

Off-Pump Reduction Aortoplasty with Coronary Artery Bypass Grafting: 3 Cases

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ABSTRACT

Coronary artery disease with ascending aort aneurysm surgery may be troublesome for both surgeon and patient. Because so many patients have concomitant other disease such as cancer, severe left ventricular dysfunction, hemodialysis dependet chronic renal failure, poor nutritional status, obesity, chronic obstructive pulmonary disease, and cerebro vascular event history. These diseases increase at risk of postoperative mortality and morbidity because of using extracorporeal circulation and aortic cross-clamping intraoperatively. Off-pump reduction aortoplasty may be the right decision for risky patients with ascending aortic aneurysm and coronary artery disease. This report presents 3 off-pump reduction aortoplasty and concomitant coronary artery bypass grafting cases.

Keywords: Ascending Aorta; Aortic Aneurysm; Coronary artery Disease; Off-Pump Coronary Artery Bypass; Wrapping

Koroner Arter Baypas Greftleme ile Off-Pump Küçültücü Aortoplasti: 3 Vaka

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ÖZET

Koroner arter hastalığı ile birlikte yapılan asendan aort cerrahisi hem cerrah hem de hasta için zorlu olabilmektedir. Çünkü birkısım hastanın kanser, düşük sol ventrikül fonksiyonu, dialize bağımlı kronik böbrek yetmezliği, kötü beslenme düzeyi, obesite, kronik obstrüktif akciğer hastalığı ve serebro vasküler hastalık öyküsü gibi eşlik eden diğer hastalıkları olabilir. Bu hastalıklar intraoperatif ekstrakorporeal dolaşım kullanımı ve aortun kros-klemlenmesi nedeniyle postoperatif mortalite ve morbiditeyi artırırlar. Off-pump küçültücü aortoplasti asendan aort anevrizması ve koroner arter hastalığının olduğu riskli hastalar için uygun karar olabilir. Bu raporda off-pump küçültücü aortoplasti ve eşzamanlı koroner arter bypass cerrahisi yapılan 3 vaka sunulmakta.

Anahtar Kelimeler: Asendan Aorta; Aort Anevrizması; Koronar Arter Hastalığı; Off-Pump Koronar Arter Baypas; Sarmak

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Introduction

Ascending aorta replacement is more common procedure than aortoplasty in case of ascending aortic aneurysm[1]. But, aortoplasty is simple, fast and effective method for moderately sized ascending aortic aneurysms with concomitant operations[2]. Although, both procedures need on-pump surgery, aortoplasty can be performed without extracorporeal circulation in specific situations such as cancer, severe left ventricular dysfunction, haemodialysis depended chronic renal failure, poor nutritional status, obesity, chronic obstructive pulmonary disease, cerebrovascular event history. Off-pump reduction aortoplasty with external wrapping was first described by Arsan[3].

Cases

We have performed 75 ascending aorta aneurysm operations in the last 5 years. Ten cases of them were external wrapping. Between April 2007 and July 2009, 3 patients (4% of all cases) were went on off-pump reduction aortoplasty and concomitant coronary artery bypass grafting (CABG). The first patient was 75 year-old man who had 50mm in diameter ascending aorta, obesity (Body Mass Index:31.14) and cerebrovascular event history. We preferred off-pump operation, for early mobilization of the patient. The second patient was 66 year-old man who was heavy smoker and had chronic obstructive pulmonary disease (COPD) and 49mm in diameter ascending aorta. His pulmonary function was poor (Forced Expiratory Volume-1:65% and O₂ saturation:85% in air room under medication), so off-pump operation was choosed to avoid adverse effect of cardiopulmonary bypass on lungs. The third patient was 79 year-old man who was heavy smoker and had 48mm in diameter ascending aorta, COPD (Forced Expiratory Volume-1:68% and O₂ saturation:87% in air room under medication) and obesity (Body Mass Index:32.59). Patients preoperative and operative data are shown in Table 1.

After standard anaesthesia, transesophageal echocardiography probe was placed to evaluate ascending aortic atherosclerotic plaque. Then median sternotomy was performed. Left internal mammarian artery and saphenous vein grafts were harvested. Systemic heparin was administered at a dose of 2mg/kg. All distal anastomosis were performed using myocard stabilizer. Left internal mammarian artery was anastomosed to the left anterior descending artery initially. Then, the other distal anastomosis were performed. Proximal anastomotic site was placed close to sinotubular junction of the aorta.

