Turkish Journal of Geriatrics
2011; 14 (1) 9-13

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RESEARCH

CORONARY ARTERY SURGERY IN PATIENTS AGED 75 YEARS OR OLDER

ABSTRACT

Introduction: The present study aimed to investigate the results and early outcomes of coronary artery bypass (CAB) surgery in older patients.

Materials and Method: A total of 73 patients aged 75 years or older (54 men, 19 women) who underwent CAB surgery were included in the study. Cardiopulmonary bypass was performed by dual stage or twin venous cannulation of ascending aorta with anterograde and/or retrograde cardioplegia and topical hypothermia in all patients.

Results: Mean age was 77.01±2.59 years. Hypertension was the most common risk factor, which was found in 50 patients (68.4%). Cardiopulmonary bypass was performed in all patients and average number of grafted coronary arteries was 3.39±1.06. The most common concomitant surgical procedure was aortic valve replacement which was performed in four (5.4%) patients. Ejection fraction (EF) was found to be lower than 30% in 8 (10.9%) patients and left ventricle end-diastolic pressure (LVEDP) was found to be higher than 20 mm Hg in 20 (27.4%) patients. Revision surgery was performed in 4 (5.4%) patients, and 8 (10.9%) cases required intra-aortic balloon pump (IABP). Early mortality rate within 30 days after the surgery was 5.4% (4 patients).

Conclusion: Although the mortality rate of CAB surgery in elderly patients is decreasing, older age remains an important risk factor.

Key Words: Aged; Coronary Artery Bypass.

ARAŞTIRMA

75 YAŞ VE ÜSTÜNDEKİ HASTALARDA KORONER ARTER CERRAHİSİ

ÖZ

Giriş: Bu çalışmada, 75 yaş ve üstündeki hastalarda, uygulanan koroner arter bypass cerrahisi (KABC) ve erken dönem sonuçlarının araştırılması amaçlanmıştır..

Gereç ve Yöntem: Çalışmaya 75 yaş ve üstündeki KABC uygulanan 54(%73.9)'ü erkek, 19(%26.1)'u kadın olan 73 hasta alındı Tüm hastalara ascenden aorta ve dual stage yada çift venöz kanülasyon ve antegrad ve/veya retrograd kardiyopleji ve topikal hipotermi ile kardiyopulmoner bypass uygulanmıştır.

Bulgular: Hastaların yaş ortalaması 77.01 ±2.59 (75-85) olarak bulunmuştur. Hipertansiyon 50 (%68.4) hasta ile en çok eşlik eden risk faktörü olmuştur. Tüm hastalarda kardiyopulmoner bypass (CPB) girişimi uygulanmış olup, ortalama distal by-pass sayısı 3.39 ±1.06 olarak gözlenmiştir. Hastaların 8(%10.9)'inde ejeksiyon fraksiyonu(EF), %30'un altında bulunurken, 20 (%27.4) hastada ise sol ventrikül diyastol sonu basıncı (LVEDP)'nın 20 mmHg'nın üzerinde olduğu görülmüştür. Aort valv replasmanı (AVR) 4 (%5.4) hasta ile KABC'ne ek olarak en çok yapılan cerrahi kombinasyondur. Hastaların 4 (%5.4)'ünde revizyon, 8 (%10.9)'inde ise intra aortik balon pompası (İABP) gereksinimi olmuştur. İlk 30 günlük erken mortalite toplam 4 (%5.4) olarak gerçekleşmiştir.

Sonuç: Yaşlı hastalarda gerçekleştirilen KABC uygulamalarında görülen mortalite, giderek azalmasına rağmen, hala önemli bir risk nedeni olmayı sürdürmektedir.

Anahtar Sözcükler: Yaşlı; Koroner Arter Bypass.

