Safety of simultaneous bilateral total knee arthroplasty: a meta-analysis

Restrepo C, Parvizi J, Dietrich T, Einhorn T A

CRD summary
The authors concluded that simultaneous bilateral total knee replacement has a higher risk of cardiac complications, pulmonary complications and mortality in comparison with staged bilateral or unilateral total knee replacement. Some aspects of the review were well-conducted, but the strength of the authors' conclusion is undermined by the lack of a quality assessment and the differences between the studies.

Authors' objectives
To assess whether the prevalence of major complications and mortality differs between simultaneous bilateral total knee arthroplasties and staged bilateral or unilateral total knee arthroplasties.

Searching
MEDLINE, EMBASE, the Cochrane Library and databases accessed via Ovid were searched to September 2005. References of articles were also screened. While the paper stated that the search was not restricted by language, the abstract stated that only English-language abstracts were obtained. Other relevant studies were found through a search of the Science Citation Index (SciSearch), and a manual search of the tables of contents from 1998 to 2005 of four major orthopaedic journals and the bibliography reference sections of three major arthroplasty textbooks. The search terms were not reported.

Study selection
Study designs of evaluations included in the review
Randomised and non-randomised trials were eligible for inclusion.

Specific interventions included in the review
Studies eligible for inclusion compared simultaneous bilateral total knee arthroplasty with staged bilateral total knee arthroplasty. The included studies compared simultaneous bilateral total knee replacement with staged bilateral and unilateral total knee replacement.

Participants included in the review
Studies of patients who underwent simultaneous bilateral total knee arthroplasty, staged bilateral or unilateral total knee arthroplasty were eligible for inclusion.

Outcomes assessed in the review
Studies reporting the prevalence of mortality and major complications (such as deep venous thrombosis, pulmonary embolism and cardiac complications) were eligible for inclusion.

How were decisions on the relevance of primary studies made?
The authors stated that two reviewers, each blinded to the author, institution, journal and results of the study, selected relevant studies.

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

Data extraction
Two reviewers independently extracted the data, reviewing the articles on five occasions; any disagreements were resolved through consensus. Results data were extracted from each study. Where required, authors of published eligible reports were contacted for additional information.

Methods of synthesis
How were the studies combined?
The studies were combined through a random-effects meta-analysis using pooled odds ratios (ORs) and 95% confidence intervals (CIs).

How were differences between studies investigated?
The authors indicated that they assessed statistical heterogeneity but no details were reported. The authors stated that differences between the studies were examined with particular reference to the interventions, populations, outcomes and methods but no details of this examination were reported.

Results of the review
Eighteen studies (27,807 patients) were included in the review. The total number of knee arthroplasties was 44,684, of which 10,930 were unilateral total knee arthroplasties, 16,419 were simultaneous bilateral total knee arthroplasties, and 458 were staged bilateral total knee arthroplasties. The number of randomised controlled trials was not reported.

The authors stated that effect sizes differed across the studies.

The prevalence of mortality was significantly greater in the population that had undergone simultaneous total knee arthroplasty (OR 2.24, 95% CI: 1.21, 4.16; 8 studies).

The probability of a deep vein thrombosis occurring was lower after simultaneous total knee arthroplasty but not significantly lower (pooled OR 0.99, 95% CI: 0.47, 2.08; 6 studies).

The probability of a pulmonary embolism was higher in patients who had undergone simultaneous total knee arthroplasty than in patients who had undergone a unilateral total knee arthroplasty (overall pooled OR 1.82, 95% CI: 1.01, 3.26; 11 studies).

Almost all articles showed an increase in the prevalence of cardiac events in patients who had undergone simultaneous total knee arthroplasty (overall pooled OR 2.49, 95% CI: 1.31, 4.73; 8 studies).

Authors’ conclusions
Simultaneous bilateral total knee replacement has a higher risk of cardiac complications, pulmonary complications and mortality in comparison with staged bilateral or unilateral total knee replacement. The prevalence of deep vein thrombosis was found to be slightly lower following bilateral total knee replacement, compared with staged bilateral or unilateral total knee replacement, but not significantly so.

CRD commentary
The review question and inclusion criteria were clear. Primary studies were sought using a range of strategies and sources, though it is unclear whether only English language studies were included. Steps were taken to minimise reviewer bias and error in the study selection and data extraction processes. No details of the patients, types of arthroplasties or study design were reported. Study validity was not assessed, thus the results from these studies and any synthesis might not be reliable. Standard statistical methods were used to pool the data, but the results of tests for statistical heterogeneity were not reported. Pooling randomised and non-randomised studies may be considered inappropriate. Some aspects of the review were well-conducted, but the strength of the authors’ conclusion is undermined by the lack of a quality assessment and the differences between the studies.

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

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