P54 Age-specific, Pressure-independent Acute Changes in Carotid-femoral Pulse Wave Velocity During Head-up Tilt

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ABSTRACT

Introduction: Acute, gravity-induced blood pressure (BP) changes during head-up tilt may generate concomitant variations in carotid-femoral pulse wave velocity (cf-PWV). We aimed to separate the pressure-dependent and -independent components of cf-PWV changes observed during head-up tilt.

Methods: 30 healthy individuals (age 48 ± 18 years (mean ± SD), 38% males, BP 130/74 ± 12/8 mmHg) underwent head-up passive tilting at a = 0°, 30°, and 60°. BP was taken at the upper arm, constantly kept at heart level. Aortic BP was reconstructed from radial tonometry (SphygmoCor). Stiffness index b0 was estimated at 0°. 1 Assumptions: [1] from MRI, the effective cf-PWV travel distance (ETD, 80% of straight carotid-to-femoral distance) begins at heart level; [2] the change in DBP along the aorta is predictable from the hydrostatic pressure gradient (0.73 mmHg/cm); [3] cf-PWV and hydrostatic pressure relate linearly, hence predicted cf-PWV can be calculated as the average of aortic (PWVaorta, using b0 and aortic DBP) and femoral (PWVfem, using b0 and femoral DBP; corresponding to aortic DBP + (ETD × sin(a) × 0.73)) PWVs.

Results: Both young (24–48 years) and old (48–82 years) individuals showed increasing trends for peripheral SBP, DBP, PP, and central DBP with tilting; central SBP remained unchanged. Heart rate (HR) and cf-PWV increased with body tilt in both groups (Figure, left); b0 linearly correlated with age (R = 0.70, p < 0.01). After adjustment for HR4, observed-vs-predicted cf-PWV exponentially increased as a function of age (R² = 0.38, p < 0.01 for quadratic equation, p = 0.04, vs. linear; Figure, right).

Conclusion: With aging, the acute relationship between BP and cf-PWV becomes progressively nonlinear.

REFERENCES


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