**Carotid Plaque Volume: Can it be accurately measured using tomographic (3D) Ultrasound?**

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Background

Current European Society of Vascular Surgery (ESVS) guidelines recommend carotid endarterectomy (CEA) for a symptomatic severe carotid stenosis (> 70%; NASCET criteria). However, in asymptomatic patients, the severity of carotid stenosis is a poor predictor of stroke, with a <2% risk of ipsilateral stroke per year for a severe stenosis. The Manchester carotid plaque study group has proven that Carotid Plaque Volume (CPV) – the volume of atherosclerotic disease within the artery or atherosclerotic burden – is significantly higher in symptomatic compared with asymptomatic patients undergoing CEA.

We investigated whether CPV can be accurately measured using tomographic (3D) ultrasound and if it is reproducible.

Methods

All patients admitted to UHSM for a CEA were recruited and underwent pre-operative 3D carotid ultrasound by a trained vascular scientist. CPV was measured by two trained observers using a standardised technique. The volume of the endarterectomised plaque was precisely measured using a water immersion technique, based on Archimedes’ Principle, by dividing the suspended weight with the density of the fluid.

Results

CPV measurements by two trained observers have been performed on 40 patients, but results on 10 patients are presented now (3 asymptomatic, 7 symptomatic). The mean CPV was (±sd) 728.9±206.7mm3. Initial results showed a strong correlation between the CPV measured by 3D ultrasound and the actual CPV, as measured by the immersion technique, with a mean difference (±sd) 99.3±63.7mm3; *rs* (10) = 0.82, p<0.0058. Interrater reliability between the two observers was excellent, with a mean difference (±sd) 22.5±42.4mm3; *rs* (10) = 0.92, p<0.0005. The results on all 40 (or more) will be available by December.

Conclusion

While this sample size is small, tomographic (3D) ultrasound may be used to measure CPV accurately and has excellent reproducibility. The results from paired measurements in over 40 carotid patients will be presented at the meeting.

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