Minimally invasive hip fracture surgery: are outcomes better?
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CRD summary
This review concluded that there was no significant difference in outcomes following minimally invasive hip fracture surgery compared to standard insertion of a sliding hip screws except blood transfusion rate, which was lower with minimally invasive surgery. The reliability of the conclusions is difficult to assess as the quality of the studies on which they are based was unclear.

Authors' objectives
To determine if minimally invasive plating, nailing or external fixation surgery lead to improved outcomes for intertrochanteric hip fractures compared with standard insertion of sliding hip screws.

Searching
MEDLINE (1966 to June 2007) and EMBASE (1980 to June 2007) were searched for articles published in English. Search terms were reported. Reference lists of retrieved papers were reviewed.

Study selection
Prospective and retrospective studies that compared minimally invasive intertrochanteric hip fracture surgery to sliding hip screws and reported outcome data by treatment group were eligible for inclusion.

The general population similar for each included study and reflected the typical intertrochanteric hip fracture population. Patient ages ranged from 76.9 to 84 years. The proportion of females ranged from 63.4% to 100% across studies. Four of the randomised controlled trials (RCTs) used extramedullary plate for fracture fixation, eight used intramedullary device and two used external fixation. Most studies followed patients for more than 12 months.

One reviewer applied the inclusion criteria.

Assessment of study quality
The authors did not state that they assessed quality of the included studies.

Data extraction
Relative risk (RR) with 95% confidence intervals (CIs) was extracted or calculated for outcomes pooled in a meta-analysis. For other outcomes the mean score or number of events was extracted and it was reported whether between-group differences were statistically significant.

The authors did not state how many reviewers extracted data.

Methods of synthesis
Relative risks with 95% CIs of minimally invasive hip fracture surgery compared with sliding hip screws were combined for some outcomes in a meta-analysis using a random-effects model. Only RCTs were used for the meta-analysis. For the remaining outcomes a narrative synthesis was undertaken, which involved reporting the number of studies with a statistically significant between-group difference. Where possible studies were grouped by implant used for minimally invasive surgery.

Heterogeneity between trials was assessed by the $I^2$ statistic.

Results of the review
Seventeen studies (n=2,099) met the inclusion criteria: 14 RCTs and three non-randomised studies.
Patients who underwent minimally invasive surgery were significantly more likely to be transfused compared to those who received sliding hip screws hip fracture surgery (RR 0.63, 95% CI 0.41 to 0.96; seven RCTs). This was also the case for studies that used extramedullary plates (RR 0.29, 95% CI 0.13 to 0.62; one RCT) and external fixator devices (RR 0.05, 95% CI 0.01 to 0.25; two RCTs). The relative risk ratio for intramedullary devices was not statistically significant (four RCTs). There was no statistically significant difference in the 12-month mortality with minimally invasive surgery compared to standard sliding hip screw fracture surgery (RR 0.99, 95% CI 0.82 to 1.2; 11 RCTs) or failure of fracture fixation. Studies were not pooled for the remaining outcomes.

The drop in haemoglobin was significantly less in the minimally invasive surgery group than in sliding hip screws (in four of six studies). The six studies that reported average intraoperative blood loss found a significantly decreased blood loss with minimally invasive surgery compared with sliding hip screws. In three of five studies there was significantly less pain in the minimally invasive group. In eight of nine studies there was no between group difference in length of hospital stay. The results for surgery time were mixed across studies: eight of sixteen studies reported a significantly shorter surgery time with minimally invasive surgery, four shorter surgery time with sliding hip screws, and four reported no statistical significant difference.

The most severe intraoperative complications involved fractures on the greater trochanter or femoral shaft with insertion of the nail which were reported in the intramedullary device studies.

**Authors' conclusions**
Minimally invasive surgery was associated with decreased blood transfusion compared with standard sliding hip screws, although there was significant heterogeneity between the studies. There was no significant difference with all other comparisons.

**CRD commentary**
This review addressed a well-defined question in terms of participants, interventions and outcomes and study design. Two relevant databases were searched. Relevant data may have been missed as only English-language studies were included and unpublished studies were not specifically sought. There was a risk of bias in the review as only one reviewer was involved in study selection and the process for data extraction was unclear. The pooling of studies, where undertaken, seemed appropriate. Studies were grouped by type of implant. Statistical heterogeneity was assessed and discussed where found. The narrative synthesis for some of the outcomes was limited by the small number of studies available and it was unclear whether the included studies were sufficiently powered to detect a difference between the two interventions. Potential sources of heterogeneity were explored and reported.

The authors' conclusions were consistent with the evidence shown. However, the lack of adequate assessment of quality of the studies included in the review and insufficient reporting of the review process made the reliability of the authors' conclusions difficult to ascertain.

**Implications of the review for practice and research**
The authors did not state any implications for practice.

**Research**: The authors stated that new controlled trials with improved reporting of medical complications were needed as these may show that minimally invasive surgery had some positive impact on patients.

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**Bibliographic details**

**DOI**
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.