Prediction of Coronary Artery Disease by B-Mode Sonography

R Molaei Langroodi[1], J Kheirkhah[1], A Barzegar[1], F Mirboluok[1], A Heydarzadeh[1], F Ebrahimian[1], A Aslani[2], M Kafi[2]

[1]*Gilan University of Medical Sciences, Gilan,* [2]*Cardiovascular Research Center, Shiraz University of Medical Sciences, Shiraz, Iran*

Background: Although coronary angiography is gold standard for diagnosis of coronary artery disease, it is nevertheless an invasive and potentially hazardous procedure. The aim of this study was to investigate the predictive value of carotid and femoral artery Intima-Media Thickness (IMT) for detection of coronary artery disease.

Methods: The present study comprised 100 consecutive patients referred for coronary angiography due to symptoms of ischemic heart disease. Ultrasound assessment of common carotid and common femoral artery were performed with an ultrasound device equipped with a high-resolution transducer. IMT was measured in the common carotid and common femoral artery (10 mm proximal to the deep femoral artery origin).

Results: There were 25 cases in each of single (S), double (D) and triple (T) vessel disease and 25 in significant left main diseases groups of patients. In regard to common carotid artery IMT was 0.78 mm in S, 0.84 mm in D, 0.97 mm in T and 1.05 mm in left main disease groups. There was a significant correlation between IMT measured in the carotid artery and severity of coronary artery disease (P = 0.0001). With respect to common femoral artery IMT was 0.66 mm in S group, 0.73 mm in D group, 0.84 mm in T groups and 0.85 mm in patients with left main disease.. There is a significant correlation between IMT (measured in the common femoral artery) and severity of coronary artery disease (P = 0.0001).

Conclusion: Our results indicated that early atherosclerosis in both carotid and femoral arteries were highly predictive of coronary involvement and IMT being associated with the number of coronary vessels disorder.

Keywords: Coronary Artery Disease, Carotid, Femoral, Intima-Media, Thickness

Introduction

Different methods have been introduced to assess coronary arterial involvement.[1-3] Although coronary angiography is gold standard for diagnosis of coronary artery disease, it is an invasive procedure with potential risks.[4-7] It is crucial to introduce a simple, non-invasive method to detect coronary artery atherosclerosis. The aim of this study was to investigate the predictive value of carotid and femoral artery Intima-Media Thickness (IMT) for detection of coronary artery disease.

Patients and Methods
Study Population

Consecutive patients who were referred for coronary angiography due to symptoms of ischemic heart disease were selected. All patients had a selective coronary angiography, trans-thoracic echocardiography and color Doppler sonography of the carotid and femoral arteries. The following patients were excluded from the study: known diabetes mellitus, peripheral vascular disease or hypertension. Coronary artery disease was defined as coronary lesion with a lumen stenosis of more than 50%. Coronary artery disease was classified as single, double or triple vessel disease.

B-Mode Sonography

Ultrasound assessment of common carotid and common femoral artery were performed with an ultrasound device (Ultrasonics) equipped with a high-resolution 10 MHz transducer. Intima-Media thickness (IMT) was measured in the common carotid and common femoral artery (10 mm proximal to the deep femoral artery origin).

Correspondence:
J Kheirkhah, MD
Heshmat Hospital, Cardiology Department, Gilan University of Medical Sciences, Gilan, Iran
Tel: +98-9121948758   E-mail: jalal.kheirkhah@yahoo.com

Statistical Analysis

Data are presented as Mean ± SD. One-Way Anova was used to compare correlation between IMT and severity of coronary artery disease between groups. A *p* value of <0.05 was considered statistically significant.

Table 1. Comparison of intima-media thickness of common carotid artery in patients with coronary artery disease.

	N	Intima-Media Thickness (mm)	P value
Single Vessel Disease	25	0.78 ± 0.12	
Two Vessel Disease	25	0.84 ± 0.11	
Three Vessel Disease	25	0.97 ± 0.21	**0.0001**
Left Main Disease	25	1.05 ± 0.1	

Results

A total of 100 consecutive patients (60 males) aged from 40 to 55 years (51.7±4.3) were enrolled in the study.

There were 25 cases in each of single (S), double (D) and triple (T) vessel diseases and 25 patients in significant left main disease groups.

IMT was 0.78 mm in S group, 0.84 mm in D, 0.97 mm in T and 1.05 mm in left main disease groups of patients. As shown in Table 1, there was a significant correlation between IMT measured in the carotid artery and severity of coronary artery disease (One -Way Anova, P = 0.0001).

IMT was 0.66 mm in S, 0.73 mm in D, 0.84 mm in T and 0.85 mm in left main disease groups of patients. As demonstrated in Table 2, a significant correlation was found between IMT measured in the common femoral artery and severity of coronary artery disease (One-Way Anova, P = 0.0001).

Discussion

Previous studies have found that there is an association between peripheral vascular disease and

Table 2. Comparison of intima-media thickness of common femoral artery in patients with coronary artery disease carotid artery.

	N	Intima-Media Thickness (mm)	P value
Single Vessel Disease	25	0.64 ± 0.11	
Two Vessel Disease	25	0.73 ± 0.10	
Three Vessel Disease	25	0.84 ± 0.15	**0.0001**
Left Main Disease	25	0.85 ± 0.08	

coronary artery atherosclerosis.[8-12] IMT of carotid arteries is a powerful and independent predictor of death in patients with hypertension, coronary artery and cerebrovascular diseases. Correlation of carotid IMT with extent and severity of coronary artery stenosis has been demonstrated in previous reports and measurement of IMT considered as an early marker of atherosclerosis.[11-12] A study demonstrated the upper limit of carotid IMT at the common It also showed that the upper limits (97.5 percentile) of carotid IMT for participants aged 35 to 39, 40 to 49, 50 to 59, and 60 years or older to be 0.60, 0.64, 0.71, and 0.81 mm, respectively [13]. In agreement with previous reports, the present study showed that either carotid or femoral artery atherosclerosis was predictors of coronary artery involvement. In our study, both carotid and femoral IMT were associated with the number of coronary vessels disease.

Our results indicated that early atherosclerosis in both carotid and femoral arteries predicted a high probability of coronary involvement and that IMT was associated with the number of coronary vessels disease.

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