Seksen yaş üzerinde kabul edilebilir mortalite ve morbidite ile koroner baypas cerrahisi

Coronary bypass surgery in octagenarians with acceptable mortality and morbidity

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ÖZET

Amaç: İleri yaştaki hastalarda morbidite ve mortalitenin yüksek olacağı öngörüsü bu grup hastalara yaklaşımda bazı çekinceler oluşturmaktadır. Bu tereddütün nedenleri arasında, bu yaş grubundaki hastaların yaşam beklentisinin göreceli olarak düşük oluşu ile birlikte, operasyonun bir parçası olan kardiyopulmoner bypass'ın (KPB) getirebileceği nörolojik, renal, pulmoner sorunları iyi tolere edemeyişleri sayılabilir.
Gereç ve yöntem: Çalışmamızda, Dr. Siyami Ersek Göğüs Kalp ve Damar Cerrahisi Eğitim ve Araştırma Hastanesi'nde 2008-2012 yılları arasında izole aortokoroner bypass yapılan hastalar retrospektif olarak incelendi. Hastalar; seksen yaş ve üzeri (çalışma grubu, n=131), 50-69 yaş arası (kontrol grubu, n=173) olarak ikiye ayrıldı. Her iki grup, preoperatif risk faktörleri ve postoperatif erken dönem (postoperatif 30 gün) sonuçları açısından karşılaştırıldı.
Bulgular: Tüm yaş grupları en az bir komplikasyon gelişmesine göre incelendiğinde; çalışma grubunda olanların tahmini rölatif riski, kontrol grubuna göre 2,5 olarak bulundu (p<0.05). Diyabetli olanların olmayanlara göre tahmini rölatif riski 2 idi (p<0,05). Euroscore standart değeri, düşük risk grubunda olanlara göre çok yüksek risk grubunda olanların tahmini rölatif riski 5,8 idi (p<0,05). NYHA sınıflaması 3 ve üzerinde olanların altında olanlara göre tahmini rölatif riski 1,8 idi.
Sonuç: Uygun zamanda ve uygun değerlendirme ile kabul edilebilir riskle 80 yaş üzerindeki hastalarda aortokoroner bypass cerrahisinin güvenle yapılabileceği kanaatindeyiz.
Anahtar Kelimeler: Seksen yaş, koroner baypas cerrahisi
Kısa Türkçe başlık: Seksen yaş üzerinde koroner baypas cerrahisi

ABSTRACT

Objective: *The prudence for high morbidity and mortality in elderly patients might be a limitation for a proper approach to this group of patients. The main reasons for this hesitation are the relatively low life expectancy in these patients and the possible neurologic, renal and pulmonary problems which might not be well tolerated if occur as a consequenceofcardiopulmonarybypass.*
Materials and metods: *Patients underwent isolated coronary artery bypass surgery between 2008 and 2012 were evaluated retrospectively. The patients were grouped as the Study Group (Group I, n=131, age 80 years-old and over), and the Control Group (Group II, n=173, age between 50 and 69 years-old). Both groups were compared to each other in terms of preoperative risk factors and results in the postoperative early period (30 dayspostoperatively).*
Results: *When two groups were evaluated according to at least a single complication taking place, the estimated relative risk was 2.5 for the Study Group when compared to the Control Group (p<0.05). The diabetic patients' estimated relative risk was 2 when compared to non-diabetics (p<0,05). According to Euroscore standard values, the high risk group had a estimated relative risk value of 5.8 when compared to low risk group (p<0,05). NYHA Class III and higher patients had a estimated relative risk value of 1.8 when compared to those in more favorable condition.*
Conclusion: *We believe coronary artery bypass surgery can be applied safely with an acceptable risk to those over 80 years-of-age with proper timing after proper evaluation.*
Key words: *Octagenerians, coronary bypass surgery*
Kısa İngilizce başlık: *Coronary bypass surgery in octagenarians*

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Introduction

Cardiovascular diseases comprises an important place among other illnesses which are encountered during the natural course of aging. Technologic improvements in cardiovascular surgery and increased experience make it possible for the elderly to be treated by means of surgical and interventional procedures.

