

SOL İNEN KORONER ARTER BYPASS GREFT POZİSYONUNDA SAFEN VEN VE SOL İNTERNAL MAMARİAL ARTERİN AÇIKLIKLARININ KARŞILAŞTIRILMASI

Comparison of Patency of the Saphenous Vein and Left Internal Mammary Artery in Left Descending Coronary Artery Bypass Graft Position

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ÖZET

Amaç: Bizim bu çalışmadaki amacımız, koroner bypas operasyonlarında (CABG), sol anterior desenden koroner arterin (LAD) revaskülarizasyonunda kullanılan sol internal mamarial arter (LİMA) ile safen ven greftinin (SVG) klinik sonuçlarını ve uzun dönem açıklık oranının değerlendirilmesidir. İlave olarak safen ven greftinin diğer koroner arter pozisyonlarında ki açıklık oranını da değerlendirildi.

Metot: Ocak 2012-Kasım 2014 arasında hastanemizde, daha önce koroner bypas cerrahisi geçirmiş ve iskemik semptomları olan 178 hastaya koroner angiografi yapıldı. Bu hastaların preoperatif ve postoperatif bilgilerini değerlendirildi. Hastalar LAD ye yapılan anastomozuna göre LİMA grubu ve SVG grubu olarak ikiye ayrıldı. Greftte, oklüzyon, string sign veya %80 den daha fazla darlık varsa greft yetmezliği olarak tanımlandı. Diğer koroner arterleri de subgrup analizi olarak değerlendirildi.

Sonuç: Her iki grup arasında preoperatif olarak komorbite, yaş ve acil operasyona alma açısından önemli bir fark yoktu. Hastaların ortalama takip zamanı SVG grubunda 48 ay, LİMA grubunda da 60 ay oldu. LİMA greftlerinin oklüzyon oranı, SVG grubundan daha düşüktü (%9.9%vs. %22.2 p=0.001). subgrup analizlerinde SVG in patensi, en düşük olarak diyagonal koroner arterde bulundu(%46.9, p=0.005).

Tartışma: Venöz veya arteriel konduitin seçimi, hem greft patensi için, hem de semptomsuz periyodun elde edilmesinde sol koroner desenden arter için önemlidir. Ayrıca safen ven grefti diagonal artere anastomoz edildiği zaman en düşük açıklık oranına sahiptir.

Anahtar Kelime: *Coronary artery bypass grafting; Left internal mammary artery; Saphenous vein graft, patency, long-term*

ABSTRACT

Objective: We aimed to evaluate long-term patency rates and clinical outcomes of the saphenous vein (SVG) and left internal mammary artery (LIMA) in left anterior descending coronary artery (LAD) position to investigate the optimum conduit for coronary artery bypass graft (CABG) operations. In addition we investigated the SVG patency in the other coronary artery positions.

Methods: From January 2012 to November 2014, there were 178 patients who were previously undergone coronary artery bypass surgery and had ischemic symptoms, were restudied with coronary angiography in our hospital. We evaluated the preoperative and postoperative data of those patients. The patients were divided into two groups according to the graft anastomosed to LAD; LIMA group and SVG group. Grafts are defined as failed if there was occlusion, string sign, or greater than 80% stenosis. We analyzed also other coronary artery targets by subgroup analysis.

Results: There were no significant differences between each group in preoperative comorbidity, age, or urgency. The mean follow-up time of the patients were 48 months in SVG group and 60 months in LIMA group. Occlusion rates of the LIMA grafts were lower than SVG (9.9% vs. 22.2% p=0.001). Subgroup analysis revealed that, as a target vessel diagonal coronary artery has the lowest SVG patency rates (46.9%, p=0.005).

Conclusion: Selection of arterial or venous conduit for the left descending coronary artery has significantly affected both patency rate and symptom-free period. In addition, saphenous vein grafts has the lowest patency rates when anastomosed to the diagonal artery.

