

# COMPLETE ARTERIAL REVASCULARISATION IN ELDER PATIENTS

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*Aim: The aim of this study was to evaluate the early and mid-term results of total arterial myocardial revascularization in elderly patients.*

*Material and Method: 65 patients aged 60 years and older (mean 64.8±5.4, range 60-78 years) who underwent total arterial myocardial revascularization between January 2002 and June 2004 were evaluated prospectively. 41 patients (63.1%) had three-vessel coronary artery disease, 18(27.7%) had two-vessel disease and 6(9.2%) with left main lesion. 22 patients had an old myocardial infarction and 11 unstable angina pectoris. Mean EF was 55%. All patients underwent TAMR. In total 167 distal anastomoses were constructed (2.6 per patient) Pedicled LITA and RITA, free RITA and Radial arter were used as single or composite T-or Y- graft.*

*Results: Patient were followed-up in a mean period of 17.6±7.3 months (range 1-28 month). There was no occluded grafts in the early postoperative period (less than 90 days) patency 100%. Late(mean 16±2 month) LITA patency was 98.1% (one graft occluded), RITA patency was 93.4% (one graft occluded) and RA patency was 93.2% (three grafts occluded).One patient died in this period (1.5%) one underwent PTCA (1.5%) two suffered angina pectoris (3.1%), there was no reoperation in this period.*

*Conclusion: This study showed that using only arterial conduits in coronary bypass surgery in elderly (patient aged over 60 years) were clearly evident with respect to higher patency rate, surgical reoperation and freedom from cardiac events.*

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The choice of graft in CABG has been searched many times. In recent years, due to coronary reoperations, use of arterial grafts and thought of complete arterial revascularisation became much more popular (1). Nowadays the researches focus on postoperative hemodynamic effects in early period and patency rate of the grafts in late period. The first usage of saphenous vein graft was for the revascularisation of RCA and this was performed in 1967(2). Later on, LITA was anastomosed to LAD and so it has been begun to use arterial grafts have in CABG widely (3). In early postoperative period, the patency has been associated with the preparation of the graft, the pathology of the coronary arteries and operative procedure while in late postoperative period (5 years

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later) it has been associated with the nature of the graft (4-5).

The aim of this study is to report the importance of complete arterial revascularisation of patients over the age of 60, and to report the patency with angiographic images taken both in early and late postoperative period.

## MATERIALS AND METHODS

In Gülhane Military Medical Academy Department Of Cardiovascular Surgery, 904 patients was performed CABG between January 2002-June 2004. 406 of patients were over the age of 60. 65 patients, over the age of 60, who underwent a procedure of complete arterial revascularisation with the use of one or more LITA, RITA and RA grafts were included to the study. The distinguishing features of patients are seen in Table-1.

**Table 1.** Patient's features

Patients	
Male/Female	48/17 (%73.8/%26.2)
Age	64.8±5.4
Risc Factors	
Diabetes mellitus	14 (%21.5)
Hypertension	38 (%58.5)
Family History	45 (%69.2)
Smoking	46 (%70.8)
Hiperkolesterolemia	41 (%63.1)
Obesity	12 (%18.4)
MI	22 (%33.8)
Unstabil angina pectoris	11(%16.9)
Coronary angiography	
LMCA	6 (%9.2)
3 vessels	41 (%63.1)
2 vessels	18 (%27.7)
LVEDP (mmHg)	12±5
LVEF(%)	55±9
Functional capacity	
NYHA I	4 (%6.2)
II	38 (%58.5)
III	17 (%26.2)
IV	6 (%9.3)

48 (%73.8) of patients were male, while 17 (%26.2) of were female idi. The youngest

patient was 60 years old and the oldest one was 78 years old. The mean of age was 64.8±5.4. Age, both angiographically and anotomically larger calibrated target coronary arteries, no diffuse CAD in the target coronary artery, and >70% occlusion were significant for the choice of the patients.

Allen's test was performed for the patients for whom the use of RA was decided. In the peroperative period the arm that radial artery was harvested monitorised with pulse oximeter. Thorax was opened with median sternotomy for all patients. Untill the bifurcation on the xhiphoid, a pediculated LITA was harvested with the use of low current diatermia (20J) and hemoclips (atrauclip titanium, Pilling, Co. USA) then, papaverin (60 mg/ml) was injected over it and finally the graft was put on a sponge. During the harvesting of LITA, pericard was not opened. If RITA was planned to harvest, it was performed before cutting the distal of LITA. After systemic heparinisation, firstly RITA's and then LITA's distal end was cut.

