Vessels and Endothelium

12.27 Does Ambulatory Blood Pressure Monitoring Provide a Reliable Measure of Arterial Stiffness?

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Introduction. Aortic stiffness is an important marker of target-organ damage in hypertension, but its measurement requires dedicated equipment and personnel. It has been recently suggested that the dynamic relation between systolic and diastolic blood pressure (BP) values obtained at 24-hour non-invasive ambulatory BP monitoring may provide an indirect measure of aortic stiffness. However, the accuracy of 24-h BP monitoring in estimating aortic stiffness is controversial.

Methods. 516 untreated subjects with essential hypertension (60% men; age 49+/-10 years, office BP 151/94+/-17/10 mmHg) underwent 24-hour BP monitoring and measurement of aortic pulse wave velocity (aPWV) with a tonometry-based technique (SphygmoCor). The following proposed parameters of stiffness were calculated: (a) ambulatory arterial stiffness index (AASI), defined as 1 minus the regression slope of diastolic on systolic BP in 24-h recordings, (b) symmetrical AASI, obtained using a symmetrical regression model, and (c) the ratio between the standard deviation of 24-hour systolic BP and the standard deviation of 24-hour diastolic BP (SD-ratio).

Results. AASI, symmetrical AASI and SD-ratio showed significant direct correlations with age ($r=0.29$, $r=0.39$, $r=0.39$) and 24-h systolic BP ($r=0.23$, $r=0.23$, $r=0.22$) (all $p<0.001$). SD-ratio very closely predicted and indeed was virtually identical to symmetrical AASI ($r=0.94$). Aortic PWV had a significant direct association with AASI ($r=0.19$), symmetrical AASI ($r=0.29$), and SD-ratio ($r=0.29$), but the relationships with symmetrical AASI and with SD-ratio were both significantly closer than that with AASI (z test, both $p<0.01$).

Conclusions. Twenty-four-hour ambulatory BP monitoring has a limited ability to estimate arterial stiffness. In comparison with AASI, both symmetrical and AASI and SD-ratio showed a closer correlation with aortic pulse wave velocity, a direct measure of large-artery stiffness.