Case report

Repair of coarctation of the aorta with simultaneous coronary artery bypass grafting without cardiopulmonary bypass

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Abstract

The article describes the management of aortic coarctation associated with coronary artery disease by a one stage surgical procedure without cardiopulmonary bypass in a 44-year-old woman. The vascular prosthesis was anastomosed end-to-end to the descending aorta and a venous bypass was subsequently formed between circumflex coronary artery and the anastomosed vascular prosthesis. There were no postoperative complications.

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1. Introduction

Coarctation of the aorta accounts for 5–8% of congenital heart disease [1,2] and is treated usually in childhood. It is not rare for aortic coarctation to be associated with coronary artery disease [3] in patients past 35 years of age. Some patients with aortic coarctation remain asymptomatic up to 30–40 years of age when the occurrence of coronary artery disease increases. When both pathologies coexist surgical management becomes particularly difficult. Usually a median sternotomy and long vascular prosthesis connected to the descending or abdominal aorta or iliac artery is employed [1,4,5]. In this report, we describe our experience with repair of aortic coarctation and simultaneous coronary artery bypass grafting (CABG) without cardiopulmonary bypass.

2. Case report

A 44-year-old woman with a history of hypertension and angina pectoris was admitted to our institute. Non-invasive and invasive investigations confirmed the clinical diagnosis of coarctation of the aorta and coronary artery disease. The electrocardiogram showed sinus rhythm with left ventricular hypertrophy. On echocardiography coarctation of the aorta and minimal aortic valve disease (aortic gradient 19 mmHg, aortic incompetence I+) was found. The estimated gradient across the coarctation was 32 mmHg. The patient was then subjected to angiographic and hemodynamic studies because of a long period of hypertension and a loud murmur suggested higher gradient across the coarctation. Angiography showed isthmic coarctation with gradient of 95 mmHg and evidence of collateral flow through the intercostal arteries. Coronarography demonstrated significant stenosis (80%) of the circumflex artery (Cx) with good left-ventricular function. We decided to perform simultaneous surgical correction of both lesions without cardiopulmonary bypass through a left thoracotomy.

3. Surgical treatment

The operation took place on 17th of March, 1998. The chest was entered through a left thoracotomy incision. The pleural cavity was opened, the left lung was lifted and the
pleura incised longitudinally over the descending aorta. The coarctation was very tight. The internal mammary artery was found. It was unusually large in diameter, pulseless on palpation and heavily calcified, therefore the great saphenous vein was harvested from the right leg. The descending aorta was partially clamped. A shunt between the aortic arch and the descending aorta was created because the blood pressure in the iliac artery dropped below 20 mmHg after cross-clamping. Two aortic cannulas with a tube between were bound together and their ends were put into the aortic arch and descending aorta. Heparin was administered at a dose of 1.5 mg/kg weight before shunting to keep the activated clotting time greater than 350 s. The 22 mm woven Dacron tube was anastomosed end-to-end to the descending aorta, after resection of the coarctation. Then the pericardium was incised longitudinally. The circumflex coronary artery was identified. Stabilization of the heart during distal anastomosis was by assistant’s hand. Distal anastomosis was performed using a continuous 7–0 Prolene suture. The proximal anastomosis was performed on the vascular prosthesis of the descending aorta using a continuous 5–0 Prolene suture during cross-clamping (Fig. 1). Heparin was reversed with protamine at the end of procedure. Closure was performed conventionally. The postoperative period was uneventful. The patient was discharged on the 19th postoperative day free of any signs of heart disease.

4. Discussion

Adult cases account for about 1% of all cases of coarctation [1,2]. The association of coarctation of the aorta with coronary artery disease is common in this patient population [3]. The repair of aortic coarctation and coronary artery disease usually requires different stages [1,4,5]. The simultaneous correction of both pathologies without cardiopulmonary bypass through a left thoracotomy using a Dacron tube seems to be the ideal choice. CABG without the use of cardiopulmonary bypass may minimize the impact of conventional risk factors on operative mortality [6]. Internal mammary artery (IMA) should be used but in aortic coarctation IMA may become severely calcified [7–9]. In our case the stenosis of Cx was narrow (80%) and long. It was located next to marginal branch of Cx, precluding PTCA. Some authors in such cases described the use of a long vascular prosthesis to create a connection between the ascending and descending or abdominal aorta through the diaphragm [1,4,5]. We considered a short vascular prosthesis connected end-to-end to the aorta as a better option. It prevents arrhythmia and heart failure [10] in the perioperative period. The use of a long prosthesis requires sometimes laparotomy with increased morbidity as in these cases. Although some authors recommend median sternotomy for one-stage repair of the coarctation and the associated cardiac lesion [1,4,5], we believe that the left thoracotomy used in our case was simpler and safer.

The operation described avoids the need for cardiopulmonary bypass, requires shorter vascular prostheses, and avoids laparotomy. This approach is a promising alternative for patients with simultaneous repair of coarctation of the aorta and significant coronary artery disease.

References