Accuracy of the Pleth Variability Index to Predict Fluid Responsiveness Depends on the Perfusion Index.

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Background

Respiratory variations in plethysmographic waveform amplitudes derived from pulse oximetry are believed to predict fluid responsiveness. The non-invasive pleth variability index (PVI) is a variable based on the calculation of changes in the perfusion index (PI). The aim of the following study was to examine whether the predictive power of PVI depends on different values of PI.

Methods

Eighty-one patients undergoing elective coronary artery surgery were studied before operation: at baseline after induction of anaesthesia and during passive leg raising (PLR). Each patient was monitored with central venous pressure (CVP), the PiCCO monitor and the non-invasive Masimo monitoring system. Stroke volume index by transpulmonary thermodilution (SVI(TPTD)), pulse pressure variation (PPV), stroke volume variation (SVV) and systemic vascular resistance index (SVRI) were measured using the PiCCO monitoring system. PI and PVI were obtained by pulse oximetry.

Results

Responders were defined to increase their SVI(TPTD) >15% after PLR. The highest area under the curve (AUC) was found for PPV (AUC: 0.83, $P<0.0001$) and SVV (AUC: 0.72, $P=0.002$), in contrast to PVI (AUC: 0.60, $P=0.11$) and CVP (AUC: 0.60, $P=0.13$). The accuracy of PVI to predict fluid responsiveness was improved on analysing patients with higher PI values. PI of about 4% (n=45) achieved statistical significance (AUC: 0.72, $P=0.01$).

Conclusion

The PVI was not able to predict fluid responsiveness with sufficient accuracy. In patients with higher perfusion states, the PVI improved its ability to predict haemodynamic changes, strongly suggesting a relevant influence of the PI on the PVI.