

Valvuloarterial impedance — parameter of overall load in aortic stenosis and hypertension

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Background: It has been reported that 30-40% of patients with aortic stenosis (AS) are hypertensive. The presence of hypertension can affect decision making in patients with AS, hence it could be valuable to consider alternative ultrasonographic measurements. Valvulo-arterial impedance (z_{va}) is a parameter of overall load, obtained by summation of valvular and vascular load. Valvular component of pressure overload is caused by an obstruction on the stenosed aortic valve level. Vascular component of the load occurs because of the systemic vascular resistance increase caused by hypertension. Z_{va} is superior to the standard indexes of aortic stenosis severity in predicting left ventricle (LV) dysfunction.

Aim: We tried to determine the influence of valvular and peripheral stress on the LV wall in patients with coexisting aortic stenosis and hypertension.

Patients and Methods: This study included 18 consecutive patients (11 male and 7 female). These patients were divided into four strata: patients with aortic stenosis and hypertension (AS+H), patients with aortic stenosis (AS), patients with hypertension (H) and control group (N).

Results: After computing z_{va} , the highest average value was found in the AS+H stratum ($z_{va}=7,46$ mmHg/ml/m²). Average z_{va} values in AS stratum ($z_{va}=5,78$ mmHg/ml/m²) and H stratum ($z_{va}=4,75$ mmHg/ml/m²) were reduced in comparison to AS+H stratum. In the N stratum we found the lowest average z_{va} value, $z_{va}=3,85$ mmHg/ml/m². In addition

to z_{va} , we also calculated systemic arterial compliance (SAC) in all strata. SAC is a measure of peripheral arterial load as a result of arterial system thickening, caused by arterial hypertension. After calculating average SAC values for all strata, we established the following results: the lowest average SAC values were in the AS+H stratum, SAC=0,43 ml/m²/mmHg, in the AS stratum the average SAC value was lower, SAC=0,62 ml/m²/mmHg, and in the H and N stratum, the average SAC value was equal (SAC=0,73 ml/m²/mmHg).

Conclusion: Hypertension creates an excessive LV hemodynamic load on valvular load caused by aortic stenosis. We also determined that systemic arterial compliance in double load decreases in regards to individual compliances measured in patients with aortic stenosis and hypertension.

KEYWORDS: aortic stenosis, arterial hypertension, valvuloarterial impedance, compliance.

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