Left ventricular pseudoaneurysm after replacement of a Melody valve in the left atrioventricular valve position

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CENTRAL MESSAGE

There is risk of left ventricular pseudoaneurysm development with replacement of the Medtronic Melody valve in the mitral valve position.

See Commentaries on pages 251 and 253.

CASE PRESENTATION

A female patient was born with partial atrioventricular septal defect, coarctation of the aorta, and multiple ventricular septal defects. At 8 days of life, she underwent coarctation repair followed by placement of a main pulmonary artery band at 3 weeks of age. After somatic growth was achieved, she underwent removal of the pulmonary artery band, fenestrated atrial septal defect repair, and closure of multiple ventricular septal defects at 10 months of age. Her postoperative course was complicated by severe left atrioventricular valve regurgitation and residual interventricular shunt, with unsuccessful attempts at valve repair and device closure of the ventricular septal defect at 10.5 months of age. At 11 months of age, a Melody valve (a Contegra valved conduit attached to a stent) was placed in the mitral position, which required eventual balloon dilation in the catheterization laboratory. She then relocated and established care at our institution at 2 years of age.

At 4 years of age, due to moderate regurgitation and moderate stenosis, she underwent repeat Melody valve balloon valvuloplasty. The procedure was complicated by worsened...
valvar regurgitation (moderate to severe); thus, she under-
went surgical replacement with a 19-mm Regent mechan-
ical heart valve (St Jude Medical, St Paul, Minn) at 5 years of 
age. Postoperative transesophageal echocardiogram 
demonstrated no residual lesions, and her recovery was 
uneventful.

Routine follow-up with surveillance echocardiography 
demonstrated a well-functioning prosthetic valve with no 
stenosis nor regurgitation. One month postoperatively, a 
small left ventricular pseudoaneurysm was noted on the 
lateral posterior aspect of the left ventricle, just below the 
native mitral annulus and in close proximity to the pro-
sthetic valve. Due to progressive enlargement of this pseu-
doaneurysm (Figure 1), the patient underwent left 
ventricular pseudoaneurysm repair 19 months after the St 
Jude valve placement. A cardiac computed tomography 
scan was obtained to delineate its relationship to the coro-
nary arteries and to assist with operative approach. The 
pseudoaneurysm was noted to be near the circumflex coro-
nary artery (Figure 2). At reoperation, due to intense scar-
ring around the base of the heart, the pseudoaneurysm 
could not be visualized externally, and a left atrial incision 
was performed. The pseudoaneurysm opening was visual-
ized through the prosthetic valve, with the most basal aspect 
of the ostium located 7 to 8 mm below the prosthetic valve 
ring. Repair of the defect was performed with a patch of 
bovine pericardium, working through the open valve. Post-
operative transesophageal echocardiogram demonstrated 
normal prosthetic valve function and no residual flow into 
the aneurysm. Recovery was uneventful, and the patient re-
 mains well at 6-month postoperative follow-up. Verbal con-
sent for publication was obtained by the patient’s mother.

DISCUSSION

Left ventricular pseudoaneurysm after mitral valve 
replacement has been previously reported in the adult popu-
lation and has been classified into various types based on 
anatomic location within the ventricle.\textsuperscript{1,2} Type 1 is a rupture 
located in the posterior atroventricular groove, type 2 is a 
rupture in the posterior wall of the left ventricle at the base 
of the papillary muscle, and type 3 is a rupture in the area be-
tween the atroventricular groove and papillary muscle. Our 
case is consistent with a type 3 pseudoaneurysm. Due to risk 
of progressive enlargement and subsequent rupture, surgical 
repair of the pseudoaneurysm is the recommended approach. 
An intracardiac approach has been recommended for type 1 
and the external approach for types 2 and 3.\textsuperscript{1}\textsuperscript{3}\textsuperscript{4} In our patient, 
the external approach was not feasible due to scarring and 
proximity of the pseudoaneurysm to the coronary artery. 
 Intracardiac repair was possible without valve removal and 
replacement. Echocardiography was vital for diagnosis and 
surveillance, whereas computed tomography scan was 
helpful in demonstrating the relationship of the circumflex 
coronary artery to the pseudoaneurysm.

The use of Medtronic Melody valve in the left atriovent-
ricular valve position is considered in infants and children 
when a small prosthesis is required that has the potential to 
be expanded with somatic growth.\textsuperscript{7} As the use of such 
valves becomes more popular, it is important to recognize 
the potential complications of a stented valve in the mitral 
position. Aggressive sharp surgical dissection to free the 
Melody valve from its surroundings at explantation may 
result in injury to the ventricular wall and such an injury 
may go unrecognized during the immediate perioperative 
period. Careful excision of the Melody valve during 
replacement along with echocardiographic surveillance 
for left ventricular pseudoaneurysm formation at follow-
up is warranted. This case represents the first report of left 
ventricular pseudoaneurysm formation in a pediatric patient 
after Melody valve replacement.

FIGURE 2. Computed tomography scan was obtained to delineate the 
relationship of the coronary artery to the left ventricular pseudoaneurysm. 
Three-dimensional computed tomography angiography reconstruction 
demonstrates the proximal left circumflex coronary artery, the pseudoa-
neurysm (*), and the left ventricular cavity (LV). The course of the left 
circumflex coronary artery was in close proximity to the pseudoaneurysm.
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