HEART RATE VARIABILITY, ASSESSED IN ONE MINUTE WINDOWS, PROVIDES INSIGHT INTO THE TIME COURSE OF CHANGES IN AUTONOMIC NERVOUS SYSTEM ACTIVITY

Poster Contributions
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Background: The autonomic nervous system (ANS) responds rapidly to homeostatic perturbations. Heart rate variability (HRV) analysis can give insights into autonomic balance but traditionally sampling windows of five minutes or more have been employed, thus making HRV insensitive to sudden changes. We sought to determine whether one minute sampling windows could be used to detect rapid changes in ANS activity during tilt table testing (TTT).

Methods: Time-domain, frequency-domain and non-linear measures of HRV were derived for patients undergoing TTT. To determine which parameters are valid in one minute windows, a five minute supine period was analysed then divided into one minute intervals and reproducibility assessed. The reproducible parameters were then used to analyse the peri-tilt and pre-syncope phases. Continuous non-invasive blood pressure and cardiac output were recorded throughout.

Results: TTT assessments in 239 patients in sinus rhythm were reviewed. Six HRV parameters were found to be reproducible in one minute windows: root mean square of successive differences, percent of successive RR intervals that differ by more than 50 ms, low and high frequency power spectral density (normalised units), SD1 (Poincare plot), and alpha 1 (detrended fluctuation analysis). On tilting, there was a fall in cardiac output and rise in blood pressure within the first two minutes. Coincident with this, all six HRV parameters reacted with the same time course. In the presyncope phase, hemodynamic changes started at least five minutes before syncope but the changes in HRV only occurred in the minute before syncope.

Conclusion: One minute time windows may be used to analyse HRV with improved temporal sensitivity. Using this technique, we demonstrated that changes in both HRV and hemodynamics were complete within the first two minutes of tilting. We also demonstrated hemodynamic changes at least five minutes before syncope but changes in HRV are much more abrupt, occurring only in the minute before syncope. This technique may be useful as a research tool to examine interventions that modulate ANS activity.