If it was decided to use the RA, non dominant arm radial artery, generally left RA was harvested in the same time with LITA. Before harvesting RA, its radius, quality and the presence of any calcification was evaluated by performing a small incision over the wrist. It is harvested as pediculated with accompanying veins. While performing it diatermia was not used but hemoclips were. Then 2.5 mg nitroglycerine, 5 mg verapamil, 0.2 mEq %8.4 sodium bicarbonate and 500 units heparin were added to 300 cc ringer lactat solution (Mong-Kong) and the harvested RA was put into it for 10 minutes. 10 cc patient blood was added to this solution. Before harvesting RA, the infusion of 0.1 mg/kg/min and 0.3-05 mg/kg/min nitroglycerin was started and it continued for 24 hours.

Standart cannulation was performed in all patients. with membrane oxigenator (Dideco D 708 Simplex, 41037 Mirandola-Italy), roller pomp (Cobe Cardiovascular INC, Arvada CO 80004-3599 USA) Operations were performed under CPB. After applying X-clamp, all of the patient were given St.Thomas II cold cristalloid cardioplegia via antegrad. When it was planned

to perform 2 distal anastomosis, hypothermia of 28-30 C $\infty$ , and for 3 or more distal anastomosis a hypothermia of 25 C $\infty$  was applied. Distal anastomosis were done with continuous suturation using 7/0 prolene (ethicon LTD. UK) sutures. LITA was generally anostomed to LAD with end-to-side technique. Proximal anastomosis were performed using 7/0 prolene sutures to the ascending aorta after removing X-clamp.

The cases for whom RA was used were given oraldiltiazem postoperatively and it was continued for 1 year. Nifedipine or only nitratlar were used when diltiazem was contraindicated. All of the patients were begun to take ASA as an antiaggregant in the absence of any contrindication. Patients were evaluated with coronary angiagrapy three month later and then once in a year. In this period patient who had angina underwent directly a coronary angiagrapy.

## RESULTS

For 62 patients, LITA was anostomosed to LAD insitu. RITA was used for 16 patients. 73 RA grafts were harvested from 63 patients. Bilateral RA harvestin was performed for 10 patients. Totally 85 distal anostomoses were done using RA grafts. Patients according to distal anostomoses and grafts are seen in Table-2. Coronary angiography was performed on 90th day and then 1 and 2 years later (figure 1-4). The results of coronary angiography were seen in Table 3. There were no complication. The patency rate was 100% according to the coronary angiography on 90th day. The coronary angiographies, performed in 16+2 months on average, revealed occlusion of 1 LITA ( patency: %98.2, occlusion rate: % 1.8), 1 RITA (patency: %93.4, occlusion rate: % 6.6), 3 RA (patency: %93.2, occlusion rate: %6.8).

## DISCUSSION

In 1967 Rene Favaloro from Cleveland Clinic was the first who performed CABG by anostomosing a saphenous vein graft to the RCA. s (2). Kolesov and Green were anostomosed

**Table 2.** The grafts according distal anastomosis

Graft	Coronary Artery	Number	
LİMA - (in-situ)	LAD	62	
	D1	3	
	OM1	1	
	-Distal anastomosis	66	
	RİMA -İn-situ	LAD	2
		RCA	6
	-Free	7	
	RA	OM1	3
		OM2	3
		RCAPd	2
-Distal anastomosis		16	
LAD		73	
D1		1	
OD		12	
OM1		4	
OM2		24	
CxPI		13	
RCAKr	7		
RCAPd	8		
RCAPİ	14		
-Distal anastomosis	2		
-Distal anastomosis	85		
Bilateral RA	10		
Sequential anastomoses	12		
-LİMA	LAD-LAD	1	
	LAD-D1	1	
-RİMA-free	OM2-RCAPD	1	
-RA	D1-OM1	3	
	D1-OM2	4	
	OM1-CxPI	2	
	OM2-RCAPd	3	
-Distal anastomosis		24	
Composit grafts		18	
-LİMA-RİMA	OM1	3	
	OM2	2	
-LİMA-RA		13	
	OM1	2	
	OM2	3	
	CxPI	2	
	D1-OM2	1	
	OM1-RCAPD	2	
	OM2-RCAPD	3	

Graft	Results		
	Number	Occlusion	% Patency rate
LIMA	53	1	98.2 (LAD)
RIMA	15	1	93.4 (RCA)
RA	44	3	93.2 (RCA, RCA,OM1)

LITA to LAD, so the thought of direct revascularisation came true. (3). In early postoperative period, the patency has been associated with the preparation of the graft, the pathology of the coronary arteries and operative procedure while in late postoperative period (5 years later) it has been associated with the origin of graft (4-5). Although it is getting prepared easily and although its implantation is easy, the early, mid and late period patency rates of saphenous vein graft, which was used largely until 1980s, are not satisfactory. Saphenous vein grafts occluded in early postoperative period and 5-8% of them get occluded a few months later. Later, the possibility of occlusion is 2-4% and 10 years later 50% of them get occluded (6).

