



Bronchial Compression Relieved by Modified Arterial Switch Operation in Patient with d-TGA, VSD and Dilated Pulmonary Artery Trunk

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Abstract

Arterial switch operation has been widely accepted as a treatment of transposition of the great arteries with reasonable mortality and morbidity rate though, several complications has been reported. We report a patient with d-TGA and VSD presented with progressive respiratory distress due to bronchial compression by largely dilated main pulmonary trunk. Triangle shape partial resection of the anterior wall of the pulmonary artery trunk, which was used for an augmentation of the neo-aorta was successfully performed as a modified arterial switch operation. Her symptom has been disappeared after the surgery and she has been followed at outpatient clinic with reasonable growth at 6 years after surgery.

Keywords: d-TGA; Bronchial compression; Giant pulmonary artery trunk

Introduction

A 2 months old girl admitted to our service with presentation of respiratory distress. Patient was born at gestational age of 40 weeks with birth weight of 2672 g. Apgar score was 8 and 9 at 1 minute and 5 min, respectively. Because of cyanosis, transthoracic echocardiography was performed at previous hospital and revealed d-transposition of great arteries with ventricular septal defect. Patient was transferred to our hospital for further medical treatment. Oxygen saturation on admission was low 70's to low 80's. Diagnosis was confirmed as d-TGA with large VSD and PDA and small bilateral pulmonary arteries (Figure 1a). Indomethacin was applied twice to close PDA on 2nd day of life and Balloon atrial septectomy was performed on 4th day of life. And then, patient was discharged from our hospital and had been followed up at outpatient clinic and patient was re-admitted to our hospital, because of progressive respiratory distress. CAT scan and cardiac catheterization were performed to confirm that left main bronchus was compressed by largely dilated main pulmonary artery (Figure 1b) and bilateral pulmonary arteries were relatively well grown. Since her symptoms had been progressively worse, emergent operation was performed under cardiopulmonary bypass.

Surgical Procedures

Under general endotracheal anesthesia, central venous line, arterial lines were obtained and midline skin incision followed by median sternotomy was performed. After dissection was made, cardiopulmonary bypass was established with bi-caval drainage. Patient was cooled down to 28°C and aortic cross clamp was made. Main pulmonary artery was excised as (Figure 2). The length of the base of triangle of excised pulmonary trunk was decided along the circumference of the neo pulmonary artery. This helped to augment the neo-aorta and plicate the neo-pulmonary artery. Coronary arteries were translocated by trapdoor technique. VSD was closed with continuous running suture. PFO was closed through the small right atrial wall incision and left pulmonary artery was interposed with 5 mm ePTFE tube graft, since the pulmonary artery trunk was located right posterior to the aorta, so the length of the left pulmonary artery was found to be short after partial resection of the main pulmonary artery particularly after Lecompte maneuver. Partial resection of main pulmonary artery might cause taut left PA. Patient was weaned from cardiopulmonary bypass and the chest was left open, although AV block was seen after the procedures and treated with temporal pacing. The permanent pacing wire was implanted when chest was closed on 3rd POD, since temporal pacing leads were not stable and her rhythm was sinus bradycardia with occasional heart block, although her AV block and bradycardia had been resolved at 7th POD. Postoperative echo showed very low flow in the ePTFE graft. CAT scan revealed clips applied to the ductus were compressed ePTFE graft. On 27th POD, these clips were removed and a revision of the ePTFE graft

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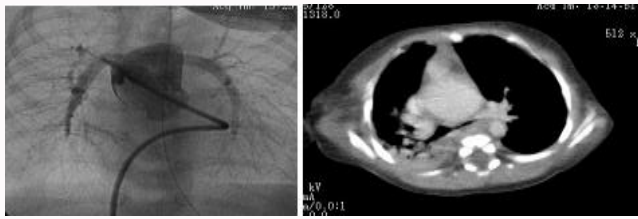


Figure 1: a: Pre-operative pulmonary artery angiography at neonatal period. b: CT scan showed left bronchial compression by dilated main pulmonary trunk.

