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Reference values for multilayer longitudinal strain in children: preliminary findings from healthy individuals

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BACKGROUND

Strain echocardiography is a reliable echocardiographic modality to measure myocardial mechanical deformation and evaluate regional and global myocardial systolic function, and has been demonstrated to be a useful tool for the evaluation of cardiac function in children with acquired and congenital heart diseases. Recent advancements in echocardiographic technology allow to analyze myocardial strain in multiple layers. To our knowledge, there are no published reference values for echocardiographic multilayer-specific strain measurement.

AIM OF THE STUDY

Aim of our study was to establish normal reference values for left ventricular (LV) and right ventricular (RV) longitudinal strain (LS) in a wide population of Italian children and to provide normal reference values of layer-specific LS in a healthy pediatric population.

METHODS AND RESULT

At present we have analyzed data from two-hundred (target: n = 500) healthy, consecutive subjects (age <18 years, mean age 7.5 ± 4 yrs; range from 1 month to 17,5 years). All subjects underwent a clinical cardiologic evaluation including ECG and physical examination. Subsequently, a complete echo Doppler examination including LS evaluation using speckle-tracking echocardiography was performed. Individuals were excluded if any significant abnormality was found at echocardiography (e.g. valvular regurgitation more than trivial, any structural abnormalities including small ASDs or VSDs; patients with isolated PFO were included). Subendocardial, midwall, subepicardial LS, and strain gradient (LSsubepi - LSsubendo) were also determined. LS% analysis was considered acceptable if missing data were present in no more than one segment per echocardiographic view, according to current consensus. Echocardiographic yield for LS analysis was 98.5 % for 4-chamber views, 82.5% for 2-chamber views and 84.5% for 3-chamber views. Accordingly Global Longitudinal Strain (GLS) was available overall in 82% of the population analyzed so far (n= 164 children) on all layers, with a total of 8,872 echocardiographic available segments analyzed. Normal distribution was found for global subendocardial, midwall and subepicardial LS. As displayed in figure 1 (panels A-B-C), means \pm SD were $-20.8 \pm 1.9\%$ for LSsubendo, $-19.2 \pm 1.8\%$ for LSsubepi and $-19.9 \pm 1.8\%$ for LSmidwall. Accordingly higher value (95ile) for normal LS were -17.9% , -16.4% and -17.1% for LSsubepi, LSsubendo and LSmidwall, respectively. A significant subepicardial to subendocardial gradient was found in all children with higher absolute values found at the endocardial level, with a mean difference of $1.6 \pm 0.9\%$ (Panel D).

CONCLUSIONS

We provide preliminary data on 200 children to establish normal reference values for echocardiographic multilayer-specific strain measurement in a wide population of healthy Italian children.

Abstract P1542 Figure.

