

Coronary compression by a right ventricle to pulmonary artery conduit: A rare but serious complication.

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Abstract

Reconstruction of Right Ventricular Outflow Tract (RVOT) may necessitate placing a conduit that establishes the continuity between the Right Ventricle (RV) and the Pulmonary Artery (PA). In addition to this method of reconstruction, some surgeons prefer direct RV-PA connection to avoid conduit-related complications. Compression of a coronary artery caused by a RV-PA conduit is a rare but serious complication. It has been described in a few reports in the literature. We here are reporting two cases of this complication.

Keywords: RV-PA conduit, Rastelli, Coronary compression.

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Introduction

Reconstruction of Right Ventricular Outflow Tract (RVOT) may necessitate placing a conduit that establishes the continuity between the Right Ventricle (RV) and the Pulmonary Artery (PA). In addition to this method of reconstruction, some surgeons prefer direct RV-PA connection to avoid conduit-related complications. Compression of a coronary artery caused by a RV-PA conduit is a rare but serious complication. It has been described in a few reports in the literature [1-3]. We here are reporting two cases of this complication.

Case 1

A 13 year old patient was born with transposition of great arteries associated with ventricular septal defect and left ventricular outflow tract obstruction (TGA/VSD/LVOTO). After birth, patient underwent balloon atrial septostomy followed by a right modified Blalock-Taussig shunt with Goretex graft 5 mm. At age of two years, patient underwent left modified Blalock-Taussig shunt with Goretex graft 6 mm. At age of 4 years, patient underwent Rastelli procedure with Dacron patch closure of the VSD to establish LV to aorta continuity, and RV to PA pulmonary homograft conduit. After 9 years of the Rastelli operation, patient presented with severe conduit stenosis (peak gradient 70 mm Hg) and free pulmonary insufficiency. Patient underwent replacement of RV-PA conduit with Hancock Dacron tube with porcine valve size 22 mm. On postoperative day one, patient developed low cardiac output syndrome, associated with ST segment changes in the inferior leads of the ECG, and moderate to severe RV dysfunction on bedside echocardiography. Patient underwent a coronary angiogram which showed

Right Coronary Artery (RCA) compression by the external conduit (Figure 1). Patient was taken back to the operating room. RCA compression was identified. It required removal of the external stent sewn on the bioprosthesis and RCA angioplasty. Patient did well and was discharged home. RV function returned to normal.

Case 2

A 20 year old patient was born with TGA/VSD/LVOTO. After birth, right BT shunt was performed. At age of 3 years, Rastelli procedure was performed with an 18 mm aortic homograft for RV-PA connection. Eventually, balloon dilatation was done and a stent was placed in a previously replaced RV-PA conduit due to severe conduit stenosis. The distal stent extends into the lumen of the right PA crossing the left PA origin. Although the patient was asymptomatic in daily activities, there was a decline in exercise capacity. It was decided to do a cardiac catheterization. A severe compression of the left main coronary artery with 95% stenosis was identified (Figure 2) and the patient was admitted for urgent surgery.

Patient was taken to the operating room for conduit replacement and decompression of the left main artery. The conduit was resected and the stented portion of the native main PA was freed from all remaining stent material. An aortotomy was then performed to assess the patency of the left main coronary artery. It was probed and it appeared to be completely unobstructed. The aortotomy was then closed. A 25 mm aortic homograft conduit was used for RV-PA connection which due to its longer shape should prevent further coronary compression. Patient did well after surgery and was discharged home. Function of both right and left ventricles was normal.

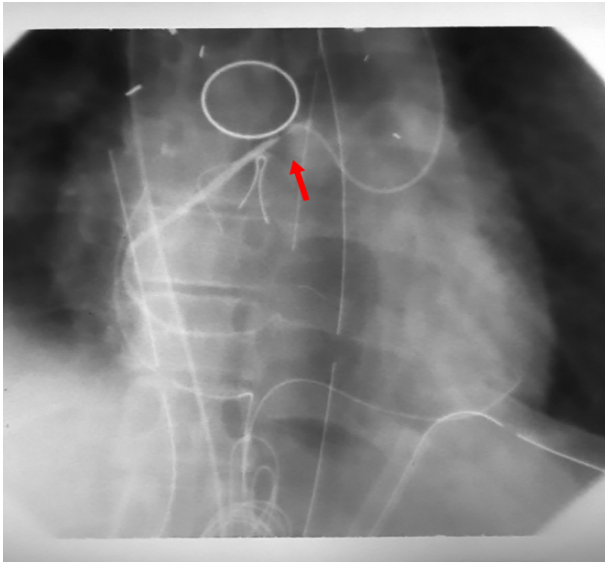


Figure 1. Right coronary artery (RCA) compression by the external conduit

Discussion

Coronary compression caused by RV-PA conduit is a rare but serious complication. It can be avoided with the knowledge of the coronary anatomy prior to surgery and by meticulous technique in placing the conduit away from the coronaries. Some patients may have a single coronary artery from the right posterior facing sinus which can give myriad of branches along the anterior wall each of which can go towards the apex. This can interfere with the conduit placement unless some of these branches would be sacrificed which would put significant myocardium in jeopardy. In such high risk patients with complex coronary anatomy, direct RV-PA connection might be considered as an option otherwise performing a single ventricle repair can be the only option.

In case of balloon dilatation and stent placement when the conduit is stenotic, say a 24 mm homograft is stenotic to 10 mm; it has to be stented open to prepare a landing zone for a percutaneous valve implant. When the conduit is enlarged, the expansion can be posterior and compress

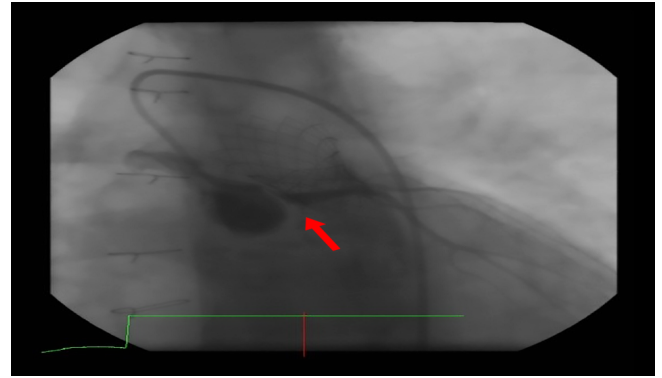


Figure 2. A severe compression of the left main coronary artery

the coronary. To avoid it, the conduit is tested by balloon dilations to the size it would be stented open to and selective coronary artery injections are done while the balloon is inflated to insure that the coronary tree is patent.

Conclusion

Coronary compression by RV-PA conduit is a rare but serious complication. All efforts should be made to avoid it. If there is any concern about safely placing the conduit without interfering with the coronaries, direct RV-PA connection might be considered. Otherwise, single ventricle repair can be the only option. In case of ballooning and stenting, coronary angiogram should be done while the balloon is inflated.

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