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Correlates of the ratio of acceleration time to ejection time in patients with aortic stenosis: an echocardiographic and computed tomography study

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Background: Acceleration time to ejection time ratio (AT/ET) prolongation is associated with increased mortality in patients with aortic stenosis (AS).

Purpose: To identify the determinants associated with increased AT/ET.

Methods: The relationships between AT/ET ratio, clinical and Doppler echocardiographic variables of interest in the setting of AS were studied in 1107 patients with AS and preserved left ventricular (LV) ejection fraction (EF), with Computed Tomography – Aortic Valve Calcium (CT-AVC) score studied in a subgroup of 342 patients.

Results: In univariate analysis, AT/ET ratio did correlate with aortic peak velocity (V_{max} , $r=0.57$, $p<0.0001$), mean pressure gradient (MPG, $r=0.60$, $p<0.0001$), aortic valve area (AVA, $r=-0.50$, $p<0.0001$) and CT-AVC score ($r=0.24$, $p<0.0001$). An AT/ET ratio had a good accuracy to predict an aortic peak velocity ≥ 4 m/s, a $MPG \geq 40$ mmHg, or an $AVA \leq 1.0$ cm², with

an optimal cut-off value of 0.34. By multivariate linear regression analysis, presence of AS-related symptoms, decreased LV stroke volume index, LVEF, systolic blood pressure (SBP), absence of diabetes mellitus, and increased LV mass index, relative wall thickness, and V_{max} were independently associated with increased AT/ET ratio (all $P<0.05$). In the subgroup of patients who underwent CT-AVC, CT-AVC score was independently associated with increased AT/ET ratio ($P<0.05$).

Conclusion: AT/ET ratio is related to echocardiographic and CT-AVC indices of AS severity. However, multiple intricate factors beyond hemodynamic and anatomic severity of AS influence AT/ET ratio including LV geometry, function and SBP. These findings should be considered when assessing AT/ET in patients with AS and preserved LVEF.

