



Ascending to Descending Aortic Bypass: Repair Via Median Sternotomy on the Beating Heart

Asendan Desendan Aortic Bypass: Atan Kalpte Mediyen Sternotomi Yoluyla Onarım

Aortik Bypass / Aortic Bypass

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Özet

Rekoarktasyon nedeniyle redo aortik ark cerrahisi için başvuran 9 aylık bir olguyu sunduk. Mevcut olguda mediyan sternotomi yoluyla kardiyopulmoner bypass kullanılmadan asendan desendan aortik bypass başarıyla uygulandı. Aort koarktasyonu farklı cerrahi müdahale ve tedavi seçenekleri oldukça tatmin edici olmasına rağmen hastaların belli bir grubunda, rekoarktasyondan dolayı yeniden ameliyat gerekmektedir. Ekstra-anatomik aortik bypass ile rekoarktasyon tamiri yüksek başarı oranı ile düşük riskli bir işlem olarak kabul edilmektedir.

Anahtar Kelimeler

Aortik Koarktasyon; İnfant; Sternotomi; Extra-Anatomik Bypass

Abstract

We report the case of a 9-month-old patient presenting for redo aortic arch surgery because of recoarctation. In present case, ascending-to-descending aortic bypass via median sternotomy was performed without cardiopulmonary bypass with good result. In spite of the fact that the different surgical and intervention treatment options of aortic coarctation are quite satisfactory, a certain group of patients need reoperation because of recoarctation. The recoarctation repair of the aorta with the extra-anatomic aortic bypass is considered a low-risk procedure with high success rate.

Keywords

Aortic Coarctation; Infant; Sternotomy; Extra-Anatomic Bypass

DOI: 10.4328/JCAM.2683

Received: 17.07.2014 Accepted: 25.07.2014 Printed: 01.10.2013

J Clin Anal Med 2013;4(suppl 5): 568-70

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Introduction

Recurrence of stenosis is the most common complication of coarctation repair associated with major long-term morbidity, whose incidence varies, being mostly related to technical and surgical aspects or to the anatomical complexity of the coarctation [1]. Percutaneous balloon angioplasty of native or recurrent coarctation of the aorta is considered a low-risk procedure with high success rate and high recurrence rates were reported in pediatric patients [2]. But, patients failing or not amenable to balloon dilation should be managed surgically. Reoperations in the majority of cases are accomplished under cardio-pulmonary bypass [3,4]. Extra-anatomic ascending-to-descending aortic bypass however, does not need local dissection of the coarctation or aortic arch, X-clamping or cardiopulmonary bypass (CPB) and yields excellent results in infant.

Case Report

A 9-month-old patient was referred to our hospital with recoarctation. In his history, a two-days-old and weighing 2.5 kg neonate with aortic coarctation underwent extended end-to-end repair, via left lateral thoracotomy with no residual gradient and complete occlusion of ductus arteriosus. At seven months follow up, femoral pulses were not palpable and recoarctation was confirmed by echocardiography. Balloon angioplasty of recurrent coarctation was conducted and the pressure gradient decreased from 65 mmHg to 8 mmHg. At 2 months after echocardiography was performed and appreciable stenosis of the descending aorta was revealed. The angiography confirmed the recurrent coarctation of the aorta (Fig. 1).

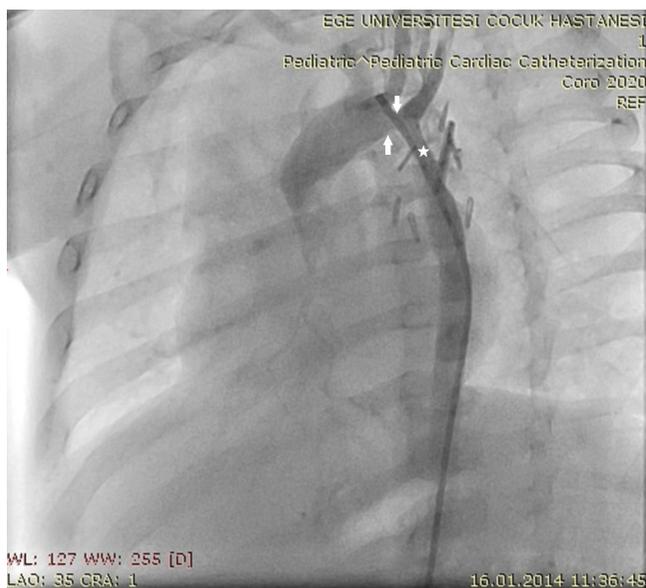


Figure 1. Preoperative angiography showing recoarctation of the isthmic aortic segment (asterisk) and stenosis of the distal aortic arch (arrows).

