

Changes in Stroke Volume Variation (SVV) and Pleth Variability Index (PVI) During Rapid Colloid Infusion.

Shimizu F., Hishinuma N., Shimizu S., Tanaka S., Kawamata M. *Proceedings of the 2011 Annual Meeting of the American Society of Anesthesiologists*. A869.

Background

Perioperative optimization of fluid status and cardiac output is necessary for reducing morbidity after major surgery. Stroke volume variation (SVV) has gained increasing impact regarding perioperative fluid optimization. More recently, interest has focused on the availability of non-invasive variables of fluid responsiveness like pleth variability index (PVI), which is strongly related to respiratory variations in the pulse oximeter waveform amplitude. A recent study showed that not only SVV but also PVI can be useful for fluid optimization in patients undergoing minor surgery. It is not clear whether SVV and PVI are reliable indicators of fluid status during major surgery in which cardiovascular instability often occurs. The aim of this study was to test accuracy of SVV and PVI during acute volume expansion in patients undergoing open-chest surgery.

Methods

After approval of the protocol of this study by the Ethical Committee of our institution, seven patients with preserved left ventricular function undergoing open-chest surgery were enrolled in this study. Anesthesia was induced with intravenous fentanyl (2 µg/kg), midazolam (0.1 mg/kg) and rocuronium (0.9 mg/kg), and maintained with remifentanyl (0.2-0.4 µg/kg/min) and propofol (4-6 mg/kg/h). After tracheal intubation, the patients' lungs were mechanically ventilated. Each patient was monitored with pulmonary capillary wedge pressure (PCWP) using a pulmonary artery catheter (Edwards Lifesciences, Irvine, CA), SVV using the FloTrac/Vigileo monitor (Edwards Lifesciences, Irvine, CA) and PVI using pulse oximeter (Radical-7 Masimo Corp., Irvine, CA). Patients were given infusion of 6% hydroxyl starch solution at a rapid, constant-rate (500 ml in 15 min) after induction of anesthesia. SVV, PVI and PCWP were measured before and after volume loading. All data were shown as means ± standard deviation (SD). Changes in individual parameters were determined with a paired Student's t-test. A P value of < 0.05 was considered to be statistically significant.

Results

Sequential changes in SVV (a), PVI (b), PCWP (c) at baseline and after volume loading are presented in Figure 1. SVV and PVI decreased significantly, whereas PCWP increased significantly after the infusion.

Conclusion

SVV and PVI showed good performances in predicting fluid responsiveness with sufficient accuracy during acute volume expansion in patients undergoing open-chest surgery. Both SVV and PVI may be useful for fluid optimization.

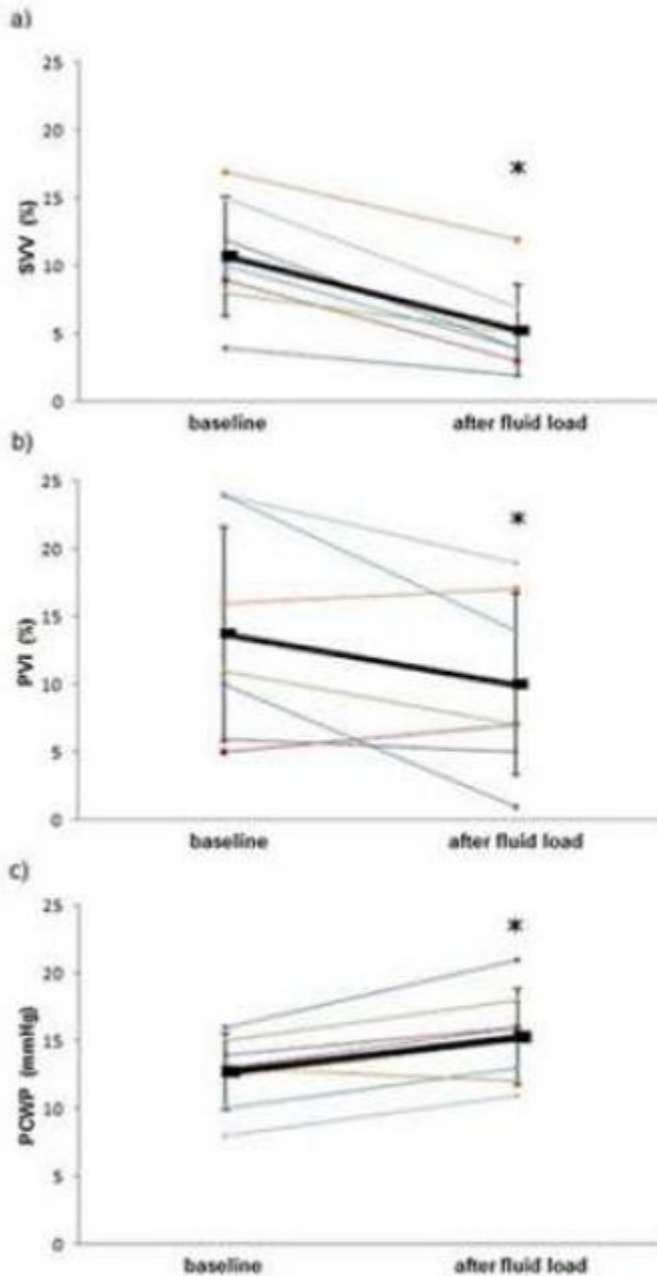


Figure 1. SVV (a), PVI (b), PCWP (c) at baseline and after fluid load. Thin lines represent data from individual patients and the thick line represents the mean data. The vertical bars represent standard deviation. *P < 0.05 compared with baseline.