

The Increase of Vasomotor Tone Avoids the Ability to Predict Fluid Responsiveness of the Dynamic Preload Indicators

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Respiratory variations in pulse pressure (PPV), stroke volume (SVV), pulse oximetry photoplethysmographic waveform amplitude (DPOP) and perfusion index (PVI: pleth variability index) has been proposed as a fluid responsiveness indicators. As vasopressors directly alter arterial tone, venous capacitance and the amplitude of the pulse oximetry waveform, we analyse the effects of phenylephrine (PHE) on the dynamic preload indicators in a model of hemorrhage.

Ten anesthetized and mechanically ventilated (VT: 9+2 ml/kg, peep: 5 cmH₂O) rabbits were studied during normovolemia (BL) and after blood progressive withdrawal (20% of volemia, BW). Then, PHE infusion was titrated to achieve a MAP of +10% of BL and a third data set of data was obtained (BW+PHE). Central venous (CVP) and left ventricular (LV) pressures, and infra-diaphragmatic aortic blood flow (Transonic) and pressure (Statham) were measured. Pulse oximetry (LNOP newborn, Masimo Corp) was recorded. PPV and SVV were obtained by the variation of beat-to-beat PP and SV, respectively. Non-invasive DPOP and PVI were also obtained. SV was estimated by the integral of aortic flow. The vasomotor tone and LV preload were assessed by total arterial peripheral resistance ($TPR \frac{1}{4}$ mean aortic pressure/ mean aortic flow) and LV end-diastolic pressure (LVEDP), respectively. Data are expressed as mean+DS and presented in the table. Pearson product moment correlation and ANOVA were used (P, 0.05).

All dynamic preload indicators were significantly correlated with PPV during the different experimental conditions (R^2 between 0.6 and 0.8). Mean doses of PHE infusion was 15+2 mg/kg/min. All dynamic preload indicators were influenced by PHE during hemorrhage.

True intravascular volume deficit have been masked by the vasomotor tone increase during PHE. We cannot rule out the increase of pulmonary arterial pressure produced by PHE concomitantly. The LVEDP maintenance can discard a significant shifting blood from unstressed to stressed volume.

References: 1. Nouira S, Elatrous S, Dimassi S, et al. Effects of norepinephrine on static and dynamic preload indicators in experimental hemorrhagic shock. *Crit Care Med* 2005; 33: 2339–43.