

# Atherosclerosis in the internal mammary artery and comparison of the risk factors

Ibrahim YEKELER, Mustafa PAÇ, Hikmet KOÇAK, Azman ATEŞ,  
Ahmet BAŞOĞLU, Erdal EGE, A.Kadir REİS, M.Engin AYDIN

Depts. of Thoracic and Cardiovascular Surgery and Pathology, Atatürk University Research Hospital, ERZURUM - TURKEY

Sixty-four patients aged range between 32-68 (mean ages of  $47 \pm 6.1$ ) were investigated for atherosclerosis in the internal mammary artery (IMA) biopsies. All the patients were divided into two groups. In respect to their risk factors related to coronary heart disease (CHD) the first group (n:31) had 4 or more risk factors and the second group (n:33) had 3 or less risk factors. The rates of distal anastomoses were 3.2 in the first group and 3.1 in the second group. In the first group two grade I and one grade IV atherosclerosis of IMA were detected. The second group had two grade I atherosclerosis.

There is no statistically significant difference between the two groups in IMA biopsies with respect to atherosclerosis.

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Key Words: Atherosclerosis, Internal mammary artery

In 1967, Favaloro and Jhonson first used the saphenous vein for coronary bypass graft (CBPG) (1,7). Green introduced the internal mammary artery (IMA) as an alternative graft into coronary surgery in 1968 (4). Although saphenous vein grafts has been routinely used for many years due to several advantages such as the availability, and for it to be readily obtained from both lower limbs, recently the use of the IMA has popularized, since postoperative high rate occlusion due to progressive fibrous or fibromuscular intimal hyperplasia has been frequently observed in patients with saphenous vein grafts (SVG) (10,17). IMA has the advantages such as rarely atherosclerotic involvement as well as being arterial-origin, and requiring only distal anastomosis (2,5,13). In many issues it has been reported that long-term patency of the internal mammary arteries is better than saphenous vein grafts (6,9,11).

The aim of our study, was to investigate the relationship between risk factors and the atherosclerotic involvement-changes in IMA of patient with CHD.

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Correspondence: ibrahim YEKELER

Department of Thoracic and  
Cardiovascular Surgery, Atatürk University  
Research Hospital,  
ERZURUM

## MATERIALS AND METHODS

Atherosclerotic involvement of IMA has been investigated in 64 patients (53 males; the ranges of age 32 to 68 years, mean age was 47yrs). The patients underwent CBP surgery by IMA and saphenous grafts.

Pathological observation was made under hematoxylineosin dye from the distal non-used segment of internal mammary artery. Patients were divided into two groups: The first group (n:31) had 4 or more risk factors for CHD and the second group (n:33) had 3 or less risk factors.

Of patients in group I; 18 patients had three vessel diseases, 7 patients two vessel diseases, and 6 patients had only proximal LAD lesion. In group II; 19 patients had three vessel diseases, 9 patients two, and 5 patients proximal LAD lesion.

Table 1 shows the distribution of patients according to risk factors.

Of six patients with peripheral vascular diseases in the group I, 4 patients had Lerich syndrome, and 2 patient had right ileofemoral occlusion.

Distal segment of the IMA artery were pathologically evaluated for atherosclerosis. The grade of atherosclerosis were classified in five categories: 0; normal, grade I; luminal narrowing less than 25%, grade II; luminal narrowing between 25% to 50%, grade III luminal narrowing greater than 50%, and grade IV; overt atherosclerosis with ulcer or calcification.

$\chi^2$  test was used for statistical evaluation.

**Table 1.** Characteristics and the risk factors of patients with atherosclerosis in the Group I and II

	Group I (n:31)			Group II (n:33)	
	Patient 1 (H.E)	Patient 2 (N.T)	Patient 3 (R.G)	Patient 1 (N.D)	Patient 2 (S.T)
Age	54	55	51	52	64
Degree of atherosclerosis	Grade I (3.2%)	Grade IV (3.2%)	Grade I (3.2%)	Grade I (3%)	Grade I (3%)
Number of lesions in the coronary artery	3	3	3 «	3	3
Sex	Male	Female	Male	Female	Male
M.Infarction	+	+	+	+	+
Smoking	+	+	+	—	+
Obesity	—	+	+	+	—
Hypertension	+	+	+	+	—
Peripheral vasa, disease	+	+	—	—	—

Group I: The patients with risk factors more than 3

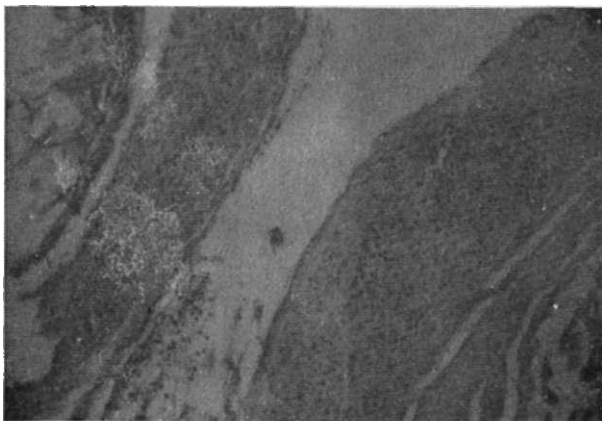
Group II: The patients with risk factors 3 or less

## RESULTS

In the pathological examinations atherosclerosis were determined in IMA of three patients in group I (9.6%), two of them had grade I involvement (6.4%) and the other had grade 4 involvement (3.2%) which was not used as bypass graft. Also in the other group the involvement was found in two patients (6%) both of them had grade 1 atherosclerosis. Atherosclerotic changes of IMA biopsies are seen in the Fig. 1, 2. Statistical differences was not significant in terms of atherosclerotic involvement of group I and II.

