A new oscillometric method for assessment of arterial stiffness: comparison with tonometric and piezo-electronic methods.

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INTRODUCTION: Pulse wave velocity (PWV) and augmentation index (AIx) are parameters of arterial stiffness and wave reflection. PWV and AIx are strong indicators for cardiovascular risk and are used increasingly in clinical practice. Previous systems for assessment of PWV and AIx are investigator dependent and time consuming. The aim of this study was to validate the new oscillometric method (Arteriograph) for determining PWV and AIx by comparing it to two clinically validated, broadly accepted tonometric and piezo-electronic systems (SphygmoCor and Complior).

DESIGN AND METHOD: PWV and AIx were measured up to five times in 51 patients with the SphygmoCor, Complior and Arteriograph. In 35 patients, the measurements were repeated after 1 week in a second session using the same protocol.

RESULTS: The correlations of the PWV as assessed with the Arteriograph with the values obtained using the SphygmoCor ($r = 0.67$, $P < 0.001$) and the Complior ($r = 0.69$, $P < 0.001$) were highly significant. Variability and reproducibility for PWV were best for the Arteriograph, followed by Complior and SphygmoCor. AIx (SphygmoCor versus Arteriograph) were very closely correlated ($r = 0.92$, $P < 0.001$).

PERSPECTIVES: The Arteriograph is a new, easy-to-use and time-effective method for assessing arterial stiffness and wave reflection.

J Hypertens 2008 Mar;26(3):523-8.

Invasive validation of a new oscillometric device (Arteriograph) for measuring augmentation index, central blood pressure and aortic pulse wave velocity.

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BACKGROUND: The importance of measuring aortic pulse wave velocity (PWVao), aortic augmentation index (Aix) and central systolic blood pressure (SBPao) has been shown under

different clinical conditions; however, information on these parameters is hard to obtain. The aim of this study was to evaluate the accuracy of a new, easily applicable oscillometric device (Arteriograph), determining these parameters simultaneously, against invasive measurements.

METHODS: Aortic Aix, SBPao and PWVao were measured invasively during cardiac catheterization in 16, 55 and 22 cases, respectively, and compared with the values measured by the Arteriograph.

RESULTS: We found strong correlation between the invasively measured aortic Aix and the oscillometrically measured brachial Aix on either beat-to-beat or mean value per patient basis ($r = 0.9$, $P < 0.001$; $r = 0.94$, $P < 0.001$), which allowed the noninvasive calculation of the aortic Aix without using generalized transfer function. Similarly strong correlation ($r = 0.95$, $P < 0.001$) was found between the invasively measured and the noninvasively calculated central SBPao; furthermore, the BHS assessment of the paired differences fulfilled the 'B' grading. The PWVao values measured invasively and by Arteriograph were 9.41 ± 1.8 m/s and 9.46 ± 1.8 m/s, respectively (mean ± SD); furthermore, the Pearson's correlation was 0.91 ($P < 0.001$). The limits of agreement were 11.4% for aortic Aix and 1.59 m/s for PWVao.

CONCLUSION: Aix, SBPao and PWVao, measured oscillometrically, showed strong correlation with the invasively obtained values. The observed limits of agreement are encouragingly low for accepting the method for clinical use. Our results suggest that the PWVao values, measured by Arteriograph, are close to the true aortic PWV, determined invasively.

J Hypertens. 2010 Oct;28(10):2068-75.