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Heart rate variability in young patients with hypertrophic cardiomyopathy is a useful indicator of risk for complex ventricular arrhythmias

Östman-Smith I., Arnell M., Allahyari P., Smith N.
Division of Paediatric Cardiology, Queen Silvia Children´s Hospital,
Gothenburg, Sweden

BACKGROUND: Heart rate variability (HRV) is an accepted tool for studying imbalance in the autonomic system non-invasively. Alterations in HRV indicating increased activity of sympathetic nervous system has been recognized as a risk factor for cardiovascular mortality, and been suggested to predispose to ventricular arrhythmias in adult patients with hypertrophic cardiomyopathy (HCM). We have used this methodology to study autonomic nervous system activity in young symptom-free patients with familial HCM.
METHODS: HRV was studied by a 5 min resting ECG-recording analysed by commercial software (CardioPerfect). Initial analysis of a control group of 51 subjects with echocardiographically normal hearts in an age-range between 1-29 years of age indicated a positive correlation between age and the low/high-frequency (LF/HF) component ratio (p=0.0007, correlation coefficient 0.46). Between the ages of 10-21 there was also a significant gender difference in the LF/HF component ratio, males 0.99 [95% CI 0.31-1.67] as compared to 0.57 [0.43-0.75] in females. We identified 23 young patients with asymptomatic HCM, who had had HRV analysis performed before any medical therapy had started (mean age 11.3 years, range 1.9-22), and compared those with age- and gender-matched controls.
RESULTS: The groups were well age-matched (mean age controls =11.2; Mann-Witney p=0.83). HCM-patients had a significantly higher LF/HF ratio, 1.25±0.96 (mean±SD) as compared to 0.53±0.24 in controls (p=0.001). The alteration was caused both by a significantly higher normalized LF (49.3±16.2 versus 33.2±10.1; p=0.001) and a significantly lower normalized HF (50.7±16.2 versus 66.8±10.1; p=0.001) in the HCM-patients. All HCM-patients had 24 h ECG-monitoring performed. 2 patients had identified ventricular tachycardia on 24 h ECG, both had LH/HF ratio >2.0. Among the patients without identified complex ventricular arrhythmia only 2/21 had an LH/FH ratio >2.0 (p=0.02 Fischer´s exact test). In addition, the two that had a high LF/HF ratio without ventricular arrhythmias both had first-degree relatives with identified ventricular tachycardia or resuscitated cardiac arrest.
CONCLUSIONS: Even asymptomatic patients with HCM diagnosed in childhood and adolescence have alterations of autonomic nervous balance suggesting an increased activity of the cardiac sympathetic system. An LF/HF ratio >2.0 is a marker of increased risk of sustained ventricular arrhythmia in this age-group.