

Regional Anaesthesia, Oxygen delivery and elective hips - breaking new ground,

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Introduction Hip arthroplasty is one of the most commonly performed surgical operations. It is a major operation, but is often performed in elderly patients, some with significant comorbidities. The mortality rate varies between 0.2% when the operation is performed electively in relatively fit patients to more than 10% in revision arthroplasties and when the operation is performed following trauma [1]. Haemodynamic optimization has been shown to reduce complications, mortality and length of hospital stay in other high-risk populations, specifically abdominal and cardiac surgery [2-4]. We wished to investigate whether such goal-directed optimization could be beneficial for patients undergoing hip arthroplasty. At the time we designed our study, no data were available concerning haemodynamic optimization during elective hip arthroplasty. However, intraoperative use of a cardiac output monitor has been shown to reduce mortality and morbidity in very sick trauma patients with neck of femur fractures [5, 6].

Hip arthroplasty is often performed under spinal anaesthesia with the patient awake [7]. In our institution patients routinely receive an invasive blood pressure monitoring with an arterial line. Continuous cardiac output monitoring that could be used to guide haemodynamic optimization is possible using pulse pressure analysis techniques that utilize the pressure waveform from an arterial line (the PiCCO™ system, Pulsion, Munich, Germany [8], the

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LiDCO™ systems, LiDCO, Cambridge, UK [9] and the Vigileo™ system, Edwards Lifesciences, Irvine, USA [10]). We decided to use the Vigileo™ system (version 1.07) with the FloTrac™ sensor, which can be connected to a normal radial arterial line and can be easily set up, allowing a rapid assessment of cardiac output.

Methods: We performed a pilot study to determine whether a haemodynamic management protocol based on targeting stroke volume maximization plus an oxygen delivery of 600 ml/m² would influence haemodynamic management. Patients undergoing elective hip arthroplasty were randomized to receive either intraoperative goal directed therapy or standard management. We collected information on haemodynamic management during and after the operation, and complications.

Results: 40 ASA 2 patients were enrolled into the study. 20 were randomized to the goal-directed therapy group and 20 to standard management. Patients in the goal-directed therapy group received on average more crystalloids (3200 ml vs 2000 ml), more colloids (2400 ml vs 550 ml) and more blood (600 ml vs 0 ml) intraoperatively. Patients with standard management received more blood postoperatively (650 ml vs 200 ml). Data are expressed as mean or medians. The amount of blood transfused overall, (intraoperative and postoperative) was not different in the two groups. The treatment group had fewer complications at 7 days..

Conclusions: goal-directed haemodynamic optimization is possible in elective major orthopaedic surgery performed under regional anaesthesia and leads to altered intraoperative management and a reduced rate of postoperative complications.

References:

1. Pearse R, Harrison D, James P, Watson D, Hinds C, Rhodes A, Grounds RM, Bennett E: **Identification and characterisation of the high-risk surgical population in the United Kingdom.** *Critical care (London, England)* 2006, **10**(3):R81.

