Assessment Of Left Ventricular Functions By Strain And Strain Rate Echocardiography In Children With Type I Diabetes Mellitus

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Introduction: Left ventricular (LV) dysfunction can occur in children with type I diabetes mellitus (DM). We evaluated regional LV myocardial functions by strain and strain rate echocardiography in children with type I DM

Methods: 101 type I DM patients (49 girls, 52 boys; mean age 14.3±3.3 years) and, 32 healthy controls (13 girls, 19 boys; mean age 13.6±2.6 years) were studied. Patients were divided into 3 groups according to the duration time of diabetes (group 1: <5 years, group 2: 5-10 years and group 3: ≥10 years). LV functions were evaluated by conventional echo, tissue Doppler, and 2D strain and strain rate echocardiography.

Results: The mean duration of diabetes was 3.1±1.1 years, 6.5±1.3 years and 12.2±1.7 years in group 1, 2 and 3, respectively. No significant difference was found between the groups in age, sex, height, weight, body mass index, body surface area, systolic blood pressures. Heart rate was significantly high (group 1: 83±13, group 2: 84±14, group 3: 92±17 beats/min, control group: 75±10 beats/min; p=0.058, p=0.020 and p=<0.001, respectively) in the patients groups. Ejection fraction and shortening fraction were similar in all groups. Mitral A velocity was significantly different in the group 3 compared to controls (0.67±0.13 vs. 0.55±0.11 cm/sec, p < 0.001). Deceleration time was significantly increased (144±31 vs. 116±33 ms; p=0.001) in group 2 compared to control group. Tei index was significantly decreased (0.35±0.06 vs. 0.41±0.11; p=0.0.05) in the group 2. The global average of longitudinal peak systolic strain values was not statistically different between all groups. Longitudinal and circumferential strain and strain rate values was significantly increased in the different regions of the left ventricle in both group 2 and group 3 compared to control group (p<0.05). There was not any correlation between the global longitudinal strain values and both HbA1c values and the duration time of diabetes.

Conclusion: 2D strain echocardiography is a useful tool to detect the effects of diabetes on the heart, especially in which those conventional methods cannot present a more detailed analysis on regional and global myocardial function.