Plethysmography Variability Index: Comparison with Pulse Pressure Variation in Vascular Surgery.

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Background

Fluid optimization is a daily issue in the operating room. Pulse Pressure Variation (PPV) is a reliable predictive index of cardiac output response after volume expansion (1), but requires an arterial catheter. Respiratory variations of plethysmographic curve show similarities with PPV curve although noninvasive (2). We sought to test the reliability of Plethysmography Variability Index (PVI) in comparison with PPV.

Materials

Observational study in vascular surgery patients (carotid and aortic surgery). PPV (Philips Intellivue MP 60) and PVI (Masimo Corp) were recorded 7 times in each patient: T0, after induction of general anesthesia; T1: table position at +20°; T2: Trendelenbourg, -20°; T3: table at 0°, after fluid expansion (500ml Ringer's lactate); T4: beginning of carotid or aortic clamping period; T5: end of clamping; T6: end of surgery. In a subgroup of patients, arterial pressure and plethysmographic raw curves were recorded in order to allow manual assessment of PPV (PPVm) and PVI (PVIm). Agreement between PPV, PVI, PPVm and PVIm was evaluated using a Bland-Altman plot and Intraclass Correlation Coefficient (ICC, strong correlation if >0.6) (3).

Results

41 patients (7 women, 34 men, mean age 69) were included. Correlation between PPV and PVI over the 287 measurements was not strong (0.55). Correlation for each time point was 0,27 at T0, 0,60 at T1, 0, 69 at T2, 0,30 at T3, 0,58 at T4, 0,50 at T5 and 0, 49 at T6. Bland-Altman plot showed a broad dispersion for high values of PPV and PVI. In the subgroup of 15 patients (8 carotid and 7 aortic surgeries) with manual computing of PPVm and PVIm, ICC was 0,87 between PPV and PPVm, 0,73 between PPVm and PVIm (strong correlations), and 0,51 between PVI and PVIm.

Conclusions

Correlation between PPV and PVI is not strong in our vascular surgery patients. PVI may not be as reliable as PPV for guiding volume expansion. Nevertheless the strong correlation between PPV and PVIm underlines the potential interest of the plethysmographic curve in providing a predictive index for fluid optimization.

References: 1) Michard F. Am J Respir Crit Care Med. 2000;162(1):134-8.
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