Management of coronary artery arising from nonfacing sinus in transposition of great arteries

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The success of the arterial switch operation (ASO) performed for transposition of the great vessels or Taussig-Bing anomaly (TBA) largely depends on the safe translocation of the coronary arteries into the neo-aorta.¹ However, variations in coronary pattern can pose surgical challenges and are associated with higher mortality and morbidity.^{1,2} A number of coronary variations have been described and categorized in the literature.^{1,3} We describe the management of a patient with TBA with the major coronary artery arising from the nonfacing sinus, a variation hitherto not described in literature.

CASE DESCRIPTION

A newborn infant born at full term was diagnosed with Goldenhar syndrome and cardiac defect consisting of double-outlet right ventricle with transposition physiology. The great vessels were located side by side with a large subpulmonic ventricular septal defect (VSD). The coronary arteries appeared to be unusual with the right coronary artery (RCA) and left anterior descending (LAD) coming far off the right nonfacing sinus and the circumflex (CX) artery emerging as a single branch from the posterior facing sinus (Figure 1, A). Cardiac catheterization confirmed the abnormal coronary anatomy with the RCA and LAD arising from the nonfacing sinus and the CX arising from the posterior facing sinus. At operation, the RCA was seen arising from the middle of the nonfacing sinus well below the level of the commissures, and this immediately gave rise to the LAD. The CX artery arose from the posterior facing sinus. No coronary artery was seen arising from the anterior facing sinus. The coronary anatomy was deemed unsuitable for a traditional ASO. The Damus-Kaye-Stansel operation with the Rastelli procedure was performed. The LAD coursed anteriorly just below the pulmonary annulus. The incision on the right ventricle for VSD baffle and proximal anastomosis of the conduit was placed well below the level

Postoperative anatomy showing surgical management of a coronary artery arising from the nonfacing sinus.

Central Message

A coronary artery emerging from the nonfacing sinus is not amenable to the traditional ASO, and a Damus operation may be the best option.

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of the LAD. A right ventricle to pulmonary artery conduit in the form of a 12-mm femoral vein was placed (Figure 1, B). The patient had an uneventful postoperative course and has continued to do well on follow-up of more than 1 year.

Comment

Coronary anomalies are well described in transposition of the great vessels and are more common in TBA.⁴ Various systems of classification have been proposed.^{1,3,4} However, a coronary artery arising from the nonfacing sinus is not described in the literature. In our patient, the RCA arose from the middle of the nonfacing sinus and immediately gave rise to the LAD. It then entered the right atrioventricular groove. The LAD crossed the right ventricular outflow tract close to the pulmonary annulus before entering the anterior interventricular groove. Surgical management of such a coronary artery can be a challenge. Traditional ASO with coronary reimplantation was not a feasible option in our patient. Coronary lengthening procedures were not considered an option because the distance between the coronary orifice and the neo-aorta was considerable (nearly equal to the diameter of the aorta) and the coronary orifice was well below the top of commissural post.⁵ The atrial switch, the Damus procedure with closure of VSD, and techniques involving creation of aortopulmonary window and pericardial baffle

FIGURE 1. A, Preoperative anatomy is demonstrated with side-by-side great vessels and a single coronary ostium in the nonfacing sinus (the most rightward sinus) of the aorta. The RCA emerges from the nonfacing sinus and immediately gives rise to the left coronary artery (LAD), which courses in front of the right ventricular outflow tract. The CX artery emerges from the posterior facing sinus. B, Postoperative anatomy showing surgical management of coronary arising from nonfacing sinus.

without actual coronary translocations are options one should consider when ASO is not feasible. The atrial switch commits the right ventricle to the systemic circulation and does not have good long-term results. Techniques involving creation of an aortopulmonary window and pericardial baffle are not feasible options when the coronary artery arises from the nonfacing sinus.⁶⁻⁸ The Damus operation, which involves a proximal aortopulmonary anastomosis, was a good option in our patient.⁹ Although we baffled the VSD to the aorta, one may just close the VSD. The higher pressure in the left side prevents the opening of the native aortic valve. Thus, this technique is also an option in patients with challenging coronary anatomy and an intact ventricular septum.

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