Hydroxyapatite-coated femoral stems in primary total hip arthroplasty: a meta-analysis
Gandhi R, Davey J R, Mahomed N N

CRD summary
This generally well-conducted review concluded that hydroxyapatite porous coating of femoral stems was not associated with a significant difference in overall stem survival from aseptic loosening or postoperative Harris Hip Scores when compared with porous coating alone. This conclusion is likely to be reliable.

Authors' objectives
To compare the effectiveness of hydroxyapatite porous coating with porous coating alone for femoral stems in primary hip arthroplasty.

Searching
MEDLINE, EMBASE, Cochrane Database of Systematic Reviews, Cochrane Central Register of Controlled Trials and Clinicaltrials.gov were searched from inception to July 2007. Search terms were reported. The reference lists of relevant publications were screened. Conference proceedings of orthopaedic meetings were searched.

Study selection
Randomised controlled trials (RCTs) or comparative observational studies that compared hydroxyapatite porous coating with porous coating alone for femoral stems in patients undergoing primary uncemented total hip replacement were eligible for inclusion. The primary outcomes were stem survival from aseptic loosening and postoperative Harris Hip Scores.

Included studies used femoral implants from a number of manufacturers. The mean age ranged from 45.3 to 66.8 years. Most patients were male.

Two reviewers independently assessed studies for inclusion. The authors did not state how disagreements were resolved.

Assessment of study quality
The quality of RCTs was assessed using the Detsky scale, a 21-point scale evaluating concealment of randomisation, blinded outcome assessment, defining inclusion and exclusion criteria, completeness of follow-up, appropriateness of statistical analyses and justification of sample size. The quality of observational studies was assessed using an 11-point scale with the following criteria: well-defined eligibility criteria; quality of outcome measures; loss to follow-up; and statistical analysis. Kappa statistics were calculated to assess the agreement between reviewers.

Two reviewers independently performed the validity assessment; any disagreements were resolved by consensus.

Data extraction
The authors extracted the data on the point estimates for the postoperative stem survival rate and Harris Hip Scores. It appeared that the authors estimated relative risks (RRs) with 95% confidence intervals (CIs) for categorical variables and mean changes with 95% CIs for continuous variables.

One reviewer extracted the data from studies (no other details were provided).

Methods of synthesis
The studies were combined in meta-analyses using both random-effects and fixed-effects models. Pooled RRs for categorical outcomes, with 95% CIs, were calculated using the Mantel-Haenszel method. Weighted mean differences (WMDs) for continuous outcomes, with 95% CIs, were also estimated. Statistical heterogeneity was assessed. Publication bias was visualised using funnel plots.
Results of the review
Nine studies (n=1,764) were included in the meta-analysis: four RCTs and five comparative observational studies. The sample size ranged from 30 to 1,152. Included studies were judged as good quality using the measure of quality assessment. Reviewers achieved excellent agreement in assessing study quality. The mean follow-up duration of included studies was 6.5 years (ranging from two to 13 years). There were 12 stem failures in total.

When the studies were pooled, hydroxyapatite porous coating of femoral stems compared with porous coating alone was associated with a non-significant difference in overall stem survival from aseptic loosening (RR 1.0, 95% CI: 1.00, 1.01, p=0.95) and a non-significant difference in the postoperative Harris Hip Scores (WMD 0.07, 95% CI: -0.06, 0.21, p=0.29).

There was no evidence of statistically significant heterogeneity for the outcome measures. No evidence of publication bias was found according to the visual scanning of funnel plots. Surgical complications were also reported in the review.

Authors' conclusions
Compared with porous coating alone, hydroxyapatite porous coating of femoral stems was associated with a non-significant difference in overall stem survival from aseptic loosening and postoperative Harris Hip scores.

CRD commentary
The review question and inclusion criteria were clear. Several relevant databases were searched. Efforts were made to find published and unpublished studies to minimise the potential for publication bias. Publication bias was further evaluated and little evidence of it was found. The authors did not state whether language restrictions were applied in the search, which made it difficult to assess the risk of language bias. Steps were taken to minimise bias by having more than one reviewer undertake the study selection and validity assessment, but it was unclear whether the process of data extraction was carried out in duplicate. Relevant criteria were used to examine the study quality. Statistical heterogeneity was assessed and appropriate statistical methods were used to pool the results. The review was well-conducted in most respects and the conclusion is likely to be reliable.

Implications of the review for practice and research
Practice: The authors stated that there were no clinical benefits in the use of hydroxyapatite porous coating in primary hip arthroplasty in comparison with porous coating alone.

Research: The authors did not state any implications for research.

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