Evaluation of the Difference in Endocardial and Epicardial Layer Contraction Elucidated by 2D Speckle Tracking Imaging in Patients with Hypertension and Preserved Left Ventricular Ejection Fraction.

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Abstract

Purpose: A 2-dimensional speckle tracking imaging (2DI) modality is now available for the quantitative assessment of regional left ventricular contraction. We used 2DI to investigate the difference in endocardial and epicardial layer contraction in patients with hypertension and preserved left ventricular ejection fraction (LVEF).

Subjects and Methods: We studied 20 hypertensive patients (hypertensive heart disease; HHD group, 4866_yrs.) with preserved LVEF (^55%) and 20 control subjects (Normal; N group, 3965_yrs.). Parasternal short axis views of 3 sections (base, mid-papillary, apex) were obtained by 2DI and the circumferential strain in endocardial and epicardial layers of each section was calculated. The strain values were the means of all representative LAPS of the myocardium. Peak systolic strain (PS, %), time to start of contraction (T_C, ms) from Q wave, and time to start of relaxation from Q wave (T_R, ms) were compared between the two groups. Conventional echocardiography, clinical characteristics, vital signs, and wall stress were measured at the same time.

Results and Discussion: There were no significant differences between the two groups in left ventricular diameters or LVEF, but the average wall thickness (septum and posterior) and relaxation markers such as deceleration time of the trans-mitral flow E wave and early diastolic velocity of the mitral annulus (e9) were significantly lower in the HHD group than in the N group. Peak systolic strain values of the circumferential strain in the endocardial layers of the three sections were significantly lower in the HHD group (1666, 1567, 1866) than in the N group (2866, 2766, 2665, p,0.01, p,0.01, p,0.01; respectively), but there were no significant differences between the groups in the epicardial layer strain values. Regarding the start of the myocardial contraction, the endocardial layers TC of the three sections (1666, 2665, 3265) were significantly shorter than those (2666, 3166, 3865, p,0.01, p,0.01, p,0.01; respectively) of the epicardial layers in the N group, whereas there were no significant differences in the HHD group. Regarding the start of the myocardial relaxation, there were no significant differences in T_R in any of the layers in either of the groups. The endocardial layer myocardial impairment may progress in the HHD group, and the initial cause of the progression may be the afterload increase.

Conclusion: We were able to estimate the difference in myocardial contraction between hypertensive patients and normal subjects using 2DI. Endocardial myocardial impairment may progress in hypertensive patients in spite of the preserved LVEF.

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Keywords

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