Pleth Variability Index is a Weak Predictor of Fluid Responsiveness in Patients Receiving Norepinephrine

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Background

In patients receiving an infusion of norepinephrine, the relationship between the amplitude of the oximeter plethysmographic waveform and stroke volume may be variable and quality of the waveform might be reduced, compared with patients not receiving norepinephrine. We assessed the reliability of the pleth variability index (PVI), an automatic measurement of the respiratory variation of the plethysmographic waveform, for predicting fluid responsiveness in patients receiving norepinephrine infusions.

Methods

We measured the response of cardiac index (transpulmonary thermodilution) to i.v. fluid administration in 42 critically ill patients receiving norepinephrine. Patients with arrhythmias, spontaneous breathing, tidal volume ,8 ml kg21, and respiratory system compliance ,30 ml cm H2O21 were excluded. Before fluid administration, we recorded the arterial pulse pressure variation (PPV) and pulse contour analysis-derived stroke volume variation (SVV, PiCCO2) and PVI (Masimo Radical-7).

Results

In seven patients, the plethysmographic signal could not be obtained. Among the 35 remaining patients [mean SAPS II score¼77 (SD¼17)], i.v. fluid increased cardiac index ≥15% in 15 'responders'. A baseline PVI ≥16% predicted fluid responsiveness with a sensitivity of 47 (inter-quartile range¼21–73)% and a specificity of 90 (68–99)%. The area under the receiver operating characteristic curve was significantly lower for PVI [0.68 (0.09)] than for PPV and SVV [0.93 (0.06) and 0.89 (0.07), respectively]. Considering all pairs of measurements, PVI was correlated with PPV (r2¼0.27). The fluid-induced changes in PVI and PPV were not significantly correlated.

Conclusions

PVI was less reliable than PPV and SVV for predicting fluid responsiveness in critically ill patients receiving norepinephrine. In addition, PVI could not be measured in a significant proportion of patients. This suggests that PVI is not useful in patients receiving norepinephrine.