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Exploring Myocardial Function in Adolescent Type 1 Diabetes.

Bradley T.J. (1), Slorach C. (1), Cherney D.Z.I. (2), Daneman D. (1), Deda L. (1), Dunger D.B. (3), Elia Y. (1), Har R. (1), Hui W. (1), Mahmud F.H. (1), Moineddin R. (4), Sochett E. (1), Mertens L. (1) The Hospital for Sick Children, Toronto, Canada (1); University Health Network, Toronto, Canada (2); Addenbrooke's Hospital, Cambridge, United Kingdom (3); Department of Family and Community Medicine, University of Toronto, Toronto, Canada (4)

Introduction: Preclinical detection of myocardial dysfunction in adolescents with type 1 diabetes (T1D) may help identify individuals at increased risk of adult-onset cardiovascular disease, who would most benefit from early intervention strategies. This study compared echocardiographic assessment of myocardial function in patients screened for the Adolescent Type 1 Diabetes Cardio-Renal Intervention Trial (AdDIT) with healthy controls.

Methods: Myocardial function assessment included tissue Doppler, strain and strain rate imaging. In subgroup analysis, T1D separated into tertiles according to urinary albumin:creatinine ratio as per the AdDIT protocol, were compared with the subgroup of healthy controls that underwent the same baseline clinical assessment including glycemic measures and serum lipids. Between groups comparisons were performed using Student's t-tests, with p-values <0.05 considered significant.

Results: 188 T1D patients (M:F 93:95; age 14.4±2.1 years; disease duration 7.0 [1.7-15.0] years) and 178 controls (M:F 84:94; age 14.5±1.6 years) were studied. Sex, age and height were similar. T1D were heavier with increased systolic and diastolic blood pressures, but decreased resting heart rates. Lateral mitral valve annulus myocardial velocities, E' (17.5±2.6 vs. 18.6±2.6 cm/s; p=0.0001), A' (5.4±1.1 vs. 5.9±1.1 cm/s; p<0.0001) and S (10.5±1.8 vs. 11.1±2.0 cm/s; p=0.0017) were decreased and mitral valve E/E' (5.8±1.1 vs. 5.4±1.0; p=0.0002) increased. Global left ventricular (LV) circumferential strain (-20.4±2.3 vs. -19.5±1.7 %; p=0.0002) and longitudinal strain (-19.6±1.7 vs. -18.9±1.9 %; p=0.0003) were different, but systolic and diastolic global longitudinal strain rates were similar. Basal rotation was similar, but apical rotation (6.26±2.97 vs. 5.28±2.45 degrees; p=0.0012) and LV twist (10.35±3.58 vs. 9.33±3.05 degrees; p=0.0065) were increased. In sub-group analysis, comparing 53 high-risk, 71 medium-risk and 64 low-risk T1D vs. 59 controls, all T1D had increased fasting blood glucose and HbA1c as expected and also HDL cholesterol, but total and LDL cholesterol and triglycerides were similar. Only global LV circumferential strain in the medium-risk tertile remained different when comparing the smaller T1D subgroups vs. controls (-19.4±1.6 vs. -18.8±1.7 %; p=0.0312).

Conclusions: Significant changes in myocardial function are evident in adolescent T1D of short to intermediate disease duration, suggesting these may be clinically useful preclinical markers of deterioration in cardiac performance to guide early intervention.