Correlation of carotid corrected flow time and respirophasic variation in blood flow peak velocity with stroke volume variation in elderly patients under general anaesthesia

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Background: Accurate assessment of volume responsiveness in elderly patients is important as it may reduce the risk of post-operative complications and enhance surgical recovery. This study evaluated the utility of two Doppler ultrasound-derived parameters, the carotid corrected flow time (FTc) and respirophasic variation in carotid artery blood flow peak velocity (ΔVpeak), to predict volume responsiveness in elderly patients under general anaesthesia.

Methods: A total of 97 elderly patients undergoing elective abdominal surgery under general anaesthesia were enrolled in this prospective observational study. After entering the operating room, all patients underwent radial artery puncture connected with a LiDCO device to measure stroke volume variation (SVV), and fluid therapy was performed after anaesthesia induction. Patients were classified as responders if SVV ≥ 13% before fluid challenge and nonresponders if SVV < 13%. The FTc, ΔVpeak, SVV and haemodynamic data were measured by ultrasound at baseline (T0) and before (T1) and after (T2) fluid challenge. The correlations between the Doppler ultrasound-derived parameters and SVV were analysed, and the receiver operating characteristic (ROC) curves was computed to characterize both FTc and ΔVpeak as measures of volume responsiveness in elderly patients.

Results: Forty-one (42.3%) patients were fluid responders. Carotid FTc before fluid challenge was negatively correlated with SVV before fluid challenge ($r = -0.77$; $P < 0.01$), and ΔVpeak was positively correlated with SVV ($r = 0.72$; $P < 0.01$). FTc and ΔVpeak predicted SVV ≥ 13% after general anaesthesia in elderly patients, with areas under the receiver operating characteristic curves (AUROCs) of 0.811 [95% confidence interval (CI), 0.721-0.900; $P < 0.001$] and 0.781 (95% CI, 0.686-0.875; $P < 0.001$), respectively. The optimal cut-off values of FTc and ΔVpeak to predict SVV ≥ 13% were 340.74 ms (sensitivity of 76.8%; specificity of 80.5%) and 11.69% (sensitivity of 78.0%; specificity of 67.9%), respectively.

Conclusions: There was a good correlation between carotid artery ultrasound parameters and SVV. FTc predicted fluid responsiveness better than ΔVpeak in elderly patients during general anaesthesia. Further study is needed before these parameters can be recommended for clinical application.