placed from the prosthesis to the posterior wall of the left ventricle and the mitral annulus was sutured with the BPS using an interrupted 5–0 polypropylene horizontal mattress suture, followed by the dilation of the Melody valve (Figure 2). The interatrial septum was closed with a bovine pericardium patch, leaving a hole for future percutaneous Melody valve dilations. The patient was transferred to the pediatric intensive care unit with IMV. A postoperative TTE was requested (Video 2) with no traces of valvular insufficiency or leaks, allowing her discharge on day 19 after surgery. Four months after the surgery, the patient had no complications reported and no need for new hospitalizations. Last TTE reported the Melody valve in the mitral position with small paravalvular leaks with no hemodynamic repercussion.

The study was submitted to the Ethics Committee of the Fundación Valle del Lili as case report No. 629 and was approved on November 10, 2022. The legal guardian signed a consent form authorizing the publication of his case and the use of clinical pictures.

DISCUSSION

Surgical options in newborns with MA that require mitral valve replacement are limited. These include bioprosthetic and mechanical fixed-diameter valves. Nevertheless, these options are restricted by their large size, short duration, and inability to adapt to the individual’s growth.2,3 The Melody valve is an alternative device for mitral replacement in newborn infants with a small mitral annulus, given its potential for size adjustment and expansion during infant growth.

In a Melody valve implantation, ensuring an unobstructed left ventricle outflow tract (LVOT) is crucial for a successful result. Two mitral valve replacements with a Melody valve in neonates have been previously reported in which the valve’s crown was trimmed in the direction of the LVOT to prevent obstruction.4,5 Although this technique was effective, it carries potential dangers, including suture rupture and damage to the Melody device.2 Pluchinotta and colleagues5 described the technique of folding the crown’s valve and Langer and colleagues2 described suturing the BPS attached to the Melody valve with the mitral annulus, leaving the device almost entirely in the left atrium. In our case, we shortened the valve size by manually folding the ends of the crown (Figure 1), which decreased the risk of valvular damage and suture rupture compared

FIGURE 1. A, Medtronic Melody valve #22 (Medtronic). The arrows indicate the direction in which the angled ends were folded. B, Bovine pericardial skirtsutured to the Melody valve.


to cutting the distal end. Likewise, suturing the BPS to the mitral annulus and the distal end of the device to the posterior wall of the left ventricle, ensured an LVOT with no obstruction.

Complications, including endocarditis and valvular damage, have been reported. Thus, further implantation techniques and valve refinements are needed to reduce complications and increase valve longevity.

CONCLUSIONS

Valvuloplasty is the preferred surgical treatment for symptomatic MA. However, if unsuccessful, a mitral valve replacement is required. The ease of the Melody valve for size adjustment and expansion during infant growth makes this surgical option ideal for newborn infants.

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References


