Patient outcomes following tricompartmental total knee replacement: a meta-analysis

Callahan C M, Drake B G, Heck D A, Dittus R S

Authors' objectives
To provide estimates of patient outcomes following tricompartmental knee replacement, and to examine variation in outcomes due to patient and prosthesis characteristics.

Searching
MEDLARS was searched from 1966 to 1992 for English language citations concerning prosthetic knee surgery. Citations were excluded if they were assigned the MeSH terms 'amputation', 'animal', 'bone neoplasm' or 'case report'. Reference lists of retrieved review articles, published from 1986 to 1992, were examined for further publications.

Study selection
Study designs of evaluations included in the review
The studies had to have enrolled at least 10 patients; case reports were excluded.

Specific interventions included in the review
Tricompartmental knee replacement using 37 different prostheses of 4 differing types: posterior cruciate ligament sparing; anterior and posterior cruciate ligament sacrificing without posterior cruciate ligament substitution; anterior and posterior cruciate ligament sacrificing with posterior cruciate ligament substitution; anterior and posterior cruciate ligament sacrificing with posterior cruciate and collateral ligament substitution.

Participants included in the review
Patients undergoing initial knee replacement were included. The weighted mean age across all studies was 65 years and 71.17% of enrolled patients were women.

Outcomes assessed in the review
Pain, function and range of motion, as measured by a global knee-rating scale (GKRS), mortality, complications (overall and thromboembolism) and revisions.

How were decisions on the relevance of primary studies made?
A multistaged assessment was performed by two of the study investigators. It is not stated whether this assessment was carried out independently or not.

Assessment of study quality
The trials were assessed on their study design, outcome assessment, and detail of study population (i.e. was there sufficient information presented to know to whom the results applied and to understand the effects of confounding medical conditions. A third reviewer, blinded to each study's author, journal, date of publication, results and conclusions, was responsible for assessing the validity of the studies.

Data extraction
The data were extracted by one of the 3 research assistants or one of the 3 study investigators. There is no mention of this process being checked for accuracy. Data were extracted so as to enable 'patients' to be used as the unit of analysis, except for post-operative complications where 'knees' were used.

Methods of synthesis
How were the studies combined?
Tricompartmental prostheses were classified according to the manner in which the cruciate and collateral ligaments
were treated. Data were summarised across studies within prosthetic groups, and for the entire group of articles, by providing weighted means and ranges for each of the abstracted variables.

How were differences between studies investigated?
Analysis of variance was used to examine differences in means among the 4 prosthetic groups for the following outcome variables: post-operative mean patient GKRS, mean difference between pre- and post-operative GKRS, mean percentage of patients with good or excellent outcomes, mean percentage of knees with any complication, mean percentage of knees with any revision, and mean percentage of patients who died per year.

Results of the review
A total of 130 articles were retrieved. These reported a total of 154 patient cohorts (9,879 patients), of which 4 studies used a clinical trial design, 53 were prospective cohort studies, 77 were historical studies, and 20 studies were of undetermined design.

Improved function following tricompartmental knee replacement.
Across all studies, the typical patient experienced a 100% improvement in GKRS, mean value 44.0 (range: 41.9-46.1) and 89.3% of patients were reported to have good or excellent outcomes (mean follow-up of 4.1 years).

Pain relief.
Twenty-six studies reported patients' post-operative pain (n=1,938; mean follow-up 4.1 years). Of these studies, 75% of patients reported no post-operative pain, 20% reported mild pain, 3.7% reported moderate pain, and 1.3% reported severe post-operative pain.

Post-operative complications.
Approximately 18% of patients experienced a post-operative complication. None of the studies reported the rate of thromboembolism during the short-term, i.e. 30-day period.

The overall rate of revision was 3.8% (mean follow-up 4.1 years). Reasons for these revisions were: aseptic loosening (42%), mechanical failure (29%), infection (21%) and unspecified (8%). The distribution of these failures over time could not be determined.

The 30-day and 1-year mortality rates following tricompartmental total knee replacement could not be determined, nor was it possible to determine which deaths were directly due to the replacement.

Authors' conclusions
Tricompartmental knee replacement was a safe and effective procedure for the patients reported. The knee pathology and the type of prosthesis were significant predictors of outcomes. Limitations in the reporting style of these articles severely constrain the ability to explore variation in outcomes due to study, patient or prosthesis characteristics, and restrict their generalisability.

CRD commentary
A thorough review with a good discussion of the limitations of both the primary studies and the meta-analysis. However, there is insufficient information given on the individual studies and their validity. 'Good' or 'excellent outcomes' are not defined within the paper.

Funding
Agency for Health Care Policy and Research grant number 06432; National Institute on Aging, grant number K08 AG00538-01.
Bibliographic details

PubMedID
8158821

Other publications of related interest

Indexing Status
Subject indexing assigned by NLM

MeSH
Aged; Aged, 80 and over; Female; Follow-Up Studies; Humans; Knee Prosthesis /instrumentation /methods /statistics & numerical data; Male; Meta-Analysis as Topic; Middle Aged; Osteoarthritis /surgery; Prognosis; Treatment Outcome

AccessionNumber
11996008198

Date bibliographic record published
30/09/1996

Date abstract record published
30/09/1996

Record Status
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.