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[Intervention Review]

Perioperative fluid volume optimization following proximal femoral fracture

Sharon R Lewis[1], Andrew R Butler[2], Andrew Brammar[3], Amanda Nicholson[4], Andrew F Smith[5]

[1]Patient Safety Research, Royal Lancaster Infirmary, Lancaster, UK. [2]Research Department, University Hospitals of Morecambe Bay NHS Foundation Trust, Lancaster, UK. [3]Department of Anaesthesia, University Hospital of South Manchester, Manchester, UK. [4]Liverpool Reviews and Implementation Group, University of Liverpool, Liverpool, UK. [5]Department of Anaesthesia, Royal Lancaster Infirmary, Lancaster, UK

Contact address: Andrew F Smith, Department of Anaesthesia, Royal Lancaster Infirmary, Ashton Road, Lancaster, Lancashire, LA1 4RP, UK. andrew.f.smith@mbht.nhs.uk.

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ABSTRACT

Background

Proximal femoral fracture (PFF) is a common orthopaedic emergency that affects mainly elderly people at high risk of complications. Advanced methods for managing fluid therapy during treatment for PFF are available, but their role in reducing risk is unclear.

Objectives

To compare the safety and effectiveness of the following methods of perioperative fluid optimization in adult participants undergoing surgical repair of hip fracture: advanced invasive haemodynamic monitoring, such as transoesophageal Doppler and pulse contour analysis; a protocol using standard measures, such as blood pressure, urine output and central venous pressure; and usual care.

Comparisons of fluid types (e.g. crystalloid vs colloid) and other methods of optimizing oxygen delivery, such as blood product therapies and pharmacological treatment with inotropes and vasoactive drugs, are considered in other reviews.

Search methods

We searched the Cochrane Central Register of Controlled Trials (CENTRAL; 2015, Issue 9*);* MEDLINE (October 2012 to September 2015); and EMBASE (October 2012 to September 2015) without language restrictions. We ran forward and backward citation searches on identified trials. We searched ClinicalTrials.gov and the World Health Organization (WHO) International Clinical Trials Registry Platform for unpublished trials. This is an updated version of a review published originally in 2004 and updated first in 2013 and again in 2015. Original searches were performed in October 2003 and October 2012.

Selection criteria

We included randomized controlled trials (RCTs) in adult participants undergoing surgical treatment for PFF that compared any two of advanced haemodynamic monitoring, protocols using standard measures or usual care, irrespective of blinding, language or publication status.

Data collection and analysis

Two review authors assessed the impact of fluid optimization interventions on outcomes of mortality, length of hospital stay, time to medical fitness, whether participants were able to return to pre-fracture accommodation at six months, participant mobility at six months and adverse events in-hospital. We pooled data using risk ratio (RR) or mean difference (MD) for dichotomous or continuous data, respectively, on the basis of random-effects models.

Main results

We included in this updated review five RCTs with a total of 403 participants, and we added two new trials identified during the 2015 search. One of the included studies was found to have a high risk of bias; no trial featured all pre-specified outcomes. We found two trials for which data are awaited for classification and one ongoing trial.

Three studies compared advanced haemodynamic monitoring with a protocol using standard measures; three compared advanced haemodynamic monitoring with usual care; and one compared a protocol using standard measures with usual care. Meta-analyses for the two advanced haemodynamic monitoring comparisons are consistent with both increased and decreased risk of mortality (RR Mantel-Haenszel (M-H) random-effects 0.41, 95% confidence interval (CI) 0.14 to 1.20; 280 participants; RR M-H random-effects 0.45, 95% CI 0.07 to 2.95; 213 participants, respectively). The study comparing a protocol with usual care found no difference between groups for this outcome.

Three studies comparing advanced haemodynamic monitoring with usual care reported data for length of stay and time to medical fitness. There was no statistically significant difference between groups for these outcomes in the two studies that we were able to combine (MD IV fixed 0.63, 95% CI -1.70 to 2.96); MD IV fixed 0.01, 95% CI -1.74 to 1.71, respectively) and no statistically significant difference in the third study. One study reported reduced time to medical fitness when comparing advanced haemodynamic monitoring with a protocol, and when comparing protocol monitoring with usual care.

The number of participants with one or more complications showed no statistically significant differences in each of the two advanced haemodynamic monitoring comparisons (RR M-H random-effects 0.83, 95% CI 0.59 to 1.17; 280 participants; RR M-H random-effects 0.72, 95% CI 0.40 to 1.31; 173 participants, respectively), nor any differences in the protocol and usual care comparison.

Only one study reported the number of participants able to return to normal accommodation after discharge with no statistically significant difference between groups.

There were few studies with a small number of participants, and by using the GRADE (Grades of Recommendation, Assessment, Development and Evaluation Working Group) approach, we judged the quality of the outcome evidence as low. We had included one study with a high risk of bias, but upon applying GRADE, we downgraded the quality of this outcome evidence to very low.

Authors' conclusions

Five studies including a total of 403 participants provided no evidence that fluid optimization strategies improve outcomes for participants undergoing surgery for PFF. Further research powered to test some of these outcomes is ongoing.

PLAIN LANGUAGE SUMMARY

Optimization of fluid levels in people suffering hip fractures

Background

Hip fractures are common among elderly people, who often have medical conditions that put them at risk of developing other problems whilst their fracture is treated. Treatment usually involves an operation to fix the break in the bone, and giving too much or too little fluid to a patient around this time may increase the risk of additional problems. Healthcare staff use many approaches to determine how much fluid a patient needs in this situation, but it is not clear whether some methods are better than others. For this Cochrane review, we looked at research on the effects of different methods of finding maximum effective fluid levels for adult men and women who undergo surgery for any type of hip fracture.

Study characteristics

Evidence is current to September 2015. We found five studies with 403 participants, each of which compared two or three methods of guiding fluid therapy. These methods include 'usual care' (whereby staff use changes in basic measurements, such as heart rate, to

decide for themselves how much fluid to give), 'protocols using standard measures' (whereby staff use changes in basic measurements when giving fluid according to a formal set of rules) and 'advanced haemodynamic monitoring' (whereby staff use invasive equipment, such as specialized blood pressure monitoring devices placed into arteries, to determine how much fluid to give).

Key results

These trials found no evidence to suggest that using one method instead of another reduces harm, including death, or decreases the number of complications. We found no evidence, when study results were combined, indicating that any method reduced length of hospital stay or time that participants were assessed as medically fit for discharge. Results also showed no difference in the number of participants able to return to normal accommodation after discharge.

Quality of evidence

We found few relevant studies with only a small number of participants. The time difference between the earliest study, published in 1985, and the latest study, published in 2014, suggests that standard practice for managing hip fracture may differ between these studies. We judged one study as having a high risk of bias, and we used the GRADE approach to assess evidence quality as low or very low. Results of the review are applicable only to countries in which the relevant studies were conducted, as 'usual care' may differ in other countries.

Conclusion

Current evidence is insufficient to show which method of finding maximum effective fluid levels in people undergoing hip fracture surgery is preferable.