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Letter to the Editor

Aortic Pulse Wave Velocity and Left Atrial Size in Elderly Subjects

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Dear Editor-in-Chief

Arterial stiffness assessed by the measurement of aortic pulse wave velocity (aPWV), is an independent predictor of cardiovascular events and mortality, in various population groups, including elderly people (1,2). Left atrial size increases with age and is a predictor for age related first cardiovascular events (3).

Data regarding possible correlations between aPWV and left atrial dimensions are sparse and inconclusive. Therefore, the aim of this study was to investigate the relationship between left atrial volume index (LAVI) and aPWV in elderly subjects without manifest cardiovascular diseases.

We included 104 non-diabetic subjects aged ≥60 yr, 62(59.6%) women, with normal left ventricular ejection fraction, examined in the 2nd Department of Internal Medicine, Cluj-Napoca in February-December 2017. Significant valvular diseases, acute coronary events, arrhythmias, chronic renal, hepatic and pulmonary diseases, cancer and previous or current smoking represented exclusion criteria.

All participants signed the informed consent and the study was approved by the ethics committee of our institution.

Vascular parameters were determined using an oscillometric device Arteriograph (TensioMed, Budapest, Hungary) which uses a brachial cuff to measure blood pressures and detects oscillations produced by pressure pulse waves. Aortic PWV represents the ratio between the distance travelled by the wave (between suprasternal notch and pubis) and the return time of the pulse wave. Vascular determinations were performed in standardised conditions (2).

Echocardiographic evaluation was made using an ALOKA ProSound α10 system (Aloka Co.Ltd, Tokyo, Japan), in accordance with the guidelines of the American Society of Echocardiography. We calculated LAVI as left atrial volume (prolate ellipse method) indexed to body surface (4). The ratio E/E' (E Doppler mitral fast inflow to the mean septal and lateral E') was used as a parameter of left ventricular diastolic dysfunction. All ultrasonographic examinations were made by the same physician.

Statistical analysis was performed using SPSS version 20.0. A *P*-value <0.05 was considered statistically significant. Clinical characteristics of participants are listed in Table 1. LAVI significantly correlated with age (r=0.31, *P*=0.001), body mass index (r=0.24, *P*=0.01), left ventricular end-diastolic diameter (r=0.22, *P*=0.02), left ventricular posterior wall thickness (r=0.37, *P*<0.001), E/E' (r=0.38, *P*<0.001) and aPWV (r=0.30, *P*=0.002) and not with other echocardiographic or vascular parameters (Pearson's correlation).

Table 1: Characteristics of the study subjects

Variable	*Rate*
Age (yr)	68.4±7.2
Body mass index (kg/m²)	26.6±3.8
Left atrial volume index (ml/m²)	23.9±3.8
Left ventricular diastolic diameter (mm)	47.9±4.8
Posterior wall thickness (mm)	10.8±1.4
Posterior wall thickness/left ventricular diastolic diameter	0.45±0.06
Left ventricular ejection fraction (%)	59±3.4
E/E'	9.3±3.8
Aortic pulse wave velocity (m/s)	9.8±2
Systolic blood pressure (mmHg)	135.3±15.8
Mean blood pressure (mmHg)	98.3±9.7
Diastolic blood pressure (mmHg)	79.9±8.8
Hypertension (%)	60.2%
Medications (%)	
- angiotensin converting enzyme inhibitors/angiotensin receptor blockers	43.6%
- calcium channel blockers	13.6%
- beta-blockers	40.7%
- diuretics	29%
- statins	23.3%

Values are mean±standard deviation or (%).

All these parameters, with the exception of left ventricular end-diastolic diameter, remained independent predictors of LAVI, in multivariate stepwise regression analysis (Table 2).

Table 2: Independent predictors of left atrial volume index

Variable	*B*	*Standard error*	*β*	*95%Confidence interval for B*	P
Left ventricular posterior wall thickness	0.70	0.23	0.26	0.24-1.10	0.004
E/E'	0.31	0.09	0.31	0.15-0.49	<0.001
Aortic pulse wave velocity	0.37	0.16	0.20	0.05-0.68	0.02
Body mass index	0.17	0.08	0.18	0.01-0.35	0.04

R^2=0.28, *P*<0.0001

Our results indicate an independent association between LAVI and aPWV in elderly non-diabetic patients. Correlations between aortic PWV and left atrial size have been previously reported in hypertensive patients (5) and in patients with atrial fibrillation immediately after cardioversion (6). However, in never treated hypertensive patients with non-dipping profile, office pulse pressure and not aPWV, was the most important arterial stiffness parameter correlated with left atrial size (7).

Stiffness of aorta produces a high left ventricular load which predisposes to left ventricular hypertrophy and diastolic dysfunction. Progression of

left ventricular diastolic dysfunction may determine atrial remodeling and dilatation (8). Possible common pathogenic pathways which may directly induce both vascular and atrial structural alterations are also discussed, including systemic inflammation, matrix metalloproteinases and renin-angiotensin-aldosterone system activation (5).
In conclusion, our results indicate that aPWV could determine left atrial dimensions in elderly patients.

Conflict of interests

None

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