Journal Of Contemporary Medicine 2016;6(2): 81-86
DOI: 10.16899/ctd.41638

ORIGINAL ARTICLE
ORİJİNAL ARAŞTIRMA

Diyabetik Yaşlı ve İleri Yaş Hasta Gruplarında Atan Kalpde Koroner Arter Cerrahisinin Perioperatif ve Klinik Sonuçları

Off-Pump Coronary Artery Surgery in Diabetic Elderly and Octogenerian Groups: Perioperative Outcome and Clinical Results

Süleyman Sürer[1], İlker İnce[1], Ali Bulut[1], Uğursay Kızıltepe[1]

1 Kalp ve Damar Cerrahisi Kliniği / Sağlık Bakanlığı Ankara Dışkapı Yıldırım Beyazıt Eğitim ve Araştırma Hastanesi, Ankara

ABSTRACT

Objective: Increased risk for perioperative morbidity and mortality after beating heart coronary artery bypass grafting(CABG) in diabetic octogenarians and elderly can be in question. We aimed to compare the risk factors and the results of off-pump CABG between diabetic elderly and octogenarian groups.

Methods: This study retrospectively enrolled 37 diabetic patients with an age equal to or greater than 65 years who underwent isolated OPCAB at our department . Twenty-five patients were between 65 and 75 years of age while 12 patients had an age equal to or greater than 76 years. Each study group was assessed for preoperative properties, operative characteristics, and postoperative outcomes.

Results: Elderly patients had a significantly higher mean number of arterial anastomoses (p=0.045), body mass index (BMI) (P=0.001), number of smoking subjects (p=0.027), and number of subjects using ACE inhibitors (P=0.027) compared to the octogenarians. Octogenarians had a significantly greater mean number of venous grafts (1.5±0.61 vs 2.25±0.75, p= 0.008).

Conclusions: People of advanced age have been increasingly operated with CABG operation as persons 80 years old or older live longer than previously expected. Off-pump CABG was a beneficial surgical coronary revascularization method for both elderly and octogenarian patients.

Key words: elderly**,** octogenarians, diabetic, off-pump coronary artery bypass grafting

ÖZET

Giriş: İleri yaş diabetik hastalarda koroner arter cerrahisine bağlı perioperatif mortalite ve morbidite riski mevcuttur. Çalışmamızda yaşlı ve ileri yaş diyabetik hasta gruplarında atan kalpte koroner arter cerrahisinin risk faktörlerini ve sonuçlarını karşılaştırmayı amaçladık.

Gereç ve Yöntem: Bu çalışma hastanemizde geriye dönük olarak izole atan kalpte koroner cerrahisi yapılan 37 Diyabetik hasta yaş gruplarına göre 65 yaş ve üzeri olanlar alındı.Çalışmaya 65 - 75 yaş arasında 25 hasta ve 76 yaş ve üzerinde 12 hasta dahil edildi. Grupların preoperatif ve operatif özellikleri ile ameliyat sonrası sonuçları karşılaştırıldı.

Bulgular: Yaşlı hastalar, ileri yaşlı grubunda olan hastalarla karşılaştırıldığında ortalama arteryel anastomos sayısı(p=0.045),vücut kitle indeksi (P=0.001), sigara (p=0.027) ve ACE inhibitörlerini (p=0.027) kullananların sayıları istatistiksel olarak anlamlı yüksek bulundu. İleri yaşlı grubunda ise ortalama venöz anastomos sayısı (1.5±0.61 vs 2.25±0.75, p= 0.008) istatistiksel olarak anlamlı yüksek bulundu.

Sonuç: Yaşlı ve İleri yaşlı gruplarında beklenenden daha uzun yaşam süreleri nedeniyle koroner arter cerrahisi sıklığı artmaktadır. İleri yaşlı gruplarında atan kalpte koroner cerrahisini faydalı bir yöntem olarak önermekteyiz.