Keywords: *Coronary artery bypass grafting; Left internal mammary artery; Saphenous vein graft, Patency, long-term*

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INTRODUCTION

The coronary artery bypass grafting (CABG) began in the late 60s [1]. One of the biggest advances in CABG is the anastomoses of internal mammary artery (IMA) to the left anterior descending (LAD) branch of the left coronary artery [1, 2]. A great number of reports have been published concerning the advantages of using arterial conduits in CABG instead of the saphenous vein (SVG) grafts [1-5].

However recent studies have shown that radial artery (RA) and SVG have similar failure rates with no evidence supporting the superiority of the RA over the SVG [6, 7]. Saphenous vein can easily be harvested for multivessel coronary artery disease, have sufficient length and diameter. As a result SVG is commonly used for CABG operations [8].

Therefore, the main problem in this graft wonder which patients and which are subject failed to establish that the target vessel.

This study aimed to compare retrospectively, the patency rates of the LIMA and SVG anastomosed to LAD and in addition, evaluate the SVG patency rates according to the target coronary vessels of the patients with recurrent ischemic symptoms.

METHODS

Patients

We screened the patients who had undergone prior CABG surgery and scheduled for coronary angiography between October 2012 and October 2014. In the past 10 years 7658 had undergone CABG in our hospital. 178 of them who were scheduled for conventional coronary angiography due to ischemic symptoms were included in this study. Institutional Review committee approved this retrospective study.

The patients were divided into two groups according to the grafts used for LAD anastomoses. The left IMA (LIMA) to LAD group consisted of 142 patients including 79 (55.6%) male patients. Mean age was 63±12 years (ranging from 39 to 88 years). (Table 1). SVG group (36 patients) included 21 (58.3%) patients with a mean age

of 60±8 years. Preoperative similar demographic characteristics of these two groups are shown in Table 1.

Preoperative clinical features, operative characteristics, complications, and length of stay in the intensive care unit were recorded. Preoperative parameters of the patients were determined as; age, gender, left ventricular ejection fraction, chronic pulmonary disease (COPD), chronic renal failure (CRF), hypertension, and diabetes mellitus (DM). The preoperative clinical characteristics, postoperative complications, duration of ICU and hospital mortality rates of the groups were compared (Table 1).

Table1: Control angiography and clinical outcomes

	SVG to LAD (n=36)	LİMA to LAD (n=142)	p
Preoperative			
Age	60 (40-78)	63 (39-88)	0.648
Gender (M)	21 (58.3%)	79 (55.6%)	0.764
Diabetes mellitus	16 (%44.4)	55 (38.1%)	0.432
Myocardial infarction	9 (25%)	35 (25%)	0.977
Hypertension	20 (55.5 %)	77 (53.4%)	0.894
EF %	38.5 (35-65)	44 (15-65)	0.835
COPD	7 (19.4%)	30 (20.8%)	0.591
Postoperative			
CHF(NYHA 3-4)	3 (8.4%)	10 (7%)	0.790
Renal failure	1 (2.7%)	4 (2.7%)	0.967
Occlusion	8 (22.2%)	14 (9.7%)	0.041
Graft number (n)	3 (2-4)	3 (1-4)	0.293
Diagonal artery	6	36	0.962
Circumflex artery	19	67	0.316
Right coronary artery	14	61	0.622
(NYHA 3-4)	6 (16.6%)	24(17%)	0.946
IABP	4 (11.1%)	5 (3.4%)	0.075
EF %	32.5 (30-65)	40 (15-65)	0.035
Patient without occluded graft	6 (16.6%)	49 (34.5%)	0.172
CHF=chronic heart failure, COPD=chronic obstructive pulmonary disease, EF=ejection fraction, IABP=intra-aortic balloon pump, M=male, NYHA=New York heart association,			

Coronary angiography

Coronary angiography was done while postoperative ischemic symptoms have been detected. Grafts are defined as failed if there was occlusion, string sign, or greater than 80% stenosis.

