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Cardiac mechanics in children with left ventricular non compaction

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Introduction: Left ventricular non-compaction (LVNC) is typically characterized by prominent trabeculations and deep intertrabecular recesses within the left ventricular (LV) wall. Despite multiple diagnostic indices have been proposed, no definitive methods have been established to recognize real LVNC from borderline hypertrabeculated hearts yet, particularly in young patients.
Therefore, the aim of the present research was to evaluate the LV mechanics and to explore its diagnostic value in children and young patients with real LVNC or borderline prominent LV hypertrabeculations (LV-HTr).

Methods: Study population (overall age 9.2 ± 5 years) included 37 patients (12 LVNC children, 9 LV-HTr children not meeting standard LVNC diagnostic criteria, and 16 CTRL). Biplane LV ejection fraction (LVEF) was assessed in the whole population. The 2D echo datasets were acquired for quantification of LV global longitudinal (GLS), radial (RS) and circumferential strain (GCS). Furthermore, biventricular volumetric data including EF were measured by cardiac magnetic resonance (CMR).

Results: LVNC, LV-HTr and CTRL showed a similar LVEF as assessed by CMR (LVNC: 64.1±8.9% vs. LV-HTr 68.9±4.7% vs CTRL 65.9±5.2%, p=NS). On the contrary, LVEF assessed by echo was significantly lower in LVNC compared to LV-HTr and CTRL groups (54±10.3% vs 61±5.5% vs 65.2±5.5%, $p<0.05$). GLS, GCS and RS were all significantly reduced in children with LVNC compared to CTRL (GLS: -16.1±3.9% vs -22.8±2.4%; GCS: -16.8±4.7% vs -25.9±.4.1%, $p<0.05$). Moreover, children with LV-Tr showed a significant reduction of longitudinal, circumferential and radial strains compared to controls (GLS: -17.7±3.0% vs -22.8±2.4%; GCS: -19.6±2.9% vs -25.9±.4.1%, $p<0.05$), but their values were not significantly better compared to those of LVNC (GLS: -17.7±3.0% vs -16.1±3.9%; GCS: -19.6±2.9% vs -16.8±4.7%, p= NS). Of note, apical CS was significantly reduced either in LVNC group compared to LV-HTr and CTRL groups, and in LV-HTr compared to CTRL (apCS: -14.9.1±5.1% vs -19.1±3.5% vs -28.9±8.2%).

Conclusions: In conclusion, impairment of cardiac mechanics was observed both in children with LVNC and with LV-HTr regardless normal CMR LVEF. In particular, apical CS might help to differentiate children with LVNC from borderline prominent LV hypertrabeculations.