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

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Br. J. Anaesth. Jun;110(6):940-6.

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 ≥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