P.042: MULTIAXIAL MECHANICAL CHARACTERISTICS OF CAROTID PLAQUE: ANALYSIS BY MULTI-ARRAY ECHOTRACKING SYSTEM.

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A modified augmentation index (AIX) using wave intensity analysis

A modified augmentation index (AIX) using wave intensity analysis. The inflexion point was determined from the 0 crossing of the 3rd derivative. For CSP and RSP-AI, standard reports of SphygmoCor were used. WTS-AI could be determined with good precision from all tracings in all patients. Agreement between WTS-AI and CSP-AI was good ($r^2 = 0.83$, RMSE = 5.8), with a 35% systematic underestimation by SphygmoCor: slope = 0.65 [0.56–0.73]). The WTS-AI and RSP-AI were aligned ($r^2 = 0.71$, RMSE = 6.9), with comparable underestimation. This underestimation was not due to GTF, but to the appplanation process since bypassing GTF had no influence on it and because AI, estimated with another type of tonometer, was incorrectly scaled with CSP-AI (slope 0.93 [0.81–1.05]). CSP-AI and RSP-AI were not in good agreement ($r^2 = 0.66$, RMSE = 10.7), but correctly scaled (slope = 0.87 [0.81–1.05]). In conclusion, wave reflections can be assessed from distension waveforms with good accuracy. Lower values for AI results from overestimation with appplanation techniques rather than from underestimation with distension waveforms.

P.042
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 study 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). Forward bending stress was 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.