Anahtar Sözcükler: Yaşlı, İleri yaşlı, diabetik, atan kalpde koroner arter cerrahisi

Corresponding Author: Süleyman Sürer
Address: Ankara Dışkapı Yıldırım Beyazıt Eğitim ve Araştırma Hastanesi
E-mail: drsuleyman1@hotmail.com

Başvuru Tarihi/Received: 09-09-2015
Kabul Tarihi/Accepted: 17-10-2015

INTRODUCTION

Increased risk for perioperative morbidity and mortality after beating heart coronary artery bypass grafting in diabetic octogenarians and elderly can be in question. Coronary artery bypass grafting (CABG) is performed at an increased rate in older patients. However, elderly persons carry an increased morbidity and mortality risk associated with bypass procedure [1,2]. In contrast to younger individuals, the elderly has a greater number of risk factors for surgery as well as a worse functional level. Although they take the highest doses of medications for cardiovascular disorders, patients aged more than 80 years usually present with severe symptoms [3].

In the present study,we compared the perioperative morbidity and mortality after beating heart coronary artery bypass grafting in diabetic patients 65 to 75 years and those 76 years and older**.**

MATERIALS AND METHODS

This study retrospectively enrolled 37 diabetic patients with an age equal to or greater than 65 years who underwent isolated OPCAB at our department between November 2011 and June 2014. Twenty-five patients were between 65 and 75 years of age while 12 patients had an age equal to or greater than 76 years. The local ethics committee at our hospital approved our study. Each study group was assessed for preoperative properties, operative characteristics, and postoperative outcomes. All patients were operated using the off-pump technique, with none requiring conversion the technique into cardiopulmonary bypass. All patients had baseline demographic and clinical data; the baseline medical data were obtained from the medical records.

Anesthetic and surgical technique

Anesthesia induction was achieved by the administration of intravenous fentanyl citrate, midazolam, and vecuronium bromide; anesthesia was maintained by intravenous remifentanyl, vecuronium bromide and inhaled sevoflurane. Following harvesting bypass grafts, patients were anticoagulated with heparin, with the activated clotting time being kept above 250 s. All patients were operated with the off-pump technique.

Statistical analysis

Statistical analysis was performed on SPSS 15.0 for Windows software package with %95 confidence. Demographic characteristics such as age, BMI, and the number of smokers among males and females were compared using the independent samples t-test. Non-parametric continuous variables were tested with Kruskal Wallis H test for more than two groups. Logistic regression analysis was used to assess the impact of the variables on age occurrence.

RESULTS

Table 1 summarizes the demographic properties of the two age groups. The mean age of the elderly and octogenarian groups were 69.36±2.82 years and 82.98 ± 2.27 years, respectively. Elderly patients had a significantly higher mean number of arterial anastomoses (p=0.045), body mass index (BMI) (P=0.001), number of smoking subjects (p=0.027), and number of subjects using ACE inhibitors (P=0.027) compared to the octogenarians. Despite being statistically non-significant, preoperative history of stroke (12% vs 0%, p=0.537), chronic obstructive respiratory disease (12% vs 0%, p=0.537), carotid lesion (12% vs 8,3%, p=1.000), ejection fraction(30-50) rate (56% vs 50%,p=0.772) were higher in the elderly group. Both groups were similar with respect to the rates of various comorbidities such as diabetes mellitus (DM), stroke, chronic obstructive pulmonary disease (COPD), chronic renal dysfunction, hypertension, and peripheral vascular disease (PVD).

Octogenarians had a significantly greater mean number of venous grafts (1.5±0.61 vs 2.25±0.75, p= 0.008). They also had a greater, albeit statistically non-significant, number of anastomoses compared to the elderly group(3.25±0.75 vs. 2.88±1.27, p>0.05). The rate of endarterectomy (8% vs 6.7%, p=0,582) vasopressor use (8%vs 25%, p=0.304), postoperative dopamine use (56% vs 83.3%, p=0.149), postop-

