Choice of implant for internal fixation of femoral neck fractures: meta-analysis of 25 randomised trials including 4,925 patients

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Authors' objectives
To determine which type of implant (screws or pins) was the most effective for the internal fixation of femoral neck fractures.

Searching
The Cochrane Controlled Trials Register (Cochrane Library, 1997) was searched for randomised trials. In addition, the following journals were handsearched for the previous seven years: Journal of Bone and Joint Surgery (American and British versions), Acta Orthopaedica Scandinavica, Injury, Clinical Orthopaedics, Orthopaedic Clinics of North America, and the Journal of the Royal College of Surgeons of Edinburgh. The authors also searched MEDLINE. Studies published in any language were considered.

Study selection
Study designs of evaluations included in the review
Randomised trials comparing implants in femoral neck fractures were included.

Specific interventions included in the review
The types of implants were screws (Scand, Richards, ASIF, Mecron, Gouffon, Uppsala, Olmed, von Bahr, Ullevaal, Toronzo) and pins or nails (Nystrom, Hansson, Rydell, Thornton, and Hessell).

Participants included in the review
Patients with femoral neck fractures, who were aged from 18 to 100 years (the average ages ranged from 69 to 81 years), were included.

Outcomes assessed in the review
The complication rate from the implant was assessed. This was calculated as the number of complications occurring during the follow-up period, including patients who died but excluding those who were lost to follow-up.

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

Assessment of study quality
Validity was assessed using a 9-point assessment scale with one point assigned for each of the criterion satisfied. The criteria included: randomisation, blinding, inclusion criteria, treatment of drop-outs, comparability of groups at baseline, similarity of care, validity of outcomes, length of follow-up, attrition rate, and peer-review status. The authors do not state how the papers were assessed for validity, or how many of the authors performed the validity assessment.

Data extraction
The authors do not state how the data were extracted for the review, or how many of the authors performed the data extraction. The authors calculated the odds ratios (ORs) and the 95% confidence intervals (CIs) for each individual study.

Methods of synthesis
How were the studies combined?
For each study, the OR and 95% CIs were calculated. Trials in which comparable implants were used were grouped together and the results pooled.

How were differences between studies investigated?
The authors do not state how differences between the studies were investigated.

Results of the review
Twenty-five randomised controlled trials with 4,925 patients were identified.

The quality scores for the included randomised controlled trials ranged from 0 to 9 (mean 5.52).

The fracture-healing complication rate was lower for the screws than for the pins: there were 152 complications in 446 cases for the smooth pins, versus 122 complications in 488 cases for the screws. The results were statistically significant in favour of the screws (OR 1.63, 95% CI: 1.22, 2.18).

The results were not statistically significant when a hook was added to the pin implant.

There was no difference between 1 pin and 2 pins, or between a sliding hip screw and multiple screw fixation.

Authors' conclusions
The authors stated that most studies had insufficient patient numbers to permit a valid comparison between the types of implants. However, the limited evidence available indicated that screws were preferable to smooth pins, although the addition of a hook to the pin may negate these differences. There was insufficient evidence to say whether 1, 2 or more screws should be used, but the use of a supplementary side-plate appeared to be unnecessary.

CRD commentary
This systematic review did not reach the highest possible standards in a number of areas. The authors defined their research question and searched both electronically and by hand for studies. They did not limit themselves to English language publications so it is probable that all relevant published studies were found. However, unpublished data may have been missed.

The authors also conducted a quality review of the literature, but they have not used the results of the quality assessment in their analysis. The authors did not report on who performed the study selection, quality assessment or data extraction. The pooling methods were unclear and the tests for heterogeneity were not reported; these are important in this study since the studies report on several different combinations of treatments and controls in several different study centres.

The authors' conclusions should be viewed with caution.

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

Research: The authors state that further studies involving large numbers of patients (at least 400), treated at centres different than that which developed the implant, are required to determine the optimal type and number of screws.

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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.