Abstract:

BACKGROUND: Patients with advanced cirrhosis of the liver typically display circulatory disturbance. Haemodynamic management may be critical for avoiding and treating functional renal failure in such patients. This study investigated the effects of plasma expansion with hyperoncotic albumin solution and the role of static haemodynamic parameters in predicting volume responsiveness in patients with advanced cirrhosis.

METHODS: Patients with advanced cirrhosis (Child B and C) of the liver receiving albumin substitution because of renal compromise were studied using trans-pulmonary thermodilution. Paired measurements before and after two infusions of 200 ml of 20% albumin per patient were recorded and standard haemodynamic parameters such as central venous pressure (CVP), mean arterial pressure (MAP), systemic vascular resistance index (SVRI), cardiac index (CI) and derived variables were assessed, including global end-diastolic blood volume index (GEDVI), a parameter that reflects central blood volume.

RESULTS: 100 measurements in 50 patients (33 m/17 w; age 56 years (+/- 8); Child-Pugh-score 12 (+/- 2), serum creatinine 256 micromol (+/- 150) were analyzed. Baseline values suggested decreased central blood volumes GEDVI = 675 ml/m² (+/- 138) despite CVP within the normal range (11 mmHg (+/- 5). After infusion, GEDVI,
CI and CVP increased (682 ml/m² (± 128) vs. 744 ml/m² (± 171), p< 0.001; 4.3 L/min/m² (± 1.1) vs. 4.7 L/min/m² (± 1.1), p< 0.001; 12 mmHg (± 6) vs. 14 mmHg (± 6), p< 0.001 respectively) and systemic vascular resistance decreased (1760 dyn s/cm⁵/m² (± 1144) vs. 1490 dyn s/cm⁵/m² (± 837); p< 0.001). Changes in GEDVI, but not CVP, correlated with changes in CI (r² = 0.51; p< 0.001). To assess the value of static haemodynamic parameters at baseline in predicting an increase in CI of 10%, receiver-operating-characteristic curves were constructed. The areas under the curve were 0.766 (p< 0.001) for SVRI, 0.723 (p< 0.001) for CI, 0.652 (p = 0.010) for CVP and 0.616 (p = 0.050) for GEDVI. CONCLUSION: In a substantial proportion of patients with advanced cirrhosis, plasma expansion results in an increase in central blood volume. GEDVI but not CVP behaves as an indicator of cardiac preload, whereas high baseline SVRI is predictive of fluid responsiveness.