Pathophysiology and clinical implications of perioperative fluid excess

Editor—We read with interest the review concerning the pathophysiology and clinical implications of perioperative fluid excess. However, we were surprised and have to disagree with the conclusion that there is a need for randomized, prospective clinical studies to compare ‘high’ vs ‘low’ fluid regimens. We were ‘surprised’ because the authors highlighted two excellent studies where appropriate plasma volume expansion resulted in significantly better gastrointestinal perfusion, and reductions in morbidity and hospital stay, and commented that ‘fluid loading to optimize cardiac function should therefore be guided by the Starling curve, and may have beneficial effects on postoperative organ function’. We suggest that a better conclusion would be to call for more randomized, prospective clinical studies comparing fluid regimens guided by appropriate perioperative haemodynamic monitoring with current practice. Current practice tends to rely on fluid therapy being guided by changes in heart rate and arterial blood pressure, which are insensitive of occult hypovolaemia, and are able to detect only major circulatory losses.

A recent randomized controlled trial in elderly patients undergoing surgery for hip fracture, again demonstrated reductions in postoperative morbidity and a faster postoperative recovery in patients receiving fluid regimens where cardiac function was ‘optimized’. ‘Optimization’ was guided by utilizing the Starling curve, with either central venous pressure or oesophageal Doppler cardiac output measurement. No patient who received additional fluids as a result of these fluid challenge techniques, experienced fluid overload. The wide range of fluid given to the protocol groups (500–3500 ml) in this study emphasizes the fact that giving a single volume load is not appropriate when applied to individuals. Fluid must be individually titrated to dynamic changes in appropriate monitored variables, and studies of arbitrary ‘high’ vs ‘low’ fluid regimens would be dangerous. Holte and colleagues have elegantly reviewed the dangers of inappropriate excessive fluid administration, and there are many studies demonstrating detrimental effects on morbidity and mortality as a consequence of occult hypovolaemia. Therefore any emphasis about fluid therapy in the perioperative period should be on additional fluid therapy guided by appropriate, relatively simple and minimally invasive, monitoring techniques. The dangers of perioperative fluid excess are avoided by these monitoring techniques, and we would not wish for future studies to include ‘low fluid regimens’, returning to the days of the dehydrated patient undergoing surgery in a critical physiological state, with all the inevitable morbidity and mortality this incurs.

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Editor—Perhaps inevitably, the review of ‘perioperative fluid excess’ by Holte and colleagues portrays an unbalanced view of current issues in fluid management. The authors detail the potential morbidity of excessive perioperative fluids, and describe the successful use of fluid restriction in some instances. They conclude by recommending randomized trials of ‘high’ vs ‘low’ volume fluid regimens, implying that excessive fluid administration is a common clinical problem.

However, the available data suggest that hypovolaemia is far more common than overhydration. In one multicentre study of 244 patients undergoing major abdominal surgery, the incidence of postoperative hypotension requiring treatment was 37%, compared with a single case of respiratory failure. Furthermore, several recent trials have demonstrated improved clinical outcomes from goal-directed fluid supplementation. Is it possible for both restriction and supplementation of fluids to be beneficial? An approach that fits the current data would be goal-directed fluid supplementation during surgery, with fluid restriction (for uncomplicated patients) starting early in the postoperative period. However, in view of the many confounding factors, such as the type of surgery/anaesthesia/analgésia, the specific type of colloid or crystalloid used, and the mode of assessment of hydration, there is clearly much work to be done. In the meantime, it would be hazardous for clinicians to think that simply restricting fluids can easily reduce surgical morbidity.

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Editor—we thank Dr Mitchell and colleagues and Dr Sartain for their thoughtful comments. We agree that both perioperative fluid excess and perioperative dehydration should be avoided. We also agree that goal-directed fluid therapy is the way forward. However, the main purpose of our review was to discuss the potential risks of perioperative fluid excess, which is commonly observed when goal-directed fluid therapy is not used. Hopefully, the important aspects emphasized by Dr Mitchell and colleagues and Dr Sartain will lead to increased attention in the future towards optimized perioperative fluid therapy, and thereby avoid the risks of fluid excess and dehydration.

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The original Aaslid formula is: eCPP = FVm MAP

where eCPP is estimated cerebral perfusion pressure, FVm is mean flow, and MAP is mean arterial pressure. The substitution of the formula during changes in vascular wall tension and, in our case, would have changed the results.

In practical terms, as far as we are aware, none of the recently described methods are fully validated; in particular, it is not clear from existing literature as to which formula is most appropriate.


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