

Use of high-frequency peak in spectral analysis of heart rate increment to improve screening of obstructive sleep apnoea.

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Purpose

Several studies have correlated the ratio of the very low frequency power spectral density of heart rate increment (%VLFI) with obstructive sleep apnoea syndrome (OSAS). However, patients with impaired heart rate variability may exhibit large variations of heart rate increment (HRI) spectral pattern and alter the screening accuracy of the method.

Methods

To overcome this limitation, the present study uses the high-frequency increment (HFI) peak in the HRI spectrum, which corresponds to the respiratory influence on RR variations over the frequency range 0.2 to 0.4 Hz. We evaluated 288 consecutive patients referred for snoring, observed nocturnal breathing cessation and/or daytime sleepiness. Patients were classified as OSAS if their apnoea plus hypopnoea index (AHI) during polysomnography exceeded 15 events per hour. Synchronized electrocardiogram Holter monitoring allowed HRI analysis.

Results

Using a %VLFI threshold $>2.4\%$ for identifying the presence of OSAS, sensitivity for OSAS was 74.9%, specificity 51%, positive predictive value 54.9% and negative predictive value 71.7% (33 false negative subjects). Using threshold for %VLFI $>2.4\%$ and HFI peak position >0.4 Hz, negative predictive value increased to 78.2% while maintaining specificity at 50.6%. Among 11 subjects with %VLFI $<2.4\%$ and HFI peak >0.4 Hz, nine demonstrated moderate to severe OSAS (AHI >30).

Conclusions

HFI represents a minimal physiological criterion for applying %VLFI by ensuring that heart rate variations are band frequency limited.