Outcomes after displaced fractures of the femoral neck: a meta-analysis of one hundred and six published reports

Authors' objectives
To assess outcomes of treatment for displaced fractures of the femoral neck.

Searching
MEDLARS was searched from 1975 to 1990, and reference lists of eligible studies were examined.

Study selection
Study designs of evaluations included in the review
Case series, population-based studies, non-randomised comparative studies and randomised controlled trials (RCTs).

Criteria for inclusion: (1) publication between 1975 and 1990; (2) results specific to fracture of the femoral neck; (3) outcomes specific to internal fixation, hemiarthroplasty or total hip replacement; (3) patients aged over 65 years; (4) more than 20 patients in each treatment group; and (5) for internal fixation, patients sustaining a displaced fracture of the femoral neck.

Criteria for exclusion: (1) review articles; (2) experimental or obsolete operative techniques or devices; (3) non-human studies; (4) studies reported in languages other than English; (5) patients with special conditions such as cancer, Parkinson's disease or arthritis; (6) abstracts or unpublished summaries; (7) unique criteria used to classify the outcomes; and (8) patients in different groups were not comparable.

Specific interventions included in the review
Internal fixation, hemiarthroplasty and total hip replacement.

Participants included in the review
Elderly patients aged over 65 years, with displaced fractures of the femoral neck; the proportion of women was greater than 72%.

Outcomes assessed in the review
The outcomes assessed were pain and mobility, mortality, complications and reoperation after the initial operation.

How were decisions on the relevance of primary studies made?
Titles and abstracts were assessed by two independent reviewers. All relevant articles were collected to assess their eligibility.

Assessment of study quality
The authors did not state that they assessed validity.

Data extraction
Data from eligible studies were extracted by two independent researchers onto standardised coding forms, and any disagreement were resolved by a third reviewer.

Methods of synthesis
How were the studies combined?
For studies that presented data comparing mobility before and after the fracture, the results were summarised
quantitatively and the remaining reports were reviewed narratively. Five comparative studies, judged to be of good quality, assessed mortality and reoperation within 2 years after the initial operation. The overall relative risk was estimated by pooling the odds ratio of these 5 studies, weighted by the inverse of its variance.

**How were differences between studies investigated?**
A sensitivity analysis was used to assess the impact of potential bias due to deficiencies in the study design.

**Results of the review**
Total number of studies: 106.

Total number of patients evaluated: 6,333 with internal fixation, 13,090 with hemiarthroplasty and 746 with total hip replacement.

Comparative studies: 9 studies compared internal fixation with arthroplasty, 2 compared hemiarthroplasty with total hip replacement, and 4 compared anterior operative approach to arthroplasty with the posterior approach. Only 1 RCT, which compared internal fixation with hemiarthroplasty, was included.

Mortality: the mortality rate following arthroplasty in the first few months was higher than that following internal fixation, but the difference was not statistically significant (P=0.22).

Reoperation: the rate of reoperation within 2 years ranged from 20 to 36% after internal fixation, and from 6 to 18% after hemiarthroplasty (relative risk 2.6, 95% confidence interval, CI: 1.4, 4.6). Most common reasons for reoperation were non-union (33%, 95% CI: 23, 37) and avascular necrosis (16%, 95% CI: 11, 19).

Patients reported less pain after arthroplasty than after internal fixation (15% versus 30%, P=0.05). There was no significant difference in mobility between treatment groups.

There was no significant difference between internal fixation and arthroplasty, with regard to the incidence of deep-vein thrombosis (p=0.14) and pulmonary embolism (p=0.23). There was more deep infections after arthroplasty than after internal fixation (p=0.001).

**Authors' conclusions**
The validity of the current study is subject to the limitations of the available data. Rigorous RCTs are rare in the literature.

The literature showed an elevated rate of mortality following arthroplasty in the first few months after the fracture, but the mortality rates were similar between the internal fixation and arthroplasty groups.

There appears to be a clear trend that arthroplasty is associated with fewer secondary major operations than internal fixation. Patients reported less pain after arthroplasty than after internal fixation.

Mobility was not significantly different between treatment groups. Some reports showed promising results after total hip replacement for displaced fractures of the femoral neck. However, RCTs are needed to establish the value of this treatment.

**CRD commentary**
The results and conclusions of this meta-analysis should be interpreted with great caution since the general quality of the primary studies included was poor: only 1 RCT was included. The review objectives and review conclusions were not presented clearly.

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