

Is the Pleth Variability Index a Surrogate for Pulse Pressure Variation in a Pediatric Population Undergoing Spine Fusion?

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Objective

To compare simultaneous measurements of pulse pressure variation (PPV) and pleth variability index (PVI) in patients undergoing spinal fusion.

Aims

To determine if PVI can be used as a surrogate for PPV and also the influence of the prone position on these measurements.

Background

Spine fusion is an involved surgical procedure requiring attention to fluid administration. Dynamic indices for assessing fluid responsiveness like PPV have proven useful to guide fluid administration. Plethysmographic waveform variation like PVI is an appealing surrogate for measurements like PPV that require invasive arterial pressure measurement. Spine fusion patients are unique and the potential of either PPV or PVI to guide fluid therapy has not been studied.

Methods

Patients undergoing spine fusion for scoliosis were studied. In addition to the usual monitors including direct arterial pressure measurement, a multi-wavelength Pulse CO-Oximeter was applied to measure PVI. Paired measurements of PPV and PVI were obtained and limits of agreement determined using the method of Bland and Altman. PPV and PVI in prone and supine positions were compared by paired t-test.

Results

The bias between PVI and PPV measurements was -0.56% with 95% limits of agreement of +21.67% to -20.55%. There was no significant difference between the prone and supine measurements at the $P = 0.05$ level (Table 1).

Conclusions

Our data indicate that PVI is not a surrogate for PPV. PVI measurements were not influenced by changing from the supine to prone position and therefore may prove useful for patients undergoing spine surgery.