Table 1: Demografic properties of the two age groups.				
		Age 65-75 years (n=25, %67,6)	**Age >75 years (n=12, %32,4))**	**P value**
Sex	Female	12 (48)	4 (33,3)	0,399
	Male	13 (52)	8 (66,7)	
BMI		26,54±4	22,36±2,7	***0,001***
Age ,yrs		69.36+-2.81	79.58+-1.38	
Previous serebrovascular disease		3 (12)	0 (0)	0,537
Chronic pulmonary disease		3 (12)	0 (0)	0,537
Carotid artery stenosis		3 (12)	1 (8,3)	1,000
Tobacco use		12 (48)	1 (8,3)	***0,027***
Peripheral vascular disaese		0 (0)	0 (0)	-
Chronic renal failure		3 (12)	3 (25)	0,367
Previous Myocardial infaction		5 (20)	3 (25)	1,000
Preoperative ejection fraction	(>50)	9 (36)	4 (33,3)	0,772
	(30-50)	14 (56)	6 (50)	
	(<30)	2 (8)	2 (16,7)	
Use of Levosimendan		3 (12)	3 (25)	0,367
Angiotensin converting inhibitors use		12 (48)	1 (8,3)	***0,027***

Data are number(percent), mean ± standard deviation

erative dobutamine use (24% vs 50 %, p=0.146), duration of intensive care unit stay (50.4±22.7 vs 59±28.2, p=0.446), as well as the amount of 24-hour drainage (510±212.1 vs 662.5±347.8, p=0.220) were greater in the octogenarians compared to the elderly group, although the differences did not reach statistical significance.

DISCUSSION

People of advanced age have been increasingly operated with CABG operation as persons 80 years old or older live longer than previously expected. Unfortunately, they also carry a greater surgical risk than patients at their 70s, owing to a greater burden of comorbid conditions and reduced physiological reserve of most organ systems associated with aging. Peterson et al. studied 24.461 octogenarians scheduled to undergo conventional CABG [4]. They concluded that octogenarians stayed longer at hospital, caused greater hospital costs, and died more frequently than younger subjects [4]. We similarly detected a longer duration of hospital stay in the octogenarians (50.4±22.7 vs 59±28.2, p=0.446). Stamou et al. attributed higher operative mortality and morbidity to a higher rate of CHF and COPD, greater Canadian Cardiological Society class, lower ejection fraction, more severe coronary artery disease, higher percentage of female gender, and more urgent operations than their younger counterparts [1]. Also being more prevalent in octogenarians in the current study, congestive heart failure and renal dysfunction reportedly increase operative mortality [5,6].

These positive results were linked to patient selection criteria, operative technique (off pump CABG, complete revascularization or not), and the quality of postoperative management. Our results suggested that octogenarians with worse physiological reserve would be more likely to have pulmonary or central nervous system complications when the duration of ICU and hospital stay were longer. Thus, it is of vital importance in octogenarians to limit intraoperative injury, extubated patients as rapid as possible, and help them recover at once. Off-pump bypass surgery

Table 2: Operative and postoperative patient characteristics

		Age 65-75 years (n=25, %67,6)	Age>75 (n=12, %32,4)	P value
Endartterectomy		2 (8)	2 (16,7)	0,582
Postoperative used of Dopamin		14 (56)	10 (83,3)	0,149
Postoperative used of Dobutamin		6 (24)	6 (50)	0,146
Postoperative used of Adrenalin		3 (12)	1 (8,3)	1,000
Use of Intra-aortic balloon pump		2 (8)	1 (8,3)	1,000
Postop EF	Good (>50)	6 (24)	4 (33,3)	0,736
	Medium (30-50)	17 (68)	8 (66,7)	
	Bed (<30)	2 (8)	0 (0)	
Mortality	Discharge	24 (96)	11 (91,7)	1,000
	Exitus	1 (4)	1 (8,3)	
Left atrial dimension (cm)		3,96±0,47	3,73±0,26	0,134
Number of distal anastomoses		2,88±1,27	3,25±0,75	0,151
Number of arterial anastomoses		1,28±0,46	1±0	***0,045***
Number of vein grafts		1,5±0,61	2,25±0,75	***0,008***
Number of sequential anastomoses		0,6±1,12	0,33±0,78	0,333
Postoperative used of Dopamin		6,57±3,74	6,85±3,42	0,741
Postoperative used of Dobutamin		10,83±3,76	6,67±4,08	0,068
Intubation time(hr)		10,42±4,64	9±2,45	0,794
Chest tube drainage (ml)		510±212,13	662,5±347,8	0,220
Intensive care unit stay time(hr)		50,4±22,72	59±28,24	0,446

is reportedly well suited for use in patients with high-risk features including respiratory, renal insufficiency or a history of cerebrovascular accident [7,8].

