Primary arthroplasty is better than internal fixation of displaced femoral neck fractures: a meta-analysis of 14 randomized studies with 2,289 patients

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CRD summary
This review compared arthroplasty, including total hip arthroplasty and hemiarthroplasty, with internal fixation for displaced femoral neck fractures in the elderly. The authors concluded that arthroplasty results in significantly fewer major complications and reoperations but has comparable mortality. Poor reporting and uncertainty as to the review methodology mean that the reliability of this conclusion cannot be determined.

Authors' objectives
To compare internal fixation with primary arthroplasty in the treatment of displaced femoral neck fractures in the elderly.

Searching
The authors stated that computerised databases were searched between 1966 and 2004, but did not name the databases searched or the search terms used. In addition, references of retrieved articles, major orthopaedics textbooks and personal files were checked.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) were eligible for inclusion in the review.

Specific interventions included in the review
Studies that compared internal fixation with arthroplasty were eligible for inclusion in the review. Studies of both total hip arthroplasty (THA) and hemiarthroplasty were eligible. A wide range of prostheses were used in the included studies, which employed both THA and hemiarthroplasty procedures.

Participants included in the review
Studies of patients aged over 60 years with displaced femoral neck fractures were eligible for inclusion. The included studies had lower age limits of between 65 and 75 years. In some of the studies included in the review, some or all of the patients enrolled were sufferers of dementia.

Outcomes assessed in the review
The primary review outcomes were major method-related complications, including a need for reoperation and mortality at 30 days and 1 year. The included studies also reported function and pain. The authors defined major method-related complications as: deep infection for both groups; early displacement, non-union and avascular necrosis for the internal fixation groups; two or more dislocations for THA; a single dislocation or acetabular erosion after hemiarthroplasty; and loosening or femoral shaft fracture adjacent to the prosthesis. Reoperations were defined so as to exclude the removal of hardware after healing of the fracture, and closed reduction of prosthesis dislocation.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
The authors did not state that they assessed validity.
Data extraction
One reviewer extracted the data. Data were extracted on primary outcomes, including failure of procedure, requirement for revision of the surgery and mortality. Odds ratios (ORs) with 95% confidence intervals (CIs) were reported.

Methods of synthesis
How were the studies combined?
The studies were grouped according to outcome and combined using both fixed-effect and random-effects models; only the fixed-effect data were reported.

How were differences between studies investigated?
Statistical heterogeneity between the studies was assessed using the chi-squared statistic. Some differences between the studies were apparent from the narrative report of study characteristics.

Results of the review
Fourteen RCTs with 2,289 patients were included in the review.

Major method-related complications (11 studies, n=1,797).
There were significantly fewer major method-related complications in the arthroplasty groups than in the internal fixation groups (OR 0.11, 95% CI: 0.08, 0.15). No statistically significant heterogeneity was detected.

Reoperations (14 studies, n=2,289).
There were significantly fewer reoperations in the arthroplasty groups than in the internal fixation groups (OR 0.12, 95% CI: 0.09, 0.15). Statistically significant heterogeneity was detected.

Mortality at 1 year (14 studies, n=2,289).
There was no significant difference between the groups in 1 year mortality (OR 1.00, 95% CI: 0.81, 1.23). No statistically significant heterogeneity was detected.

Mortality at 30 days (10 studies, n=1,692).
There was no significant difference between the groups in 30-day mortality (OR 1.30, 95% CI: 0.85, 2.01) in favour of internal fixation. No statistically significant heterogeneity was detected.

Functional outcome and post-operative pain were also reported.

Authors' conclusions
Primary arthroplasty for displaced femoral neck fractures resulted in significantly fewer major method-related complications and reoperations with open surgery than internal fixation.

CRD commentary
The review question and the inclusion criteria were clear. It was not possible to assess how effective the literature searches were since details of the databases searched were not reported. Although some attempt to locate unpublished studies appears to have been made, it is also difficult to assess the likelihood that relevant studies were missed. The authors did not report using methods designed to reduce bias and error when selecting studies for the review or when extracting the data. They also did not report that they assessed the validity of the included studies, thus it is difficult to assess the reliability of the data.

There appeared to be considerable clinical heterogeneity between the included studies, which could have been usefully explored in a table of study characteristics. The decision to employ a meta-analysis did, however, seem appropriate. The
authors’ conclusions reflect the results of the review but, in the absence of a validity assessment and with uncertainty as to the extent of the search and the rigour of the review methodology, it is not possible to determine whether the conclusions are likely to be reliable.

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

**Practice:** The authors stated that primary arthroplasty should be used in most patients with displaced femoral neck fracture. Patients who are healthy, without dementia, and aged 70 to 80 years should be given a THA; older, impaired or institutionalised patients should be given hemiarthroplasty. The authors further stated that patients younger than 65 to 70 years can be treated with a closed reduction and internal fixation.

**Research:** The authors stated that further research could concentrate on the types of prosthetic most appropriate to different patient groups.

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