

Differences of myocardial systolic deformation and correlates of diastolic function in competitive rowers and young hypertensives: a speckle-tracking echocardiography study

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The aim of this study was to compare speckle-tracking echocardiography-derived left ventricular (LV) systolic mechanics and their relationships with LV diastolic properties in young patients with hypertension and in young competitive athletes in relation to their respective alterations of LV structure. Nineteen sedentary controls, 22 top-level rowers, and 18 young newly diagnosed, never-treated patients with hypertension, all male, underwent Doppler echocardiography including pulsed tissue Doppler of the mitral annulus and speckle-tracking echocardiography. Peak longitudinal strain was calculated in apical long-axis, four-chamber, and two-chamber views, and values of the three views were averaged (global longitudinal strain [GLS]). Regional circumferential and radial strain were calculated at the LV basal, middle, and apical levels, and values were averaged. LV torsion was determined as the net difference in the mean rotation between the apical and basal levels. The three groups were comparable for age, whereas body mass index and blood pressure were higher in patients with hypertension, and heart rate was lower in rowers. LV mass index was higher in rowers and in patients with hypertension than in controls, without differences in relative wall thickness, ejection fraction, and midwall shortening. Left atrial volume index was greater in rowers than in controls and patients with hypertension. Annular systolic velocity (s_0) ($P < .001$) and early diastolic velocity (e_0) ($P < .0001$) were lower and the E/e_0 ratio was higher ($P < .0001$) in patients with hypertension. GLS was lower in patients with hypertension than in rowers and in controls ($P < .0001$). Global circumferential strain, global radial strain, and torsion were similar among the three groups. In the pooled population, GLS was an independent contributor to E/e_0 ratio ($P < .0001$) after adjusting for age, heart rate, meridional end-systolic stress, LV mass index and left atrial volume index. By receiver operating characteristic curve analyses, both GLS and E/e_0 ratio appeared to be accurate in discriminating patients with hypertension from healthy controls, with the E/e_0 ratio being more sensitive (77.8%) and GLS more specific (89.5%). The hearts of young patients with hypertension are characterized by reduced GLS, whereas global circumferential strain, global radial strain, and torsion are similar to those of athletes' hearts. The extent of GLS is strongly associated with LV diastolic function, independently of afterload changes and the degree of LV hypertrophy.

Keywords: Speckle-tracking echocardiography, Arterial hypertension, Athlete's heart, Left ventricular filling pressure, Longitudinal strain