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Geliş Tarihi: 06/06/2009
(Received)

Kabul Tarihi: 13/09/2009
(Accepted)

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INTRODUCTION

The frequency and severity of coronary artery diseases is increasing in elderly patients. In our country, parallel to this increase, coronary artery bypass (CAB) surgeries are more frequently performed in this age group (1). Although CAB surgery is associated with higher mortality rates in elderly patients compared to younger ones, recent studies have reported more acceptable mortality rates in this population (2). In the present study, we aimed to discuss our experience, surgical techniques and early outcomes of CAB surgery performed for coronary artery disease (CAD) in patients aged 75 years or older.

MATERIALS AND METHOD

A total of 73 patients aged 75 years or older underwent coronary artery bypass surgery between January 01, 2001 and January 01, 2009 for coronary artery disease (CAD). There were 54 men (73.9%) and 19 women (26%) with a mean age of 77.01±2.59 years. Right and left heart catheterization was performed in patients with valve surgery while trans-thoracic echocardiography (TTE), carotid artery Doppler ultrasonography and angiocardiography were performed in all patients. All patients were assessed in Common Council of Cardiovascular Surgery Department and Cardiology Department and decision of surgery was made according to American College of Cardiology (ACC)/American Heart Association (AHA) revascularization indications by consensus. This study was approved by Erciyes University local ethics committee.

Surgical Approach

All surgeries were performed under general anesthesia. Fentanyl and etomidate were used for induction of anesthesia, and then vecuronium was given to facilitate intubation. Fentanyl infusion and seufluran were used to maintain anesthesia. Following classic median sternotomy, activated clotting time (ACT) was maintained above 400 seconds by heparin infusion at dose of 3 mg/kg. Hemodynamic status of patients, chronic obstructive pulmonary disease, carotid artery occlusion and pulsation and diameter of left internal thoracic artery (LITA) were taken into account when deciding whether or not to use LITA. Two-stage venous cannulation was used in isolated CAB surgeries whereas double venous cannulation and ascending aortic cannulation were used in other patients. The mean perfusion pressure was attempted to be maintained at about 80-90 mmHg. Cardiac arrest was achieved by cold crystalloid cardioplegy with potassium after placement of aortic cross clamps following systemic hypothermia. Topical hypothermia and blood cardioplegy at 20-minute intervals were used concomitantly for myocardial preservation. Efforts were made to maintain the hematocrit level above 25%. Left anterior descending (LAD) endarterectomy was performed in two patients. In these patients, LAD arteriotomy was extended until a healthy lumen was observed. Distal anastomosis was closed by 7/0 and 8/0 polypropylene. After completion of the distal anastomosis and valve replacement, LITA-LAD and proximal anastomosis were achieved by 6/0 polypropylene with partial aortic clamping on the beating heart. Following standard decannulation process, all patients were taken into the intensive care unit by closing sternotomy incisions in a normal fashion.

RESULTS

The most common additional pathology was chronic obstructive pulmonary disease in 6 cases (8.2%). LITA was used in 20% of the patients. The peak number of distal anastomoses was 6 during the surgical procedures and the mean number of distal anastomoses was 3.39±1.06. Previous myocardial infarction was present in 29 patients (39.17%) and one of them underwent ventricular septal defect repair (Table 2).

Hypertension was present 68.4% of all patients. (Table 1). The most common concomitant surgical procedure was aortic valve replacement. Aortic valve replacement was performed in 5.4% of patients (Table 2).

Six (8.2%) patients underwent urgent CAB surgery and the remaining 67 (91.2%) patients underwent elective CAB surgery.

Before the surgery, ejection fraction (EF) was lower than 30% in eight patients (10.9%). The mean cardiopulmonary bypass (CPB) time was 165.43±58.39 minutes, whereas the mean aortic-cross clamp time was 82.12±25.70 minutes. Eight (10.9%) patients required intra-aortic balloon pump (IABP) in addition to positive inotropic support. Revision was made in 4 (5.4%) patients. Mean intensive care unit and ward stay was 19.7±8.0 days. Three (4.1%) patients died intraoperatively and an additional three (4.1%) patients died in the postoperative period, and the early mortality rate within 30 days was 5.4% (4 patients). Two patients in the low EF group died on postoperative 40th and 43th day due to pulmonary infections during the hospital stay. Thus, total hospital mortality rate reached 8.2% (6 cases). Reparation was performed due to VSD following myocardial infarction in one of these patients. For one of the patients in the low EF group who died, surgery was performed in emergency conditions

