

Heart rate variability in young patients with hypertrophic cardiomyopathy is altered, and can be used for risk stratification

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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 low-frequency components ($p=0.0001$, correlation coefficient 0.48) and a significant gender difference between the ages of 10-21 in the low/high-frequency (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.

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.

Results: The groups were well age-matched (mean age controls = 11.2; Mann-Witney $p=0.83$).

Comparison between HRV-parameters in HCM-patients and matched controls

Measure (Mean \pm SD)	Controls n=46	HCM-patients n=23	Mann-Witney
Normalized LF	33.2 \pm 10.1	49.3 \pm 16.2	P=0.001
Normalized HF	66.8 \pm 10.1	50.7 \pm 16.2	P=0.001
LF:HF ratio	0.53 \pm 0.24	1.25 \pm 0.96	P=0.001

LF=low frequency component (40-150 mHz); HF= high-frequency component (150-400 mHz); normalized means correction to a proportion of total spectrum activity

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/HF 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.