Relationship between Intima-Media Thickness of Carotid Arteries and Coronary Stenosis in Angiography

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ABSTRACT
Objective: To investigate the relationship between atherosclerosis of carotid arteries and coronary arteries.

Methods: This was a cross-sectional case control study and 100 patients took part in it. All participants underwent angiography to determine if they had coronary stenosis. Fifty angiography positive patients were selected as case and 50 angiography negative served as control. With a 7 MH probe, intima media thickness (IMT) of carotid arteries was measured by B-mode sonography. IMT over 1 mm was considered as significant atherosclerosis. Stenotic lesion over 50% of cross-sectional surface of any coronary vessel was defined as significant coronary stenosis.

Results: Of 50 patients with significant stenosis in one or more coronary arteries, 38 had carotid IMT over 1 mm. Of fifty normal coronary individuals, 10 had carotid arteries thicker than 1 mm. Chi square test shows a significant difference between case and control groups. The relative risk of coronary heart disease for persons, who had carotid IMT over 1 mm at carotid sonography, was 3.43 (CI 95% 4.75-2.47).

Conclusion: Carotid Intima-media thickness over 1 mm increases the risk of significant coronary artery disease (RR=3.43). (Rawal Med J 2008;33:59-61).

Key words: Carotid, atherosclerosis, intima, media.

INTRODUCTION
High resolution B-mode ultrasound is a non-invasive technique used to assess atherosclerosis in superficial arteries. It allows accurate measurement of the distance between blood-intima and media-adventitia interfaces of the carotid wall, which is defined as carotid intima-media thickness (IMT). Several authors have suggested that carotid IMT is a marker of atherosclerosis in other vascular beds. An increased carotid IMT has been associated with a number of atherosclerosis risk factors. In the present study, we investigated the relationship between coronary arteries disease and carotid atherosclerosis by measurement of IMT in carotid arteries in our patients in Isfahan.

PATIENTS AND METHODS
Fifty patients with coronary arteries stenosis and 50 with normal coronary arteries (aged 40 to 60 years) participated this study. Informed consent was taken from all patient before angiography. All patient were angiographed because of chest pain not
responding to medical therapy. Patient with diabetes and vasculitis were excluded from study. Coronary Angiography was performed according to standard techniques via femoral artery and multiple views were stored on a CD-ROM. The angiograms were evaluated by an experienced observer who was blinded to the results of carotid sonography.

All persons were evaluated by carotid sonography and their carotid arteries’ intima media thickness was measured by a seven Mega Herts prob. IMT over 1 mm considered as positive for atherosclerosis. Stenotic lesion over 50% of cross sectional surface of any coronary vessel was defined as significant coronary stenosis.

RESULTS
Of fifty patient with coronary artery stenosis, 38 had one or two carotid arteries with IMT over one mm. Of fifty normal coronary individuals, 10 had carotid arteries thicker than 1 mm. Chi square test revealed a significant difference between these two group (value 29.21, p<0.0001). The relative risk for coronary stenosis in patients with IMT over 1 mm was 3.43 (CI= 2.05-5.75)

Table 1. Relative frequency of IMT increase in coronary disease.

<table>
<thead>
<tr>
<th>Increase IMT</th>
<th>Significant coronary stenosis</th>
<th>Number</th>
<th>IMT over diseased 1 mm in coronary (%)</th>
<th>IMT over 1 mm in normal coronary patients (%)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>-</td>
<td>10</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+</td>
<td>+</td>
<td>38</td>
<td>76</td>
<td></td>
<td>0.005</td>
</tr>
</tbody>
</table>

DISCUSSION
Our study showed that increased carotid IMT increased relative risk of significant stenosis in one or more coronary arteries. Studies have found that for each 0.03 mm increase per year in carotid arterial intima-media thickness, the relative risk for nonfatal myocardial infarction or coronary death would be 2.2 (95% CI, 1.4 to 3.6) and the relative risk for any coronary event would be 3.1 (CI, 2.1 to 4.5) (table 2).6

Table 2. Relative risk of significant coronary disease in patient with increased IMT of carotid arteries.

<table>
<thead>
<tr>
<th>Study subjects</th>
<th>Relative risk</th>
<th>%95:Confidence interval</th>
<th>Study Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any coronary event</td>
<td>3.1</td>
<td>2.1-4.5</td>
<td>14</td>
</tr>
<tr>
<td>Myocardial infarction or coronary death</td>
<td>2.2</td>
<td>3.6-1.43</td>
<td>14</td>
</tr>
<tr>
<td>Coronary stenosis</td>
<td>3.43</td>
<td>4.75-2.47</td>
<td>Present study</td>
</tr>
</tbody>
</table>

Held in a sub study of APSS (The Angina Prognosis Study in Stockholm) observed a relation between measurements of intima-media thickness, lumen diameter and/or plaques in the carotid and femoral arteries and cardiovascular end-points. In this study, increased intima-media thickness and plaques in the femoral artery were best
risk predictors of revisualization, whereas plaques in the carotid artery tended to predict cardiovascular death or myocardial infarction. Rahmani et al demonstrated a significant correlation between aortic plaque score and common carotid artery IMT.

With advancing age and development of atherosclerosis, the intima and media layers change in different directions, i.e. the intima becomes thicker and the media becomes thinner. Keny et al studied the relation of separate estimates of intima and media thickness and their ratio to cardiovascular disease and concluded that separate assessment of carotid artery intima and media thickness using noninvasive high-frequency ultrasound appears to be of potential value, in differentiating patient with atherosclerosis with and without cardiovascular disease. Increase in the thickness of intima and media of carotid artery is associated with an increased risk of myocardial infarction and stroke in subjects with or without known coronary artery disease.

The average value of IMT of the far wall at three sites of the common carotid, carotid bulb, internal carotid and common femoral artery then calculated IMT score this scoring were well correlated with the extent and severity of coronary artery disease. In conclusion, the evaluation of carotid arteries and other accessible vascular beds by IMT measurement would be a suitable noninvasive method to screen high-risk patients for atherosclerotic vascular disease such as cerebrovascular disease, coronary artery disease and peripheral artery disease. IMT over 1 mm increases risk of significant coronary artery stenosis.

REFERENCES