P.040: INCREASED CAROTID INTIMA-MEDIA THICKNESS PREDICTS HIGH CARDIOVASCULAR RISK

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A modified Augmentation Index (AIX) using wave intensity analysis

Poster Presentations

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A MODIFIED AUGMENTATION INDEX (AIX) USING WAVE INTENSITY ANALYSIS

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ANALYSIS A MODIFIED AUGMENTATION INDEX (AIX) USING WAVE INTENSITY
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giving a modified Augmentation index (mAIx = P–/PP).

Results:
was evaluated by SCORE system.

Laboratory tests included serum lipid and glucose profile. The total CV risk
radial pulse wave velocity (crPWV), stiffness index (SI), measured by
49.91
Methods:
48% during diaphragm and 20% during abdominal occlusions, all compared to

The Ip is not an accurate method for determining P–. This can result in
significant errors in the estimation of AIX. The mAIx, derived from pressure-
flow relationship in the wave intensity analysis is more sensitive to the
determination of P, than AIX which uses only the pressure waveform.

P.040

INCREASED CAROTID INTIMA-MEDIA THICKNESS PREDICTS HIGH CARDIOVASCULAR RISK

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Objectives: The aim of this study was to investigate the relationship between the total cardiovascular risk assessed by SCORE system and vascular markers: carotid intima-media thickness (IMT), arterial stiffness indices, brachial artery flow mediated dilatation (FMD) and the ankle-brachial pressure index (ABI).

Background: Carotid IMT, arterial stiffness indices, FMD and ABI are markers of subclinical atherosclerosis. The SCORE risk system offers direct estimation of ten-year total fatal cardiovascular (CV) risk. The relationship between these markers and SCORE risk has not been investigated.

Methods: We studied 160 subjects without cardiovascular disease (aged 49.91 ± 17.16 years, 69 males). Traditional risk factors, carotid IMT, carotid radial pulse wave velocity (crPWV), stiffness index (SI), measured by photoplethysmography, brachial artery FMD and the ABI were assessed. Laboratory tests included serum lipid and glucose profile. The total CV risk was evaluated by SCORE system.

Results: By multivariate analysis carotid IMT (p = 0.001) and SI (p = 0.008) were correlated with SCORE risk. Brachial artery FMD, ABI and crPWV didn’t correlate significantly with SCORE risk (p = 0.052, p = 0.110 and p = 0.937 respectively). In stepwise regression models that include carotid IMT, crPWV, SI, FMD and ABI, only carotid IMT > 0.9 mm correlated with high total CV risk (SCORE ≥ 5%). Odds ratio for increased CV risk was 8.56 (CI 95% 3.109-23.567). The IMT cut-off point at 0.9 mm predicts high CV risk (sensitivity 67.4%, specificity 78.6%).

Conclusions: Carotid artery IMT and arterial stiffness marker SI predict total CV risk. Carotid IMT is a prognostic marker for high CV risk.

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VALIDATION OF SPHYMGOCOR-PROCESSED AUGMENTATION INDEX USING CAROTID ARTERY DISTENSION WAVEFORM

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FLOW AND WALL SHEAR STRESS IN LARGE ARTERY USING ULTRASOUND APPLICATION OF WOMERSLEY THEORY: ESTIMATION OF PULSE VOLUME FLOW AND WALL SHEAR STRESS IN LARGE ARTERY USING ULTRASOUND


Cholesterol and its concomitants are major risk factors for cardiovascular disease, which are linked to an increase in plasma lipids. The measurement of plasma lipids is usually done by measuring the total cholesterol level, which is calculated by multiplying the triglyceride level by 5 and adding this to the total cholesterol level. This method is not accurate and may result in underestimation. A better method of measuring plasma lipids is to measure the high-density lipoprotein (HDL) cholesterol level, which is a more accurate measure of plasma lipids. HDL cholesterol is found in the blood and is responsible for carrying cholesterol from the arteries to the liver, where it is broken down and excreted from the body. HDL cholesterol is considered to be beneficial because it helps to remove excess cholesterol from the arteries, thus reducing the risk of heart disease. It is recommended that adults should aim to maintain HDL cholesterol levels above 40 mg/dL to reduce the risk of heart disease. 

In conclusion, wave reflections can be assessed from distension waveforms with good accuracy. Lower values for AI resulted from overestimation with application techniques rather than from underestimation with distension waveforms.

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MULTIAXIAL MECHANICAL CHARACTERISTICS OF CAROTID PLAQUE: ANALYSIS BY MULTI-ARRAY ECHOTRACKING SYSTEM.


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Carotid plaque rupture depends on the various types of mechanical stresses. Our objective was to determine the multiaxial mechanical characteristics of atherosclerotic plaque and adjacent segment of the common carotid artery (CCA). A novel non-invasive echotracking system was used to measure intima-media thickness, diameter, pulsatile strain, and distensibility at 128 sites on a 4 cm long CCA segment. The included 62 patients with recent cerebrovascular ischemic event and either a plaque on the far wall of CCA (n = 25) or no plaque (n = 37). The mechanical characteristics of the carotid segment devoid of plaque did not differ between the two groups. Among patients with plaque, 16 had a larger radial strain at the level of plaque than at the level of adjacent CCA (pattern A: outward bending strain). The 8 patients who had an opposite pattern (inward bending strain) were more often dyslipidemic (100% vs 56% P < 0.03) and type 2 diabetic (63% vs 12%, P = 0.04) than pattern A patients. Strain gradient significantly decreased in parallel with the presence of dyslipidemia and/or type 2 diabetes. Longitudinal gradients of distensibility and Young's elastic modulus were consistent with strain gradients. In conclusion, type 2 diabetes and dyslipidemia were associated with a stiffer carotid at the level of the plaque than in adjacent CCA, leading to an inward bending stress. The analysis of plaque mechanics along the longitudinal axis may afford useful information, since repetitive bending strain of an atherosclerotic plaque may fatigue the wall material and result in plaque rupture.

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APPLICATION OF WOMESLEY THEORY: ESTIMATION OF PULSE VOLUME FLOW AND WALL SHEAR STRESS IN LARGE ARTERY USING ULTRASOUND


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In order to assess pulse volume flow (PVF) and wall shear stress (WSS) in large arteries by the means of ultrasound, a Womersley theory based iterative method is proposed. Firstly, the PVF is computed by integrating the estimated Womersley profiles. The PVF and WSS are then computed by applying the Womersley theory to the estimated Womersley profiles.

The results displayed a large relative difference in average maximal PVF (27.7%, p < 0.01) and WSS (72.3%), p < 0.01, the intra individual variations being 4.9% for the PVF and 11.6% for the WSS. In the case of the mean