

Winner of EUROSON 2012 Young Investigator Award

Dose-Dependent Artefact in the far Wall of the Carotid Artery with Dynamic Contrast Enhanced Ultrasound

Introduction

Dynamic contrast enhanced ultrasound (DCE-US) is an emerging technology to assess neovascularization in atherosclerosis. The aim of this study was to quantify a pseudo-enhancement phenomenon observed during DCE-US of the carotid in other studies.

Methods

Ethical approval was obtained for this prospective case series and each patient gave written informed consent. 31 patients with 50–99% internal carotid artery stenosis underwent DCE-US imaging of the carotid bifurcation using 2 ml of intravenous SonoVue™. In the final 10 patients, a further 1 ml bolus was administered after 15 minutes. Raw linear DICOM data was analysed offline. Regions of interest were drawn within the common carotid lumen and immediately adjacent in the near and far wall adventitia. Peak intensity was measured. In addition, an in vitro experiment, using a single channel flow phan-

tom was performed. SonoVue™ concentrations of 0.02, 0.1, 0.5, 1, and 2 ‰ were pumped into the tube. Regions of interest were drawn in a similar fashion and the peak intensity measured.

Results

The carotid far wall was significantly more echogenic than the near wall at 2 ml ($p < 0.0001$, $n = 31$) and the far wall intensity rose synchronously with that of the lumen. The intensity difference was a factor of 4 at 1 ml and 12 at 2 ml. In vitro, the phantom demonstrated a similar pattern and magnitude of enhancement in an area without vasa vasorum.

Conclusion

A dose-dependent, non-linear propagation artefact occurs in the far wall adventitia of the carotid artery, which should not be mistaken as a marker of plaque vulnerability.



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