P2.26: PRESSURE AT THE LAST SYSTOLIC SHOULDER OF THE ARTERIAL WAVEFORM EQUALS CENTRAL AORTIC SYSTOLIC PRESSURE AND IS CONSTANT ALONG THE UPPER LIMB

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To link to this article: https://doi.org/10.1016/j.artres.2012.09.107

Published online: 21 December 2019
There was no statistically significant correlation between raPWV and arm musculature. 3) Left-handed individuals had higher raPWV than right-handed individuals, figure below. (unpaired t-test; both limbs PWV p<0.001, dominant only p<0.015, non-dominant p<0.001).

Summary and Conclusions: Results failed to support hypotheses 1 and 2, although differences in musculature between the two arms were small.

Intriguingly, for reasons unknown, left handers had stiffer arms than right handers. In future we will measure PWV at other sites and include racquet sport players with greater muscular disparity between each arm.

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Background: Rupture of atherosclerotic plaques occurs when mechanical stress exceeds material strength. Increased radial strain (εr, measured in the wall tissue) may be indicative for both locally increased mechanical stress as well as locally decreased material strength. The aim of our feasibility study was to analyse the precision and accuracy of εr within the common carotid artery (CCA) wall of patients with and without recent cerebrovascular accident (CVA, <6weeks).

Methods: The left and right CCA of 21 patients (15 with CVA) were measured twice with multiple M-mode ultrasound. εr was determined for the intima-media layer (εm) and adventitia layer (εa), separately, using an RF-based algorithm. Intima-to-intima (εa D/Dm) and adventitia-to-adventitia relative distension (εa D/Dm) were also obtained, which are strongly related to strain (εr = −D/Dm) when wall-inhomogeneities are negligible.

Results: Intra-subject precision was 1.8% for εm and 1.0% for εa. Averaged over all patients, εm = −7.4±2.7% (mean±SD) was higher than εa = −3.9±1.7% (p<0.0001). εm was significantly correlated with (D/Dm) (r² = 0.48, p<0.0001), but higher than −(D/Dm) (Δ = 0.8±2.15%, p = 0.02). For the adventitial layer, the correlation between εa and (D/Dm) was weaker (r² = 0.10, p = 0.05; Δ = 0.7±2.0%, p = 0.02). Despite similar blood pressures and stenosis degrees, εm (D/Dm) but not εa were higher at the ipsilateral side for patients with than for patients without CVA, (p = 0.002, p = 0.05 and p = 0.06, respectively).

Conclusion: Strain can be measured directly within wall tissue with reasonable accuracy and precision and allows discrimination between arterial layers and patient groups. As (D/Dm) is not applicable to inhomogeneous walls, strain is a promising tool to evaluate vulnerability of plaques.

P2.28 OPTICAL AND MECHANICAL MEASUREMENT OF THE ARTERIAL ELASTICITY

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The photoplethysmography (PPG) derives from the change of attenuation of the light either transmitted or reflected through the tissues over which the LED light has been applied. Variation in light intensity received by the photodetector depends on the amount of blood in arteries, but the accurate waveform is also caused by arterial wall properties, e.g., arterial elasticity. Also eletromechanical film (EMFi) is an excellent sensor material which can provide extremely small displacements for long-term applications for arterial pulse wave recordings to find out wall elasticity. The EMFi sensor measures extremely small displacements (εm) accurately within wall tissue (εr) and 1.0% for εa D/Dm)

P2.27 LOCAL RADIAL STRAIN OF THE COMMON CAROTID ARTERY WALL

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