

Pulmonary hypertension

Heart Rate Variability and Arrhythmic Burden in Pulmonary Hypertension

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Objectives:

A growing body of evidence indicates that sudden cardiac death constitutes a major cause of mortality in pulmonary hypertension (PH). As validated method to evaluate cardiac autonomic system dysfunction, alterations in heart rate variability (HRV) are predictive of arrhythmic events, particularly in left-heart disease. Here, we sought to determine the clinical value of HRV assessment in PH.

Methods:

54 patients pertaining to different PH-subgroups were enrolled in this prospectively conducted trial: 25 patients with pulmonary arterial hypertension (PAH), 11 patients with chronic thromboembolic PH (CTEPH-patients) and 28 patients with COPD-driven PH. All patients underwent 24-hour Holter-electrocardiogram for HRV assessment by time- and frequency-domain analysis. Arrhythmic burden was evaluated by manual analysis and complementary automatic measurement of premature atrial and ventricular contractions. Results were compared to 31 healthy controls.

Results:

As compared to controls, PAH patients offered a significantly higher mean heart rate (78.6 ± 10.4 bpm vs. 70.1 ± 10.3 bpm, $p=0.04$), a significantly higher burden in premature ventricular contractions ($p<0.01$), as well as a significant decrease in HRV as measured by time- and frequency-domain analysis (SDNN: $p<0.01$; SDANN: $p<0.01$; very low frequency: $p<0.01$; low frequency/high frequency ratio: $p<0.01$; total power: $p=0.02$). In CTEPH, only the amount of premature ventricular contractions differed from controls ($p<0.01$), whereas in COPD both premature atrial contractions count and frequency-domain-based HRV manifested significant differences.

Conclusions:

Among studied PH subgroups, PAH appears to be primarily affected by HRV alterations and ventricular arrhythmic burden, pointing at PAH to confer the highest risk for malignant arrhythmic events.

Keywords: sudden cardiac death, atrial fibrillation, systolic pulmonary arterial pressure, time-domain analysis, frequency-domain analysis, echocardiography, right heart catheterization