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Heart rate variability during weaning from mechanical ventilation

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Introduction Weaning from mechanical ventilation (MV) can be associated with cardiovascular changes including elevation of heart rate (HR) and development of arrhythmias. The behavior is not yet known of HR variability during weaning from MV comparing pressure support ventilation (PSV) and the T-tube (TT) in patients with and without heart disease. The aim of this study was to evaluate the impact on heart rate variability (HRV) in these groups of patients during PSV and TT.
Methods Patients with (group 1, $n = 8$) and without (group 2, $n = 22$) heart disease, under MV for at least 48 hours, were observed during 30 minutes of PSV or TT, in a random order. Variables analyzed were: APACHE score, length of stay in the ICU (LOS), and cardiorespiratory variables including the HR, respiratory rate (RR), rapid shallow breathing index (*f*/VT), maximum inspiratory (PImax) and expiratory (PEmax) pressure. Continuous ECG was recorded by the Holter method. The data of HRV were accomplished by analysis of the frequency domain. For statistical analyses, analysis of variance and *t* test were used. The level of significance was $P < 0.05$.
Results Values for the APACHE score, LOS, PImax and Pemax did not show significant differences comparing groups. The RR was significantly higher during TT than during PSV in group 1 (25 ± 6; 20 ± 4; $P < 0.01$), but similar in group 2 (22 ± 5; 22 ± 5; not significant (NS)). *f*/VT was significantly higher during TT in relationship to PSV in group 1 (65 ± 35; 39 ± 17; $P < 0.01$), but similar in group 2 (49 ± 19; 49 ± 22; NS). Changes in the RR interval comparing PSV and TT were significantly different in the entire group (0.48 ± 55; –30 ± 72; $P = 0.02$) as well as changes in the HR interval (–0.3 ± 8; 8 ± 12; $P < 0.001$). Changes in HRV by frequency domain were not significantly different comparing groups 1 and 2 in PSV and TT. The high frequency was in PSV (4 ± 21; 0.4 ± 11; NS), and in TT (–0.64 ± 12; 1 ± 12; NS). The low frequency was in PSV (–11 ± 22; 3 ± 14; NS), and in TT (–6 ± 17; 1.8 ± 19; NS).
Conclusion During weaning from MV, cardiac patients showed higher RR and higher *f*/VT during TT when compared with PSV. Furthermore, there were significant changes in the RR and HR intervals in TT. However, we did not find significant changes comparing HRV in groups, perhaps because the frequency domain analysis had low power to verify those changes.