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PERIPHERAL ARTERIAL WAVEFORMS FOR THE PREDICTION OF CARDIOVASCULAR EVENTS: CAROTID VERSUS RADIAL PULSE WAVE ANALYSISA J M Lewis, D Kotecha *John Radcliffe Hospital*

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Purpose Augmentation of central systolic blood pressure identified with pulse wave analysis (PWA) is a marker of arterial stiffness associated with coronary atheroma and cardiovascular events. We sought to determine if waveforms obtained from the carotid artery

Figure 1

would be superior to those from the radial artery. Our hypothesis was that due to proximity to the aorta, carotid PWA would better reflect central aortic pressures.

Methods Radial and carotid pulse waveforms were available in 201 patients enrolled into the Alternative Risk Markers in Coronary Artery Disease (ARM-CAD) study with follow-up data at a mean of 1.2 years. Patients were recruited prior to elective coronary angiography into a prospective multicentre observational study. Peripheral waveforms were obtained over 12 s using a Millar tonometer. Augmentation pressure (AP), derived from a signal-averaged waveform, was calculated as the difference in pressure between the first and second systolic shoulders. Radial and carotid PWA were compared by assessing intra-operator variability using Bland & Altman plots, and Cox regression analysis for death or myocardial infarction (MI) adjusted for baseline Framingham Score and cardiac medications.

Results Mean age was 66 years, 63% were male, 45% had prior angina/MI, 23% a history of diabetes and 17% some impairment of left-ventricular function. As demonstrated in the example waveforms, there was a marked difference in AP from carotid and radial PWA (20 mm Hg mean difference; $p < 0.01$). Carotid waveforms were technically more difficult to obtain and less reproducible. The SD of difference between repeated measurements for radial AP was 4.2 mm Hg (Bland and Altman 95% limits of agreement -7.2 to 9.1) versus 6.6 mm Hg for carotid AP (limits -12.1 to 13.7). Higher radial AP was associated with death or MI on follow-up with an adjusted Cox HR of 3.48 per SD increase (95% CI 1.28 to 9.45; $p = 0.014$). In contrast, carotid AP was unrelated to outcomes in either adjusted or unadjusted analyses (95% CI 0.59 to 2.73; $p = 0.548$).

Conclusions The utility of carotid PWA for the prediction of cardiovascular events is restricted by lower reproducibility, leading to

higher intrasubject variability. Augmentation pressure from the peripheral radial artery waveform, but not carotid, is associated with cardiovascular events in patients referred for diagnostic angiography.