Influence of the Site of Measurement on the Ability of Plethysmographic Variability Index to Predict Fluid Responsiveness.

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Background

Plethysmographic variability index (PVI) is an accurate predictor of fluid responsiveness in mechanically ventilated patients. However, the site of measurement of the plethysmographic waveform impacts its morphology and its respiratory variation. The goal of this study was to investigate the ability of PVI to predict fluid responsiveness at three sites of measurement (the forehead, ear, and finger) in mechanically ventilated patients under general anaesthesia.

Methods

We studied 28 subjects after induction of general anaesthesia. Subjects were monitored with a pulmonary artery catheter and three pulse oximeter sensors (the finger, ear, and forehead). Pulse pressure variation, central venous pressure, cardiac index (CI), and PVI measured at the forehead, ear, and finger (PVIforehead, PVIear, and PVIfinger) were recorded before and after fluid loading (FL). Subjects were responders to volume expansion if CI increased .15% after FL.

Results

Areas under the receiver-operating curves to predict fluid responsiveness were 0.906, 0.880, and 0.836 for PVIforehead, PVIear, and PVIfinger, respectively (P,0.05). PVIforehead, PVIear, and PVIfinger had a threshold value to predict fluid responsiveness of 15%, 16%, and 12% with sensitivities of 89%, 74%, and 74% and specificities of 78%, 74%, and 67%, respectively.

Conclusions

PVI can predict fluid responsiveness in anaesthetized and ventilated subjects at all three sites of measurement. However, the threshold values for predicting fluid responsiveness differ with the site of measurement. These results support the use of this plethysmographic dynamic index in the cephalic region when the finger is inaccessible or during states of low peripheral perfusion.