The percentage of the elderly is increasing in the population. The incidence of coronary artery disease increases sharply after the fourth decade proportional to age. Cardiovascular diseases are frequently encountered over 80 years-of-age (1,2). Edmunds et al. stated that the prevalance of symptomatic cardiac disease in this age group is 40% (3). Increase in life expectancy and the population over 80 mandate increase in cardiac surgical interventions in this age group as a result of more accessible diagnostic modalities or in cases when medical treatment cannot achieve the desired well being (4,5).

In this study, preoperative risk factors and their impact on the postoperative early period in patients 80 years-of-age and over are compared to those of patients who are 50 to 69 years-of-age.

Materials and Methods

Patients operated for isolated coronary artery disease between 2008 and 2012 in our centre were evaluated retrospectively and were divided into 2 groups. Group I consisted of all patients who were 80 and over at the time operation while Group II consisted of randomly chosen patients underwent isolated coronary bypass surgery and were between 50 to 69 years-of-age at the time of operation.

All cases were evaluated according to preoperative risk factors, accompanying diseases [creatinine clearence, spirometry, cardiac condition, diabetes mellitus, hypertension, cerebrovascular event, peripheric arterial disease], Euroscore, intra-operative data [cross clamp (CC) time, cardiopulmonary bypass (CPB) time, number of grafts, need for inotrops, need for intraaortic balloon pump (IABP), method of myocardial protection], postoperative data [intensive care unit stay, cardiac condition, arrhythmia, wound infection or mediastinitis, cerebrovascular event, renal insufficiency-creatinine clearence] to assess the effect on mortality and morbidity. The demographics and the medical data of both groups are shown in Table 1.

Table 1. Distribution of preoperative demographic and medical data.

	Group		
	Group I; ≥80 years (n=131)	Group II; 50-69 years (n=173)	*p value*
Gender (male/female)	39/92	34/139	0,04
Smoking	55(%42,3)	33 (%19,1)	0,0001
History of AMI	43 (%32,8)	30(%17,3)	0,001
Diabetes	47(%35,9)	24(%13,9)	0,0007
Hypertention	83 (%63,4)	41 (%23,7)	0,0003
Renal insufficiency	3 (%2,3)	-	-
CVE	7 (%5,3)	5(%2,9)	0,21
Carotid disease	34 (26,8)	20(%11,6)	0,02
PAD	14 (%10,8)	18 (%10,4)	0,91
COPD	32 (%24,4)	19 (%11,0)	0,002

Exclusion criteria included previous open heart surgery and additional cardiac surgical procedures at the time of coronary bypass surgery.

SPSS software package was used for statistical analysis. For the comparison of categorical variables chi-square test and Fisher exact test were used. Statistical significance level was considered as $p<0,05$.

Results

Patients in Group I was consisting 43.1% (n=131) of the study population while Group II consisted 56.9% (n=173) of the patients. The difference in gender distribution of the Groups were statistically significant ($p<0,05$); 70.2% and 80.3% of the patients in Group I and Group II were male, respectively.

History of smoking was positive in 42.3% of patients in Group I and 19.1% in Group II. This difference was statistically significant ($p<0,05$).

History of diabetes, acute myocardial infarction (AMI) and hypertension was significantly high in Group I ($p<0,05$). Both Groups were similar in terms of cerebrovascular events ($p>0,05$). Carotid artery stenosis was significantly high in Group I (26.8%) when compared to that of Group II (11.6%) ($p<0,05$). There was no difference both Groups when peripheric arterial disease was concerned and the incidence of chronic obstructive pulmonary disease (COPD) was significantly high in Group I (24.4%) compared to that of Group II (11.0%) ($p<0,05$).

Mortality rates were 12.2% and 2.9% for Group I and II respectively and the difference was statistically significant ($p=0,0002$) (Table 2).

Table 2. Age and mortality distribution between the groups. *(p=0,0002)*

		GRUP					
		Group I; ≥80 years		Group II; 50-69 years			
		n	%	n	%	Total	%
Mortality	no	115	87,8	168	97,1	283	93,1
	yes	16	12,2	5	2,9	21	6,9
Total		131	100,0	173	100,0	304	100,0

The rate of postoperative complications in both groups were listed in Table 3. Among the complications encountered, only renal insufficiency was significantly high in Group I. Group I had significantly high EuroSCORE and logistic EuroSCORE values (p<0,05).

