Hemiarthroplasty vs primary total hip arthroplasty for displaced fractures of the femoral neck in the elderly: a meta-analysis

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CRD summary
This review concluded that total hip arthroplasty for displaced femoral neck fractures in elderly patients could improve the reoperation rate and pain relief, but hemiarthroplasty lowered the incidence of dislocation. The number and size of trials and missing result details imply that the authors' conclusions might not be reliable. There were no significant differences in mortality and infection rates.

Authors' objectives
To compare the efficacy and adverse events of hemiarthroplasty versus primary total hip arthroplasty in elderly patients with a displaced fracture of the femoral neck.

Searching
PubMed and Cochrane Central Register of Controlled Trials (CENTRAL), were searched for studies published in English from January 1966 to December 2010; search terms were reported. The bibliographies of relevant publications, major orthopaedic textbooks and main journals were searched.

Study selection
Randomised controlled trials (RCTs) or quasi-RCTs comparing hemiarthroplasty versus primary total hip arthroplasty in elderly patients (over 60 years old), with a displaced fracture of the femoral neck (Garden stage III or IV) were eligible for inclusion if they reported the clinical outcomes. Trials of patients with a pathological fracture secondary to malignant disease or with osteoarthritis or rheumatoid arthritis of the hip were excluded. Relevant outcomes included: mortality at different follow-up times; pain; main complications, including infection (superficial or deep); dislocation; and reoperation.

In included trials, both the hemiarthroplasty and the primary total hip arthroplasty groups were either cemented or uncemented; there were few uncemented total hip arthroplasty groups. The average patient age ranged from 69 to 81 years. The main outcomes were postoperative complications and function recovery.

Two independent reviewers selected trials.

Assessment of study quality
Two independent reviewers assessed quality using the criteria of Juni et al., with disagreements resolved by discussion. The criteria included: treatment assignment; concealment of allocation; description of entry criteria; intention-to-treat analysis; blinding; and handling of withdrawals.

Data extraction
Two independent reviewers extracted the data in duplicate. The numbers of events were used to calculate relative risks, with 95% confidence intervals. Trial authors were contacted for further information.

Methods of synthesis
The results were pooled to give relative risks, with 95% confidence intervals, using a random-effects model (DerSimonian and Laird), unless there was evidence of significant heterogeneity, in which case a fixed-effect model (Mantel-Haenszel) was used. I² and Cochran Q were used to assess between-study heterogeneity. Trials were divided into three subgroups by length of follow-up: within one year; between one and five years; and between five and 13 years.

Results of the review
Nine trials were identified, with 1,208 participants (range 40 to 252). There were five RCTs (673 participants, range 40 to 252) and four quasi-RCTs (535 participants, range 86 to 180). Follow-up ranged from 12 to 156 months. Five trials
had adequate randomisation procedures, concealment of allocation, intention-to-treat analyses, and complete follow-up; in two trials outcome assessment was blind. All trials had specified entry criteria and defined outcome measures.

**Mortality:** There was no overall significant difference in mortality for hemiarthroplasty versus total hip arthroplasty (eight trials; I²=45%) or for follow-up within one year (two trials; I²=0), between one and five years (five trials; I²=48%), or between five and 13 years (one trial).

**Postoperative complications:** There was a significantly greater risk of reoperation for hemiarthroplasty versus total hip arthroplasty (RR 2.43, 95% CI 1.53 to 3.84; seven trials; I²=28%). Hemiarthroplasty had a significantly lower risk of dislocation versus total hip arthroplasty (RR 0.49, 95% CI 0.32 to 0.75; seven trials; I²=18%). Pain was significantly more common with hemiarthroplasty versus total hip arthroplasty (RR 11.11, 95% CI 4.80 to 25.76; two trials; I²=29%). Overall infection rates did not significantly differ for hemiarthroplasty versus total hip arthroplasty (five trials; I²=0). Results were reported for the subgroup analyses for these postoperative complications by length of follow-up.

Results for functional improvement, operation time, and blood loss were not reported.

**Authors’ conclusions**
Total hip arthroplasty for displaced femoral neck fractures in elderly patients could improve the reoperation rate and pain relief, but hemiarthroplasty lowered the incidence of dislocation.

**CRD commentary**
The review addressed a well-defined question for study design, participants, and interventions, but the outcomes were less clear. Relevant databases were searched, but the search was not extensive for unpublished trials and only studies published in English were included; some relevant trials may have been missed. Trial quality was assessed using suitable criteria and found to be adequate. Efforts were made to reduce error and bias throughout the review process. Some relevant trial details were reported, but not the gender of patients.

The synthesis seems to have been appropriate. At the end of the paper, the authors’ conclusion included results that were not presented in the review, for example functional recovery, operation time, and blood loss, and the conclusion from the abstract is presented above. Some outcomes had wide confidence intervals (for example, pain). One trial had no events and was not included in the meta-analysis.

Some of the outcomes that the authors reported in their conclusions might not have been measured and there were limitations to the numbers and size of trials, both of which imply that the conclusions may not be reliable. In addition, other outcomes should have been considered.

**Implications of the review for practice and research**
**Practice:** The authors recommended that orthopaedic specialists should consider the patient’s age, life expectancy, pre-existing disease, quality-of-life, anticipated functional demands, psychological status, and bone and joint quality when choosing the surgical treatment for a displaced femoral neck fracture.

**Research:** The authors recommended that larger well-designed RCTs should be conducted for the elderly population. They should assess techniques and devices, assess the change in dislocation rates over a long time after femoral neck fracture, and use a single combined clinical outcome.

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