

## Composite graft in cases of insufficient length of internal thoracic artery

### *İnternal torasik arter uzunluğunun yetmediği durumda kompozit greft*

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The main strategy of coronary artery bypass grafting (CABG) is based on grafting the left internal thoracic artery (LITA) to left anterior descending artery (LAD) and using the saphenous vein graft (SVG) for the remaining affected vessels and anastomosing the grafts proximally to the ascending aorta. Although proximal anastomosis of either saphenous or arterial graft (free ITA, radial artery, epigastric artery) to the aorta is undertaken in majority of cases, in rare instances, it may pose some difficulties and have some complication rates due to heavy calcification of the aorta. Full pedicled arterial grafts are recommended for "no touch" technique to the aorta (1, 2). However, adequacy of LITA graft may not be fully appreciated in some cases and the surgeon may prefer not using the distal segment of LITA due to low flow pattern or spasm or inadequate diameter in the middle and distal segments of internal thoracic artery. We present the experience of LITA and saphenous vein composite grafts use in 8 patients, that underwent CABG between April 2000 and October 2004, in whom other arterial grafts were not harvested due to limitations of time or special circumstances.

Six patients with single vessel disease (LAD artery) had calcific plaques in the proximal aorta necessitating "no touch" technique to the aorta. In order to avoid the placing cross or partial clamp to the calcified aorta, SVG was interposed between the proximal LITA and LAD arteries with off-pump beating heart technique either because of inadequate flow due to hematoma formation or due to spasm and inadequate diameter of the distal third of LITA. In the other two patients with double and triple vessel disease, calcification of the aorta was not present however; distal portion of the LITA was not found to be suitable for grafting. There was SVG at hand and attachment of adequate length of it to the proximal half of LITA was undertaken as there was not enough time for harvesting right ITA, epigastric or radial artery. The operations were done under cardiopulmonary bypass.

The mean age of the patients was 60.9 years. Mean follow-up of the patients was 42.1 months. Patients' characteristics are summarized in Table 1. In three patients, postoperative coronary

angiography was employed due to the recurrence of chest pain. All grafts were open on the control angiographies. One angiographic view is presented for the demonstration of our technique and an illustration of LITA-composite SVG-coronary arterial anastomosis is added (Fig. 1 and 2).

All patients had diabetes mellitus and/or associated peripheral vascular disease. So bilateral ITA harvesting was not undertaken. Radial artery harvesting on the other hand, requires special positioning of the arm of the patient, which has to be done before or during the induction of anesthesia and having the consent of the patient with testing for the adequacy of ulnar flow to the hand is mandatory.

F.Mason Sones had first described coronary angiography in 1959 (3). Then, the techniques of CABG have evolved since pioneering works of Demikov, Goetz, Sabiston, Favaloro and many others (3-5). Saphenous vein graft and technique of the anastomosis between the grafts and the coronary arteries have been well described by Favaloro. Loop and colleagues had popularized use of LITA (6). Standard grafting techniques, popularized by the authors, have gained general acceptance by all cardiac surgeons in the world.

Coronary artery bypass graft surgery is a well-known technique for treating multi-vessel end stage ischemic heart disease. Arterial and venous grafts are the main tools of the surgery. During the surgical procedure, LITA-LAD anastomosis plays vital role because of the superior long-term patency compared to the other techniques. The LITA is found to be resistant to atherosclerosis. The SVG is another option during CABG. For blood inflow, aorta coronary bypass is indicated. If aortic wall is not severely calcified, SVG is used with acceptable long-term patency rates.

Careful harvesting of the grafts is necessary for a successful revascularization procedure. In some instances, LITA may be strictly adhered to the neighbouring tissues. In these cases, anatomical integrity of ITA cannot be maintained. Tissue injury and edema and hematoma formation, which could significantly reduce the flow reserve of this graft, may occur. However

although the proximal part of graft is free from the any damage inadequate length of the graft can make it impossible for use in CABG. Luminal narrowing or increased tendency for spasm at the level of bifurcation may put the patient at risk for ischemic events in the early postoperative period. In this situation, using the proximal portion of LITA with suitable luminal diameter as a free graft with proximal anastomosis to the ascending aorta may be undertaken; however, with this technique touching the aorta is not avoided. For these specific cases, we used LITA-saphenous vein composite grafts for coronary revascularization.

Thirty-eight years-old young patient in this series had LAD and diagonal coronary artery lesions and full arterial revascularization was planned. However, the patient did not give consent for harvesting radial artery. Right ITA was not prepared due to presence of diabetes mellitus. The SVG was used for diagonal coronary revascularization and some segment of SVG was attached

to the proximal half of LITA due to inadequate diameter of distal half of LITA.

The most cumbersome part of this technique is the anastomosis of LITA to the SVG. It can be assumed that the intimal hyperplasia may narrow the anastomotic opening. In the postoperative coronary angiography of three patients; 16, 19 and, 23 months after the operation we observed that the anastomoses were patent and free from any narrowing based on the angiographic views. However, follow-up of the patients for longer periods is necessary.