Patients are evaluated according to the postoperative complications encountered and their respective EuroSCORE risk scores are listed as low risk, high risk and very high risk. Renal insufficiency, pulmonary insufficiency and mortality were significantly high in high risk and very high risk categories (p<0,005) while there was no difference in other variables (Table 3).

Tablo3. Distribution of complications between the groups.

	GROUP						
		Group I; ≥80 years		Group II; 50-69 years		Total	
		N	%	N	%	N	%
CVE	no	122	93,1	167	96,5	289	95,1
	yes	9	6,9	6	3,5	15	4,9
							p=0,27
Peroperative MI	no	126	96,9	161	93,1	287	94,7
	yes	4	3,1	12	6,9	16	5,3
							p=0,22
Pacemaker	no	126	96,2	164	94,8	290	95,4
	yes	5	3,8	9	5,2	14	4,6
							p=0,76
Atrial fibrillation	no	116	88,5	144	83,2	260	85,5
	yes	15	11,5	29	16,6	44	14,5
							p=0,25
Renal Insufficiency	**no**	**114**	**87**	**168**	**97,1**	**282**	**92,8**
	yes	**17**	**13,0**	**5**	**2,9**	**22**	**7,2**
							p=0,001
Pulmonary insufficiency	no	112	85,5	158	91,3	270	88,8
	yes	19	14,5	15	8,7	34	11,2
							p=0,15
Sternal infection	no	129	98,5	167	96,5	296	97,4
	yes	2	1,5	6	3,5	8	2,6
							p=0,47
Bleeding complications	no	121	92,4	165	95,4	286	94,1
	yes	10	7,6	8	4,6	18	5,9
							p=0,39
GI complications	no	125	95,4	166	96,0	291	95,7
	yes	6	4,6	7	4,0	12	3,9
Total		131	100,0	173	100,0	304	100,0
							p=1,0

Similarly, when logistic EuroSCORE values are categorised in low risk and high risk categories, renal and pulmonary insufficiency as well as mortality were significantly high in high risk category (p<0.05) while there was no difference in other variables.

Odd's ratio for both Groups were listed in Table 4 according to the complications seen. Estimated relative risk for renal insufficiency was 5 times higher in Group I compared to Group II and this difference was statistically significant (p<0,05). There was no statistical difference in other variables.

Table 4. Distribution of postoperative complications between the groups.

Complication	Odds ratio*	95% confidence interval	p
CVE	2,05	0,71-5,9	0,17
Peroperative MI	0,42	0,13-1,35	0,13
Pace maker	0,72	0,23-2,2	0,76
Atrial fibrillation	0,64	0,32-1,25	0,25
Renal insufficiency	**5,0**	**1,7-13,9**	**0,002**
Pulmonary insufficiency	1,78	0,87-3,66	0,15
Sternal infection	0,43	0,08-2,17	0,47
Bleeding complications	1,7	0,65-4,47	0,39
GI complications	1,13	0,37-3,4	0,51

*Predicted relative risk of Group I according to Group II.

Estimated relative risk for mortality for patients with COPD was 4.3 times higher compared to study population. There was significant difference between the Groups (p<0,05) while there was no significant difference in other variables.

Estimated relative risk for mortality for patients with carotid disease was 3.9 times higher compared to study population. The risk was significantly higher for Group I (p<0,05).

When both Groups were compared to each other in terms of complications for patients having peripheric arterial disease, there was no statistical difference between the Groups.

When off-pump coronary bypass surgery is concerned, the mortality rate was slightly higher in the study population and patients in Group I who received on-pump coronary bypass surgery (p<0,05). There was no significant difference in other variables (p>0,05).

Discussion

Despite all the progress in cardiac surgery, morbidity and mortality following coronary arterial bypass still remain as the major concern (6,7). While mortality rates for coronary artery bypass grafting were 3% in pre-1970s and 0.4-0.5% in early 1980s, it rose to 1.5-

2% in the current era (8). The main reason in this rise is the change in the patient population referred to surgery. Depending on the advances in interventional cardiology more patients with poor ventricle functions and with multi-vessel disease have become candidates for surgery as well as the elderly and the high-risk patients (9-11).