Aorta was dissected from pulmonary artery and peripheral tissue gently. Then, aorta wrapped with longitudinally cut 30mm Dacron graft on beating heart. Systolic arterial pressure was kept under 90mmHg with controlled esmolol infusion. Single 5 or 6 U sutures used to plicate the fusiform aneurysmatic segment of the aorta between the free sides of graft (Figure-1a/b). Systolic arterial pressure was dropped about 40mmHg via inferior vena cava occlusion by fingers to tie sutures (Figure-2a/b). After hemodynamic stabilization, operation was terminated. The external tube graft did not retract the proximal anastomosis due the exclusion of the proximal anastomotic site out of the wrapping side. All patients had an uneventful recovery.

The length of stay in intensive care unit and hospital were shorter than expected (Table-1). Control computerized tomography angiography showed that ascending aorta of the patients were in normal limits (26-27mm in diameter) and all coronary grafts were patent (Figure-3).

Discussion

Indication for concomitant operation includes CABG patients who have ascending aorta aneurysm of greater than 4.5cm. In case of ascending aortic aneurysm, the general consensus tends toward performing ascending aortic replacement rather than aortoplasty with or without external wrapping. But, patients needing concomitant CABG may be has worse survival than isolated surgery in the next years [4]. Because it may be due to adverse effects of long extracorporeal circulation time or emergent surgery, as well as the patients have independent risk factors such as cardiac or non-cardiac diseases. Off-pump cardiac surgery may be the best surgical alternative approach to avoid these adverse effects. Off-pump reduction aortoplasty with external wrapping, described by Arsan can be a solution for high risk patients [3].

Whether on-pump or off-pump is utilized, aortoplasty with external wrapping includes some complications as its own for example embolic stroke due to atherosclerotic plaque rupture. To reduce the risk of embolism, aortic wall must be evaluated with transesophageal echocardiography or computerized tomography before the aortoplasty. The other complications are erosion and dislocation. Bauer et al. reported a dislocated wrap causing erosion of the ascending aorta after 4 years [5]. Erosion can be appear due to necrosis since the aortic wall is under the pressure by wrap externally, and blood flow internally. Neri et al. reported on two patients developed false ascending aorta aneurysm after 7 and 11 years [6]. These both reports are on-pump wrapping aortoplasty. Akgun et al.

reported that 2 of 12 patients had developed aortic dissection and one of 12 patient had developed aortic root aneurysm after off-pump wrapping aortoplasty [7]. We predict that these complications are results of progressive aortic disease. Although these complications and adverse effect of wrapping aortoplasty, sometimes, wrapping aortoplasty and concomitant coronary artery bypass grafting may be needed to perform with off-pump in selective patients to avoid from available risks. We performed both off-pump surgery and wrapping aortoplasty concomitant CABG on three high risk patients. So, we benefited from advantageous of off-pump surgery. One another reason may be appropriate diameter of ascending aorta (Between 4.5 cm and 6 cm) and aortic wall layers may be more strength than other large-scale diameter of ascending aorta.

Calafiore et al. and Ascione et al. reported advantageous of off-pump CABG [8,9]. In these studies, they showed that off-pump CABG surgery decreased ventilation time, intensive care and hospital stay length and early major events. In addition, off-pump CABG contributed to early mobilization and patient comfort. Guler et al. reported off-pump bypass surgical procedures are more advantageous than on-pump methods for patients with COPD respect pulmonary functions [10]. Although, our patients had high risks, we provided with off-pump surgery decreased ventilation time, intensive care unit and hospital stay length than expected.

As a result, patients postoperative courses were uneventful and mid-term results were satisfactory. Especially, one of the our patients is in fourth years and has any problems.

Consequently, we believe that wrapping aortoplasty concomitant CABG should be performed with off-pump surgery to salvage from troublesome situations on selected patients who are elderly and can't tolerated cardiopulmonary bypass and aortic cross-clamp because of severe cardiac and noncardiac disease.

Conflict of interest

The authors declare that there were no conflict of interests in the stage of drafting and publishing this article.