We propose that this technique may offer an alternative method when heavily calcified aorta necessitates "no touch" technique to the aorta and when there is a shortage of arterial grafts and available SVG at hand. Because of this study, we concluded that this technique might be kept in mind in some selected and problematic patients.

Table 1. Characteristics of the patients

Patient No	Age	Sex	Extent of coroner artery disease	Calcific Aorta	Postoperative chest pain	PAD	DM	C.A.	C.A. Time (month)	Results
1	65	M	Single vessel	+	+	-	+	+	16	Intact and open graft
2	64	M	Single vessel	+	-	+	+	-		No complaint
3	38	M	Double vessels	-	+	-	+	+	19	Intact and open grafts
4	67	F	Single vessel	+	+	+	+	+	23	Intact and open graft
5	51	M	Triple vessels	-	-	+	+	-		No complaint
6	71	M	Single vessel	+	-	+	-	-		No complaint
7	65	M	Single vessel	+	-	+	-	-		No complaint
8	66	F	Single vessel	+	-	-	+	-		No complaint

C.A.- Control angiography, DM- diabetes mellitus, F- female, M- male, PAD- peripheral arterial disease

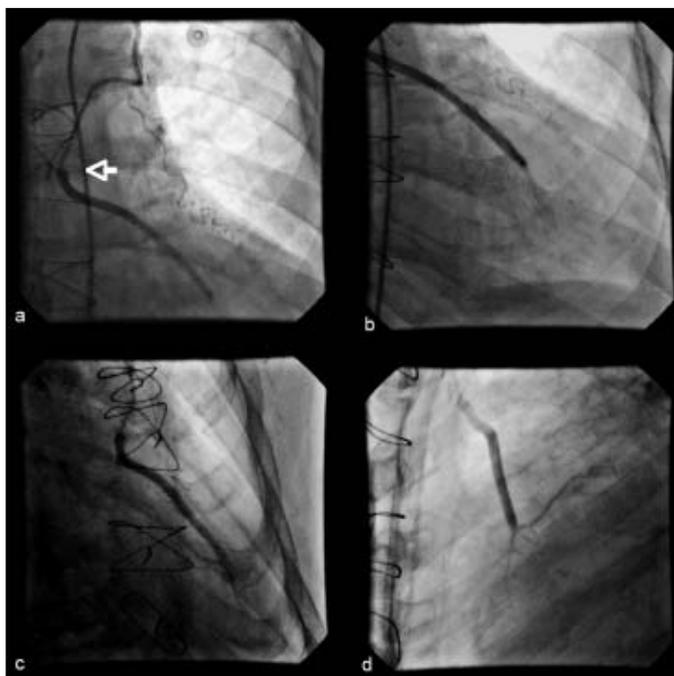


Figure 1. Control coronary angiography; Arrow indicates the left ITA-Saphenous vein graft anastomosis in Fig. 1a. Saphenous vein graft-LAD anastomosis in Fig. 1b, c, d

ITA- internal thoracic artery, LAD- left anterior descending artery

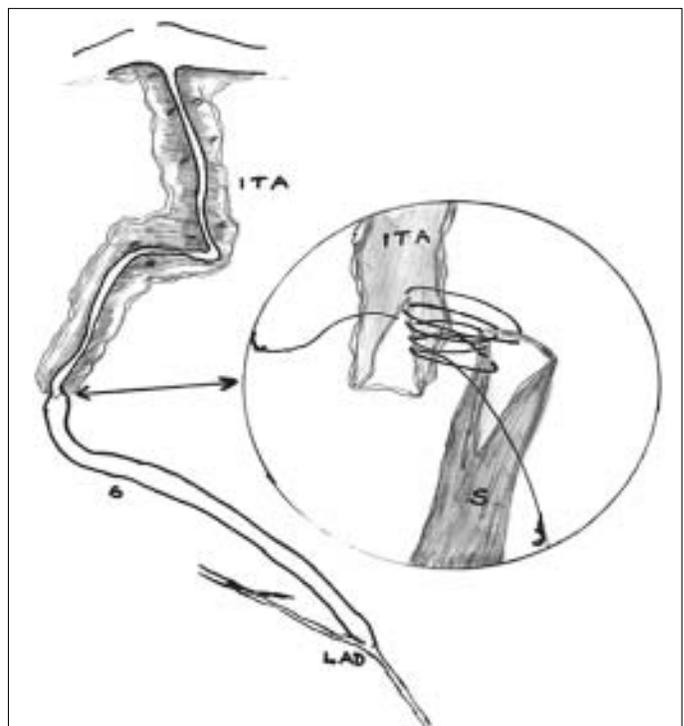


Figure 2. An illustration of the coronary revascularization technique

ITA- internal thoracic artery, S- saphenous vein graft, LAD- left anterior descending artery

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