

Aortic Stiffness, Obesity and Left Atrial Volume in Older Participants in the Age, Gene/Environment Susceptibility—Reykjavik Study

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Objectives: Larger left atrial volume (LAV) is associated with increased risk for atrial fibrillation, stroke, and other cardiovascular diseases. Relations of LAV with obesity and various hemodynamic measures have been investigated separately. We evaluated the combined relations of LAV with obesity, volume load on the heart, and aortic stiffness in order to determine whether relations between obesity and LAV are attributable to hemodynamic abnormalities.

Methods: We used biplane magnetic resonance imaging to measure LAV in 423 participants (72 to 89 years of age, 245 women) in the community-based Age, Gene/Environment Susceptibility-Reykjavik Study. Aortic stiffness was assessed as carotid-femoral pulse wave velocity and central aortic pressure-flow relations. Adiposity was assessed as body-mass index (BMI).

Results: In a single multivariable model that included age, sex, left ventricular diastolic volume, and standard cardiovascular disease risk factors, larger LAV was associated with higher BMI (B=1.08 fold higher LAV per SD higher BMI; 95% CL=1.04,1.11; P<0.001), cardiac output (CO) (B=1.08; 95% CL=1.04,1.11; P<0.001), central pulse pressure (CPP) (B=1.06; 95% CL=1.03,1.09; P<0.001) and carotid-femoral pulse wave velocity (B=1.04; 95% CL=1.01,1.07; P=0.007). In a risk factor-adjusted multivariable model that examined components of CPP, larger LAV was associated with higher forward wave amplitude (B=1.09; 95% CL=1.05, 1.14; P<0.001) but not backward wave amplitude (P=0.7). In a dual impedance-flow model, larger LAV was associated with higher characteristic impedance (B=1.09; 95% CL=1.05,1.12; P<0.001) and peak flow (B=1.12; 95% CL=1.08,1.16; P<0.001). Obesity (BMI≥30 kg/m², P<0.001) and CPP above the sex-specific median (P<0.001) were associated with larger LAV (interaction, P=0.7, **Figure**). Similarly, obesity (P<0.001) and CO above the sex-specific median (P<0.001) were associated with larger LAV (interaction, P=0.12, **Figure**).

Conclusions: Higher pulsatile load (attributable to increased characteristic impedance, forward wave amplitude, and a stiffer aorta), higher steady-flow volume load and obesity are jointly associated with larger LAV.