Till 1980s, LITA was not used widely because of longer time of harvesting according to the other grafts, difficulty in anastomosing technique and the thought that its flow is not enough to supply satisfactory blood to the coronary arteries. In 1980s after exploring its higher patency in both early and late postoperative period, in 1990s it became most widely used graft. (7). As the most ideal graft of CABG, patency of LITA is 95% in 10 years and 90% in 15 years. RITA is the second after LITA. (8). Our study revealed a LITA patency of 98,2% and a RITA patency of 93,4%. In addition, using more than one arterial graft reduces the risk of reoperation and enhances the survival. (9-10).

RA graft was firstly used by Carpentier in 1973 (11). But, it was seen that the rate of occlusion after 1 year was 64%. So, it was not used till 1990s. And the histological examination of occluded RA revealed thickening of subintimal layer and loss of media layer. In 1992 Acar et al. reported their 10-year study about RA (12). Coronary angiography that performed 15 years later revealed good patency. Calafiore et al. (13) reported the RA early patency as 100% and

late patency as 94%. Literatures from different parts of the world indicates that RA is the most popular graft of decade. (14). In literatures its early and late patency has been reported between 91.6% -99% (15). In our follow up periods, we have determined its patency as 93.2%. From the view of surgery RA is a convenient graft; because it is easy to harvest, it can be get ready at the same time with LITA, its wall is thick and radius is large and these simplifies anastomosing it to a coronary artery, it is long enough to perform a sequential anastomosis. Sternal injury due to harvesting of bilateral ITA causes no complication. It can be used as a single or T or Y graft and the clinical an angiographic results of these are the same (16-17). Our study revealed an early late (16+2 months on average) patency rate as 93.2%. 3 of them got occluded 2 of which was anastomosed to RCA and 1 of to CxOM1. 12 LIMA-RA was used as T and Y composite graft. Bilateral RA grafts were used in 10 patients. Incidences of MI and low CO was low. These results emphasize the safety of RA as both single and composite graft.

Cardiac events happening in the late period are thought to be associated with patency. A study by Loop et al. revealed a significant superiority in the meaning of survival and other cardiac events for the cases that got ITA. So, the risk of annually death is 1.6, risk of MI is 1.4, risk of cardiac reoperation is 2, and the risk of hospitalisation due to the other cardiac events is 1.25 and risk of whole cardiac event is 1,27 times higher for the patients for whom ITA is not used (18).

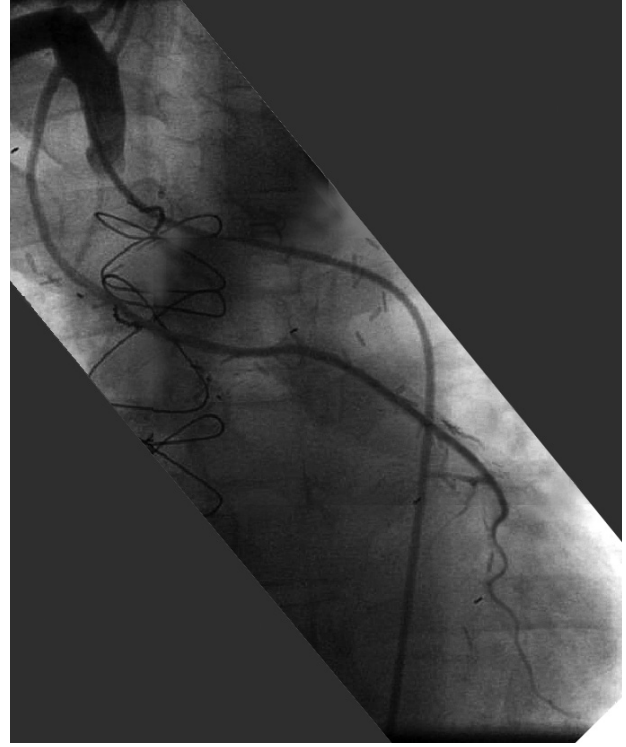
Calafiore et al. (19) were reported the early and late patency of LITA-RITA as 100% while Tatoulis et al. reported free RITA patency 94.5% for 41.5 month on average. The use of both ITA grafts reveals a patency of 97.5% for 9 years and 98% for 17+4 months on average, so it supplies higher clinical benefits.

Tatoulis et al. (17) reported that the late patency of arterial grafts are excellent and they showed that this is associated with the sort of graft, the anastomosed coronary artery and the stenosis rate of native coronary artery.

