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Tissue Doppler Imaging combined with advanced 12-lead ECG analysis might improve early diagnosis of hypertrophic cardiomyopathy in childhood

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Introduction:
Optimization of early diagnosis of childhood hypertrophic cardiomyopathy (HCM) is essential in lowering the risk of HCM complications. Standard echocardiography (ECHO) has shown to be less sensitive in this regard. In this study, we sought to assess whether spatial QRS-T angle deviation, which has shown to predict HCM in adults with high sensitivity, and myocardial Tissue Doppler Imaging (TDI) could be additional tools in early diagnosis of HCM in childhood.

Methods:
Children and adolescents with familial HCM (n=10, median age 16, range 5-27 years), and without obvious hypertrophy but with heredity for HCM (n=12, median age 16, range 4-25 years, HCM or sudden death with autopsy-verified HCM in ≥1 first-degree relative, HCM-risk) were additionally investigated with TDI and advanced 12-lead ECG analysis using Cardiax® (IMED Co Ltd, Budapest, Hungary and Houston). Spatial QRS-T angle (SA) was derived from Kors regression-related transformation. Healthy age-matched controls (n=21) were also studied. All participants underwent thorough clinical examination.

Results:
Spatial QRS-T angle (Figure/ Panel A) and septal E/Ea ratio (Figure/Panel B) were most increased in HCM group as compared to the HCM-risk and control groups (p<0.05). Of note, these 2 variables showed a trend toward higher levels in HCM-risk group than in control group (p=0.05 for E/Ea and 0.06 for QRS/T by ANOVA). In a logistic regression model, increased SA and septal E/Ea ratio appeared to significantly predict both the disease (Chi-square in HCM group: 9 and 5, respectively, p<0.05 for both) and the risk for HCM (Chi-square in HCM-risk group: 5 and 4 respectively, p<0.05 for both), with further increased predictability level when these 2 variables were combined (Chi-square 10 in HCM group, and 7 in HCM-risk group, p<0.01 for both).

Conclusions:
In this small material, Tissue Doppler Imaging and spatial mean QRS-T angle deviation, particularly when combined, appear to be sensitive in predicting the risk for developing childhood HCM. Large-scale, prospective studies are needed to confirm this hypothes.

Panel A   Panel B