BYPASS OF THE RECOARCTATED SEGMENT OF THE AORTA WITH A GORE-TEX GRAFT: A CASE REPORT

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Recoarctation, late hypertension, and sudden death are three major problems in aortic coarctation surgery. In addition to these problems associated cardiac anomalies are found up to 70 % of the cases. These are mostly ventricular septal defect (VSD), left ventricular outflow tract obstruction (LVTO), atrial septal defect (ASD), and patent ductus arterious (PDA).

In this case report, a 14-year- old male patient was admitted to the hospital with complaints of dyspnea on exertion, weakness of the pulsation in the lower limbs after exercise. He was diagnosed to have aortic coarctation and subaortic stenosis. The coarctation was repaired with patch aortoplasty; subaortic stenosis was repaired with septal myotomy and subvalvular membrane resection 18 months after the first operation. Three months later he was taken to the third operation for recoarctation, in this case, due to extensive fibrosis. A bypass procedure was applied from the transverse arch to the thoracic aorta with a 12 mm Goretex tubular graft. This is one of the alternative techniques for recoarctation repair, it is safe for the point of spinal cord protection, and also shortens the operation time.

Key words: aortic coarctation, subaortic stenosis, patch aortoplasty.

Aortic coarctation can be isolated or with multiple intracardiac abnormalities. Some of these intracardiac abnormalities are; ventricular septal defect (VSD), patent ductus arterious (PDA), atrial septal defect (ASD), and left ventricular outflow tract obstruction[1,2]. Left ventricular outflow tract obstruction can be categorized into three groups: 1. Subvalvular aortic stenosis, 2. Valvular aortic stenosis, 3. Aortic atresia. Subvalvular aortic stenosis is the most commonly found abnormality in left ventricular outflow tract obstruction. It may be just a membrane, or muscular hypertrophy, or may be part of the Shone syndrome [3] being associated with parachute mitral valve, and supravalvular ring of the left atrium. Tubular hypoplasia are also considered in this group. Since it was first correction by Crafoord in 1945 [4], several diferent techniques were applied to this abnormality.

Initial experience with resection of the coarcted segment and end-to-end (E-E) anastomosis was associated with a high incidence of restonosis at the site of repair [5,6]. Subclavian flap angioplasty (SFA) technique was introduced by Waldhausen and Nahrwold in 1966, it was advocated by many surgeons as the operation of choice for infants [7,8]. Meanwhile synthetic patch aortoplasty was recommended by some authors [9, 10]. More recently an aggressive approach was introduced that is extended aortic arc end -to-end anastomosis [11].

CASE REPORT

A thirteen-year-old male patient was admitted to the hospital with complaints of dyspnea on exertion, and weakness of the periferal pulses in the lower limbs after exercise.

His brachial blood pressure was 160/85 mmHg, whereas calf blood pressure was 105/ 60 mmHg. On auscultation systolic ejection murmur was heard on the mesocardiac area. Chest radiography showed left ventricular hypertrophy, and prominent pulmonary vascularity. There was no evidence of rib notching.

Two dimensional and Doppler echocardiography showed subvalvular aortic stenosis with a pressure gradient of 150 mmHg, and aortic coarctation distal to the left subclavian artery with a pressure gradient of 55 mmHg.

Coarctation repair was performed with a left toracotomy on January 1994. A diamond shaped patch aortoplasty was applied to the coarcted segment, the pressure gradient was decreased to 8 mmHg after aortoplasty. The subvalvular aortic stenosis was repaired eigteen months later the first operation. Following the subvalvular membrane resection and septal myotomy, intraoperative pressure gradient between the left ventricle and the ascending aorta decreased to 5 mmHg. Three months following the second open heart operation, the patient observed weakness in his lower limbs, and during control examination approximately 35 mmHg pressure gradient was measured between upper and lower extremities. Cardiac catheterization was applied to the patient and a 45 mm Hg pressure gradient was measured between the proximal and distal parts of the coarctation. Aortography was performed with digital substruction angiography technique, and it revealed anatomical deformity at the level of the previous aortoplasty (Fig.1). The patient was operated for the third time. A 12 cm tubular Gore-Tex graft was implanted from the aortic arc just distal to the left carotid artery to the thoracic aorta, 10 cm distal to the recoarcted segment (Fig. 2). Intraoperative pressure gradient was measured as 10 mmHg between the proximal and distal ends of the graft. One week after the operation pressure gradient was measured 15 mmHg by control cardiac catheterization. The patient was discharged from the hospital free of symptoms.

