Case report

Anomalous origin of the left coronary artery from the pulmonary artery
A case using the autologous pulmonary arterial wall graft

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Abstract

A 10-year-old girl with anomalous origin of the left coronary artery from the pulmonary artery underwent a two coronary system reconstruction with a new technique. Her left coronary artery was stenotic next to its origin and had a severe adhesion with the aorta. We made a bypass grafting between the aorta and the left coronary artery with a roll shaped transected main pulmonary arterial wall graft. The postoperative angiogram showed a good patency of a reconstructed left coronary artery. This technique is considered useful surgical option for bypass grafting to the left coronary artery when the left coronary artery has an obstructive lesion or a difficulty to dissect and mobilize.

Keywords: Left coronary artery from the pulmonary artery; Aorta; Angiogram

1. Introduction

Various operative procedures have been reported [1–4] for anomalous origin of the left coronary artery from the pulmonary artery (ALCAPA) to reconstruct a two coronary system. Now we report a 10-year-old girl with ALCAPA who underwent the reconstruction of a two coronary system with a roll shaped transected main pulmonary arterial wall graft.

A 10-year-old girl who had been treated for dilated cardiomyopathy during 9 years was referred to our department on June 26, 2000. This patient had dyspnea and cardiomegaly at 5-month-old, and the echocardiogram showed severe left ventricular dysfunction and dilatation. On the basis of the echocardiogram, it was thought at the time that the left coronary artery (LCA) was arising from the aorta. She was treated for dilated cardiomyopathy with diuretics and digitalis. Her left ventricular function had improved gradually, but the repeated echocardiogram at 9-year-old showed a dilatation of the both coronary arteries. There was no cardiac murmur and the electrocardiogram showed left ventricular hypertrophy and abnormal Q wave in leads V4, V5, V6. The angiogram showed the LCA originated from the pulmonary artery and well-developed collateral vessels from RCA to the left anterior descending coronary artery (Fig. 1a). The catheter examination revealed the oxygen saturation step-up at the main pulmonary artery, and a thallium-201 scintigram showed the malperfusion of the antero-lateral wall.

The operation was performed under cardiopulmonary bypass with ascending aortic and bicaval cannulation. The right coronary artery had a high take-off from the right coronary sinus and was very dilated. The LCA originated from the right side of the pulmonary artery proximal to the bifurcation, and had a stenotic lesion next to its orifice and a severe adhesion with the left aspect of the aortic wall distally (Fig. 2A). After cardiopulmonary bypass, we tried to dissect the LCA from the aortic wall, but it was very difficult because of severe adhesion like they had a common wall. The distal LCA wall became extremely thin during the dissection and we relinquished its mobilization. We transected the main pulmonary artery at the anomalous LCA orifice level like a cylinder form and divided the LCA at the origin just proximal to the stenotic lesion (Fig. 2B). The one edge of the transected pulmonary artery was continuously sewn closed and the other edge was partially sewn closed by 6-0 absorbable suture to form a roll shape for bypass graft (Fig. 2C). The open left coronary orifice on the pulmonary arterial wall graft was end-to-end anastomosed with the divided normally appearing portion of the LCA distal to the adherent area with the aorta by interrupted 7-0 polypropylene suture. The open end of the transected pulmonary arterial wall graft was end-to-side anastomosed with 4.5 mm punched out opening at right-posterior wall of the

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the aorta by continuous 6-0 absorbable suture (Fig. 2D). The divided main pulmonary artery was directly end-to-end anastomosed by continuous 5-0 absorbable suture (Fig. 2E). No prosthetic material was used. The weaning from the cardiopulmonary bypass was uneventful and she required a little inotropic support.

She was extubated 3 days after operation, took uneventful recovery, was clinically well at discharge. The postoperative catheterization study performed at 4 weeks after operation revealed disappearance of oxygen saturation step-up at the main pulmonary artery, no pressure gradient between the right ventricle and the pulmonary artery. The aortogram showed a good patency of the roll shaped autologous pulmonary arterial wall graft between the aorta and the LCA and the decrease in the size of the right coronary artery (Fig. 1b). The left ventriculogram also showed a complete recovery of the left ventricular contraction.

2. Discussion

Many operative procedures have been reported to manage the ALCAPA and the establishment of a two coronary system is usually favored [1]. It was performed by direct
aortic re-implantation of the LCA, bypass grafting, intrapulmonary tunnel type repair [2], left main coronary angioplasty using the transected main pulmonary artery [3], unroofing the intramural portion of the LCA within the aorta [4], and so on.

In this patient, it was difficult to dissect and mobilize the LCA because of the severe adhesion with the aortic wall, and the LCA wall became extremely thin during the dissection. The length of distal LCA having normal looking wall was judged too short to perform the direct aortic re-implantation. It was deemed that bypass grafting was the best way to reconstruct a two coronary system. However the long-term result of bypass grafting using a left subclavian artery or a saphenous vein was not satisfactory, and the result of internal mammary arterial bypass in children is not unclear yet. [5–7].

We made a roll shaped autologous graft using a transected main pulmonary artery by suturing its upper and lower edges continuously, and interposed it between the aorta and the LCA. This method has a possibility of obstruction of new LCA at the anastomosis, but the roll shaped autologous pulmonary arterial wall graft has a wide diameter, a growth potential, and a good postoperative patency. This technique is considered to be useful surgical option to manage ALCAPA with bypass grafting when the dissection and mobilization of the LCA is difficult or impossible, when the LCA has an obstruction like stenosis, aneurysm, and when the LCA was surgically damaged.

References