Statistical analysis

Results were summarized using descriptive statistics. Data were expressed as numbers and class for categorical variables and mean±standard deviation or median and range for continuous variables according to distribution of the data. Categorical data were compared with χ^2 test or Fisher’s exact tests. Normally distributed data were compared using Student’s t test and Tukey tests, while data with skewed distribution were compared by using Kruskal Wallis Test. The difference was considered statistically significant if $p < 0.05$. All statistical analyses were performed by using SPSS 18 (SPSS Inc., Chicago, IL, USA) software.

RESULTS

Coronary angiograms of the patients were scanned between December 2012 and December 2014. 178 patients who had undergone prior CABG were included in the study. Preoperative demographic characteristics of the two groups were similar. (Table1). Left ventricle ejection fraction rates were decreased in the SVG group at the time of angiographic control.

One hundred seventy-five grafts were defined as occluded in a total number of 536 grafts. Graft patency rate was 67.4% and average median follow-up time was 64.5 (0-108) months. Despite being symptomatic 50 (35.2%) patients in the LIMA group, and 6 (16.6%) patients in SVG group did not have any graft occlusion. Fourteen (9.9%) of the LIMA grafts were occluded after a mean follow-up of 69.3 months (Table 2). Postoperative symptom-free period was higher in LIMA-LAD group compared to the SVG group ($p=0,001$).

In terms of congestive heart failure and the need for IABP, there were no statistically significant differences between the groups. Saphenous vein graft occlusion rate was higher than the LIMA graft (Table 2). The time without ischemic events was decreased in the Ao-LAD (SVG) group.

Table 2. Graft patency rates and following time according to the groups

	Total graft (n)	Patent Graft (mean)	Following time (months)	p
Graft				
LIMA-LAD	142	128 (90.1%)	69.3 (0-108)	0.001
Ao-LAD	36	28 (77.8%)	49 (8-108)	
Diabetes mellitus				
Diabetic	72	9 (12.5%)	70.2 (0-108)	0.019
No diabetic	106	12(11.3)	60.4 (0-108)	
Gender				
Female	78	7(9.8%)	62.4 (9-108)	0.377
Male	100	15 (15%)	66.1(0-108)	
Pulmonary disease				
COPD	37	2 (5%)	69.4 (9-108)	0.373
Control	141	15 (10.6%)	66.5 (0-108)	
Renal disease				
CRF	5	1 (10.6%)	76 (0-108)	0.327
Control	173		63.6 (0-108)	

LAD=left descending coronary artery, LIMA=left internal mammary artery, Ao=aorta, COPD=chronic obstructive pulmonary disease, CRF=chronic renal failure

Subgroup analysis showed that SVG patency rate was significantly lower in the diagonal coronary artery position compared to the other coronary arteries ((46.9%, $p=0.005$). Saphenous vein graft patency was highest in LAD position compared to the other coronary arteries (77.8%, $p=0.017$) (Table 3).

Table 3. Subgroup analysis of the objectives and SVG coroner artery patency rate

	LAD	CX	DI	RCA	p
Occlusion (n)	8	54	51	48	0.008
Rate within the group	22.2%	38.6%	53.1%	39.3%	
Total (n)	36	140	96	122	
p (with in occlusion)	0.017	0.492	0.005	0.681	

LAD=left descending coronary artery, CX=circumflex coronary artery, RCA=right coronary artery, DI=diagonal coronary artery

DISCUSSION

In this study, the saphenous vein graft and LIMA grafts were compared according to the long-term patency rates. In addition saphenous vein graft patency rates were also examined according to the distal anastomotic site. Preoperative and postoperative data of the patients were recorded and their effects on graft patency rate were investigated. LIMA to LAD anastomosis patency rate was higher than the saphenous vein graft (90.1% versus 77.8%, $p=0.001$). In addition, asymptomatic ischemic follow-up period was higher in these patients. The effects of the preoperative patient characteristics on anastomotic patency were not significant. However symptom-free duration was significantly lower in diabetic patients. Saphenous vein graft patency rate was higher in the LAD anastomosis site while the patency rate was detected lowest in diagonal anastomosis region.

