

A superiority of arterial stiffness index over pulse wave velocity and pulse pressure in the evaluation of arterial stiffness

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Objective:

Pulse-wave velocity (PWV) is widely used to provide a quantitative measure of arterial stiffness. However, PWV is affected by blood pressure level at the time of measurement and this clearly reduces its value as an index of arterial stiffness. CardioVision®, a newly developed device for measurement of brachial arterial stiffness, establishes a quantitative estimate of arterial stiffness, the arterial stiffness index (ASI), through computerized analysis of arterial pulse oscillometry. Accordingly, we compared the efficacy of ASI, PWV, and more conventional pulse pressure (PP) in the measurement of arterial stiffness.

Design and Methods:

Blood pressure, ASI by computerized oscillometry (CardioVision®, IMDP, Inc.), PWV and PP were measured in 98 consecutive subjects, 41 men and 53 women. They shared the following characteristics (means): age 70, body mass index 23 kg/m², systolic blood pressure (SBP) 135 mmHg, diastolic blood pressure (DBP) 75 mmHg, and PP 61 mmHg. Those on antihypertensive medication were classified into hypertension (HT) group (n = 57) irrespective of current blood pressure. On the other hand, those without antihypertensive therapy were classified into the non-hypertension (non-HT) group even if their blood pressure was higher than 140 mmHg systolic and/or 90 mmHg diastolic.

Results: The mean (\pm SD) BP was 142 ± 19 and 126 ± 17 mmHg in HT and non-HT groups, respectively. ASI, PWV, and PP all significantly increased with age. The correlation coefficients of ASI, PWV, and PP

for age were 0.398, 0.392, and 0.390, respectively. The difference between the HT and non-HT groups regarding age-related increase in arterial stiffness was detected only by ASI, but not by the other two means. Specifically, when ASI was plotted as a function of age, the regression line was significantly steeper in the HT group than in the non-HT group. Discrimination of the HT group from the non-HT group was not possible by PWV and PP measurements.

Conclusions:

The age-related increase in arterial stiffness is accelerated in **the HT group**. This phenomenon was detectable by ASI, but not by PWV and PP measurements. Thus, ASI may be the most sensitive non-invasive measure of arterial stiffness among currently available methods.