

Repair of Taussig-Bing anomaly with unusual coronary pattern using autologous pericardial tube extension

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ABSTRACT

The incidence of unusual coronary patterns including single coronary artery is high in Taussig-Bing anomaly (TBA). The relocation of a single coronary artery from a nonfacing sinus can be technically challenging with implications on early and late outcomes. Many innovative techniques for coronary transfer have been described and no coronary pattern precludes arterial switch operation in the current era. We describe a technique of coronary transfer using autologous pericardial tube extension with good early outcome.

Keywords: Arterial switch operation, coronary artery, pericardium, Taussig-Bing anomaly

INTRODUCTION

The incidence of variations in coronary artery anatomy is high with Taussig-Bing anomaly. Many innovative techniques of coronary artery transfer have been described in the literature. We describe a technique of autologous pericardial tube extension to facilitate successful coronary artery transfer.

CASE REPORT

A 2-month-old girl child weighing 3 kg presented with cyanosis, breathlessness, and failure to thrive. On examination, the child had tachycardia and tachypnea with oxygen saturation of 77% on room air. The precordium was hyper dynamic and a systolic murmur was auscultated. The chest radiogram revealed cardiomegaly and pulmonary plethora. The diagnosis of TBA with large subpulmonic ventricular septal defect (VSD) and large patent ductus arteriosus (PDA) was confirmed on echocardiogram. A single coronary artery arising from nonfacing sinus was reported. The surgery was performed through median sternotomy on moderate

hypothermic cardioplegic arrest. The great arteries were in side by side relationship with aorta anterior and to the right of pulmonary artery. A significant size discrepancy between the great arteries was noted. A single coronary was arising from the nonfacing sinus and it soon divided into right coronary artery (RCA), left main coronary artery (LMCA), and two prominent conal arteries. The RCA course was usual in the right atrioventricular (AV) groove. The LMCA looped posterior to the great arteries before bifurcating into circumflex coursing in the left AV groove and left anterior descending artery in the interventricular groove. An additional tiny conal artery was arising from the facing sinus [Figures 1 and 2]. The cardiopulmonary bypass was instituted following aortobicaval cannulation. The PDA was divided and antegrade Delnido's cardioplegia was delivered. The VSD was repaired with e-PTFE patch. Aorta was transected and coronary buttons were harvested. The pulmonary artery was transected and LeCompte maneuver was performed. The distance between the coronary button

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and the neo-aortic root was 25 mm. An autologous untreated pericardial tube was constructed over 5 mm Hegar’s dilator [Figure 3] and interposed between the coronary button and the neo-aorta. The length of the pericardial tube was 25 mm approximately. The pulmonary confluence was shifted rightwards away from the pericardial tube [Figures 4 and 5]. The rest of surgery was routine and postoperative course was uneventful. The sternum was left open at the end of surgery and was closed uneventfully on the first postoperative day. The Echocardiogram at discharge demonstrated patent coronary artery and good biventricular function. Amino Salicylic Acid (5 mg/kg) was prescribed for 3 months. The child was diagnosed with subvalvar right ventricular outflow tract obstruction (RVOTO) after 2 years and she underwent surgery for the RVOTO relief. This could be achieved by coring out the fibromuscular obstruction through the right atrium. The coronary artery was found patent on the angiogram performed prior to re-operation [Figure 6]. The child continues to do well at 30 months’ follow-up.

Comment

The single coronary may present technical challenges during arterial switch operation (ASO) with both early and long-term implications.^[1] The transfer of a single coronary artery from nonfacing sinus in Taussig-Bing anomaly with side-by-side relationship of great arteries can indeed be difficult. The distance from the nonfacing sinus to neo-aorta can be significant enough to preclude direct transfer. The mobilization of a single coronary artery is further limited by early branching. Atrial switch or Damus-kaye-stansel (DKS) with Rastelli can be considered when traditional ASO cannot be performed.^[2] However, atrial switch commits right ventricle for systemic circulation and is bound to have poor long-term prognosis. DKS with Rastelli is an innovative technique but the child is committed