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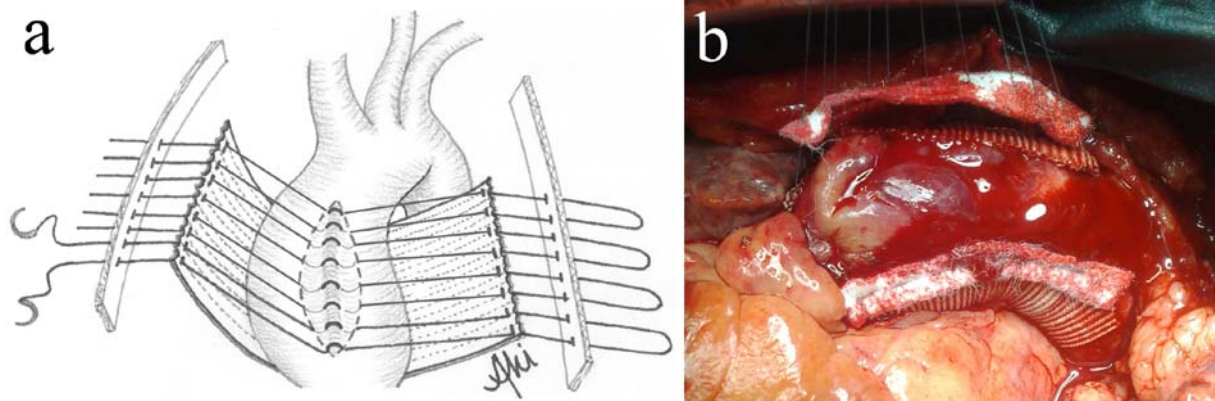
Figur legend

Figure-1: A. Aorta wrapped with longitudinally cut 30mm Dacron. Single 5 or 6 U sutures used to plicate the fusiform aneurysmatic segment of the aorta between the free sides of graft. Plicated segment of aorta must be diamond shape. B. Intraoperative view of passed sutures.

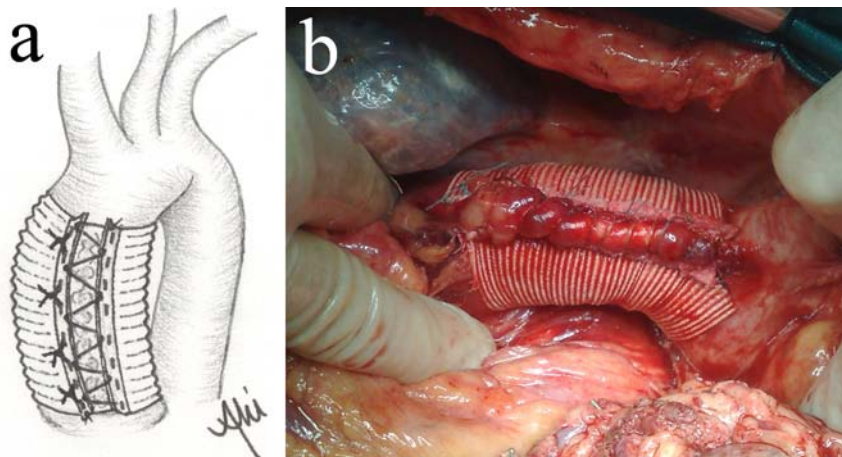


Figure-2: A. Sutures tie at the end. B. Intraoperative view of off-pump wrapped aorta.



Figure-3: Postoperative control computerised tomography angiography. Arrow shows the suture line.

Variable	Patient 1	Patient 2	Patient 3
Age/Sex	75/M	66/M	79/M
Comorbid conditions	Obesity,CVE	Severe COPD	Severe COPD, Obesity
Other risk factors	DM,HT	HT,HL	DM,HT,HL
Size of the aorta(mm)	50	49	48
LVEF%	43	48	50
Stenotic coronary artery	LAD(95%)	LAD(80%) RCA Prox(90%)	LAD(90%)
Coronary procedures(BH) (+reduction aortoplasty)	LIMA-LAD	LIMA-LAD Ao-SVG-RCAM	LIMA-LAD
Total operation time(min)	120	145	140
Postoperative drainage(ml)	400	450	450
ICU stay/Intubation time(h)	15/7	17/8	14/9
Hospitalization(day)	5	6	6
Follow up time(months)	47	59	51
Aortic size at Control(mm) (inner size)	27	26.5	26

Ao:Aorta; CVE:Cerebro Vascular Event; COPD:Chronic Obstructive Pulmonary Disease;
DM:Diabetes Mellitus; HL:Hyperlipidemia; HT:Hypertension; ICU:Intensive Care Unit;
LAD:Left Anterior Descending; LVEF:Left Ventricle Ejection Fraction; LIMA: Left Internal
Mammary Artery; OM: Obtuse Margin Branch Of Circumflex Artery; RCA:Right Coronary
Artery; RCAM: Right Coronary Artery Acute Margin Branch; SVG:Saphenous Vein Graft.