Heart rate variability and arrhythmias in sleep apnea

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1. Cyclic variation of heart rate and obstructive sleep apnea

Episodes of obstructive sleep apnea (OSA) are accompanied by a characteristic heart rate pattern, known as cyclic variation of heart rate (CVHR). Detection of CVHR by Holter ECG has long been suggested as a useful method for OSA screening, but this method has not been well validated. We explored a new automated ECG algorithm called autocorrelated wave detection with adaptive threshold (ACAT) and applied to 862 patients referred for diagnostic sleep study. The number of CVHR detected by the ACAT well correlated ($r=0.84$) with the apnea-hypopnea index and the CVHR $\geq$15 episodes/h identified the patients with apnea-hypopnea index $\geq$15 with 77% positive predictive accuracy (Circ Arrhythm Electrophysiol. 2011; 4: 64).

2. Central sleep apnea, inflammation and arrhythmias in heart failure

Heart failure is associated with elevated inflammatory status, central sleep apnea (CSA) and complex ventricular arrhythmia. We then examined the associations among these 3 factors in the 178 heart failure patients. A multivariate analysis revealed that the central apnea index (CAI) was associated with atrial fibrillation and sinus pause during the night-time period. The CAI and C-reactive protein were independently associated with nonsustained ventricular tachycardia during both daytime and night-time periods. The CSA was an independent predictor of cardiovascular deaths; however only 5 (2.8%) of them died due to ventricular tachyarrhythmia, occurring during wakefulness. This study provides suggestive evidence of a CSA was associated with increased mortality risk, but it was not related directly to nocturnal death due to ventricular tachyarrhythmia (Eur J Heart Fail. 2013; 15, 1003).