Pleth variability index to monitor the respiratory variations in the pulse oximeter plethysmographic waveform amplitude and predict fluid responsiveness in the operating theatre.


BACKGROUND: Respiratory variations in pulse oximetry plethysmographic waveform amplitude (DeltaPOP) can predict fluid responsiveness in mechanically ventilated patients but cannot be easily assessed at the bedside. Pleth variability index (PVI) is a new algorithm allowing for automated and continuous monitoring of DeltaPOP. We hypothesized that PVI can predict fluid responsiveness in mechanically ventilated patients under general anaesthesia.

METHODS: Twenty-five patients were studied after induction of general anaesthesia. Haemodynamic data [cardiac index (CI), respiratory variations in arterial pulse pressure (DeltaPP), DeltaPOP, and PVI] were recorded before and after volume expansion (500 ml of hetastarch 6%). Fluid responsiveness was defined as an increase in CI > or =15%.

RESULTS: Volume expansion induced changes in CI [2.0 (sd 0.9) to 2.5 (1.2) litre min(-1) m(-2); P<0.01], DeltaPOP [15 (7)% to 8 (3)%; P<0.01], and PVI [14 (7)% to 9 (3)%; P<0.01]. DeltaPOP and PVI were higher in responders than in non-responders [19 (9)% vs 9 (4)% and 18 (6)% vs 8 (4)%, respectively; P<0.01 for both]. A PVI >14% before volume expansion discriminated between responders and non-responders with 81% sensitivity and 100% specificity. There was a significant relationship between PVI before volume expansion and change in CI after volume expansion (r=0.67; P<0.01).

CONCLUSIONS: PVI, an automatic and continuous monitor of DeltaPOP, can predict fluid responsiveness non-invasively in mechanically ventilated patients during general anaesthesia. This index has potential clinical applications.