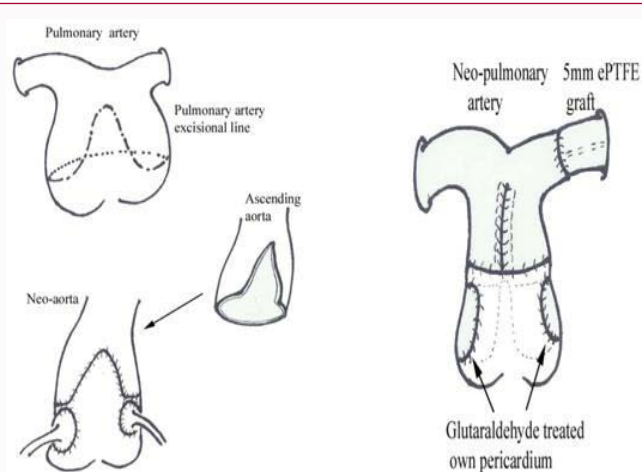


Figure 2: a Schematic operative technique. Pulmonary artery trunk was excised to reduce the size of the neo-pulmonary artery and augment the neo-aorta.

was made through the left thoracotomy. Patient has been discharged from our hospital and followed up at outpatient clinic. CAT scan, which was performed again at 2 weeks after the 2nd surgery, showed good patent ePTFE graft (Figure 2). Follow-up echocardiography showed good cardiac contraction without pulmonary valve regurgitation or aortic valve regurgitation. Although she may need revision of the graft in future, she has been active in daily life and reasonable weight gain at outpatient clinic.

Comment

Arterial Switch Operation (ASO) for a treatment of simple transposition of great arteries (d-TGA) has been established with reasonable low mortality rate [1-2]. However, there are several complications have been reported, including left main bronchus compression after ASO [3-4] Mustard procedure [5]. Bronchial compression has been also reported in other congenital heart anomalies such as VSD [6] and persistent truncus arteriosus with interrupted aortic arch [7]. These complications developed after ASO. Our patient's presentation was very unique, since her pulmonary vascular tree was poorly developed immediately after birth and huge gigantic pulmonary artery trunk was developed within next 2 months, which caused tracheal compression and respiratory distress. These symptoms may be similar to those seen in patient with absent pulmonary valve syndrome (APVS), although a mechanism might be different. Operative treatment for APVS remains a controversial subject. Reduction pulmonary arterioplasty with only plication of the arteries or resection of the redundant tissue was most likely performed [8]. In our patient, reduction pulmonary arterioplasty with partial resection of the redundant tissue was only able to do at

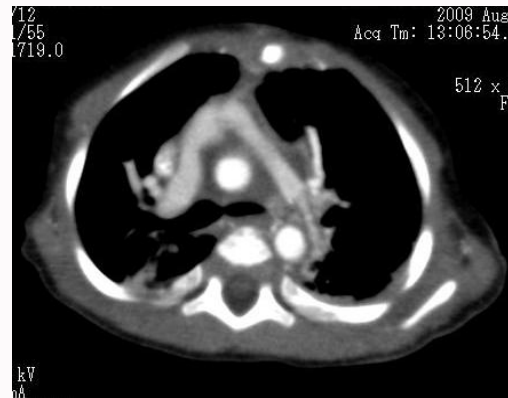


Figure 2: b: CT scan showed widely patent left main bronchus.



Figure 2: c: Reconstructed 3D-CT revealed prosthetic tube graft applied to the left pulmonary artery and augmented neo-aorta.

pulmonary artery trunk. This procedure, location of the great arteries and Lecompte maneuver made taut left pulmonary artery even after aggressive dissection of the bilateral pulmonary arteries and poor development of both pulmonary arteries might also be contributed to this result.

Conclusion

We have experienced very unique presentation of patient with d-TGA with VSD. Modification of arterial switch operation by partial resection of the pulmonary artery and placcation of the neo-pulmonary artery was effective to reduce tracheal compression and relieve respiratory distress symptom. Modified reconstruction technique in neo-aorta and neo-pulmonary artery may further be warranted to reduce a chance of prosthetic conduit use for even such minor subgroup of patients with d-TGA.

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