Today the LIMA is considered as the first option for coronary artery bypass grafting surgery. The LIMA has the highest patency rates due to its histologic features and adaptation features according to the coronary flow. Unfortunately, each individual has only one LIMA. The other commonly used arterial graft is the radial artery (RA). Cohen et al. [4] have reported that cumulative angiographic patency rates of radial artery at postoperative 3 months, and postoperative 1 year is approximately 97.5% and 93% respectively. Hata et al. [9] reported a RA graft patency rate of 98.1% in 3-year follow-up, which was superior to SVGs. Cumulative graft patency rates at 8 years were 74.3% for RA and 64.7% for SVG. Although results of SVG patency rate are lower. Fremes et al. [5] has reported that up to 15% of SVGs are occluded within the first postoperative year, and at 10 years postoperatively only 50–60% of SV are patent.

However, some studies showed that patency rate of SVGs were similar to the RA. Benedetto et al. [6], however, reported a pooled analysis of recent randomized trials and showed that cumulative graft failure rates were 14.1% and 14.6% for the RA and SVG, respectively, with no significant advantage for the RA. Furthermore, another study indicated that the patency rate of RA grafts was inferior to that of vein grafts [7].

Saphenous vein grafts patency rate may vary also according to the patient's characteristics and target coronary region. Luca et al. [10] have shown that patency rates of the SVG anastomosed to RCA, diagonal, and CX territories were 65%, 75.5%, and 78% respectively. Tatoulis et al. [11] have reported that patency rates of RA graft anastomosed to LAD, CX, and RCA territories were 90.7%, 92.5%, and 86.7%, respectively. Campbell et al. [12] has published the results of CT angiography of 130 asymptomatic patients. Graft occlusion rate was 23.5% and the average follow-up time was 7.3 years. Patency of the grafts had shown significant differences according to the target vessel. SVG patency rate was found 66.7% when anastomosed to the left anterior descending coronary artery. In our study, graft patency rates were determined at different distal anastomotic sites. Saphenous vein graft patency rates for the LAD, diagonal, RCA, and CX territories were 77.8%, 46.9%, 60.7% and 61.4 %, respectively. SVG to LAD anastomoses caused both early ischemic symptoms and a high rate of graft occlusion. Saphenous vein graft occlusion rate was higher when compared to the previous studies. But our study group was consisted of the patients who had ischemic symptoms.

SVG demonstrates a significant deterioration with up to 18-26% of occlusion rates in first postoperative year [13]. Long term survey depends on graft patency and native vessel disease [14]. In recent years, graft management strategies have changed. Application of secondary prevention methods and modification of lifestyle factors have had a powerful effect on the patency of SVGs. Improvements in graft-harvesting techniques, the use of intensive statin therapy for preventing atherosclerosis in the SVGs, and inclusion of 2 or more anti-platelet agents to prevent thrombus formation associated with plaque rupture, have all contributed to improvement of SVG patency rates [5, 11, 15]. In this study, a significant effect of risk factors on graft occlusion could not be shown. However, duration without symptom was shorter in patients with diabetes.

The Limitations of the Study

The limitations of our study include the relatively small number of patients with a highly prevalent disease, lack of data for other adverse outcomes during the

follow-up period and the possibility of missing medical records.

CONCLUSIONS

Our analysis revealed that LIMA graft patency rate was greater than SVG. SVG patency rates decrease when anastomosed to the diagonal branch of the left descending coronary artery. No significant differences were detected in the preoperative characteristics between the occluded and patent grafts.

Declaration of conflicting interests

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