Characteristics and the risk factors of patients with atherosclerosis in the group I and II are seen in Table 2.

All patients with atherosclerosis of IMA in the group I had hypertension. One patient in group II had also hypertension. On the other hand none of the patients with hyperlipidemia and diabetes had atherosclerosis in internal mammary artery.



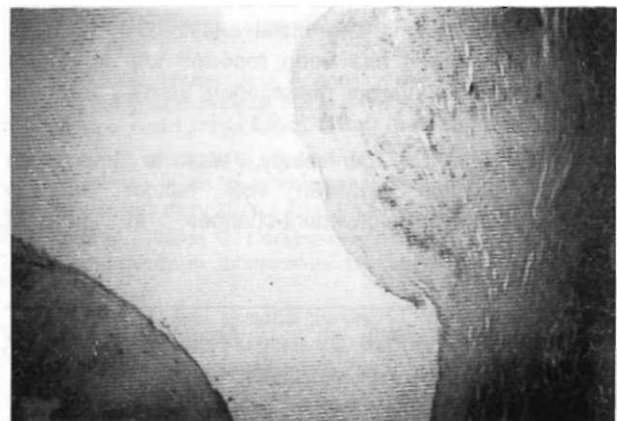
**Figure 1.** Grade I atherosclerosis in internal mammary artery showing lesion, hardly discernible intimal thickening.

## DISCUSSION

The extent of atherosclerotic alterations in the aorta and coronary arteries increases with age (9,11). But there was not a linear positive correlation between age and all atherosclerotic alterations in the coronary arteries. The intimal thickness of IMA does not increase with age (14).

IMA grafts are superior to other types of conduit in terms of both long-term patency and late clinical outcome (4,5,13,15,16). Patients with an IMA graft also have a lower incidence of reoperation (6). We don't know the basic mechanism whereby the IMA is resistant to atherosclerosis. Previous studies showed a low incidence of atherosclerosis in the IMA. Kay reported 4.2% (8), Mestress 5% (9) atherosclerosis of IMA. But Suma and Takanashi reported 23% grade I atherosclerosis in IMA biopsies (15).

Sisto and Isola reported that the known risk factors associated with the development of



**Figure 2.** Grade IV atherosclerosis in internal mammary artery showing calcified, mainly fibrous lesion obliterating the lumen.

Table 2. Preoperative risk factors in the Group I and Group II

Risk factors	Group I (n:31)		Group II (n:33)	
	Number of patients	%	Number of patients	%
Sex (Male)	26	83.8	27	81.8
Cigarette smoking	24	77.4	17	51.5
Myocardial Infarction	27	87	14	42.4
Hyperlipidemia (>240 mg)	13	41.9		21.2
Hypertension	12	38.7	8	24.2
Obesity	12	38.7	7	21.2
Diabetes Mellitus	9	29	4	12.1
Peripheral vasa, disease	6	19.3	-	-

Group I: The patients with risk factors more than 3

Group II: The patients with risk factors 3 or less

atherosclerosis, only hypertension correlated with intimal thickening; diabetes alone and diabetes with hypertension did not (14). In our study three patients with atherosclerosis in group I (1st and 4th grade) had hypertension. On the other hand, one of patient in group II had also hypertension. The IMA's of smokers did not differ from these of non-smokers or former smokers, and the body mass index did not correlate with intimal thickness of the IMA. Both of these factors correlated well with CHD (14). The reasons why the other risk factors do not correlate with intimal thickness of the IMA are unknown.

Sisto and Isola evaluated the incidence of atherosclerosis in the IMA in a consecutive Finnish autopsy series of hundred sixty patients (14). Forty-five patients (28%) had marked occlusion in some coronary arteries as well as a history of angina pectoris. Only 5 (3.1%) of the 160 patients had notable stenosis in the IMA. Three of these 5 patients did not have coronary heart disease. In our study, the incidence of atherosclerosis in the IMA were 9.6% in the first group having 4 or more risk factors and 6% in the second group having risk factors 3 or less.

As a result, only hypertension affected the atherosclerotic changes in IMA and the other risk factors are not found effective solely in our study.

### Internal mammarian arterilerde atheroskleroz ve risk faktörlerinin karşılaştırılması

Yaşları 32-68 arasında olan (yaş ort: 47±6.1) 64 hastada Internal mammarian arter (İMA) biopsileri atherosklerozis yönünden araştırıldı. Hastalar iki gruba ayrıldı. Grup I'deki hastalar koroner kalp hastalığıyla (KKH) ilişkili 4 veya daha fazla, Grup II'deki hastalar ise 3 veya daha az risk faktörlerine sahiptir. Distal anastomoz oranları Grup I'de 3.2, Grup II'de 3.1 idi. Grup I'de 2 tane grade I ve 1 tane grade IV atherosklerotik İMA tespit edildi.

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Atheroskleroz yönünden 2 grup arasında İMA biopsilerinde anlamlı istatistiksel farklılık bulunmadı. [TurkJMedRes 1993; 11(2): 89-92]

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