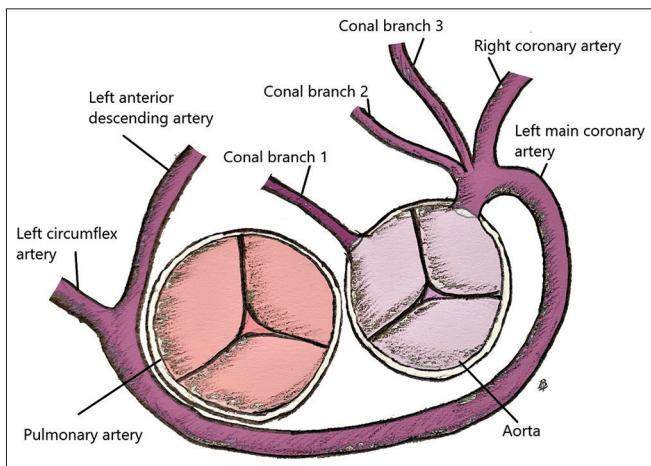


Figure 1: Preoperative cross-section view of great vessels and coronary artery anatomy

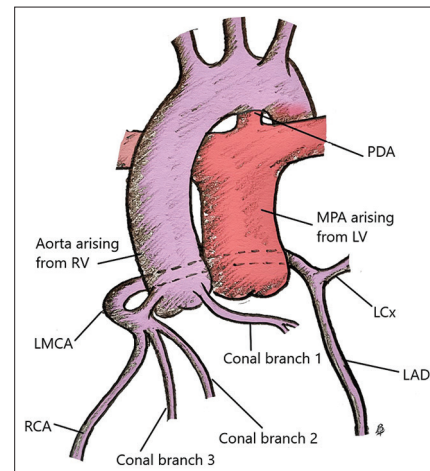


Figure 2: Preoperative frontal plane view of great arteries and coronary artery anatomy. LAD: Left anterior descending artery, LCx: Left circumflex artery, LMCA: Left main coronary artery, PDA: Patent ductus arteriosus, RCA: Right coronary artery, RV: Right ventricle

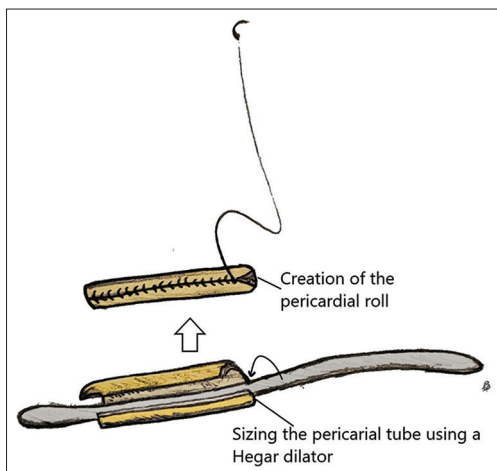


Figure 3: Pericardial tube construction

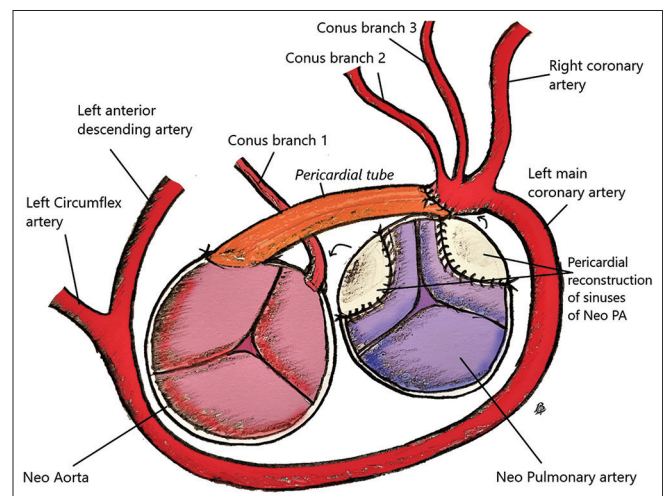


Figure 4: Postoperative cross-section view of great vessels and coronary anatomy with the pericardial tube. PA: Pulmonary artery

