High-flexion implants in primary total knee arthroplasty: a meta-analysis
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CRD summary
This review found that range of motion is improved with high flexion-implant design compared to traditional implants but there is no clinical advantage over traditional designs. These conclusions are supported by the data presented but should be interpreted with caution due to the failure to address study quality in the analysis.

Authors' objectives
To determine whether a high-flexion knee implant improves patient outcomes or range of motion after primary knee arthroplasty compared to conventional knee implants.

Searching
MEDLINE, EMBASE, the Cochrane Database of Systematic Reviews and the Cochrane Central Register of Controlled Trials were searched from inception to 2007. Search terms were reported. Archives of orthopaedic meetings were searched for relevant abstracts and clinicaltrials.gov was searched. Both published and unpublished articles were eligible.

Study selection
Randomised controlled trials (RCTs) and observational studies that compared standard posterior-stabilised knee implants with high-flexion design knee implants in patients undergoing primary total knee replacement for osteoarthritis were eligible for inclusion. Studies had to report Knee Society Scores and preoperative plus postoperative range of motion.

Specific high-flexion design knee implants evaluated were Genesis II High-Flex PS (Smith and Nephew), NexGen LPS-Flex (Zimmer) and Superflex (Stryker). Standard knee implants were Genesis II PS (Smith and Nephew), NexGen LPS (Zimmer) and Scorpio PS (Stryker). Mean age ranged from 62.3 to 70.1 where reported and the proportion of men in the included studies ranged from 4 to 45%.

Abstracts were screened independently, the number of reviewers was unclear. The authors did not state how the full text papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
Studies were assessed for methodological quality using the 21-point quality assessment scale of Detsky et al (1992). Observational studies were graded on an 11 point scale that included the following: well defined eligibility criteria that would limit potential for confounding, quality of outcome measures and statistical analysis.

Two reviewers independently assessed study quality.

Data extraction
Outcome data were assessed after at least one year follow-up. For range of motion data, the difference between the mean postoperative range of motion and preoperative range of motion was calculated for each treatment group. Where standard errors for mean differences were not reported, these were calculated by converting the p-value to a z-score to estimate the standard error. Where necessary, authors were contacted for additional information.

The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.

Methods of synthesis
Weighted mean differences were estimated using random-effects models.
Publication bias was assessed using funnel plots.

**Results of the review**

Six studies (number of participants not reported) were included in the review, two studies were RCTs and the other studies were defined as comparison observational studies.

There was no difference in Knee Society Score ratings between patients who received high-flexion design knee implants and those who received standard posterior-stabilised knee implants (pooled mean difference was 0.144, 95% CI: -0.018 to 0.306, p=0.081). There was no evidence of heterogeneity (p=0.984).

Range of motion was improved in those who received high-flexion design knee implants compared to those who received standard posterior-stabilised knee implants (weighted mean difference was 0.404, 95% CI: 0.139, 0.669, p=0.003). There was significant heterogeneity between studies (p=0.026, I²=61%).

The only reported surgical complication was one lateral condyle fracture in each group which healed uneventfully.

There was no evidence of publication bias.

**Authors' conclusions**

Range of motion is improved with high flexion-implant design compared to traditional implants but there is no clinical advantage of these implants over traditional designs.

**CRD commentary**

The review addressed a focused question supported by clearly defined inclusion criteria. The literature search was adequate but specific attempts were not made to locate unpublished studies. Publication bias was addressed. Some details of the review process, such as the number of reviewers assessing full text articles for inclusion and extracting data, were poorly reported, so it is not possible to determine whether appropriate steps were taken to minimise bias and errors at all stages of the review. Study quality was assessed but very few details on the scales used were reported and the results were not presented or considered in the analysis. The methods used to synthesise studies appeared appropriate, although exact details on the methods used were not reported. It would have been helpful for stratified results on study design to have been reported, given that the review combines RCTs with observational studies, which are more prone to bias. This would have been particularly important for the analysis based on range of motion, where significant heterogeneity was found between studies but not investigated further. The number of participants in the included studies was not reported making it difficult to determine the power of the analysis. The authors’ conclusions are supported by the data presented but should be interpreted with caution due to the failure to address study quality in the analysis.

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

The authors did not state any implications for practice or research.

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