

Aortic Reconstruction Using a Main Pulmonary Artery Flap in an Isolated Aortopulmonary Window

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Aortopulmonary window (APW) is a rare cardiac anomaly that was reported to occur in only 43 cases over 33 years at a large-volume cardiac center. It can present as an isolated anomaly or in combination with another cardiac anomaly. The surgical technique for APW has evolved from simple ligation to separation of the 2 great arteries. However, because of the rarity of APW, there is no standard surgical treatment for this disease entity. Herein, we present successful aortic reconstruction using a main pulmonary artery flap after separation of the 2 great arteries in a neonate with isolated APW.

Key words: 1. Aortopulmonary Septal Defect
2. Aortic reconstruction

Case report

A female neonate, delivered at 39+2 weeks and weighing 3.3 kg, was admitted to neonatal intensive care unit of Korea University Ansan Hospital on her 10th day of life with symptoms of heart failure. The patient showed tachypnea and chest retraction during breastfeeding. A chest X-ray revealed cardiomegaly with bilateral congestion. Echocardiography allowed the diagnosis of intermediate-type aortopulmonary window (APW) [1], with a size of 10 mm and atrial septal defect (ASD) secundum (Fig. 1A). The patient was stabilized with diuretic treatment and nasogastric tube feeding and the planned operation was delayed due to status epilepticus management. Computed tomography (CT) showed similar findings to echocardiography (Fig. 1B).

The operation was performed through a median sternotomy. After external inspection of the extent of the APW (Fig. 1C), careful dissection was performed

to encircle the ascending aorta and both pulmonary arteries. Ascending aortic cannulation was performed in a high position at the counterpart of the left common carotid artery to facilitate aortic cross-clamping, and routine bicaval cannulation was performed. After aortic cross-clamping, the incision was begun on the anterior part of the main pulmonary artery to create a pulmonary artery flap and extended to the back side of the APW, taking care not to damage the right pulmonary artery opening. After separation of the aorta and pulmonary artery, the main pulmonary artery flap was sutured to reconstruct the ascending aorta with a continuous 7-0 polypropylene suture. The defect of the main pulmonary artery was repaired with an autologous pericardial patch (Fig. 2). ASD secundum was repaired by direct suturing with a continuous 6-0 polypropylene suture. The patient's postoperative course was uneventful, and she was discharged home 35 days postoperatively, with a delay due to the intravenous site wound treatment.

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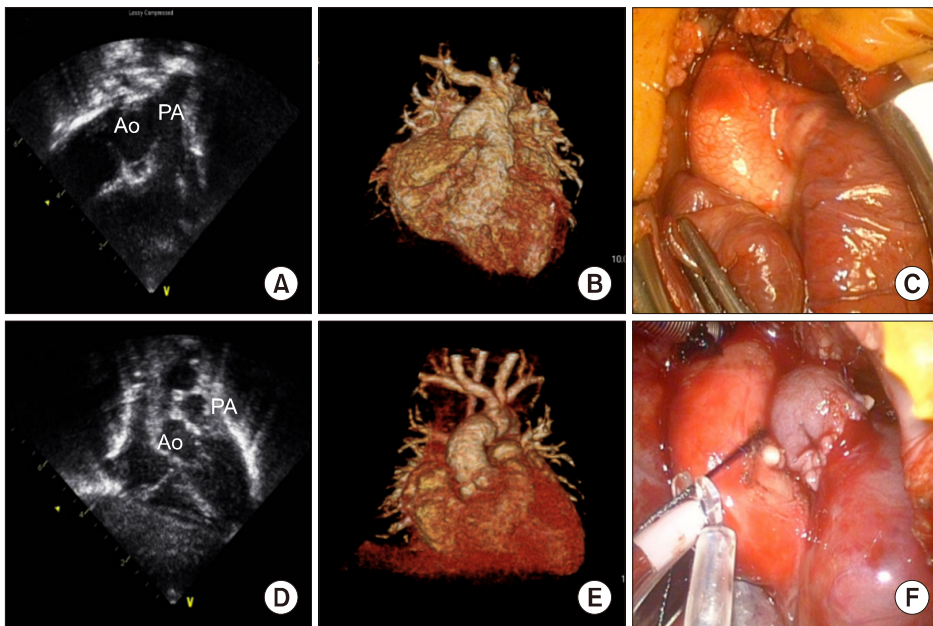