Table 1— Preoperative Characteristics of the Patients

Characteristics	n	%
Gender		
Male	54	73.9
Female	19	26.1
Age		
75-79	63	86.3
80-84	6	8.2
85-↑	4	5.4
Atherosclerotic Risk Faktors		
Smoking	45	61.6
Hypertension	50	68.4
DM	24	32.0
Family History	20	27.3
Additional Disease		
Peripheral Arterial Disease	2	2.7
Serebrovascual Disease	1	1.3
Chronic Renal Insufficiency	6	8.2
Chronic Obstructive Lung Disease	29	39.7
MI		
Ejection Fraction		
%30 and ↓	8	10.9
%31-%50	23	31.5
Normal	42	57.5
Left Ventricular End Diastolic Pressure (LVEDP)		
20 mmHg and ↑	20	27.3

Table 2— Operative Characteristics of the Patients

Characteristics	n	%
Emergency Surgery	6	8.3
Elective Surgery	67	91.7
LİTA Using	20	20.7
Only CABG	59	80.8
CABG+AVR	4	5.4
CABG+MVR	3	4.1
CABG+AVR+MVR	1	1.3
CABG+Aneurism Repairing	2	2.6
CABG+Implanting Pacemaker	1	1.3
CABG+Endarterectomy	2	2.6
CABG+VSD	1	1.3

and in another patient who died, aortic valve replacement and coronary artery bypass surgery was performed. Another patient who died experienced persistent ventricular fibrillation during cannulation.

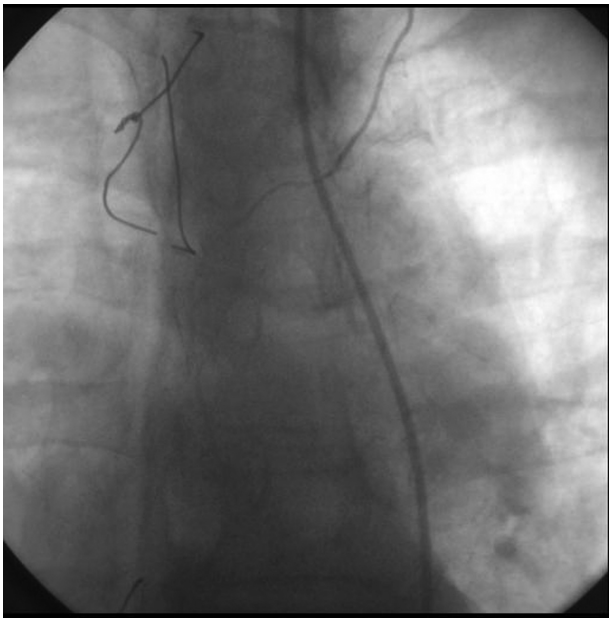

Figure 1— Functional occlusion of LITA-LAD anastomosis could be seen in conventional angiography

Angiography was performed in two patients who had a complaint of angina pectoris in control visits. When control angiographies were evaluated, saphen vein graft anastomosis in OM1 (obtuse marginal-1), OM2 (obtuse marginal-2) and RCA (right coronary artery) were found to be patent in one patient who had functionally occluded LAD-LITA anastomosis in the control angiography performed 2 years after CAB surgery (Figure 1). LAD (left anterior descending), Cx-PL (posterior lateral branch of circumflex artery) and RCA (right coronary artery) anastomoses were all patent in the other patient in the control angiography which was performed 3 years after the surgery (Figure 2).