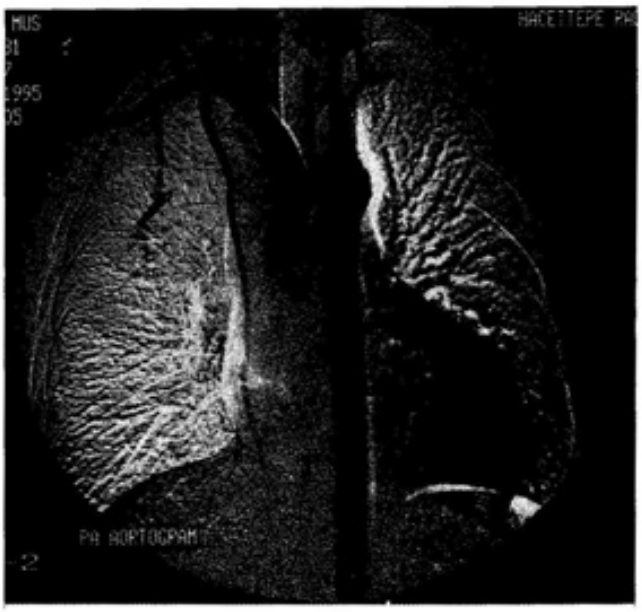

Figure 1. Anatomical deformity at the site of patch aortoplasty.

Figure 2. Gore-Tex graft implanted from the transverse arch to the thoracic aorta.

DISCUSSION

Although aortic coarctation has been first corrected nearly four decades ago, there are still some controversies on timing of operation, techniques of the operation, and surgical planning especially those with concomittant intracardiac anomalies.

The major problem in coarctation surgery is residual or recurrent coarctation, which in some series recoarctation is reported up to 44 % with E-E anastomosis technique[12,13,14]. In some other series with the SFA technique, better results were reported for the point of recurrent coarctation[15,16,17]. In contrast Çobanoğlu et all. [18] noticed that with the SFA technique periductal coarctation tissue and resected posterior aortic ridge continue to grow, and finally it obstructs the lumen of the aorta; therefore it is advocated to complete the resection of the coarctation tissue and E-E anastomosis.

Growth of periductal coarctation tissue and resected posterior aortic ridge is also seen with the patch aortoplasty technique. Aortic aneurysm can also be observed at the site of the aortoplasty patch following correction.

Late hypertension and sudden death are other two important problems after coarctation surgery, according to Brouwer et al [19], ideal age for aortic coarctation is 1.5 years old with respect to these three major problems.

Aortic coarctation can be with some intracardiac abnormalities in up to 70% [20,21]. VSD is the most commonly seen intracardiac abnormality, correction of the aortic coarctation decrease systemic resistance of the left ventricle, this leads to decrease in left to right shunt.

Left ventricular outflow tract obstruction is encountered after VSD in frequency, it is mostly subaortic muscular ridge, and valvular stenosis is rare.

In this case report, we decided to have a two staged operation due to low mortality, and in this age group recoarctation is relatively low. In our case recoarctation is mostly due to fibrosis around coarctation site, and periductal tissue growth may be taken part in recoarctation.

Bypass procedure from transverse arch to distal aorta may be an alternative way to eliminate recoarctation in this kind of cases with extensive fibrosis that make exploration impossible.

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