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

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Introduction:
Optimizing the early diagnosis of childhood hypertrophic cardiomyopathy (HCM) is essential for lowering the risk of HCM-related complications. However, use of standard echocardiography (ECHO) for diagnosis of HCM has been shown to be less sensitive in children than adults, and conventional resting 12-lead ECG is also usually normal in the early stages of HCM. Newer advanced electrocardiograms (A-ECGs) might therefore aid the earlier diagnosis of HCM, especially through their assessment of the spatial QRS-T angle, a parameter that has been suggested to be highly sensitive for HCM in adults and that can be derived from 12-to-Frank-lead transformations in software. Recent studies for example have shown that spatial QRS-T angles derived from standard 12-lead ECG recordings by using Kors’ regression coefficients are statistically equivalent to those derived from simultaneous true Frank XYZ -lead recordings.

In this study, we sought to assess whether spatial QRS-T angle and myocardial Tissue Doppler Imaging (TDI) could aid the early diagnosis of HCM in childhood.

Study population:
HCM: Children and adolescents with familial HCM (n=10, median age 16, range 5-27 years, phenotype positive by ECHO and ECG, heredity for HCM; genopositive for HCM n=8/10),
HCM-Risk: Children and adolescents at risk for HCM, without obvious hypertrophy but combined with heredity for HCM (n=12, median age 16, range 4-25 years, HCM or sudden death autopsy-verified HCM in ≥1 first-degree relative) Controls: Healthy age-matched volunteers (n=21, no cardiac symptoms and no history of cardiac disease)

Methods:
All participants responded to a questionnaire and underwent routine physical examination. They were also investigated by routine ECHO (Philips iE33) TDI and 5-minute ECG sampling for advanced 12-lead ECG (A-ECG) analysis. The latter was done by using Cardias® (IMED Co Ltd, Budapest, Hungary) and CardioSoft® (Houston, Texas, USA).

Spatial mean QRS-T angle (SA) was derived from the 12-lead ECG by using Kors’ regression transformation.

Conclusions:
In this small pilot study, Tissue Doppler Imaging and spatial mean QRS-T angle, particularly when combined, appear to be sensitive in predicting both HCM and HCM-risk in children. Large-scale prospective studies are needed to confirm these initial findings.

References:
5. Cortez D, Schegel TT. When deriving the spatial QRS-T angle from the 12-lead electrocardiogram, which is more Frank: regression or inverse Dower? Journal of Electrocadioology 2010; 43: 302-309

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