We are of the opinion that patient outcomes were favorably affected by performing off-pump CABG and complete revascularization in all patients.

In a study comprising 169 cases of conventional surgery and 60 off-pump surgeries, Hoff et al. reported that off-pump bypass surgery was associated with reduced ventilation need and stroke rate [9]. Because of severe calcification in the ascending aortas of octogenarians, aortic cannulation during conventional CABG may give rise to atheromatous microemboli, which causes neurological complications[10]. This highlights the importance of off-pump CABG without the need for aortic cannulation for averting neurological sequela [11]. Octogenarians had a favorable outcome in our study.

It seems that complete revascularization is of lesser importance in these patients compared to younger ones, possibly because of the much lesser life expectancy in octogenarians. That study reported that complete revascularization was achieved in 67% of patients in octogenarians and 81% of those younger [12]. In contrast, we found higher rates of complete revascularization in the octogenarian group (2.88±1.2 vs 2.25±0.75, p=0.151).

CABG mortality and morbidity in the elderly have been found to be augmented by the following factors. Preoperative: reduced LVEF (particularly below 30%), diabetes mellitus, recent (within 30 days) myocardial infarction, left main stenosis or three-vessel disease, atrial fibrillation, renal dysfunction, obesity, chronic obstruc-

tive pulmonary disease, smoking, and female gender [13]. A multi-center study retrospectively analyzing the data regarding the cardiac surgical outcomes of 22 high-volume centers in the United States reported that in-hospital mortality was 8.1% for isolated CABG; 10.1% for combined CABG and AVR; and 19.6% for combined CABG and MVR [14]. In our study, one mortality was observed in each groups. Postoperative bleeding, prolonged mechanical ventilation, congestive heart failure, gastrointestinal hemorrhage, cerebrovascular accident, and wound infection are among the other complications. Postoperative complications in our study were similar to those previously reported with regard to both incidence and nature [15,16].

Urgent operations, reduced left ventricular function, peripheral vascular disease or cerebrovascular disease, and mitral regurgitation and use of intraaortic balloon pump were found to predict increased mortality after CABG in octogenarians. There were 6 (9%) cases with in-hospital or 30-day mortality [16,17].

The deceased patients in our study had an EF as severely reduced as less than 30% and chronic respiratory disease, the latter having been worsened at the postoperative period. Two deaths were attributable to respiratory failure that was unresponsive to postoperative ventilatory support; they later had a need for intraaortic balloon pumping and inotropic medications. Two patients were lost to sepsis and multi-organ failure.

There are some limitations of our present study.First,this study had a non-randomized, retrospective nature, which were the major drawbacks. Furthermore, the study sample was small; we therefore recommend that further, large-scale studies be conducted in this field.

In conclusion, elderly patients aged 65 years or older also benefited surgical revascularization. Off-pump CABG was a beneficial surgical coronary revascularization method for both elderly and octogenarian patients.

Conflict of Interest

The authors have no financial disclosures to declare and no conflicts of interest to report.

