Meta-analysis comparing arthroplasty with internal fixation for displaced femoral neck fracture in the elderly

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CRD summary
This review concluded that arthroplasty reduced reoperation and complication rates with no difference in mortality compared with internal fixation in the treatment of displaced femoral neck fracture in the elderly. The evidence supported the authors' findings, but methodological shortcomings of the data and variability between trials mean that the conclusions should be interpreted with caution.

Authors' objectives
To compare the clinical outcomes of internal fixation with arthroplasty for the treatment of displaced femoral neck fracture in elderly patients (60 years or older).

Searching
PubMed was searched up to December 2008 for publications in English. Search terms were reported. Grey literature, major orthopaedic textbooks and the bibliographies of retrieved articles were screened for further studies.

Study selection
Randomised controlled trials (RCTs) that compared internal fixation with arthroplasty (hemiarthroplasty or total hip arthroplasty) for the treatment of displaced femoral neck fracture (Garden III and IV classification) in elderly patients were eligible for inclusion in the review. Patients had to be at least 60 years old and mobile prior to the fracture, with a normal mental state and no serious concomitant disease (such as known metastatic disease or terminal illness) or other reason for exclusion (such as contraindication to anaesthesia or clinically degeneration or inflammatory arthritis). Eligible outcomes were mortality, reoperation and major complication rates (outcomes were further defined in the review).

Over half of the included trials compared hemiarthroplasty with internal screw fixation; other trials compared total hip arthroplasty with internal screw fixation. One trial compared hemiarthroplasty with dynamic hip screws. No patient characteristics were reported.

The authors did not state how papers were selected for the review.

Assessment of study quality
The methodological quality of the included trials was assessed using criteria for randomisation, allocation concealment, assessor blinding, and loss to follow-up. Each trial was awarded a grade (B or C). Those trials awarded a 'C' grade appeared to be of lower quality.

The authors did not state how many authors performed the quality assessment.

Data extraction
Two reviewers independently extracted the trial data. Odds ratios (ORs) with 95% confidence intervals (CIs) were reported for each outcome. Discrepancies were resolved through consensus.

Methods of synthesis
Trials were grouped by outcome. Pooled odds ratios with 95% confidence intervals were calculated using a fixed-effect meta-analysis. Heterogeneity was assessed using $X^2$ and $I^2$. Where heterogeneity was present, a random-effects analysis was used.

Results of the review
Nineteen RCTs were included in the review (n=3,505 patients). Sample sizes ranged from 20 to 683 patients. Duration of follow-up ranged from 12 to 166 months. Randomisation was inadequate in three trials. Allocation concealment was
unclear in one trial. Assessor blinding was unclear in 14 trials. Loss to follow-up ranged from 1 to 17.9% (where reported). Fourteen trials were awarded grade B and five trials grade C for quality.

There was no statistically significant difference between arthroplasty and internal fixation for mortality at one year after surgery (17 RCTs; no significant heterogeneity).

Arthroplasty resulted in a statistically significant decrease in the rate of reoperation (OR 0.10, 95% CI 0.08 to 0.13; 18 RCTs; significant heterogeneity) and the rate of major method-related complications (OR 0.11, 95% CI 0.08 to 0.15; 11 RCTs; no significant heterogeneity) compared with internal fixation.

**Authors' conclusions**

In elderly patients with displaced femoral neck fracture, primary arthroplasty reduced the rate of reoperation and incidence of complications with no difference in mortality compared with internal fixation.

**CRD commentary**

This review answered a clearly defined review question. The authors stated that they tried to identify both unpublished and published studies. However, relevant data may have been missed as only one database was searched and only English language studies were eligible for inclusion, which increased the risk of language bias. Although two reviewers extracted the study data, similar precautions were not reported for the selection of studies and assessment of trial quality, so the risk of reviewer error and bias was unclear.

Relevant criteria were used to assess the methodological quality of the included trials, but a number of the trials appeared to have methodological flaws. Statistical heterogeneity was assessed and only found to be significant for one pooled analysis. However, there appeared to be differences between the trials with in the definition of outcomes, trial methods and measurements, which suggested that the findings may not be reliable (as acknowledged by the authors).

The evidence supported the authors' findings, but the methodological shortcomings of the data and the variability between trials suggest that the conclusions should be interpreted with caution.

**Implications of the review for practice and research**

**Practice:** The authors stated that there was evidence to support the use of arthroplasty as a primary treatment for displaced femoral neck fractures in the relatively healthy independent elderly patients.

**Research:** The authors stated that further research was required to determine the best type of arthroplasty to use for the treatment of displaced femoral neck fractures in the elderly.

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