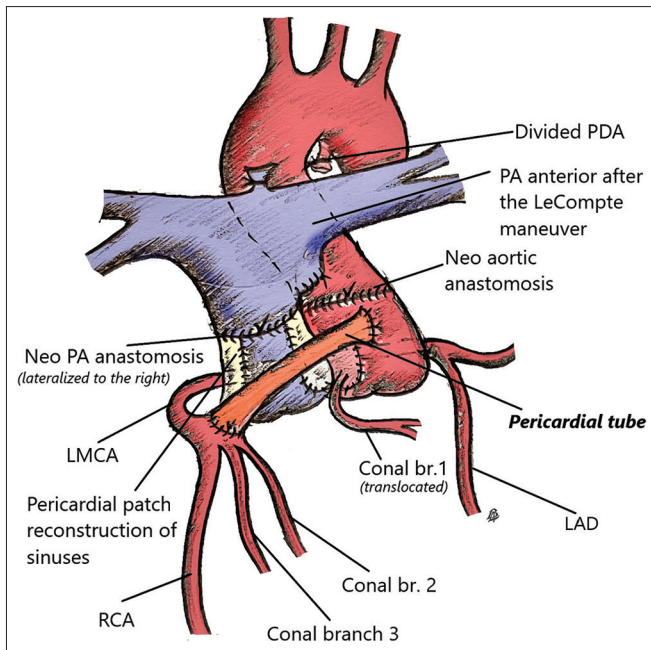


Figure 5: Postoperative frontal plane view of great arteries and coronary anatomy with the pericardial tube. LAD: Left anterior descending artery, LMCA: Left main coronary artery, PA: Pulmonary artery, PDA: Patent ductus arteriosus, RCA: Right coronary artery

to multiple operations for the right ventricle outflow tract. Therefore, pursuing ASO may still be the best option. Some of the techniques described to facilitate ASO with “difficult to transfer” coronary patterns are *in situ* coronary relocation, trap door with pericardial hood and coronary extension using aortic autograft.^[3-5] Although aortic autograft concept has an advantage of growth potential, it may not always be feasible to obtain enough aortic tissue to create a tube of desired length. The *in situ* coronary translocation is not feasible if the coronary artery arises from the nonfacing sinus. In such circumstances, autologous pericardial tube which is viable, nonallogenic, pliable, hemostatic, and readily available is an acceptable alternative. Animal studies have demonstrated that autologous pericardium has better fibrinolytic activity and less subendothelial fibrosis which will translate into less thrombogenicity and contracture.^[6] Although the pericardial tube as coronary extension has remained patent for more than 2 years, the long-term outcome is yet to be seen and a cautious follow-up is recommended.

Consent

The patient’s family gave permission to publish this case report.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the

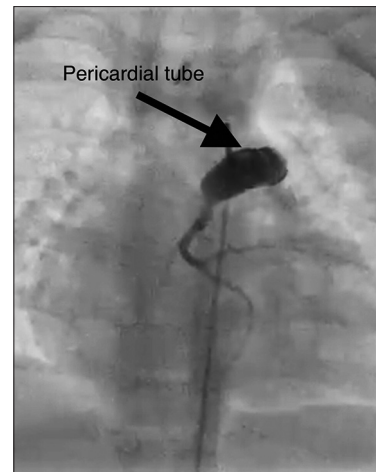


Figure 6: Coronary angiogram demonstrating the patent pericardial tube

legal guardian has given his consent for images and other clinical information to be reported in the journal. The guardian understands that names and initials will not be published and due efforts will be made to conceal patient identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Scheule AM, Jonas RA. Management of transposition of the great arteries with single coronary artery. *Semin Thorac Cardiovasc Surg Pediatr Card Surg Annu* 2001;4:34-57.
2. Kumar TK, Amin N, Sathanandam S, Knott-Craig CJ. Management of coronary artery arising from nonfacing sinus in transposition of great arteries. *J Thorac Cardiovasc Surg* 2018;156:e189-90.
3. Kim TH, Jung JJ, Kim YH, Yang JH, Jun TG. Technique of coronary transfer for TGA with single coronary artery. *Korean J Thorac Cardiovasc Surg* 2014;47:529-32.
4. Macé L, Vanhuysse F, Jellimann JM, Youssef D, Moulin-Zinsch A, Lethor JP, et al. Arterial switch operation with a single coronary artery: The autograft concept. *Ann Thorac Surg* 2009;87:1967-8.
5. Murthy KS, Coelho R, Kulkarni S, Ninan B, Cherian KM. Arterial switch operation with *in situ* coronary reallocation for transposition of great arteries with single coronary artery. *Eur J Cardiothorac Surg* 2004;25:246-9.
6. Iha K, Koja K, Kusaba A. Morphological, immunohistological and fibrinolytic features of patch grafts for reconstruction of the inferior vena cava. *Cardiovasc Surg* 1994;2:592-7.