Correlation coefficient between plethysmographic variability index and Systolic Pressure Variation as an indicator for fluid responsiveness in hypotensive patients in the ICU/OT.

Datta R, Dhar M, Setlur R, Lamba N.

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Abstract

Background

Prediction of fluid responsiveness in hypotensive patients is a challenge. The correlation between a novel noninvasive dynamic indicator, Pleth Variability Index (PVI ®), and a gold-standard Systolic Pressure Variation (SPV) as a measure of fluid responsiveness was assessed in the Intensive Care Unit (ICU) or Operation Theatre (OT) in a tertiary care hospital.

Methods

A prospective experimental study was conducted over a span of one year on 100 mechanically ventilated patients with hypotension. Vital parameters along with SPV and PVI ® were recorded before and after a standard volume expansion protocol. A 10% SPV threshold was used to define fluid responders and nonresponders.

Results

Pearson's correlation graph at baseline showed positive correlation between PVI ® and SPV ($r = 0.59$, p-value = 0.001). Strength of correlation was comparatively less but still showed positive correlation at 15 ($r = 0.39$, p-value = 0.009) and 30 ($r = 0.404$, p-value = 0.004) minutes of fluid bolus. The Bland Altman analysis of baseline values of PVI ® and SPV showed good agreement with a mean bias of 9.05. Percentage change of PVI ® and SPV over 30 min showed a statistically significant positive correlation in the responder group ($r = 0.53$, $p < 0.05$). A threshold value of PVI ® more than 18% before volume expansion differentiated fluid responders and nonresponders with a sensitivity of 75% and specificity of 67%, with an area under Receiver Operating Characteristic (ROC) of 0.78.

Conclusion

A positive correlation exists between SPV and PVI ®, justifying the use of noninvasive PVI ® in a clinical setting of hypotension.