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Correlation of doppler ultrasound assessment of carotid femoral pulse wave velocity with coronary artery disease

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Topic(s):
Prevention – Cardiovascular Risk Assessment: Imaging

Citation:
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Background:
Arterial stiffness is an important cardiovascular risk factor. Carotid femoral pulse wave velocity (cfPWV) is simple noninvasive method to determine aortic stiffness. Arterial stiffness measures, cfPWV in particular, have been found to be correlate with stroke and peripheral artery disease. Usually SphygmoCor or Complior are used to calculate cfPWV. Doppler ultrasound can serve as an alternative to these methods.

Purpose:
To assess cfPWV using doppler ultrasound and study its correlation with coronary artery disease and its severity.

Methods:
cfPWV was assessed by ultrasound Doppler in patient aged 20-70 years undergoing coronary angiography. cfPWV was measured by sequential recordings of arterial pressure waveform at the carotid and femoral arteries with a Doppler ultrasound with ECG gating and calculated as the distance between the carotid and the femoral sampling site divided by the time interval.

Result:
Of the 358 subjects studied, 243 had coronary artery disease(CAD) (>50% diameter stenosis) and were further divided into single, double or triple vessel disease groups. 115 patients had mild CAD (< 50% stenosis) or no CAD and served as controls. Baseline characteristics were similar except diabetes (more common in CAD group)(39.09% v/s 27.82%). cfPWV was found to increase with age in all groups. cfPWV was not significantly affected by sex, diabetes, dyslipidemia, BMI, smoking or hypothyroidism. Mean cfPWV was significantly higher in patients with CAD (8.99 v/s 6.51 m/s, p<0.001) and hypertensives (8.71 v/s 7.83 m/s, p<0.001). Patients with triple vessel disease(TVD) had significantly higher cfPWV (10.12 m/s) than those with double(DVD)(8.84 m/s) or single vessel disease(SVD)(8.28m/s)(p<0.001). Multinomial logistic regression revealed an odds ratio of 2.00, 2.375 and 3.368 respectively for SVD, DVD and TVD groups in comparison to controls (p < 0.001). cfPWV value > 7.25 m/s predicted CAD with sensitivity 78.6 % and specificity 74.8% (AUC =0.848, P<0.001).

Conclusion:
Carotid femoral pulse wave velocity can be measured noninvasively by ultrasound Doppler. cfPWV increases with age and hypertension and has strong correlation with coronary artery disease and its severity. The cfPWV can be an independent risk factor and may be utilized for cardiovascular risk prediction.

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One Way ANOVA: p<0.001
Multiple comparisons: Significant pairs:
All pairs (p<0.05) except one pair (single vs double)