Case of a Ascending-to-Descending Aortic Bypass for Complex Coarctation of the Aorta

Asendan - Desendan Aortik Bypass Yapılan Komplike Aort Koarktasyonu Olgusu

Asendan - Desendan Aortik Bypass / Ascending-to-Descending Aortic Bypass

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Özet

Aort koarktasyonu kompleks formunun tedavisi için çeşitli yaklaşımlar ve cerrahi teknikler önerilmektedir. Cerrahi düzeltme gerektiren ek kardiyovasküler bozukluk olduğunda lezyonların aynı kesiden aynı anda düzeltmesi tercih edilir. Bu yazıda, komplike aort koarktasyonlu olguda median sternotomi ile gerçekleştirilen asendan- desendan aorta bypass grefti tekniği ve eşzamanlı ek kardiovasküler bozukluk onarımını anlattık.

Anahtar Kelimeler

Aort Koarktasyonu; Anastomoz; Cerrahi; Hipertansiyon

Abstract

A variety of approaches and surgical techniques have been proposed for the management of complex form of aortic coarctation. When there is an additional cardiovascular disorder that requires surgical correction it is preferable to correct both lesions through the same incision simultaneously. In this paper, we describe the technique of ascending-to-descending aorta bypass grafting performed through the median sternotomy and simultaneous additional cardiovascular disorders repair in a case who had complex aortic Coarctation.

Keywords

Aortic Coarctation; Anastomosis; Surgical; Hypertension

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Introduction

Complex or recurrent form of aortic coarctation with or without additional cardiovascular disorders represents a surgical challenge. In these patients, anatomic repair of the aortic coarctation is associated with high risk of postoperative morbidity and mortality [1]. To decrease high risk, several surgical techniques have been described for treatment of aortic coarctation instead of anatomic repair. Some of them include several extra-anatomic bypass grafting methods [2-4].

In this study, we report a case of ascending-to-descending aorta bypass grafting in a patients with aortic coarctation. Extra-anatomic bypass indication was associated mitral valve stenosis and residual hypoplastic aortic arch.

Case Report

The case was a 19 years old female who has experienced a previous surgery for aortic coarctation. When she was 12 years old, an aortic coarctation (nearly interrupted aortic arch) and additional mild mitral valve stenosis have been demonstrated. Surgical repair of coarctation has been performed by implanting a Dacron tube graft between aorto-left subclavian artery junction and thoracic aorta via left posterolateral thoracotomy. Four years after the first operation, the patient was hospitalized for hypertension complain. Diagnostic procedures showed that previous aortic bypass graft was patent. It was also observed that there were severe mitral valve stenosis and residual aortic arch hypoplasia (figure-1). After diagnosis, we decided to correct disorders through the same incision.

Following sternotomy, arterial cannulation accomplished by using the ascending aorta and then venous cannulation was performed. After cannulation cardiopulmonary bypass (CPB) was initiated and cardiac arrest was established. The patient was cooled to a rectal temperature of 33°C. In order to approach to the descending aorta, the heart was retracted superiorly in cephalic direction. The retrocardiac descending thoracic aorta was exposed and isolated through the posterior pericardium and a side-biting clamp was used for the distal anastomosis. The non-bifurcated side of a 20/10-mm Hemashield Y graft (Mead-ox Medical, Inc., since acquired by Boston Scientific Corporation; Natick, Mass) was implanted to descending aorta with end-to-side anastomosis. The graft was routed around the left margin of the heart and the bifurcated side of Y graft was implanted to ascending aorta (figure-2). Then left atriotomy was made and mitral valve fenestration and valvotomy were performed.

Postoperative period was quite satisfactory and any measured blood pressure difference between upper and lower extremities wasn't observed. However, after asymptomatic 3 years period, symptoms were recurred. Ehocardiography showed severe mitral insufficiency and aortography revealed that one limb of the Y graft was occluded and the other limb has severe stenosis at the inflow orifice. She underwent a reoperation and Y graft was replaced with a 24mm Hemashield tube graft and additionaly mitral valve replacement (St. Jude Medical, Inc.; St. Paul, Minn) was performed. It was observed that occlusion of graft was due to severe calcification at the inflow orifice. Postoperative course was uneventful and measured blood pressure of upper and lower extremities was equal postoperatively. Her life quality was wonderful at her long term follow up (3 years after the last operation).



Figure 1. Aortography shows aortic coarctation , residual aortic arch hypoplasia and patent aortic bypass graft.