Discussion

Age is considered as a risk factor for coronary artery disease. Although the mortality rate associated with coronary artery disease is decreasing in all age groups around the world, coronary artery disease remains an important cause of mortality in elderly patients (3). Coronary artery disease often involves the coronary artery and has a more rapid course (4). In a previous study in elderly patients, no significant difference was found between off-pump and on-pump surgical procedures (2). CAB surgery was performed on beating hearts in all cases. Because systemic atherosclerosis is common in elderly

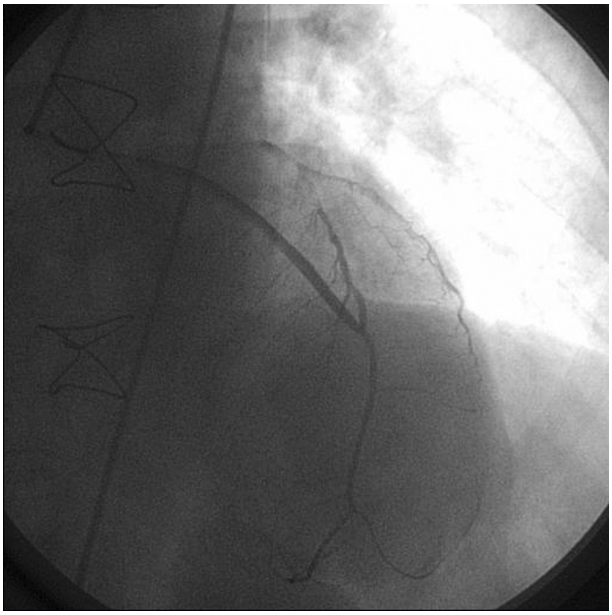

Figure 2— Patent LAD-Saphen anastomosis could be seen in conventional angiography.

patients who undergo CAB surgery, perfusion pressure must be high and one should not permit perfusion pressures below 80-90 mmHg during the surgery (5). We paid attention to maintaining the perfusion pressure above these values for providing high cerebral perfusion pressure.

In some series, arterial grafts have been used less often in elderly patients (6). LITA, one of these arterial grafts, has been most commonly used for grafting in LAD and, therefore, it has been recommended by ACC/AHA due to its durability and longer patency rates (7). However it should not be used in urgent surgery, mastectomy, obesity, preoperative weakness, left ventricular hypertrophy and severe pulmonary disease (8). As a result, LITA-LAD anastomosis was performed in 27.4% (20 patients) of our patients. In control angiographies of two patients which were performed 2 and 3 years after surgery, LAD-saphen anastomosis was found to be patent in one patient and LAD-LITA anastomosis was found to be functionally occluded in the other.

According to some institutional reports, surgical trauma is minimized by decreasing the number of anastomoses in older patients compared to younger ones (6). In the present study, we preferred complete coronary revascularization in all patients. The most significant determinants of mortality in coronary artery disease are the number of diseased arteries and the left ventricle EF (9). EF was ≤%50 in 42.4% (31 patients) of our patients. Two patients who died had an EF ≤%50. VSD following myocardial infarction was more frequent in patients who had single artery disease and who experienced the first myocardial infarction at an age over 65. This complication has a high mortality rate (10). One of the patients who died had VSD.

The other two patients who died underwent urgent surgical revascularization. Urgent surgery increases the mortality rate up to 3 fold. The mortality rate may reach up to 60% in patients with low EF and cardiogenic shock (2, 11). The mortality rate associated with combined CAB and valve surgery was reported to be 3-6% in CAB+AVR and CAB+MVR group and 9-12% in CAB+AVR+MVR group (12). In our study the other patient who died was in CAB+AVR group. The cross clamp time was longer in combined CAB and valve surgery. Prolonged cross clamp time has been reported as risk factor for early postoperative death (13). The early mortality rate of CAB in elderly patients has been reported to be as high as 24% in some studies; although it has gradually decreased in recent studies; it is still high (2, 14).

In conclusion, elderly patients cannot tolerate surgical trauma like younger patients. Factors such as low EF, urgent surgical intervention and concomitant valve replacement increase the intraoperative and postoperative mortality rates. Although the mortality rates of CAB surgeries performed in elderly patients is decreasing, older age is still an important risk factor. We believe that careful preoperative assessment and postoperative care with complete revascularization will further decrease the mortality and morbidity rates.

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