REFERENCES

1. Stamou SC, Dangas G, Dullum MKC, Pfister AJ, Boyce SW, Bafi AS, et al. Beating heart surgery in octogenarians: perioperative outcome and comparison with younger age groups. Ann Thorac Surg 2000; 69: 1140–5. (PMID:10800808).
2. Curtis JJ, Walls JT, Boley TM, Schmaltz RA, Demmy TL, Salam N. Coronary revascularization in the elderly: determinants of operative mortality. Ann Thorac Surg 1994; 58: 1069–72. (PMID:7944752).
3. D. S. Fruitman, C. E. MacDougall and D. B. Ross. "Cardiac Surgery in Octogenarians: Can Elderly Patients Benefit? Quality of Life after Cardiac Surgery," American Journal of Cardiology, 1999;68(6): 2129- 2135.(PMID:10616989).
4. Peterson ED, Cowper PA, Jollis JG, Bebchuk JD, DeLong ER, Muhlbaier LH, et al. Outcomes of coronary artery bypass graft surgery in 24,461 patients aged 80 years or older. Circulation 1995; 92 (II):85-91. (PMID:7586468).
5. Williams DB, Carrillo RG, Traad EA, Wyatt CH, Grahowksi R, Wittels SH, et al. Determinants of operative mortality in octogenarians undergoing coronary bypass. Ann Thorac Surg 1995; 60: 1038– 43.(PMID:7574944).
6. Ko W, Krieger KH, Lazenby S, Shin YT, Goldstein M, Lazzaro R ,et al. Isolated coronary artery bypass grafting in one hundred consecutive octogenarian patients: a multivariate analysis. J Thorac Cardiovasc Surg 1991**;** 102: 532–8.(PMID:1681137).
7. Trehan N, Mishra M, Sharma OP, Mishra A, Kasliwal R. Further reduction in stroke after off-pump coronary artery bypass grafting: a 10-year experience. Ann Thorac Surg 2001; 72: 1026–32. (PMID:11565720).
8. Ascione R, Nason G, Al-Ruzzeh S, Ko C, Ciulli F, Angelini GD. Coronary revascularization with and without cardiopulmonary bypass in patients with preoperative nondialysis-dependent renal insufficiency. Ann Thorac Surg 2001; 72: 2020–5.(PMID:11789787).
9. Hoff SJ, Ball SK, Coltharp WH, Glassford DM Jr, Lea JW 4th, Petracek MR. Coronary artery bypass in patients 80 years and over: is off-pump the operation of choice? Ann Thorac Surg 2002; 74: 1340–3. (PMID:12400813).
10. 10. Freeman WK, Schaff HV, O'Brian PC, Orszulak TA,

Naessens JM, Tajik AJ. Cardiac surgery in the octogenarians: perioperative outcome and clinical follow-up.J Am Coll Cardiol 1991; 18: 29–35. (PMID:1904893).

11. Newman MF, Kirchner JL, Phillips-Bute B, Gaver V, Grocott H, Jones RH et al. Longitudinal assessment of neurocognitive function after coronary artery bypass surgery. N Engl J Med 2001; 344: 395–402. (PMID:11172175).
12. Hiroyuki Tanaka ,Takashi Narisawa,Mikio Masuda, Daizirou Kishi ,Takashi Suzuki. Coronary Artery Bypass in Patients 80 Years and Older:Comparison with a Younger Age Group Age Group. Ann Thorac Surg 2004;10: 85-89.(PMID:15209549).
13. Eagle KA Guyton RA, Davidoff R, Edwards FH, Ewy GA, Gardner TJ et al. ACC/AHA 2004 guideline update for coronary artery bypass graft surgery. A report of the American College ofCardiology/American Heart Association Task Force on Practice Guidelines (Committee to update the 1999 guidelines for coronary artery bypass graft surgery). Circulation 2004;1(9):1168-76.(PMID:15339866).
14. Alexander KP, Anstrom KJ, Muhlbaier LH, Grosswald RD, Smith PK, Jones RH,et al. Outcomes of cardiac surgery in patients > or =80 years: results from the National Cardiovascular Network. J Am Coll Cardiol 2000;35:731–738.(PMID:10716477).
15. Speziale G, Nasso G, Barattoni M.C, Esposito G, Popoff G, Argano V, et al. “Short-Term and Long-Term Results of Cardiac Surgery in Elderly and Very Elderly Patients,” The Journal of Thoracic and Cardiovascular Surgery 2011;141(3): 725-731. (PMID:20646718).
16. Ullery B.W, Peterson J.C, Milla F, Wells M.T, Briggs W, Girardi L.N, et al. “Cardiac Surgery in Select Nonagenarians: Should We or Shouldn’t We?” .The Annals of Thoracic Surgery 2008; 85(3): 854-860. (PMID:18291156) .
17. Bridges C.R, Edwards F.H, Peterson E.D, Coombs L.P and Ferguson T.B. “Cardiac Surgery in Nonagenarians and Centenarians”. Journal of the American College of Surgeons 2003;197(3): 347-356. (PMID:12946784).