The surgery was performed through median sternotomy. After dissecting the ascending aorta, aortic arch and its branches, and the initial segment of the descending aorta, the presence of aortic coarctation was confirmed. The descending aorta was exposed through the posterior pericardium by gently retracting the heart cephalad and incising the pericardium longitudinally, using techniques known from off-pump CABG surgery. After systemic heparinization, the descending aorta is partially side-

clamped and an end-to-side anastomosis with 10 mm dacron graft performed with continuous 4-0 polypropylen suture (Fig. 2A). After local control for hemostasis, the graft was directed anterior to the esophagus and routed posterior to the inferior vena cava but anterior to the right inferior pulmonary vein. The graft was led around the right atrium (Fig. 2B). The graft was then cut obliquely and anastomosed to the right lateral aspect of the ascending aorta, using a side-biting clamp. The procedure was totally uneventful; it lasted 40 min and the patient was taken to the intensive care unit. He had a good postoperative evolution, being discharged from the hospital in good clinical conditions on the sixth postoperative day. At follow-up, echocardiography demonstrated patency of graft and no residual gradient.

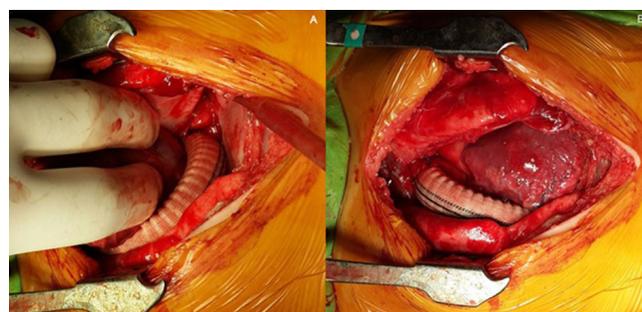


Figure 2. Exposure of the descending thoracic aorta through the posterior pericardium. The heart is retracted by the assistant as partial aortic clamping is applied to the descending aorta, and the distal anastomosis is performed (A). The Dacron graft was brought laterally to the right atrium and anteriorly to the inferior vena cava (B).

Discussion

The extra-anatomic aortic bypass was initially described by Vijayanagar et al. for recoarctations [1]. Powell et al. described a modification of this technique, which routed the graft around the right margin of the heart [5]. The prevalence of recurrent coarctation varies widely from 7 to 60% of operated coarctations and as shown by the reported data, the incidence of aortic arch hypoplasia in infants undergoing operations for aortic coarctation accounts for 70% [6].

There is a tendency in the literature to repair aortic recoarctation by using the extra-anatomic technique, because of its relative easiness and smaller dissection of adhered planes, which might lead to lesions in the aorta or its adjacent structures [7]. In this respect, extraanatomic ascending-to-descending aortic bypass, however, does not need local dissection of adhesions and the risk of injury to adjacent anatomical structures or the diseased aorta, nor cross-clamping of the diseased aortic segment, nor CPB [3,6].

The access was performed with heart mobilization and heart traction. The heart is retracted by the assistant as partial aortic clamping is applied to the descending aorta, and the distal anastomosis is performed. Despite this stabilization, the heart's natural motion and potential for hemodynamic derangement during cardiac retraction may concern for the quality of the distal anastomosis. If hemodynamic derangement occurs, conversion to partial CPB may be necessary. But our case is well exposed without any hemodynamic derangement during the surgery.

There is no single applicable technique for patients with these cases. The anatomic localization of the stenosis and the pa-

tient being in growth process are main challenges for surgery. Although the technique aids in protecting against complications related to re-coarctation repair, the lack of growth potential in the long-term is a limitation of this technique that necessitates re-operation. We conclude that recoarctation can be repaired in selected patients through median sternotomy and posterior pericardial approach minimizing morbidity and mortality due to CPB and circulatory arrest. In summary, this procedure is safe and feasible alternative technique for aortic recoarctation that affects the aortic arch or the area close to the left subclavian artery can be performed without cardiopulmonary bypass and with a short hospitalization time.

Competing interests

The authors declare that they have no competing interests.

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How to cite this article:

Akyuz M, Isik O, Ayik MF, Atay Y. Ascending to Descending Aortic Bypass: Repair Via Median Sternotomy on the Beating Heart. *J Clin Anal Med* 2013;4(suppl 5): 568-70.