Fluid-responsiveness, blood volume and perfusion in preoperative haemodynamic optimisation of hip fracture patients; a prospective observational study

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Background: Preoperative resuscitation strategies in patients with hip fracture (HF) are lacking. We aimed to investigate fluid-responsiveness, peripheral perfusion index (PPI) and blood volume (BV)-status in patients with HF undergoing resuscitation in the preoperative phase.

Methods: In a prospective observational study, we evaluated preoperative fluid-responsiveness, indices of perfusion and BV before and after lumbar epidural analgesia in 50 patients with HF shortly after admittance.

Results: Initially, 18 (36%) patients were fluid-responsive (≥10% increased SV in response to 250 ml fluid bolus) and 13 (26%) presented hypovolaemia (deviation of measured BV from estimated BV ≤ 0.9). According to fluid-responsiveness, no difference in absolute values of cardiac index (CI) (2.7 L [2.1-3.3] vs. 2.8 L [2.3-3.4], p = .5) was seen, but cardiac output (CO) rose significantly in the hypovolaemic patients: 9% [5-18] vs. 1% [-3-7], p = .004. After epidural analgesia, 26 (52%) patients were again fluid-responsive and 15 (30%) were hypovolaemic. CI was now significantly lower in fluid-responsive patients (2.2 L [1.7-2.7] vs. 2.9 L [2.3-3.5], p = .001). Prior to epidural analgesia, no significant trend towards hypovolaemic patients having lower indices of perfusion was seen. After epidural analgesia, more patients with hypovolaemia presented with PPI≤1.5 (8 (53%) vs. 3 (9%), p = .001) and absolute values of PPI were also significantly lower if IBV was low (1.4 [0.9-3.2] vs. 3.2 [2.4-4.8], p = .01). PPI correlated with hypovolaemia after epidural analgesia (rho 0.4 [0.1-0.7], p = .007).

Conclusions: Preoperative fluid-responsivity in HF patients might be attributable to elements of hypovolaemia and sympathetic compensatory ability conjointly, confounding the use of SV-guided resuscitation. PPI could be associated with BV, which may support clinicians during perioperative haemodynamic optimisation.