Peri and postoperative low cardiac output is frequently encountered as an important factor for morbidity and mortality in the elderly patients. Rao et al. founded that patient age over 70 years increases the tendency to develop low cardiac output state (12). In our study, postoperative need for inotropes was 16% (n=21) and for IABP was 0.5% (n=7) for Group I. The rates were 26% (n=45) and 0.3% (n=6) respectively for Group II. There was no difference between the groups concerning the cardiopulmonary bypass and cross-clamp times. Diffuse atherosclerosis and irreversible myocardial fibrosis as a consequence of aging, inadequate myocardial perfusion and myocardial protection may explain postoperative development of low cardiac output.

EuroSCORE is a simple and effective system to assess the risk for morbidity and mortality in open heart surgery (13-15). In our study, postoperative renal insufficiency was significantly higher in Group I compared to Group II ($p<0.001$) however, there was no significant difference in other variables causing morbidity and mortality. In the literature, renal and pulmonary insufficiency and stroke is highly associated with mortality in the elderly patients undergoing coronary bypass surgery (16,17).

Our study demonstrated that mortality, renal and pulmonary insufficiency were relatively higher in the high and very-high risk categories in Group I according to EuroSCORE system although it was high in Group I as well. This finding is consistent with those published in the litereture. Surprisingly the rate of postoperative cerebrovascular events in the elderly was lower than that of the reports published elsewhere (17). This might be attributed to the preoperative carotid Doppler ultrasonography applied to all patients, and the necessary precautions taken for those who had stenosis detected. We believe close monitorisation of the perfusion pressure during cardiopulmonary bypass or off-pump surgery in those who are eligible may avoid this risk.

Main objective of this study was to demonstrate the feasibility of coronary artery bypass grafting in the elderly patients. İmmediate survival of octagenarians undergoing coronary artery bypass grafting may be even better than previously estimated (18). Therefore when we neglected the effect of age in EuroSCORE for both groups and reconcidered the results for mortality and mobidity; mortality, postoperative renal and pulmonary insufficiency were significantly high in high and very-high risk categories in both Groups. What differed was the higher incidence of peroperative myocardial infarction and postoperative bleeding and second-look surgery. These findings suggest the physiologic alteretions with age tend to increase postoperative morbidity and mortality, howeverer, accompanying preoperative factors (i.e. acute myocardial infarction, peripheric arterial disease, renal insufficiency, high NYHA score, emergent operation, neurologic dysfunction, ejection fraction <40%) have a stronger effect on postoperative morbidity and mortality.

There is reduction in the glomerular filtration rate due to aging and the elderly patients frequently use diuretics for the control of blood pressure or congestive cardiac failure. It is well known that radioopaque dyes utilised for cardiac cathaterisation and angiography have adverse effects on renal function and they may cause renal insufficiency in those having borderline glomerular filtration. Preoperative BUN, creatinine and creatinine clearence values shoud be studied and the possible postoperative need for dialysis or ultrafiltration should be kept in mind for those who has 50% of creatinine clearence less than expected. It is the adverse effects of cardiopulmonary bypass itself which determines the postoperative renal insufficiency in those having lower glomerular filtration either due to aging or due to diabetic nephropathy (19). In our study, the incidence of diabetes (35.9%) and postoperative renal insufficiency was significantly high in Group I.

Many studies refer old age as a predictive factor for long intensive care unit and hospital stay. Complications (low cardiac output, atrial fibrillation, cerebrovascular events) which are more frequent in the elderly increase the duration of hospital stay (20-24). We didnot find any statistically significant difference between the ICU and hospital stay for both groups. When subgroups are studied, hospital stay was longer for patients having longer cardiopulmonary bypass and cross-clamp times, preoperative renal insufficiency, neurologic sequele and loewr ejection fraction than 40% in both Groups.

When elderly patients are concerned, the main objectives of coronary artery bypass grafting are the relief of anginal symptoms, avoiding myocardial infarction thus sudden cardiac death, preserving

myocardial functions and improving quality of life. This elderly population has less metabolic reserves and diminished oral intake and therefore they require a detailed preoperative assessment, proper choice of procedure and a well-organised postoperative care compared to that of applied to standard adult patients.

These patients should have immediate and coordinated priority access to the clinics they are followed-up after discharge from the hospital.

We believe open heart surgery may be applied safely providing a beter and healthier life to this elderly patient population after a thorough and well planned organisation.

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