Carotid Arterial Hemodynamic and Stiffness Parameters in Patients with Ischemic Leukoaraiosis

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Background: Ischemic leukoaraiosis (ILA) is believed to be ischaemic in origin due its association with cerebrovascular risk factors and similar location as lacunar infarctions. However, its pathophysiology is not well understood and its diagnosis so far is still based on magnetic resonance imaging (MRI) and exclusion of other radiologically similar changes. We used carotid duplex ultrasound as a non-invasive diagnostic tool in order to determine the cerebral blood flow and carotid stiffness in ILA patients.

Methods: We compared 59 ILA patients to 45 risk factor matched controls with normal head MRI. ILA diagnosis was based on MRI and was further categorised according to the Fazekas scale. Carotid artery blood flow velocity, flow and resistance indices (RI, PI) and carotid stiffness indices: pulse wave velocity beta (PWVb), pressure–strain elasticity modulus (Ep), b index , augmentation index (Aix) and arterial compliance (AC) were determined.

Results: Diastolic, systolic and mean blood flow velocities and blood flows were significantly lower in the ILA group(p≤0.05). All the velocities and blood flows showed a decreasing trend with higher Fazekas score, whereas resistance indices showed an increasing trend. PWVb, Ep, b index and Aix were higher and AC values were lower in the ILA group; however, only Ep and PWVb reached statistical significance (p≤0.05).

Conclusions: Lower blood flow and higher resistance of carotid arteries as well as increased carotid stiffness were found in ILA patients compared to risk factor-matched controls. Carotid blood flow parameters, Ep and local PWVb could have a diagnostic role in ILA patients.