Fig. 1. Preoperative and post-operative echocardiography (A, D), computed tomography (B, E), and operative findings (C, F) showed intermediate-type aortopulmonary window. Ao, aorta; PA, pulmonary artery.

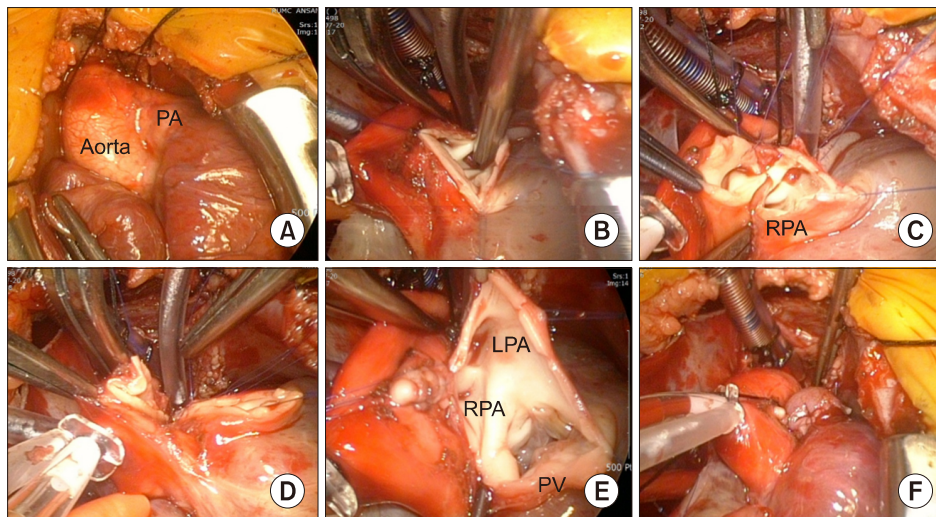


Fig. 2. Isolated APW repair procedure. After external inspection of the extent of the APW, a careful dissection was performed, encircling the ascending aorta and both pulmonary arteries (A). After aortic cross-clamping, the incision was begun on the anterior part of the main PA to create a PA flap (B), and then extended to the back side of the APW, taking care not to damage the RPA opening (C). After separation of the aorta and PA (D), the main PA flap was sutured with a continuous 7-0 polypropylene suture to reconstruct the ascending aorta (E). Finally, the defect of the main PA was repaired with an autologous pericardial patch (F). APW, aortopulmonary window; PA, pulmonary artery; RPA, right pulmonary artery; LPA, left pulmonary artery; PV, pulmonary valve.

Follow-up echocardiography and CT showed good aortic flow, good flow of both pulmonary arteries, and well-divided great arteries (Fig. 1D, E).

Discussion

The surgical treatment of isolated APW has

evolved from simple ligation to separation of the 2 great arteries [2-4]. Because of its rarity, no standard technique exists for the treatment of APW. We reviewed various surgical techniques to repair isolated APW and decided to separate the great arteries to maintain an anatomical position. However, it is also important to consider the configuration of the aorta

(partial stenosis) when repairing it with direct suturing, and likewise, when repairing the aortic side with a patch, it is necessary to consider factors related to the lifespan of the patch, such as calcification or aneurysm formation. Therefore, we reconstructed the aorta with a main pulmonary artery flap to anticipate the anatomical growth of the aorta. We found a report from 2000 that described using the same technique [5]; however, long-term data are not available. Despite the lack of long-term data, we believe that this technique is the best surgical approach for isolated APW.

Conflict of interest

No potential conflict of interest relevant to this article was reported.

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