Comparison of Arterial Pressure and Plethysmographic Waveform-Based Dynamic Preload Variables in Assessing Fluid Responsiveness and Dynamic Arterial Tone in Patients Undergoing Major Hepatic Resection

Background
Dynamic preload variables to predict fluid responsiveness are based either on the arterial pressure waveform (APW) or on the plethysmographic waveform (PW). We compared the ability of APW-based variations in stroke volume (SVV) and pulse pressure (PPV) and of PW-based plethysmographic variability index (PVI) to predict fluid responsiveness and to track fluid changes in patients undergoing major hepatic resection. Furthermore, we assessed whether the PPV/SVV ratio, as a measure of dynamic arterial elastance (Eadyn), could predict a reduction in norepinephrine requirement after fluid administration.

Methods
Thirty patients received i.v. fluid (15 ml kg\(^{-1}\) in 30 min) after hepatic resection and were considered responders when stroke volume index (SVI) increased \(\geq 20\%\) after fluid administration. SVV and SVI were measured by the FloTrac-Vigileo® device, and PVI was measured by the Masimo Radical 7 pulse co-oximeter®.

Results
The areas under a receiver operating characteristic curve for SVV, PPV, and PVI were 0.81, 0.77, and 0.78, respectively. In responders, all dynamic variables, except PVI, decreased after fluid administration. Eadyn predicted a reduced norepinephrine requirement (AUC = 0.81).

Conclusions
In patients undergoing major hepatic resection, both APW- and PW-based dynamic preload variables predict fluid responsiveness (preload) to a similar extent. Most variables (except PVI) also tracked fluid changes. Eadyn, as a measure of arterial elastance (afterload), might be helpful to distinguish the origin of hypotension.