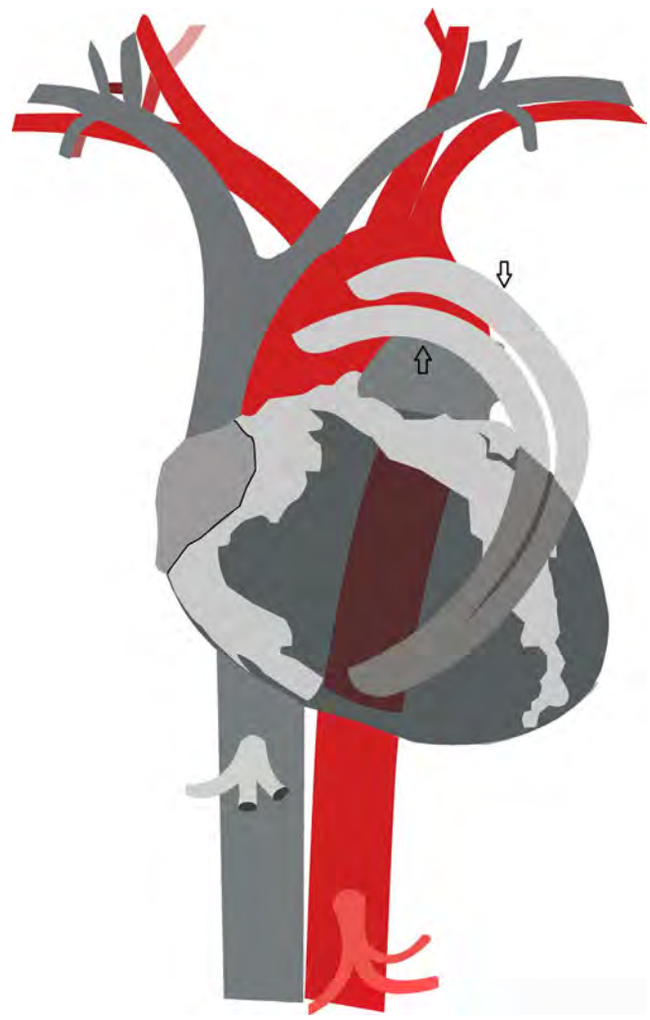


Figure 2. Hemashield Y graft was implanted to descending aorta with end-to-side anastomosis. The graft was routed around the left margin of the heart and the bifurcated side was implanted to ascending aorta (Diagrammatic image).

Discussion

Coarctation or recoarctation of the aorta with additional cardiovascular disorders that require repair present a major challenge for the surgeon. In such patients, staged surgical treatment may be associated with increased complications. In1980, Vijayanagar et al.[2], described the technique of extra-anatomic ascending-to-descending aortic bypass with the posterior pericardial approach to access the descending aorta and simultaneous aortic valve replacement. They performed this procedure through a single median sternotomy and used a tube graft for extra-anatomic bypass which placed around the left margin of the heart. Later Powell et al.[5], reported a modification of this procedure, in which the graft has been placed around the right margin of the heart. Since the initial description, several reports demonstrated successful outcome of ascending-to-descending aortic bypass [1, 4, 6].

In this case, at previous extra-anatomic aortic bypass operation we used Y graft for ascending-to-descending aortic bypass because of small ascending aorta. Although there were no complaint for the tube graft in the other reports, we also guessed that a tube graft would be a block intra-pericardial mass and consequently the heart might be distributed by this block mass in such a small sized patient. So we decided to perform this procedure with Y graft. The length of non-bifurcated side of a Y graft was held shortly as possible as. Thus, the big part of the graft that routed around the heart was consisted of bifurcated side which wasn't a block mass. Intraoperative experience led us to taught that, Y graft could be a favorable choice for patients with small pericardial cavity and ascending aorta.

However, there was a drawback of Y graft because of the orifice area of bifurcated side is lower than non-bifurcated side. This difference might not allow complete relief of aortic coarctation caused blood pressure gradient. In this case there was already some patency of coarcted segments. Therefore, we thought that blood flow through the graft plus the native aorta would be enough. Actually, we didn't observed any measured blood pressure difference between upper and lower extremities postoperatively. Unfortunately, we experienced calcified occlusion of Y at follow up which might be result of high turnover of calcium metabolism in this young patient. However, we taught that this was a drawback related to the graft type, not else ascending-to-descending aortic bypass technique.

In conclusion, ascending-to-descending aortic bypass for patients with complex coarctation and concomitant cardiovascular disorders appears to be a surgically feasible method. However, possibility of calcified stenosis of graft orifice especially in small sized grafts should be kept in mind.

Çıkar Çakışması ve Finansman Beyanı

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