Pre-operative measurement of heart rate variability predicts hypotension during general anesthesia

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摘要

Abstract

Background: Peri-operative hymodynamic instability is one of the major concerns for anesthesiologists when performing general anesthesia for individuals with autonomic dysfunction. The purpose of this study was to examine the potential usage of pre-operative measurement of heart rate variability (HRV) in identifying which individuals, with or without diabetes, may be at risk of blood pressure (BP) instability during general anesthesia.

Methods: We studied 46 patients with diabetes and 87 patients without diabetes ASA class II or III undergoing elective surgery. Participants' cardiovascular autonomic function and HRV were assessed pre-operatively, and hymodynamic parameters were monitored continuously intra-operatively by an independent observer.

Results: Only 6% of the participants were classified as having cardiovascular autonomic neuropathy (CAN) based on traditional autonomic function tests whereas 15% experienced hypotension. Total power (TP, P = 0.006), low frequency (LF, P = 0.012) and high frequency (HF, P = 0.028) were significantly lower in individuals who experienced hypotension compared with those who did not. Multivariate logistic regression analysis revealed that TP [odds ratio (OR) = 0.15, 95% confidence interval (CI) = 0.05－0.47, P = 0.001] independently predicted the incidence of hypotension, indicating that each log ms2 increase in total HRV lowers the incidence of hypotension during general anesthesia by 0.15 times. After stepwise multiple linear regression analysis (R2 = 11.5%), HF (β = −11.1, SE = 2.79, P < 0.001) was the only independent determinant of the magnitude of systolic blood pressure (SBP) reduction at the 15th min after tracheal intubation.

Conclusions: Spectral analysis of HRV is a sensitive method for detecting individuals who

may be at risk of BP instability during general anesthesia but may not have apparent CAN according to traditional tests of autonomic function