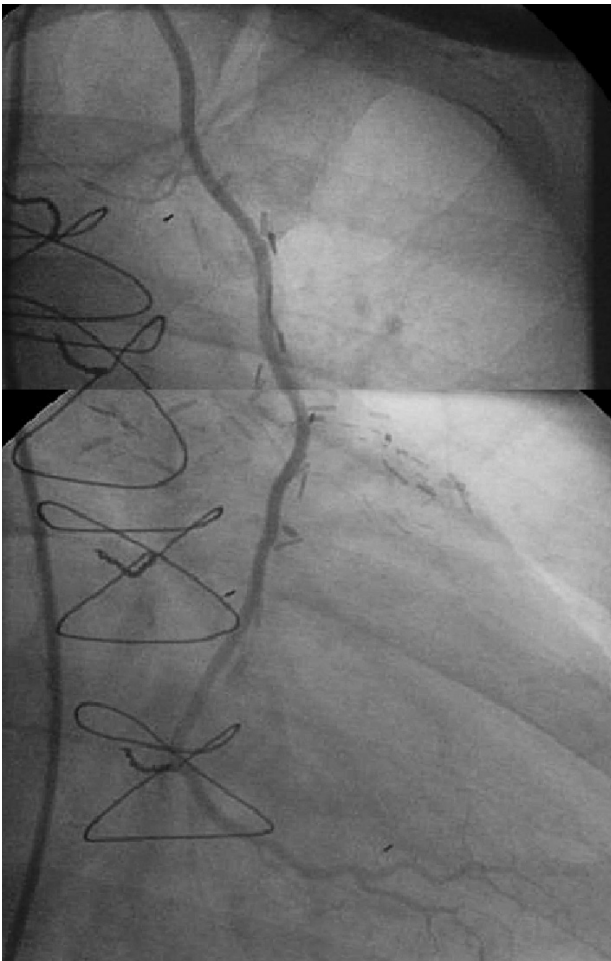




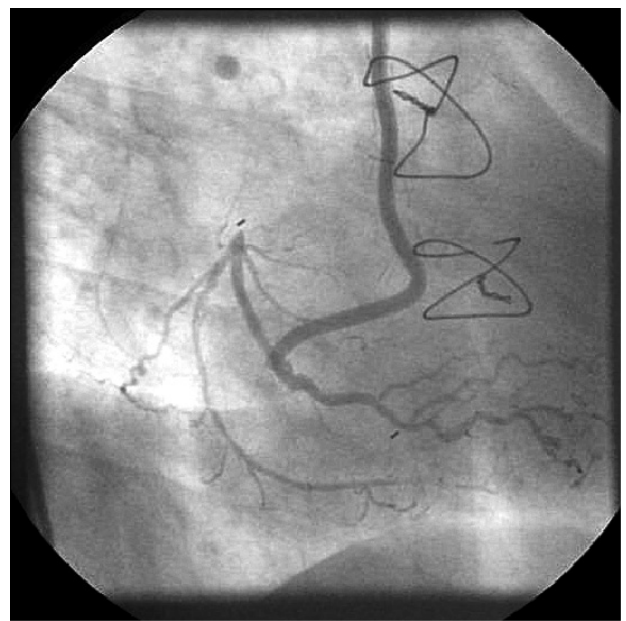
**Figure 1:** Postop. first year, LIMA-LAD.



**Figure 3:** Postop. Second years RIMA-LAD.



**Figure 2:** Postop. Second years, LIMA-OM.



**Figure 4:** Postop. Second years RA –OM.

The more stenosis in the native coronary artery means the higher arterial graft patency. For this, the threshold stenosis is 60 % for LIMA and RITA. It is 80% for RA probably because of thicker muscular wall it has. (19).

Cosgrove et al. performed a study about the use of Bilateral IMA with 338 patients. They

looked it it increases the surgical risk or not. They declared that use of bilateral IMA slightly increases the mortality (20). As a result of bilateral IMA harvesting, there happens avascularisation on the sternal wall and it causes wound healing problems. So, these authors reported 0 % sternal wound infection for the patients with only SVG, 0.3% sternal infection for 1 ITA and 2.4% sternal infection for bilateral ITA. In the same study, Cosgrove reported that the other indicator of wound infection is DM and the infection rate for the patients who were diabetic and had bilateral ITA was 16.7% while it was 0.7% for the patients who were not diabetic but had bilateral ITA. We performed 10 CABG by using bilateral ITA and there were no sternal wound infection.

As a result, we performed 65 complete myocardial revascularisation by using arterial grafts. The mean followed up period was  $17.6 \pm 7.3$  months. None of the patients required reoperation. 1 case required PTCA in early period. We think that, for the elder population ( over the age of 60) CABG with only arterial grafts is a safe procedure and for this population complete arterial revascularisation has better clinic outcomes and it increases the quality of life.

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