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Left atrial function - association with left ventriculoarterial function in hypertensive patients

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BACKGROUND: Vascular stiffness and left atrial volume index (LAVI) are predictors of cardiovascular complications in hypertensive patients. The correlation of left atrium (LA) with left ventricle (LV) – arterial functional changes has not been well established.

PURPOSE: To investigate the relationship between LA remodeling and ventriculoarterial function.

METHODS: We studied 70 consecutive middle-aged patients (54 ± 13 years), separated in two groups: 55 with mild to moderate hypertension and duration up to 5 years and 15 healthy controls. All parameters for arterial stiffness – 24-hour central systolic pressure (cSys24h), central pulse pressure (cPP24h), augmentation index 24h (Aix24h) and 24-hour pulse wave velocity (PWV24h) were measured non-invasively with oscillometric method by Mobil-O-graph PWA. All patients underwent standard two-dimensional echocardiography with Spackle tracking analysis for LA and LV global longitudinal strain (GLS).

RESULTS: Statistically significant differences in parameters of vascular stiffness were found in patients with hypertension in comparison with healthy controls: cSys24h (116.64 ± 10.52 vs. 108.4 ± 6.19 mm Hg, $p < 0.001$), cPP24h (47.64 ± 9.43 vs. 40.4 ± 4.98 mmHg, $p < 0.001$), PWV24h (8.59 ± 1.49 vs. 6.29 ± 0.91 m/s, $p < 0.0001$). Patients with hypertension have higher LV filling pressures: E/e' ratio (9.62 ± 3.13 vs. 7.62 ± 1.58 , $p < 0.006$), higher velocities of A-wave transmitral blood flow (85.15 ± 16.88 vs. 64.57 ± 13.76 cm/s, $p < 0.0001$), dilated LA (LAVI: 33.78 ± 10.68 vs. 24.96 ± 4.89 ml/m², $p < 0.001$) and reduced LA GLS (29.34 ± 3.45 vs. $41.33 \pm 4.37\%$, $p < 0.0001$) in comparison to control group. There were no statistically significant differences in Aix24h and cardiac output between the two groups. There is moderate positive correlation between LAVI with cPP24h ($r = 0.491$, $p < 0.0001$) and cSys24h ($r = 0.366$, $p < 0.004$). We found moderate positive correlation between LAVI and LV mass index ($r = 0.386$, $p < 0.002$). PWV24h correlated moderately and positively with LAVI ($r = 0.404$, $p < 0.0001$), and negatively with LA GLS ($r = -0.471$, $p < 0.0001$). **CONCLUSION:** LA remodeling is determined by the high 24-hour values of non-invasively measured central systolic pressure and pulse wave velocity. The parameters of arterial stiffness - cSys24h, cPP24h correlate positively with LA. PWV24h correlates negatively with reservoir strain of the left atrium. Using the method in clinical practice can improve risk stratification and therapeutic management. Further investigations are needed for prognostic and therapeutic value of LA remodeling.