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Case of the Month

Storm Preparations: Use of Carotid Ultrasound for Assessment of Atherosclerotic Disease

Amer M. Johri MD, Martin Noël PhD, Parvin Mousavi PhD, Purang Abolmaesumi PhD, Paul Malik MD, Murray Matangi MD, Chris Simpson MD

The prevalence of atherosclerotic cardiovascular disease (ACVD) continues to be the leading cause of moribidity and mortality in the Western World [1,2], with scientists at the 2010 American Heart Association announcing the warning call: "Cardiovascular Disease in the Elderly is the Coming Tsunami"[3]. There is a demonstrated need for subclinical detection of coronary artery disease (CAD) within this patient population. Ultrasonic imaging is a non-invasive technique that can detect carotid intimal-medial thickening (CIMT)[4]. Importantly, these early pathological changes can be measured prior to atherosclerotic plaque formation and therefore may be useful as a predictor of ACVD[4,5]. Based on these hypotheses we set out to determine the sensitivity and negative predicative value (NPV) of CIMT and carotid plaque in patients referred for angiography. Outpatients were subjected to carotid scans immediately following an angiogram to record images from the right and left carotid arteries (Figure 1). Based on angiogram results patients were classified by CAD state (Table 1).

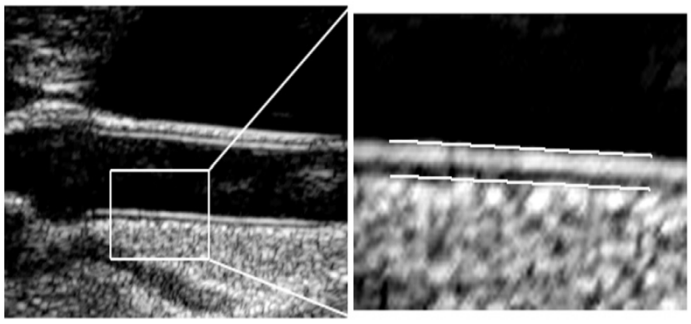

Figure 1. 2D Ultrasound Image of Common Carotid Artery. The rectangular sector in the left hand panel is magnified and shown in the right hand panel. The distance between the lumen-intima interface (top white marking in right hand panel) and the media-adventitia interface (bottom white marking) is measured to provide CIMT.

Table 1. Score and Corresponding CAD State Used To Classify Patients.

Score	CAD state
0	no coronoary lesions
1	mild coronary atherosclerosis
2	at least 50% narrowing in one vessel
3	at least 50% narrowing in two or more vessels

Sensitivity and NPV measurements of CIMT <1 mm and plaque <1.5mm for patients with angiogram scores of 0 or 1 were calculated. Significant CAD was 71% prevalent within this population. As shown in Figure 2, plaque thickness but not CIMT was greater in patients with CAD ($p<0.001$).

The results of this study suggest a complete carotid ultrasound that includes plaque assessment may serve as an inexpensive and low-risk test to help rule out CAD in low to intermediate risk outpatients.

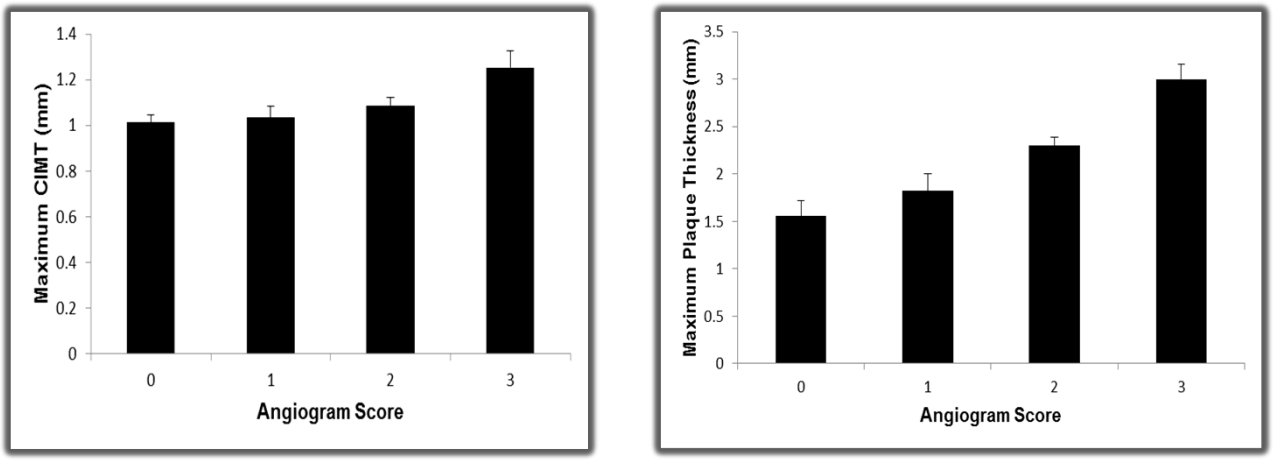

Figure 2. (Left) Maximum CIMT versus Angiographic Score. (Right) Maximum Plaque Thickness versus Angiographic Score.

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